VISUAL IMPACT ASSESSMENT

REPORT FOR THE PROPOSED

BOLOBEDU POWERLINE PROJECT

ON THE FARM BOLOBEDU 1024 LT AND THE FARM
WORCESTER 200 LT
GREATER LETABA LOCAL MUNICIPALITY,
MOPANI DISTRICT MUNICIPALITY,
LIMPOPO PROVINCE

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Prepared for: Bolobedu Solar Park PV (Pty) Ltd
Johannesburg, South Africa

Prepared by: M. Cilliers (PrLArch.)
Contact: mithaworx@gmail.com
+27 82 824 5830
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This document was prepared by M. Cilliers (PrLArch.) Mitha is a landscape architect with ten years' experience. She has worked in South Africa and Angola and has extensive experience in the practice of landscape architecture and visual impact assessments.

The study approach in this report is based on the *Guideline for Involving Visual and Aesthetic Specialists* in EIA Processes by the Provincial Government of the Western Cape. The visual impact assessment methodology is based on a methodology developed by Derek Townshend from his experiences overseas, combined with GIS and graphic expertise gained locally. All intellectual property rights and copyright associated in the compilation of this report are reserved by the author. This document may not be reproduced, or used without prior written consent of the author. All due care and diligence are exercised in the preparation of this report. By receiving this document, the client indemnifies the authors from any liability for any actions, claims, demands, costs, losses, liabilities, damages and expenses arising from or in connection with the services rendered and by the use of the information contained in this document.

I, Mitha Cilliers, author of this Visual Impact specialist report, hereby declare that:

- I am an independent consultant appointed to provide specialist input on the proposed project.
- I have no business, financial, personal or other interest in the proposed activity or the application there of, other than fair remunerations for professional services rendered in connection with the proposed activity and application.

Mitha C. Cilliers
PrLArch

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EXECUTIVE SUMMARY

Renewable Solutions (Pty) Ltd proposes to develop the Bolubedu Powerline, a 143m long 132kV line, on the eastern section of the Farm Bolobedu 1024 LT and the western section of the Farm Worcester 200 LT, within the Greater Letaba local Municipality, Mopani District Municipality, Limpopo Province. This project will connect the proposed Bolobedu Powerline Project to the existing Bolubedu Substation to its immediate west. The proposed development site is located on communal land surrounded by rural villages south of the R81 Mooketsi – Giyani road and west of the existing Bolubedu Substation.

The study area's sense of place can be described as rural / pastoral. The feel is that of a placid and tranquil rural community life within the Savanna busveld landscape of the Limpopo Province. The topography of the study area is characterised by moderately undulating plains covered in perennial and non-perennial waterways and dams of various sizes. More prominent topographical features include a cluster of koppies, approximately 7km north-northwest from the site and in the southwest, approximately 4km from the site, the end section of the Malematsa range.

The medium-sized vegetation and moderately undulating plains with the mountains in the far background results in lines being mostly in the horizontal plane. The vegetation provides the colour scheme with an olive green and dark grey-brown colour range. During drought or winter conditions, the dark greys from bare trunks of shrubs / trees become more dominating together with the ochre colours of the soil being exposed. Sandy soils and overgrazing also expose the bare soil, bringing out the colour. Large shrubs / small trees as well as clusters of bigger trees create a mottled texture of olive greens on an ochre base of the exposed soil. Shrubs and trees are rounded and irregular. The density and height (approximately 3 - 5m) of the vegetation results in a high visual absorption capacity within the horizontal field. Structures below the vegetation line can easily be screened.

Street level and residential lighting would create a soft glow around the various communities at night time. During overcast nights these 'pockets' of lights would reflect against the clouds and be visible over a greater distance. The rural communities however do not exert an intensely obtrusive amount of light pollution within a study area.

Overall the proposed powerline project has a ***low contrast* with its receiving environment**. As described in section 3.7 **'Relevance'** above, it can be concluded that the impacts on VSRs are mostly ***insubstantial* with a few *moderate* incidences**. The one incidence where an '*extreme'* impact is anticipated would not be permanent in nature. This incidence occurs where travellers walking along Ga-Ramaroka footpaths are elevated above the vegetation line and / or breaks in the vegetation line allows for temporary views. These views would however include the existing substation and power line. It is therefore highly likely that the structures from the proposal would merge with these existing structures and become less noticeable. As stated, these views would also be temporary as the travellers pass by specific observation points along the routes. It might also be the case that travellers are not focussed on their environment and may not notice the presence of the proposal. Therefore the *insubstantial* and *moderate* ratings are accurate reflections of the overall anticipated impact.

Moderate impacts are anticipated for:

- some residents from the villages of Ga-Ramaroka and Mohlabaneng

- some travellers on connecting road between Mohlabeng and Ga-Famane
- some travellers on Ga-Ramaroka connecting roads
- some areas of Subsistence farming

When applying *extent*, *duration* and *probability* criteria as found in the significance impact assessment methodology based on DEAT's Guideline Document: EIA Regulations (1998) (Appendix B) the following conclusions can be made. The ***significance*** of the impact from the project would be:

- ***negative, medium*** for Residential and Open Space / Recreational VSRs during both construction and operational phases
- ***negative, medium – high*** for Residential and Open Space / Recreational VSRs during both construction and operational phases

The high result of the rating is mostly due to the duration of the project life.

No night time impacts are anticipated from this project.

Mitigation measures would mostly be effective during construction and decommissioning phases when dust clouds would arise from the activities and clearing of vegetation and structures would expose bare soil.

The photo-simulations seen in **Figures 10a** and **10b** in the main report illustrate the proposed project set within the receiving landscape. Photo-simulation 1 (representing VSRs R2 and T2) shows the proposal when set behind the existing substation forming part of the visual clutter from the existing substation. Photo-simulation 2 (representing VSR R1) puts the proposal in the context with the existing substation as background.

Overall the proposed powerline project has a ***low contrast*** **with its receiving environment**. As described in section 3.7 **'Relevance'** above, it can be concluded that the impacts on VSRs are mostly ***insubstantial*** **with a few *moderate* incidences**. The one incidence where an '*extreme'* impact is anticipated would not be permanent in nature. This incidence occurs where travellers walking along Ga-Ramaroka footpaths are elevated above the vegetation line and / or breaks in the vegetation line allows for temporary views. These views would however include the existing substation and power line. It is therefore highly likely that the structures from the proposal would merge with these existing structures and become less noticeable. As stated, these views would also be temporary as the travellers pass by specific observation points along the routes. It might also be the case that travellers are not focussed on their environment and may not notice the presence of the proposal. Therefore the *insubstantial* and *moderate* ratings are accurate reflections of the overall anticipated impact.

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some areas of Subsistence farming

The final *EIA significance* of the impact from the project was rated as ***negative, medium*** for Residential and Open Space / Recreational VSRs during both construction and operational phases and as ***negative, medium***

– ***high*** for Travelling as well as Business / Occupational / Industrial VSRs during both construction and operational phases. No night time impacts are anticipated from this project. Mitigation measures would mostly be effective during construction and decommissioning phases when dust clouds would arise from the activities and clearing of vegetation and structures would expose bare soil.

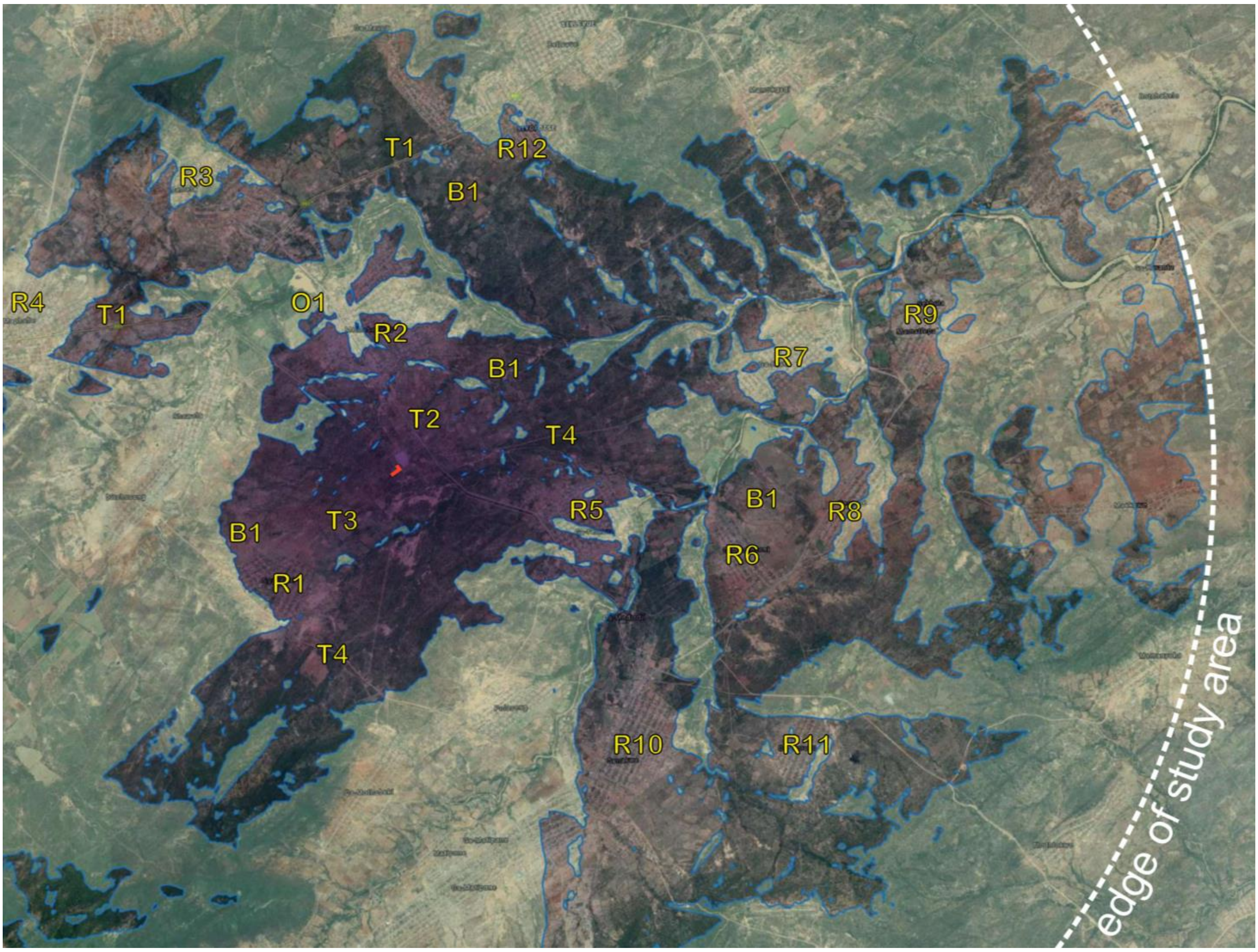

Figure 9 (extract – not to scale): Relevance map

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ABBREVIATIONS & ACRONYMS

BLM / NEPA	Bureau of Land Management / National Environmental Policy Act (United States of America)
CALP	Collaborative for Advanced Landscape Planning (Canada)
CL	Camera Locations (see Appendix C)
DEA	Dept. of Environmental Affairs and Development Planning (RSA)
DEM / DTM	Digital Elevation Model / Digital Terrain Model
DoC	Degree of Contrast
DoE	Department of Energy
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GIS	Geographic Information System
IEP	National Integrated Energy Plan
KOP	Key Observation Point
m.a.m.s.l	meters above mean sea level
SoP	Areas with a unique Sense of Place
VIA	Visual Impact Assessment
VC	View Corridor
ZVI	Zone of Visual Influence

Degree of Contrast (DoC)	This contrast rating is an evaluation of how different the proposal is to the receiving environment. It looks at line, colour, materials, texture, form, transparency and existing visual clutter. The *Degree of Contrast* will influence the Exposure curve/gradient or visual intrusion on plan. The *Degree of Contrast* should be read as part of the *Visual Absorption Capacity*.
Exposure (curve / gradient)	The exposure curve (gradient) illustrates the size of impacts of a proposal on scenic quality with relation to the observer's distance. It is suitably adjusted for every project and is affected by scale, contrast, visual clutter, sharp light or glare, or movement.
Key Observation Point (KOP)	These points refer to typical and/or critical places where *Visually Sensitive Receptors* views are affected. KOPs can either be a single point, a linear view along a transport route, trail, or river corridor, or an area.
Landscape Character	A combined impression of the landscape qualities, generally providing a *sense of place* that could often be more than the sum of its parts.
Landscape Quality	In the VIA context, Landscape Quality refers to elements in the landscape (hills, valleys, woods, trees, water bodies, buildings and roads) that contribute to the visual context, and play a role in the sensitivity of receivers (see Sensitivity maps).
Magnitude (of Visual Impact)	The *Magnitude of Visual Impact* is a measure of visual intrusion that an observer may experience. It is based primarily on the *gradient* and *exposure curve* but on plan may, if relevant, be further influenced by other factors such as *Visual Wholeness*.
Project / Project site / site / proposal	The Bolobedu Powerline Project will be located on the eastern section of the Farm Bolobedu 1024LT associated with the Bolubedu Solar Park Project as well as on a western portion of the Farm Worcester 200 LT.
Relevance (of Visual Impact)	In this VIA context, *Relevance* refers to the synthesis of *Sensitivity* and *Magnitude*. The result indicates the importance of impacts, and subsequently where mitigation measures might be most effectively applied. *Significance* is often the industry term used for this value but *Relevance* is used here instead so as not to be confused with the *EIA Significance* term.
Recessive Colours	Recessive colours refers to colours and tones that do not catch the attention of the eye and do not punctuate the landscape. One tends to overlook recessive colours more easily. This principle is illustrated when driving through the suburbs. In cases where gardens have black, grey, brown or olive coloured fences or gates, the viewer naturally looks through these elements at the garden behind. Conversely, if these were white, cream, yellow or such, the viewer is forced to look at that element and struggles to look through it.

Sensitivity	This describes how sensitive a receptor is to changes in their environment. In this VIA context the *Resultant Sensitivity* is a blend of the *Landscape Character,* the *VSR Sensitivity,* the sensitivity created by the *Landscape Quality,* and a *Calibration factor* that incorporates attitudes and plans for the area.
Sense of Place	A description of a specific place or area that depicts the experience of the viewer.
Significance (EIA)	This is a final indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. It is a term used for integration into the final EIA methodology of South Africa.
Study Area	An area with a radius of approximately 20km around the proposed project.
Visual Absorption Capacity	The ability of an environment to accept the proposed changes without transformation in its visual character and quality.
Viewshed Analysis	Areas where a particular object is visible from within the study area.
Visual characteristics	The forms, shapes, colours and textures that makes up the pallet of the receiving environment or of the project components.
Visual Resource	the receiving environment into which the components of the proposed project will be introduced.
Visually Sensitive Receivers (*VSRs*)	Points (individuals, groups or communities), linear (roads) or areas (farms) that would be subject / sensitive to the visual influence of a particular project. The sensitivity of VSRs is based on the activity of individuals when viewing the proposal and what their surroundings are.
Wholeness (Visual)	*Visual Wholeness* refers to the amount of the proposed project components that is visible. It ranges from seeing all of the site (complete) to seeing very little of it (a snippet). More specifically, it refers to the proportion visible against the maximum proportion ever visible. After all, one can never see all sides of a proposal. A value of 100% (or red on the wholeness maps) therefore shows areas where the maximum proportion can be seen. *Visual Proportion*, *Visual Abundance* or *Visual Frequency* are industry synonyms for this term.
Zone of Visual Influence (*ZVI*)	The area from which the proposed project would be potentially be visible within a 20km radius around the proposed project components. This is derived from the *viewshed analysis* and is synonymous with that term, as well as the industry term of *visual catchment* area.

1 INTRODUCTION

1.1 Background & Locality

South Africa experiences some of the highest levels of solar radiation in the world. The daily solar radiation varies between 4.5 and 6.5 kilowatt hours per square meter. Solar energy, as a renewable energy resource, thus has an enormous potential to provide in the continued energy security of the country's future energy needs. However, to utilise this resource, considerable investments in infrastructure is required. The Department of Energy (DoE) has undertaken the objective of ensuring continued energy security in an affordable and sustainable way while minimising negative environmental impacts. A National Integrated Energy Plan (IEP) was developed and reviewed and published on an annual basis. The IPP Procurement Programme to procure renewable energy generation from the private sector was initiated by the DoE and has to date procured over 4000 MW of renewable energy.

Rapid progression in community development within the Greater Letaba Local Municipality, Limpopo Province, has raised the issue of sustainable development and also the use of renewable energy technologies to meet projected future electrical power needs. Renewable Solutions (Pty) Ltd proposes to develop the Bolubedu Powerline, a 143m long 132kV line, on the eastern section of the Farm Bolobedu 1024 LT and the western section of the Farm Worcester 200 LT, within the Greater Letaba local Municipality, Mopani District Municipality, Limpopo Province. This project will connect the proposed Bolobedu Powerline Project to the existing Bolubedu Substation to its immediate west. The proposed development site is located on communal land surrounded by rural villages south of the R81 Mooketsi – Giyani road and west of the existing Bolubedu Substation. The nearest big towns area Gyiani (approximately 49km to the northeast), Modjadjiskloof (approximately 58km to the southwest) and Tzaneen (approximately 75km to the southwest). Refer to **Figure 1** for the locality map. Favourable radiation conditions; appropriate morphology (flat terrain); compatibility with the ecosystem and the surrounding landscape as well as low requirement for municipal services and the compliance with national and provincial energy policies and strategies earmarked the site as ideal for the proposed development.

1.2 Project Description & Layout

Figure 2 depicts the layout of the proposed Bolubedu Solar Park as well as proposed Bolobedu 132kV Powerline. The power line will be located on an area between the proposed Bolubedu Solar Park and the existing Bolobedu Substation adjacent to the east and has a proposed length of 143m. The project will connect proposed Bolubedu Solar Park to the Eskom grid via the existing Bolobedu Substation. Project components will consist of electrical transmission poles. At this stage it is not certain whether the structures would be monopoles or lattice structures. The height of the current options ranges from 18m to 25m. For the purpose of this report, a 'worst case scenario' height of 25m will be used.

1.3 Visual Characteristics of the Project Components

[form or shape, colour, line, texture]

As stated above, a final decision has not yet been made on the type of pylons at this point in time. The options for 132kV pylons are monopoles or lattice type structures. Normally monopoles are shorter than lattice type pylons. Monopoles however are solid sturdy structures generally light in colour. Lattice type structures have a finer, texturised greyish appearance. This adds a character of 'transparency' to its appearance allowing it to faster fade away with distance.

In terms of night time impact, it is assumed that, as with most powerlines, the project will not be light up. It is also assumed that no maintenance activities would take place at night time.

1.4 Assumptions & Limitations

- The digital terrain model and analysis is based on a 20m contours and spot heights available from the Chief Director of Surveys and Mapping. It does not take vegetation cover into consideration.
- Topographical sheets (2230 AC AD BC CA CB DA) used from the Chief Director of Surveys and Mapping were dated 1980, 1983, 1997, 2002, 2002 and 2002. Vector data used, corresponding to these toposheets, and also from the Chief Director of Surveys and Mapping, was more up to date at 2006.
- The study was undertaken during the planning phase of the project using a layout file named 'Bolobedu PLine BA - Loc Map 2' received on 25th of February 2020.
- A final decision between the use of monopoles or lattice type structures has not yet been made on the type of pylons at this point in time. The height of the current options ranges from 18m to 25m. For the purpose of this report, a 'worst case scenario' height of 25m will be used.
- In terms of lighting, it is assumed both construction and decommissioning activities would be restricted to daylight hours; this project would not use of night lighting during its operational phase; and that maintenance activities would only take place at daytime.
- It is assumed that construction would last approximately 6 to 8 months, and the project lifespan approximately 30 years.
- The field work was done during the summer, in March and April 2018, and does not reflect the complete Landscape Character of the area as experienced through all seasons nor the latest conditions and landscape character.

1.5 Relevant Standards

There is an ethical obligation to be as representative and accurate as possible in this assessment and in the production of photo-simulations. Visualizations can easily be manipulated and misleading in a variety of ways, which must be guarded against. In terms of adhering to standards, this report follows the *Proposed Interim Code of Ethics for Landscape Visualisation*, developed by CALP in Canada (Sheppard, S.R.J., 2005). This document therefore follows that landscape visualizations are responsible for showing:

- a full understanding of changes,
- providing an honest and neutral representation,
- avoiding bias, and
- demonstrating legitimacy in the visualization process.

Presenters should also adhere to the following, and demonstrate their 1) Access to information, 2) Accuracy, 3) Legitimacy, 4) Representativeness, 5) Visual Clarity, and 6) Interest. More specifically, this code of ethical conduct (Sheppard, S.R.J., 2005) states that the presenter should:

- Demonstrate an appropriate level of qualification and experience;
- Use visualization tools and media that are appropriate to the purpose;
- Choose the appropriate level of realism;
- Identify, collect and document supporting visual data available for, or used in, the visualization process;
- Conduct an on-site visual analysis to determine important issues and views;
- Seek community input on viewpoints and landscape issues to address in the visualizations;
- Provide the viewer with a reasonable choice of viewpoints, view directions, view angles, viewing conditions and timeframes, appropriate to the area being visualized;
- Estimate and disclose the expected degree of uncertainty, indicating areas and possible visual consequences of the uncertainties;
- Use more than one appropriate presentation mode and means of access for the affected public;
- Present important non-visual information at the same time as the visual presentation, using a neutral delivery;
- Avoid the use, or the appearance of 'sales techniques' or special effects;
- Avoid seeking a particular response from the audience;
- Provide information describing how the visualization process was conducted and how key decisions were taken.

The 2011 advice note 01/11 of the UK's Landscape Institute recommends that for landscape and visual impact assessment purposes a photomontage should:

- be reproduced at a size and level of geometric accuracy to permit impact assessment, which must include inspection at the location where the photograph was taken;
- be based on a replicable, transparent and structured process, so that the accuracy of the representation can be verified, and trust established;
- use techniques, with appropriate explanation, that in the opinion of the landscape professional best represent the scheme under consideration and its proposed environment accurately as possible;
- be easily understood, and usable by members of the public and those with a non-technical background;
- be based on a good quality photographic image taken in representative weather conditions.

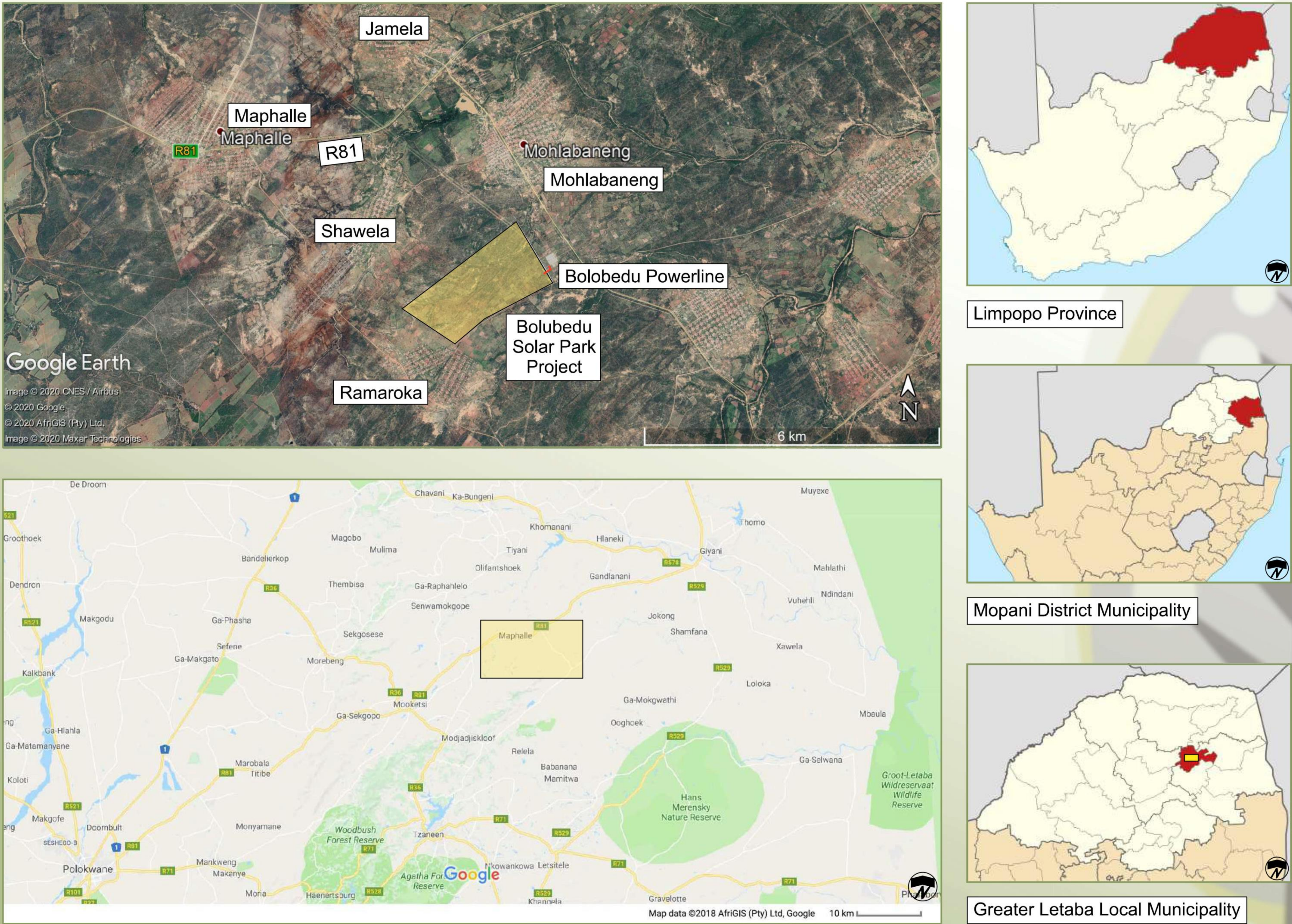
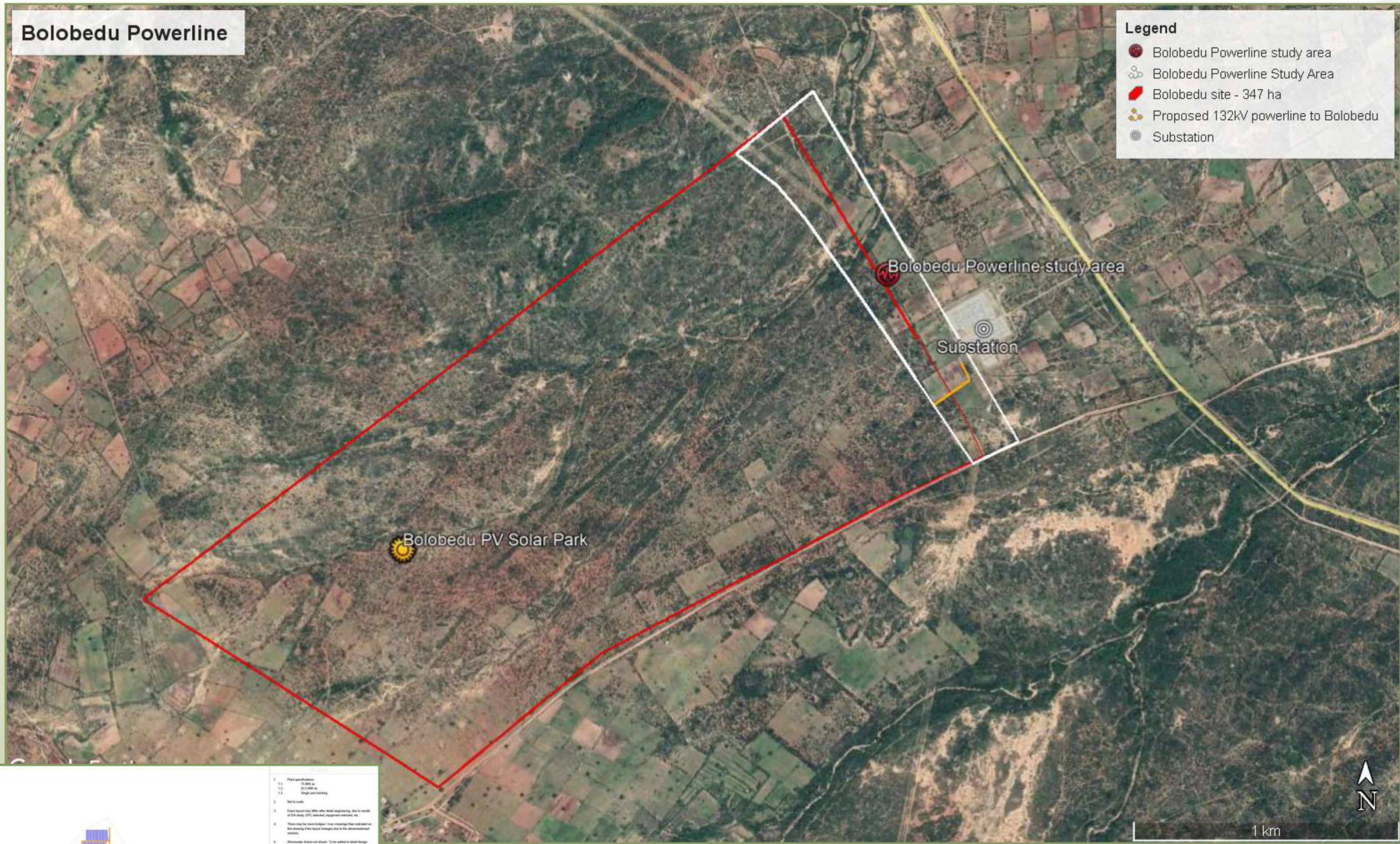


Figure 1: Project Location



Bolobedu Powerline Layout

Bolobedu Solar Park Layout

Examples of pylon types

https://beeteeprojects.co.za/with-the-variety-of-power-lines-are-there-a-variety-of-bird-guards/

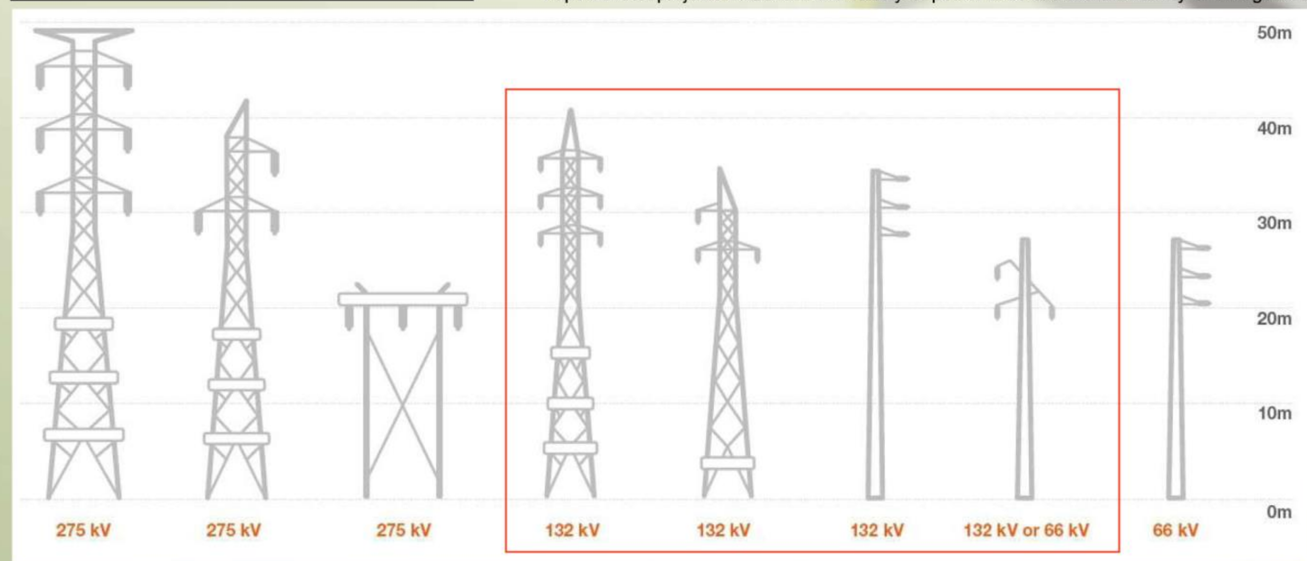


Figure 2: Layout & Project Components

2 RECEIVING ENVIRONMENT / VISUAL RESOURCE

Photos relevant to this section can be seen in **Figures 3a to 3c**. **Figure 3d** indicates the various veld types within the study area, while **Figure 3e** shows *Landcover* derived from satellite remote sensing. Refer to **Appendix C** for all camera locations (CL).

2.1 Introduction

[approach]

The sensitivity of users in an area to change is affected by the following;

1. their activities,

their immediate surroundings,

their distant surroundings, and

their general perceptions and identity of the area, i.e. form its *sense of place* or *character*.

It is therefore necessary to fully describe these *sensitivity factors* below as the receiving environment onto which any proposal intrudes. As all VIAs are spatial, quantifying and mapping this sensitivity (even though qualitative in nature) is desirable and useful for further analysis and assessment. This is covered in the following chapters and methodology.

The proposed powerline project is fairly small in relation to its associated solar park project. However, the receiving environments will be very similar and therefore the description of the receiving environment for the powerline project is very similar to that of the solar park project.

2.2 Biophysical

[topography, landforms, geology, soils, climate and vegetation]

The topography of the study area is characterised by moderately undulating plains covered in perennial and non-perennial waterways and dams of various sizes. More prominent topographical features include a cluster of koppies, approximately 7km north-northwest from the site and in the southwest, approximately 4km from the site, the end section of the Malematsa range. The highest point in the study area is near Ravenshill (1300m above sea level) on the Malematsa area range, to the southwest. The lowest point (488m above sea level) is along the Madikoma River to the southeast. The average height for the whole study area is at 703.8m above sea level. The centre of the proposed site area is around 600m above sea level.

The underlying geology includes the grey rocks of the biotite Gneiss and Migmatite of the Goudplaats Gneiss in the northern section of the study area and the leucocratic Biotite Granite of the Vaalian age in the south and east. These can be noted where cliffs in the mountains are not covered by vegetation. On the plains the geology is mostly covered by the soil layers and vegetation. The associated soils are by red-yellow apedal, freely drained with a red high base status. Soils area mostly deep sandy to sandy-loam on the plains while black, alluvial soils are associated with the drainage lines. These are visible where vegetation has been cleared around the settlements and to for agricultural purposes.

In terms of climate, we refer to Giyani, the closest town. Giyani has a mean annual precipitation of approximately 421mm. This precipitation mainly occurs during midsummer. Average midday temperatures for Giyani range from 23.9°C in June to 31°C in January. The region is the coldest during July with minimum temperatures as low as 8°C during the night.

Vegetation on site as well as within the study area include a grassy ground layer and a distinct upper layer of woody plants (trees and shrubs) typical of the Savanna biome. The vegetation is classified Mucina & Rutherford as the Granite Lowveld Bushveld. The vegetation pallet consists typically of tall shrubland with few trees to medium dense low woodland on the deep sandy uplands. Dense thicket to open savanna dominate the bottomlands. Dense fringes of *Terminalia sericea* with *Eragrostis gummiflua* occurs in seeplines of the study area. The average vegetation height of the tree layer is approximately 5m with some higher samples in between.

2.3 Land Use

[residential, tourism, agriculture, roads, transport, infrastructure, industrial, mining]

The residential element within the study area mostly comprise of rural villages including Ditshoseng, Ga-Femane, GaRamaroka, Lebaka, Mohlabaneng and Xawela.

The study area falls within an area that is a well-known for a wide variety of tourist attractions ranging from hunting and adventure activities (such as canopy tours, crocodile feeding, flying, quad biking, 4x4-ing) to hiking and recreational crafts classes. The nearest of these tourist attractions is the Modjadji Nature Reserve (approximately 13km south of the project site) associated with the legendary Rain Queen. Another attraction is the Sunland Baobab (approximately 22km southwest of the project site). This was the largest of its specimens until most of the tree died in 2016 and 2017. The tree is estimated to be over 1000 years old. It was well-known for the bar and cellar located inside of the hollow interior. The touristic Route R71 will take you from Polokwane to the Kruger Park and the African East coast.

The larger region's economy depends largely on the farming of fruits, vegetables, animals and timber. Fruit farming includes mangoes, bananas, oranges, litchis, tomatoes and avocados. The area produces approximately 40% of South Africa's avocados, 40% of South Africa's mangoes, 20% of South Africa's bananas and 90% of South Africa's tomatoes. Timber farming includes pine and eucalyptus. The area around the project site mostly practice subsistence farming.

Roads within the study area include the tarred R81, running east – west approximately 4km north of the site. A secondary road, running north – south approximately 700m east of the site, connects the R81 with another main east – west running tarred road, approximately 5.5km from the site. Other roads are all local dirt roads in various drivable conditions. Other infrastructure includes the Bolobedu Substation and associated power lines. Light industries are associated with the larger towns, like Tzaneen. Furthermore iron and related minerals are mined within the larger region. For example the Tivani Project, an open cast mining project by Ferrox Holdings Ltd., produces ilmenite (TiO_2), iron, vanadium (V_2O) and phosphate.

2.4 Background / Sense of Place / Landscape Character

[history, sense of place / landscape character, feel, colours, lines, textures, forms, visual absorption capacity, night character]

The Balobedu is a tribe of the Northern Sotho people. Their culture originated in the early 1600's in, the nowadays, Zimbabwe from where the king's daughter, Dzugundini, fled after being impregnated by her brother. Original tradition has it that her father gave her rainmaking abilities to defend herself against her enemies. The Balobedu settled in the mountainous area that is today known as, Modjadjikloof. Over the next two centuries the Balobedu had 6 male rulers. The last male ruler, Mokoto, was indicated as the next ruler during the traditional hut-opening ceremony, however he was not unanimously accepted as the sixth king. Mokoto's own sons later threatened to kill each other, so he secretly trained his daughter, Modjadji, in the rainmaking rituals. After his death in 1800, it was Modjadji who opened the hut during the ceremony and was pointed out as the successive ruler and the first Rain Queen. From there on the Balobedu was reign matrilineal by mystical rain queens. The Rain Queen special powers are believed to include the ability to control the clouds and rainfall and are believed to be reflected in the lush garden which surrounds her royal '*kraal'*. Surrounded by a relatively dry landscape, the royal '*kraal*' is situated within a mist belt hosting the only pure cycad tree ('*Encephalartos transvenosus*') forest in Southern Africa. The first Rain Queen reigned for 54 years. The last Rain Queen reigned for only two years before her death of an undisclosed illness in 2005. Her daughter, at that time only a couple of months old, was said to be inaugurated in 2016. She will then become the youngest Rain Queen at the age of 11. The rain queen still is prominent figure and the focal point and strength of their Kingdom. Fear of her powers has always restrained both internal opposition and any attack from outside. Many communities respect her position and attempt to avoid conflict in deference thereto. Historically even Shaka Zulu of Zululand sent his top representatives to ask for her blessings. Later Nelson Mandela maintained cordial relations with the fifth Rain Queen, Mokope Modjadji.

According to Lynch (1992), sense of place, "is the extent to which a person can recognize or recall a place as being distinct from other places – as having a vivid, unique, or at least particular, character of its own". Sense of place is therefore the unique value allocated to a place by the experience of the user. It is the identity derived from the emotional, aesthetic and visual response to the whole environment, in context. As such all landscape components; mountains, koppies, farm dams, rivers and streams, residences, as well as man-made infrastructural elements such as roads, power and telecommunication infrastructure, contribute to the sense of place of an area. The sense of place of this study area can be described as rural / pastoral. The feel is that of a placid and tranquil rural community life.

The medium-sized vegetation and moderately undulating plains with the mountains in the far background results in lines being mostly in the horizontal plane. The vegetation provides the colour scheme with an olive green and dark grey-brown colour range. During drought or winter conditions, the dark greys from bare trunks of shrubs / trees become more dominating together with the ochre colours of the soil being exposed. Sandy soils and overgrazing also expose the bare soil, bringing out the colour. Large shrubs / small trees as well as clusters of bigger trees create a mottled texture of olive greens on an ochre base of the exposed soil. Shrubs and trees are rounded and irregular. The density and height (approximately 3 - 5m) of the vegetation results in a high visual absorption capacity within the horizontal field. Structures below the vegetation line can easily be screened.

Street level and residential lighting create a soft glow around the various communities at night time. During overcast nights these 'pockets' of lights would reflect against the clouds and be visible over a greater distance. The rural communities however do not exert an intensely obtrusive amount of light pollution within a study area.

2.5 Classification of Visual Resource

[USA's BLM (NEPA) classification system, Sensitivity mapping]

The Bureau of Land Management of the United States of America has defined classes into which the value of a visual resource can be classified. As there is already human interference within the study area (towns and residential areas, farmsteads and residences, roads, power lines and mining), it can no longer be regarded as pristine. According to BLM system, this area would be classified as a *Class III* value landscape. A Class III value represents a *moderate* value. The objective for a Class III landscape is to:

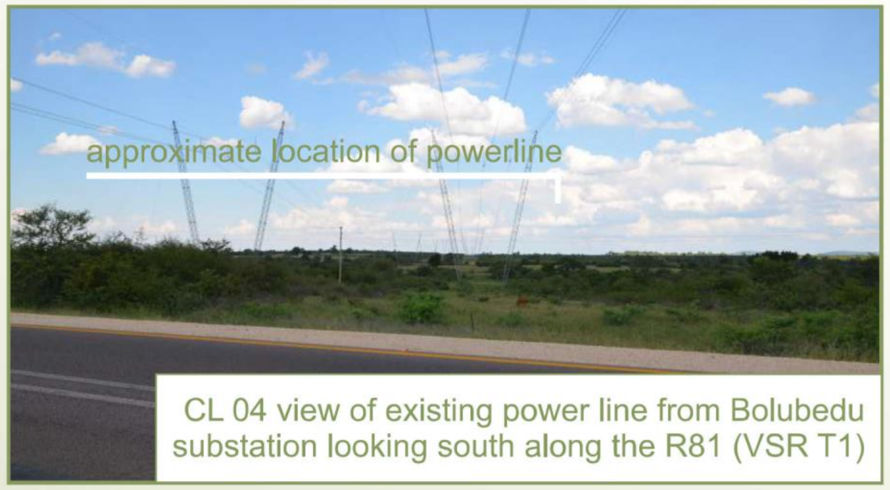
- partially retain the existing character of the landscape, where the level of change to the characteristic landscape should be moderate;
- management activities may attract attention, but should not dominate the view of the casual observer; and
- changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Although the BLM system provides a good starting point, a GIS-mapped sensitivity system (that then blends with the impacts) produces more detailed and spatially relevant results, predicting exactly who is affected, where they are, by how much, and where mitigation measures might be most effective.

The GIS-mapped sensitivity system used in this report was created from the blending of 4 things:

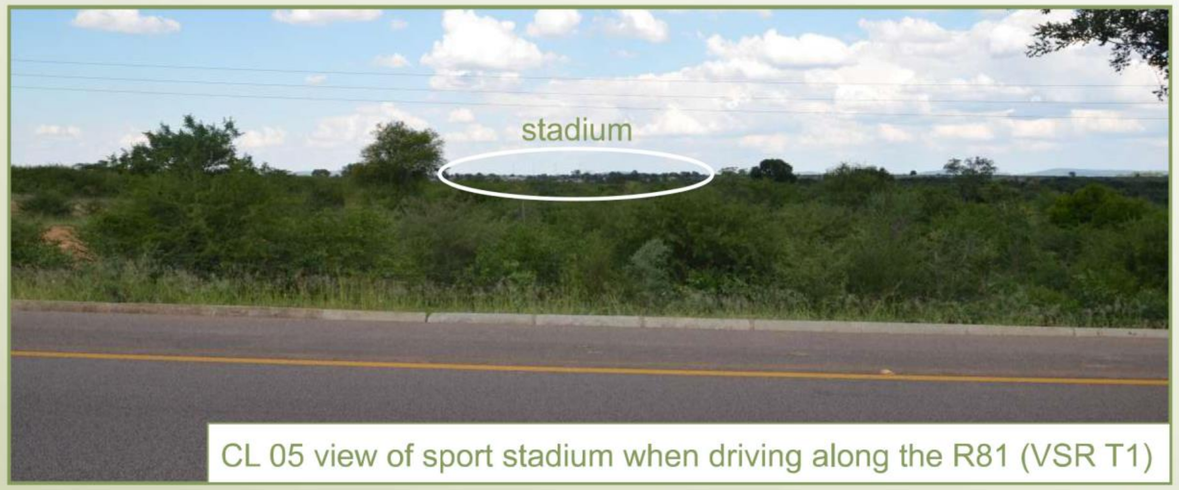
- a starting **landscape character** value, covering the entire study area, based very loosely on the BLM system, though with our biomes taken into consideration;
- a more **local landscape character** map, averaged or blurred to 300m, based on the satellite-derived *Landcover* maps produced by GeoTerra for the DEA;
- a detailed **landscape quality** map, using extracted toposheet data from the Chief Director of Surveys and Mapping. This would present things such as form (ruggedness), openness, water (the sea, rivers, lakes, marshes, etc), vegetation & wild Life, land-use, seasonal differences (if relevant), cultural modifications, roads and footpaths, and industrial infrastructure;
- a detailed **VSR** map, also using extracted toposheet data from the Chief Director of Surveys and Mapping. This maps people's activities and identifies where significant groups of people are that might be affected. It would present activities such residing at home, sports activities, recreation, working, etc.; and

Of course, landscape qualities and their subsequent sensitivities are subjective and not always reliable (Palmer, 2000). However, some level of consistency can still be achieved using common sense and supporting literature. For example: people naturally like water bodies and topographic variation (rolling hills etc.), and generally dislike incongruous industrial elements. Palmer's 2000 review paper shows that denotative attributes (literal elements) such naturalism and development (i.e. disturbance to nature) show a high degree of reliability, versus more connotative attributes (i.e. metaphorical / symbolic), vary greatly and are more subjective. This is also supported by Hull & Bishop's 1988 paper showing that the scenic impact curve is indeed related to context, and that the greatest, and therefore likely the most reliable, impacts occur in the most scenic landscapes (rural in the case of this study).



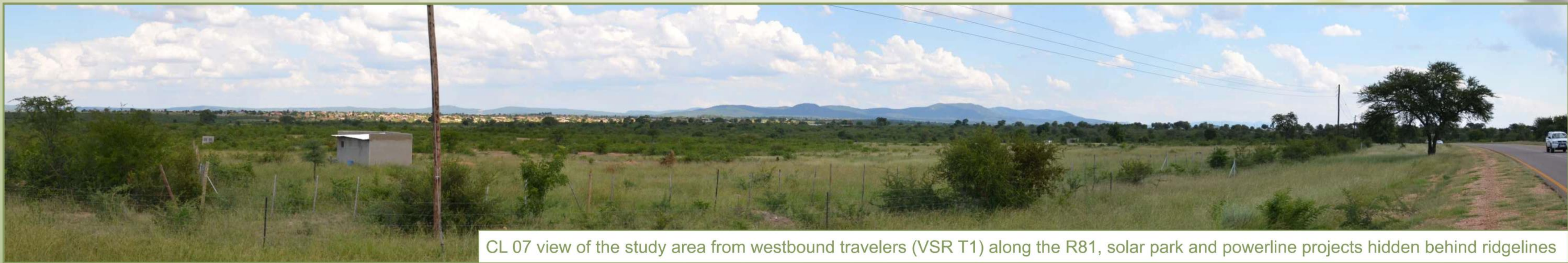
CL 04 view of existing power line from Bolubedu substation looking south along the R81 (VSR T1)

CL 02 view of project landscape as seen by T1 VSRs looking southeast along the R81



CL 05 view of sport stadium when driving along the R81 (VSR T1)

CL 08 view of the stadium driving southbound along the road between Mhlabaneng and Mokwakwaila (VSR T2)

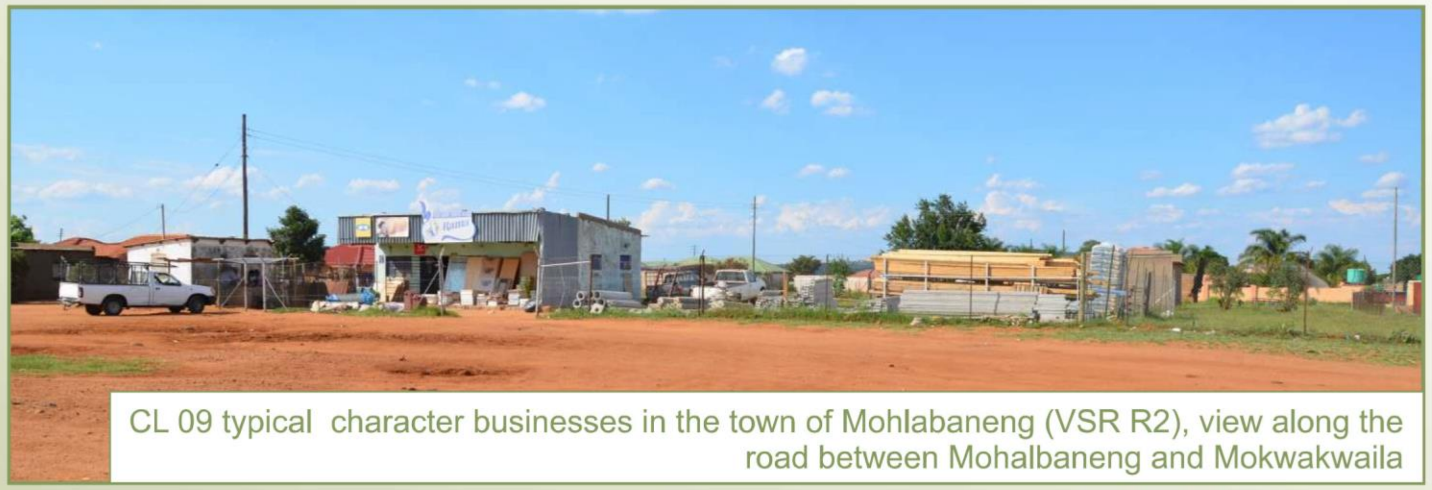

CL 07 view of the study area from westbound travelers (VSR T1) along the R81, solar park and powerline projects hidden behind ridgelines

CL 11 view of the proposed powerline site when driving southbound along the road between Mohalbageng and Mokwakwaila

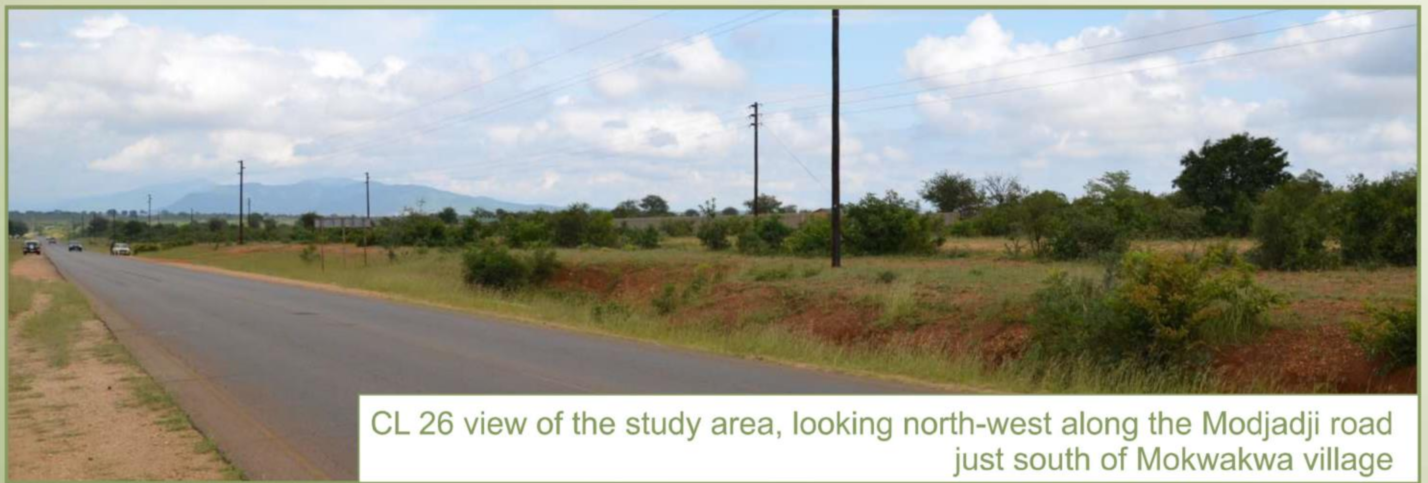
Figure 3a: Landscape Character

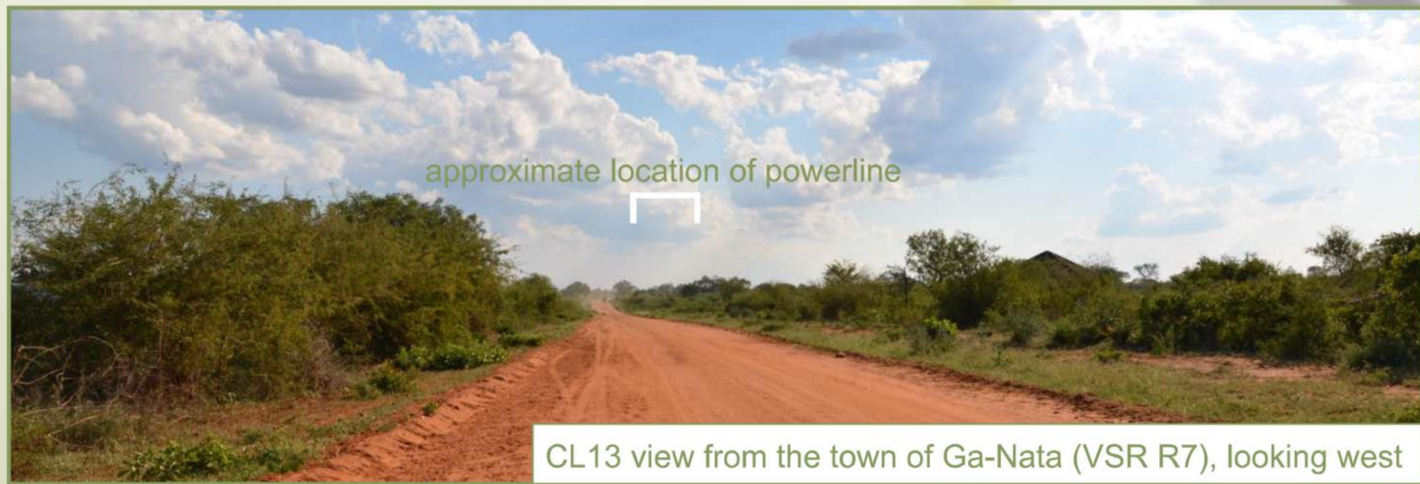

CL 09 typical residential character of the town of Mohlabaneng (VSR R2), view along the road between Mohalbaneng and Mokwakwaila

CL 09 typical residential character of the town of Mohlabaneng (VSR R2), view along the road between Mohalbaneng and Mokwakwaila, solar park project screened by ridge line


CL 09 typical character businesses in the town of Mohlabaneng (VSR R2), view along the road between Mohalbaneng and Mokwakwaila


CL13 VSR R7 town of Ga-Nata


CL 26 view of the study area, looking north-west along the Modjadji road just south of Mokwakwa village



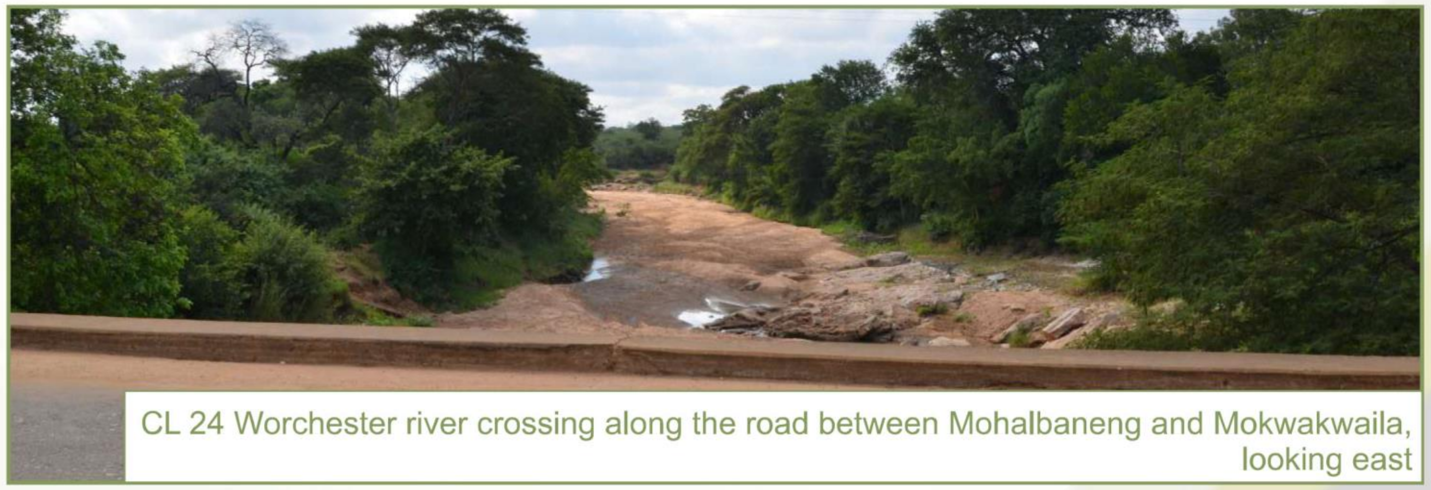
CL13 view from the town of Ga-Nata (VSR R7), looking west


CL 22 view of Ga-Famane (VSR R5) from along the raod between Mohalabaneng and Mokwakwaila


CL 22 view from Ga-Famane (VSR R5) when driving northbound along the raod between Mohalabaneng and Mokwakwaila

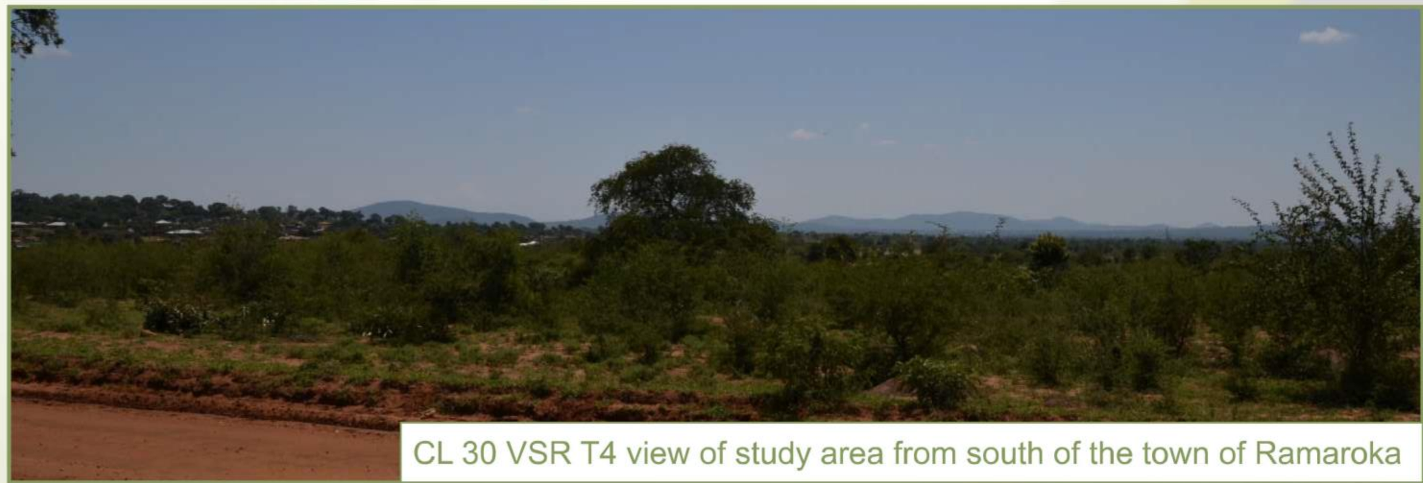
Figure 3b: Landscape Character

CL 24 Worchester river crossing along the road between Mohalbaneng and Mokwakwaila, looking west

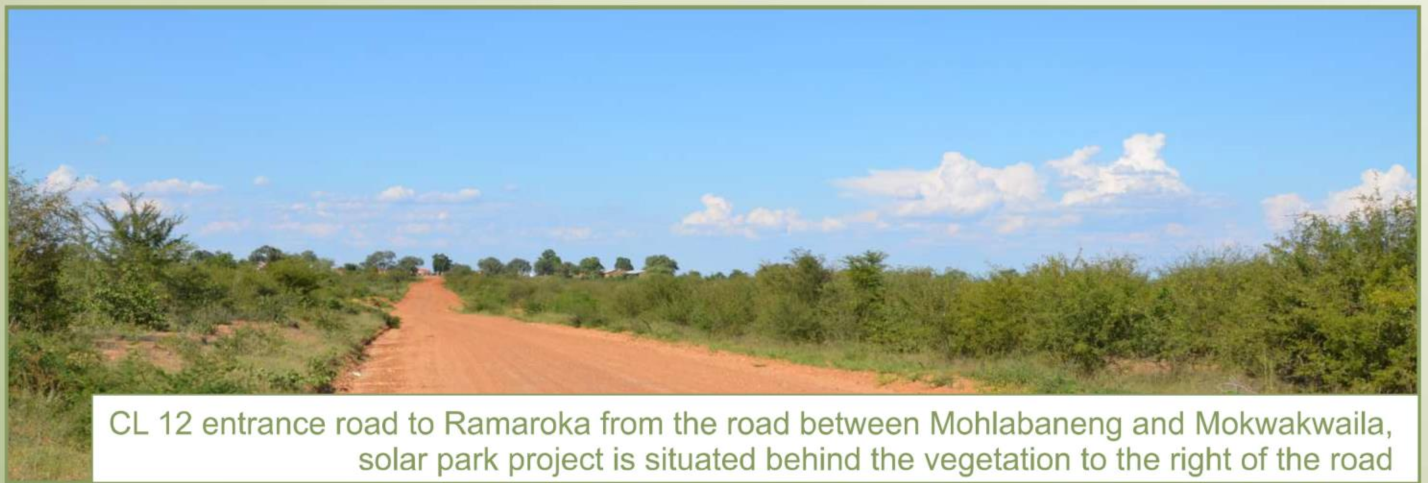


CL 24 Worchester river crossing along the road between Mohalbaneng and Mokwakwaila, looking east

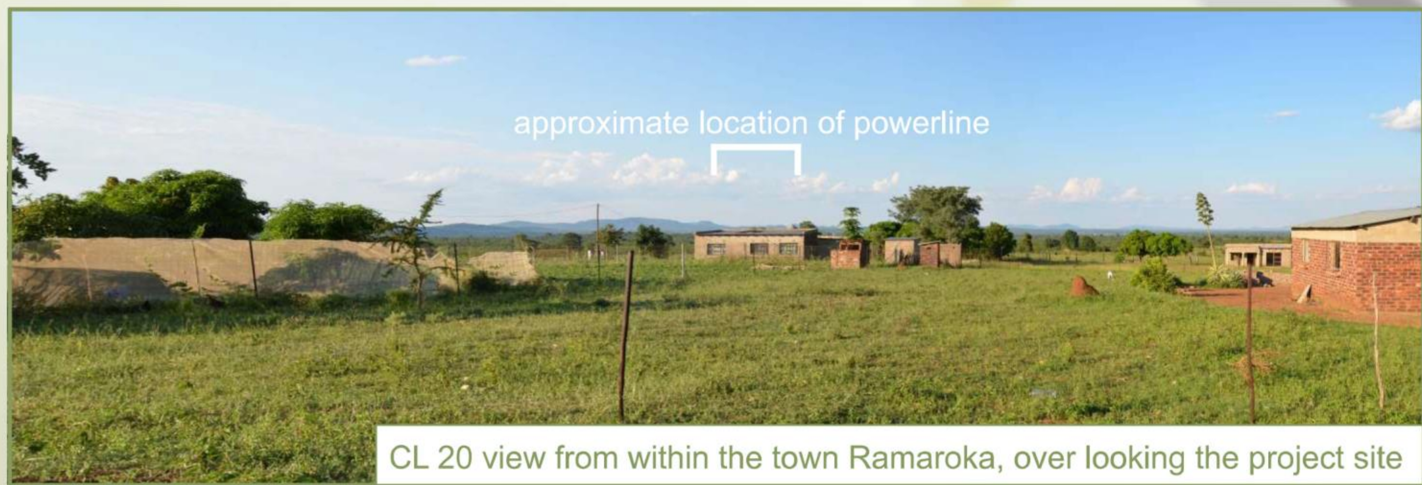
CL 16 Bolobedu substation



CL 30 VSR T4 view of study area from south of the town of Ramaroka



CL 12 entrance road to Ramaroka from the road between Mohlabaneng and Mokwakwaila, solar park project is situated behind the vegetation to the right of the road

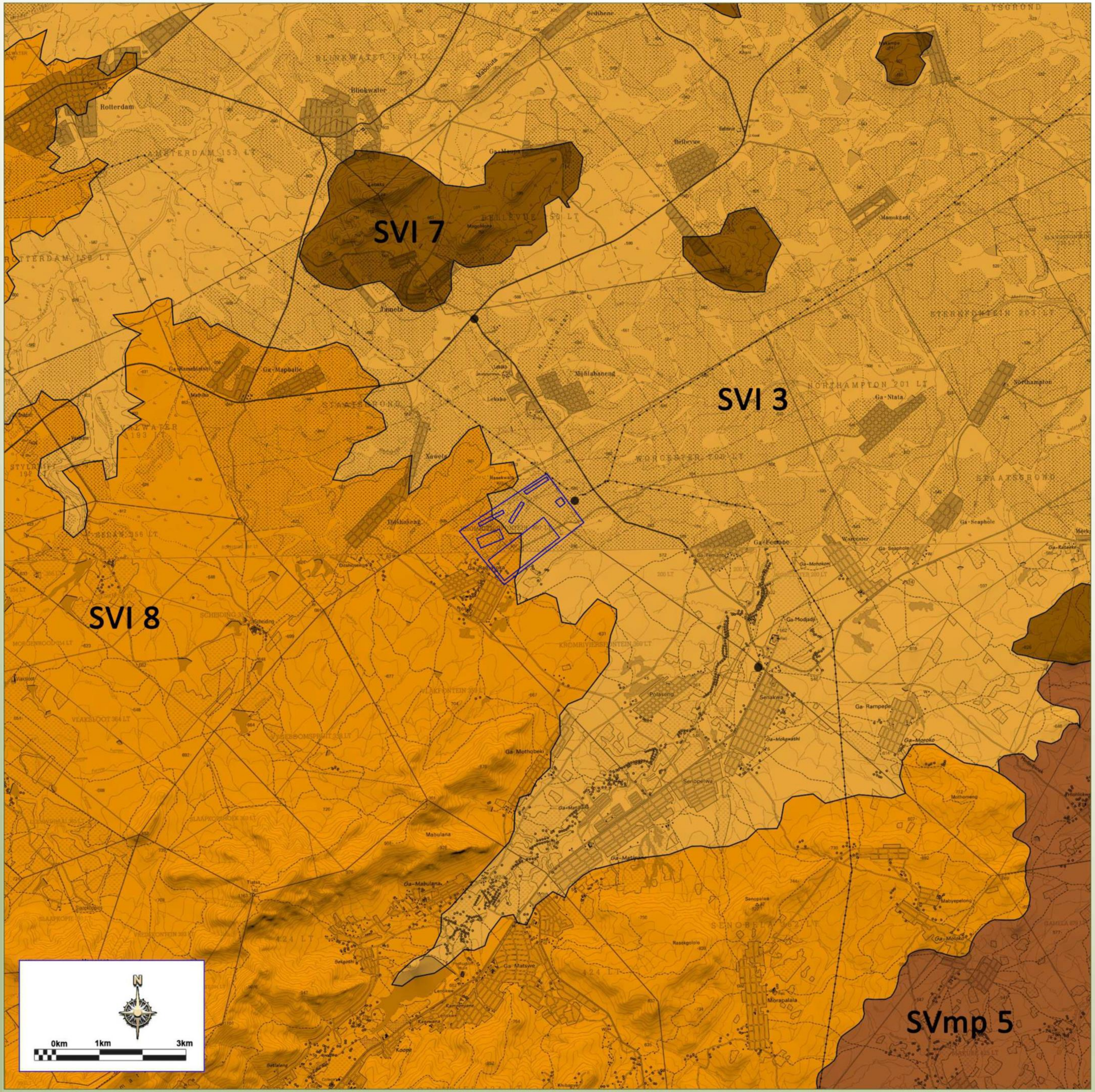


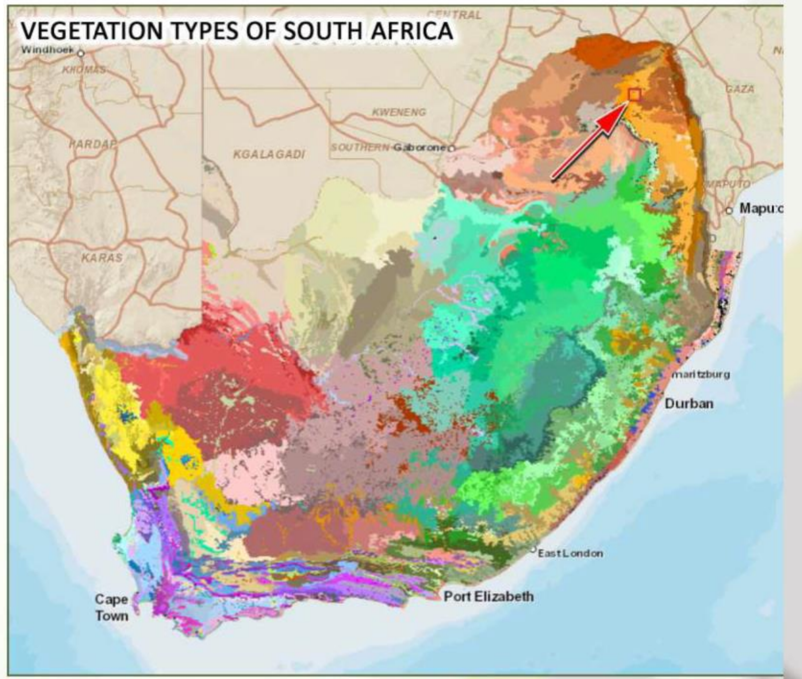
CL 20 view from within the town Ramaroka, over looking the project site

CL 18 view of the project site, looking north-east from the town of Ramaroka

Figure 3c: Landscape Character

SANBI Vegetation Types





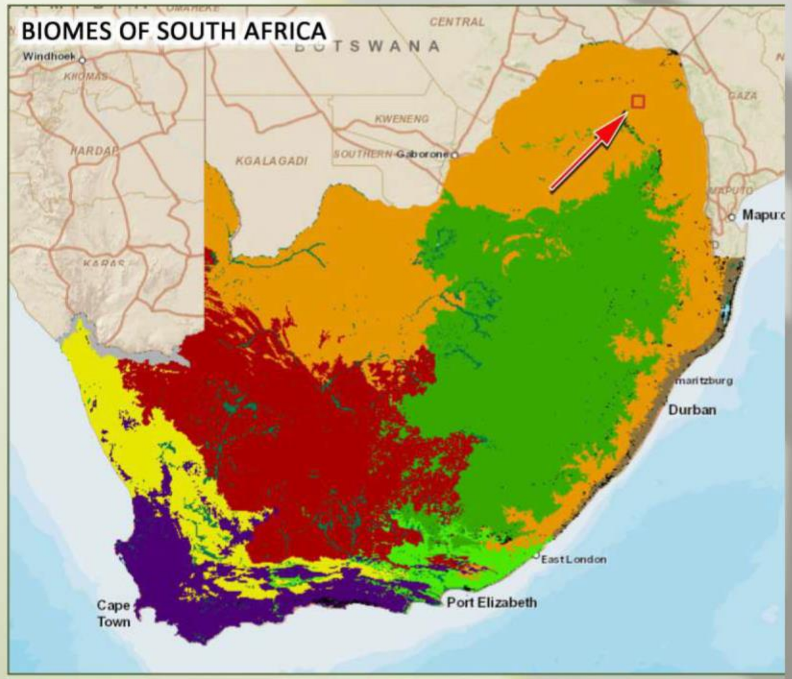
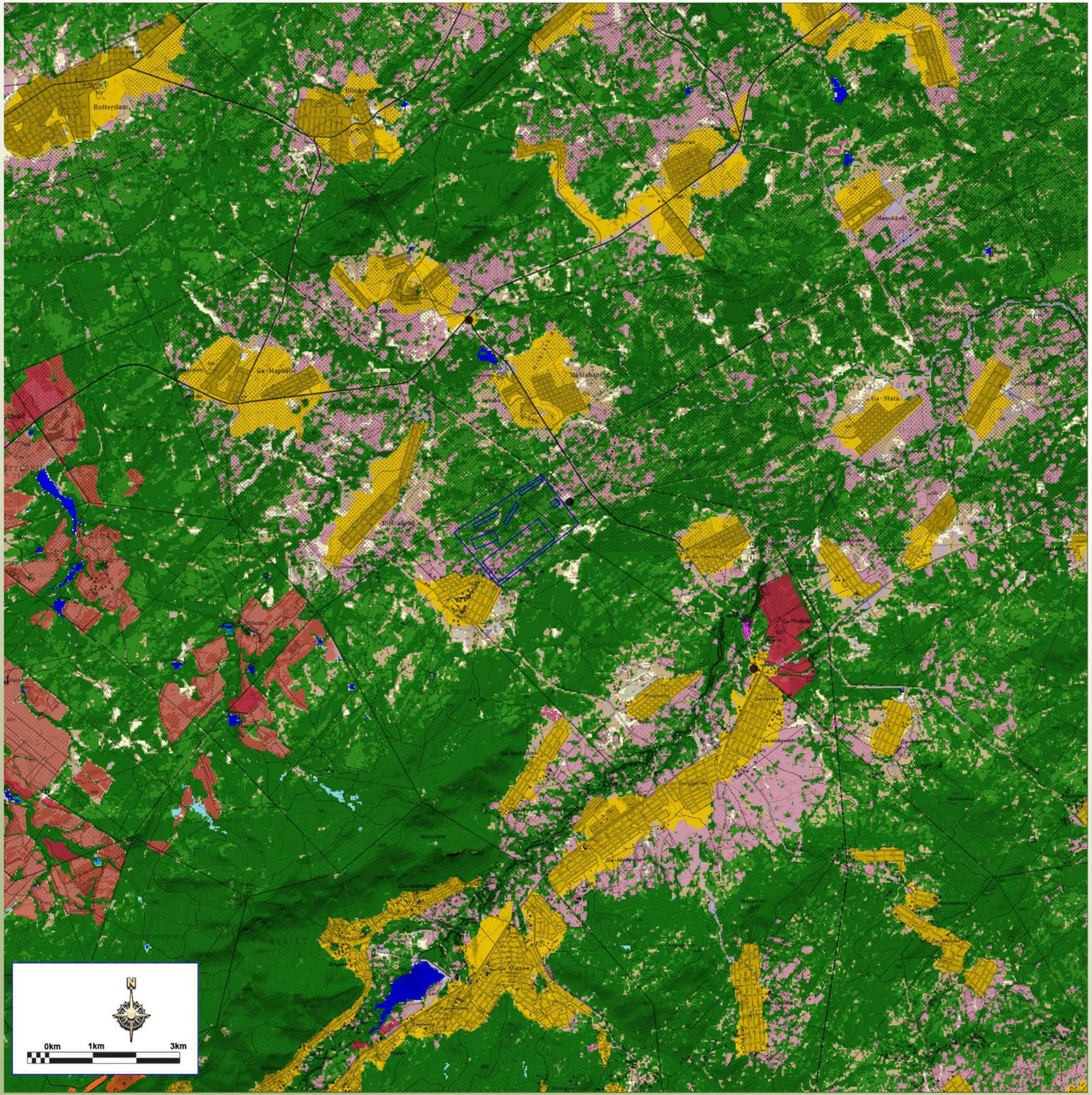


Figure 3d: Landscape Character - Vegetation Types map



1.	Water seasonal	0.02%
2.	Water permanent	0.27%
3.	Wetlands	0.06%
4.	Indigenous Forest	
5.	Thicket /Dense bush	42.80%
6.	Woodlan/Open bush	24.13%
7.	Grassland	7.48%
8.	Shrubland fynbos	
9.	Low shrubland	1.06%
10.	Cultivated comm fields (high)	0.07%
11.	Cultivated comm fields (med)	1.43%
12.	Cultivated comm fields (low)	1.84%
13.	Cultivated comm pivots (high)	
14.	Cultivated comm pivots (med)	
15.	Cultivated comm pivots (low)	
16.	Cultivated orchards (high)	0.24%
17.	Cultivated orchards (med)	0.31%
18.	Cultivated orchards (low)	0.09%
19.	Cultivated vines (high)	
20.	Cultivated vines (med)	
21.	Cultivated vines (low)	
22.	Cultivated permanent pineapple	
23.	Cultivated subsistence (high)	0.11%
24.	Cultivated subsistence (med)	3.84%
25.	Cultivated subsistence (low)	4.83%
26.	Cultivated cane pivot - crop	
27.	Cultivated cane pivot - fallow	
28.	Cultivated cane commercial - crop	
29.	Cultivated cane commercial - fallow	
30.	Cultivated cane emerging - crop	
31.	Cultivated cane emerging - fallow	
32.	Plantations / Woodlots mature	
33.	Plantation / Woodlots young	
34.	Plantation / Woodlots clearfelled	
35.	Mines 1 bare	
36.	Mines 2 semi-bare	0.03%
37.	Mines water seasonal	
38.	Mines water permanent	
39.	Mine buildings	
40.	Erosion (donga)	1.22%
41.	Bare none vegetated	0.04%
42.	Urban commercial	
43.	Urban industrial	
44.	Urban informal (dense trees / bush)	
45.	Urban informal (open trees / bush)	
46.	Urban informal (low veg / grass)	
47.	Urban informal (bare)	
48.	Urban residential (dense trees / bush)	
49.	Urban residential (open trees / bush)	
50.	Urban residential (low veg / grass)	
51.	Urban residential (bare)	
52.	Urban school and sports ground	
53.	Urban smallholding (dense trees / bush)	
54.	Urban smallholding (open trees / bush)	
55.	Urban smallholding (low veg / grass)	
56.	Urban smallholding (bare)	
57.	Urban sports and golf (dense tree / bush)	
58.	Urban sports and golf (open tree / bush)	
59.	Urban sports and golf (low veg / grass)	
60.	Urban sports and golf (bare)	
61.	Urban township (dense trees / bush)	
62.	Urban township (open trees / bush)	
63.	Urban township (low veg / grass)	
64.	Urban township (bare)	
65.	Urban village (dense trees / bush)	0.64%
66.	Urban village (open trees / bush)	1.60%
67.	Urban village (low veg / grass)	7.88%
68.	Urban village (bare)	0.01%
69.	Urban built-up (dense trees / bush)	0.00%
70.	Urban built-up (open trees / bush)	0.01%
71.	Urban built-up (low veg / grass)	0.01%
72.	Urban built-up (bare)	

Figure 3e: Landscape Character - Landcover map

3.1 Basic Methodology*

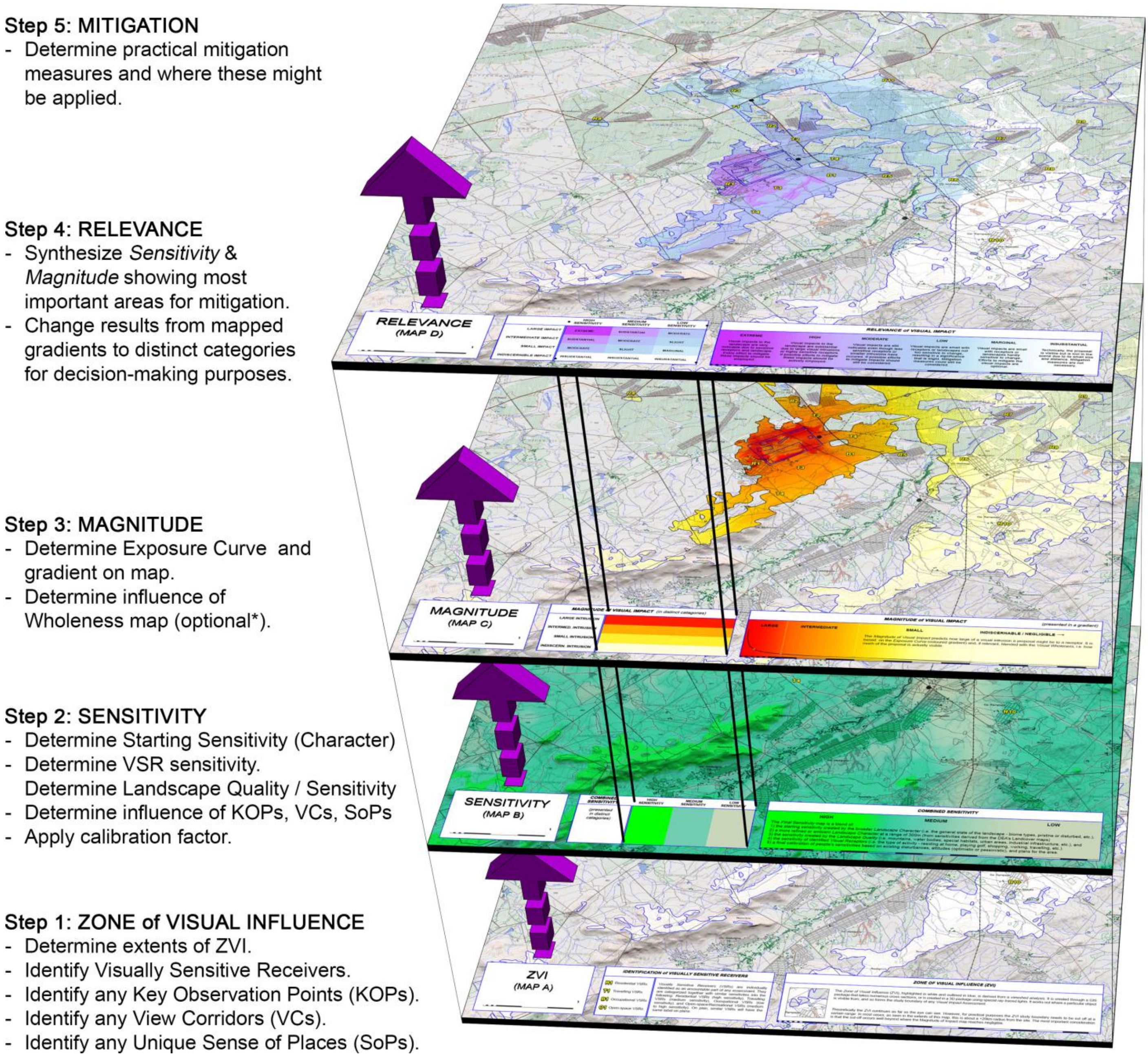


Figure 4: Basic Methodology*

(* A ***Refined Visual Impact Assessment Methodology*** is illustrated in Appendix A. It consists of additional maps that have been used to generate the *Sensitivity* and *Magnitude* maps)

Any *Visual Analysis* begins by first identifying the area in which the proposal is visible from. This is the study boundary, or the *Zone of Visual Influence* (ZVI). The ZVI is derived through a *viewshed analysis* which is created through a GIS or 3D modelling package using special 'ray-traced' lights. Theoretically, this study area, or the ZVI, extends as far as the eye can see, but for practical purposes is further limited, if necessary, to an area 20km from the proposal. Because of the relative small size of the project (143m), the stud area has been set to a radius of 15km from the proposal. The most important consideration is that this cut-off occurs well-beyond where the *Magnitude of Visual Impact* map reaches *Indiscernible / Negligible*.

The next step is to identify *Visually Sensitive Receivers* (VSRs) within this ZVI and to rate their inherent sensitivity (low, medium, or high) based on their activity. VSRs are broadly grouped into residential (R), travelling (T), occupational or business (B) and open space or recreational (O) users. For simplicity, similar VSRs are often grouped together. *Landscape Quality* and *Landscape Character* are also factors influencing the *Resultant Sensitivity*.

The *Magnitude of Visual Impact* generally refers to the size or intrusion of an object in one's view. On plan this is spatially determined (mostly using the *exposure map*), which takes into consideration the distances away from the proposed development, the size or area of the proposal within one's view (i.e., its height x width, often measured in square arc-minutes), and any other contrasting factors that may exaggerate the intrusion into the visual environment, such as movement or sharp glare from the proposal.

The *vanishing threshold* for the *magnitude* has been established at 8km away. This is the distance where no discernible impact is observed, even if the proposal is technically still visible. This 8km estimate is based on Hull and Bishop's 1988 study, which determined empirically from human feedback a *vanishing threshold* distance of 6km for 45m high lattice pylons spaced 400m apart. The 8km distance is estimated from past, onsite experience, Hull and Bishop's study, and what might be experienced if all of the proposal was visible. Typically, powerlines are good examples where *wholeness maps* play a major role in determining how exposed areas are to the proposal. Some areas (usually elevated) see much of a proposal, while other areas are only exposed to tiny slithers. This influence of these *wholeness maps* can significantly influence the final *magnitude maps*.

The synthesis of s*ensitivity* and *magnitude* to produce a final *relevance* value is standard practice across many disciplines (ecology, noise, etc.). This approach is also adopted for numerous VIAs methodologies around the world. It is used here too but is further developed into a spatial context - i.e. it is mapped using GIS layering instead of simply being tabulated.

Table 1: Relevance Engine - showing relationship between Sensitivity and Magnitude

	HIGH SENSITIVITY	MEDIUM SENSITIVITY	LOW SENSITIVITY
LARGE IMPACT	EXTREME	SUBSTANTIAL	MODERATE
INTERMEDIATE IMPACT	SUBSTANTIAL	MODERATE	SLIGHT
SMALL IMPACT	MODERATE	SLIGHT	MARGINAL
NEGLIGABLE IMPACT	INSUBSTANTIAL	INSUBSTANTIAL	INSUBSTANTIAL

The *Relevance of Visual Impact* results range from e*xtreme to marginal.* This scale highlights potential trouble-spots in purple and so implies where mitigation measures would be most needed. The scale from purple to light turquoise and white can also be seen as a scale from visually unacceptable to visually acceptable.

Note that the term *Relevance* has been used here instead of the usual *VIA Significance,* so as not to be confused with other terms in the South African EIA result which uses the *Significance* term differently).

Extreme (high sensitivity x large impact) occurs when visual impacts are very noticeable by receptors that are highly sensitive to changes in their environment. Every effort should be employed to mitigate these impacts. If mitigation is not possible AND the area of *extreme* is large enough then the proposal should be reviewed for *no-go* or *critically flawed* status.

Substantial (medium sensitivity x large impact OR high sensitivity x intermediate impact) occurs when impacts are distinctly noticeable but due to less sensitive receptors of smaller intrusions are not considered too significant. If important VSRs occur in this area, then all practical efforts to mitigate the proposal must be considered.

Moderate (low sensitivity x large impact OR medium sensitivity x intermediate impact OR high sensitivity x small impact) occurs when impacts are distinctly noticeable but due to less sensitive receptors or smaller intrusions are not considered too significant. If important VSRs occur in this area, then all practical efforts to mitigate the proposal should still be considered.

Slight (low sensitivity x intermediate impact OR medium sensitivity x small impact) occurs when impacts are small and / or receptors are not very sensitive to change. Mitigation measures might still be considered, depending on the importance of the VSRs.

Marginal (low sensitivity x small impact) occurs when impacts are small and receptors are not sensitive to change. Efforts to mitigate the visual impacts are optional.

Insubstantial (high OR medium OR low sensitivity x negligible impact). Technically the proposed development is visible but is lost in the scene due to its small size as a result of the great distance from the visual receptor. Mitigation measures are not necessary.

It should be noted that the entire assessment is determined by worst-case-scenarios. As such, the effect of the existing vegetation is not included in the DEM and *viewshed analysis*. Although it can easily be argued that existing vegetation can form a visual screen, it should be kept in mind that vegetation is not a fixed landscape entity and can vary or disappear due to seasonal variation, overgrazing, veld fires, erosion, drought, natural catastrophes, climate-change, etc. This is especially true for the type of vegetation in this area - i.e. low shrub land and savannah. Random breaks in the vegetation lines could also possibly allow for views of the proposed development. Therefore, for the purpose of determining the worst-case-scenario the effect of the existing vegetation is omitted. However, in the final *relevance* discussion, the effect of existing vegetation, as identified during site investigations, is considered. Existing vegetation as a visual barrier should be considered a *bonus* mitigation measure. As such, it should become the responsibility of the developer of the proposal, in collaboration with the necessary authorities or landowner, to retain and maintain this resource.

3.2 Zone of Visual Influence (ZVI)

[area of visibility]

The *ZVI* is derived from a *viewshed analysis* created in a GIS package, or 3D modelling package using special *ray-traced lights*, and indicates where a particular object would possibly be visible from. The *ZVI* forms the study boundary for the visual impact analysis section of this report. In this project the ZVI is derived from the viewshed analysis for the proposed powerline pylons working with a ‘worst case scenario’ height of 25m. The ZVI is indicated as the areas not masked in **Figure 6**.

The ZVI covers approximately 20-25% of the study area. The majority of the ZVI lies east and south-east of the proposed project. A smaller portion also stretches out to the north and north-east and a small section towards the south-west. *Key Observation Points* (KOPs) within the ZVI are mainly from exposed portions of the residential areas within the ZVI as well as sections located along the R81 and other connecting roads.

3.3 Visually Sensitive Receivers (VSRs)

*[identify and rate sensitivity of visually sensitive receivers within the ZVI]*For the purpose of this report VSRs are broadly grouped into residential (R), travelling (T), occupational (B) and open-space or recreational users. For simplicity similar VSRs are often grouped together. The locations of the VSRs are indicated on the maps and discussed in Table 2 below.

VSR Sensitivity is indicated on the map in **Figure 12a** (**Appendix A** at the end of this report). The sensitivity in terms *Landscape Quality* is shown on the map in **Figure 12b** (**Appendix A** at the end of this report). The synthesis of these two maps, together with the starting overall value from the *Landscape Character*, and a *Calibration Factor*, forms the *Overall Sensitivity* map (see **Figure 7** at the end of this section).

As seen in **Table 4** and **Figures 12a (Appendix A)**, all residential VSRs (R) were rated with a *high* sensitivity, all travelling VSRs (T) with a *medium* sensitivity, except tourist routes which were rated *high*. All Business / Occupational / Industrial VSRs (B) as well as Subsistence Farming Activities / Grazing / Open space / Recreational VSRs (O) were rated as *low*. Although there were no Recreational VSRs within the ZVI, the upper rows of the northern pavilion of the sport stadium, may have partial views of the project components where not obscured by the southern pavilion.

Table 2: VSR Identification

VSR IDENTIFICATION TABLE		
ID KEY	**TITLE**	**DESCRIPTION**
Residential VSRs		
R1	**Ga-Ramaroka**	This village settlement is directly adjacent to the site. Residents here also look down on the site and are therefore exposed to seeing most of it. Vegetation is therefore not likely to play a mitigating role
R2	**Mohlabaneng**	These village settlements, including Mohlabaneng and Lebaka, are near the site but their views are likely to be obscured by vegetation. Residents here are already familiar with existing power infrastructure.
R3	**Jamela**	These village settlements are some distance from the site. They are elevated above the site so vegetation is unlikely to mitigate their views.
R4	**Ga-Maphalle**	These village settlements are some distance from the site. They are elevated above the site so vegetation is unlikely to mitigate their views. However, local ridges between this VSR and the site are likely to obscure most views.
R5	**Ga-Femane**	These village settlements are a moderate distance from the site. They are below the site so vegetation is likely to further mitigate their views.
R6	**Ga-Mohokoni**	These village settlements are some distance from the site. They are below the site so vegetation is likely to further mitigate their views.
R7	**Ga-Ntata**	These village settlements are some distance from the site. They are below the site so vegetation is likely to further mitigate their views.
R8	**Ga-Seaphole**	These village settlements are some distance from the site. They are below the site so vegetation is likely to further mitigate their views.
R9	**Northamptom-Sekhula**	These village settlements are some distance from the site. They are below the site so vegetation is likely to further mitigate their views.
R10	**Senakwe**	These village settlements are some distance from the site. They are below the site so vegetation is likely to further mitigate their views.
11	**Ga-Moroka**	These village settlements are some distance from the site. They are level with the site so vegetation is likely to further mitigate their views.
12	**Bellevue-Sefofotse-Ga-Maupa**	These village settlements are some distance from the site. They are elevated above the site so vegetation is unlikely to mitigate their views.
Travelling VSRs		
T1	**Travellers on R81 Main Road**	This VSR represents tourist travellers through the study area on Route R81. Due to the distances involved, vegetation and the transitory nature of these VSRs, impacts are expected to be small..
T2	**Travellers on connecting road between Mohlabeng and Ga-Famane**	This VSR represents travellers along the connecting road east of the site which feeds many of the settlements in the area.
T3	**Travellers on Ga-Ramaroka Footpaths**	This VSR represents travellers (walking) from Ga-Ramaroka to neighbouring settlements. The footpaths are well-used and in some places are elevated above the site, making vegetation unlikely to mitigate their views.
T4	**Travellers on Ga-Ramaroka Connecting Roads**	This VSR represents travellers (driving and walking) from Ga-Ramaroka to neighbouring settlements. These travellers are in some places are elevated above the site, making vegetation unlikely to mitigate their views.
Business / Occupational / Industrial VSRs		
B1	**Subsistence Farming**	This VSR represents the subsistence farming (crops, cattle and goat rearing) in the area. This activity is scattered throughout the area and can not be shown as distinct areas on the map. Impacts are likely to occur in the Ga-Ramaroka area the most.
Open Space users / Recreational VSRs		
O1	**Sport Stadium**	This VSR represents participants, supporters and visitors to the sport stadium. Eventhough this VSR falls outside the ZVI, views from the upper rows of the northern pavilion, where not obscured by the southern pavilion, might include sections of the project components.

3.4 Magnitude of Visual Impact

The *Magnitude of Visual Impact* is based primarily on the *exposure* of VSRs to a proposed development. The *exposure curve* (as originally determined by Hull & Bishop 1988) illustrates the impacts on scenic quality with relation to the observer's distance. On plan, this gradient may sometimes, if relevant, be further influenced and blended by factors such as *Visual Wholeness*, i.e. how much of the proposal is actually visible. Refer to **Appendix A** for a refined methodology and additional maps that are used in this study.

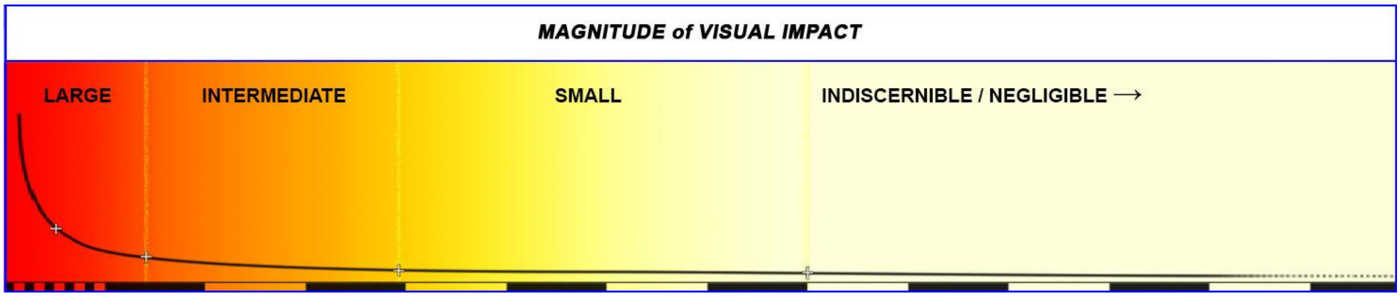


Figure 5: Magnitude and Exposure curve

This *exposure curve* is suitably adjusted for every project and is affected by and estimated on scale, contrast and context (see **Table 3** below), existing visual clutter, sharp light or glare, or movement. In this project, the curve and *visual threshold* has been adjusted to 8km.

In this study *Magnitude* is a combination of *Exposure* and *Wholeness,* and is shown in **Figure 8** below, with the locations of VSRs shown in context.

Table 4 further below, summarises the findings of the above described analysis maps for each of the VSRs.

Table 3: Degree of Contrast

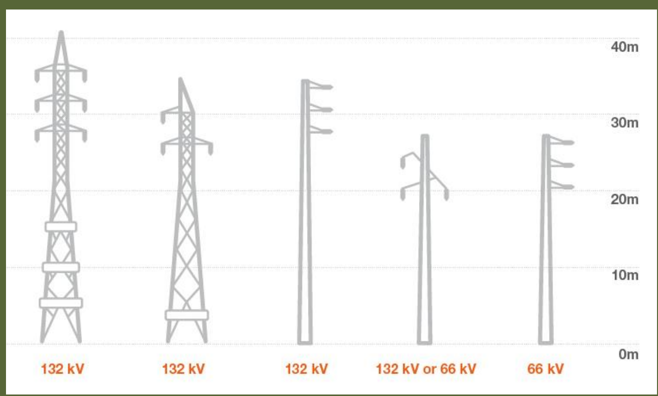
Existing / Receiving Environment	Proposed Development
	 image curtesy of https://beeteeprojects.co.za/with-the-variety-of-power-lines-are-there-a-variety-of-bird-guards/ (Google)
Note: Comparative images show similar structures as seen in the immediate vicinity of the proposal	

Table 3: Degree of Contrast (continues…)

Table 3: Degree of Contrast (continued)

Line	
The medium vegetation height and moderately undulating plains with the mountains in the far background results in lines within the landscape being mostly in the horizontal plane. The substation and associated powerlines introduce predominantly vertical but also horizontal and diagonal lines.	Pylon structures are linear in nature with the lines mostly in the vertical plane. With lattice structures some horizontal and diagonal lines are also introduced into the structures. The lines of the structures are however similar to those of the existing adjacent substation and existing nearby powerline structures.
	Conclusion: Low Contrast
Colour & Materials	
The vegetation has an olive green and dark grey-brown colour range. During drought or winter conditions, the dark greys from bare trunks of shrubs / trees become more dominating together with the ochre colours of the soil being exposed. Where bare soils are exposed the bare its reddish, sandy colour is revealed. The substation and associated powerlines introduce steel structures that are light in colour and dull in appearance.	The colours and materials of the proposed powerline are similar to that of the existing powerlines and substation. Newly installed powerlines may have a shinier appearance which would fade and become similarly dull in appearance in a short period of time.
	Conclusion: Low Contrast
Texture	
Large shrubs / small trees as well as clusters of bigger trees create a mottled texture of olive greens on an ochre base of the exposed soil. The substation and associated powerlines introduce a fine to medium grid-line texture into the scene.	The proposed powerline will add to the fine to medium grid-line texture of the existing scene.
	Conclusion: Low Contrast
Form	
Shrubs and trees are rounded and irregular. The existing substation and associated powerlines are rectangular and linear in shape.	The proposed powerlines are rectangular and linear in shape.
	Conclusion: Low Contrast

Ridgelines	
Where the proposed powerline structures might break ridgelines it would be seen together with the substation structures and higher existing powerlines.	
	Conclusion: Low Contrast
Visual Clutter and Uniformity	
The natural surrounds of the project, although mottle, are uniform and *rational* to the viewer.	The proposed powerline would add to the current visual clutter from the existing substation and power lines and be in unison with the character of the existing structures.
	Conclusion: Low Contrast
Transparency	
Rainy season vegetation would be dense while dry season vegetation would have a more lattice-like transparency. The proposed powerline would have a similar transparency to the structures of the existing substation and powerlines.	
	Conclusion: Low Contrast
	Overall Conclusion: LOW CONTRAST

3.5 Night-lighting Impacts

In terms of lighting, it is assumed both construction and decommissioning activities would be restricted to daylight hours; this project would make use of a video-surveillance system and therefore only small internal street lamps would be required for the duration of the operational phase; security lighting would only be activated during illegal intrusion to the property; and that maintenance activities would only take place at daytime.

3.6 Photo-simulations

The photo-simulations seen in **Figures 10a and 10b** illustrate the proposed project set within the receiving landscape. Refer to **Appendix C** for all camera locations.

For accuracy and representativeness of photo-simulations, refer to **Section 1.5** of this report on standards. In this regard, every effort has been taken to produce extremely accurate photo-simulations. The scaling and positioning of components is very accurately determined. Colouring, lighting and shadows are a more of an 'artist's impression', but these have been adjusted to match similar objects in the scene.

Photo-simulation 1, from camera location 11, represents VSRs R2 (residents from Mhlabaneng) and T2 (travellers along the connection road between Mhlabaneng and Ga-Famane). This shows the proposal within its surrounding environment and also in context with its associated proposed solar park. From this location the proposal would be behind the existing substation and thus form part of the visual clutter from the existing substation.

Photo-simulation 2, from the north-eastern side of Ga-Ramaroko, representing VSR R1 (residents from Ga-Ramaroko). This view puts the proposal in the context with the existing substation as background. The photo-simulation depicts the proposal as it would appear in association with the proposed solar park. In this view the whole solar park would be in front of the proposed powerline. The proposal would therefore be totally absorbed within in its setting.

Both photo-simulations also indicate what a possible night landscape might look like after installation of both of the projects.

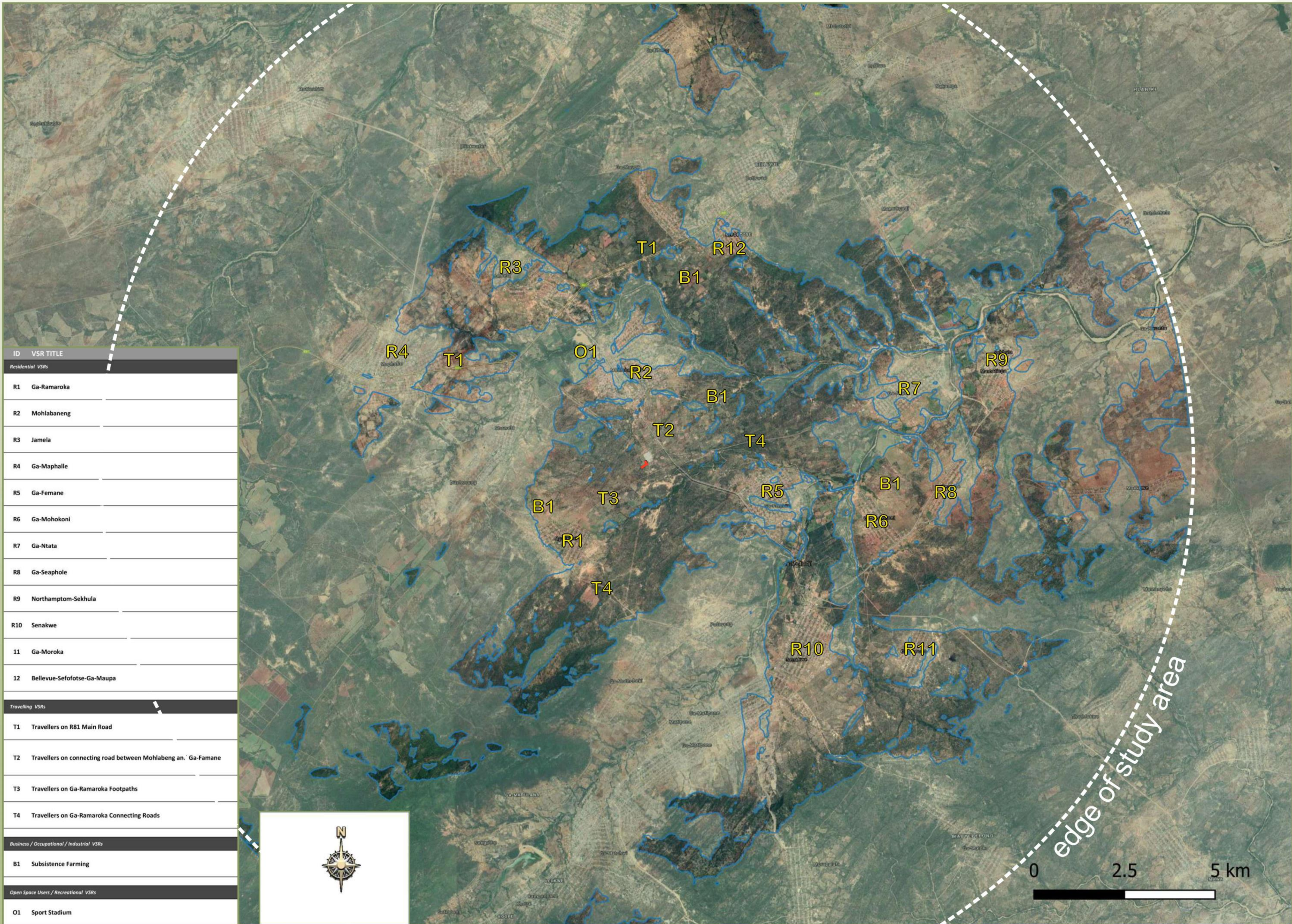
3.7 Relevance of Visual Impacts

From the analysis, as portrayed on **Figure 9** and **Table 4** and indicated by the coloured areas (purple), it can be concluded that, overall, the impacts on VSRs are mostly *moderate* and *insubstantial*. There is only one incidence where a possible *extreme* impact is anticipated. This incidence occurs where elevation and a lack in screening vegetation allows for views of the proposal for travellers walking along Ga-Ramaroka footpaths. These views would however include the existing substation and power line. It is therefore highly likely that the structures from the proposal would merge with these existing structures and become less noticeable. These views are also temporary as the travellers pass by the specific incidences along the routes. It might also be the case that travellers are not focussed on their environment and may not notice the presence of the proposal. Therefore the *moderate* and *insubstantial* ratings are a relevant reflection of the anticipated impact that might arise from the proposal.

Moderate impacts are anticipated for:

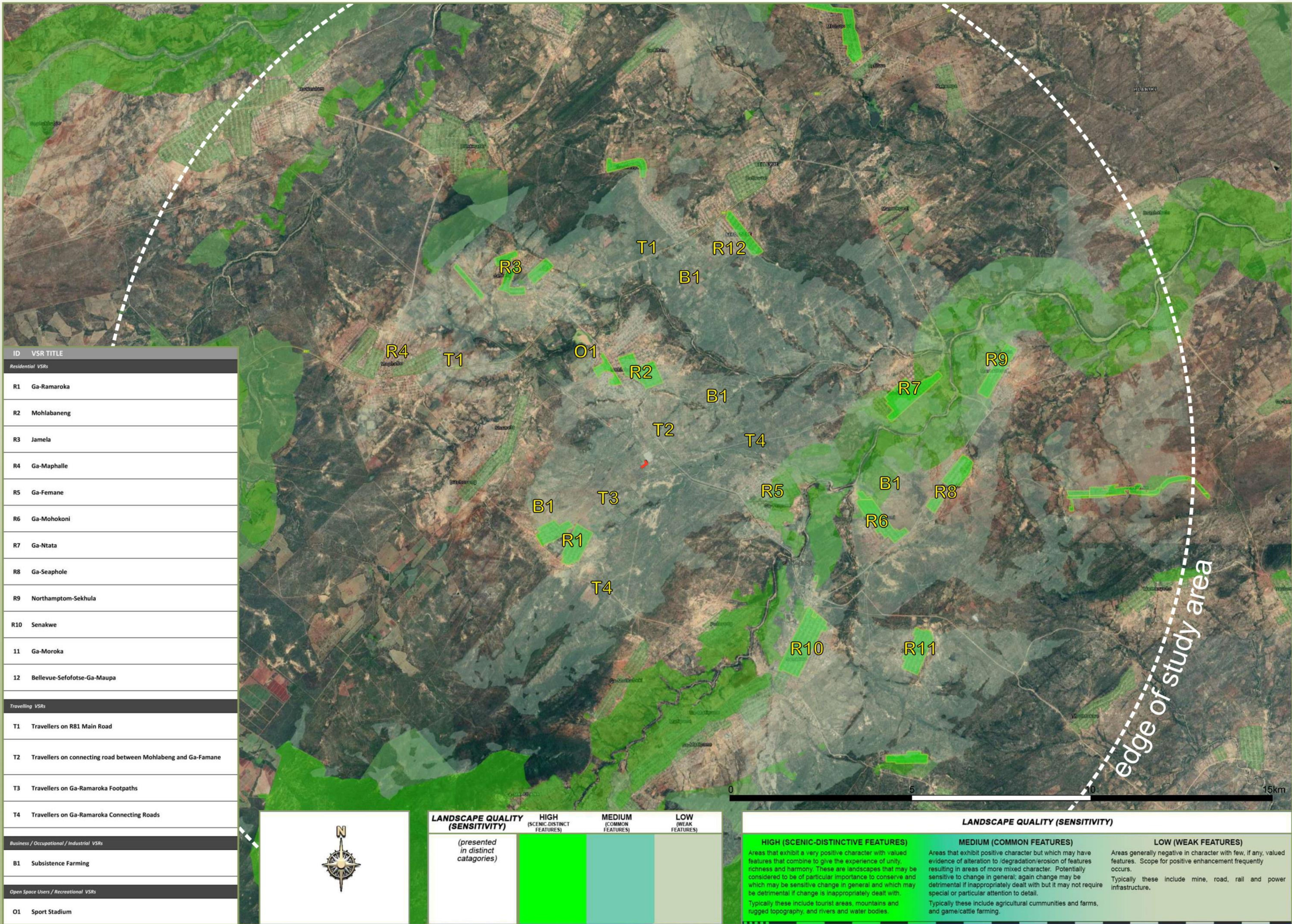
- some residents from the villages of Ga-Ramaroka and Mohlabaneng
- some travellers on connecting road between Mohlabeng and Ga-Famane
- some travellers on Ga-Ramaroka Connecting roads
- some areas of Subsistence farming

Zone of Visual Influence



ID	VSR TITLE
Residential VSRs	
R1	Ga-Ramaroka
R2	Mohlabaneng
R3	Jamela
R4	Ga-Maphalle
R5	Ga-Femane
R6	Ga-Mohokoni
R7	Ga-Ntata
R8	Ga-Seaphole
R9	Northamptom-Sekhula
R10	Senakwe
11	Ga-Moroka
12	Bellevue-Sefofotse-Ga-Maupa
Travelling VSRs	
T1	Travellers on R81 Main Road
T2	Travellers on connecting road between Mohlabeng an. Ga-Famane
T3	Travellers on Ga-Ramaroka Footpaths
T4	Travellers on Ga-Ramaroka Connecting Roads
Business / Occupational / Industrial VSRs	
B1	Subsistence Farming
Open Space Users / Recreational VSRs	
O1	Sport Stadium

Figure 6: Zone of Visual Influence map



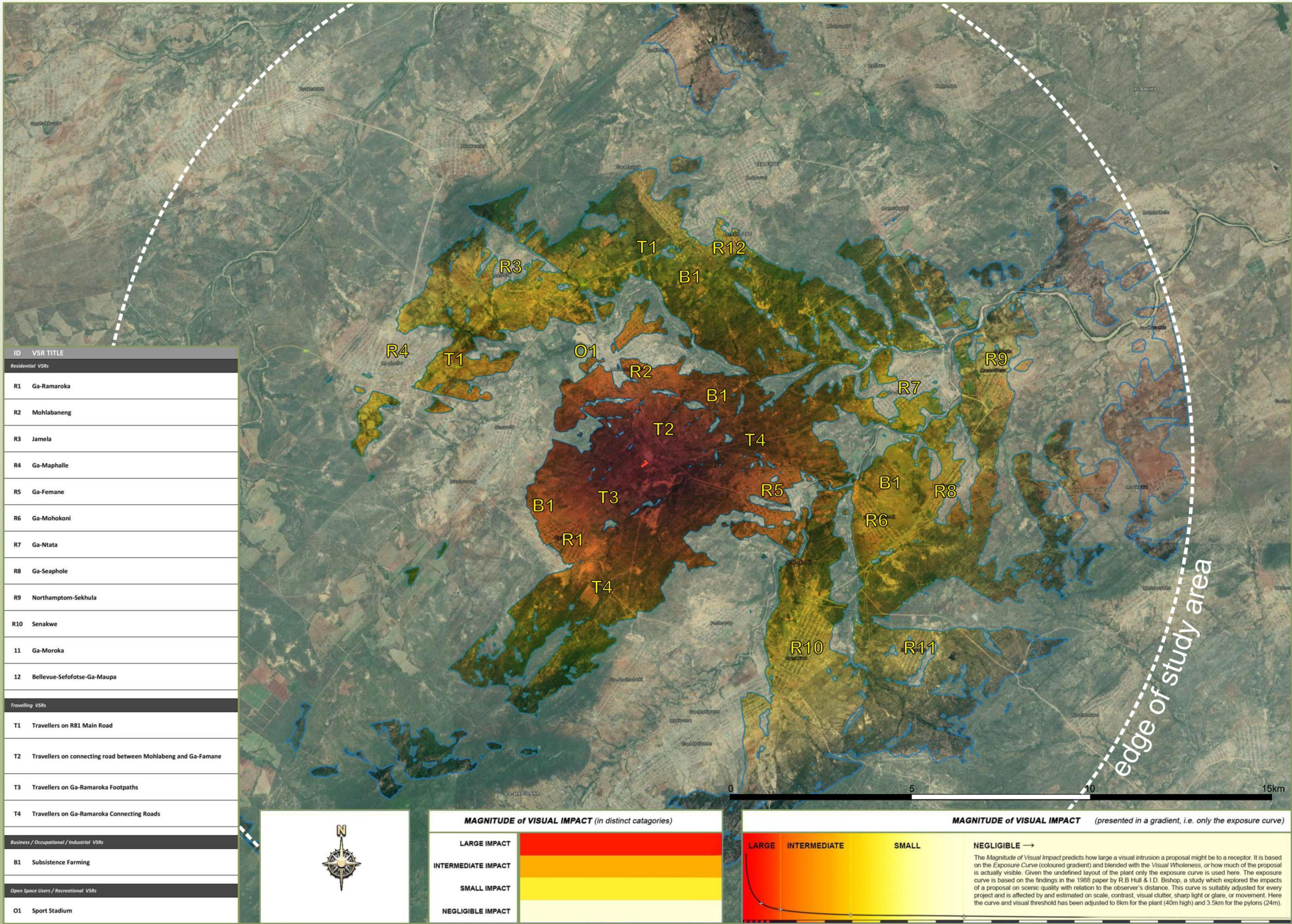
ID	VSR TITLE
Residential VSRs	
R1	Ga-Ramaroka
R2	Mohlabaneng
R3	Jamela
R4	Ga-Maphalle
R5	Ga-Femane
R6	Ga-Mohokoni
R7	Ga-Ntata
R8	Ga-Seaphole
R9	Northamptom-Sekhula
R10	Senakwe
11	Ga-Moroka
12	Bellevue-Sefofotse-Ga-Maupa
Travelling VSRs	
T1	Travellers on R81 Main Road
T2	Travellers on connecting road between Mohlabeng and Ga-Famane
T3	Travellers on Ga-Ramaroka Footpaths
T4	Travellers on Ga-Ramaroka Connecting Roads
Business / Occupational / Industrial VSRs	
B1	Subsistence Farming
Open Space Users / Recreational VSRs	
O1	Sport Stadium

LANDSCAPE QUALITY (SENSITIVITY)	HIGH (SCENIC-DISTINCT FEATURES)	MEDIUM (COMMON FEATURES)	LOW (WEAK FEATURES)
(presented in distinct catagories)			

LANDSCAPE QUALITY (SENSITIVITY)

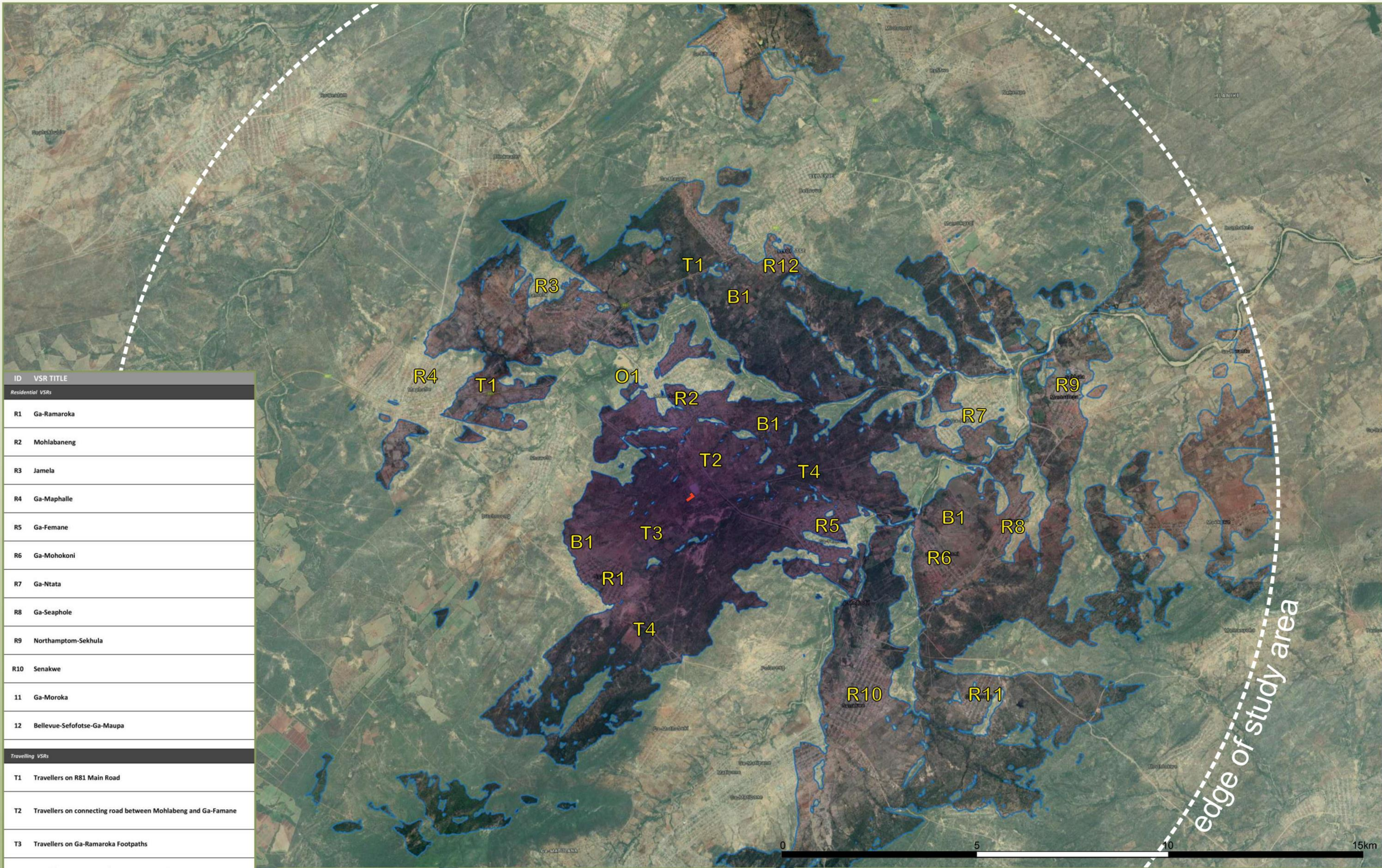
HIGH (SCENIC-DISTINCTIVE FEATURES)	MEDIUM (COMMON FEATURES)	LOW (WEAK FEATURES)
Areas that exhibit a very positive character with valued features that combine to give the experience of unity, richness and harmony. These are landscapes that may be considered to be of particular importance to conserve and which may be sensitive change in general and which may be detrimental if change is inappropriately dealt with. Typically these include tourist areas, mountains and rugged topography, and rivers and water bodies.	Areas that exhibit positive character but which may have evidence of alteration to /degradation/erosion of features resulting in areas of more mixed character. Potentially sensitive to change in general; again change may be detrimental if inappropriately dealt with but it may not require special or particular attention to detail. Typically these include agricultural cummunities and farms, and game/cattle farming.	Areas generally negative in character with few, if any, valued features. Scope for positive enhancement frequently occurs. Typically these include mine, road, rail and power infrastructure.

Figure 7: Combined Sensitivity map



ID	VSR TITLE
Residential VSRs	
R1	Ga-Ramaroka
R2	Mohlabaneng
R3	Jamela
R4	Ga-Maphalle
R5	Ga-Femane
R6	Ga-Mohokoni
R7	Ga-Ntata
R8	Ga-Seaphole
R9	Northamptom-Sekhula
R10	Senakwe
11	Ga-Moroka
12	Bellevue-Sefofotse-Ga-Maupa
Travelling VSRs	
T1	Travellers on R81 Main Road
T2	Travellers on connecting road between Mohlabeng and Ga-Famane
T3	Travellers on Ga-Ramaroka Footpaths
T4	Travellers on Ga-Ramaroka Connecting Roads
Business / Occupational / Industrial VSRs	
B1	Subsistence Farming
Open Space Users / Recreational VSRs	
O1	Sport Stadium

Figure 8: Magnitude of Visual Impact map



ID	VSR TITLE
Residential VSRs	
R1	Ga-Ramaroka
R2	Mohlabaneng
R3	Jamela
R4	Ga-Maphalle
R5	Ga-Femane
R6	Ga-Mohokoni
R7	Ga-Ntata
R8	Ga-Seaphole
R9	Northamptom-Sekhula
R10	Senakwe
11	Ga-Moroka
12	Bellevue-Sefofotse-Ga-Maupa
Travelling VSRs	
T1	Travellers on R81 Main Road
T2	Travellers on connecting road between Mohlabeng and Ga-Famane
T3	Travellers on Ga-Ramaroka Footpaths
T4	Travellers on Ga-Ramaroka Connecting Roads
Business / Occupational / Industrial VSRs	
B1	Subsistence Farming
Open Space Users / Recreational VSRs	
O1	Sport Stadium

	HIGH SENSITIVITY	MEDIUM SENSITIVITY	LOW SENSITIVITY
LARGE IMPACT	EXTREME	SUBSTANTIAL	MODERATE
INTERMEDIATE IMPACT	SUBSTANTIAL	MODERATE	SLIGHT
SMALL IMPACT	MODERATE	SLIGHT	MARGINAL
NEGLIGABLE IMPACT	INSUBSTANTIAL	INSUBSTANTIAL	INSUBSTANTIAL

RELEVANCE of VISUAL IMPACT

EXTREME	SUBSTANTIAL	MODERATE	LOW	VERY LOW	INSUBSTANTIAL
Visual impacts to the landscape are extremely noticable to highly sensitive receptors and landscape. Every effort to mitigate these impacts should be employed.	Visual impacts to the landscape are substantial due to a large visual intrusion or highly sensitive receptors. If possible efforts to mitigate these impacts should be actively employed.	Visual impacts are still noticable even though less sensitive receptors or smaller intrusions have occured. If possible efforts to mitigate impacts should still be considered.	Visual impacts are small with receptors or landscapes not too sensitive to change, resulting in a significance that is slight. Mitigation measures could still be considered.	Visual impacts are small with receptors or landscapes hardlt sensitive to change. Efforts to mitigate the visual impacts are optional.	Technically, the proposal is visible but is lost in the scene due to its small size and distance. Mitigation measures are not necessary.

Relevance

Figure 9: Relevance map

Figure 10a: Photo-simulation 1 (CL11), Representing VSRs R2 & T2

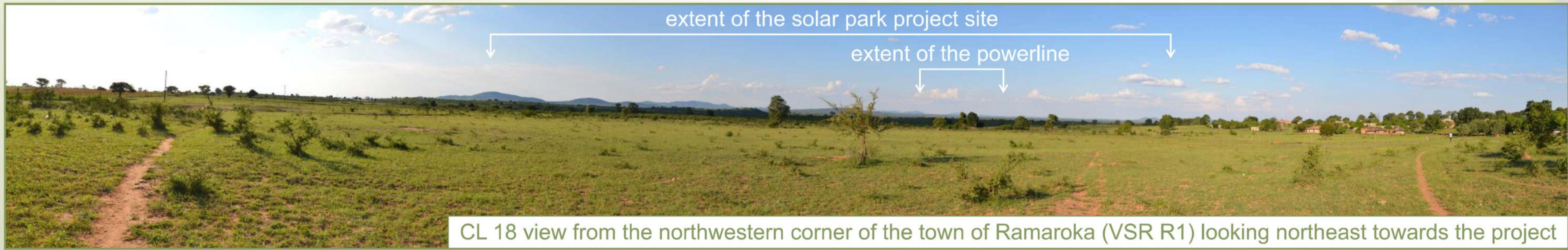


Figure 10b: Photo-simulation 2 (CL18), Representing VSR R1

RELEVANCE TABLE

a synthesis of ***Sensitivity*** and ***Magnitude*** for each VSR

* NOTE 1: Values for VSRs may range depending on their exact location from the proposal (see maps). This table therefore notes only the worst case scenario for each VSR.
* NOTE 2 Relevance results may differ slightly from the basic *Relevance Engine*. This is due to the blending of map gradients and the *calibration factor* that lowers the

ID KEY	TITLE	DESCRIPTION	SENSITIVITY	MAGNITUDE *	RELEVANCE *
Residential VSRs					
R1	Ga-Ramaroka	This village settlement is directly adjacent to the site. Residents here also look down on the site and are therefore exposed to seeing most of it. Vegetation is therefore not likely to play a mitigating role	High	Small	Moderate
R2	Mohlabaneng	These village settlements, including Mohlabaneng and Lebaka, are near the site but their views are likely to be obscured by vegetation. Residents here are already familiar with existing power infrastructure.	High	Small	Moderate
R3	Jamela	These village settlements are some distance from the site. They are elevated above the site so vegetation is unlikely to mitigate their views.	High	Negligible	Insubstantial
R4	Ga-Maphalle	These village settlements are some distance from the site. They are elevated above the site so vegetation is unlikely to mitigate their views. However, local ridges between this VSR and the site are likely to obscure most views.	High	Negligible	Insubstantial
R5	Ga-Femane	These village settlements are a moderate distance from the site. They are below the site so vegetation is likely to further mitigate their views.	High	Negligible	Insubstantial
R6	Ga-Mohokoni	These village settlements are some distance from the site. They are below the site so vegetation is likely to further mitigate their views.	High	Negligible	Insubstantial
R7	Ga-Ntata	These village settlements are some distance from the site. They are below the site so vegetation is likely to further mitigate their views.	High	Negligible	Insubstantial
R8	Ga-Seaphole	These village settlements are some distance from the site. They are below the site so vegetation is likely to further mitigate their views.	High	Negligible	Insubstantial
R9	Northamptom-Sekhula	These village settlements are some distance from the site. They are below the site so vegetation is likely to further mitigate their views.	High	Negligible	Insubstantial
R10	Senakwe	These village settlements are some distance from the site. They are level with the site so vegetation is likely to further mitigate their views.	High	Negligible	Insubstantial
R11	Ga-Moroka	These village settlements are some distance from the site. They are level with the site so vegetation is likely to further mitigate their views.	High	Negligible	Insubstantial
R12	Bellevue-Sefofotse-Ga-Maupa	These village settlements are some distance from the site. They are elevated above the site so vegetation is unlikely to mitigate their views.	High	Negligible	Insubstantial
		SUMMARY:	HIGH	NEGLIGIBLE	INSUBSTANTIAL
Travelling VSRs					
T1	Travellers on R81 Main Road	This VSR represents tourist travellers through the study area on Route R81. Due to the distances involved, vegetation and the transitory nature of these VSRs, impacts are expected to be small..	High	Negligible	Insubstantial
T2	Travellers on connecting road between Mohlabeng and Ga-Famane	This VSR represents travellers along the connecting road east of the site which feeds many of the settlements in the area.	Medium	Intermediate	Moderate
T3	Travellers on Ga-Ramaroka Footpaths	This VSR represents travellers (walking) from Ga-Ramaroka to neighbouring settlements. The footpaths are well-used and in some places are elevated above the site, making vegetation unlikely to mitigate their views.	High	Large	Extreme
T4	Travellers on Ga-Ramaroka Connecting Roads	This VSR represents travellers (driving and walking) from Ga-Ramaroka to neighbouring settlements. These travellers are in some places are elevated above the site, making vegetation unlikely to mitigate their views.	Medium	Intermediate	Moderate
		SUMMARY:	MEDIUM	INTERMEDIATE	MODERATE
Business / Occupational / Industrial VSRs					
B1	Subsistence Farming	This VSR represents the subsistence farming (crops, cattle and goat rearing) in the area. This activity is scattered throughout the area and can not be shown as distinct areas on the map. Impacts are likely to occur in the Ga-Ramaroka area the most.	Low	Large	Moderate
		SUMMARY:	LOW	LARGE	MODERATE
Open Space Users / Recreational VSRs					
O1	Sport Stadium	This VSR represents participants, supporters and visitors to the sport stadium. Eventhough this VSR falls outside the ZVI, views from the upper rows of the northern pavilion, where not obscured by the southern pavilion, might include sections of the project components.	Medium	Negligible	Insubstantial
		SUMMARY:	MEDIUM	NEGLIGIBLE	INSUBSTANTIAL

LANDSCAPE QUALITY (SENSITIVITY) *(presented in distinct catagories)*
HIGH (SCENIC-DISTINCT FEATURES)
MEDIUM (COMMON FEATURES)
LOW (WEAK FEATURES)

MAGNITUDE of VISUAL IMPACT *(in distinct catagories)*
LARGE IMPACT
INTERMEDIATE IMPACT
SMALL IMPACT
NEGLIGIBLE IMPACT

	HIGH SENSITIVITY	MEDIUM SENSITIVITY	LOW SENSITIVITY
LARGE IMPACT	EXTREME	SUBSTANTIAL	MODERATE
INTERMEDIATE IMPACT	SUBSTANTIAL	MODERATE	SLIGHT
SMALL IMPACT	MODERATE	SLIGHT	MARGINAL
NEGLIGABLE IMPACT	INSUBSTANTIAL	INSUBSTANTIAL	INSUBSTANTIAL

Table 4: Relevance Table

4 MITIGATION MEASURES

The following general mitigation measures would be proposed for the planning, construction, operational and decommissioning phases of the proposed development. Existing vegetation is considered a bonus existing mitigation measure for which the developer is responsible for maintaining. In the exceptional cases where the existing vegetation, especially those around VSRs, do not screen views of the proposed structures, further mitigating planting can be negotiated with the landowner to establish screening vegetation in the lines of sight at the relevant VSR locations.

Table 5: Proposed Mitigation Measures

Anticipated Impact	Proposed Mitigation Measure
Construction Phase	
Timing	Plan construction activities when vegetation is dormant to minimise impacts on wetlands and sensitive plants.
Dust clouds from construction activities and where existing vegetation has been cleared in order to install the power plant and associated components.	Ensure that dust suppressing techniques are in place at all times. These could include the regular wetting of the soil or the application of dust suppressing agents.
Clearing of vegetation for the construction camp, access roads and project footprint.	During the impact assessment it was noted that the existing vegetation would play a minimal role in screening the proposed project components from VSRs. However, care should still be taken to: • Retain as much of the existing vegetation as possible. • Where vegetation is cleared, a rehabilitation plan should be implemented. This should be done in conjunction with the Vegetation, Visual Impact and any other relevant specialists. • Where possible and required, careful placement of new or transplanted vegetation should be planted in areas relevant to VSR site lines.
Erosion control	Minimise the clearance of existing vegetation, the need for re-vegetating efforts, and exposed surface soil. Implement correct and effective storm-water management measures that would reduce the potential and amount of erosion around the project components. This would also result in reducing the loss of valuable topsoil and vegetation habitat.
Lighting	It is assumed that construction activities would be limited to daylight hours. With regards to the construction camp: • Refrain from causing 'light spillage' beyond the construction camp by installing light fixtures with

	directional illumination. • Keep lighting to a minimum by installing low-level bollard type lights instead of post top lights along walkways between buildings. • Where possible avoid high flood lights, and instead use lower locally lit installations. • In general, lighting should be carefully directed and only be used where absolutely necessary. Should construction activities extend during night time, adhere to the same recommendations as for the construction camp.
Operational Phase	
Dust clouds	Keep travelling speeds along unpaved access roads as low as possible so as to avoid creating dust clouds.
Colour	In the case of monopoles earthy tones to greys with a toned-down hues, instead of whites and creams, could be used as such combinations are recessive to the eye and tend to be slightly less noticed.
Lighting	Refer to lighting recommendations for Construction Phase
Decommissioning / Closure Phase	
Dust clouds from decommissioning activities.	Refer to the discussions related to dust control mitigation measures above.
Exposing of soil due to the removal of the project structures and components.	Rehabilitate and re-vegetate exposed soil areas, with indigenous planting, as soon as possible. A vegetation specialist should be consulted in this regard.
Erosion control	Minimise the clearance of existing vegetation, the need for re-vegetating, and exposed surfaces. Implement correct and effective storm-water management measures that would reduce the potential for erosion.
Lighting	It is assumed that decommissioning activities would be restricted to daylight hours with no lighting requirements. However if lighting is needed, refer to the mitigation measures proposed above.

5 EIA SIGNIFICANCE

The *Relevance* is further qualified by the application of extent, duration and probability criteria as found in the significance impact assessment methodology based on DEAT's Guideline Document: EIA Regulations (1998) (Appendix B).

Table 6: EIA Significance Rating Table

Phase	Residential VSR's	Travelling VSR's	Business / Occupational / Industrial VSR's	Open Space Users / Recreational VSR's
Construction	Medium	Medium - High	Medium - High	Medium
Operational	Medium	Medium - High	Medium - High	Medium

From **Table 6** above it can be conclude that the significance of the impact from the project would be *negative medium* for Residential and Open Space / Recreational VSRs during both construction and operational phases. The significance of the impact from the project would be *negative medium – high* for Residential and Open Space / Recreational VSRs during both construction and operational phases.

There is no anticipated night time impact.

6 CONCLUSION

Overall the proposed powerline project has a ***low contrast*** **with its receiving environment**. As described in section 3.7 **'Relevance'** above, it can be concluded that the impacts on VSRs are mostly ***insubstantial*** **with a few** ***moderate*** **incidences**. The one incidence where an '*extreme'* impact is anticipated would not be permanent in nature. This incidence occurs where travellers walking along Ga-Ramaroka footpaths are elevated above the vegetation line and / or breaks in the vegetation line allows for temporary views. These views would however include the existing substation and power line. It is therefore highly likely that the structures from the proposal would merge with these existing structures and become less noticeable. As stated, these views would also be temporary as the travellers pass by specific observation points along the routes. It might also be the case that travellers are not focussed on their environment and may not notice the presence of the proposal. Therefore the *insubstantial* and *moderate* ratings are accurate reflections of the overall anticipated impact.

Moderate impacts are anticipated for:

- some residents from the villages of Ga-Ramaroka and Mohlabaneng
- some travellers on connecting road between Mohlabeng and Ga-Famane
- some travellers on Ga-Ramaroka connecting roads
- some areas of Subsistence farming

When applying *extent*, *duration* and *probability* criteria as found in the significance impact assessment methodology based on DEAT's Guideline Document: EIA Regulations (1998) (Appendix B) the following conclusions can be made. The ***significance*** of the impact from the project would be:

- ***negative, medium*** for Residential and Open Space / Recreational VSRs during both construction and operational phases
- ***negative, medium – high*** for Travelling as well as Business / Occupational / Industrial VSRs during both construction and operational phases

The relative high result of the significance rating is mostly due to the duration of the project life.

No night time impacts are anticipated from this project.

Mitigation measures would mostly be effective during construction and decommissioning phases when dust clouds would arise from the activities and clearing of vegetation and structures would expose bare soil.

7 REFERENCES & RESOURCES

7.1 References

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7.2 Other Resources

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13. https://beeteeprojects.co.za/with-the-variety-of-power-lines-are-there-a-variety-of-bird-guards/
14. http://citizen.co.za/796540/youngest-rain-queen-soon-to-rule/
15. http://www.saexplorer.co.za
16. https://en.wikipedia.org/wiki/Greater_Letaba_Local_Municipality
17. https://en.wikipedia.org/wiki/Limpopo
18. https://en.wikipedia.org/wiki/Lobedu_people
19. https://en.wikipedia.org/wiki/Mopani_District_Municipality
20. https://en.wikipedia.org/wiki/Rain_Queen
21. https://en.wikipedia.org/wiki/Tzaneen
22. http://iinfo.co.za/
23. http://www.ferroxholdings.com/overview
24. http://www.southafrica.net/blog/en/posts/entry/the-misty-magical-story-of-modjadji-the-rain-queen1

APPENDIX A
REFINED METHODOLOGY

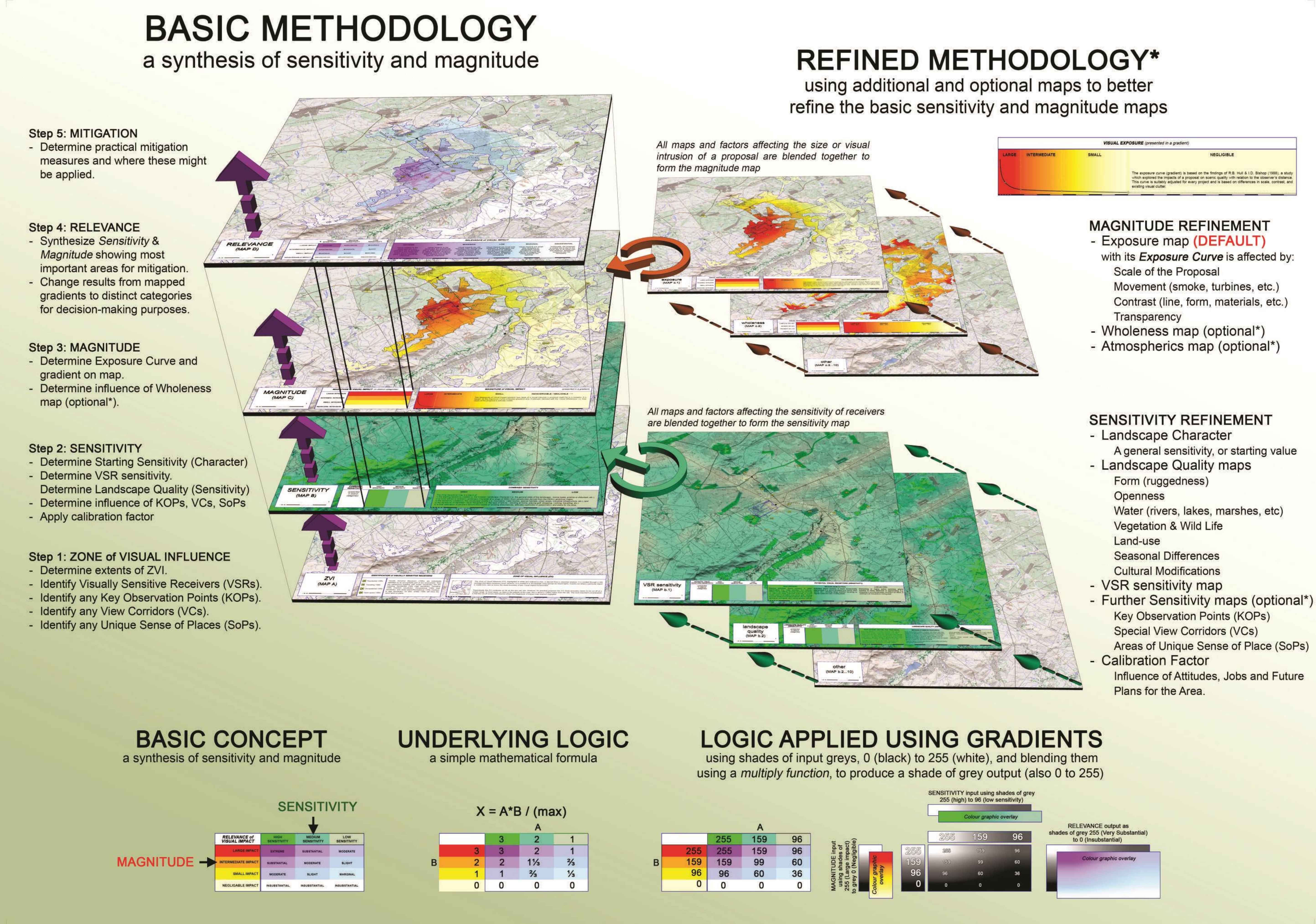


Figure 11: Refined Methodology

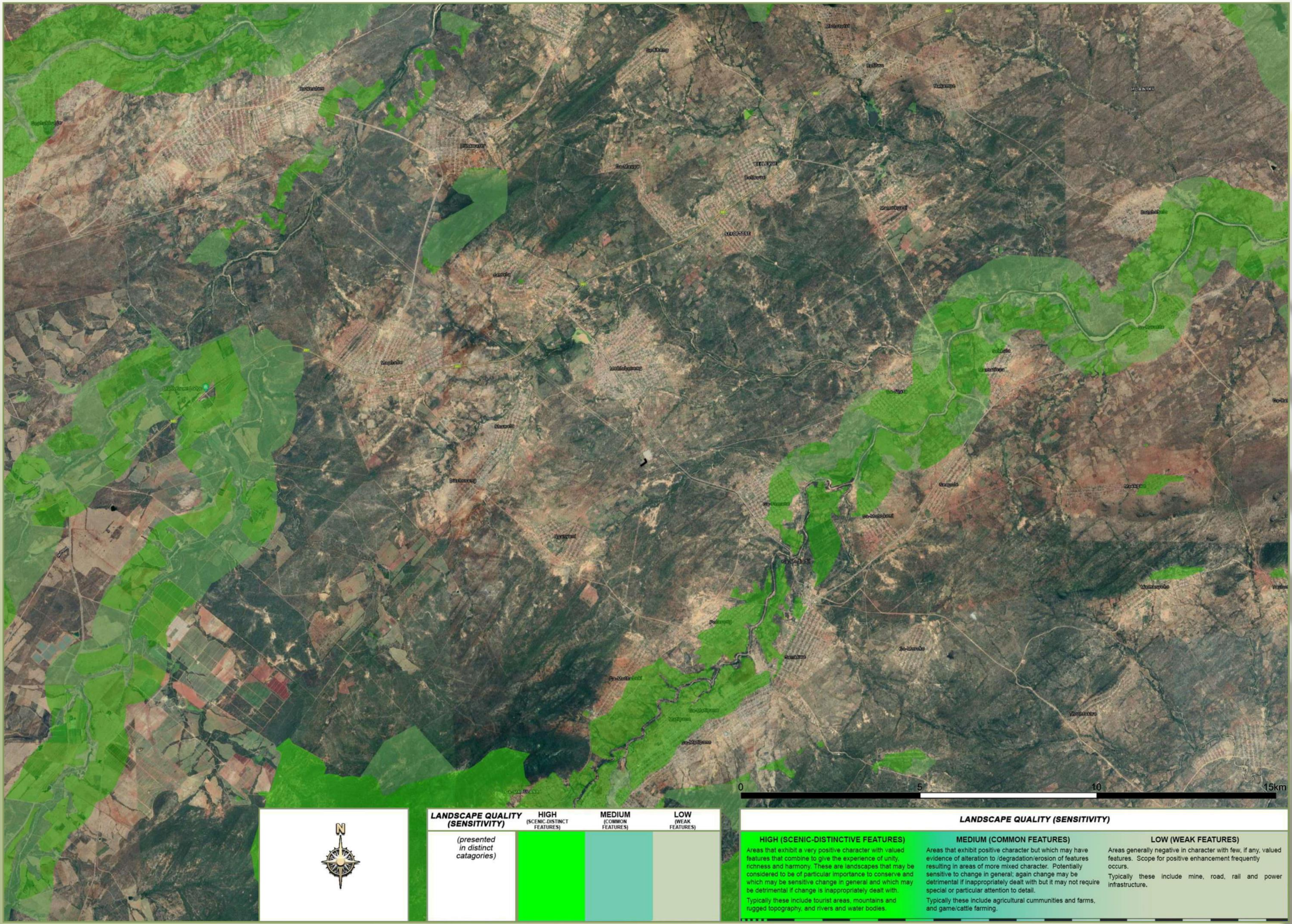
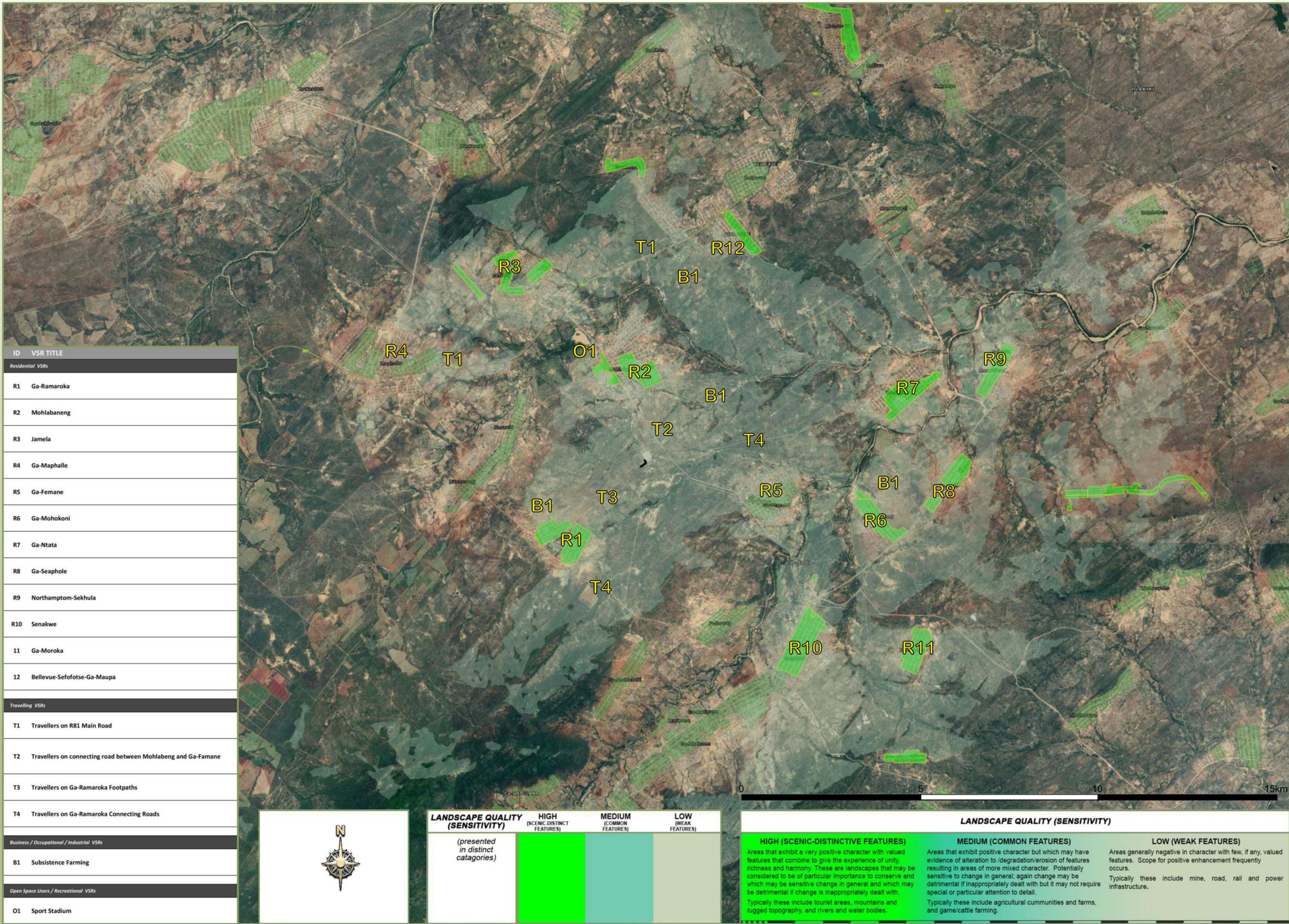


Figure 12a Landscape Quality



ID	VSR TITLE
Residential VSRs	
R1	Ga-Ramaroka
R2	Mohlabaneng
R3	Jamela
R4	Ga-Maphalle
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R7	Ga-Ntata
R8	Ga-Seaphole
R9	Northamptom-Sekhula
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Travelling VSRs	
T1	Travellers on R81 Main Road
T2	Travellers on connecting road between Mohlabeng and Ga-Famane
T3	Travellers on Ga-Ramaroka Footpaths
T4	Travellers on Ga-Ramaroka Connecting Roads
Business / Occupational / Industrial VSRs	
B1	Subsistence Farming
Open Space Users / Recreational VSRs	
O1	Sport Stadium

Figure 12b VSR Sensitivity:

APPENDIX B
SIGNIFICANCE OF IMPACTS (EIA)

APPENDIX B – ENVIRONMENTAL IMPACT DETERMINATION AND EVALUATION

The following impact assessment methodology is as described by the EAP.

An environmental impact is defined as a change in the environment, be it the physical/chemical, biological, cultural and or socio-economic environment. Any impact can be related to certain aspects of human activities in this environment and this impact can be either positive or negative. It could also affect the environment directly or indirectly and the effect of it can be cumulative.

1. METHODOLOGY TO ASSESS THE IMPACTS

To assess the impacts on the environment, the process will be divided into two main phases namely the Construction phase and the Operational phase. The activities, products and services present in these two phases will be studied to identify and predict all possible impacts.

In any process of identifying and recognising impacts, one must recognise that the determination of impact significance is inherently an anthropocentric concept. Duinker and Beanlands, (1986) in DEAT 2002. Thompson (1988), (1990) in DEAT 2002 stated that the significance of an impact is an expression of the cost or value of an impact to society.

However, the tendency is always towards a system of quantifying the significance of the impacts so that it is a true representation of the existing situation on site. This will be done by using where ever possible, legal and scientific standards which are applicable

The significance of the aspects/impacts of the process will be rated by using a matrix derived from *Plomp* (2004) and adapted to some extent to fit this process. These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The consequence matrix use parameters like severity, duration and extent of impact as well as compliance to standards. Values of 1-5 are assigned to the parameters that are added and averaged to determine the overall consequence. The same process is followed with the likelihood that consists of two parameters namely frequency and probability. The overall consequence and the overall likelihood are then multiplied to give values ranging from 1 to 25. These values as shown in the following table are then used to rank the significance. It must be said however that in the end, a subjective judging of an impact can still be done, but the reasons for doing so must be qualified.

Table 7: Significance Ratings (Plomp 2004)

Significance	Low -	Low-Medium -	Medium -	Medium-High -	High -
Overall Consequence X Overall Likelihood	1-4.9	5-9.9	10-14.9	15-19.9	20-25

Significance	Low +	Low-Medium +	Medium +	Medium-High +	High +
Overall Consequence X Overall Likelihood	1-4.9	5-9.9	10-14.9	15-19.9	20-25

DESCRIPTION OF THE PARAMETERS USED IN THE MATRIXES

Severity:

Low	Low cost/high potential to mitigate. Impacts easily reversible, non-harmful insignificant change/deterioration or disturbance to natural environments
Low-medium	Low cost to mitigate Small/ potentially harmful Moderate change/deterioration or disturbance to natural environment.
Medium	Substantial cost to mitigate. Potential to mitigate and potential to reverse impact. Harmful Significant change/ deterioration or disturbance to natural environment
Medium-high	High cost to mitigate. Possible to mitigate Great / Very Harmful Very significant change/deterioration or disturbance to natural environment
High	Prohibitive cost to mitigate. Little or no mechanism to mitigate. Irreversible. Extremely Harmful Disastrous change/deterioration or disturbance to natural environment

Duration:

Low	Up to one month
Low-medium	One month to three months
Medium	Three months to one year
Medium-high	One to ten years
High	Beyond ten years

Extent:

Low	Within footprint area
Low-medium	Whole of site
Medium	Adjacent properties
Medium-high	Communities around site
High	Municipal area

Frequency:

Low	Once/more a year or once/more during operation
Low-medium	Once/more in 6 months
Medium	Once/more a month
Medium-high	Once/more a week
High	Daily

Probability:

Low	Almost never/almost impossible
Low-medium	Very seldom/highly unlikely
Medium	Infrequent/unlikely/seldom
Medium-high	Often/Regularly/Likely/Possible
High	Daily/Highly likely/definitely

Compliance:

The following criteria are used during the rating of possible impacts.

Low	Best Practise
Low-medium	Compliance
Medium	Non-compliance/conformance to policies etc. - internal
Medium-high	Non-compliance/conformance to legislation etc. - external
High	Directive, prosecution of closure or potential for non-renewal of licences or rights

2. ASSESSMENT CRITERIA

Table 8: Impact Assessment Criteria

Nature of impact This is an appraisal of the type of effect the proposed activity would have on the affected environmental component. The description should include what's being affected and how.		
Extent		
The physical and spatial size of the impact.	**Site**	The impact could affect the whole, or a measurable portion of the above-mentioned properties.
	Local	The impacted area extends only as far as the activity, e.g. a footprint.
	Regional	The impact could affect the area including the neighbouring farms, the transport routes and the adjoining towns.
Duration		
The lifetime of the impact; this is measured in the context of the lifetime of the base.	**Short term**	The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than any of the phases.
	Medium term	The impact will last up to the end of the phases, where after it will be entirely negated.
	Long term	The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter.
	Permanent	The only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.
Intensity		
	Low	The impact alters the affected environment in such a way that the natural processes or functions are not affected.
	Medium	The affected environment is altered, but function and process continue, albeit in a modified way.
	High	Function or process of the affected environment is disturbed to the extent where it temporarily or

		permanently ceases.
Probability		
The likelihood of impacts occurring. Impact may occur for any length of time during the life cycle of activity and not at any given time.	**Improbable**	The possibility of the impact occurring is very low, due either to the circumstances, design or experience.
	Probable	There is a possibility that the impact will occur to the extent that provisions must be made therefore.
	Highly probable	It is most likely that the impacts will occur at some or other stage of the development. Plans must be drawn up before the undertaking of the activity.
	Definite	The impact will take place regardless of prevention plans, and there can only be relied on mitigation actions or contingency plans to contain the effect.
Determination of Significance		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.	**No significance**	The impact is not substantial and does not require any mitigation action.
	Low	The impact is of little importance, but may require limited mitigation.
	Medium	The impact is of importance and therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
	High	The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

The general approach to this study has been guided by the principles of Integrated Environmental Management (IEM). In accordance with the IEM Guidelines issued by the DEA, an open, approach, which encourages accountable decision-making, was adopted.

The principles of the IEM require:

- informed decision-making;
- accountability for information on which decisions are made;
- a broad interpretation of the term “environment”;
- an open participatory approach in the planning of proposals;
- consultation with I&APs;
- due consideration of alternatives;

- an attempt to mitigate negative impacts and enhance positive impacts of proposals;
- an attempt to ensure that social costs of developments are outweighed by the social benefits;
- democratic regard for individual rights and obligations;
- compliance with these principles during all stages of the planning, implementation and decommissioning of proposals; and
- the opportunity for public and specialist input in the decision-making process.

The study is also guided by the requirements of the EIA Regulations in terms of the NEMA. The NEMA EIA Regulations, which are more specific in their focus than the IEM principles, define the detailed approach to the EIA process.

APPENDIX C
CAMERA LOCATIONS

Camera Locations

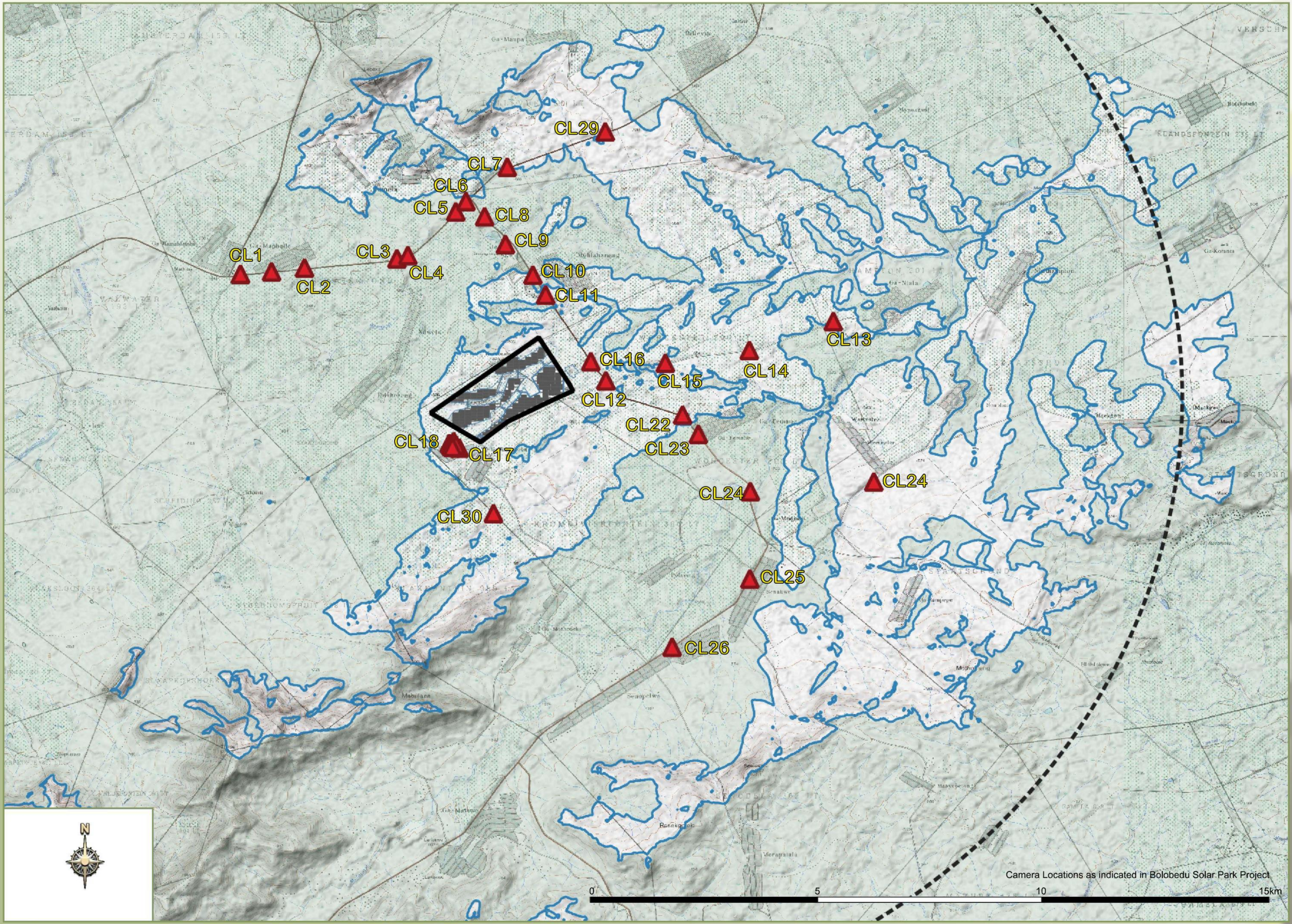

Figure 13: Camera Locations (CL)