GRID CONNECTION INFRASTRUCTURE FOR WITFONTEIN POWERLINE 1 NEAR VILJOENSKROON

FREE STATE PROVINCE

DRAFT VISUAL IMPACT ASSESSMENT REPORT

September 2023

Prepared for

GENERAL INFORMATION

Report name:	Draft Visual Impact Assessment Report for the Grid Connection Infrastructure for Witfontein Solar PL 1 near Viljoenskroon, Free State Province Draft 1 – September 2023
Specialist:	Green Tree Environmental Consulting 7 Dublin Street Rangeview Ext 2 Krugersdorp Gauteng 082 409 0405 yonanda@gtec.net.za
Client:	Witfontein Solar PL 1 (Pty) Ltd
Environmental Consultant:	Solis Environmental
Report Compiled by:	Yonanda Martin CV attached as Annexure A
Date of the Site Visit:	20 July 2023
Date of Report:	3 September 2023 – Draft VIA Report

DECLARATION OF INDEPENDENCE

I, Yonanda Martin, appointed specialist responsible for compiling the Visual Impact Assessment Report declare that I: -

- act as an independent consultant, my conclusions are formed independently and without influence from external parties.
- I will perform the work relating to this report in an objective manner, even if the results and findings are not favourable to the applicant.
- have no financial interest in Solis Environmental and Witfontein Solar PL 1 (Pty) Ltd or any of its subsidiaries.
- do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed.
- undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document, and
- based on information provided to me by the project proponent, and in addition to information obtained during the course of this study and the site visit, will present the results and conclusion within the associated document to the best of my professional judgment.

Signed:

Date: 2022/04/18

SPECIALIST REPORTING REQUIREMENTS

Specialist Reporting Requirements According to Appendix 6 of the National Environmental Management Act (Act 107 of 1998), Environmental Impact Assessment Regulation 2014 (as amended on 7 April 2017)	
Requirement	**Relevant section in report**
Details of the specialist who prepared the report	Appendix A
The expertise of that person to compile a specialist report including a curriculum vitae	Appendix A
A declaration that the person is independent in a form as may be specified by the competent authority	Page iii
An indication of the scope of, and the purpose for which, the report was prepared;	Page 1
An indication of the quality and age of base data used for the specialist report;	N/A
A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Page 28-31 and 51-53
The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Page 8
A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Appendix B
Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure	Page 32-34
An identification of any areas to be avoided, including buffers	Page 35
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figure 23
A description of any assumptions made and any uncertainties or gaps in knowledge;	Page 1
A description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Page 37-43
Any mitigation measures for inclusion in the EMPr;	Page 45-46
Any conditions for inclusion in the environmental authorisation	Page 45-46
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Page 45-46

A reasoned opinion whether the proposed activity, activities or portions thereof should be authorised regarding the acceptability of the proposed activity or activities; and	Page 56
If the opinion is that the proposed activity, or activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Page 56
A description of any consultation process that was undertaken during the course of carrying out the study	Page 15
A summary and copies if any comments that were received during any consultation process	Page 15
Any other information requested by the competent authority.	N/A

ABBREVIATIONS, ACORNYMS AND GLOSSARY

AC	Alternating Current
BA	Basic Assessment
BESS	Battery Energy Storage System
BOS	Balance of System
CEA	Cumulative Effects Assessment
DC	Direct Current
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EP	Equator Principles
EPFI	Equator Principles Financial Institutions
Environmental impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.
I&AP	Interested and affected party
kV	Kilo Volt
Mitigate	Activities designed to compensate for unavoidable environmental damage.
MW	Megawatt
NEMA	National Environmental Management Act No. 107 of 1998
O&M	Operational & Maintenance
OHPL	Overhead Powerline
Project Area	Project area of influence
PV	Photovoltaic
REIPPP	Renewable Energy IPP Procurement Process
SAHRA	South African Heritage Resources Agency
SPP	Solar Power Plant
VIA	Visual Impact Assessment
ZoPI	Zone of Influence or Zone of Potential Influence

Change in Landscape	*Fundamental change* – dominates the view frame and experience of the receptor. *Noticeable change* – clearly visible within the view frame and experience of the receptor. *Some change* – recognisable feature within the view frame and experience of the receptor. *Limited change* – not particularly noticeable within the view frame and experience of the receptor. *Generally compatible* – Practically not visible or blends in with the surroundings.
Cumulative Effects	The summation of effects that result from changes caused by a development in conjunction with the other past, present, or reasonably foreseeable actions.
Landscape Character	The individual elements that make up the landscape, including prominent or eye-catching features such as hills, valleys, woods, trees, water bodies, buildings, and roads. They are generally quantifiable and can be easily described.
Landscape Impact	Landscape effects derive from changes in the physical landscape, which may give rise to changes in its character and how this is experienced (Landscape Institute and the Institute of Environmental Management and Assessment, 2013).
Landscape Integrity	The compatibility or similarity of the project with the qualities of the existing landscape or the 'sense of place'.
Study area/ Project Area	For the purposes of this report the Project study area refers to the proposed project footprint / project site as well as the 'zone of potential influence' (the area defined as the radius about the centre point of the project beyond which the visual impact of the most visible features will be insignificant) which is a 10,0km radius surrounding the proposed project footprint / site.
Project Footprint / Site	For the purposes of this report the Project *site* / *footprint* refers to the actual footprint of the new chute and coal stockpile and associated infrastructure.
Sense of Place (genius loci)	Sense of place is the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. *A genius locus literally means* 'spirit of the place'.
Sensitive Receptors/ Viewers	Sensitivity of visual receptors (viewers) to a proposed development.

Viewshed analysis/ Line of Sight	The two-dimensional spatial pattern created by an analysis that defines areas, which contain all possible observation sites from which an object would be visible. The basic assumption for preparing a viewshed/line of sight analysis is that the observer eye height is 1,8m above ground level. This analysis is based on worst-case scenario and doesn't take vegetation buffers or other structures into consideration.
Visual Absorption Capacity	The potential of the landscape to conceal the proposed project. VAC depends upon general topography, aspect, tree cover or other visual obstruction, elevation and distance.
Visual Exposure of the area	The geographic area from which the project will be visible, or view catchment area.
Visual Impact	Visual effects relate to the changes that arise in the composition of available views because of changes to the landscape, to people's responses to the changes, and to the overall effects with respect to visual amenity.
Visibility	The visibility of the project is based on distance from the project to selected viewpoints.
Worst-case Scenario	Principle applied where the environmental effects may vary, for example, seasonally to ensure the most severe potential effect is assessed.
Zone of Potential Visual Influence (ZoPI)	By determining the zone of potential visual influence, it is possible to identify the extent of potential visibility and views which could be affected by the proposed development. Its maximum extent is the radius around an object beyond which the visual impact of its most visible features will be insignificant primarily due to distance.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Green Tree Environmental Consulting was appointed to conduct a Visual Impact Assessment (VIA) for the proposed Grid Infrastructure Connect for Witfontein Solar Powerline (PL) 1 near Viljoenskroon, Free State Province (Figure 1 - 2: Locality Map and Figure 3: Aerial View).

Witfontein Solar PL 1 (Pty) Ltd intends to develop a photovoltaic solar facility and associated infrastructure on the Remaining extent of the Farm Witfontein No. 444, as part of the solar facility, powerlines must be constructed in order to form a connection to the Eskom substation. The powerline will be a 132kV overhead line with a 400m grid connection corridor. The project is situated within the Moqhaka Local Municipality, area of jurisdiction and approximately 20km northwest of the town of Viljoenskroon. The proposed 132kV overhead power line will be approximately 13.4km long and will be constructed within the identified grid connection corridor.

In terms of the National Environmental Management Act (Act 107 of 1998), with specific reference to Sections 24 and 24D, as read with GNR 517, as amended (2021), Environmental Authorisation is required for the Witfontein Solar PL 1 Project. This VIA Report will form part of the specialist reports that are required for the environmental process in order to obtain authorisation for the proposed Project. The Witfontein Solar PV 1 Project was assessed in a separate Visual Impact Assessment Report.

Objective of the Specialist Study

The main aim of the study is to ensure that the visual/aesthetic consequences of the proposed Project is understood and adequately considered in the impact assessment process. The VIA Report will be compiled in terms of Appendix 6 of the National Environmental Management Act (Act 107 of 1998): Environmental Impact Assessment Regulations 2014 (amended 2017).

Terms and Reference

A specialist study is required to assess the potential visual impacts arising from the Project and therefore the following terms of reference was established:

- Conduct a field survey of the proposed project area and photograph the area from sensitive viewing points (site visit was undertaken on 20 July 2023).
- Comment on the potential impact of the proposed Project and its cumulative effects.
- Provide possible mitigation measures.
- Make a reasoned opinion whether the proposed activity, activities or portions thereof should be authorised regarding the acceptability of the proposed activity or activities.

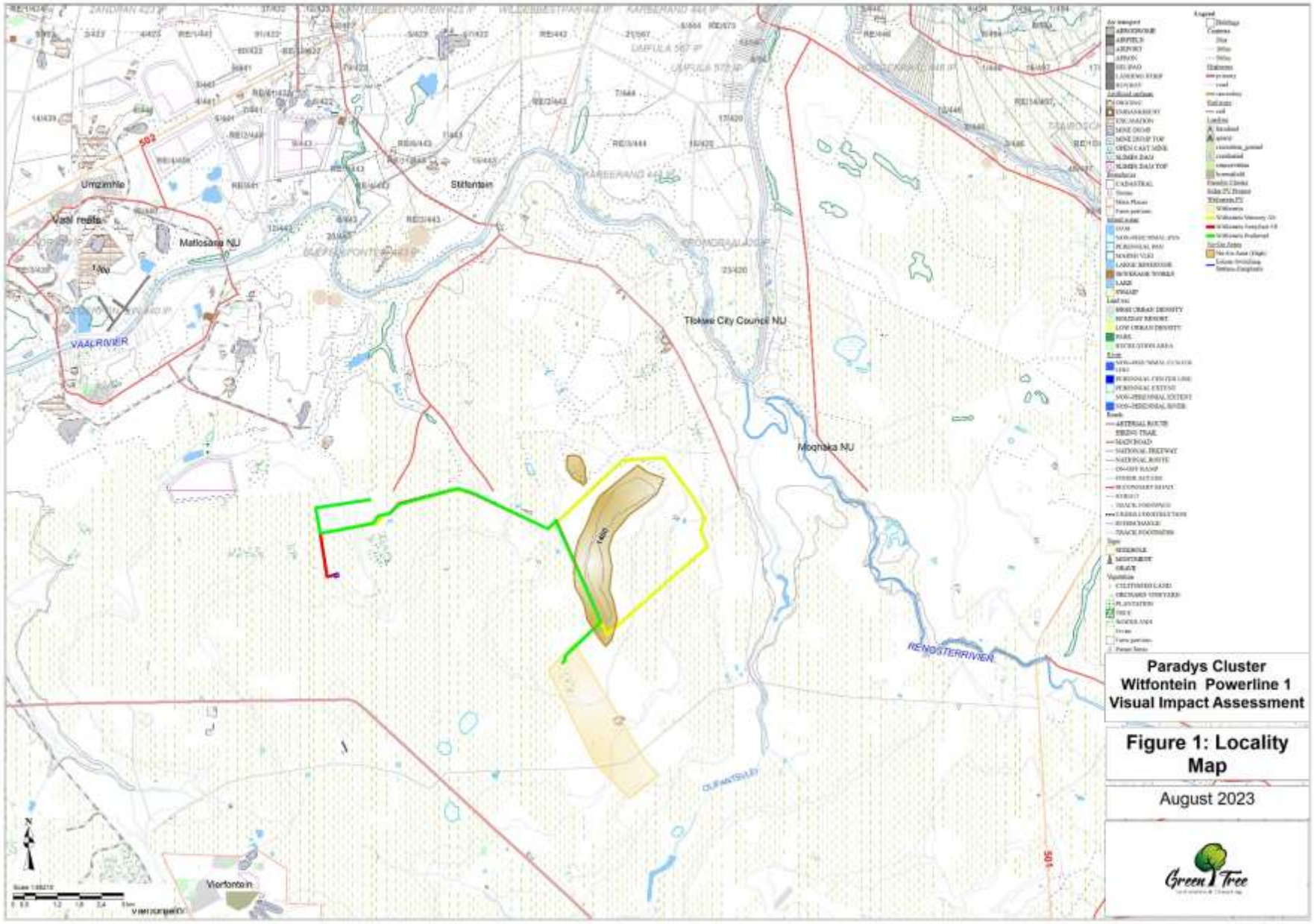
Assumption, Uncertainties and Limitations

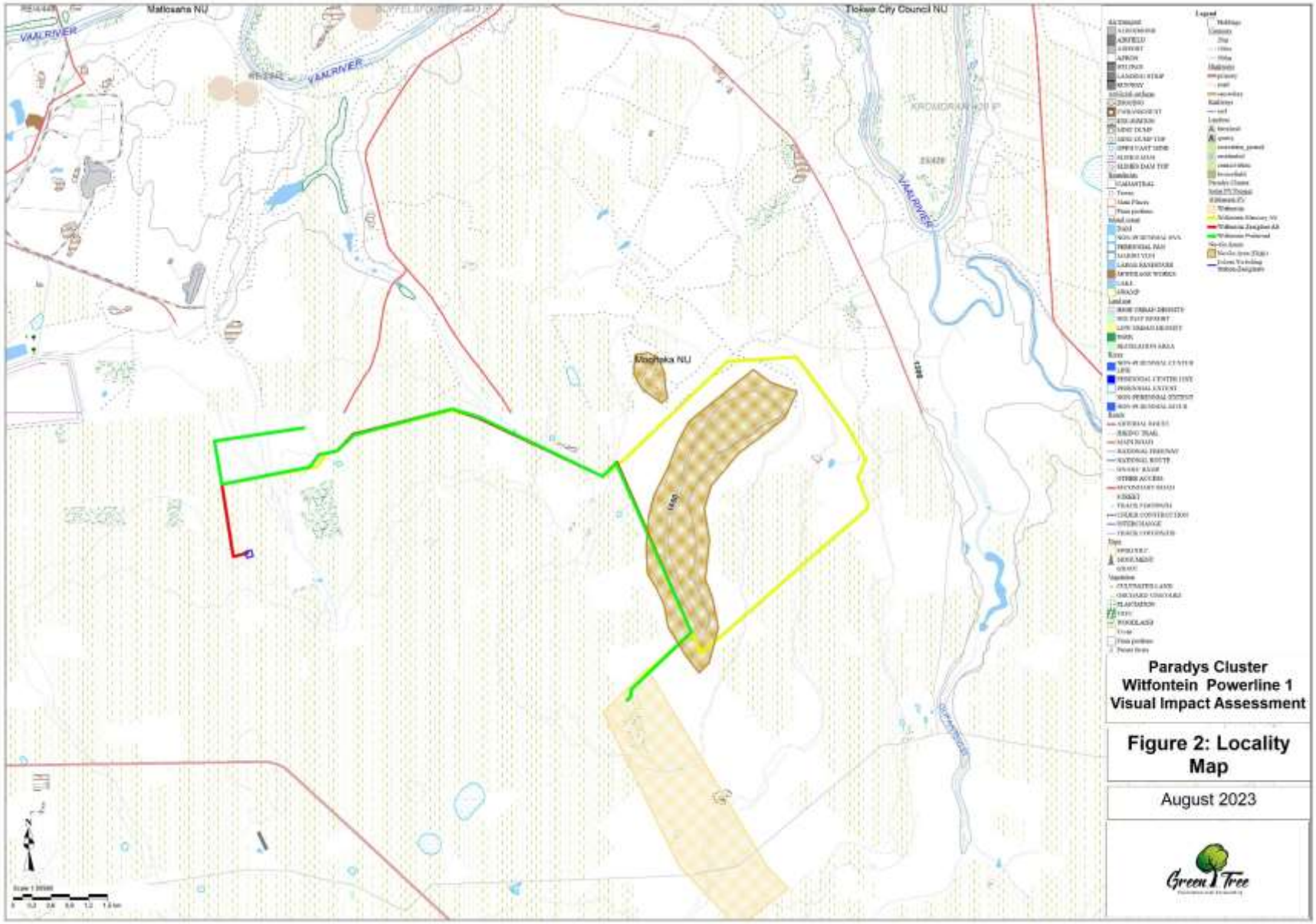
The following assumptions limitations have been made in the study:

- The extent of the study area is determined by the zone of potential influence, which in this study

relates to a radius of 10km around the Project site. At 5km and beyond the Project would recede into background views and or be screened by existing buildings, vegetation, topography or infrastructure;

- The viewshed analysis/ line of site was determined by looking at the topography of the area, the viewshed doesn't take the plant cover into consideration.
- It was assumed that the residential dwellings surrounding the proposed Project was occupied, unless otherwise confirmed during the site visit.
- There are no people located within the footprint of the Project. Should there be people located within the servitude or the Project footprint, they will be relocated. At this stage there is however no indication that anybody will be relocated.
- The description of project components is as per the information provided by the Environmental Assessment Practitioner.
- During the compilation of this report the public participation has commenced but there were no comments and or concerns from the interested and affected parties. The comments from the interested and affected parties will be considered once received.


Umzimhle
Vaal reefs
Matlosana NU
Stilfontein
Tlokwe City Council NU
Moqhaka NU
VAALRIVER
RENOSTERRIVIER
Viljoenskroon
Viljoenskroon
Paradys Cluster
Witfontein Powerline 1
Visual Impact Assessment
Figure 1: Locality Map
August 2023


Matlosana NU
Tlokwe City Council NU
VAALRIVER
VAALRIVER
VAALRIVER
Mooiplaas NU
Paradys Cluster
Witfontein Powerline 1
Visual Impact Assessment
Figure 2: Locality Map
August 2023
Green Tree

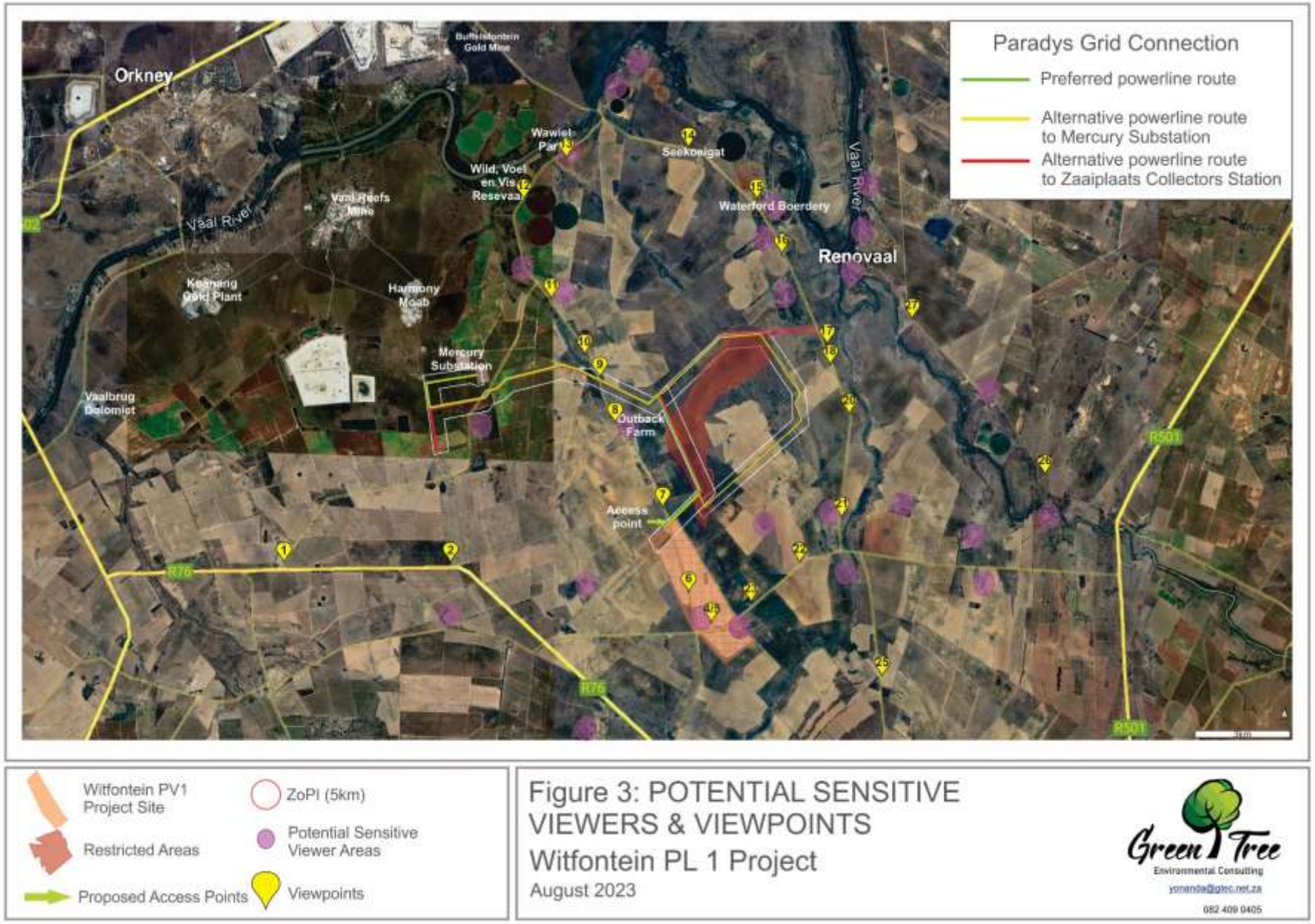


Figure 3: POTENTIAL SENSITIVE VIEWERS & VIEWPOINTS
Witfontein PL 1 Project
August 2023

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LEGISLATION AND GUIDELINES

This report adheres to the following legal requirements and guideline documents.

National Environmental Management Act (Act 107 of 1998), EIA Regulations

The specialist report is in accordance to the specification on conducting specialist studies as per Government Gazette (GN) R 982 of the National Environmental Management Act (NEMA) Act 107 of 1998. The mitigation measures as stipulated in the specialist report can be used as part of the Environmental Management Programme (EMPr) and will be in support of the Environmental Impact Assessment (EIA) and Appendix 6 of the EIA Regulations 2014 (amended 2017).

The National Heritage Resources Act (25 of 1999)

The Act is applicable to the protection of heritage resources and includes the visual resources such as cultural landscapes, nature reserves, proclaimed scenic routes and urban conservation areas.

Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)

Although the guidelines were specifically compiled for the Province of the Western Cape, they provide guidance that is appropriate for any EIA process. The Guideline document also seeks to clarify instances when a visual specialist should get involved in the EIA process.

METHODOLOGY

Methodology

The following method was used:

- Site visit: A field survey was undertaken (20 July 2023) to document the receiving environment.
- Project components: The physical characteristics of the project components will be described and illustrated based on information supplied by the Environmental Assessment Practitioner.
- The landscape character of the study area will be described. The description of the landscape focused on the nature and character of the landscape rather than the response of a viewer.
- The visual resource/ scenic quality of the area will be determined by looking at the quality of the landscape.
- The sense of place of the study area will be described as to the uniqueness and distinctiveness of the landscape.
- The visual impact will be determined looking at the sensitivity of the visual receptors/ viewers, the visual exposure, visibility, and the visual absorption capacity.
- The significance of the visual impact will be determined by using the criteria provided by the Environmental Assessment Practitioner.
- A line of sight/ viewshed analysis will be generated to illustrate the visibility and visual exposure of the proposed project.
- Mitigation measures will be suggested that will form part of the EMPr.

The Approach and Methodology used for the Visual Impact assessment is based on work and research done by Graham Young, the Guidelines for Landscape and Visual Impact Assessment (Landscape Institute and Institute of Environmental Management, 2013) and the Guidelines issued by Western Cape Province (2005), Refer to Appendix B.

PROJECT DESCRIPTION

The following Project description was provided by the Environmental Assessment Practitioner.

For the authorised Witfontein Solar PV 1 to connect to the electrical grid, requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation (i.e., collector substation) will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. A substation has been authorised to step the voltage up to 132kV, after which the power will be evacuated into the national grid via the Zaaiplaats collector substation and the power line. The existing Eskom lines with capacity and Eskom Switching stations of other Mulilo projects currently under development is considered as the feasible connection point:

- Construction Phase:

  The proposed 132kV overhead power line will be approximately 13.4km long and will be constructed within the identified grid connection corridor. The minimum vertical clearance to buildings, poles and structures not forming part of the power line must be 3.8m, while the minimum vertical clearance between the conductors and the ground is 6.7m. The minimum distance between trees and shrubs and any bare phase conductor of a 132kV power line must be 4m, allowing for the possible sideways movement and swing of both the power line conductor and the tree or shrub. The structure to be utilised for the power line towers will be informed by the local geotechnical and topographical conditions as well as by specific requirements from Eskom. The construction of the proposed overhead power line and collector substation(s)will take approximately 12 months to complete. Following the Commercial Operation Date (COD) of the authorised Witfontein Solar PV the applicant will hand over the powerline and the associated infrastructure (i.e. substation and service road) to Eskom Holdings SOC Ltd (Eskom) to operate and maintain. This is in line with Eskom's well-established Self Build Grid Connection Strategy for Renewable Energy Projects developed under the REIPPP Procurement Programme.

- Operation Phase:

  The proposed power line and associated servitude will require routine maintenance throughout

- Decommissioning Phase:

  The photovoltaic solar power plant has a lifespan of between 20 and 25 years from where the facility and its associated infrastructure will be decommissioned or upgraded. If the solar plant is not decommissioned the power line is expected to have a lifespan of more than 40 years (with maintenance) and the infrastructure will only be decommissioned once it has reached the end of life, or if no longer required. Upon decommissioning, the power line would be disassembled, and the components removed from site, and recycled where possible, in line with the Environmental Management Programme EMP.

Table 1: Technical details for the proposed facility

Component	Description / dimensions
Properties	Powerline: • Remaining Extent Bresiefontein No.173 • Portion 1 of Kleinfontein No. 369 • Remaining Extent of Uitval No. 457 • RE of Farm Smaldeel No. 157. • Remaining Extent of Paradys No. 137 • Portion 1 of Jackalsfontein 443 • Remaining Extent of Vlakfontein No. 15 • Remaining Extent of Zaaiplaats No. 190 • Portion 2 of Zaaiplaats No. 190 • Portion 3 of Zaaiplaats No. 190 • Remaining Extent of Witfontein No. 444 • Portion 1 of Mooiwater No. 408
Type of technology	132 kV single circuit/ double circuit overhead power line
Structure Height	Powerline ~32m
Length of the power line	Approximately 13.4km long
Grid connection corridor width	400m wide on average
Collector Substation capacity	132kV
Structure orientation	Ha
Servitude width	31m
Surface area to be covered	ha
Service road	Internal roads~6m wide


Mercury Substation
Zaaiplaats Collector
Paradys Grid Connection
Preferred powerline route
Alternative powerline route to Mercury Substation
Alternative powerline route to Zaaiplaats Collectors Station
Witfontein PV 1 Project Site
Restricted Areas
Gridline
Proposed Access Points
Laydown Area
Diesel Storage Area
BESS Area
O&M Building
IPP Substation
Eskom Switching Station
Figure 4: SITE LAYOUT PLAN
Witfontein PL 1 Project
August 2023
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CONSIDERATION OF ALTERNATIVES

The Department of Environmental Affairs and Tourism (DEAT) 2006 Guidelines on 'assessment of alternatives and impacts' proposes the consideration of four types of alternatives namely, the no-go, location, activity, and design alternatives. It is, however, important to note that the regulation and guidelines specifically state that only 'feasible' and 'reasonable' alternatives should be explored. It also recognizes that the consideration of alternatives is an iterative process of feedback between the developer and EAP, which in some instances culminates in a single preferred project proposal. An initial site screening was conducted by the developer the affected properties and the farm portions were found favorable due to its proximity to grid connections, solar radiation, ecology and relative flat terrain. These factors were then taken into consideration and avoided as far as possible.

The following alternatives were considered in relation to the proposed activity and all specialists should also make mention of these:

No-go alternative

This alternative considers the option of 'do nothing' and maintaining the status quo. The site is currently zoned for agricultural land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for agricultural purposes. The potential opportunity costs in terms of alternative land use income through rental for energy facility and the supporting social and economic development in the area would be lost if the status quo persist.

Location alternatives

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the power line. Only one route alternative is being considered since this is considered a the most feasible and shortest route to connect the Solar PV to the National Grid. The proposed powerline is approximately 13.4km long, and the proposed route of the power line is the shortest route from the authorised on-site substation(s)to the National Grid.

Design and layout alternatives

1. Collector Substation Alternative Locations:

Within the grid connection corridor, two collector substation location options are being considered for development. These are all located within the northern section of the grid connection, and each has a capacity of 132kV and will be ~2.5ha in extent.

The choice of pylon structure to be used for the power line will be determined in consultation with Eskom and does not significantly affect the environmental impacts of the proposed development as provision has already been made for the visual, avifauna, ecological and heritage impacts of erecting a power line. No defined structure has been confirmed at this stage and will depend on Eskom's technical requirements. The proposed 132kV line must be constructed according to the authorised standards for

a power line approved by Eskom Holdings SoC Ltd. The structure to be utilised for the power line towers will also be informed by the local geotechnical and topographical conditions. The following alternatives are considered with regards to the proposed structures:

2. Steel lattice towers:

The steel lattice towers provide the following advantages over the other tower types available:

- Enables multipath earthing which enhances the overall electrical performance of the powerline.
- Is visually less obtrusive than the mono-pole option
- Is more practicable that other options i.e. more cost effective and more practical to construct and maintain.
- Is safer to work on than the monopole and wood pole structures.
- Is more durable than the wood pole structures.

3. Steel monopoles:

The steel monopole is considered less suitable than the steel lattice towers for the following reasons:

- Is visually more intrusive than the lattice towers.
- Is more expensive than the lattice towers.
- Requires more steel than the lattice towers.
- Is more difficult to erect.
- Is not as safe to work on as the lattice towers.

4. Wood poles:

Wood pole structures are only used in extreme circumstances where a visual impact needs to be avoided. Wood pole structures may be cheaper to produce and to construct, but they have one tenth of the lifespan of the metal counterparts and are far more susceptible to weather conditions which makes them less efficient and practicable. The wood pole structure is also more susceptible to having the cross arms burnt off by electrical faults as well as being susceptible to deformation with height.

Technology alternatives

The powerline will be constructed within the identified grid connection corridor towards the existing Eskom Mercury Substation. The 132kV overhead powerline is the only preferred alternative for the evacuation of the generated electricity due to the following reasons:

1. Overhead Transmission Lines-Overhead lines are less costly to construct than underground lines. Therefore, the preference with overhead lines is mainly on the grounds of cost. Overhead lines allow high voltage operations and the surrounding air provides the necessary electrical insulation to earth. Further, the surrounding air cools the conductors that produce heat due to lost energy (Swingler et al, 2006).

The overall weather conditions in the Free State Province are less likely to cause damage and faults on the proposed overhead transmission power line. Nonetheless, if a fault occurs, it can be found quickly by visual means using a manual line patrol. Repair to overhead lines is relatively simple in most cases and the line can usually be put back into service within a few days. In terms of potential impacts caused by overhead transmission lines include visual intrusion and threats to sensitive habitat (where applicable).

The choice of structure to be used for the power line will be determined in consultation with Eskom once the Engineers have assessed the geotechnical and topographical conditions and decided on a suitable structure which meets the prescribed technical requirements. The choice of structures to be used will not have any adverse impacts on the environment. The line will be constructed according to the authorised standards for a power line approved by Eskom Holdings SoC Ltd.

2. Underground Transmission Lines-Underground cables have generally been used where it is impossible to use overhead lines for example because of space constraints. Underground cabling of high voltage power lines over long distances is not considered a feasible or environmentally practicable alternative for the following reasons:
    - Underground cabling will incur significantly higher installation and maintenance costs.
    - It is more difficult and takes longer to isolate and repair faults on underground cables.
    - There is increased potential for faulting at the transition point from underground cable to overhead power line.
    - Underground cables require a larger area to be disturbed during construction and maintenance operations and hence have a bigger environmental disturbance footprint.
    - Underground cabling requires the disturbance of a greater area when it comes to agriculture and other compatible land uses as the entire servitude becomes available for use as opposed to just the area around the towers.

The use of an underground power line is not feasible for the proposed project due to the length of the line, which is ~9.2km long.

The following alternatives may be considered for **the overhead power line.**

1. Single Circuit Overhead Power Line

The use of single circuit overhead power lines to distribute electricity is considered the most appropriate technology and has been designed over many years for the existing environmental conditions and terrain as specified by Eskom Specifications and best international practice. Based on all current technologies available, single circuit overhead power lines are considered the most environmentally practicable technology available for the distribution of power. This option is considered appropriate for the following reasons:

- More cost-effective installation costs
- Less environmental damage during installation
- More effective and cheaper maintenance costs over the lifetime of the power line.

The use of a single-circuit power line is considered for the proposed project as it will meet the requirements to evacuate the generated solar electricity from the one Solar PV to the national grid.

2. Double Circuit Overhead Power Line

Where sensitive environmental features are identified, and there is sufficient justification, Eskom will consider the use of double circuit (placing 2 power lines on either side of the same tower structure) to minimize impacts. However, the use of double-circuiting has a number of technical disadvantage Faults or problems on one power line may mean that the other power line is also disabled during maintenance, and this will affect the quality of supply to an area. Larger and taller towers as well as more towers are required for double-circuit power lines. The double-circuit overhead power line proves more feasible since the single circuit may not have the capacity to transmit the large amount of electricity generated from the plant and during maintenance the entire plant would not have to be off-line as one of the double circuit lines would still be able to supply electricity. The double circuit would also be able to accommodate more than one Solar PV.

VISUAL CONCERNS

The public participation process will be conducted by Solis Environmental. At this stage no visual concerns were received but should there be any visual concerns it will be addressed accordingly.

VISUAL CHARACTER

The Study Area

The study area is characterised by kopppies, rivers and smaller streams, farmsteads and agricultural fields, small towns, and mining activities. The koppies, rivers and streams create a rolling topography which is evident in the views captured in Figures 5 - 13 (Landscape Character). The vegetation types within the study area are characterised by Mucina and Rutherford (2006) as Rand Highveld Grassland, Vaal-vet Sandy Grassland and Highveld Salt Pans. Refer to Figures 5 – 13 for the panoramas illustrating the character and nature of the study area and Figure 3: Potential Sensitive Viewers and Viewpoints, which indicates the location of the viewing points.

The Natural Landscape

The Project area is characterised by a rolling topography which is created by the Vaal River, Renoster River, Olivantsvlei and the Paradys koppie that traverse the study site. The vegetation is a combination of grassland and bushveld trees with a medium height, as well as agricultural fields. In some sections the vegetation cover is dense, especially along the roads and surrounding the farmsteads, but most of the study area has a vegetation cover that comprise of grass and agricultural fields. The Vaal River is located to the north of the study site, with the Renoster River and Olifantsvlei located to the east and the south of the study site.

Land Use

The primary land-uses within the study area/ zone of potential influence are described in the table below.

Table 1: Land Use within the Study Area

Land Use	Description
Residential	The residential component of the study area mainly consists of farmsteads and villages where the farm workers stay. There are a few small holdings and residential units located along the Vaal and Renoster River. The bigger towns are Viljoenskroon (17km south-east), Orkney (17km north-west) and Stilfontein (18km north-west) with smaller informal settlements such as Umzimhle located approximately 16km to the north-west of the study site.
Industrial/ Mining	There is only one mine locate within the study area, Harmony Moab Mine, but there are several mines located to the north-west of the study site. The mines include Vaal Reefs Mine, Kopanang Gold Plant, Buffelsfontein Mine and Nicolor South Plant. The Vierfontein Mine is located to the south-west of the project site.

	The Mercury Substation is located to the north-west of the site.
Infrastructure	The access road to the project site is a gravel road (Vermaadrift Road). Other roads include the S643, the R501, which will form the main access road, the R76 and other farm roads that connect the farmsteads. The infrastructure includes the existing Eskom lines that traverse the study area as well as the substation located at the entrance to the Senekal Boerdery.
Institutional/Recreational	There are no institutional facilities. There are several recreational facilities, which is mainly fishing, located along the Vaal and the Renoster River. There are two schools located within the study area but from the site investigation it seemed that they are no longer in use. The schools include Klipplaat Primary School and Hwetla Primary School.
Tourism	The tourist facilities are located along the Vaal River and the following attractions were noted during the site inspection: • Wawielpark Holiday Resort – 6.9km north • Seekoeigat – 5km north • Hennie en Magda se Visvang Hoekie – 7km north-east • Renovaal – 3.8km north-east • Inyadu Lodge – 4km north • Clementia Function Venue – 7.2km north • Wild, Voël en Vis Reservaat – 6.9 north

Landscape Character Types

Landscape character types are landscape units refined from Mucina and Rutherford (2009) vegetation types, the regional physiographic and cultural data derived from 1:50 000 topographical maps, aerial photographs and information gathered on the site visit. Dominant landform and land use features (e.g., hills, rolling plains, valleys and mining areas) of similar physiographic and visual characteristics, typically define landscape character types.

Photographic panoramas are presented in Figures 5 – 13 (Landscape Character) to illustrate the nature and character of the study area's landscape. Figure 3: Sensitive Viewer Location and Viewpoints illustrates the location of the viewing points and Figure 14: Aesthetic Quality shows the spatial

distribution of the various landscape types identified within the study area. These are:

- Koppies
- Rivers/ streams
- Grassland
- Lodges or tourist accommodation
- Residential (farmsteads and workers villages)
- Agricultural fields
- Infrastructure (roads, railway and power lines)

The landscape types are discussed in terms of their visual appeal in the Section below to determine the baseline (i.e. quality of the visual resource) of the study area.

Photo 1: View from the R76 towards the proposed project site, approximately 7.4km southwest of Mercury Substation.

Photo 2: View from the R76 towards the proposed project site, approximately 5.15km southwest of mercury Substation.

Refer to Figure 3 for the location of the viewpoints.

Figure 5: LANDSCAPE CHARACTER

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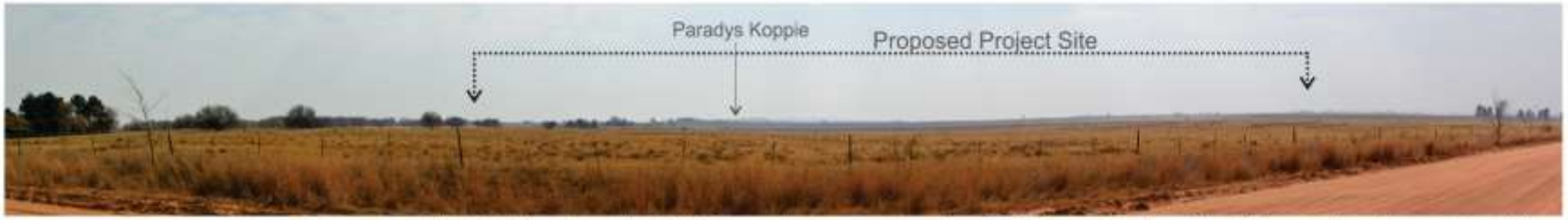

Photo 5: View from the S462 towards the proposed project site, approximately 3.4km south of the preferred line.

Photo 6: View from the Vermaasdrift Rd towards the proposed project site, approximately 2.4km south of the preferred line.

Photo A: Example of vegetation forming a screen along the S642 Rd.

Refer to Figure 3 for the location of the viewpoints.

Figure 6: LANDSCAPE CHARACTER

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Photo 7: View from the Vermaasdrift Rd towards the proposed project site, approximately 0.3km west of the preferred line.

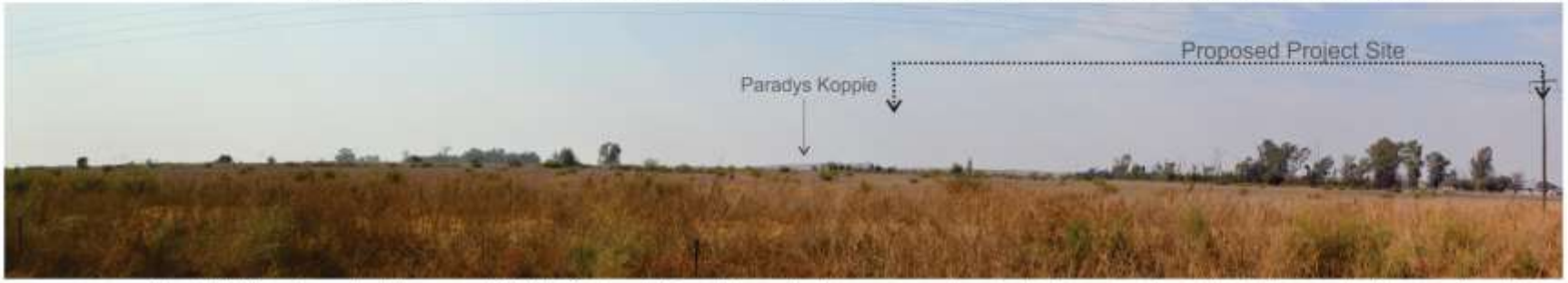

Photo 8: View from the Vermaasdrift Rd (Outback Farm) towards the proposed project site, approximately 1.4km west of the preferred line.

Photo B: View of the Mercury Substation.

Refer to Figure 3 for the location of the viewpoints.

Figure 7: LANDSCAPE CHARACTER

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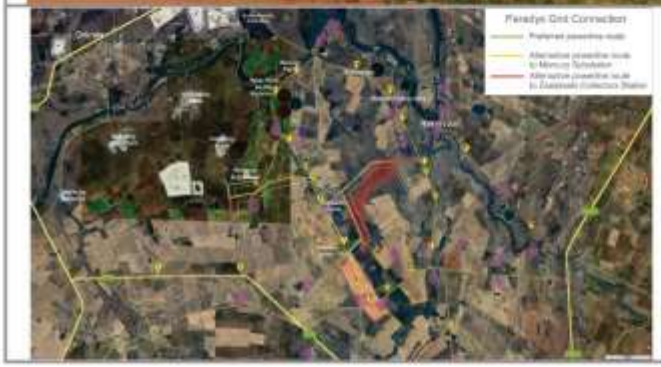
Photo 10a: View from the Vermaasdrift Rd towards the proposed project site, approximately 0.9km north of the preferred powerline.

Photo 10b: View from the current grid line and the Mercury Substation.



Refer to Figure 3 for the location of the viewpoints.

Figure 8: LANDSCAPE CHARACTER

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Photo 11: View from the Vermaasdrift Rd towards the proposed project site, approximately 1.9km north of the preferred line.

Photo 12: View from the Vermaasdrift Rd towards the proposed project site, approximately 4.8km north of the preferred line.

Refer to Figure 3 for the location of the viewpoints.

Figure 9: LANDSCAPE CHARACTER

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Photo 13: View from the Vermaasdrift Rd (Wawielpark entrance) towards the proposed project site, approximately 5.9km north of the preferred line.

Photo 14: View from the S643 (Seekoeigat) towards the proposed project site, approximately 5.3km north of the alternative line.

Photo 15: View from the S643 (Inyadu Lodge entrance) towards the proposed project site, approximately 3.6km north of the alternative line.

Refer to Figure 3 for the location of the viewpoints.

Figure 10: LANDSCAPE CHARACTER

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Photo 16: View from the S643 towards the proposed project site, approximately 2.3km north of the alternative line.

Photo 18: View from the S643 towards the proposed project site, approximately 1.3km east of the alternative line.

Photo 20: View from the S643 towards the proposed project site, approximately 1.4km east of the alternative line.

Refer to Figure 3 for the location of the viewpoints.

Figure 11: LANDSCAPE CHARACTER

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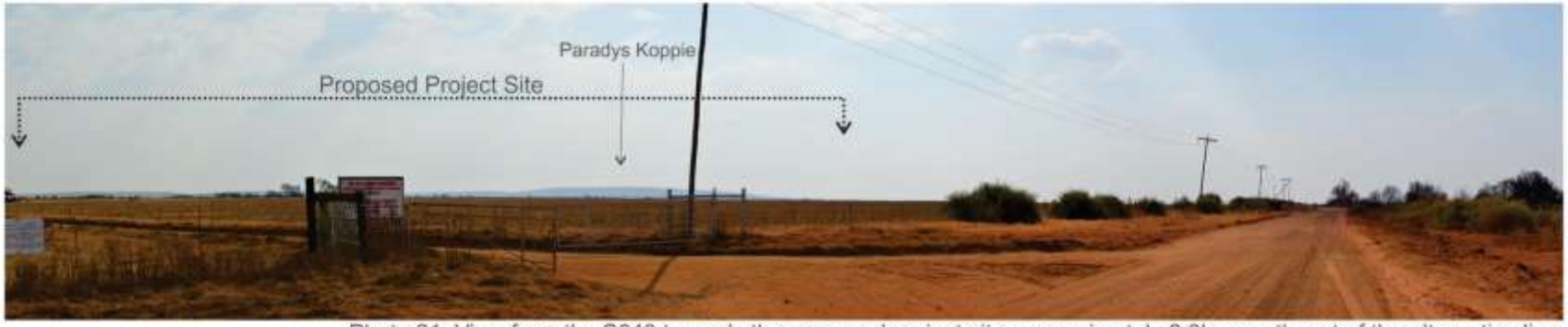

Photo 21: View from the S643 towards the proposed project site, approximately 2.8km southeast of the alternative line.

Photo 22: View from the S642 towards the proposed project site, approximately 3.2km south of the alternative line.

Photo 23: View from the S643 towards the proposed project site, approximately 4.2km south of the alternative line.

Refer to Figure 3 for the location of the viewpoints.

Figure 12: LANDSCAPE CHARACTER

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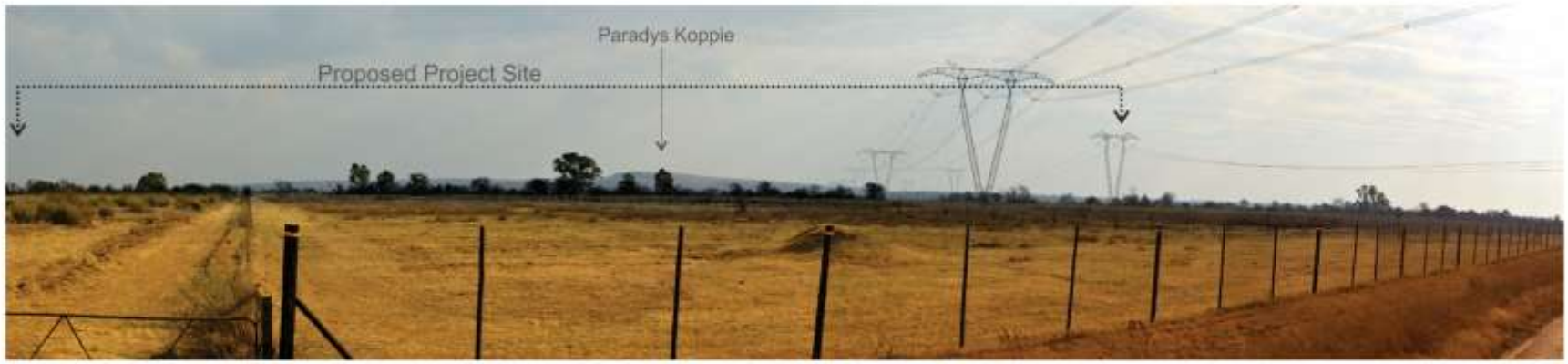

Photo 27: View from the Vermaasdrift Rd towards the proposed project site, approximately 4.3km east of the alternative line.

Refer to Figure 3 for the location of the viewpoints.

Figure 13: LANDSCAPE CHARACTER

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VISUAL RESOURCE

Visual Resource Value / Scenic Quality

The scenic/aesthetic quality of the study area is primarily derived from the combination of land-uses described above and the rolling topography created by the koppies and rivers, as illustrated in Figures 5 - 13 (Landscape Character). There are mining activities, farmsteads, workers accommodation, tourist facilities and some infrastructure that attributes to the man-made impacts of the area. Refer to Figure 14: Aesthetic Quality.

When considering the criteria as listed in Table 3: Value of Visual Resource below, an overall rating of *moderate* is allocated to the study area, this is mainly because the natural landscape has been compromised by the existing infrastructure, agricultural and mining activities. There are elements within the study area that was considered high visual resources (koppie and rivers) but the overall study area is not distinct when comparing it to the general surrounding areas. A summary of the study area's visual resource values is tabulated in Table 3: Value of Visual Resource below.

Table 3: Value of the Visual Resource

Value	Description	Visual Resource
High	This landscape type is considered to have a *high* value because it is a: Distinct landscape that exhibits a very positive character with valued features that combine to give the experience of unity, richness, and harmony. It is a landscape that may be of particular importance to conserve, and which has a strong sense of place. <u>Sensitivity:</u> It is sensitive to change in general and will be detrimentally affected if change is inappropriately dealt with.	Mountains/ Koppies: • Paradys Koppie Water bodies: • Rivers such as the Vaal, Renoster and Olifantsvlei
Moderate	This landscape type is considered to have a *moderate* value because it is a: Common landscape that exhibits some positive character, but which has evidence of alteration / degradation/ erosion of features resulting in areas of more mixed character.	Agricultural Activities • Grassland or grazing veld Lodges/ Tourist destinations: • Wawielpark Holiday Resort • Seekoeigat

	Sensitivity: It is potentially sensitive to change in general and change may be detrimental if inappropriately dealt with	• Hennie en Magda se Visvang Hoekie • Renovaal • Inyadu Lodge • Clementia Function Venue • Wild, Voël en Vis Reservaat
Low	This landscape type is considered to have a *low* value because it is a: Minimal landscape generally negative in character with few, if any, valued features. Sensitivity: It is not sensitive to change in general and change	Infrastructure • Substation • Power lines • Roads Mining: • Vaal Reefs Mine, • Kopanang Gold Plant, • Buffelsfontein Mine • Nicolor South Plant • Vierfontein Mine

(After: The Landscape Institute with the Institute of Environmental Management and Assessment, 2013)

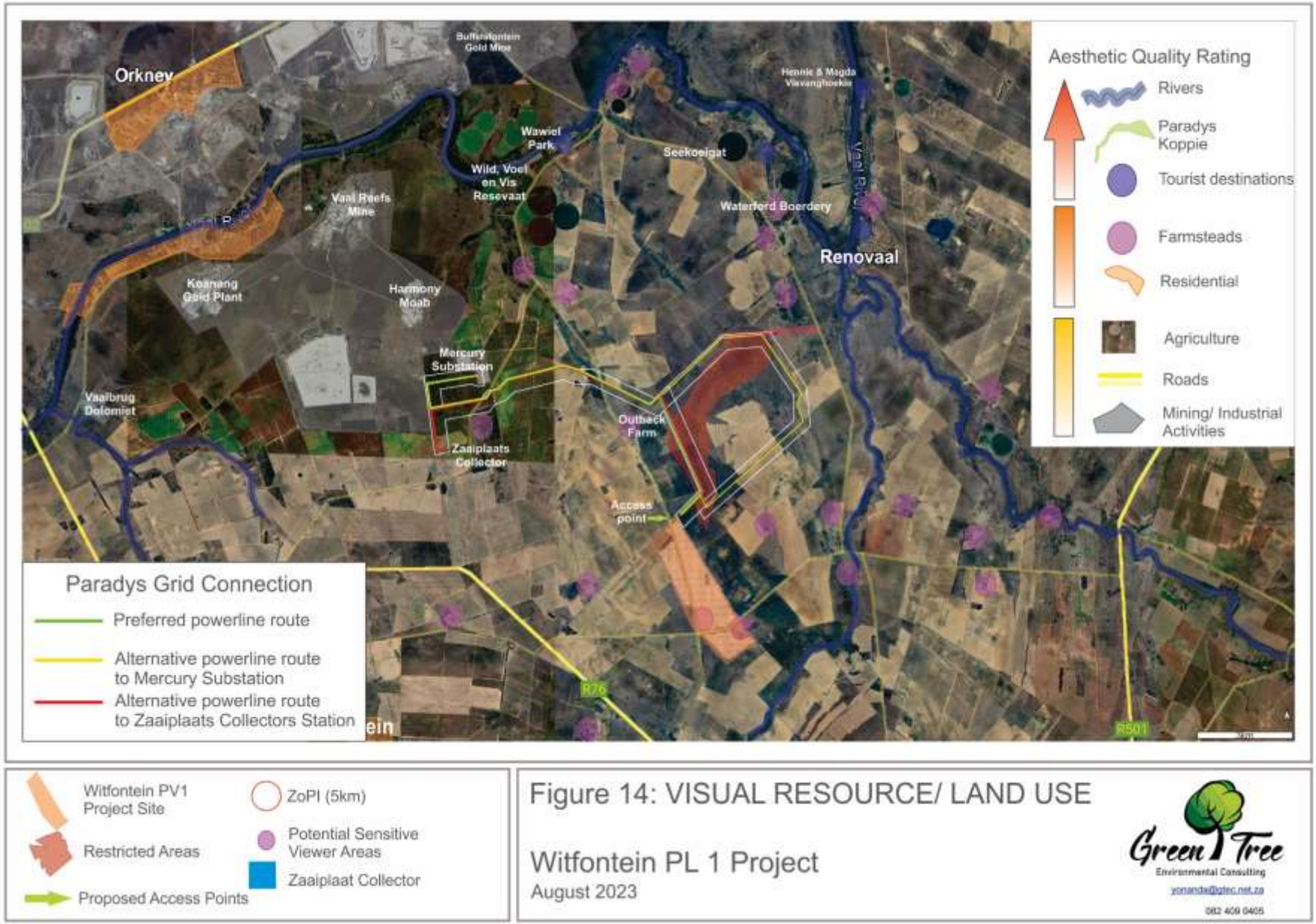

Figure 14: VISUAL RESOURCE/ LAND USE

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Sense of Place

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, or unique, or at least particular, character of its own. The sense of place for the study area derives from the combination of all landscape types and their impact on the senses. The sense of place of the study area is a rural/ farming or pastoral sense of place. The dominant landscape character is agricultural which is created by the scattered farmsteads, crop fields and grazing fields. Although there are mining activities, these activities occur on the outskirts of the project study area and is visible on the horizon.

VISUAL RECEPTORS

The sensitivity of the visual receptors/ viewers is determined by looking at the susceptibility of the visual receptors to the change that the proposed Project will bring to their views. The susceptibility of the visual receptor is a function of:

- Occupation or activity of people experiencing the view at locations; and
- The extent to which their attention or interest may therefore be focused on the views and the visual amenity they experience at locations.

The Landscape Institute with the Institute of Environmental Management and Assessment (2013) therefore suggest that the visual receptors most susceptible to change are generally likely to include:

- Residents at home.
- People who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focused on the landscape and or views.
- Visitors to heritage assets or other attractions, where views of the surroundings are an important contributor to the experience.
- Communities where views contribute to the landscape setting and enjoyed by residents in the area.

Visual receptors with a moderate susceptibility to change will include:

- Travellers on road, rail, or other transport routes.

Visual receptors that are likely less sensitive to change would include:

- People engaged in outdoor sport or recreation which does not involve or depend on appreciation of views of the landscape.
- People at their place of work whose attention may be on their work and not on their surroundings.

When considering the proposed project, the visual receptors identified during the site visit will include the following, also refer to Table 3: Potential Sensitivity of Visual Receptors below:

- Receptors located in the residential areas (farmsteads and workers accommodation).
- People visiting tourist destinations (tourist venues).
- people travelling along the local roads located within the study area.
- people traveling to and from work.

Table 3: Potential Sensitivity of Visual Receptors – the Project

Value	Type of viewer	Potential Sensitive Receptors
High	Residents that surround the study site. Photo 8 – Figure 7 Photo 11 – Figure 9 Photo 21 – Figure 12	Residents bordering the project site are considered to be more sensitive since the project will be in their foreground view. Other potential sensitive viewers include viewers from neighbouring farms or viewers located within the ZoPI.
	Tourist Photo 13 – Figure 10 Photo 14 – Figure 10 Photo 15 – Figure 10	People visiting the following tourist destinations: • Wawiel Park • Wild, Voël en Vis Reservaat • Seekoeigat • Inyandu Ldoge • Renovaal • Hennie & Magda se Visvanghoekie
Moderate	Locals and visitors travelling through the study area on the local roads. Photo 10a and 10b – Figure 8 Photo 16 – Figure 11	
Low	People working within the study area and travelling along local roads whose attention may be focused on their work or activity and who therefore may be potentially less susceptible to changes in the view.	

LANDSCAPE IMPACT

The *landscape impact* (i.e. the change to the fabric and character of the landscape caused by the physical presence of the intervention) of the proposed Project is considered ***low.*** The construction of the proposed powerline will result in the change of the landscape due to the physical presence of additional pylons. The landscape is characterised by the pastoral activities such as the farmsteads, crop and grazing fields but there are existing powerlines that traverse the area, and the proposed project will therefore not be completely out of character. The physical presence of the proposed Project will however bring a change in the landscape and will therefore have a negative landscape impact.

As stated in the approach section, the physical change to the landscape at the Project site must be understood in terms of the Project's visibility (impact on sensitive views) and its effect on the visual aesthetics of the area (impact on the baseline resource). The following sections discuss the effect that the Project could have on the visual and aesthetic environment.

VISUAL SENSITIVE/ NO-GO AREAS

Only one visual sensitive area was identified during the site inspection, the Paradys Koppie, which runs in from the north-eastern to a south-western corner of the project site. The visual sensitive area or no-go area (illustrated as brown area) includes the crest and higher laying slope of the koppie. No development should take place on these sections due to the height and the visibility of the koppie.

The higher the infrastructure or powerline are placed on the koppie (slope of the koppie), the more visible it will be to viewers surrounding the project site and the more difficult it becomes to mitigate the visual impact. There are three alternative routes for the proposed project of which the Preferred Option and the Zaaiplaats Alternative Option will run along a section of the koppie. The powerline pylons will therefore be constructed on elevated areas and be more visible.
The third alternative is the Mercury Substation Alternative which is aligned around the Paradys Koppie and along the boundary of the farms.

Figure 15: VISUAL SENSITIVE/ NO-GO AREAS
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VISUAL IMPACT

The visual impact of the proposed project will be determined by first looking at the *severity/magnitude* of the visual impact. This is determined using visibility, visual absorption capacity, landscape integrity, visual exposure and viewer sensitivity criteria. When the *severity/magnitude* of the impact is qualified with spatial, duration and probability criteria the significance of the impact can be predicted. This is done by using the Impact Assessment Criteria as provided by the Environmental Assessment Practitioner.

The visual impact of the project will be caused during the construction, when vegetation is cleared for the purpose of site establishment, stockpiling of material, the movement of heavy vehicles and machinery on site, the site office or camp site and the construction of the powerline and associated infrastructure. During the operational phase the entire Project will have an impact on the visual resource of the area. During the decommissioning phase the Project will not necessarily have a negative visual impact but will rather be a nuisance to the surrounding community due to the decommissioning of the pylons, generation of dust and heavy vehicles using the access roads. Activities associated with the Project will mostly be visible during daytime and at night it is anticipated that the visual impact will be limited to the security lights associated with the project components such as the switching station and not necessarily the powerline. The red safety lights on top of the pylons might be a nuisance during the evenings.

Sensitive Viewers and Locations

The most prominent views to the Project site would be from the farmsteads and smaller worker's villages that directly surround the Project site or falls within the first kilometre from the proposed powerlines (including all the alternatives). This will include views from the Outback Farm, the farmstead located to the north and the farmstead located directly south of the Mercury Substation. Views from here will be foreground views, as illustrated in Photo 7 and Photo 8, Figures 7. Foreground views along the Mercury Substation Alternative will include the farmstead located along the S463, the farmstead towards the east of the Witfontein Solar PV site and the farmsteads and accommodation on the Witfontein property, refer to Photo 18, Figure 11.

Other viewers with a potentially *high* sensitivity toward the Project include people visiting the area due to the aesthetic beauty of the area, this would include tourist destinations in the area. Although these viewers are sensitive viewers it should be noted that most of the tourist destinations are located along the river and therefore the views towards the proposed project will be screened by vegetation and the topography.

Visibility

The visibility of the proposed project is based on the distance from the proposed project to selected viewpoints. The 'zone of potential influence' was established at 5km, over 5km the impact of the Project's activities would have diminished as the project will recede into the background and/or views

to the site would be screened by vegetation, the rolling topography and existing residential/urban structures.

It is clear from the site photos (Figure 5 – 13) that the rolling topography, created by the koppies and the rivers/ streams traversing the study area, assist in screening or partially screening the proposed powerlines from viewers located beyond these landscape structures.

The project also becomes less visible the closer you move towards the river. This is mainly due to the dense vegetation along the river as well as the topography, where viewers along the river is much lower than the actual project site.

In addition to the vegetation cover and the topography, the haze in the atmosphere will also contribute to the visibility of the proposed project. As illustrated in the photos (Figure 5 – 13), the atmospheric haze decreases the visibility of the existing structures and infrastructure and will therefore also affect the visibility of the proposed project. This is however a seasonal occurrence and will be more prominent during the winter dry season.

Visual Exposure

Visual exposure is determined by qualifying the visibility with a distance rating to indicate the degree of intrusion and visual acuity. The following criteria was used to describe the visual exposure:

- Highly visible – dominant or clearly noticeable, foreground view (0km – 0.8km)
- High-Moderately visible – noticeable to the viewer, middle-ground view (0.8km – 2km)
- Moderately visible – recognisable to the viewer, middle-ground view (2km – 5km)
- Marginally (Low) visible – not particularly noticeable to the viewer, background view (5km and beyond)

Table 5 below indicates the exposure of the various sensitive viewing areas.

Table 5: Sensitive Receptors – Visual Exposure

Foreground View	Middle-ground View		Background View
High **0km – 0.8km**	**High-Moderate** **0.8km - 2km**	**Moderate** **2km - 5km**	**Low** **5km and beyond**
The project will be in the foreground for viewers located within this zone. Views will vary from clear to partially obstructed views. Viewers along the Preferred and Zaaiplaats Alternative include: • The Outback Farm • Farmsteads located to the south of the Mercury substation. • Sections of the Vermaasdrift Rd Viewers along the Mercury Substation Alternative include: • The Outback Farm • Farmsteads located to the south of the Mercury substation. • Sections of the Vermaasdrift Rd • Sections of the S463	The project will be in the middle ground for viewers located within this zone. Views will vary from clear, partially obstructed to completely screened views. Viewers along the Preferred and Zaaiplaats Alternative include: • Farmstead along Vermaasdrift Rd (North of the site) • Sections of the Vermaasdrift Rd Viewers along the Mercury Substation Alternative include: • Farmstead located in Witfontein property and to the east of the property • Sections of the Vermaasdrift Rd • Sections of the S463 • Farmsteads located along the S463	The project will be in the middle to background for viewers located within this zone. Views will vary from partially to obstructed/ screened views. Viewers along the Preferred and Zaaiplaats Alternative include: • Wild, Voël en Vis Reservaat • Farmstead located north and east of the site. • Farmstead along Vermaasdrift Rd • Sections of the S463 • Sections of the S462 Viewers along the Mercury Substation Alternative include: • Wild, Voël en Vis Reservaat • Renovaal, Inyadu and Seekoeigat • Farmstead along Vermaasdrift Rd • Sections of the S463 • Sections of the S462 • Waterford Boerdery • Farmsteads to the south and the east of the Witfontein property	The project will be in the background for viewers located within this zone. Views will vary from partially to obstructed/ screened views. Viewers along the Preferred and Zaaiplaats Alternative include: • Tourist accommodation along the Vaal River such as Wawiel Park, Renovaal, and Inyadu Lodge • Farmstead located to the north, east and the southeast of the site. • Sections of the S463 • Sections of the S462 • Section of the R76 • Seekoeigat Viewers along the Mercury Substation Alternative include: • Tourist accommodation along the Vaal River such as Wawiel Park • Wild, Voël en Vis Reservaat • Sections of the S463 • Sections of the S462 • Section of the R76

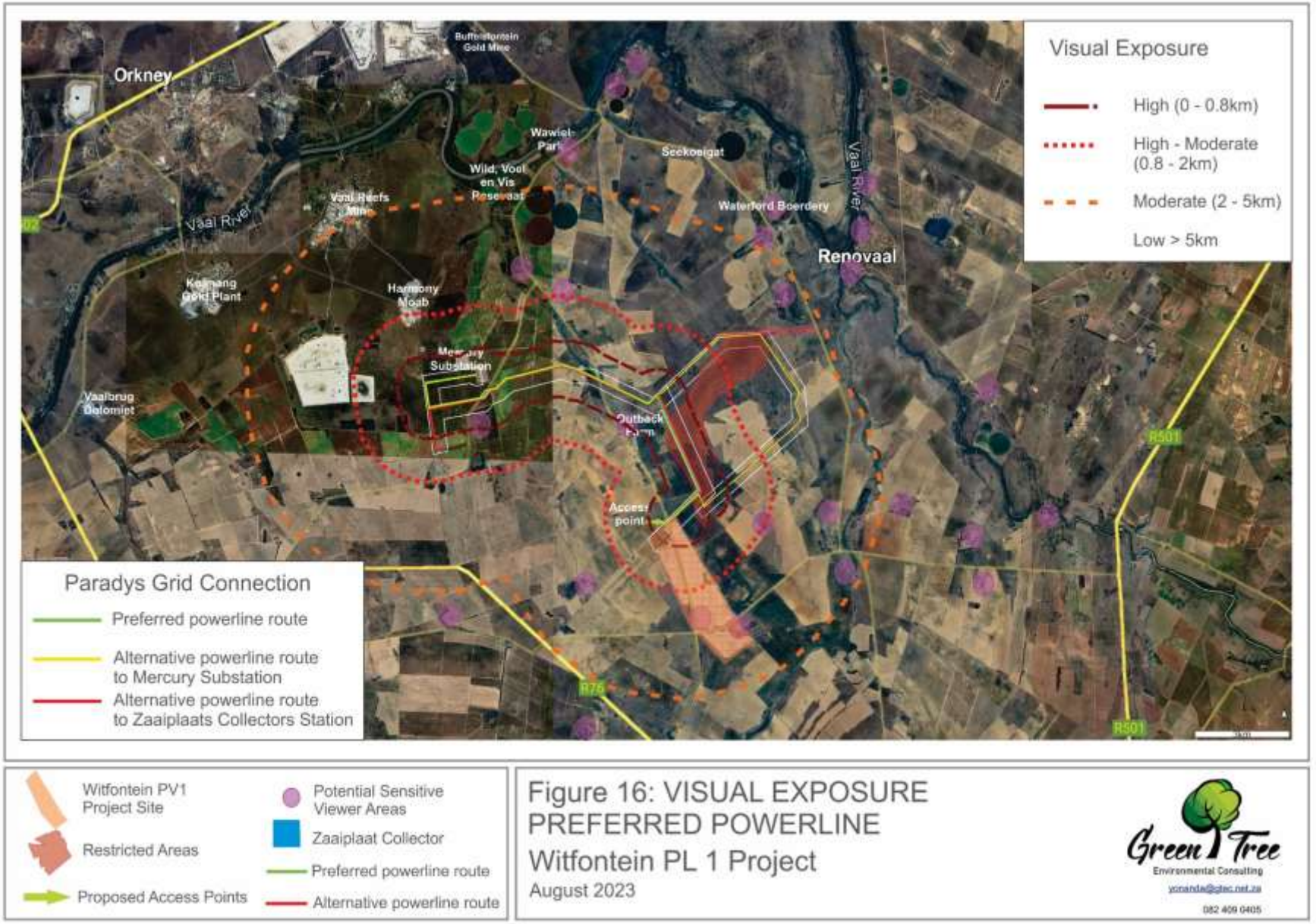

Figure 16: VISUAL EXPOSURE PREFERRED POWERLINE
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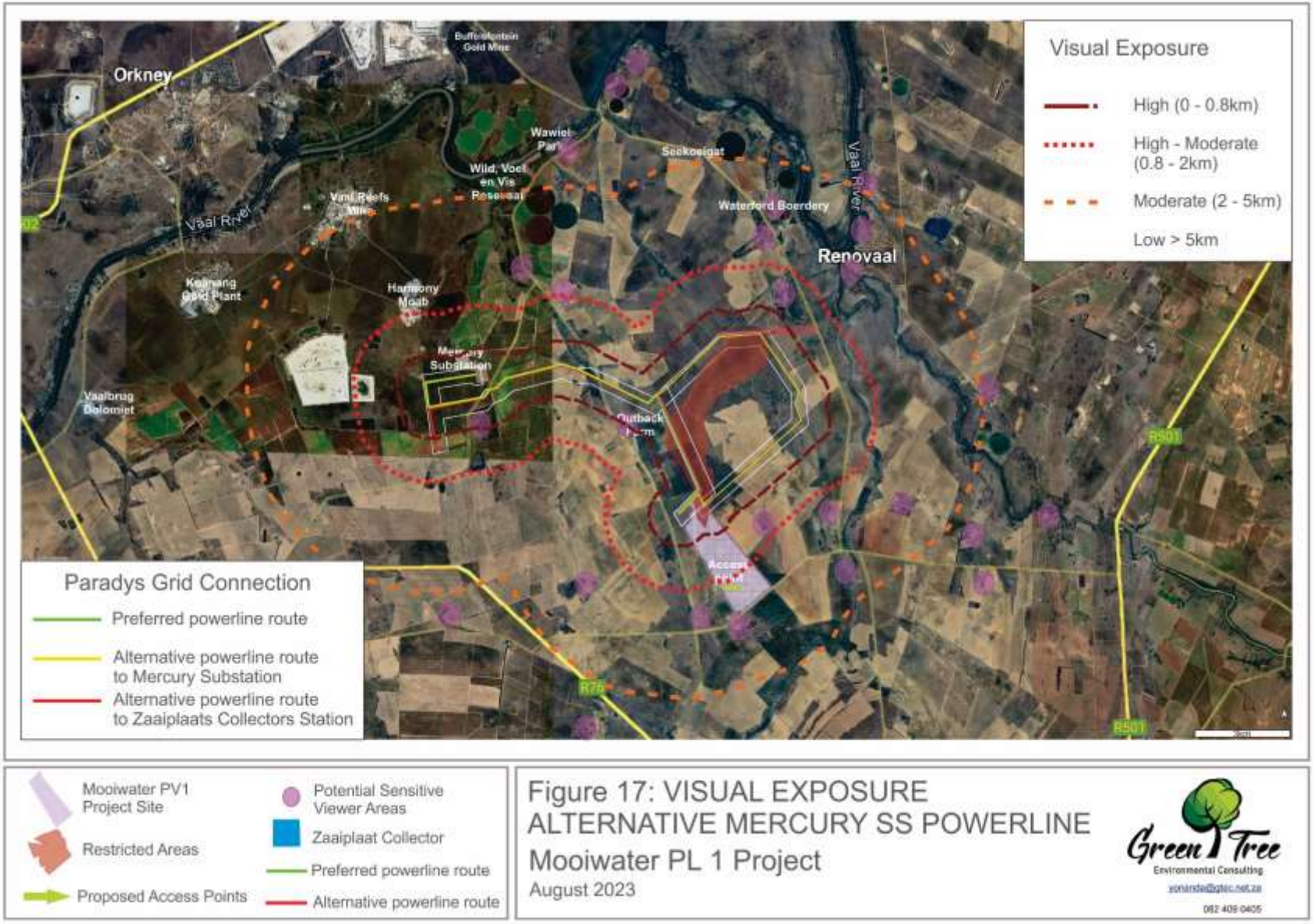

Figure 17: VISUAL EXPOSURE ALTERNATIVE MERCURY SS POWERLINE
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Visual Absorption Capacity (VAC)

The visual absorption capacity is the potential of the landscape to absorb or conceal the proposed project:

- *High VAC* – e.g. effective screening by topography and vegetation.
- *Moderate VAC* - e.g. partial screening by topography and vegetation.
- *Low VAC* - e.g. little screening by topography or vegetation.

The visual absorption capacity of the landscape was moderate. The vegetation in the study area is mostly agricultural fields (crops) with some sections of grassland and bushveld trees that varies from scattered to densely grouped. The visual absorption capacity will change between planting seasons since the crops will assist in shielding/ screening views when they are fully grown. The visual absorption capacity will also increase as the viewer moves closer to the Vaal River or when the viewer is behind the Paradys Koppie (east of the project site).

Landscape Integrity

Landscape integrity refers to the compatibility or similarity of the project with the qualities of the existing landscape, or the 'sense of place'.

- *Low compatibility* – visually intrudes, or is discordant with the surroundings.
- *Medium compatibility* – partially fits into the surroundings, but clearly noticeable.
- *High compatibility* – blends in well with the surroundings.

The landscape integrity of the proposed project has a medium compatibility. The dominant (main) land uses in the area are farmsteads with associated staff accommodation, grazing field, agricultural crops and the natural elements such as the rivers and the Paradys Koppie. There is however infrastructure (transmission lines, substation and roads) in the area as well as mining activities in the background and therefore the proposed project will partially fit into the surrounding land use.

Intensity of Impact

Referring to discussions above, the intensity of visual impact of the Project is rated in Table 7 below. To assess the intensity of visual impact five main factors are considered.

- *Visual Absorption Capacity:* The visual absorption capacity is the potential of the landscape to absorb or conceal the proposed project.
- *Landscape Integrity:* Landscape integrity refers to the compatibility or similarity of the project with the qualities of the existing landscape, or the 'sense of place'
- *Visibility:* The area / points from which project components will be visible.
- *Visual exposure:* Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion.
- *Sensitivity of the Receptors:* Sensitivity of visual receptors to the proposed development

In synthesising the criteria used to establish the intensity of visual impact, a numerical or weighting system is avoided. Attempting to attach a precise numerical value to qualitative resources is rarely successful, and should not be used as a substitute for reasoned professional judgement (Landscape Institute and the Institute of Environmental Management and Assessment, 2013).

According to the results tabulated below in Table 6 the intensity of visual impact (based on the worst case scenario) of the proposed Project will be moderate as it will cause a partial loss to the key elements/features/characteristics of the baseline environment.

Table 6: Intensity of Impact of the proposed Project

High	Moderate	Low	Negligible
Total loss of or major alteration to key elements / features / characteristics of the baseline. i.e. Pre-development landscape or view and / or introduction of elements considered to be totally uncharacteristic when set within the attributes of the receiving landscape. High scenic quality impacts would result.	Partial loss of or alteration to key elements / features / characteristics of the baseline. i.e. Pre-development landscape or view and / or introduction of elements that may be prominent but may not necessarily be substantially uncharacteristic when set within the attributes of the receiving landscape. Moderate scenic quality impacts would result	Minor loss of or alteration to key elements / features / characteristics of the baseline. i.e. Pre-development landscape or view and / or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape. Low scenic quality impacts would result.	Very minor loss or alteration to key elements/features/ characteristics of the baseline. i.e. Pre-development landscape or view and / or introduction of elements that is not uncharacteristic with the surrounding landscape – approximating the 'no change' situation. Negligible scenic quality impacts would result.

The intensity of impact is predicted to be moderate (during construction and operational phases) on sensitive viewers for the following reasons:

- The proposed Project will have a moderate negative effect on the visual quality of the landscape since it is partially compatible with the patterns that define the study area's landscape. The study area is characterised by the farmsteads, agricultural and grazing fields, natural features such as the rivers and koppie but there are also human interventions such as the existing powerlines and substation.
- The proposed Project will have a moderate compatibility with the existing land uses.
- The visual absorption capacity of the landscape is moderate due to the rolling topography and the vegetation of the study area.
- The proposed Project will have a moderate effect on sensitive viewing areas.

MITIGATION MEASURES

In considering mitigating measures three rules are considered - the measures should be feasible (economically), effective (how long will it take to implement and what provision is made for management / maintenance) and acceptable (within the framework of the existing landscape and land use policies for the area). To address these, the following principles have been established:

- Mitigation measures should be designed to suit the existing landscape character and needs of the locality. They should respect and build upon landscape distinctiveness.
- It should be recognized that many mitigation measures, especially the establishment of planted screens and rehabilitation, are not immediately effective.

The following mitigation measures are suggested and should be included as part of the Environmental Management Programme (EMPr). The following general actions are recommended:

Planning and site development

- The powerlines should be properly planned and aligned or placed in the same corridor to avoid visual clutter.
- With the construction of the powerlines and associated activities (site camp office, stockpiling area and material laydown area), the minimum amount of existing vegetation and topsoil should be removed.
- Ensure, wherever possible, natural vegetation is retained and incorporated into the site rehabilitation.
- All top-soil that occurs within the proposed footprint of an activity must be removed and stockpiled for later use.
- Visual Sensitive (No-Go) Areas must be avoided.
- Good housekeeping will be required and it is recommended that shade net be used to block views towards the construction site camp.
- Waste management is essential and can contribute to an untidy and aesthetically unpleasing construction site.

Earthworks

- Earthworks should be executed in such a way that only the footprint and a small ‘construction buffer zone’ around the proposed activities is exposed. In all other areas, the natural occurring vegetation, more importantly the indigenous vegetation should be retained, especially along the periphery of the site.
- Dense vegetation or tree cover along the roads, as illustrated in Photo A: Figure 6, must be kept intact. The vegetation cover forms a visual screen that aids in the mitigation of the visual impact.
- Dust suppression techniques should be in place always during all phases of the project, where required.

Landscaping and ecological approach

- Should new vegetation be introduced to the site, an ecological approach to rehabilitation and vegetative screening measures, as opposed to a horticultural approach to landscaping should be adopted.

SIGNIFICANCE OF THE IMPACT

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, refer to Appendix C for the detailed impact assessment criteria.

The calculation of the significance of an impact uses the following formula:

(**Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.**

Table 7: SIGNIFICANCE of Visual Impact

Potential Visual Impact	ENVIRONMENTAL SIGNIFICANCE						
	Significance before mitigation			After mitigation			
			SIG	Mitigation Measure	Mitigation Confidence	SIG	
Proposed Project – Construction							
Alteration to the visual quality of the residents staying on the farms surrounding the study site, due to the physical presence and construction activities. The Project and its associated infrastructure will have a moderate impact on key residential areas such as the bordering farmsteads. Mitigation measures are possible to implement in order to reduce the visual impact during construction.	Extent	2	**Negative Low**	• Good housekeeping to reduce impacts that could cause a nuisance. ○ Dust suppression ○ proper waste collection ○ clean and neat site camp/office ○ shade net to block views towards site camp/office • Retain the vegetation, especially along the boundary of the site	0.8	**Negative Low**	
	Duration	1					
	Reversibility	1					
	Irreplaceable loss of resources	2					
	Probability	4					
	Cumulative Impact	3					
	Magnitude/ Intensity	2					
Proposed Project – Operational							
	Extent	2			0.8		

Alteration to the visual quality of the residents staying on the farms surrounding the study site, due to the physical presence of the Witfontein Solar PL 1. Mitigation measures are possible but will not be able to hide/screen the proposed activities completely, since the powerline will rise above the tree level.	Duration	1	**Negative Medium**	• Good housekeeping to reduce impacts that could cause a nuisance. ○ Dust suppression • Building should be painted a 'natural' colour. • Vegetate the areas that were exposed during the construction phase. • Retain the vegetation, especially along the boundary of the site		**Negative Low**
	Reversibility	1				
	Irreplaceable loss of resources	3				
	Probability	4				
	Cumulative Impact	4				
	Magnitude/ Intensity	2				
Proposed Project – Decommissioning						
Alteration to the visual quality of the residents staying on the farms surrounding the study site, due to the physical decommissioning of the project. Mitigation measures are possible to implement. The visual impact will only be positive when all the structures are removed and the area that was disturbed are successfully rehabilitated.	Extent	2	**Negative Low**	• Good housekeeping to reduce impacts that could cause a nuisance. ○ Dust suppression ○ Proper waste collection ○ Neat stockpiling of material.	0.8	**Negative Low**
	Duration	1				
	Reversibility	1				
	Irreplaceable loss of resources	1				
	Probability	4				

	Cumulative Impact	3		• Vegetate the areas that were exposed during the construction phase.		
	Magnitude/ Intensity	1				

CUMULATIVE IMPACT

Cumulative landscape and visual effects (impacts) result from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future. They may also affect the way in which the landscape is experienced. Cumulative effects may be positive or negative. Where they comprise a range of benefits, they may be considered to form part of the mitigation measures.

Cumulative effects can also arise from the indivisibility of a range of developments and /or the combined effects of individual components of the proposed development occurring in different locations or over a period of time. The separate effects of such individual components or developments may not be significant, but together they may create an unacceptable degree of adverse effect on visual receptors within their combined visual envelopes. Indivisibility depends upon general topography, aspect, tree cover or other visual obstruction, elevation and distance, as this affects visual acuity, which is also influenced by weather and light conditions (Landscape Institute and the Institute of Environmental Management and Assessment, 2013).

Geographic Area of Evaluation

The geographic area of evaluation is the spatial boundary in which the cumulative effects analysis was undertaken. The spatial boundary evaluated in this cumulative effects analysis generally includes an area of a 30km radius surrounding the proposed development – refer to Figure 14 below.

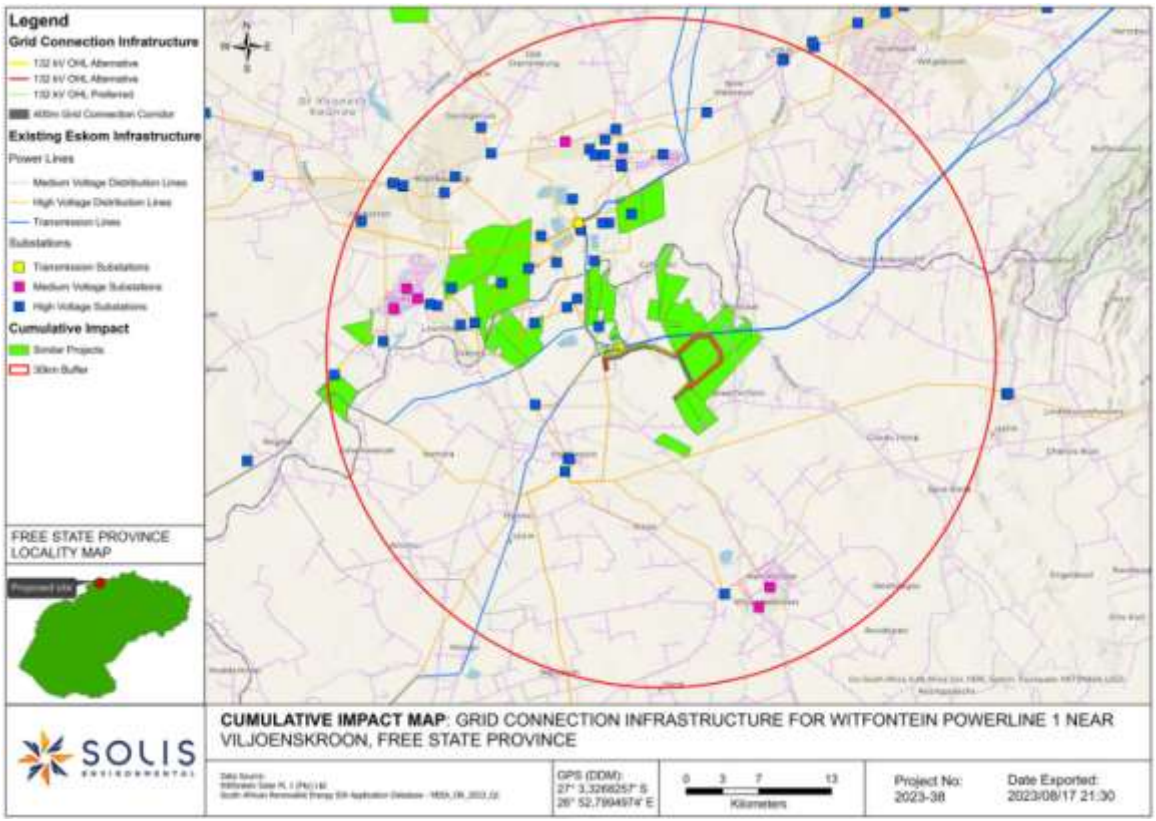

Figure 14: Witfontein Solar PL 1 geographic area of evaluation with utility-scale renewable energy generation sites and power lines

The geographic spread of PV solar projects, administrative boundaries and any environmental features (the nature of the landscape) were considered when determining the geographic area of investigation. It was argued that a radius of 30km would generally confine the potential for cumulative effects within this particular environmental landscape. The geographic area includes projects located within the Free State Province. A larger geographic area may be used to analyse cumulative impacts based on the specific temporal or spatial impacts of a resource. For example, the socioeconomic cumulative analysis may include a larger area, as the construction workforce may draw from a much wider area. The geographic area of analysis is specified in the discussion of the cumulative impacts for that resource where it differs from the general area of evaluation described above.

Temporal Boundary of Evaluation

A temporal boundary is the timeframe during which the cumulative effects are reasonably expected to occur. The temporal parameters for these cumulative effects analysis is the anticipated lifespan of the Proposed Project, beginning in 2024 and extending out at least 20 years, which is the minimum expected project life of the proposed project. Where appropriate, particular focus is on near-term cumulative impacts of overlapping construction schedules for proposed projects in evaluation.

Cumulative effect of the Project

The following section provides details on existing, and project being proposed in the geographical area of evaluation.

Table 8: A summary of related facilities that may have a cumulative impact, in a 30 km radius of Mooiwater Solar PL 1

Site name	Distance from study area	Proposed generating capacity	DFFE reference	EIA process	Project status
Noko solar plant near Orkney, North West Province	26km	20 MW	14/12/16/3/3/1/2474	BAR	Approved
Nyarhi solar power plant near Viljoenskroon,Free State Province	6km	100MW	14/12/16/3/3/1/2533	BAR	In process
Paleso solar power plant near Viljoenskroon situated within the Moqhaka local municipality, the	13km	150MW	14/12/16/3/3/1/2365	BAR	Approved

Greater Fezile Dabi District Municipality in the Free State Province					
The remaining extent of portion 1 of the farm Grootdraai 468, registration division Viljoenskroon situated within Moqhaka local municipality and the Greater Fezile FS	11,5km	150MW	14/12/16/3/3/2/1/2369	BAR	Approved
Buffels Solar PV 1 Solar Energy Project on a site near Orkney, North West Province	11km	75MW	14/12/16/3/3/2/777	Scoping and EIA	Approved
Portion 5 and 57 within the City of Matlosana Local Municipality.	11km	100MW	14/12/16/3/3/2/778	Scoping and EIA	Approved
Grootvaders Bosch No. 592 and Anglo No. 593, Registration Division Viljoenskroon, Free State Province	8km	150MW	14/12/16/3/3/1/2476	Scoping and EIA	Approved
Portion 23 of the Farm Pretorius Kraal No. 53, Registration Division Viljoenskroon, Free State Province	14km	150MW	14/12/16/3/3/1/2535	Scoping and EIA	Approved

Portion 3 of the Farm Tweepunt No. 14, Registration Division Viljoenskroon, Free State Province	5,5km	129MW	14/12/16/3/3/1/2543	Scoping and EIA	Approved
Portion 1 of the Farm Waterford No. 53, Registration Division Viljoenskroon, Free State Province	1,5km	300MW	14/12/16/3/3/1/2698	Scoping and EIA	Approved
Portion 2 of the Farm Waterford No. 53, Registration Division Viljoenskroon, Free State Province	0km	200MW	14/12/16/3/3/1/2705	Scoping and EIA	Approved
The Remaining Extent of the Farm Cijfervlei 6 and Portion 1 of the Farm La Reys Kraal Zuid 165	4,5km	250MW	14/12/16/3/3/1/2707	Scoping and EIA	Approved
Paradys Solar PV Project One	0km	220MW	To be confirmed	Scoping and EIA	In process
Utopia Solar PV Project One	0km	240MW	To be confirmed	Scoping and EIA	In process
Mooiwater Solar PV Project One	0km	140MW	To be confirmed	Scoping and EIA	In process
Rudolph Solar PV Project One	0km	175 MW	To be confirmed	Scoping and EIA	In process

It is unclear whether other projects not related to renewable energy is or has been constructed in this area, and whether other projects are proposed. In general, development activity in the area is focused on agriculture and mining. It is quite possible that future solar farm development may take place within the general area.

The next section of this report will aim to evaluate the potential for solar projects for this area in the foreseeable future.

Cumulative effect of the Project

The construction of the Witfontein Solar PL 1 project will have a negative impact on the visual quality of the study area. There are several powerlines/ transmission lines that traverse the study area as well as the Mercury substation located to the west of the project site. The addition of more powerlines, such as the Witfontein Solar PL1 project, will contribute to the overall cumulative impact the power/energy infrastructure have on the visual resource of the study area. The future planning of the area includes several Solar PV plants with associated infrastructure, the combination of the current infrastructure, the proposed project and the future projects will negatively impact the visual quality of the area by changing not only the landscape character of the area but also changing the sense of place.

The combination of the various solar projects with their associated powerlines could result in visual clutter if the projects are not properly managed or the powerline routes not well aligned.

CONCLUSION AND RECOMMENDATIONS

The existing visual condition of the landscape that may be affected by the proposed Project has been described. The study areas scenic quality has been rated moderate within the context of the sub-region and sensitive viewing areas and landscape types identified and mapped indicating potential sensitivity to the proposed development within a 5km radius of the project site (Zone of potential Influence).

Impacts to views are the highest when viewers are identified as being sensitive to change in the landscape, and their views are focused on and dominated by the change. Visual impacts occur when changes in the landscape are noticeable to viewers looking at the landscape from their homes or travel routes, and important cultural features and historic sites, especially in foreground views. Sensitivity to the project was high primarily due to the distance of the viewers to the project, and the change it will bring in their immediate foreground views.

The proposed project will be partially compatible to the existing land use and will be slightly absorbed by the surrounding landscape. It will be in the foreground view of residents staying along the powerline route and within the first kilometre of the project. This will include views from Outback Farm and the farmstead located south of the substation, the farmsteads directly south and north of the Mercury Substation Alternative powerline. Viewers that are not located within the direct vicinity (0 – 2km) of the project site will not experience a high visual impact since the topography and the vegetation in the surrounding area will partially obstruct views towards the project site. The project will be visible from elevated areas. Other factors that will affect the visibility of the project will be the atmospheric haze that is a seasonal occurrence and will contribute to the decrease in the project visibility.

During construction the significance of visual impact will be negative low and will increase to negative moderate as the Project enters the operational phase. The significance during the construction period could however become moderate if the mitigation measures are not implemented, this is mainly due to the nuisances that are created by vehicles driving up and down, dust, waste on site and the site or construction yard. The negative moderate impact experienced during the operational phase can be reduced to negative low, should the mitigation measures be implemented successfully. During the decommissioning phase the structures will be removed, and rehabilitation will take place. The impact will be negative low during the decommissioning but could result in a low positive impact, should rehabilitation be successful.

Mitigation measures are difficult since the pylons will be seen above the vegetation/ tree line and should the Preferred powerline or the Zaaiplaats Alternative powerline be chosen it will run along the koppie which will make mitigation even more difficult. Good housing keeping and retaining the dense vegetation cover, especially along the boundary of the project area will be essential. The mitigation will decrease the significance of the visual impact but will not be able to decrease the significance of the visual impact, should there be more than one project located in the area.

When considering the three alternatives, it is recommended that the Mercury Substation Alternative powerline be considered. This alternative route alignment runs around the Paradys Koppie and follows the existing Eskom transmission/ powerlines for most of the route before it breaks away and follow the farm fences towards the Witfontein Solar PV. Although the powerline will be visible to sensitive viewers, it will be less intrusive than when the powerline runs along the Paradys Koppie.

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ANNEXURE A – CV OF INDEPENDENT AUDITOR

YONANDA MARTIN

GREEN TREE ENVIRONMENTAL CONSULTING

7 Dublin Street, Rangeview, Krugersdorp

082 409 0405

Yonanda@gtec.net.za

EXPERIENCE:

2006 – 2012

Environmental Assessment practitioner, **NEWTOWN LANDSCAPE ARCHITECTS**

Responsible for writing up of environmental projects, which includes:

- Basic Assessments,
- Environmental Impact Assessments (Scoping & EIA),
- Environmental Management Programmes (EMPr),
- Environmental Monitoring,
- Water Use Licenses,
- Visual Impact Assessments.

2012 – 2017

Associate and Senior Environmental Assessment Practitioner, **NEWTOWN LANDSCAPE ARCHITECTS**

- Manager of the Environmental Division at NLA
- Management of junior staff
- Management of specialist
- Management of the proposals and invoices of the Environmental Division
- Responsible for writing up of environmental projects, which includes:
- Basic Assessments,
    - Environmental Impact Assessments (Scoping & EIA),
    - Environmental Management Programmes (EMPr),
    - Environmental Monitoring,
    - Water Use Licenses,
    - Visual Impact Assessments.

EDUCATION:

2003

BSc. Environmental Sciences, **NORTH WEST UNIVERSITY – POTCHEFSTROOM CAMPUS**

2007

MSc. Ecological Remediation and Sustainable Utilization, **NORTH WEST UNIVERSITY – POTCHEFSTROOM CAMPUS**

Thesis: Tree vitality along the urbanization gradient in Potchefstroom, South Africa

2016 Environmental Law Training, Business Success Solutions
2016 Invasive Species Training: Module 1 – Introduction to Legislation, South African Green Industries Council (SAGIC)
2016 Invasive Species Training: Module 2 – Developing and Implementing Control Plans, South African Green Industries Council (SAGIC)
2015 Invasive Species Identification Training Workshop, South African Green Industries Council (SAGIC)
2014 Sharpening the Tool: New techniques and methods in Environmental Impact Assessment, SE Solutions
2014 First Aid Level 1, Action Training Academy
2011 Supervisory Management, ISIMBI
2009 Public Participation Course, International Association for Public Participation, Golder Midrand
2008 Wetland Training Course on Delineation, Legislation and Rehabilitation, University of Pretoria
2008 Environmental Impact Assessment: NEMA Regulations – A practical approach, Centre for Environmental Management: University of North West
2008 Effective Business Writing Skills, ISIMBI
2007 Short course in Geographic Information Systems (GIS), Planet GIS

EXPERIENCE:

Environmental Projects

Diepsloot East Residential Development, Diepsloot. Environmental Impact Assessment, Environmental Management Programme, Water Use License and management of specialist.

Lindley Waste Water Treatment Works, Mogale City Local Municipality project located in Lindley / Lanseria. Environmental Screening, Environmental Impact Assessment, Environmental Management Programme and Water Use License Application and management of specialist.

African Leadership Academy, Laser Park, Johannesburg. This project entails the rectification of activities undertaken by ALA as well as the compilation of an overall Environmental Management Programme (EMPr) that addresses current environmental concerns on campus but also future projects such as recycling, rain water harvesting, vegetable gardens and events.

Orchards Extension 50-53, Orchards. The project includes the construction of a residential development. The project includes monitoring of the environmental conditions as well as the appointment of sub-consultants for rehabilitation purposes.

Kareekloof Oxidation Ponds, Suikerbosrand. This project entails the environmental monitoring during construction and rehabilitation of the project

Visual Impact Assessments

Holfontein Integrated Waste Management Facility Project (SLR Consulting (Pty) Ltd), Holfontein, Gauteng Province

Eskom Arnot Ash Dump Project (Environmental Impact Management Services), Rietkuil, Mpumalanga Province

Kalkheuwel Housing Development (ECO Assessments), Kalkheuvel, NorthWest Province

Kyasand Light Industrial Project (Terre Pacis Environmental), Kyasand, Gauteng Province

AFFILIATIONS:

Registered Professional Natural Scientist – 400204/09 (September 2009)

Member of IAIAsa

IAIAsa Gauteng Branch Chair 2016/17, 2017/18 and 2018/19

APPENDIX B: APPROACH FOR DETERMINING THE VISUAL IMPACT

The Approach and Methodology used for the Visual Impact Assessment is based on work and research done by Graham Young, the Guidelines for Landscape and Visual Impact Assessment (Landscape Institute and Institute of Environmental Management, 2013) and the Guidelines issued by Western Cape Province (2005), Refer to Appendix B.

Approach

The assessment of likely effects on a landscape resource and on visual amenity is complex, since it is determined through a combination of quantitative and qualitative evaluations. When assessing visual impact, the worst-case scenario is considered. Landscape and visual assessments are separate, although linked, procedures.

The landscape, its analysis and the assessment of impacts on the landscape all contribute to the baseline for visual impact assessment studies. The assessment of the potential impact on the landscape is carried out as an impact on an environmental resource, i.e. the physical landscape. Visual impacts, on the other hand, are assessed as one of the interrelated effects on people (i.e. the viewers and the impact of an introduced object into a view or scene).

The Visual Resource

Landscape character, landscape quality (Warnock & Brown 1998) and “sense of place” (Lynch 1992) are used to evaluate the visual resource i.e. the receiving environment. A qualitative evaluation of the landscape is essentially a subjective matter. In this study the aesthetic evaluation of the study area is determined by the professional opinion of the author based on site observations and the results of contemporary research in perceptual psychology.

Aesthetic value is the emotional response derived from the experience of the environment with its natural and cultural attributes. The response is usually to both visual and non-visual elements and can embrace sound, smell and any other factor having a strong impact on human thoughts, feelings and attitudes (Ramsay 1993). Thus, aesthetic value is more than the combined factors of the seen view, visual quality or scenery. It includes atmosphere, landscape character and sense of place (Schapper 1993).

Studies for perceptual psychology have shown human preference for landscapes with higher visual complexity, for instance scenes with water or topographic interest. Based on contemporary research, landscape quality increases where:

- Topographic ruggedness and relative relief increase;
- Water forms are present;
- Diverse patterns of grassland and trees occur;
- Natural landscape increases and man-made landscape decreases;
- Where land use compatibility increases (Crawford 1994).

Aesthetic appeal (value) is therefore considered high when the following are present (Ramsay 1993):

- Abstract qualities: such as the presence of vivid, distinguished, uncommon or rare features or abstract attributes;
- Evocative responses: the ability of the landscape to evoke particularly strong responses in community members or visitors;
- Meanings: the existence of a long-standing special meaning to a group of people or the ability of the landscape to convey special meanings to viewers in general;
- Landmark quality: a feature that stands out and is recognized by the broader community.

And conversely, it would be low where:

- Limited patterns of grasslands and trees occur;
- Natural landscape decreases and man-made landscape increases;
- And where land use compatibility decreases (Crawford 1994).

In determining the quality of the visual resource for the Project site, both the objective and the subjective or aesthetic factors associated with the landscape are considered. Many landscapes can be said to have a keen sense of place, regardless of whether they are considered to be scenically beautiful. However, where landscape quality, aesthetic value and a strong sense of place coincide, the visual resource or perceived value of the landscape is considered to be very high.

Sensitivity of Visual Resource

The sensitivity of a landscape or visual resource is the degree to which a landscape type or area can accommodate change arising from a development, without detrimental effects on its character. Its determination is based upon an evaluation of each key elements or characteristics of the landscape likely to be affected. The evaluation will reflect such factors as its “quality, value, contribution to landscape character, and the degree to which the particular element or characteristic can be replaced or substituted” (Landscape Institute and the Institute of Environmental Management and Assessment, 2013).

Sense of Place

Central to the concept of sense of place is that the landscape requires uniqueness and distinctiveness. The primary informant of these qualities is the spatial form and character of the natural landscape taken together with the cultural transformations and traditions associated with the historic use and habitation of the area. 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 the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. In some cases, the values allocated to the place are similar for a wide spectrum of users or viewers, giving the place a universally recognized and therefore, keen sense of place.

The study area’s sense of place is derived from the emotional, aesthetic and visual response to the environment, and therefore it cannot be experienced in isolation. The landscape context must be considered. The combination of the natural landscape (highveld) together with the manmade structures (residential areas, roads, and utilities) contribute to the sense of place for the study area. It is this combination that define the study area, and which establish its visual and aesthetic identity.

Sensitive Viewer Locations

The sensitivity of visual receptors and views are dependent on the location and context of the viewpoint, the expectations and occupation or activity of the receptor or the importance of the view, which may be determined with respect to its popularity or numbers of people affected, its appearance in guidebooks, on tourist maps, and in the facilities provided for its enjoyment and references to it in literature or art.

Typically, sensitive receptors may include:

- Users of all outdoor recreational facilities including public rights of way, whose intention or interest may be focused on the landscape;
- Communities where development results in negative changes in the landscape setting or valued views enjoyed by the community;
- Occupiers of residential properties with views negatively affected by the development.

Views from residences and tourist facilities/routes are typically the most sensitive, since they are frequent and of long duration.

Other, less sensitive, receptors include:

- People engaged in outdoor sport or recreation (other than appreciation of the landscape, as in landscapes of acknowledged importance or value);
- People traveling through or past the affected landscape in cars or other transport modes;
- People at their place of work.

Image 1 below, graphically illustrates the visual impact process used to determine the significance of visual impact of the Project.

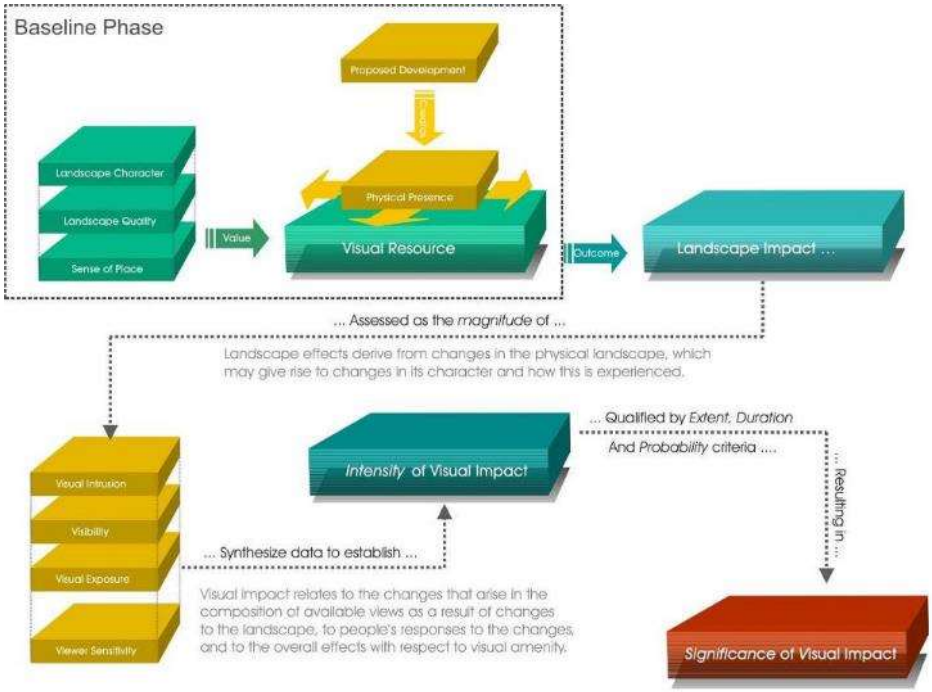

Image 1: Visual Impact Process

APPENDIX C: CRITERIA FOR SIGNIFICANCE OF IMPACT ASSESSMENT

The environmental assessment aims to identify the various possible environmental impacts that could result from the proposed activity. Different impacts need to be evaluated in terms of its significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e., site, local, national or global whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 4.1.

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. The total number of points scored for each impact indicates the level of significance of the impact.

1.1.1 Impact Rating System

Impact assessment must take account of the nature, scale and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:

Table 1: The Impact Rating System

NATURE
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.

GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.

DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects 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 (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.

REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible, and no mitigation measures exist.

IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.

CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant to minor cumulative effects.
3	Medium cumulative impact	The impact would result in minor to moderate cumulative effects.

4	High cumulative impact	The impact would result in significant cumulative effects

PROBABILITY	**PROBABILITY**	**PROBABILITY**
This describes the chance of occurrence of an impact.	This describes the chance of occurrence of an impact.	This describes the chance of occurrence of an impact.
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).

INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and

		functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.

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. The calculation of the significance of an impact uses the following formula: (**Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.**

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact significance rating	Description
6 to 28	**Negative low impact**	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	**Positive low impact**	The anticipated impact will have minor positive effects.
29 to 50	**Negative medium impact**	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	**Positive medium impact**	The anticipated impact will have moderate positive effects.
51 to 73	**Negative high impact**	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	**Positive high impact**	The anticipated impact will have significant positive effects.
74 to 96	**Negative very high impact**	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated

		adequately. These impacts could be considered "fatal flaws".
74 to 96	**Positive very high impact**	The anticipated impact will have highly significant positive effects.

Mitigation Confidence

The significance of the impact is assessed following the implementation of mitigation measures, based on the confidence levels that the mitigation measures will reduce and/or enhance the impact.

Mitigation Confidence - Negative and Positive Impacts

1	Very low	There is no confidence that the mitigation measures will reduce/enhance the impact.
0.8	Low	20% confidence that the mitigation measures will reduce/enhance the impact
0.5	Moderate	50% confidence that the mitigation measures will reduce/enhance the impact
0.2	High	80% confidence that the mitigation measures will reduce/enhance the impact