Visual Impact Assessment

Visual Impact Assessment for the Proposed Glencore Lydenburg Solar PV Facility, Mpumalanga Province

September 2024

Visual Impact Assessment Report for the Proposed Glencore Lydenburg Solar PV Facility, Mpumalanga Province

Submitted to:

Environmental Impact Management Services (EIMS)
8 Dalmeny Road,
Pine Park,
Randburg,
2194
Email: john@eims.co.za

Prepared by:

Eco-Thunder Consulting (Pty) Ltd
PO Box 2055
Fourways
2191
Tel: 064 655 2752

Afzelia Environmental Consultants (Pty) Ltd
PO Box 37069
Overport
Durban
4067
Tel: 0313032835

Report Revision No: 2
Date Issued: 26th September 2024
Prepared By: Marvin Gabara and Andrew Batho
Reference: Eco Thunder Consulting and Afzelia Environmental Consultants (Pty) Ltd (2024) Proposed Glencore Lydenburg PV Project

CONTROL SHEET

Afzelia Reference:	VIA24-0030	
Project Name:	Proposed Glencore Lydenburg PV Project	
Applicant:	Glencore Operations SA (Pty) Ltd	
Prepared By:	Afzelia Environmental Consultants (Pty) Ltd in association with Eco-Thunder Consulting (Pty) Ltd	
Address:	236 on Ninth Avenue Morningside Durban 4001	
Telephone Number:	0836019411	
Email Address:	andrew@afzelia.co.za	
Report Compiled By:	**Compiler:**	Brogan Geldenhuys
	Affiliation No.	AIAsa: 7152 IAP2SA: 135 ILASA: 2135
	Signature:	
	Date:	24th August 2024
Report Reviewed By:	**Reviewer:**	Siobhan Motley
	Affiliation	IAIAsa (7594) IAP2SA (133)
	Signature:	
	Date:	25th September 2024
	Reviewer:	Andrew Batho
	Affiliation	EAPASA (1179)
Client:	Environmental Impact Management Services (EIMS)	
Revision Number:	002	
Date Issued:	26th September 2024	

COPYRIGHT INFORMATION

EXECUTIVE SUMMARY

The Proposed Glencore Lydenburg Solar PV Facility, developed by Glencore South Africa (Pty) Ltd, is located near Mashishing, Mpumalanga Province. The proposed facility will generate up to 300MW of electricity, primarily to supply the Lydenburg Smelter and other operations. The project includes the development of associated infrastructure such as BESS, an on-site substation, and power lines to connect to the existing electrical grid.

The VIA considered the site's location within a protected area, the Lydenburg Nature Reserve, which raises the visual sensitivity due to its environmental and recreational significance. Despite this, the presence of existing industrial infrastructure, including the Lydenburg Smelter, has altered the natural landscape, reducing the sensitivity of parts of the reserve to additional developments.

Key findings from the VIA include:

- The site has a moderate VAC due to the presence of existing industrial developments, which help absorb visual changes from the new facility. However, portions of the landscape, particularly areas with limited vegetative cover or near natural features, will need specific mitigation measures.
- he project's location within the Lydenburg Nature Reserve elevates its visual sensitivity, particularly from key viewpoints within the reserve and nearby recreational areas. Additionally, the Potloodspruit River, which runs along the northern boundary of the project site, adds ecological and visual significance. Appropriate mitigation measures are necessary to reduce visual impacts from both the natural features of the reserve and surrounding sensitive receptors, such as Mashishing (~2 km away).
- Recommended mitigation strategies include:
  - Strategic placement of infrastructure to avoid prominent areas and reduce visibility from key viewpoints.

    - Implementation of vegetation screening, especially near visual corridors, to blend the development with the natural landscape.
    - The use of materials and colours that harmonise with the surrounding environment to reduce visual contrast.
    - Preservation of natural landforms and vegetation where possible to maintain the visual integrity of the nature reserve.
- Given the site's location within a nature reserve, ongoing consultation with relevant authorities and local stakeholders, including landowners and residents, will be crucial to ensure that visual and environmental impacts are effectively managed.
- Cumulative visual impacts, particularly from the existing industrial infrastructure within and around the reserve, were considered. The existing industrial elements, such as power lines and the Lydenburg Smelter, already influence the visual landscape, helping to mitigate the relative visual intrusion of the new facility. However, the project will need to ensure that additional visual clutter is minimised through careful design and placement.

The VIA concludes that receptors within 1 km of the buildable area, particularly those within the nature reserve or in nearby residential areas, are likely to experience the highest levels of visual intrusion. Beyond this zone, the visual impact diminishes with distance. Although the open landscape offers limited natural screening, proposed mitigation measures, including vegetative buffers, will help reduce visual exposure.

In conclusion, while the location of the Proposed Glencore Lydenburg Solar PV Facility within the Lydenburg Nature Reserve increases the sensitivity of the project, the VIA has identified no fatal visual flaws that would prevent the project from proceeding. The successful implementation of recommended mitigation measures, combined with stakeholder engagement, will help integrate the project into its surroundings while minimising its visual and environmental impacts.

The project is recommended for environmental authorisation, subject to the implementation of the mitigation measures outlined in the VIA and compliance with the Environmental Management Programme (EMPr). The VIA specialist should review the final project layout to ensure that it adheres to the specific recommendations outlined in this assessment.

TABLE OF CONTENT

LIST OF FIGURES

LIST OF PHOTOGRAPHS

LIST OF TABLES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AfDB	African Development Bank
Afzelia	Afzelia Environmental Consultants (Pty) Ltd
BAR	Basic Assessment Report
BESS	Battery Energy Storage System
DFFE	Department of Forestry, Fisheries and Environment
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme Report
ETC	Eco Thunder Consulting (Pty) Ltd
GIS	Geographical Information Systems
HA	Hectares
IFC	International Finance Corporation
MW	Megawatts
NEMA	National Environmental Management Act
UNESCO	United Nations Educational, Scientific and Cultural Organisation
OHL	Overhead Line
O&M	Operation and Maintenance
PV	Photovoltaic
REDz	Renewable Energy Development Zone/s
SACLAP	South African Council for the Landscape Architectural Profession
SEF	Solar Energy Facility
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
WHC	World Heritage Convention

GLOSSARY LIST

GLOSSARY ITEM	DESCRIPTION
Aesthetic Value	Aesthetic value is the emotional response derived from the experience of the environment with its natural and cultural attributes. The response can be either to visual or 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 encompasses more than the seen view, visual quality, or scenery, and includes atmosphere, landscape character and sense of place (Schapper, 1993).
Aesthetically significant place	A formally designated place visited by recreationists and others for the express purpose of enjoying its beauty. For example, tens of thousands of people visit Table Mountain on an annual basis. They come from around the country and even from around the world. By these measurements, one can make the case that Table Mountain (a designated National Park) is an aesthetic resource of national significance. Similarly, a resource that is visited by large numbers who come from across the region probably has regional significance. A place visited primarily by people whose place of origin is local is generally of local significance. Unvisited places either have no significance or are "no trespass" places. (After New York, Department of Environment 2000).
Aesthetic impact	Aesthetic impact occurs when there is a detrimental effect on the perceived beauty of a place or structure. Mere visibility, even startling visibility of a Project proposal, should not be a threshold for decision making. Instead, a Project, by its visibility, must clearly interfere with or reduce (i.e., visual impact) the public's enjoyment and/or appreciation of the appearance of a valued resource e.g., cooling tower blocks a view from a National Park overlook (after New York, Department of Environment 2000).
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.
Glare	The sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted, which causes annoyance, discomfort, or loss in visual performance and visibility. See Glint. (USDI 2013:314)
Glint	A momentary flash of light resulting from a spatially localised reflection of sunlight. See Glare. (USDI 2013:314)
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.

GLOSSARY ITEM	DESCRIPTION
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 (Institute of Environmental Assessment & The Landscape Institute 1996).
Study area	For the purposes of this report this Project the 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 5,0km radius surrounding the proposed Project footprint/site.
Project Footprint/ Site	For the purposes of this report the Project site/footprint refers to the actual layout of the Project as described.
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	Sensitivity of visual receptors (viewers) to a proposed development.
Viewshed analysis	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 analysis is that the observer eye height is 1,8m above ground level.
Visibility	The area from which Project components would potentially be visible. Visibility depends upon general topography, aspect, tree cover or other visual obstruction, elevation, and distance.
Visual Exposure	Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion and visual acuity, which is also influenced by weather and light conditions.
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 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.
Visual Intrusion	The nature of intrusion of an object on the visual quality of the environment resulting in its compatibility (absorbed into the landscape elements) or discord (contrasts with the landscape elements) with the landscape and surrounding land uses.

GLOSSARY ITEM	DESCRIPTION
Visual Absorption Capacity (VAC)	VAC is defined as the landscape's ability to absorb physical changes without transformation in its visual character and quality. The landscape's ability to absorb change ranges from low- capacity areas, in which the location of an activity is likely to cause visual change in the character of the area, to high-capacity areas, in which the visual impact of development will be minimal (Amir & Gidalizon 1990).
Worst-case Scenario	Principle applied where the environmental effects may vary, for example, seasonally or collectively to ensure the most severe potential effect is assessed.
Zone of Potential Visual Influence	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.

SPECIALIST CHECKLIST

No.	NEMA 2014 (as amended) Regs - Appendix 6(1) Requirement	Report Section
	A specialist report prepared in terms of these Regulations must contain -	
a	details of - • the specialist who prepared the report; and • the expertise of that specialist to compile a specialist report including a curriculum vitae.	Specialist Details and Appendix A
b	a declaration that the specialist is independent in a form as may be specified by the competent authority (CA);	Specialist Declaration and Specialist Affirmation
c	an indication of the scope of, and the purpose for which, the report was prepared;	Section 5.1
	an indication of the quality and age of base data used for the specialist report	Section 1.4
	a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Section 7 and 8
d	the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 5.4
e	a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 0

No.	NEMA 2014 (as amended) Regs - Appendix 6(1) Requirement	Report Section
f	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, inclusive of a site plan identifying site alternatives;	Section 8.2 and 0
g	an identification of any areas to be avoided, including buffers;	Section 7.2
h	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;	Section 7.2
I	a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.7
j	a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 8.2
k	any mitigation measures for inclusion in the EMPr;	Section 0
l	any conditions for inclusion in the EA;	Section 8.5
m	any monitoring requirements for inclusion in the EMPr or EA;	Section 0
n	a reasoned opinion - • whether the proposed activity, activities or portions thereof should be authorised; • regarding the acceptability of the proposed activity or activities; and • if the opinion is that the proposed activity, 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.	Section 8.5
o	a description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A
p	a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
q	any other information requested by the CA.	N/A

SPECIALIST DECLARATION

Full Name	**Title/Position**
Brogan Geldenhuys	Director
Telephone Number	**Email Address**
064 655 2752	brogan@eco-thunder.co.za
Qualification(s):	BEng (Industrial)
Experience (years):	7
Registration(s):	IAIAsa, GISSA, IAP2, ECSA

I, **Brogan Geldenhuys**, declare that: –

- I act as an independent specialist in this application;
- I will perform the work relating to the application objectively, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the CA all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken concerning the application by the CA; and - the objectivity of any report, plan or document to be prepared by myself for submission to the CA;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offense and is punishable by law.

BG | 25/09/2024

Signature of the Specialist | *Date*

Afzelia Environmental Consultants (Pty) Ltd in association with Eco Thunder Consulting, acting as an independent specialist in the field of visual impact assessments within the renewable energy sector, hereby affirms its professional standing and expertise. Appointed by Afzelia for the specific purpose of conducting an independent and unbiased assessment, our firm leverages approaches and methodologies that have been meticulously refined and successfully applied across various projects.

Our engagement with this project is characterised by a commitment to maintaining the highest standards of integrity and professionalism. The opinions and viewpoints expressed within this report are solely those of abovementioned companies and reflect our extensive experience and specialised knowledge in visual impact assessments within the renewable energy sector.

This assessment is conducted in accordance with the best practices and industry standards, ensuring a comprehensive and objective analysis. It is our firm belief that the methodologies employed are robust and have established precedence in maintaining the quality and accuracy required for such evaluations.

In fulfilling our role as an independent specialist, we have adhered to all relevant legal and regulatory requirements, ensuring that our assessment is both transparent and accountable. We affirm that our relationship with Afzelia and all other parties involved in this project is free from any conflict of interest or undue influence, thereby safeguarding the impartiality of our findings and recommendations.

The above-mentioned companies are committed to providing an assessment that is not only thorough and precise but also contributes positively to the renewable energy sector, reflecting our ongoing commitment to environmental sustainability and responsible development.

The author of this report, however, accepts no liability for any actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from or in connection with services rendered, and by the use of the information contained in this document.

No form of this report may be amended or extended without the prior written consent of the author and/or a relevant reference to the report by the inclusion of an appropriately detailed citation.

Any recommendations, statements, or conclusions drawn from or based on this report must cite or refer to this report. Whenever such recommendations, statements or conclusions form part of the main report relating to the current investigation, this report must be included in its entirety.

REVIEWER DECLARATION

Full name	**Title/Position**
Andrew Batho	Director and Principal Consultant
Qualification(s):	BSocSc (Masters) in Geography and Environmental Management
Experience (years):	14
Registration(s):	EAPASA (2019/1179

I, Andrew Batho declare that: –

I act as an independent specialist in this application.

- I will perform the work relating to the application objectively, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations and all other applicable legislation.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken concerning the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority.

All the particulars furnished by me in this form are true and correct; and I realise that a false declaration is an offense and is punishable by law.

Andrew Batho

24/10/2024

Signature of the Specialist *Date*

Findings, recommendations, and conclusions provided in this report are based on the best available scientific methods and the author's professional knowledge and information at the time of compilation. The author of this report, however, accepts no liability for any actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from or in connection with services rendered, and by the use of the information contained in this document.

No form of this report may be amended or extended without the prior written consent of the author and/or a relevant reference to the report by the inclusion of an appropriately detailed citation.

Any recommendations, statements, or conclusions drawn from or based on this report must cite or refer to this report. Whenever such recommendations, statements or conclusions form part of the main report relating to the current investigation, this report must be included in its entirety.

1 BACKGROUND

1.1 Scope and Objective of the Specialist Study

The main aim of the study is to document the baseline and to ensure that the visual/aesthetic consequences of the proposed Glencore Lydenburg Solar PV Facility are understood. The report therefore aims to identify scenic resources, and visually sensitive areas or receptors. It also aims to identify key concerns or issues relating to potential visual impacts arising from the proposed Project, which must be addressed in the assessment phase.

1.2 Structure of the Report

The report is organised into ten sections:

- Section **Error! Reference source not found.**: Background;
- Section 2: Project Description;
- Section 3: Requirement for a VIA;
- Section 4: Legislation and Policy Review;
- Section 5: Approach and Methodology;
- Section 6: Baseline Environmental Profile;
- Section **Error! Reference source not found.**: Identification of Visual Impacts
- Section 8: Impacts and Risks Identified;
- Section 9: Environmental Impact Statement Conclusion; and
- Section 10: References.

1.3 Seasonal Change

In terms of Appendix 6 of the 2014 EIA Regulations, a specialist report must contain information on "the date and season of the site investigation and the relevance of the season to the outcome of the assessment". The site visit was undertaken in Early Spring (17th September 2024). The season in which the site visit was undertaken does not have any considerable effect on the significance of the impacts identified. The mitigation measures, as well as the assessment will take into consideration any changes to vegetation cover that may vary over the seasons.

1.4 Information Base

The following information was used to conduct the VIA:

- Documentation and KML files supplied by the client;

- Photographs and information captured during the site visit;
- Google Earth software and data (aerial imagery – 2023);
- Sentinel-2 Satellite Imagery (2023);
- SRTM Digital Elevation Model;
- South African National Landcover dataset (2022);
- Stakeholder input and feedback;
- Relevant environmental impact assessment (EIA) reports;
- Geographic Information System (GIS) data;
- Regulatory and policy documents.

1.5 Terms and Reference

A specialist study is required to establish the visual baseline and to identify and potential visual impacts arising from the proposed development based on the general requirements for a comprehensive VIA.

The following terms of reference were established:

- Data collected allows for a description and characterisation of the receiving environment;
- Describe the landscape character, quality and assess the visual resource of the study area;
- Describe the visual characteristics of the components of the Project;
- Identify issues that must be addressed in the impact assessment phase; and
- Propose mitigation options to reduce the potential impact of the Project.

1.6 Level of Confidence

The level of confidence in the assessment is determined by two key factors: the availability of information and the practitioner's understanding of the study area and experience with similar projects. These factors are rated on a scale of 1 to 3, as follows:

- Availability of Information of the Study Area/Project:
  - 3: High level of information available; thorough knowledge base established through accessible site visits, surveys, etc.
  - 2: Moderate level of information available; moderate knowledge base established, with acceptable accessibility to the study area.

- 1: Limited information available; poor knowledge base established, or no site visits and/or surveys carried out.

- Understanding of the Study Area, and Experience with Similar Projects:
  - 3: High level of information and knowledge available; visual impact assessor is highly experienced with this type of project and level of assessment.
  - 2: Moderate level of information and knowledge available; visual impact assessor has moderate experience with this type of project and level of assessment.
  - 1: Limited information and knowledge available; visual impact assessor has low experience with this type of project and level of assessment.

The level of confidence for this assessment is determined to be 9 and indicates that the author's confidence in the accuracy of the findings is high.

1.7 Limitations and Assumptions

The following assumptions and limitations are applicable to this Report:

- The assessment has been based on the requirements of the Western Cape Department of Environmental Affairs & Development Planning Guidelines[1].
- The assessment assumes that all necessary consultations with stakeholders, including local communities, authorities, and other interested parties, have been/will be conducted in accordance with legal requirements, and that their views and concerns have been duly considered[2].
- Whilst the majority of homesteads and housing areas were visited during the site visit in order to confirm their nature and likely visibility of the development, it was not possible to visit all homesteads and housing areas.
- The information and analysis provided in this report is based on the details available during the undertaking of the Visual Impact Assessment (VIA). As the VIA specialists we have, to the best of our ability analysed and interpreted the data provided.
- We operate under the assumption that all information supplied by the client is accurate, current, and reflective of the agreements made with relevant landowners. Any decisions regarding development on specific portions of land, including agreements on relocations, demolitions, or other alterations, should be confirmed, and discussed directly with the

[1] Western Cape Department of Environmental Affairs & Development Planning Guidelines provide guidance that is appropriate for involving visual and aesthetic specialists in EIA processes.

[2] According to the "Guideline on Public Participation" published by the Western Cape Department of Environmental Affairs & Development Planning (DEA&DP), it is mandatory for both landowners and land occupiers to be notified about any impending development projects. The Environmental Assessment Practitioner (EAP) is responsible for ensuring that this notification procedure is executed accurately and in compliance with the guidelines.

relevant landowners. Our assessments and recommendations are based on the information provided to us, and we rely on the client to ensure that this information is complete and up to date.

- The assessment of cumulative impacts, particularly in relation to other renewable energy projects within a 30km radius of the proposed site, is based on publicly available information and data from the Department of Forestry, Fisheries, and the Environment (DFFE) website. However, there may be additional projects not yet recorded or detailed in this data set. The limitation in the information could affect the comprehensiveness of the cumulative impact assessment in this report.
- The Project report uses the concept of 'worst case scenario' to identify issues and rate visual impacts. This scenario assumes that all facilities along with the associated grid infrastructure and sub-stations would be constructed at the same time. At the time of writing the VIA Report, there was no evidence to the contrary.
- The responsibility for implementing the recommendations, mitigation measures, and any other actions outlined in this report lies solely with the client or project proponent. The VIA practitioners are not responsible for monitoring, enforcing, or ensuring compliance with these measures. It is the client's duty to ensure that all necessary permits, approvals, and consents are obtained and that the project is carried out in accordance with all applicable laws, regulations, and standards. Any deviations from the recommendations or failure to implement the suggested measures may result in different impacts and outcomes than those described in this report.
- This report is intended solely for the use of the client and specific stakeholders identified in the report. No third party should rely on the report without the express written consent of the VIA practitioners. Any unauthorised use of, or reliance on, this report by third parties is strictly prohibited and may lead to inaccurate conclusions or decisions. The VIA practitioners disclaim any liability to third parties who choose to rely on this report without such consent.

2 Project Description

Glencore South Africa (Pty) Ltd proposes the development of a solar photovoltaic (PV) energy facility, known as the Glencore Lydenburg Solar PV Facility, with associated infrastructure near Mashishing. This project is being developed in line with Glencore's strategy to reduce carbon emissions and transition towards renewable energy solutions within its operations.

The Glencore Lydenburg Solar PV Facility is intended to provide power to the nearby Lydenburg Smelter and other Glencore operations, with a maximum capacity of 300MW. It is not part of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) and will primarily serve Glencore's internal energy needs. However, the project infrastructure is designed to be adaptable to future energy wheeling agreements or other energy demands that may arise within Glencore's operational framework.

The proposed Glencore Lydenburg Solar PV Facility will occupy an area of ~195ha, with the associated infrastructure including:

- Solar PV panels mounted on fixed or tracking systems,
- Battery Energy Storage Systems (BESS),
- An on-site switching station,
- Internal access roads totalling ~13.5km in length, and
- 132kV power lines connecting the facility to the Lydenburg Smelter and other Glencore energy networks.

The overall objective of the Glencore Lydenburg Solar PV Facility is to contribute to Glencore's broader sustainability goals by reducing its reliance on fossil fuels, decreasing its carbon footprint, and ensuring energy security for its operations. The development will also align with South Africa's national policies on renewable energy and climate change mitigation, while supporting local economic growth through job creation during the construction and operational phases.

The VIA process involves several key steps, including:

- Identifying and mapping existing sensitive receptors, buffers, important viewpoints, and view corridors;
- Identifying and screening potential visual concerns;
- Ensuring that the visual assessment will be in compliance with relevant standards, policies, laws, and regulations; and
- Providing recommendations for the impact assessment phase.

The VIA is conducted in accordance with the guidelines provided by relevant authorities, and while there is little legislation relating directly to VIAs, there are guidelines that provide direction for visual assessment as well as a number of laws which aim to protect visual resources.

2.1 Project Location

The proposed development of the Glencore Lydenburg Solar PV Facility, with a generating capacity of up to 300MW, is located ~2km north of Mashishing town, within the Thaba Chweu Local Municipality, Ehlanzeni District Municipality, Mpumalanga Province. The project site is situated adjacent to the existing Lydenburg Smelter, which is operated by Glencore, and is divided into northern and southern sections, with the smelter positioned centrally between them.

2.2 Project Technical Details

Table 1, Table 2 and **Error! Reference source not found.** provides the details of the project, including the main infrastructure components and services that will be required during the project life cycle.

Table 1: Details of the Study Area

COMPONENT	DESCRIPTION/DIMENSIONS
District Municipality	Ehlanzeni District Municipality
Local Municipality	Thaba Chweu Local Municipality
Ward Number(s)	Ward 12 and Ward 13
Nearest Town(s)	Mashishing (~2 km north of the project site)

The proposed facility will comprise the following infrastructure components, which will be located within the designated development footprint areas:

- **Solar PV Panels/Arrays:** The solar PV panels will be mounted on either fixed-tilt or tracking systems, with a maximum height of 3–5ms above ground level. These arrays will be arranged within the buildable areas of the site, and the specific type of panels and mounting structures will be finalised during the detailed design phase. The panels may also occupy the temporary laydown areas once construction is complete.
- **Access Roads:** The development includes internal access roads, with a total length of ~13.5km, to connect the solar arrays and associated infrastructure. Existing roads and disturbed areas will be used where possible to minimise environmental impact. During construction, the access road corridors may be up to 7m wide and will be rehabilitated to a width of 5 meters post-construction.
- **Battery Energy Storage System (BESS):** The facility will incorporate a battery energy storage system located within designated substation hubs to store excess electricity

generated by the solar panels. This infrastructure will ensure the stability and reliability of power supply.

- **Electrical Infrastructure:** The facility will include internal electrical reticulation in the form of low and medium-voltage power lines (22kV or up to 33kV), which will be placed underground where feasible, at a depth of up to 1.5m. In addition, 132kV overhead powerlines, ~2km in length, will connect the solar PV facility to the Lydenburg Smelter and other Glencore operations.
- **On-site Substations:** Two on-site substations, up to 0.72ha in extent each, will be developed to house electrical transformation equipment, including step-up transformers, switchgear, and auxiliary buildings for control and maintenance purposes. These substations will step up the electricity generated from 22kV or 33kV to 132kV for transmission via the power lines.
- **Perimeter Fencing:** The facility will be enclosed by a perimeter fence, up to 3m in height. The fencing type will either be palisade, mesh, or fully electrified, depending on site security requirements.
- **Temporary Laydown Areas:** Temporary laydown areas will be established during the construction phase to accommodate construction materials, equipment, and worker facilities. These areas will be rehabilitated once construction is complete, and, where applicable, may be utilised for the installation of additional solar arrays.
- **Water Requirements:** Water will be required for panel washing, dust control, and sanitation for operational staff. Water will ideally be sourced from the local municipality through a service level agreement. Should this not be possible, alternative arrangements, such as storage tanks (up to 10,000L) or water deliveries via trucks, will be made. Sanitation for staff facilities will either connect to the municipal sewage system or, where this is not feasible, make use of a conservancy tank serviced by an external contractor.
- **Solid Waste Management:** The amount of solid waste generated during both the construction and operational phases will be minimal. Waste will be removed from the site by the local municipality or a private contractor.
- **Stormwater Management:** The design will include stormwater control measures along the access roads and around critical infrastructure areas to prevent erosion and manage runoff effectively.

Associated Electrical Grid Infrastructure (EGI)[3]

Glencore South Africa (Pty) Ltd proposes the construction and operation of electrical grid infrastructure to connect the Glencore Lydenburg Solar PV Facility to the existing Lydenburg Smelter's energy network. The grid connection infrastructure includes the on-site substations and the 132kV powerlines, which will extend over ~2km.

The design of the electrical infrastructure ensures compliance with industry standards for grid connectivity and operational efficiency, supporting Glencore's long-term energy needs while reducing reliance on fossil fuels.

It is important to note that the exact specifications of the project components, including the specific types of solar panels, mounting structures, and infrastructure designs, will be determined during the detailed engineering design phase prior to construction. The information provided here reflects the maximum development footprint as a worst-case scenario for the purposes of this assessment.

[3] This will be further assessed in a separate application, however must be taken into consideration to adequately describe the cumulative impacts

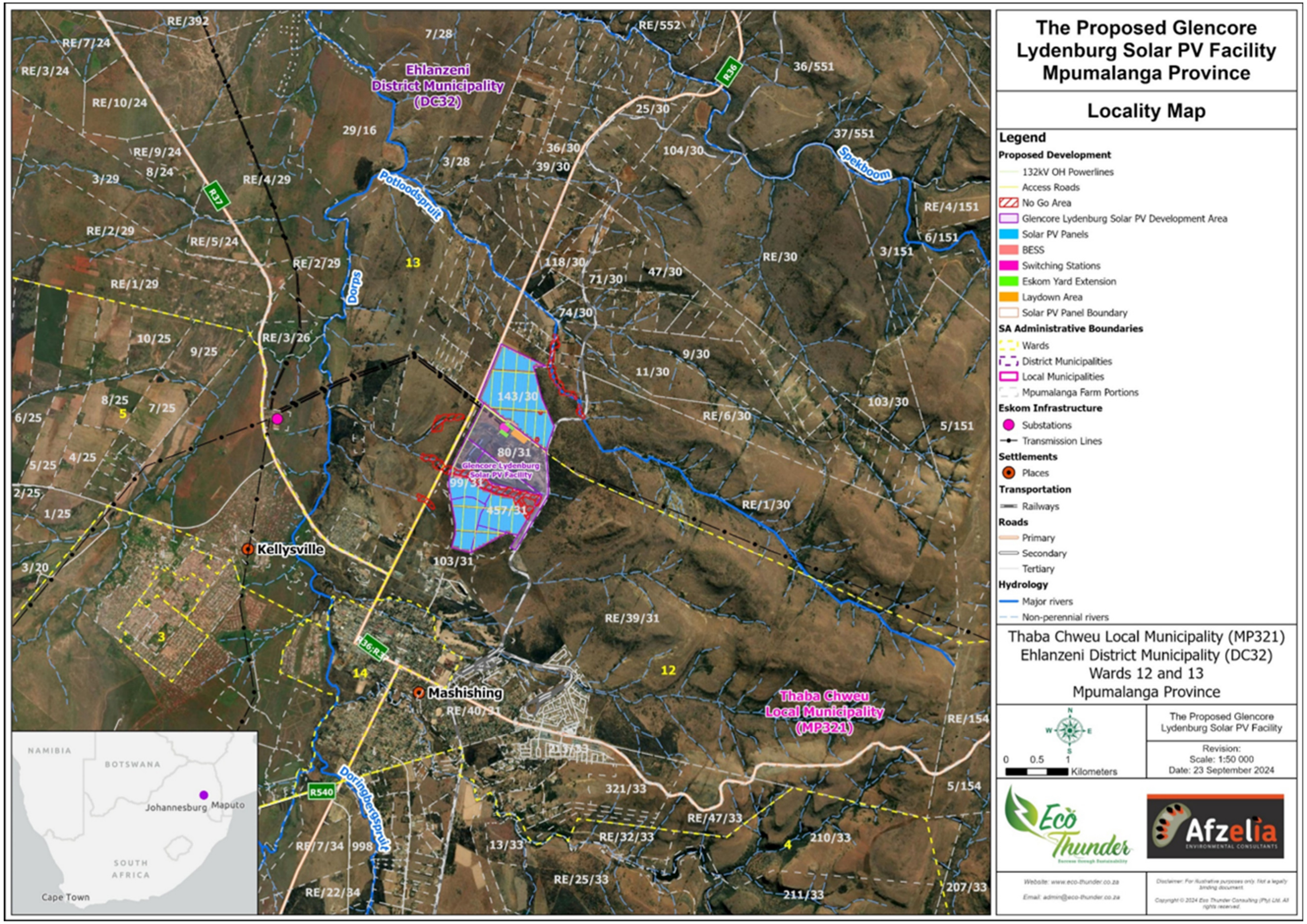

Figure 1: Locality Map

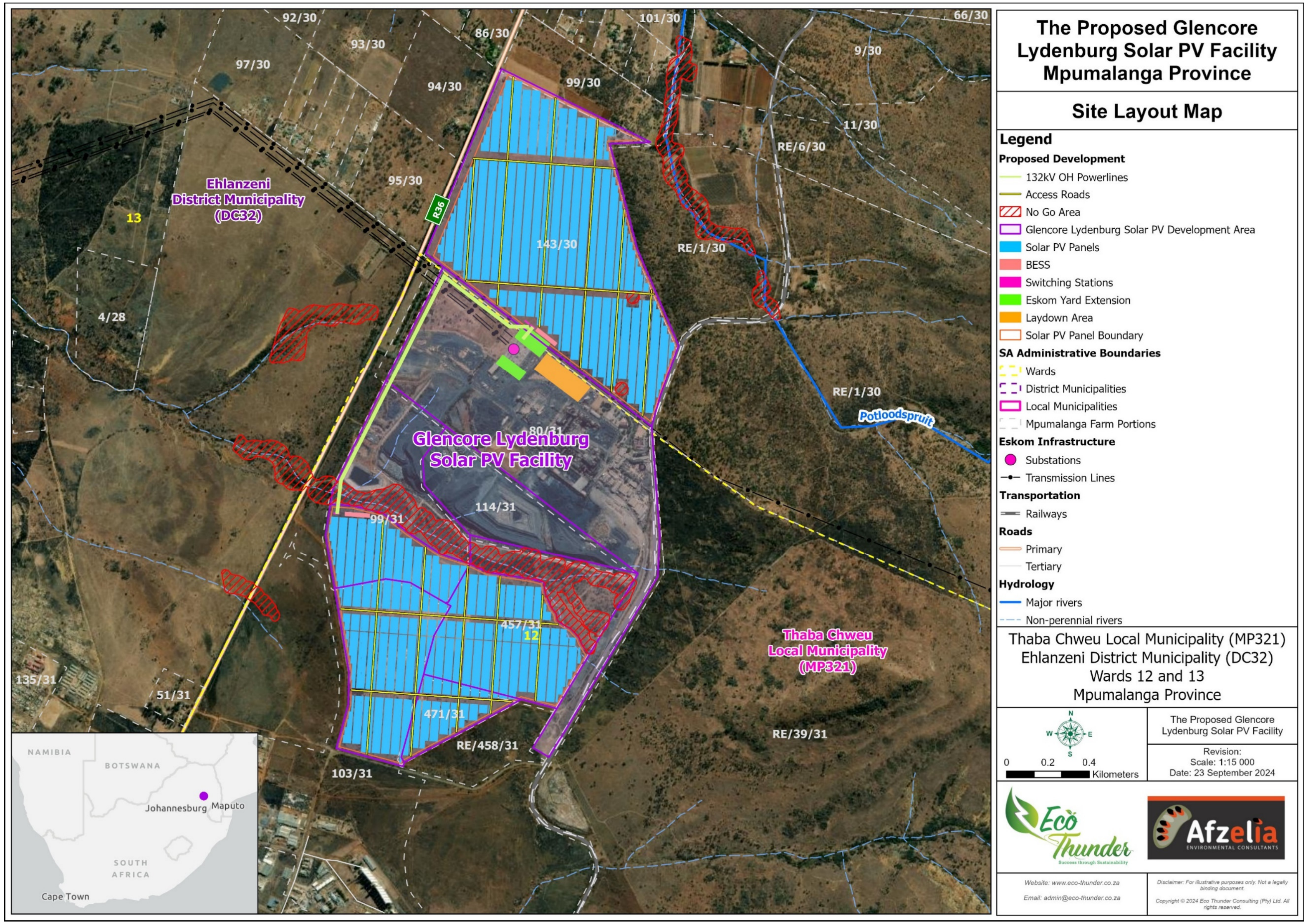

Figure 2: Glencore Lydenburg Solar PV Facility Proposed Layout

Table 2: Technical Details of the Proposed Project

COMPONENT	DESCRIPTION/DIMENSIONS
Farm Name(s) and Number(s) of Properties Affected by the PV Facility, incl. SG 21 Digit Code (s)	Below are the properties affected: • Portion 143 of Farm 30 Potloodspruit (T0JT00000000003000143); • Portion 114 of Farm 31 Townlands of Lydenburg (T0JT00000000003100114); • Portion 457 of Farm 31 Townlands of Lydenburg (T0JT00000000003100457); • Portion 471 of Farm 31 Townlands of Lydenburg (T0JT00000000003100471); • Portion 1 of Lydenburg Smelter Erf 6099 (T0JT00080000609900001) • Lydenburg Smelter Erf 2540 (T0JT00080000254000000) • Lydenburg Smelter Erf 2541 (T0JT00080000254100000)
Current zoning	Mixed
Site Coordinates	**Northern Section:** • North Corner: 25° 2'54.64"S; 30°28'4.70"E • West Corner: 25° 3'23.60"S; 30°27'54.04"E • South Corner: 25° 3'47.84"S; 30°28'34.08"E • East Corner: 25° 3'2.98"S; 30°28'27.42"E • Central Point: 25°03'20.54"S; 30°28'17.19"E **Southern Section:** • North Corner: 25° 4'5.30"S; 30°27'41.06"E • West Corner: 25° 4'41.30"S; 30°27'45.51"E • South Corner: 25° 4'42.63"S; 30°27'56.08"E • East Corner: 25° 4'13.60"S; 30°28'17.68"E • Central Point: 25° 4'26.76"S; 30°28'0.83"E
Coordinates of 132kV Over Headline(s) (Beginning, Mid and end point)	Beginning: Lat 25° 3'35.48"S Long 30°28'11.79"E Mid: Lat 25° 3'40.01"S Long 30°27'51.05"E End: Lat 25° 4'4.20"S Long 30°27'41.87"E
Affected Properties Area	~375ha

COMPONENT	DESCRIPTION/DIMENSIONS
Buildable Area	~195ha
Anticipated Capacity	Up to 300MW
Overhead Powerline	The proposed development of a 132kV overhead powerline of ~2km in length will connect the Glencore Lydenburg Solar PV Facility to the existing Lydenburg Smelter electrical grid.
Construction Camp	No construction camps would be developed, and labour would be sourced from nearby areas, as per relevant procurement requirements.
Site Access	The proposed facility will be accessed via a new road connecting the site to the existing R36 route.
Estimated number of employment opportunities generated by each PV project	• Construction phase: ~200 (20 skilled and 180 unskilled) new employment opportunities (excluding indirect opportunities). • Operational phase: ~20 unskilled opportunities will be created in the operational phase with 10 skilled employees to be recruited. • Decommissioning phase: Unknown.
Construction: Methodology	The facility would be constructed in the following sequence: • Final design and micro-siting of the infrastructure based on topographical conditions and environmental sensitivities, and following obtaining required environmental permits; • Vegetation clearance and construction of access roads (where required); • Construction of foundations; • Assembly and erection of infrastructure on site; • Stringing of inverters; • Rehabilitation of disturbed areas; and • Continued maintenance.
Construction: Duration and start date	Up to 12-18 months, start date is dependent upon award of a bid. Construction activities could take place concurrently.

The operational requirements for the facility include minimal water usage for cleaning panels and dust suppression, with sanitation services sourced from the local municipality or alternative water supply methods, such as storage tanks, if necessary. Sanitation for operational staff will connect to municipal sewage systems where feasible or employ external contractors for waste disposal services.

2.3 Project Alternatives

2.3.1 Location Alternatives

The properties were assessed in their full extent for the Glencore Lydenburg Solar PV Facility. The proposed project is divided into a northern and southern section within the Lydenburg Smelter property area. Due to the specific development requirements and the proximity to the smelter, geographically separate location alternatives have not been considered. The proposed facility is confined to the designated land surrounding the smelter, making it unsuitable to evaluate alternative sites outside this area.

2.3.2 Process Alternatives

Process alternatives are also known as technological and equipment alternatives that can be implemented to achieve the desired goal of a project. The process alternatives can be either mechanical (physical), chemical or biological and must be suitable to the specific type of development. There are three primary technologies by which solar energy is harnessed: photovoltaics (PV), which directly convert light to electricity; concentrating solar power (CSP), which uses heat from the sun (thermal energy) to drive utility-scale, electric turbines; and solar heating and cooling (SHC) systems, which collect thermal energy to provide hot water and air heating or conditioning. The latter is not discussed in this report as it is not applicable to the nature of the proposed development.

PV devices generate electricity directly from sunlight via an electronic process that occurs naturally in certain types of material, called semiconductors. Electrons in these materials are freed by solar energy and can be induced to travel through an electrical circuit, powering electrical devices or sending electricity to the grid. CSP plants use mirrors to concentrate the sun's energy to drive traditional steam turbines or engines that create electricity. The thermal energy concentrated in a CSP plant can be stored and used to produce electricity when it is needed, day or night. These technologies displace the need to use electricity or natural gas.

The advantages and disadvantages of each process is indicated in **Table 3** below.

Table 3: Advantages and Disadvantages of Solar Process Alternatives

ADVANTAGE	DISADVANTAGE
PHOTOVOLTAIC (PV)	
Electricity produced by solar cells is clean and silent.	PV systems are not capable of producing or storing thermal energy.
PV systems make use of batteries to temporary store energy to use in unfavourable conditions.	Battery energy storage systems are relatively expensive and considerable to significant negative impacts on the environment.

Small photovoltaic systems are quiet and visually unobtrusive.	High demand met through PV facility requires extensive PV plants which in turn require a large area to be completely transformed/disturbed.
PV systems are a lot easier to build and are relatively cheaper to development and maintain.	Orientation matters. If the panels do not face the sun, minimum solar energy will be captured.
PV systems do not release any harmful air or water pollution into the environment, deplete natural resources, or endanger animal or human health.	
CONCENTRATING SOLAR POWER (CSP)	
CSP systems are able to produce excess energy and store it for future use.	It is difficult and dangerous to store and manage high volume electricity.
High energy efficiency. CSP plants can also compete favourably with coal or nuclear power plants, whose energy efficiency are around 35 percent.	Requires high levels of solar irradiance for extended periods of time. This means its rollout is limited exclusively to countries or regions that meet these requirements.
CSP can Produce Both Electricity and Heat as concentrating solar collectors deliver heat at a much higher temperature.	High cost of electricity produced at CSP plants. CSP systems are more difficult to build and are relatively more expensive to develop and maintain.
	The reflective mirrors are usually visually obtrusive.

Based on the indicated advantages and disadvantages of the two applicable types of technological processes used in harnessing solar energy, the PV process is the most preferred method as it is relatively cheaper, less obtrusive and has reduced environmental impacts.

2.3.3 Design Alternatives

Design alternatives are the consideration of different designs for technical efficiency, aesthetic purposes or different construction materials in an attempt to optimise local benefits and sustainability. The following design alternatives were considered for the project.

2.3.3.1 Types of Solar Power Plant

The solar power plant is classified into two types according to the way load is connected, namely, Standalone system and Grid-connected system which are discussed below. The advantages and disadvantages of the different types of PV plants are indicated in **Table 4**.

2.3.3.2 Standalone System

A standalone system operates independently, without connection to the electrical grid. This system is ideal for locations where grid access is unavailable, such as remote areas or off-grid locations. It can also serve as a backup power source when the grid is down. Although optional, batteries and charge controllers are typically integrated into standalone systems to enhance reliability, allowing the system to store energy for future use. DC loads can connect directly to the plant, but an inverter is required to convert DC power into AC when serving AC loads. Due to its nature, a standalone system is generally used for smaller loads or in emergency situations, rather than for bulk electricity production.

2.3.3.3 Grid-Connected System

A grid-connected system is designed to generate power and transmit it to the load via the electrical grid, making it a grid-connected power plant. In this type of system, a large number of solar panels are utilised to produce significant amounts of electricity, requiring a substantial area for installation. The generated power is converted to AC to match the grid's form of power. For the system to operate effectively, the output from the solar plant must align with the grid's frequency and voltage. It is crucial that the power quality meets the grid's standards to ensure smooth integration.

Table 4: Advantages and Disadvantages of Different Types of PV Plants

ADVANTAGE	DISADVANTAGE
Standalone System	
Independence. No longer subjected to the terms and policies of the utility company especially with the current electricity issues with Eskom.	Higher initial cost to develop.
A large off-grid solar system saves money in the long run by taking away the monthly bills.	Solar batteries are expensive, and bigger ones are required to properly store energy for future use.
No waste or byproducts are generated.	Maintenance can be expensive.
	Electricity access is wholly dependent on two sources: the sun and the energy stored in your battery bank.
GRID-CONNECTED SYSTEM	
More cost-effective due to the lower upfront cost and the ability to receive credits for excess energy production.	When there is no sunlight and the grid goes down resulting in a power outage, there is no access to any electricity. Making the need for batteries very important.
When grid-tied systems produce more energy than required, the extra energy is sent back to the supply grid in exchange for electricity credits.	
A grid-tied solar system always provides access to electricity – whether or not there is sunlight.	Grid-tied system will still result in minimal charges that will still reflect on the electricity bill.
The grid-connected PV system has a low gestation period.	

Given the project's objective of generating up to 300MW of electricity, primarily for the smelter, a hybrid system incorporating both standalone and grid-connected components is considered the most suitable for the Glencore Lydenburg Solar PV Facility.

2.3.3.4 Types of Solar Panels

Though there are many brands and styles of solar panels, there are generally four main types of cells of a solar panel, namely; bifacial solar panels, monocrystalline, polycrystalline, and thin-film. Bifacial solar panels, the reversible fashion accessory of the solar industry, are double-sided panels that absorb solar energy from both sides. Moncrystalline and polycrystalline panels are used for residential installations, while thin-film panels are more common for bigger solar projects.

The types of solar panels are discussed below, and the advantages and disadvantages are indicated in **Table 5**.

2.3.3.5 Bifacial Solar Panels

Bifacial solar panels can generate electrical energy from both the front and back surfaces, utilising sunlight reflected off surfaces like the ground. The main difference between bifacial and traditional solar panels is the transparent or reflective backsheet, which allows sunlight to pass through and reach the rear side of the panel. Bifacial modules typically use monocrystalline cells and come in both framed and frameless designs. The additional exposure to sunlight enhances energy production, particularly in environments with high albedo, such as areas with light-coloured surfaces or snow.

2.3.3.6 Monocrystalline Solar Panels

Monocrystalline solar panels are composed of cells made from a single, continuous silicon crystal. These panels are highly efficient, making them ideal for rooftops or areas where space is limited. There are two main variations of monocrystalline panels: Passivated Emitter and Rear Contact (PERC) and bifacial panels. PERC panels increase energy absorption with an additional conductive layer on the back, while bifacial panels absorb light on both sides. Monocrystalline panels are typically solid black, offering a sleek and uniform aesthetic.

2.3.3.7 Polycrystalline Solar Panels

Polycrystalline panels are made from silicon solar cells, similar to monocrystalline panels, but use a different cooling process that creates multiple crystals rather than one. This gives polycrystalline panels their distinctive blue, marbled appearance. While less efficient than monocrystalline panels, polycrystalline panels are more affordable, making them a cost-effective option for larger installations where space is less of a constraint.

2.3.3.8 Thin-film Solar Panels

Thin-film solar panels are less efficient than monocrystalline or polycrystalline varieties but are lighter, more flexible, and often used for large-scale industrial projects. Their sleek, black appearance allows them to blend seamlessly into various landscapes. However, thin-film panels are not suitable for residential installations due to their low efficiency and higher overall costs associated with their increased degradation rate over time.

Table 5: Advantages and Disadvantages of Different Solar Panels

ADVANTAGE	DISADVANTAGE
BIFACIAL SOLAR PANEL	
Produces renewable energy from both surfaces	More expensive than regular one-sided panels
Produces more power than conventional solar panels because their entire surface works to produce electricity for the facility	Unsuitable for use in areas with lots of shade or obstructing buildings. Also not suitable to be installed above dark coloured, non-reflective surfaces such as dirt or grass
More durable as they are less likely to get damaged by extreme weather	The installation of bifacial (double-sided) solar panels sometimes requires more time and effort than single-sided panel installation
Solar panels can work at different angles or orientations as long as they are facing towards the equator	Bifacial panels with double-sided glass surfaces are heavier than conventional solar panels. Their weight makes it difficult to manoeuvre or adjust them
Rodents cannot live or hide under double-sided solar panels because they don't have one side resting on surfaces like regular solar panels	
MONOCRYSTALLINE SOLAR PANEL	
Lasts more than 25 years	More expensive than the other two panel types
Made of the highest-grade silicon	Can be slightly less efficient during cold weather
Requires the least amount of roof space	Wastes material during production process
POLYCRYSTALLINE SOLAR PANEL	
Lasts more than 25 years	More easily affected by high temperatures
Is more affordable than monocrystalline panels	Less efficient than monocrystalline panels
Produces less waste during the manufacturing process	Requires more roof space
THIN-FILM SOLAR PANEL	
Can withstand high temperatures	Is the least efficient
Is the least expensive panel option	Requires the most space
Weighs less than monocrystalline and polycrystalline panels	Is not sufficient for residential rooftop installations

Given the advantages and disadvantages of the different panel types and the goal of generating up to 300MW of electricity, bifacial solar panels are the most favourable for this project due to their dual-sided energy generation and durability. Polycrystalline panels are a good secondary option for areas requiring cost-effectiveness. However, all panel types have similar environmental impacts, and the final decision may depend on specific site conditions and cost factors.

2.3.3.9 Energy Storage Devices

Energy storage is the capture of energy produced at one time for use at a later time to reduce imbalances between energy demand and energy production. A device that stores energy is generally called an accumulator or battery. Energy comes in multiple forms including radiation, chemical, gravitational potential, electrical potential, electricity, elevated temperature, latent heat and kinetic. Energy storage involves converting energy from forms that are difficult to store to more conveniently or economically storable forms. Storage options include batteries, thermal, or mechanical systems. All of these technologies can be paired with software that controls the charge and discharge of energy. There are many types of energy storage devices, however for purposes of this study, the discussion will be limited to the main storage devices namely, batteries, thermal, or mechanical systems.

2.3.3.10 Battery Energy Storage Systems (BESS)

Batteries are used to store electrical energy generated by the solar power plants. The storage components are the most important component in a power plant to meet the demand and variation of the load. This component is used especially when the sunshine is not available for few days.

According to Arabkoohsar (2020), There are various forms of batteries, including: lithium-ion, flow, lead acid, sodium, and others designed to meet specific power and duration requirements. The two main battery energy storage systems used in the solar power facilities are Lead-Acid battery or Nickel-Cadmium battery.

A NiCad battery pack comprises two or more individual cells. This battery is a type of rechargeable battery using nickel oxide hydroxide and metallic cadmium as electrodes.

A lead acid battery is a rechargeable battery that uses lead and sulphuric acid to function. The lead is submerged into the sulphuric acid to allow a controlled chemical reaction.

There is also a different type of battery known as a Redox Flow Battery in which energy is stored and provided by two chemicals that are dissolved in liquids and stored in tanks. These are well suited for longer duration storage (Arabkoohsar, 2020).

2.3.3.11 Thermal Energy Storage Systems (TESS)

Thermal systems use heating and cooling methods to store and release energy. Thermal energy conversion involves the conversion of residual heat and heat from sustainable sources – such as solar energy, biomass or geothermal heat – to other energy carriers, such as electricity, heat at a different temperature level or cold (Arabkoohsar, 2020).

Conversion systems also form the link between the various energy networks and may therefore act as energy hubs. An example of thermal energy device is molten salt storing solar-generated heat for use when there is no sunlight. Ice storage in buildings reduces the need to run compressors while still providing air conditioning over a period of several hours. Other systems use chilled water and dispatchable hot water heaters. In all cases, excess energy charges the storage system (heat the molten salts, freeze the water, etc.) and is later released as needed.

The different kinds of thermal energy storage can be divided into three separate categories: sensible heat, latent heat, and thermo-chemical heat storage (Arabkoohsar, 2020). Each of these has different advantages and disadvantages that determine their applications. Sensible heat storage (SHS) is the most straightforward method. It simply means the temperature of some medium is either increased or decreased. This type of storage is the most commercially available out of the three; other techniques are less developed. The sensible heat of molten salt is also used for storing solar energy at a high temperature, termed molten-salt technology or molten salt energy storage (MSES). Secondly, Latent Heat Storage (LHS) is associated with a phase transition, the general term for the associated media is Phase-Change Material (PCM). During these transitions, heat can be added or extracted without affecting the material's temperature, giving it an advantage over SHS-technologies. Storage capacities are often higher as well. This allows for a more target-oriented system design. Lastly, Thermo-chemical heat storage (TCS) involves some kind of reversible exotherm/endotherm chemical reaction with thermo-chemical materials (TCM). Depending on the reactants, this method can allow for an even higher storage capacity than LHS (Arabkoohsar, 2020).

2.3.3.12 Mechanical Energy Storage Systems (MESS)

According to Arabkoohsar (2020), Mechanical energy Storage Systems (MESS) works in complex systems that use heat, water or air with compressors, turbines, and other machinery, providing robust alternatives to electrochemical battery storage. Mechanical energy storage systems use kinetic or gravitational forces to store energy. Since generators use the movement of a turbine to generate electricity, these systems harness the potential force to drive that turbine for a later date. Like thermal energy storage, it's based off a relatively simple theory, but produces some complex and imaginative results. In its simplest form it can take the shape of a weight and pulley, with the energy required to lift the weight stored as gravitational potential until it is released again, but more ambitious ideas are required in order to store grid-scale energy.

The four most common MESS are Pumped Heat Energy Storage, Pumped Storage Hydropower, Compressed Air Energy Storage, and Flywheel Energy Storage.

Pumped heat energy storage converts electric energy from the grid into thermal energy that is stored as a thermal potential. At full capacity, the system can store energy in tanks for hours or up to several weeks before converting it back to electrical energy. The system can then provide greater than 10 hours of electricity at rated power.

Pumped Storage Hydropower are electric power systems use pumped storage hydropower (PSH) for load balancing. The method uses the gravitational potential energy of water, pumped from a lower-elevation to a higher-elevation reservoir using low-cost, off-peak surplus electric power to run the pumps. During periods of high electrical demand, the stored water is returned to the lower reservoir, driving turbines to produce electric power.

Compressed Air Energy Storage (CAES) plants work similarly to pumped storage hydropower plants, but rather than pumping water between reservoirs, these types of plants compress and store ambient air in an underground cavern during periods of excess power. When power is needed, the air is heated and expanded in a turbine to drive power generation.

Flywheel Energy Storage systems store energy as kinetic energy in a high-speed rotor connected to a motor or generator, typically in a vacuum environment. The flywheels decelerate in discharge mode and are ideal for short-duration fast-response backup power (Arabkoohsar, 2020).

Some of the advantages and disadvantages of the various energy storage devices are indicated in **Table 6**.

Table 6: Advantages and Disadvantages of Energy Storage Devices

ADVANTAGE	DISADVANTAGE
BATTERY ENERGY STORAGE DEVICES	
Stores energy for future consumption when demand arises	Batteries which last longer can be expensive
Reduces the carbon footprint	Batteries do not last forever, and proper care is required to avoid negative environmental impacts through incorrect disposal
Can be charged faster and have a longer life cycle of up to 15-20 years	More likely to leak acid, which can damage the device
Some batteries such as Lead-Acid battery are easier to dispose of and recycle	Harmful to the environment as they contain toxic metals
Less likely to suffer from self-discharge, meaning they can hold their charge for extended periods	More likely to leak acid, which can damage the device
Provide a large amount of power when needed	Require regular maintenance, such as topping up the water level and cleaning the terminals
Easier to dispose of and recycle	Produce hydrogen gas when charging, which can be explosive if it builds up in a confined space
THERMAL ENERGY STORAGE SYSTEMS	
Longer life (batteries typically 10 to 15 years, thermal storage up to 30 years)	Less efficiency (< 70%)
Generally better than batteries for storing heat or cooling	Very expensive system/infrastructure cost
Thermal energy storage can save energy consumed and cost	Device must always be sealed (to prevent loss of water when subjected to long-term thermal cycling)
Can increase the uptake of renewable energy	Problems of corrosion with container
Thermal storage systems are generally 100% recyclable	Integration/transport challenges

Provides backup when heating or cooling generating equipment fails	Long term stability is a requirement for any thermal storage system
MECHANICAL ENERGY STORAGE SYSTEMS	
Affordable and low environmental impact	Very high-cost energy storage systems to establish
Most parts of the systems are dependable and commercially available for years, which results in an enhanced lifetime	Continuous maintenance which can be expensive
Depends on itself to generate the power, so it is autonomous	Energy use is most efficient locally, inefficient to try to send over long distances
Very versatile, so it has multiple applications and uses	Low energy densities and very high losses due to friction
More comfortable and safe, technological advances have decreased occupational hazards and accidents have been reduced	Long construction lead time and technology type can be dependent on regional topography

Given the scale and energy storage needs of the Glencore Lydenburg Solar PV Facility, a lithium-ion or vanadium-redox battery system is the most suitable choice for energy storage. It offers high storage capacity, efficiency, and a longer life cycle, aligning well with the project's requirements. The feasibility of these systems will be further evaluated in the EIA.

2.3.4 No-Go Alternative

The no-go alternative assumes that the proposed solar facility will not be developed. In this scenario, the land will remain in its current state, primarily used for industrial purposes in conjunction with the Lydenburg Smelter. This alternative serves as a baseline for comparing the potential impacts of the proposed development. Under this scenario, no renewable energy generation would occur, and the economic and employment benefits of the solar facility would not materialise. However, it would avoid any potential environmental or visual impacts that the development may cause.

3 Requirement for a VIA

As outlined in **Table 7**, the requirement for visual input may arise from the characteristics of both the receiving environment and the project itself. The following indicators are identified as potential signals for the necessity of visual input:

The nature of the receiving environment:

- Areas with protection status, such as national parks or nature reserves;
- Areas with proclaimed heritage sites or scenic routes;
- Areas with intact wilderness qualities, or pristine ecosystems;
- Areas with intact or outstanding rural or townscape qualities;
- Areas with a recognised special character or sense of place;
- Areas lying outside a defined urban edge line;
- Areas with sites of cultural or religious significance;
- Areas of important tourism or recreation value;
- Areas with important vistas or scenic corridors; and
- Areas with visually prominent ridgelines or skylines.

The nature of the project:

- High intensity type projects including large-scale infrastructure;
- A change in land use from the prevailing use;
- A use that is in conflict with an adopted plan or vision for the area;
- A significant change to the fabric and character of the area;
- A significant change to the townscape or streetscape;
- Possible visual intrusion in the landscape; and
- Obstruction of views of others in the area.

These indicators can help determine whether a visual impact assessment is necessary for a particular project. It's important to note that this list is not exhaustive and other factors may also suggest the need for visual input.

3.1 Components of Visual Studies

As per Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005), the typical components of visual studies according to Box 8 are as follows:

Table 7: Typical Components of Visual Studies

BOX 8: TYPICAL COMPONENTS OF VISUAL STUDIES
• Identification of issues and values relating to visual, aesthetic, and scenic resources through the involvement of I&APs and the public. • Identification of landscape types, landscape character and sense of place, generally based on geology, landforms, vegetation cover and land use patterns; • Identification of viewsheds, view catchment area and the zone of visual influence, generally based on topography; • Identification of important viewpoints and view corridors within the affected environment, including sensitive receptors; • Indication of distance radii from the proposed project to the various viewpoints and receptors; • Determination of the VAC of the landscape, usually based on topography, vegetation cover or urban fabric in the area; • Determination of the relative visibility, or visual intrusion, of the proposed project. • Determination of the relative compatibility or conflict of the project with the surroundings; • A comparison of the existing situation with the probable effect of the proposed project, through visual simulation, generally using photomontages.

The approach to visual assessment should be based on both quantitative and qualitative aspects. Quantitative aspects often make use of landscape resource classification methods. These may include combinations of landforms (geomorphology), vegetation cover, and land use mapping.

The actual approach and method used would depend on the level of visual input required in the EIA process. Effective interaction with other specialists should be facilitated by the EIA practitioner to ensure that an integrated approach is adopted, where the various components of the environment are seen as a whole.

This visual guideline document is therefore an attempt to develop a 'best practice' approach for visual specialists, EIA practitioners and authorities involved in the EIA process.

4 Legislation and Policy Review

A vital aspect of this process involves assessing the suitability of a proposed development in relation to key planning and policy documents.

It is worth noting the following points:

- The African Development Bank (AfDB) do not provide guidelines for VIAs.

Although there is limited legislation specifically addressing VIAs, there exist guidelines that offer guidance for conducting visual assessments. Additionally, several laws are in place to safeguard visual resources, as well as regulations applicable to specialists in various fields.

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

- International Good Practice;
- National Legislation and Guidelines; and
- Policy Fit.

4.1 International Good Practice

The following documentation provides good practice guidelines, specifically:

- Guidelines for Landscape and VIA;
- International Finance Corporation (IFC);
- Millennium Ecosystem Assessment (MEA);
- AfDB - While they do not provide specific guidelines for VIAs, their general environmental and social guidelines may be relevant.

4.1.1 Guidelines for Landscape and Visual Impact Assessment, Second Edition

These guidelines establish principles that promote consistency, credibility, and effectiveness in landscape and VIA within the EIA process. According to the guidelines, landscape encompasses the entirety of our external environment, whether in urban or rural areas, including buildings, streets, open spaces, trees, and their interconnected relationships. The guidelines highlight the importance of landscape for various reasons, including being a natural resource, containing archaeological and historical evidence, providing habitats for plants and animals (including humans), evoking sensual, cultural, and spiritual responses, and contributing to our quality of life in urban and rural settings. Additionally, landscapes offer valuable opportunities for recreation and resources.

4.1.2 International Finance Corporation

The IFC Performance Standards (IFC, 2012) related to VIAs:

- **IFC Performance Standard 1:** Assessment and Management of Environmental and Social Risks and Impacts: This standard requires the identification and assessment of potential visual impacts as part of the overall environmental and social risks and impacts of a project. From a VIA perspective, this could involve identifying potential changes to the visual character of the landscape, assessing the visual sensitivity of the area, and evaluating the magnitude of the visual impact. This process should consider both adverse and beneficial impacts and involve consultation with affected communities.
- **IFC Performance Standard 3:** Resource Efficiency and Pollution Prevention: This standard defines pollution to include the creation of potential for visual impacts, including light. Therefore, a VIA under this standard would need to assess potential visual pollution, such as excessive or intrusive lighting, and propose measures to avoid, minimise, or mitigate these impacts. This could involve, for example, designing lighting to minimise light spill, using lower intensity lighting, or using directional lighting to focus light where it is needed.
- **IFC Performance Standard 6:** Biodiversity Conservation and Sustainable Management of Living Natural Resources: While this performance standard does not specifically address VIAs, it recognises the importance of biodiversity and ecosystem services. Visual impacts on natural landscapes can have implications for biodiversity and ecosystem functions. Therefore, when conducting a VIA under IFC Performance Standard 6, it is important to consider the potential effects of visual impacts on biodiversity and incorporate appropriate mitigation measures to conserve biodiversity and sustainably manage living natural resources.
- **IFC Performance Standard 8:** Cultural Heritage: This standard requires the assessment of potential visual impacts on cultural heritage sites. This could involve assessing changes to the visual character or setting of the site and considering how these changes could impact the cultural heritage values of the site. The VIA would need to propose measures to avoid, minimise, or mitigate these impacts, and these measures should be developed in consultation with affected communities. It is worth noting that cultural heritage includes both tangible forms (such as objects, sites, and structures) and unique natural features that embody cultural values.
- **The IFC Environmental Health and Safety Guidelines** for Electric Power Transmission and Distribution (IFC, 2007) specifically identify the risks posed by power generation and distribution projects to create visual impacts on Housing/farming communities. It recommends mitigation measures to minimise visual impact. These should include the placement of powerlines and the design of substations with due consideration to landscape views and important environmental and community features. Prioritising the location of high-voltage transmission and distribution lines in less populated areas, where possible, is also promoted.

4.1.3 Millennium Ecosystem Assessment (MEA)

According to the Ecosystems and Human Well-being document compiled by the MEA in 2005, ecosystems play a vital role in supporting human well-being through their provisioning, regulating, cultural, and supporting services. The document highlights the increasing evidence of human activities negatively impacting ecological systems globally, raising concerns about the potential consequences of these ecosystem changes on human well-being.

The MEA defined the following non-material benefits that can be obtained from ecosystems.

- **Inspiration:** Ecosystems provide a rich source of inspiration for art, folklore, national symbols, architecture, and advertising.
- **Aesthetic values:** Many people find beauty or aesthetic value in various aspects of ecosystems, as reflected in the support for parks, scenic drives, and the selection of housing locations.
- **Sense of place:** Many people value the "sense of place" that is associated with recognised features of their environment, including aspects of the ecosystem.
- **Cultural heritage values:** Many societies place high value on the maintenance of either historically important landscapes ("cultural landscapes") or culturally significant species; and
- **Recreation and ecotourism:** People often choose where to spend their leisure time based in part on the characteristics of the natural or cultivated landscapes in a particular area. (MEA, 2005)

The MEA Ecosystems and Human Well-being: Synthesis report indicates that there has been a "rapid decline in sacred groves and species" in relation to spiritual and religious values, and aesthetic values have seen a "decline in quantity and quality of natural lands". (MEA, 2005).

4.2 National Legislation and Guidelines

To comply with the Visual Resource Management requirements, it is necessary to clarify which National and Regional planning policies govern the proposed development area to ensure that the scale, density and nature of activities or developments are harmonious and in accordance with the sense of place and character of the area.

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

The specialist report is in accordance with 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 EMPr and will be in support of the EIA and Appendix 6 of the EIA Regulations 2014, as amended on 7 April 2017.

Specialist Screening Protocols are also required by the 2014 EIA Regulations. However, the Landscape (Solar) Theme Sensitivity was referenced as there is no specific 'visual' protocol.

4.2.2 NEMA: Protected Areas Act 57 of 2003

- Management of declared World Heritage Sites (WHS) and buffer areas within South Africa;
- The purpose of the National Environmental Management: Protected Areas Act (Act 57 of 2003) (NEMPAA) is to, inter alia, provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. To this end, it provides for the declaration and management of various types of protected areas;
- Section 39 of NEMPAA requires the preparation and submission of a management plan for a protected area declared in terms of the Act. The objective of a management plan, as stated in Section 41 of NEPAA, is to ensure the protection, conservation and management of the protected area concerned in a manner that is consistent with the objectives of NEMPAA and for the purpose it was declared;
- Section 50(5) of NEMPAA states that "no development, construction or farming may be permitted in a nature reserve or world heritage site without the prior written approval of the management authority;
- The management authority for a WHS is established through a NEMPAA process. The Management Authority (MA) is located within and funded by the DFFE; and
- The MA is tasked with ensuring that activities within the WHS and its buffer area comply with the approved Conservation Management Plan developed for the WHS.

4.2.3 Western Cape DEA: 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[4], they provide guidance that is appropriate for any EIA process. According to the Western Cape Department of Environmental Affairs & Development Planning's guideline on involving visual and aesthetic specialists in EIA processes, the following information is relevant for our visual impact assessment report:

- Current South African environmental legislation governing the EIA process includes the National Environmental Management Act (NEMA) (Act No. 107 of 1998) and the EIA regulations under the Environment Conservation Act (Act No. 73 of 1989).

4 The Western Cape Guidelines are the only official guidelines for VIA reports in South Africa and can be regarded as best practice throughout the country.

- The Protected Areas Act (NEMA) (Act 57 of 2003, Section 17) aims to protect natural landscapes.
- The National Heritage Resources Act (Act No. 25 of 1999) and associated provincial regulations provide legislative protection for listed or proclaimed sites, such as urban conservation areas, nature reserves, and scenic routes.
- Visual pollution is controlled, to a limited extent, by the Advertising on Roads and Ribbons Act (Act No. 21 of 1940), which deals mainly with signage on public roads.
- The Municipal Systems Act (Act 32 of 2000) requires municipalities to undergo an Integrated Development Planning (IDP) process, including the preparation of a five-year strategic development plan. The IDP process, particularly the spatial component known as the Spatial Development Framework, follows a bioregional planning approach in the Western Cape Province. Bioregional planning aims to achieve landscape continuity, protect natural areas, and integrate social, environmental, and economic criteria in local planning initiatives.

Specialists should refer to the relevant provincial or local authority to determine the existence of policies, by-laws, or other restrictions regarding visual impact or the protection of scenic, rural, or cultural resources.

4.3 Policy Fit

Policy fit refers to the extent to which the proposed changes to the landscape align with planning and policy at the International, National, Provincial, and Local levels.

Regarding international best practices, the proposed landscape modifications do not meet the criteria for triggering best practice guidelines, as there are no significant cultural or landscape resources within the site or its immediate surroundings.

The specialist followed the United States Bureau of Land Management's Visual Resource Management method (USDI, 2004) to determine the significance of the landscape. This method, based on mapping and Geographical Information System (GIS) techniques, enhances objectivity and consistency by utilising standardised assessment criteria.

5 Approach and Methodology

5.1 Purpose of the Study

The purpose of the study is to document the baseline and to ensure that the visual/aesthetic consequences of the proposed Glencore Lydenburg Solar PV Facility are understood. The report therefore aims to identify scenic resources, and visually sensitive areas or receptors. It also aims to identify key concerns or issues relating to potential visual impacts arising from the Project, and which must be addressed in the assessment phase.

5.2 Approach to Study

Assessing the effects of the development on landscape resources and visual amenities involves a combination of quantitative and qualitative evaluations. Visual impact is evaluated based on the worst-case scenario, while landscape and visual assessments are distinct but interconnected processes. The landscape analysis and assessment of impacts contribute to the baseline for VIA studies. The assessment of potential landscape impacts focuses on the physical landscape as an environmental resource. In contrast, visual impacts are evaluated as the effects on viewers when an object is introduced into a view or scene.

To conduct the study, Geographic Information System (GIS) software was utilised as a tool for generating viewshed analysis and applying relevant spatial criteria to the proposed infrastructure. A detailed Digital Terrain Model (DTM) of the study area was created using topographical data provided by the Japan Aerospace Exploration Agency (JAXA), specifically the ALOS Global Digital Surface Model "ALOS World 3D - 30m" (AW3D30) elevation model.

The scope of work for this report includes.

- Identify the scope of work/assessment required;
- Establish the baseline profile of the Environment;
- Identify potentially sensitive visual receptors within the receiving environment;
- Determine visual distance/observer proximity to the facility;
- Determine viewer incidence/viewer perception;
- Determine the VAC of the landscape;
- Determine the significance of identified impacts;
- Propose mitigation to reduce or alleviate potential adverse visual impacts;
- Conclude with an impact statement of significance and a project recommendation; and
- Comply with the IFC standards.

The VIA is determined according to the nature, extent, duration, intensity or magnitude, probability, and significance of the potential visual impacts, and will propose management actions and/or monitoring programs and may include recommendations related to the proposed Glencore Lydenburg Solar PV Facility.

The visual impact is determined for the highest impact-operating scenario (worst-case scenario) and varying climatic conditions (i.e., different seasons, weather conditions, etc.) are not considered.

The VIA considers potential cumulative visual impacts or the potential to concentrate visual exposure/impact within the region.

5.3 Site Verification and Specific VIA Approach

Selecting the appropriate approach for a VIA is a crucial step in the process. The method and input for a VIA should be determined based on the expected level of visual impact, the nature of the project, and the characteristics of the receiving environment– that is the baseline landscape and visual conditions.

This in turn will form the basis from which the magnitude and significance of the landscape and visual effects of the development may be identified and assessed.

Table 8 provides the site verification report for an analysis of the existing landscape features, characteristics, the way the landscape is experienced, and the condition and the value or importance of the landscape and visual resources in the vicinity of the proposed development as well as the level of assessment deemed suitable for the Glencore Lydenburg Solar PV Facility development.

Based on the evaluation conducted, the findings from the site verification report indicate that a Level 4 Visual Assessment will be required.

Table 8: Categorisation of Approaches and Methods Used for Visual Assessment

Approach and Method	**Type of Issue**				
	Little or No Visual Impact Expected	**Minimal Visual Impact Expected**	**Moderate Visual Impact Expected**	**High Visual Impact Expected**	**Very High Visual Impact Expected**
Level of Visual Assessment Recommended	Level 1 Visual Assessment	Level 2 Visual Assessment	Level 3 Visual Assessment	Level 4 Visual Assessment	

5.4 Significance of Visual Impact

Having established the specific type of VIA required, it is now crucial to delve into the generic aspects and themes associated with a VIA. These elements will be examined at a site-specific level within this report, enabling us to accurately identify and understand the unique impacts associated with the site under consideration[5].

A combined quantitative and qualitative methodology, as supplied by the Environmental Practitioner, was used to describe the significance of impacts.

- **Significance** of impact is rated as the consequence of impact multiplied by the probability of the impact occurring.
- **Consequence** is determined using intensity, spatial scale, and duration criteria.

A summary of each of the qualitative descriptions along with the equivalent quantitative rating scale is given in Figure 3 below.

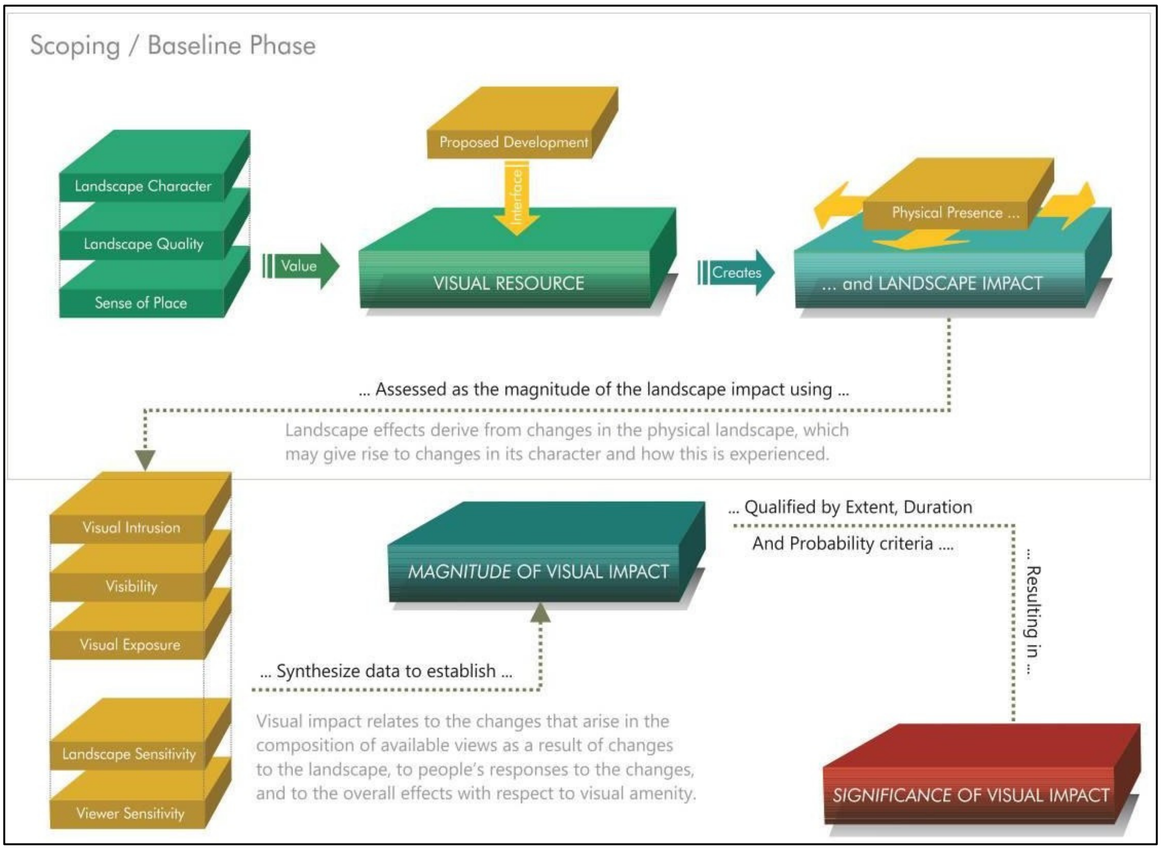

Figure 3: VIA Process

5.4.1 Landform (Topographical) and Micro-Topographical Context

The visibility of a feature within a landscape is significantly influenced by its landform context. Factors such as the feature's placement (e.g., valley bottom or ridge top), the viewer's location, and the slope's morphology can either enhance or obstruct visibility. Micro-topographical elements

[5] Themes and Elements discussed in 5.4.1 to 5.4.9 will be site specifically addressed in Section 6.

like buildings or vegetation can also screen views, potentially eliminating visual impact. Therefore, a comprehensive understanding of the topographical context is crucial in assessing visual impact.

5.4.2 Landscape Development Context

The presence/existence of other anthropogenic objects associated with the built environment may influence the perception of whether a new development is associated with a visual impact. Where buildings and other infrastructure exists, the visual environment could be already altered from a natural context and thus the introduction of a feature into this setting may be considered to be less of a visual impact than if there was no existing built infrastructure visible.

5.4.3 Receptor Type and Nature of the View

Visual impacts can be perceived by various types of receptors, including individuals driving along roads or residing/working in the vicinity where the structural feature is visible. The type of receptor influences the typical "view" of a potential source of visual impact, with views being constant in the case of residences or permanent human habitats, and transient in the case of vehicles moving along a road. The nature of the view encountered directly influences the intensity of the visual impact experienced.

5.4.4 Presence of Receptors

It is important to note that visual impacts are only experienced when there are receptors present to experience the impact; thus, in a context where there are no human receptors or viewers present, there are not likely to be any visual impacts experienced.

5.4.5 Viewing Distance

The distance between the viewer or receptor location and an object is the primary factor influencing the perception of visual impacts. Beyond a certain distance, even large structural features become less visible and blend into the surrounding landscape. The visibility of an object tends to decrease exponentially as the distance from the object increases. The maximum impact is typically felt by receptors within a distance of 500m or less.

As one moves away from the source of impact, the visual impact diminishes exponentially. At a distance of 1000m, the impact is approximately one-quarter of that experienced at 500m. At distances of 5000m or more, the impact becomes negligible.

5.4.6 Sense of Place

According to Lynch (1992), a sense of place is the extent to which a person can recognise or recall a place as being distinct from other places - as having a vivid, unique, or at least particular character of its own. The sense of place for the study area derives from a combination of the local landscape types described above, their relative ‘intactness’, and their impact on the senses.

Sense of place goes hand in hand with place attachment, which is the sense of connectedness a person/community feels towards certain places. Place attachment may be evident at different geographic levels, e.g., site-specific (e.g., a house, burial site, or tree where religious gatherings take place), area-specific (e.g., Zululand), and physiography-specific (e.g., wetlands). Territorial behaviour is viewed as a set of behaviours and cognition a group exhibits based on perceived ownership. The concept of sense of place attempts to integrate the character of a setting with the personal emotions and memories associated with it.

Much of what is valuable in a culture is embedded in place, which cannot be measured in monetary terms. It is because of a sense of place and belonging that people loath to be moved from their dwelling place, despite the fact that they will be compensated for the inconvenience and impact on their lives. Places/natural resources should be assessed in terms of its cultural value by studying visiting and consumption patterns, behaviour patterns, etc.

5.4.7 Viewer Perception

The perception of visual impact by viewers is subjective and influenced by various factors, including the aesthetic value, identity, and sense of place associated with a landscape. The way development is perceived can vary; it may be viewed positively if it is seen as linked to progress or human upliftment, or negatively if it disrupts a cherished landscape.

The character of the landscape, its scenic value, and the surrounding land use context all play a role in determining whether new developments are seen as unwelcome intrusions. Areas of natural conservation or scenic beauty are often more sensitive to visual impacts since the natural or scenic character of the landscape contributes to its overall appeal. In such areas, structural features like high-voltage power lines may be perceived as incongruous within a natural setting, often resulting in a perceived visual impact.

5.4.8 Visual Character

Visual character is shaped by human perception and the observer's response to the relationships and composition of the landscape, including the land uses and identifiable elements within it. The assessment of visual character involves describing the scenic attractiveness of the landscape, considering the landscape attributes that hold aesthetic value and make significant contributions to the visual quality of the views, vistas, and viewpoints within the study area (ALA, 2013).

5.4.9 Weather and Visibility

Meteorological factors, such as weather conditions like haze or heavy mist, can influence the nature and intensity of a potential visual impact associated with a structural feature. These factors directly impact visibility, potentially altering the way the structural feature is perceived and affecting the extent of its visual impact.

Vegetation, particularly trees and shrubs, can serve as an effective visual screen for solar facilities, helping to mitigate the visual impact on surrounding receptors. By strategically placing vegetation around the facility, it can obscure or soften the view of the solar panels, blending the facility more harmoniously into the natural landscape. However, it's crucial to ensure that the vegetation is positioned at an appropriate distance from the solar panels. This is to prevent potential shading effects that could reduce the panels' energy output. Therefore, while vegetation can significantly contribute to visual impact mitigation, its placement requires careful planning to balance aesthetic considerations with the operational efficiency of the solar facility.

5.4.10 Factors Influencing Visibility of Overhead Lines

The visibility of Overhead Lines (OHLs) and Loop-in-Loop-out (LILO) lines within a landscape is a multifaceted issue, influenced by a diverse array of factors that include both natural and human-made elements. The topography of the area, for instance, plays a significant role in determining visibility. Elevated terrains or flat landscapes often make these structures more prominent, while valleys or undulating lands can serve to obscure them. The height, material, and colour of the pylons or monopoles are also crucial factors. Taller structures are naturally more visible, but strategic design and colour choices can mitigate their prominence, especially when they harmonise with the surrounding environment.

Vegetation density serves as another natural screen, although its effectiveness can be subject to seasonal variations. The strategic co-location of new OHLs with existing ones is a particularly effective approach for mitigating their cumulative visual impact. This is especially relevant in rural or semi-rural settings where preserving the natural vista is often a priority. However, the benefits of this co-location strategy can be offset if the new OHLs or LILO lines are substantially larger or differ significantly in design from the existing lines.

Weather and lighting conditions further contribute to the visibility equation. For example, fog and mist can act as natural diffusers, while the angle and intensity of sunlight can either highlight or diminish the structures. Human factors, such as the viewer's position and the land use of the area, also play a role. In urban or industrial settings, where other infrastructures are prevalent, OHLs and LILO lines may blend in more easily. Conversely, in pristine or rural landscapes, even minimally visible lines can become focal points, drawing more attention to themselves.

Therefore, a nuanced understanding of these multiple factors, including the design and layout of new OHLs and LILO lines in relation to existing ones, is essential for a comprehensive VIA. This in-depth analysis can inform design and placement strategies aimed at minimising the visibility and overall impact of these lines on the landscape, particularly in the specialised context of solar renewable energy projects in South Africa.

5.5 Methodology

The following methodology was employed for the assessment:

- A comprehensive field survey was conducted to accurately document and describe the receiving environment. **Refer to 5.3.**

- The physical characteristics of the project components were described and depicted based on information provided by Afzelia. **See Section 2.2 and Section 5.6 for a detailed overview.**

- The visual resource general landscape characterisation, representing the receiving environment, was mapped using data from the field survey, Google Earth imagery, and Mucina and Rutherford's (2006) reference book, *"The Vegetation of South Africa, Lesotho, and Swaziland"*. The landscape description focused on the natural features of the land rather than subjective viewer responses.

- The landscape's character was evaluated and rated based on its aesthetic appeal, utilising established research in perceptual psychology as the foundation, and its sensitivity as a landscape receptor. **See Section 6.1 for a detailed overview.**

- The unique and distinct sense of place in the study area was described, considering the spatial form and character of the natural landscape, as well as the cultural transformations associated with the historical and current land use. **See Chapter 6 for a detailed overview.**

- Viewshed analyses were conducted from the proposed project site to determine visual exposure and assess the topography's capacity to absorb potential visual impacts. The analysis considered the dimensions of the proposed structures and activities. **See Section 6.2.4 and 7.2. for a detailed overview**

- The potential impacts of the proposed projects on the visual environment were identified and rated using Afzelia's significance rating criteria. **More information can be obtained in 8.1.**

- Recommendations were provided for mitigating the negative impacts of the proposed projects. **See Section 8.2 and 8.4 for a detailed overview.**

5.6 Project Phases and Activities

Activities to be undertaken during each of the phases are described in the following sections.

5.6.1 Environmental Authorisation and Public Participation

The stakeholder consultation process is an essential component of this VIA. Rather than conducting a separate consultation, we have integrated this process with the public participation for the environmental authorisation documents. This integrated approach provides stakeholders, government authorities, and other interested parties with a 30-day period to review the VIA document and provide feedback.

All comments received during this consultation period will be carefully considered and incorporated into the final VIA report. This ensures that the assessment is comprehensive, accurate, and addresses stakeholder concerns effectively.

Subsequent to the initial phase of the visual impact assessment, feedback was received from landowners within the buildable area. The landowners who responded expressed specific preferences regarding the treatment of different types of structures on their properties:

- **Temporary Structures/Worker Houses/Settlements**: Landowners indicated that temporary structures, worker houses, or settlements were generally not considered obstacles, as landowners were open to accommodate the project's needs within the parameters of their existing property use. The current tenants in the farmhouses are not expected to be significantly impacted by the development.

This feedback provides valuable insights into the landowners' values, needs, and expectations, and it will be incorporated into the ongoing visual impact assessment. It supports the flexible approach adopted in this assessment, allowing for adjustments and refinements based on the specific conditions and preferences of the stakeholders.

5.6.2 Construction Phase

During the construction phase of the Glencore Lydenburg Solar PV Facility, a systematic and comprehensive approach to facility construction is followed[6], encompassing a variety of activities:

- Final design and micro-siting of infrastructure based on topographical conditions and environmental permits.
  - Vegetation clearance and construction of access roads, if required.

[6] Please note that the specific sequence and activities may be subject to adjustment based on the project's unique requirements and conditions.

    - Determining the ultimate visual impact of the OHLs. Potential alteration of existing visual buffers, as vegetation clearance makes OHLs more noticeable from various viewpoints.
- Assembly and erection of infrastructure on site.
    - Vertical introduction of OHL poles and conductors creates geometric contrast with the natural surroundings.
- Excavation of cable trenches.
    - Ramming or drilling of the mounting structure frames. Temporary exposure of subsoil, potentially visually discordant.
    - Installation of PV modules onto the frames.
    - Installation of measuring equipment.
    - Laying of cables between the module rows to the inverter stations.
    - Optional laying of gravel or aggregate from nearby quarries placed in the rows between the PV panel array for enhanced reflection onto the panels, assisting in vegetation control and drainage. This could change ground texture and colouration, which affects how the OHLs blend with the site.
- Stringing of inverters.
- Construction of operations and maintenance buildings.
- Undertaking of rehabilitation on disturbed areas, as required. This will somewhat restore the original landscape, minimising the OHLs' visual prominence.
- Testing and commissioning.
    - Thorough testing of the solar facility to ensure proper functionality.
- Continued maintenance.
    - Ongoing maintenance activities to ensure the optimal performance of the facility.
- Removal of equipment.
    - Removal of any construction equipment that is no longer needed.

The construction phase of the proposed project is expected to span a period of 12 to 18 months. However, this timeline can be influenced by factors such as weather conditions and unforeseen challenges encountered during construction.

5.6.3 Operational Phase

The proposed Glencore Lydenburg Solar PV Facility will be operated on a 24 hour, 7 days a week basis. The operation phase of the Project will comprise the following activities:

- Regular cleaning of PV modules.
- Vegetation management for optimal operation.
- Maintenance of office and operational buildings.
- Supervision of solar PV facility operations.
- Continuous site security monitoring.
- Minimal facility servicing with on-site electrical supply.
- Water usage for sanitation, panel washing, and dust control.
- Temporary water storage, if required.
- Sanitation requirements met with municipal sewage system or alternatives.
- Management of minimal refuse/solid waste, removed by municipality or private contractor.

5.6.4 Decommissioning Phase

The proposed Glencore Lydenburg Solar PV Facility is expected to operate for at least 25 years. Once the solar PV facility reaches the end of its life, the facility and the grid connection infrastructure will be decommissioned or continue to operate following the issuance of a new Power Purchase Agreement (PPA) by Eskom. If decommissioned, all components will be removed, and the site rehabilitated. Where possible all materials will be recycled, otherwise they will be disposed of in accordance with local regulations and international best practice.

6 Baseline Environmental Profile

6.1 Character and Nature of Environment

The proposed Glencore Lydenburg Solar PV Facility and associated infrastructure is located ~2km north of Mashishing, within the Thaba Chweu Local Municipality in Mpumalanga Province. The site is adjacent to the Lydenburg Smelter, situated in an area characterised by industrial, agricultural, and some residential land uses.

6.1.1 Climate Conditions

Mashishing, Mpumalanga, where the proposed Glencore Lydenburg Solar PV Facility is situated, experiences a temperate climate with distinct seasonal variations. The region receives an average annual rainfall of approximately 600 to 800mm, with the wettest months typically occurring between November and March. The winter months, particularly June to August, are the driest, with minimal precipitation.

Temperatures in the area are typical of a temperate climate, with warm summers and cooler winters. Summer temperatures, from December to February, range between 25℃ and 30℃, while winter temperatures, particularly in June and July, can drop to between 0℃ and 10℃. Frost is not uncommon during the coldest months.

The region also benefits from high levels of solar irradiance, making it well-suited for solar energy generation. Mashishing receives around 2,800 to 3,000 hours of sunshine annually, with an average daily solar radiation of approximately 5.5 to 6.5 kilowatt-hours per square meter (kWh/m^2).

While wind speeds in the area are generally mild, occasional gusts may occur, though strong, persistent winds are not characteristic of the region.

As with any location, climate conditions can vary year to year due to natural variations and broader climate patterns. Additionally, potential shifts in long-term weather patterns due to climate change may affect the region’s climate in the future.

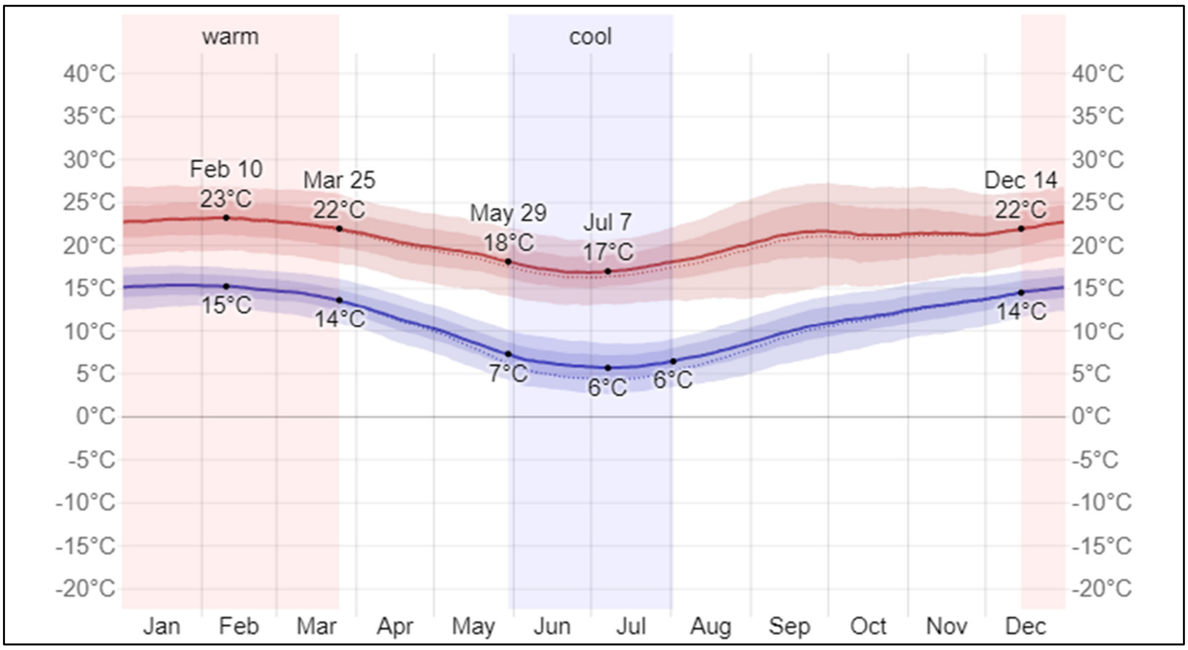

Figure 4: Average Daily Shortwave Solar Energy per square meter (kWh/m²)

6.1.2 Topography and Landscape

The proposed Glencore Lydenburg Solar PV Facility development area is divided into northern and southern sections, with varying topographical features that influence the design and layout of the solar facility.

The region is characterised by gently undulating terrain typical of the Highveld plateau. The elevation across the project area ranges from ~1,413m to 1,455m above sea level. The elevation profiles for both sections show gradual changes in altitude, though the slopes in some areas are more pronounced. The elevation profiles below demonstrate the fluctuating topography of the northern and southern sections.

The northern section shows a relatively smooth incline from north-to-south, with an elevation gain of 32.25m across ~1,1173m and a maximum slope of 8.52%. The west-to-east profile for the northern section reveals more consistent elevation changes, with gain of 17.09m and a max slope of 14.67% over a distance of ~998m.

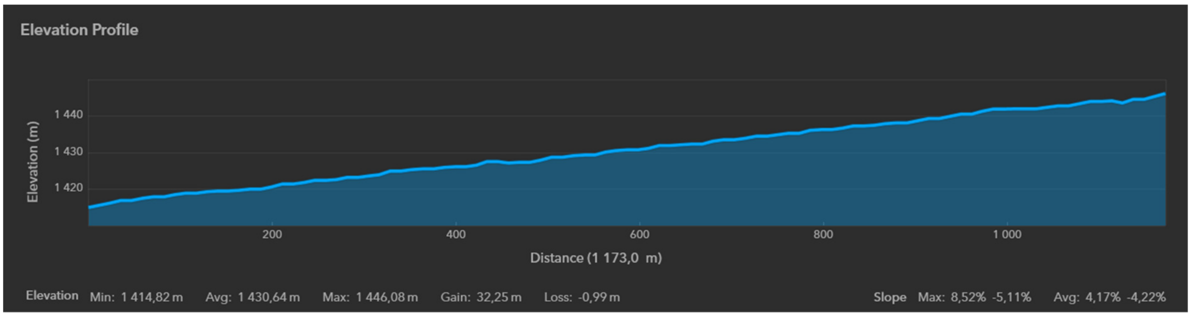

Figure 5: Northern Section: North to South Elevation Profile (captured from the site's midpoint)

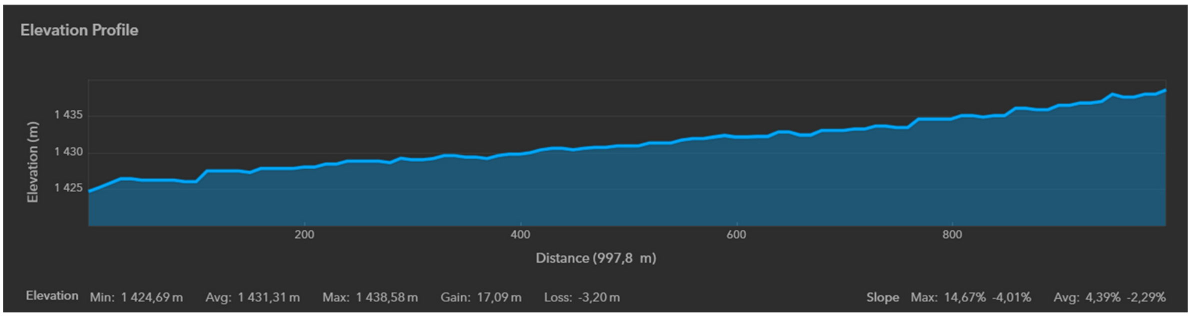

Figure 6: Northern Section: West to East Elevation Profile (captured from the site's midpoint)

In contrast, the southern section features more substantial elevation changes. The north-to-south profile shows a total elevation gain of 24.45m over ~1,011 meters, with a maximum slope of 15.82%. The west-to-east profile for the southern section reveals a gain of 43.08m over a distance of ~1,160m, with a maximum slope of 12.06%. These changes in elevation present unique design challenges, particularly regarding panel orientation and drainage systems.

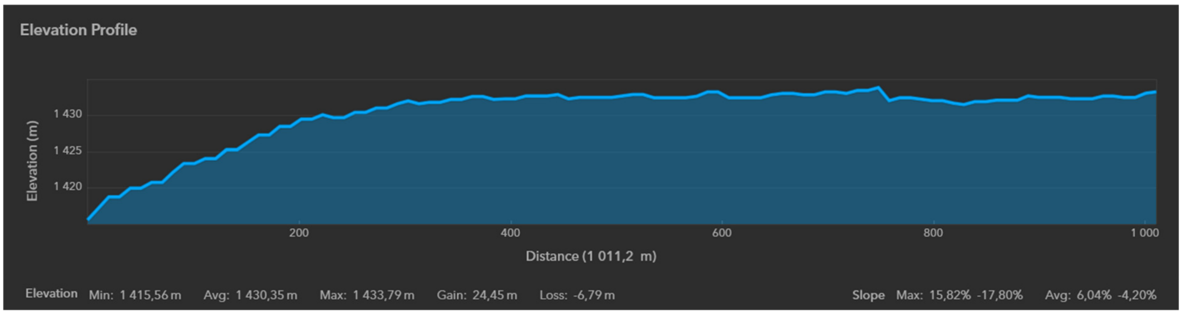

Figure 7: Southern Section: North to South Elevation Profile (captured from the site's midpoint)

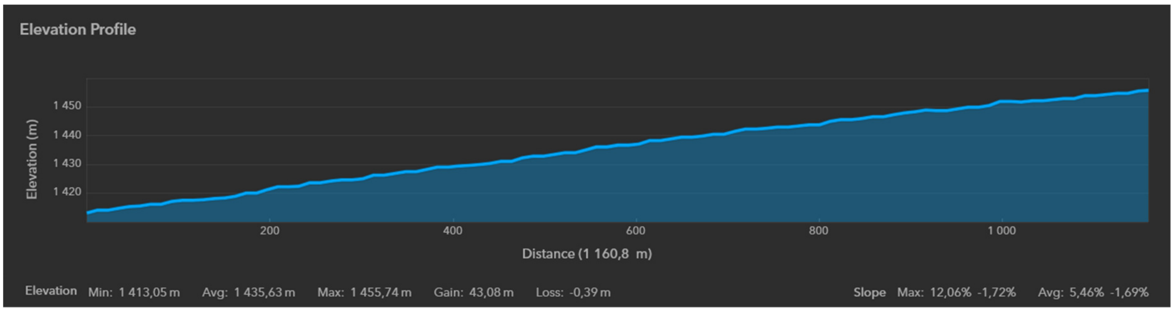

Figure 8: Southern Section: West to East Elevation Profile (captured from the site's midpoint)

The topography of the site, while varied, remains conducive to the development of the solar PV facility. The changes in elevation and slope must be carefully considered during the design phase, as they will influence the orientation of the solar panels and the overall layout of the facility. These topographical characteristics also have implications for the visual impact of the proposed Glencore Lydenburg Solar PV Facility, particularly from lower-lying areas.

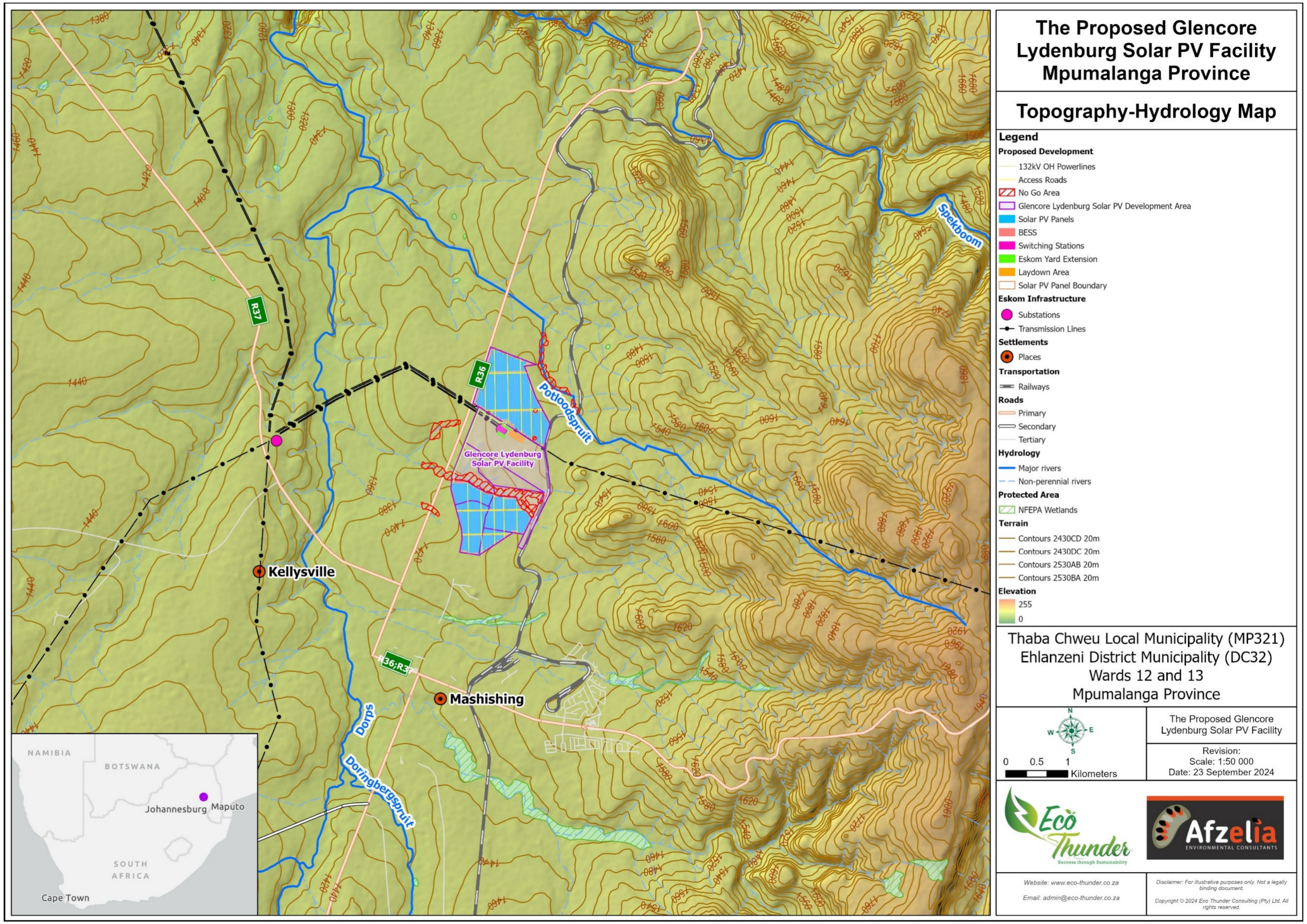

Figure 9: Map of Topographical-Hydrological Profile of the Proposed Site

6.1.3 Natural Landscapes

The proposed Glencore Lydenburg Solar PV Facility is located within a region typified by the Lydenburg Grassland, which is part of the North-Eastern Mountain Sourveld biome. This grassland is notable for its diverse flora and fauna, despite past disturbances from mining and agricultural activities. The vegetation structure consists primarily of closed grassland, with patches of woodland, particularly in rocky areas. These woodlands are interspersed with species such as *Vachellia karroo*, which can survive in the frost-prone valleys typical of this region.

Although proposed development is located within the Lydenburg Nature Reserve, there is already significant development that has taken place within the nature reserve. The natural landscape is interspersed with human-made elements, pockets of intact natural vegetation remain, particularly around the boundaries of the project site. These include areas of grassland and thicker vegetation, especially along the eastern edge, which links with nearby natural reserves, including the Gustav Klingbiel (~2.3km south-east), and Kudu Private Nature Reserve (~6.6km north-west), which are home to unique ecosystems and contribute to the conservation of the Lydenburg Thornveld. While the site itself is moderately disturbed, it still holds visual significance due to the presence of medium to high vegetation species diversity.

In terms of hydrological features, the Potloodspruit River runs adjacent to the northern section of the proposed project site, with non-perennial rivers traversing the proposed Glencore Lydenburg Solar PV Facility development sites, adding to the biodiversity of the area and providing visual corridors. This proximity to water features reinforces the importance of managing potential impacts on the aquatic ecosystems during the construction and operational phases.

In summary, while the natural landscape around the Glencore Lydenburg Solar PV Facility has been shaped by industrial and agricultural activities, it retains aesthetic value. The integration of the solar facility into this landscape must be handled with care, ensuring that visual impacts are minimised through thoughtful planning and mitigation strategies.

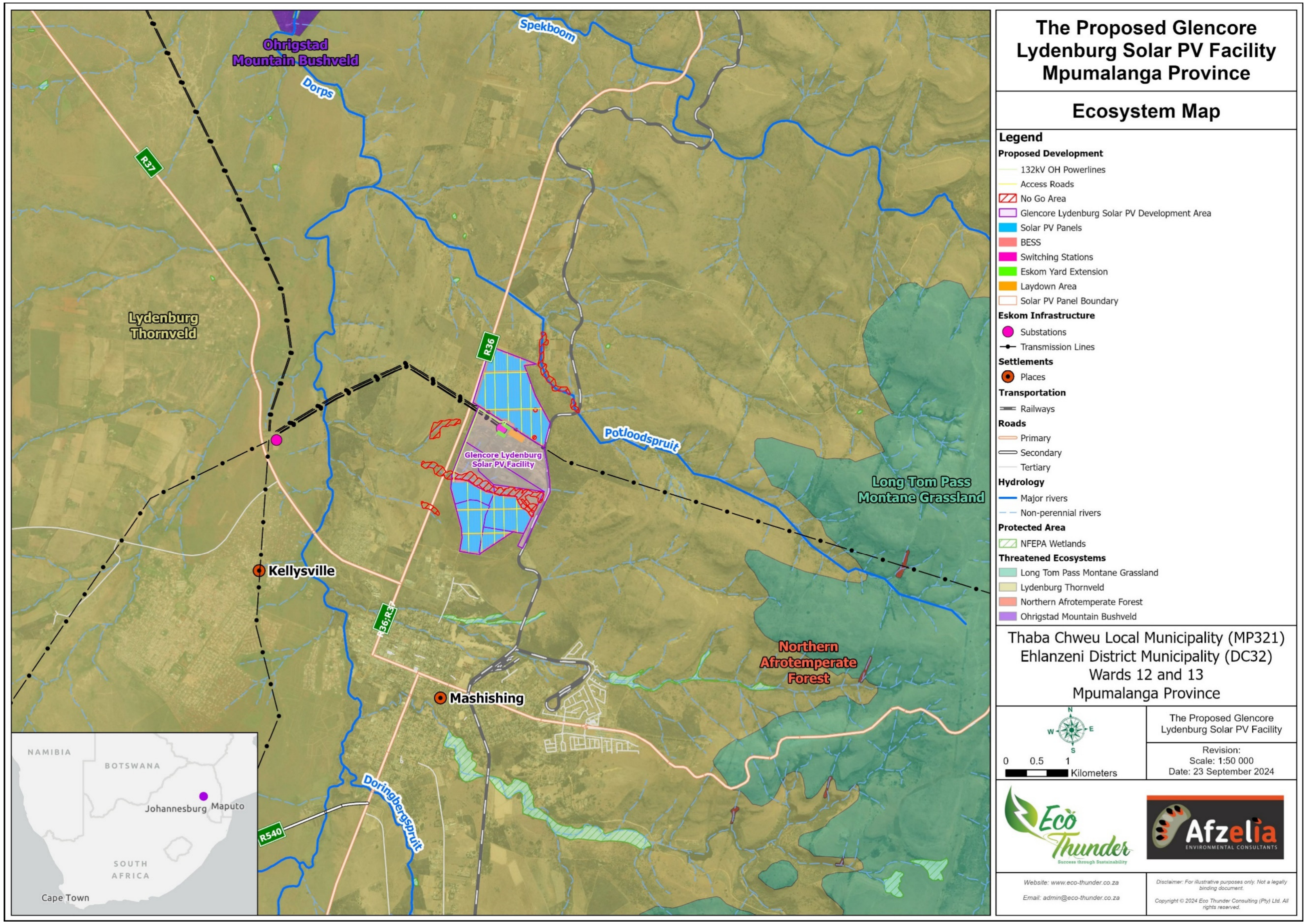

Figure 10: Ecosystem Map

Photograph 1: Natural Landscape within the Proposed Development Area: View 1

Photograph 2: Natural Landscape within the Proposed Development Area: View 2

Photograph 3: Natural Landscape within the Proposed Development Area: View 3

Photograph 4: Natural Landscape within the Proposed Development Area: View 4

Photograph 5: Natural Landscape within the Proposed Development Area: View 5

Photograph 5: Natural Landscape within the Proposed Development Area: View 5

Photograph 5: Made-Made Dam within the Lydenburg Smelter Site

Photograph 6: Existing Eskom OHLs surrounding the Proposed Development Area

6.1.4 Cultural and Tourism Resource

The proposed Glencore Lydenburg Solar PV Facility is located within a region that has a layered cultural heritage, deeply rooted in the historical context of Mpumalanga Province. This area is known for its diverse history, which spans from early agricultural settlements to more recent industrial developments. The cultural heritage of this region is protected by the National Heritage Resources Act, 1999 (Act No. 25 of 1999), which mandates the identification, protection, and management of heritage resources.

According to the Heritage Impact Assessment, the site falls within an area of high cultural and archaeological sensitivity, as highlighted by the South African Heritage Resources Information System (SAHRIS) and the Department of Forestry, Fisheries and Environment (DFFE) Screening Tool. Preliminary assessments indicate that there are cultural features such as stone-walled sites within the Lydenburg Smelter vicinity. Mitigation measures to protect these cultural features will need to be implemented according to the Heritage Specialist's recommendations.

Tourism in this area, while not as prominent as other parts of Mpumalanga, is nonetheless supported by nearby nature reserves and cultural landmarks. The Gustav Klingbiel Nature Reserve, and the Lydenburg Nature Reserve serve as key ecological and recreational resources, attracting tourists interested in the region's natural beauty and wildlife. The reserve is home to a variety of flora and fauna, contributing to the local tourism economy. Additionally, the Kudu Private Nature Reserve, ~6.6km north-west of the project site, provides further opportunities for eco-tourism and outdoor activities.

While no direct cultural tourism activities are located on the project site, the broader region has significant cultural and natural attractions that must be considered during the development process. It is important that the visual impacts of the proposed solar PV facility be managed in such a way that they do not detract from the overall sense of place or disrupt the aesthetic value of the surrounding landscape.

6.1.5 Land Management

The land surrounding the proposed Glencore Lydenburg Solar PV Facility comprises a combination of industrial, agricultural, and residential zones. The area directly impacted by the facility is located ~2km north of the town of Mashishing and spans ~375ha hectares. The land has been historically used for industrial activities associated with the Lydenburg Smelter, as well as some agricultural use on the surrounding farmlands.

6.1.5.1 Land Use

The land use surrounding the proposed Glencore Lydenburg Solar PV Facility includes a mix of industrial, agricultural, and residential areas. The proposed solar PV facility is located ~2 km north of Mashishing, adjacent to the Lydenburg Smelter. Historically, this area has been used primarily for industrial activities, particularly those associated with the smelter. Additionally, there is agricultural activity on surrounding farmland, where open veld and agricultural plots dominate the landscape.

The land to the east and west of the project area consists of open veld, with industrial and residential areas located to the south. To the north, the landscape is scattered with homesteads and small lodging facilities. Within the project area itself, the land is largely industrial, with parts allocated for the smelter’s operations.

The establishment of a solar PV facility will result in a shift from a largely industrial and agricultural land use to renewable energy production. The proposed Glencore Lydenburg Solar PV Facility will house PV panels and associated infrastructure, repurposing land that was previously used for industrial and agricultural purposes. This shift aligns with the broader provincial and national goals to transition toward renewable energy. The visual landscape will change due to the introduction of solar panels, but careful design and placement will help reduce adverse impacts.

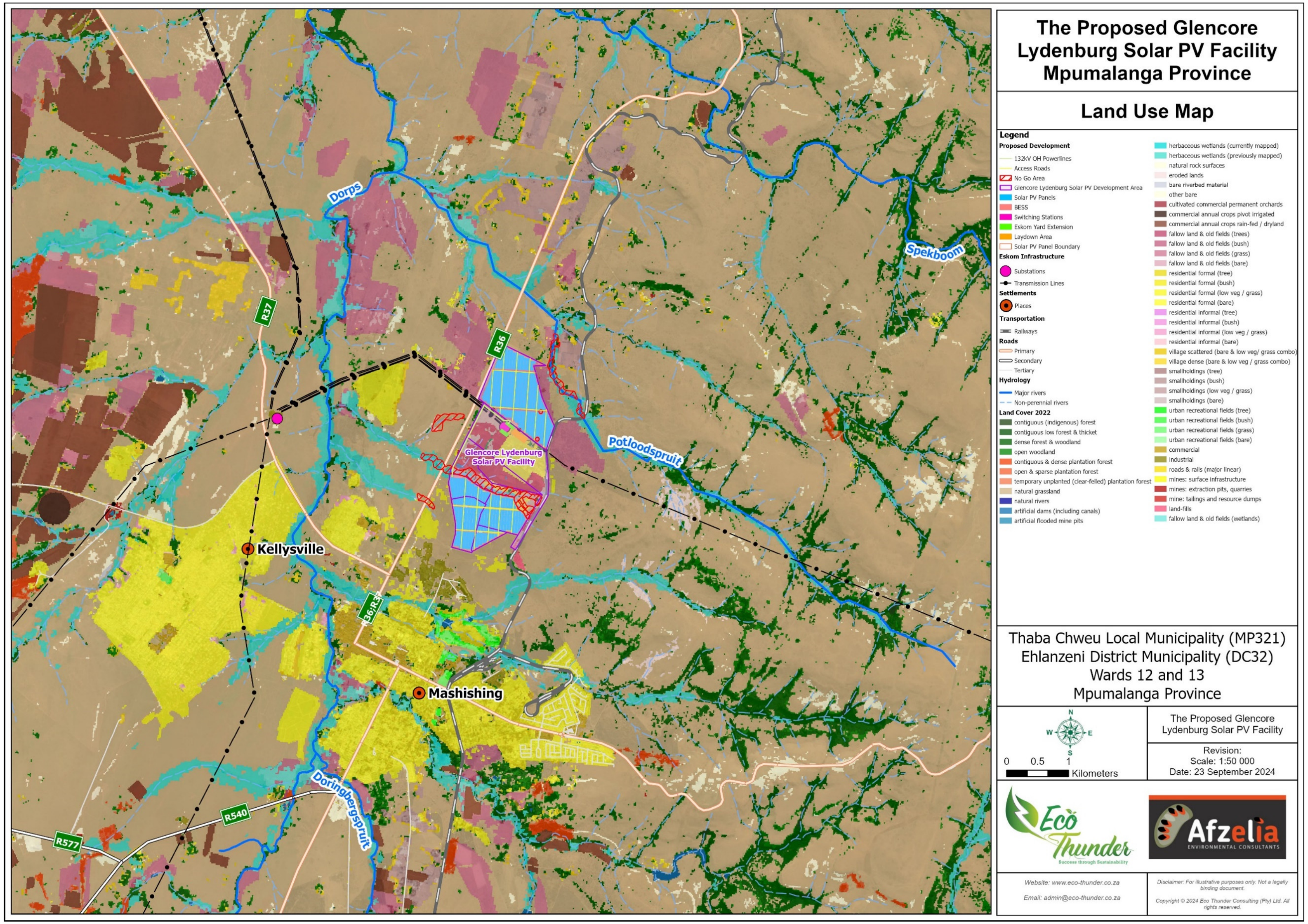

Figure 11: Land Cover Map

Photograph 7: Existing Eskom OHL within the Proposed Development Area

Photograph 8: Ongoing Construction of a Man-Made Dam within the Lydenburg Smelter Site

Photograph 9: Lydenburg Smelter Internal Access Road to the Proposed Development Area

Photograph 10: On-Site Substation within the Lydenburg Smelter Site

Photograph 11: Existing Infrastructure within the Lydenburg Smelter Site: View 1

Photograph 12: Existing Infrastructure within the Lydenburg Smelter Site: View 2

Photograph 13: Existing Infrastructure within the Lydenburg Smelter Site: View 3

Photograph 14: Landscape View from the Lydenburg Smelter Site of the Proposed Development Area

6.1.5.2 Agricultural Land Use

The land surrounding the proposed Glencore Lydenburg Solar PV Facility includes areas of agricultural activities, with small-scale livestock rearing and crop cultivation. However, agricultural activities are limited due to the dominance of industrial land uses, particularly the Lydenburg Smelter.

Any potential negative effects on agricultural land use will be mitigated through careful planning and stakeholder engagement. The project will avoid impacting active agricultural areas as far as possible, and any concerns from local farmers or land users will be addressed through targeted mitigation measures, such as ensuring that access to water resources for irrigation remains unaffected and that there is no contamination of agricultural lands.

6.1.5.3 Housing/Residential Land Use

The project site is located in proximity to several farms and homesteads[7]. The project should aim to minimise any potential visual impacts on these homesteads and farming areas. This could be achieved through careful site planning, the use of appropriate materials and colours that blend with the natural landscape, and the implementation of effective screening measures where necessary.

The following are the closest settlements within relative proximity to the study area:

- Mashishing (~2km south); and
- Kellysville (~3.2km south-west).

The housing/residential land use in the region is diverse, ranging from urban centres like Mashishing and Kellysville to smaller settlements and rural homesteads. Mashishing, in particular, has an active property market with a wide selection of property types from homes to apartments, security estates, to vacant land as well as commercial properties.

Various accommodation providers can be found within relative proximity to the study area, and include, but are not limited to:

- Impangele Inn Guest House (~0.5 km north-west);
- Kingwoody Lodge (~0.5 km north-east);
- Angels Guest House (~1.3 km south);
- Adelpragt Guesthouse (~1.4 km south);

[7] It is important to highlight that houses confirmed within the "buildable area" could be verified as being subject to relocation or avoidance by the development. It is strongly advised that areas that will remain inhabited be avoided by the solar facility, as it is not feasible for individuals to reside within or in close proximity to the solar PV facility area. Such a scenario would have a significant visual and social impact, considerations that were beyond the scope of this assessment.

- Mashishing Lodge (~1.6 km south-west), etc.

In the rural areas, housing/residential land use is often intertwined with agricultural activities, with many households engaged in small-scale farming. This pattern of land use reflects the region's agricultural heritage and the importance of farming to the local economy.

With careful planning and management, the impacts of the project on Housing/farming land use can be reduced. The project has the potential to contribute positively to the local community and economy by aligning with local development plans and aspirations, and by providing a source of local renewable energy.

Photograph 15: Occupied Residence within the Northern Section of the Proposed Development Area: View 1

Photograph 16: Occupied Residence within the Northern Section of the Proposed Development Area: View 2

Photograph 17: Agricultural Activities within ~1km South of the Proposed Development Area

Photograph 18: Impangele Inn, located ~0.5km North-West of the Proposed Development Area

Photograph 19: Agricultural Activities within the Northern Section of the Proposed Development Area

Photograph 20: Farm Infrastructure and Existing Eskom OHLs within ~1km of the Proposed Development Area

Photograph 21: Cattle Grazing within ~1km South of the Proposed Development Area

Photograph 22: Kingwoody Lodge, ~0.5 km North-East of the Proposed Development Area

6.1.5.4 Natural and Conservation Areas

The broader region surrounding the proposed Glencore Lydenburg Solar PV Facility is home to several protected areas, natural reserves, and ecologically significant sites that contribute to the biodiversity and landscape character of the region. These areas are crucial for the conservation of unique flora and fauna and play an essential role in maintaining the ecological integrity of the area.

The proposed development area is located with the Lydenburg Nature Reserve and of the nearby reserves include the Gustav Klingbiel Nature Reserve (~2.3 km south-east), the and the Kudu Private Nature Reserve (~6.6 km north-west). These reserves are notable for their contribution to the conservation of the Lydenburg Thornveld biome, a vital ecosystem that supports a wide range of plant and animal species.

Additionally, these natural areas play a significant role in local tourism, attracting visitors for activities such as wildlife viewing, hiking, and birdwatching. The proximity of these reserves to the proposed project site emphasises the importance of careful planning to mitigate potential visual impacts and preserve the natural beauty and ecological functions of the area.

From a visual impact perspective, it is recommended to establish appropriate buffer zones according to the vegetation specialist's recommendations around these conservation/protected areas within close proximity to the site to reduce any potential ecological and visual disturbance caused by the development. This could include setting back the solar panels and associated infrastructure to minimise the visual footprint and incorporating vegetative screening where necessary. These measures will ensure that the visual integrity of the natural areas is preserved, and the long-term ecological health of the region is maintained.

Moreover, the proximity to watercourses, such as the Potloodspruit River and several non-perennial rivers crossing the project area, highlights the need for the implementation of the aquatic specialist's mitigation measures to avoid disrupting aquatic ecosystems and protect the visual integrity of the area. These water bodies form natural corridors that contribute to the region's biodiversity as well as the visual aesthetic and should be protected throughout the construction and operational phases of the solar PV facility.

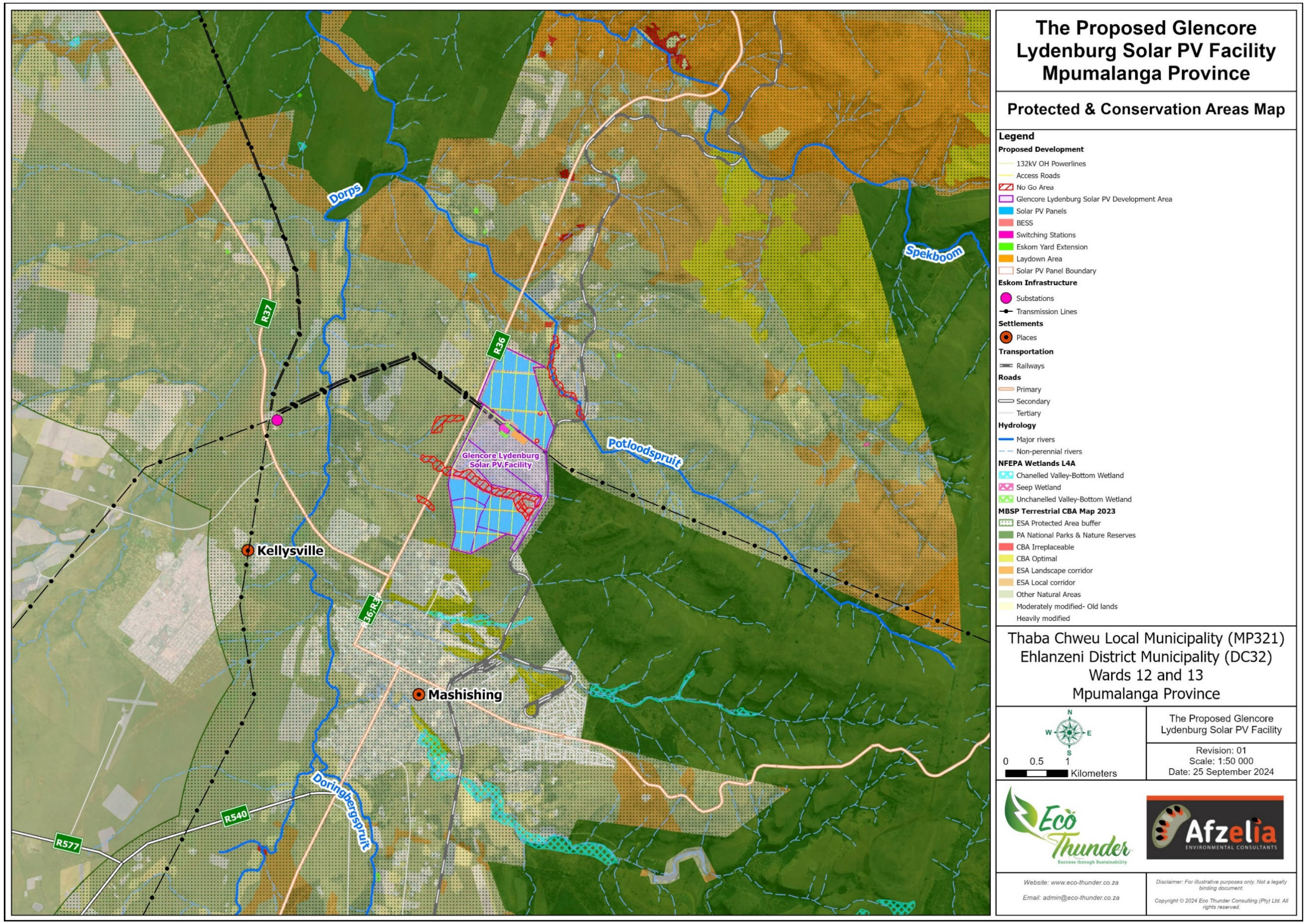

Figure 12: Protected Area Map

6.1.5.5 Roads

The proposed Glencore Lydenburg Solar PV Facility is strategically located ~2km north of the town of Mashishing, Mpumalanga. The region is well-connected by a network of national and regional roads that support both industrial and agricultural activities. The N4 highway, a key transport route in the province, lies to the south and connects Mashishing to other major economic hubs, including Johannesburg and Pretoria, as well as Maputo in Mozambique.

The development site is bordered by and can be directly accessed via the R36, a regional road that runs north-to-south through the area and connects Mashishing with Kellysville and other towns in the Thaba Chweu Local Municipality. Additionally, several smaller secondary roads and gravel tracks provide access to the site and the surrounding industrial and agricultural areas.

A critical road for this project is the R36 route, which is located to the west of the site and provides access to Kellysville. The R36 is a regional road that facilitates the movement of goods and services in the area. There are also minor access roads leading to the Lydenburg Smelter, which borders the project site. These roads are vital for transporting equipment and materials during the construction, operation, and maintenance phases of the proposed solar PV facility.

Given the proximity of the R36, R37 and other smaller access routes, it is essential to minimise any disruptions to local traffic patterns and ensure the roads remain functional during all phases of the project. The establishment of the solar facility will impact some of the smaller gravel roads in the area, but these can be managed through road upgrades and maintenance during construction.

It is recommended that a 20m setback zone be established along the key access roads, such as the R36 and any gravel roads that are adjacent to the development. This setback zone can be used to plant screening vegetation or install fencing that will blend the solar facility into the natural surroundings, reducing potential visual impacts for road users.

In summary, while the Glencore Lydenburg Solar PV Facility is located in a well-connected area with access to key regional roads, careful planning is required to ensure that construction and operation do not disrupt local traffic. Adequate measures, such as road upgrades and setback zones, will help mitigate visual and operational impacts on the road network.

Photograph 23: Entrance to the Northern Section of the Proposed Development Area

Photograph 24: Direct Access from the R36 to the Northern Section of the Proposed Development Area

Photograph 25: R36 Access Road: View 1

Photograph 26: Direct Access from the R36 through Lydenburg Smelter Site to the Southern Section of the Proposed Development Area

Photograph 27: Gravel Road within the Proposed Development Area: View 1

Photograph 28: R36 Access Road: View 2

Photograph 29: Gravel Road within the Proposed Development Area: View 2

Photograph 30: Gravel Road within the Proposed Development Area: View 3

6.2 Visual Resource

6.2.1 Visual Receptors

Visual receptors, also known as viewer groups, are individuals or groups of individuals who have the potential to view or perceive the proposed development. The identification of visual receptors is a crucial step in the visual impact assessment process as it helps to understand who will be affected by the visual changes brought about by the project. Visual receptors that have been identified can be assessed in terms of ''beneficiaries and losers[8]'', resulting from the proposed development.

Beneficiaries may include the following:

- Residents or users of a project, such as a resort in a scenic area;
- Individuals or communities who will benefit from infrastructure development;
- Poor or unemployed individuals who will benefit from economic-type development and related job opportunities.

Losers may include the following:

- National parks, nature reserves, and other protected or pristine areas that rely on a wilderness experience for their visitors;
- Individuals and organisations who depend on scenic and recreation resources for their livelihood;
- Property owners who may rely on uninterrupted views and the absence of visual intrusions.

This comprehensive identification of visual receptors ensures that the assessment considers both the positive and negative visual impacts of the proposed development, taking into account the specific needs and concerns of various stakeholders. For the Glencore Lydenburg Solar PV Facility, a general recommendation is made to utilise vegetation screening, landscaping techniques, vegetation covers, or barriers, where applicable, to mitigate the visual impact on highly sensitive receptors, specifically those living in close proximity but not on the affected property.

It is postulated that all structures, homes, or buildings within the buildable area on land rented by the develop are deemed to have a lower significance in the context of the visual impact assessment. Conversely, where land or structures are owned or occupied by a different holder or

[8] Landowners (those who financial benefit) who have agreed to leasing their land for this development are seen as Beneficiaries and therefore assessed at a lower impact class. Residents, neighbours, tourists, and settlers are identified as losers.

group, it is assumed that these individuals have been informed of the development, and their properties will be adequately avoided or thoroughly screened.

- **Local Residents:** This includes nearby residents, farmers, homesteads and residents of the nearby settlements such as Mashishing, Kellysville and surrounding. These local residents could potentially view the project from their homes or while moving around their communities.
- **Road Users:** This group includes individuals travelling on the local road network, particularly the R36 and R37, which provides access to several of the nearby farms and settlements. Road users could potentially view the project while commuting or travelling for other purposes.
- **Agricultural and Mining Workers:** Given the current land use and mining activities in the immediate area, agricultural and mining workers are likely to be visual receptors. They could potentially view the project while working.

Each of these visual receptors will have a different level of sensitivity to changes in the visual environment, depending on factors such as their location, the frequency and duration of their views, and their personal or cultural values.

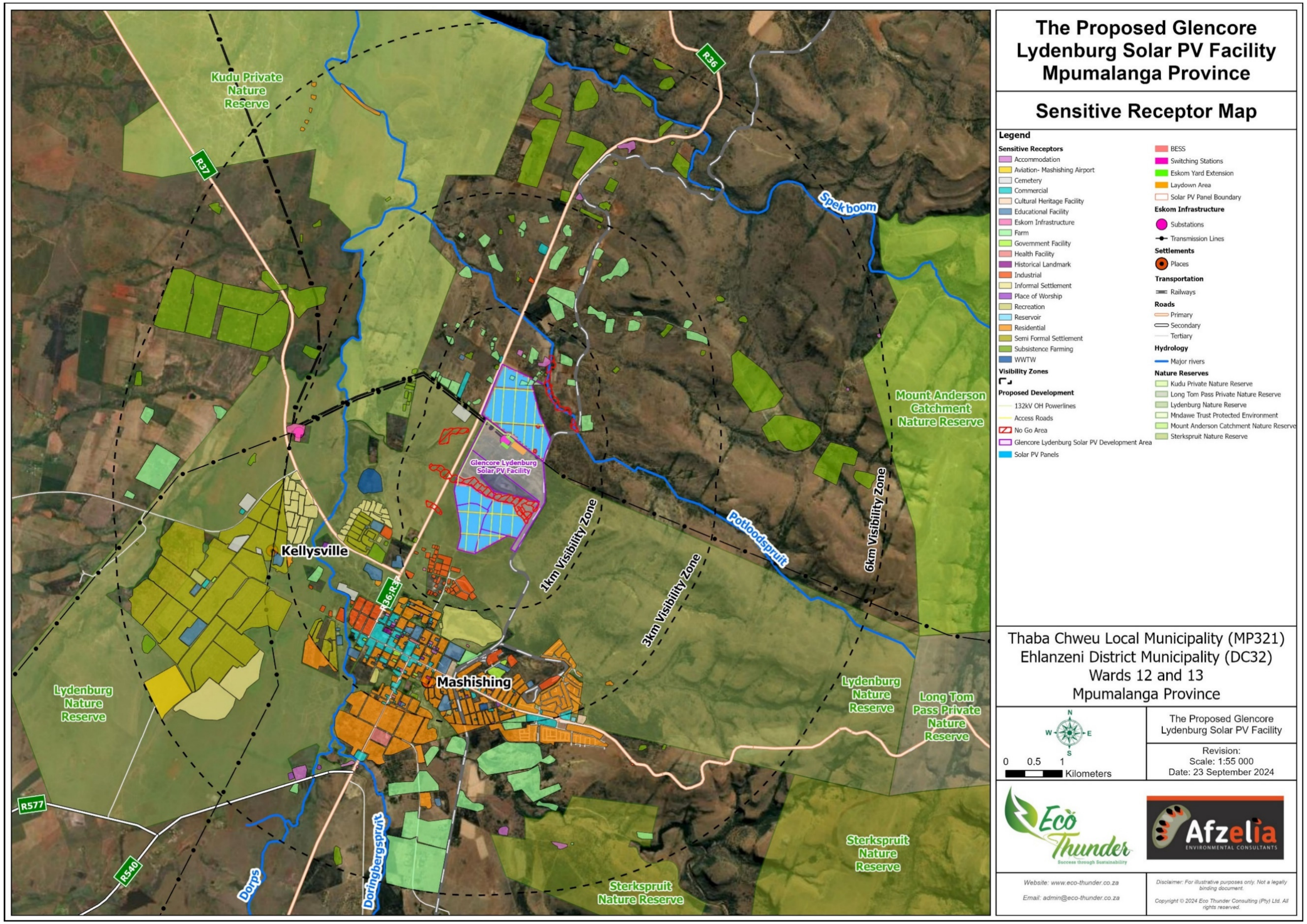

Figure 13: Visual Receptors for the Broader Study Area

6.2.2 DFFE Screening Tool Results

The Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool was employed to assess the potential visual impact of the proposed Doornrug Solar Park project. According to this tool, the Landscape (Solar PV) Theme received a VERY HIGH rating, indicating significant landscape sensitivities within the proposed development site and its surroundings that could be impacted by a Solar PV development.

The Screening Tool includes a map that delineates the relative sensitivity of the landscape theme in relation to solar developments. This map reveals that the proposed site intersects with several areas of varying sensitivity due to different features.

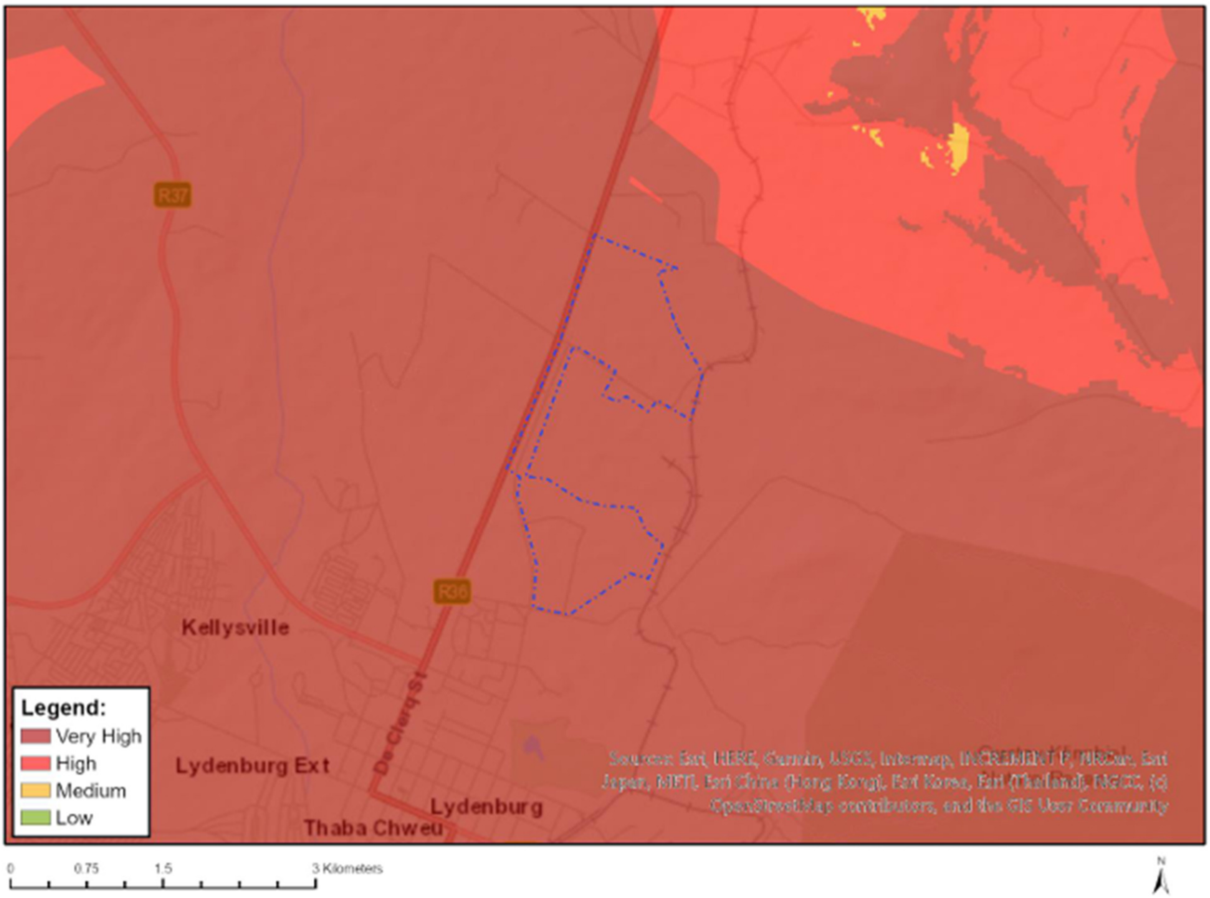

Figure 14: DFFE Screening Tool Identification

The features and their corresponding sensitivity levels, as per the DFFE Screening Tool (**Figure 14**), are as follows:

- Within 250m of a River: Very High sensitivity.

- The Potloodspruit River runs near the northern section of the proposed Glencore Lydenburg Solar PV Facility. The proximity of the project site to this river places it within 250m, thereby confirming a very high sensitivity rating due to the proximity to a significant water body. The presence of the river necessitates careful consideration in the planning and design phases to avoid negative visual impacts. An Aquatic Specialist must be consulted to verify the aquatic sensitivity rating and to establish precise buffer zones that will mitigate potential visual impacts and protect the ecological integrity of the river.

- Within 1.5km of a Nature Reserve: Very High Sensitivity
  - The proposed development area falls within Lydenburg Nature Reserve which confirms the very high sensitivity rating. However significant development has already taken place within the nature reserve. The vegetation specialist's recommendations will need to be strictly adhered to preserve the remaining ecological and visual integrity of the area. It remains essential to carefully design and position the infrastructure to ensure it integrates harmoniously with the surrounding landscape and does not detract from the natural aesthetic of the reserve and its vicinity.
- Within 500m of a Town or Village: Very High Sensitivity
  - The outskirts of Mashishing fall within 500m of the proposed Glencore Lydenburg Solar PV Facility, resulting in a very high sensitivity rating. Due to the proximity to the town, careful consideration is needed to mitigate potential visual impacts on residents living on the periphery of Mashishing. Visual screening measures such as vegetation barriers, as well as strategic placement of infrastructure, should be employed to minimise the facility's visual intrusion, ensuring that the development integrates harmoniously with the surrounding landscape without disrupting the views from residential areas.
- Within 500m of a River: High sensitivity
  - The Potloodspruit River runs near the northern section of the proposed Glencore Lydenburg Solar PV Facility. The proximity of the project site to this river also places it within 500m, thereby confirming a high sensitivity rating due to the proximity to this water body. An Aquatic Specialist must be consulted to verify the aquatic sensitivity rating and to establish precise buffer zones that will mitigate potential visual impacts and protect the ecological integrity of the river.
- Between 500 and 1000m of a Town or Village: High Sensitivity
  - The outskirts of Mashishing fall within the 500 to 1000m range. This contributes to a high sensitivity rating, as residents in these outlying areas may still be affected by visual changes introduced by the solar PV facility. To mitigate these potential impacts, visual screening measures such as planting vegetation or employing materials and

colours that harmonise with the natural environment should be considered. These efforts will help ensure that the development is visually unobtrusive, even to those residing on the outskirts of Mashishing.

- Between 1 and 2km of a Town or Village: Medium Sensitivity
    - Mashishing is located within 1 to 2km of the proposed Glencore Lydenburg Solar PV Facility. This proximity places it within the medium sensitivity category, as the visual changes introduced by the facility may still be noticeable from certain vantage points within the town. Although the distance helps to reduce the potential visual impact, it remains important to consider design elements that minimise visual intrusion. This could involve strategic siting of infrastructure and using colours and materials that blend into the surrounding landscape, ensuring that the solar PV facility has a minimal visual presence from key viewpoints within Mashishing.
- Between 2 and 3km of a Game Farm: Medium Sensitivity
    - The proposed Glencore Lydenburg Solar PV Facility is located within 2 to 3km of nearby reserves, including the Gustav Klingbiel Nature Reserve (~2.3km south-east) and the Lydenburg Nature Reserve (~2.5km south-west). These reserves contribute to the area's natural visual aesthetics and ecological significance. While the medium sensitivity rating suggests that the visual impact is somewhat reduced due to the distance, the facility may still be visible from certain vantage points within these reserves. To mitigate potential visual disruptions, measures such as strategic placement of infrastructure, vegetation screening, and the use of natural colours and materials should be applied.
- Within 1000m of a Wetland: Medium Sensitivity
    - The site visit confirmed the presence of a wetlands within the southern section of the proposed development area. The presence of wetlands within the proposed development site further requires a revised rating of very high. Wetlands are ecologically important and often visually sensitive areas that require special consideration to avoid significant impacts. The Aquatic Specialist must be consulted to verify the aquatic sensitivity rating and to establish precise buffer zones that will mitigate potential visual impacts and protect the ecological integrity of the wetland.
- Slope Less than 1:10: Low Sensitivity
    - The proposed project site includes areas with slopes less than 1:10, which contributes to a low sensitivity rating. These gentle slopes generally reduce the visual prominence of any development, as the terrain's flatness allows the solar infrastructure to blend more naturally into the landscape. While this reduces the potential for visual impact, it remains important to consider the overall design and placement of the infrastructure to ensure it harmonises with the surrounding environment.

Despite the initial classifications by the DFFE Screening Tool, the site sensitivity verification suggests adjustments to the overall sensitivity rating for the proposed Glencore Lydenburg Solar PV Facility based on the following:

- **Visual Absorption Capacity (VAC):** The visual absorption capacity of the site is moderate. The area around the facility has a mix of industrial infrastructure, particularly the existing Lydenburg Smelter, and open land. This industrial setting contributes to a somewhat higher ability to absorb visual changes. However, certain portions of the landscape, particularly those with limited vegetative cover, have a lower ability to absorb the visual impact of new infrastructure. While there are man-made elements already present, the low vegetation and flat terrain offer limited natural screening. Therefore, thoughtful design and mitigation measures such as screening through vegetation will be crucial in reducing potential visual impacts.
- **Unique Visual Resources:** The proposed site is located within the Lydenburg Nature Reserve, which significantly elevates its visual sensitivity. However, due to the considerable existing development within the reserve, the natural visual integrity has already been compromised. While the proximity to the Gustav Klingbiel Nature Reserve (~2.3 km to the south-east) and nearby wetlands still enhances the ecological and visual importance of the site, the presence of industrial and other human-made elements within the Lydenburg Nature Reserve itself reduces the overall sensitivity to new visual impacts. The existing development within the reserve mitigates some concerns, but the solar facility will still require mitigation measures to reduce its visual impact, especially from recreational and ecologically sensitive areas. Furthermore, the Potloodspruit River, running along the northern boundary, and the wetland within the southern section of the development site, add to the site's ecological and visual significance. Therefore, care must be taken to ensure the visual integration of the facility to avoid further disturbance to these remaining visual and ecological resources.
- **Existing Man-Made Elements:** The surrounding area includes existing industrial infrastructure, such as the Lydenburg Smelter and associated power lines. These elements create a landscape that has already been altered by human activities, which reduces its sensitivity to further developments. The presence of these industrial features will help the new solar infrastructure integrate more seamlessly into the environment. However, care must still be taken to ensure that the solar PV panels, energy storage systems, and transmission lines do not exacerbate visual clutter, particularly when viewed from nearby residential areas, such as Mashishing (~2km south).

  These existing elements contribute to a landscape that is already heavily influenced by human activities, creating a setting where the visual sensitivity to new developments is reduced. The presence of these established infrastructures could facilitate the integration of new structures like the Glencore Lydenburg Solar PV Facility, as the landscape has already adapted to accommodate significant human interventions.

Given these factors, the sensitivity rating for the Glencore Lydenburg Solar PV Facility site has been revised to High. This reflects the moderate VAC, the industrial context of the area, and the need to manage visual impacts on nearby ecological and recreational resources. The rating underscores the importance of implementing design and layout strategies that mitigate visual intrusion while ensuring that the project aligns with the industrial character of the surrounding landscape. As part of this VIA, specific mitigation measures will be discussed to address the key visual sensitivities identified, ensuring the development is visually integrated into its surroundings.

7 Identification of Visual Impacts

The VIA forms a crucial part of the EIA for the proposed Glencore Lydenburg Solar PV Facility. This assessment entails a meticulous evaluation of various criteria including visual intrusion, visibility, visual exposure, and viewer sensitivity. These factors collectively determine the intensity of potential visual impacts. Once the intensity is ascertained, it is further refined by considering spatial, temporal, and probability criteria to establish the overall significance of the visual impact.

This visual environment is a significant resource that contributes to the quality of life, sense of place, and cultural identity of local communities. Consequently, any alterations to the visual environment as a result of the proposed development necessitate careful assessment and management[9].

7.1 The Viewshed

The viewshed analysis for the proposed Glencore Lydenburg Solar PV Facility was conducted using a combination of desktop and field studies, supplemented by GIS software tools. The analysis was based on data from local sources, topographical data provided by the Japan Aerospace Exploration Agency (JAXA), Earth Observation Research Centre, and the ALOS Global Digital Surface Model "ALOS World 3D - 30m" (AW3D30) elevation model.

Key viewpoints were identified based on sensitive receptors noted during the site visit, including accommodations, businesses, homes, farms, roads, the railway, and other points of interest within a 6km radius of the proposed development.

The viewshed analysis was conducted using ArcGIS Pro and Google Earth, with the GIS software generating viewshed analysis and applying relevant spatial criteria to the proposed infrastructure. The analysis considered observers at a height of 1.6m, representing an average eye-level view.

The viewshed analysis considered the context of the view, the relative number of viewers, duration of view, and view distance. Based on a combination of all these factors, an overall rating of visibility was applied to each observation point. Categories of visibility were defined as Very High (VH), High (H), Moderate (M), Low (L) or Very Low (VL).

According to the results of the viewshed analysis, the following visibility distribution was observed within the viewshed of the proposed Glencore Lydenburg Solar PV Facility:

- 5% of the viewshed was classified as Very Low visibility;
- 50% as Low visibility;
- 20% as Moderate visibility;

[9] In this assessment, we adopt a worst-case scenario approach, assuming simultaneous construction of the PV facilities and grid connection infrastructure. Given their close proximity, these components are likely to be observed within the same visual range from sensitive viewing areas, albeit to varying degrees.

- 15% as High visibility; and
- 10% as Very High visibility.

These results indicate that the majority of the viewshed falls within the moderate visibility range, with notable pockets of high and very high visibility due to the open terrain and proximity to certain sensitive receptors, such as those in the Kellysville and Mashishing areas.

The analysis also considered the project's impact on the local road network, particularly the R36 and R37, which serve as key routes providing access to nearby settlements, including Mashishing and Kellysville. The viewshed analysis indicated that sections of the R36 within 50m of the western borders of the development area may experience significant visual impacts, with this area being classified as very high sensitivity. Road users travelling along this route may have direct views of the solar infrastructure, necessitating careful consideration of mitigation strategies to reduce visual intrusion.

The viewshed analysis forms a critical part of the visual impact assessment, providing valuable insights into the potential visual impacts of the proposed development.

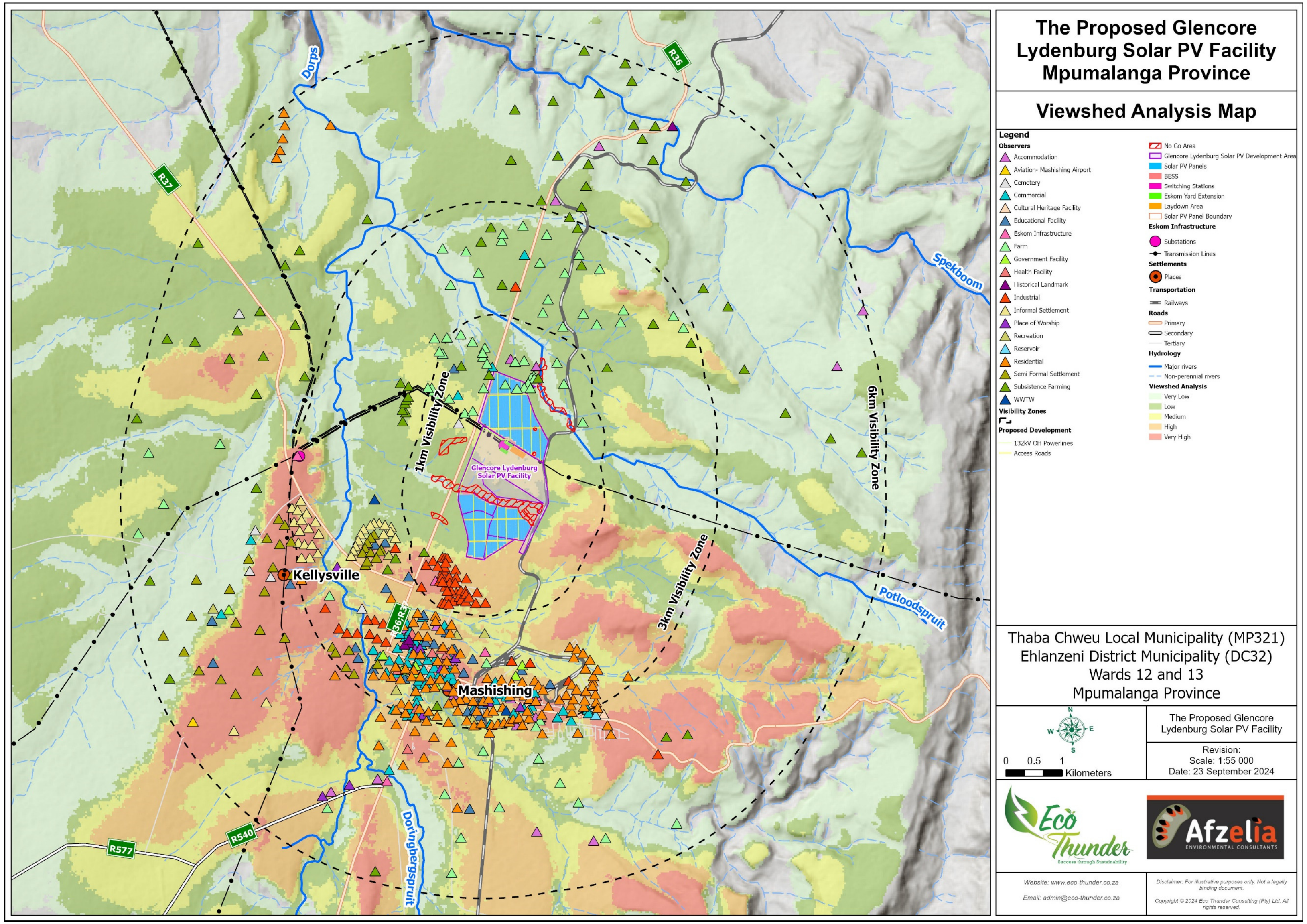

Figure 15: Viewshed Illustration

7.2 Visual Exposure within Study Area

The result of the viewshed analysis for the proposed facility is shown on **Figure 16** to **Figure 18** below. The viewshed analysis was undertaken from several vantage points within the proposed development area at an offset of 6m above average ground level. This offset was selected to simulate the maximum height of the proposed structures, specifically the PV panels. The analysis aimed to determine the general visual exposure (visibility) of the area under investigation. Visual exposure is categorised based on the distance from the proposed development, with the sensitivity of the area generally decreasing as the distance from the development increases.

Visual exposure is categorised based on the distance from the proposed development, with the sensitivity of the area decreasing as the distance increases. The categories are as follows:

7.2.1 Very High Sensitivity Area (Under 1 KM)

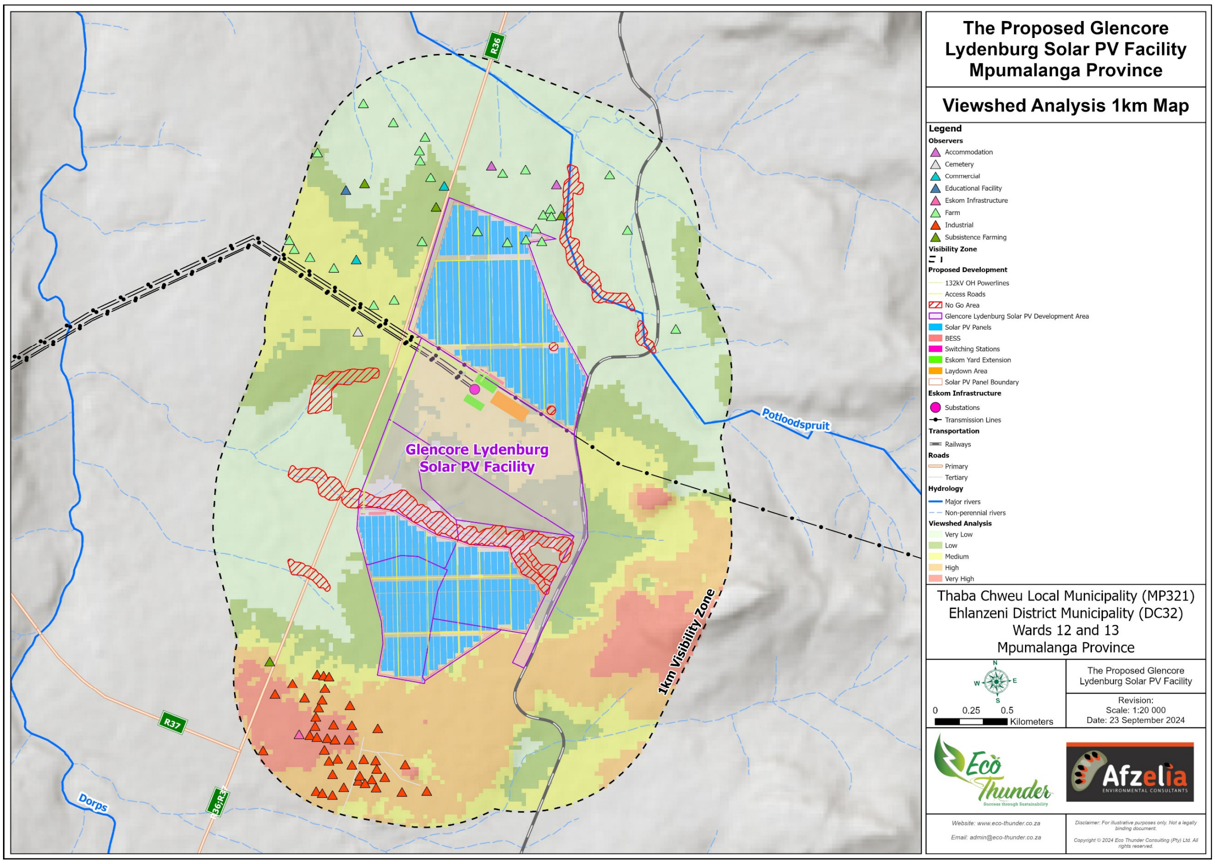

Figure 16: Very High Sensitivity Area (Under 1 KM)

In this zone, the visual impact on sensitive receptors is anticipated to be most pronounced. residents, farmers, and workers within this 1km radius, as shown in **Figure 16**, will experience the most significant changes in their visual environment due to the proximity of the solar facility. The relatively open terrain surrounding the site offers limited natural screening, making the solar panels and associated infrastructure highly visible. Specific receptors within this zone include farmsteads and guest accommodations such as Impangele Inn Guest House (~0.5km north-west) and Kingwoody Lodge (~0.5km north-east), as well as portions of the outskirts of Mashishing.

During the construction phase, the visual intrusion will be particularly noticeable, with machinery, temporary storage areas, and initial structures visibly altering the landscape. This phase will introduce a more industrial character to an area historically defined by agricultural, rural residential land uses, and Eskom infrastructure. Without significant natural barriers, the construction activities will be highly visible to nearby residents and road users on the R36 and R37.

Efforts to mitigate these impacts within the Very High Visual Impact Zone will be crucial. This may involve implementing visual screening techniques, such as temporary fencing and the use of natural vegetation buffers, to reduce the visual impact. Additionally, clear communication with local residents and stakeholders about the construction timeline and efforts to minimise disruption will be essential in managing perceptions and reducing negative visual impacts.

7.2.2 High Sensitivity (1 – 3 KM)

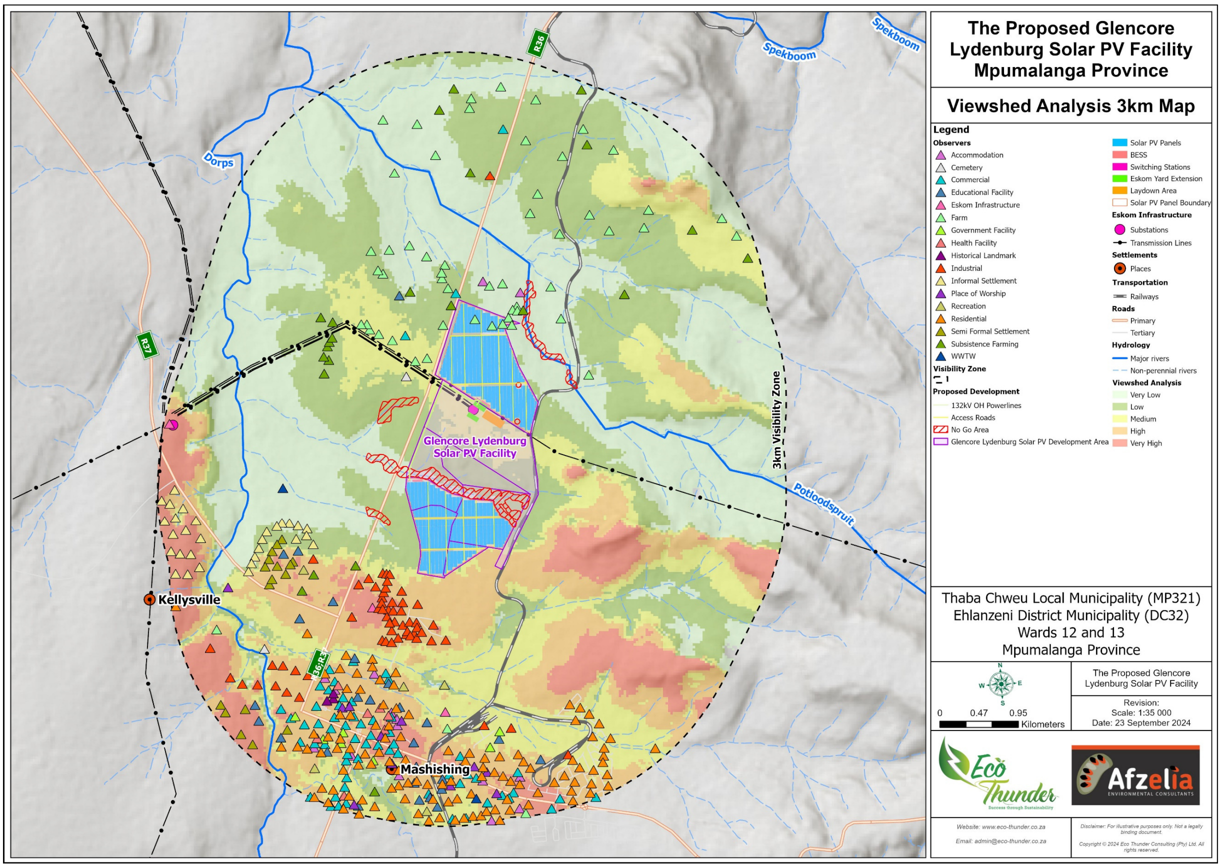

Figure 17: High Sensitivity Area (1 – 3 KM)

In this High Sensitivity Area (**Figure 17**), visual impacts begin to diminish with distance but remain significant due to the relatively open nature of the surrounding landscape. Although the increased distance offers some natural and man-made screening, the solar facility is still a visible and prominent feature in the landscape. Residents and workers within the 1-3km range, as well as travellers along key roads like the R36 and R37, will be able to view the solar arrays and associated infrastructure, especially from elevated or unobstructed viewpoints.

Specific receptors within this zone include parts of Mashishing, Kellysville, and the nearby farms scattered within this range. Accommodations, such as Mashishing Lodge (~1.6km south-west) and Angels Guest House (~1.3km south), are also located within this zone and may have partial views of the solar facility. While some existing vegetation, buildings, and natural landscape features provide limited screening, the solar PV panels will still be visible from several vantage points.

However, visual impacts in this area are somewhat mitigated by the presence of existing industrial and agricultural infrastructure. The proximity to the Lydenburg Smelter and other industrial features in the region may help the solar facility blend into the broader landscape, reducing the perceived visual disruption for residents, farmers, and road users.

Mitigation efforts in this High Sensitivity Zone should focus on enhancing natural screening, such as planting additional vegetation along the most visible edges of the proposed facility. This can help to reduce the overall visibility of the solar arrays. Additionally, proactive community engagement with local residents and stakeholders will be essential in managing concerns related to visual impacts and explaining the steps being taken to reduce any perceived disruption.

By addressing these concerns, the visual impact of the Glencore Lydenburg Solar PV Facility in this zone can be moderated, integrating more smoothly with the surrounding landscape and existing industrial context.

7.2.3 Medium Sensitivity (3 - 6KM)

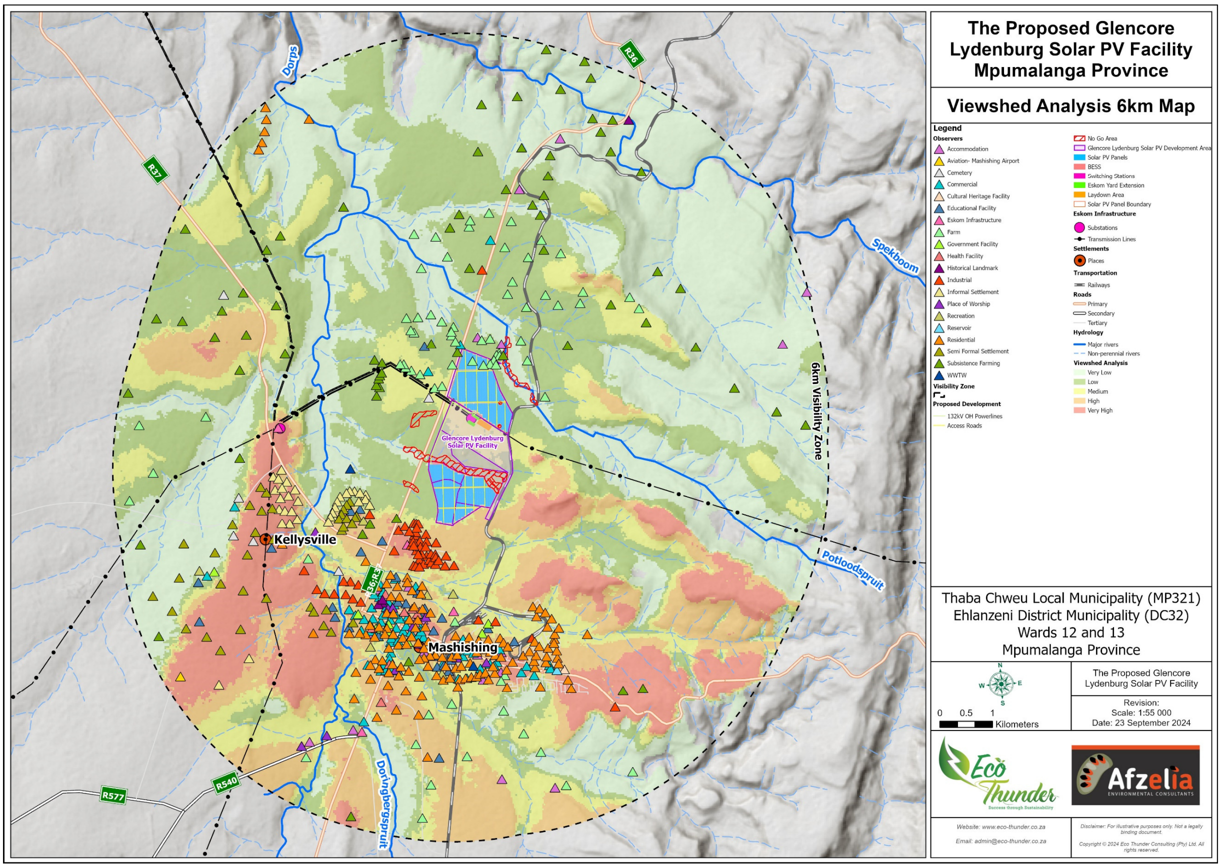

Figure 18: Moderate Sensitivity Area (3 – 6 KM)

Beyond 3km, the visual impact of the proposed Glencore Lydenburg Solar PV Facility reduces considerably. The increased distance, combined with intervening landscape elements such as natural vegetation, agricultural fields, and existing infrastructure, helps to obscure the facility from view. In this zone, the solar panels will appear as a smaller and more distant feature in the broader landscape, blending more seamlessly with the horizon and reducing its overall prominence.

This zone includes parts of Mashishing and Kellysville, where the visual impact on residents, workers, and road users will be less noticeable compared to the areas closer to the facility. In particular, residential areas, educational facilities, and agricultural lands located within this zone may observe the facility as a distant element, but it will not dominate the overall view. The visual presence of the solar arrays and infrastructure will be reduced, appearing as a minor component in the larger landscape context.

Key transportation routes, such as segments of the R36 and R37, will also fall within this zone. Travellers along these routes will see the solar facility as a distant element that does not significantly alter their visual experience. For those commuting or travelling for recreational purposes, the solar infrastructure will blend more naturally into the environment, contributing only minimally to the overall visual changes in the area.

Mitigation measures in this zone are less critical but still beneficial. Enhancing natural vegetation and maintaining existing landscape features can further reduce the visual impact. Informing the community about the project and its benefits can help foster a positive perception, even in areas where the visual impact is already low. By ensuring that the facility integrates with the broader landscape, the Glencore Lydenburg Solar PV Facility can maintain the visual quality and character of the region, even from distances of 3 to 6km.

Overall, the viewshed analysis indicates that the proposed Glencore Lydenburg Solar PV Facility will introduce a new visual element into the landscape, with the most substantial impact within the immediate vicinity (under 1km). As the distance increases, the visual impact reduces, aided by natural and built features that provide partial screening. The project design should incorporate strategic mitigation measures, such as vegetative screening and careful placement of infrastructure, to reduce visual impacts and integrate with the surrounding environment.

7.3 Impact Index

The Visual Impact Index (VII) is a quantitative measure used to assess the visual impact of a project on its surroundings. It considers various factors such as the sensitivity of the viewer, the visibility of the project, and the magnitude of the change.

The VII is calculated by considering three main factors:

- **Viewer Sensitivity (VS):** This refers to the degree to which the viewer is sensitive to changes in the visual environment. It can be influenced by factors such as the number of viewers, their activity, and the importance of the view.
- **Project Visibility (PV):** This refers to the extent to which the project is visible from various viewpoints. It considers factors such as the distance of the viewer from the project, the angle of view, and the presence of any screening elements in the landscape.
- **Magnitude of Change (MC):** This refers to the degree of change that the project introduces to the visual environment. It considers the size, scale, and design of the project, as well as its contrast with the existing landscape.

For the Glencore Lydenburg Solar PV Facility, Viewer Sensitivity was assessed as high in areas close to the facility, particularly around guest accommodations such as Impangele Inn Guest House (~0.5km north-west), Kingwoody Lodge (~0.5km north-east), and Angels Guest House (~1.3km south), as well as in residential areas like Mashishing and Kellysville. However, the rural and industrial context of the broader landscape, along with the lower population density, help reduce this sensitivity somewhat.

The Project Visibility PV was assessed as high, considering that the solar infrastructure will be visible from nearby roads, guest accommodations such as Impangele Inn Guest House (~0.5km north-west), Kingwoody Lodge (~0.5km north-east), Angels Guest House (~1.3km south), and Adelpragt Guesthouse (~1.4 km south), as well as farms and settlements, especially within the 1-3 km range. Nonetheless, the site's topography and the potential for vegetative screening lower the visibility for many receptors.

The Magnitude of Change MC was evaluated as medium, reflecting the scale of the proposed solar arrays and their contrast with the agricultural and rural character of the area. The presence of existing industrial infrastructure, such as the Lydenburg Smelter, contributes to reducing the magnitude of change for certain receptors.

Overall, the index suggests that receptors located within a 1km radius of the Glencore Lydenburg Solar PV Facility are likely to experience a high visual impact, due to the combination of viewer sensitivity, visibility, and magnitude of change. As distance from the facility increases, the visual impact lessens. Beyond 6km, receptors are expected to experience low visual impact, given the diminished visibility and the greater distance between the facility and sensitive viewers.

.

8 Impacts and Risks Assessment

This section aims to rate the significance of the identified potential impacts pre-mitigation and post-mitigation. The potential impacts identified in this section are a result of both the environment in which the Project activity takes place, as well as the activity itself. The identification of potential impacts is performed by determining the potential source, possible pathways and receptors. In essence, the potential for any change to a resource or receptor (i.e., environmental aspect) brought about by the presence of a Project component or by a Project-related activity has been identified as a potential impact.

The potential impacts are discussed per environmental feature/aspect and according to each phase of the Project i.e., the Construction, Operational and Decommissioning/Post Closure Phases. The significance, probability and duration of these potential impacts have been assessed based on the detailed specialist studies undertaken on the sensitivity of the receiving environment.

8.1 Impacts and Risk Methodology

The EIA Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining of the significance of an environmental impact on an environmental parameter is determined through a systematic analysis.

8.1.1 Determination of Significance of Impacts

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 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.

8.1.2 Impact Rating System

The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue/impact is also assessed according to the various project stages, as follows:

- Planning;
- Construction;
- Operation; and

- Decommissioning.

Direct, indirect, and cumulative impacts associated with the projects must be assessed in terms of the following criteria:

- **Nature of the impact:** The evaluation of the nature is impact specific. Most negative impacts will remain negative, however, after mitigation, significance should reduce:
  - Positive.
  - Negative.
- **Extent:** A description of whether the impact would occur on a scale limited to within the study area (local), limited to within 5 km of the study area (area); on a regional scale i.e. Local Municipality (region); or would occur at a national or international scale:
  - Local (1)
  - Area (2)
  - Region (3)
  - National (4)
  - International (5)
- **Duration:** A prediction of whether the duration of the impact would be Immediate and once-off (less than one month), more than once, but short term (less than one year), regular, medium term (1 to 5 years), Long term (6 to 15 years), Project life/permanent (> 15 years, with the impact ceasing after the operational life of the development or should be considered as permanent):
  - Immediate (1)
  - Short-Term (2)
  - Medium-Term (3)
  - Long-Term (4)
  - Project Life/Permanent (5)
- **Intensity:** This provides an order of magnitude of whether or not the intensity (magnitude/size/frequency) of the impact would be negligible, low, medium, high or very high. This is based on the following aspects:
  - an assessment of the reversibility of the impact (permanent loss of resources, or impact is reversible after project life);
  - whether or not the aspect is controversial;

- an assessment of the irreplaceability of the resource loss caused by the activity (whether the project will destroy the resources which are easily replaceable, or the project will destroy resources which are irreplaceable and cannot be replaced); and
- the level of alteration to the natural systems, processes or systems.
- Intensity is assessed as follows:
    - Negligible (1): The impact does not affect physical, biophysical, or socio-economic functions and processes.
    - Low/Potentially Harmful (2): The impact has limited impacts on physical, biophysical or socio-economic functions and processes.
    - Medium/Slightly Harmful (3): The impact has an effect on physical, biophysical and socio-economic functions and processes, but in such a way that these processes can still continue to function albeit in a modified fashion.
    - High/Harmful (4): Where the physical, bio-physical, and socio-economic functions and processes are impacted on in such a way as to cause them to temporarily or permanently cease.
    - Very High/Disastrous (5): Where the physical, bio-physical and socio-economic functions and processes are highly impacted on in such a way as to cause them to permanently cease.

- **Frequency:** This provides a description of any repetitive, continuous or time-linked characteristics of the impact: Once Off (occurring any time during construction or operation); Intermittent (occurring from time to time, without specific periodicity); Periodic (occurring at more or less regular intervals); Continuous (without interruption). This is assessed as follows:
    - Once Off (1): Once
    - Rare (2): 1/5 to 1/10 years
    - Frequent (3): Once a year
    - Very Frequent (4): Once a month
    - Continuous (5): ≥ Once a day/ per shift
- **Probability:** A description of the chance that consequences of that selected level of severity could occur during the exposure:
    - Highly Unlikely (1): The probability of the impact occurring is highly unlikely due to its design or historic experience.

    - Improbable (2): The probability of the impact occurring is low due to its design or historic experience.
    - Probable (3): There is a distinct probability of the impact occurring.
    - Almost Certain (4): It is most likely that the impact will occur.
    - Definite (5): The impact will occur regardless of any prevention measures.
- The **status**, which will be described as either positive, negative, or neutral.

The **risk rating** is calculated by combining the criteria in the following formula:

- **Severity (S)** = Extent (E)+ Duration (D) + Intensity (I_1)
- **Incidence (I_2)** = Frequency (F) + Probability (P)
- **Risk (R)** = (E+D+I1) x (F+P)

$$\therefore \mathbf{R = S \times I_2}$$

The **significance weightings** for each potential impact are as follows:

- 0 – 50 points: Low (i.e., the impact is of little importance/insignificant, but may/may not require minimal management),
- 51 – 100 points: Medium (i.e., the impact is important, management is required to reduce negative impacts to acceptable levels), and
- 101 – 150 points: High (i.e., the impact is of great importance, negative impacts could render development options or the entire project unacceptable if they cannot be reduced to acceptable levels and/or if they are not balanced by significant positive impacts, management of negative impacts is essential).

8.2 Impacts and Mitigation

Table 9 to **Table 11** summarise the consequence and significance of the visual impact of the proposed Glencore Lydenburg Solar PV Facility. These results are based on the worst-case scenario when the impacts of all aspects of the Project are taken together (PV facilities, grid connection and battery systems). Consequence of impact is a function of intensity, duration, and spatial extent. Intensity of impact is taken from the worst-case situation. These facilities are rated together, from a visual impact perspective, as the one would not exist without the other and they must be understood as the collective/cumulative.

8.2.1 Construction Phase

Table 9: Potential Impacts identified for the Construction Phase

Impact: Altered Landscape and Sense of Place during Construction		
Nature: The introduction of construction activities and infrastructure for the proposed Glencore Lydenburg Solar PV Facility will temporarily alter the visual character of the landscape. The current landscape, characteristic of the Mpumalanga Province, will be interspersed with construction equipment, temporary storage, and initial solar structures.		
	Before Mitigation	**After Mitigation**
Extent	Area (2)	Area (2)
Duration	Medium-Term (3)	Medium-Term (3)
Intensity	Medium (3)	Low (2)
Frequency	Continuous (5)	Continuous (5)
Probability	Definite (5)	Almost Certain (4)
Significance	Medium (80)	Medium (63)
Status:	Negative - The construction phase will introduce temporary visual disturbances that could be perceived as out of harmony with the existing landscape.	
Reversibility:	High - Post-construction, with proper landscaping and mitigation measures, the site can regain a resemblance of its original character, although some permanent changes, like the solar panels, will remain.	
Irreplaceable loss of resources?	No - While the landscape's visual character will be altered, with proper mitigation, there won't be a significant irreplaceable loss. However, care should be taken to ensure that no unique or endangered flora is affected during construction.	
Can impacts be mitigated?	Yes	
Mitigation Measures: • Minimise Land Disturbance: Limit the construction footprint to the minimum necessary for the proposed Project. Use only the required area to preserve the existing grassland landscape and unique sense of place. • Use of Natural Colours and Materials: Use materials and colours that blend with the natural grassland landscape for any temporary structures or construction materials. Mimic the texture and colours of the natural environment. • Vegetative Screens: At key points of sensitivity, native vegetation may be planted around the construction site's perimeter to act as a natural screen, reducing the visual impact. This would mirror the natural grasslands of the region, ensuring a semblance of continuity.		

• Localised Construction: Focus construction activities in smaller, localised areas rather than spreading out across the entire site simultaneously. This phased approach can reduce the overall visual impact at any given time. • Revegetation for Restoration: Post-construction, prioritise revegetation efforts, especially in areas where native grasslands were disturbed. This can help in restoring the site's original visual character. • Community Engagement: Engage with the local community and stakeholders in the surrounding area to understand their values and concerns related to the landscape and sense of place. Incorporate their input into the project design and mitigation measures, where feasible. • Minimise Night-time Activities: Limit construction activities during the night to reduce light pollution, especially given the proximity to residential areas like Mashishing and Kellysville. • Visual Simulations: Before starting construction, provide visual simulations to stakeholders, showcasing the expected changes to the landscape, if feasible.
Cumulative Impact: Medium - When combined with other existing infrastructure like the nearby Eskom installations and agricultural structures, the cumulative visual impact during construction could be more pronounced. However, with mitigation measures in place, this can be managed.
Residual Risk: Low - With the proposed mitigation measures, the residual visual impacts during the construction phase are expected to be reduced. However, some temporary visual disturbances will be unavoidable.

Impact: Visibility of the Facility to Residents during Construction		
Nature: The proposed Glencore Lydenburg Solar PV Facility, during its construction phase, will introduce a variety of structures and activities that will be visible to nearby residents and travellers. For residents and travellers within approximately 1km, this will be especially prominent.		
	Before Mitigation	**After Mitigation**
Extent	Area (2)	Area (2)
Duration	Medium-Term (3)	Medium-Term (3)
Intensity	Medium (3)	Low (2)
Frequency	Continuous (5)	Continuous (5)
Probability	Definite (5)	Almost Certain (4)
Significance	Medium (80)	Medium (63)
Status:	Negative - The visibility of construction activities could be perceived as a visual intrusion into the daily lives of nearby residents.	
Reversibility:	Medium - While the construction activities are temporary, the solar structures, once erected, will be a permanent addition to the landscape. However, over time, residents might acclimatise to the new visual elements.	

Irreplaceable loss of resources?	No - The visual change does not result in the loss of any irreplaceable resources. However, the familiar visual character for residents might be altered.
Can impacts be mitigated?	Yes

Mitigation Measures

- Construction Scheduling: Schedule construction activities involving visually intrusive structures for times when visibility is reduced, such as outside of regular daylight hours or during poor weather. Comply with local regulations and consider potential noise and light pollution.
- Make use of landscaping techniques and visual screening to reduce the impact as best possible.
- Site Screening: Use natural topography, existing vegetation, or temporary screens to shield construction activities from viewers. Situate construction activities in lower-lying areas or behind hills. Use screens made of materials that blend with the natural environment.
- Minimise Structure Heights: Keep temporary structure heights to a minimum to reduce their visibility, where possible. Use materials and colours that blend with the surrounding landscape.
- Lighting Control: Minimise light pollution by directing lights downwards, using shields to prevent light spill, and turning off lights when not in use.
- Strategic Placement: Where possible, prioritise the placement of taller construction equipment and initial solar structures in areas less visible to the majority of residents.
- Vegetative Barriers: Enhance and fast-track the planting of native vegetation barriers, especially in areas facing residences, to provide a natural screen.
- Limit Daytime Activities: If feasible, schedule some of the more visually intrusive construction activities during times when visibility is reduced, such as early morning or late afternoon.

Cumulative Impact: Medium - The combined visual impact of the construction activities, along with existing structures like the nearby Eskom installations and agricultural infrastructure, could be more noticeable for residents. However, with mitigation measures, this cumulative impact can be managed.

Residual Impact: Medium - Even with mitigation measures, the visibility of certain construction activities to residents will be evident. However, as the construction phase progresses and residents become more accustomed to the changes, the perceived impact would reduce.

Impact: Dust and Construction Impact during Construction
Nature: The construction activities for the proposed Glencore Lydenburg Solar PV Facility will inevitably disturb the soil, leading to dust generation, especially in an area characterised by open grasslands. This dust can be carried by winds, affecting the immediate surroundings. Nearby residents and travellers, particularly those along the R36 and R37, would experience a temporary increase in dust levels. This could affect their daily activities, health, and overall quality of life. Additionally, the movement of construction vehicles, machinery operations, and groundwork would cause noise and vibrations, further adding to the disturbances experienced by nearby residents.

	Before Mitigation	After Mitigation
Extent	Site (1)	Site (1)
Duration	Medium-Term (3)	Medium-Term (3)
Intensity	Medium (3)	Low (2)
Frequency	Continuous (5)	Continuous (5)
Probability	Definite (5)	Probable (3)
Significance	Medium (70)	Medium (48)
Status:	Negative - The dust and other disturbances from construction activities can be perceived as nuisances by nearby residents and can have potential health implications.	
Reversibility:	High - The dust and construction-related disturbances are temporary and will cease once construction is completed. The environment is expected to return to its pre-construction state in terms of dust levels.	
Irreplaceable loss of resources?	No - The dust and construction disturbances do not result in the loss of any irreplaceable resources. However, there might be a temporary decline in air quality and ambient noise levels.	
Can impacts be mitigated?	Yes	

Mitigation Measures:

- Dust Suppression: Regularly water down the construction site, especially during dry and windy conditions, to minimise dust generation.
- Windbreaks: Install temporary windbreaks or barriers around the construction site to reduce the spread of dust.
- Vehicle Speed Limits: Implement strict speed limits for construction vehicles within the site to reduce dust kick-up.
- Construction Scheduling: Schedule dust-generating activities for times when wind speeds are low or when wind direction is away from sensitive receptors. Consider nearby residences.
- Use of Dust Screens: Install dust screens or barriers around the construction site, particularly in areas close to sensitive receptors, to contain dust within the site.
- Rehabilitation of Disturbed Areas: Promptly rehabilitate areas where construction activities have ceased. Re-vegetate with native species or suitable ground cover to stabilise the soil and reduce dust generation.
- Regular Monitoring: Implement a monitoring program to assess the effectiveness of dust control measures. This could involve visual inspections and, if necessary, air quality monitoring.
- Machinery Maintenance: Ensure construction machinery is well-maintained to minimise excessive noise and vibrations.

• Work Hours: Where possible, restrict the noisiest construction activities to daytime hours and avoid work during early mornings, late evenings, or weekends when residents are more likely to be at home. • Community Communication: Keep the local community informed about construction schedules, especially during particularly disruptive activities. This allows residents to prepare or adjust their schedules accordingly.
Cumulative Impact: Medium - The combined impact of dust, noise, and other construction-related disturbances, along with existing activities in the area, could be more noticeable for residents. However, with mitigation measures, this cumulative impact can be managed.
Residual Risk: Low to Medium - With the proposed mitigation measures, the residual impact of dust and construction disturbances should be significantly reduced. However, occasional spikes in dust or noise might still be experienced during certain construction activities.

Impact: Impact on Local Infrastructure and Traffic during Construction		
Nature: The construction of the proposed Glencore Lydenburg Solar PV Facility will place additional stress on local infrastructure, particularly roads, due to the movement of heavy construction vehicles, equipment, and materials. This increased traffic can lead to wear and tear on local roads and may necessitate the widening of access roads. The increased construction traffic can also lead to congestion, delays, and potential safety hazards for local residents, and travellers along the R36 and R37.		
	Before Mitigation	**After Mitigation**
Extent	Area (2)	Area (2)
Duration	Medium-Term (3)	Medium-Term (3)
Intensity	Medium (3)	Low (2)
Frequency	Continuous (5)	Continuous (5)
Probability	Almost Certain (4)	Probable (3)
Significance	Medium (72)	Medium (56)
Status:	Negative - The construction phase will introduce temporary disturbances to local infrastructure and traffic that could be perceived as out of harmony with the existing infrastructure and traffic patterns.	
Reversibility:	High - Post-construction, with proper restoration and mitigation measures, local infrastructure and traffic flow can be returned to their original condition, although some temporary disruptions will have occurred.	
Irreplaceable loss of resources?	No - The impact on local infrastructure and traffic is temporary and does not result in the loss of irreplaceable resources. However, there might be temporary inconveniences and disruptions for the local community, travellers and nearby facilities.	

Can impacts be mitigated?	Yes

Mitigation Measures:

- Construction Traffic Management Plan: Develop and implement a plan to manage the movement of construction vehicles and minimise disruption to local traffic. Schedule deliveries and heavy vehicle movements outside of peak traffic times and use designated routes that avoid sensitive areas.
- Traffic Control Measures: Implement traffic control measures, such as flaggers, temporary traffic signals, and signage, to ensure safe and efficient traffic flow around the construction site.
- Infrastructure Protection Measures: Implement measures to protect local infrastructure from damage. Use appropriate vehicles and equipment to minimise wear and tear on local roads. Install protective barriers around sensitive infrastructure.
- Coordination with Local Authorities: Coordinate with local authorities and utility providers to ensure construction activities do not disrupt services or damage infrastructure. Notify relevant parties of construction schedules, obtain necessary permits and approvals, and promptly address any issues.
- Post-Construction Rehabilitation: Repair any damage caused to local infrastructure after construction. Restore the area to its pre-construction condition by repairing roads, replacing damaged vegetation, and removing temporary structures or equipment.

Cumulative Impact: Medium - The combined impact of the construction activities, along with existing infrastructure usage and traffic, could be more noticeable for the local residents and nearby travellers. However, with mitigation measures, this cumulative impact can be managed

Residual Risk: Low - With the proposed mitigation measures, the residual impact on local infrastructure and traffic during the construction phase is expected to be minimal. However, some temporary disruptions might still be experienced during certain construction activities.

8.2.2 Operational Phase

Table 10: Potential Impacts during the Operational Phase

Impact: Altered Landscape and Sense of Place during Operation		
Nature: The operational phase of the proposed Glencore Lydenburg Solar PV Facility will introduce a new visual element to the landscape, characterised by rows of solar panels. This change will be a departure from the existing landscape. The presence of these structures can alter the visual harmony and the intrinsic sense of place that residents and travellers associate with the region. The project will become a permanent feature in the landscape for its operational lifespan, potentially influencing how the area is perceived and experienced.		
	Before Mitigation	**After Mitigation**
Extent	Area (2)	Area (2)
Duration	Long-Term (4)	Long-Term (4)
Intensity	Medium (3)	Low (2)
Frequency	Continuous (5)	Continuous (5)
Probability	Almost Certain (4)	Probable (3)
Significance	Medium (81)	Medium (64)
Status:	Negative - The transformation of the landscape due to the presence of solar panels can be perceived as a visual intrusion by some, especially those who value the natural aesthetics of the region.	
Reversibility:	Medium - While the landscape alteration is long-term during the facility's operational phase, post-decommissioning, there's potential for the land to be restored to a more natural state, albeit with some lasting changes.	
Irreplaceable loss of resources?	No - The sense of place is subjective and can evolve over time. While the landscape's visual character changes, no tangible resources are irrevocably lost.	
Can impacts be mitigated?	Yes	
Mitigation Measures: • Minimise Visual Impact: Use low-reflective materials and colours that blend with the natural landscape to reduce the visual impact of the solar panels where possible. This can help the facility blend in with the surrounding environment and reduce the alteration of the landscape. • Landscaping and Screening: Plant native vegetation around the perimeter of the facility to screen views of the solar panels, especially for nearby residents and travellers along the R36. This can help to maintain the natural appearance of the landscape and reduce the visual impact of the facility.		

• Minimise Lighting: Use minimal lighting for the facility and ensure that any necessary lighting is directed downwards and shielded to reduce light pollution. This can help to maintain the natural night-time environment and reduce the impact on local residents and travellers along the R36 and R37. • Regular Maintenance: Regularly maintain the facility and the surrounding landscape to ensure that it remains in good condition and blends in with the natural environment. This includes maintaining the vegetation used for screening and ensuring that the solar panels remain clean and in good condition. • Community Engagement: Engage with the local community to understand their concerns and incorporate their feedback into the design and operation of the facility, where feasible. This can help to maintain a positive relationship with the local communities and ensure that the facility is a good fit for the local area.
Cumulative Impact: Medium - The facility, in combination with other developments and infrastructure in the area, contributes to a changing landscape character. However, with mitigation measures, the cumulative visual impact can be managed.
Residual Risk: Low to Medium - With the proposed mitigation measures, the residual impact on the landscape and sense of place should be significantly reduced. However, the presence of the Proposed Project will still be a noticeable change in the landscape during its operational phase.

Impact: Visibility of the Facility to Residents during Operation		
Nature: During the operational phase, the proposed Glencore Lydenburg Solar PV Facility will become a prominent feature in the landscape, especially given the flat nature of the site. Nearby residents and travellers will have varying degrees of visibility of the facility. This increased visibility can influence residents' and travellers' daily visual experience, potentially altering their sense of place and connection to the landscape.		
	Before Mitigation	**After Mitigation**
Extent	Area (2)	Area (2)
Duration	Long-Term (4)	Long-Term (4)
Intensity	Medium (3)	Low (2)
Frequency	Continuous (5)	Continuous (5)
Probability	Definite (5)	Probable (3)
Significance	Medium (90)	Medium (64)
Status:	Negative - For nearby residents and travellers who value the untouched nature of the landscape, the visibility of the solar panels can be perceived as a visual intrusion.	
Reversibility:	Medium - The visual impact is persistent during the facility's operational phase. However, once decommissioned, and if the land is restored, the visibility factor can be reversed.	

Irreplaceable loss of resources?	No - While the visual character of the area changes, there's no permanent loss of tangible resources. The sense of place, though altered, can evolve and adapt over time.
Can impacts be mitigated?	Yes

Mitigation Measures:

- Enhanced Landscaping and Screening: Focus on implementing landscaping and natural screening methods only where practically feasible to reduce the visibility of the solar panels from local residents, such as those from Mashishing, and travellers along the R36 and key viewpoints.
- Vegetative Screening: At key points of sensitivity, native trees and shrubs may be planted to create natural screens that obscure the view of the facility from nearby residents and travellers along the R36.
- Regular Maintenance: Regular maintenance of the facility and its surroundings can help to ensure that it remains as unobtrusive as possible. This would include keeping structures clean and in good repair and maintaining vegetative screening.
- Periodic Review: Conduct a periodic review of the effectiveness of the mitigation measures and make necessary adjustments. This is particularly important given the long operational phase of the project.
- Community Involvement: Involve the community in decision-making processes related to the facility's design and layout, where feasible. This can foster a sense of ownership and reduce potential opposition.

Cumulative Impact: Medium - The facility's visibility, combined with other infrastructural elements in the area, contributes to a changing visual landscape. However, with mitigation measures in place, the cumulative visual impact can be moderated.

Residual Risk: Low to Medium - Implementing the proposed mitigation measures should significantly reduce the facility's visibility impact on nearby residents and travellers along the R36 and R37. However, some level of visibility will remain, especially from certain vantage points.

Impact: Potential Visual Impact of Operational, Safety, and Security Lighting during Operation

Nature: Operational, safety, and security lighting are essential components of the proposed Glencore Lydenburg Solar PV Facility to ensure safe and efficient operations, especially during nighttime hours. However, this lighting can introduce a new source of light in the area, potentially causing light pollution. This can be particularly noticeable in areas that previously had minimal artificial lighting, altering the nocturnal landscape and potentially affecting the night sky visibility for nearby residents and travellers along the R36 and R37.

	Before Mitigation	After Mitigation
Extent	Area (2)	Local (1)
Duration	Long-Term (4)	Long-Term (4)

<table>
<tr><td>Intensity</td><td>Medium (3)</td><td>Low (2)</td></tr>
<tr><td>Frequency</td><td>Continuous (5)</td><td>Continuous (5)</td></tr>
<tr><td>Probability</td><td>Almost Certain (4)</td><td>Probable (3)</td></tr>
<tr><td>Significance</td><td>Medium (81)</td><td>Medium (56)</td></tr>
<tr><td>Status:</td><td colspan="2">Negative - The introduction of artificial lighting can be perceived as a visual disturbance, especially if it contrasts starkly with the existing ambient light levels.</td></tr>
<tr><td>Reversibility:</td><td colspan="2">High - The impact is directly tied to the operational phase. Once the facility is decommissioned or if lighting practices are modified, the impact can be quickly reversed.</td></tr>
<tr><td>Irreplaceable loss of resources?</td><td colspan="2">No - While the night-time visual character might change, there's no permanent loss of resources. However, the natural night sky, if significantly affected, can be considered a non-renewable resource in the context of the project's lifespan.</td></tr>
<tr><td>Can impacts be mitigated?</td><td colspan="2">Yes</td></tr>
<tr><td colspan="3">Mitigation Measures:
Downward-facing Lights: Use fixtures that direct light downwards to minimise upward light spill, preserving the night sky.
Motion Sensors: Install motion sensors so that lights are only activated when necessary, reducing the duration of light emissions.
Low-intensity Lighting: Opt for low-intensity lighting that provides sufficient illumination for safety without being overly bright.
Shielding: Use shields on lights to direct illumination to the intended areas and prevent light spill into unintended areas.
Educate Staff: Ensure that staff are aware of the importance of minimising light pollution and are trained to use lighting efficiently.
Periodic Reviews: Conduct periodic reviews of lighting practices to identify and rectify any unnecessary light emissions.
</td></tr>
<tr><td colspan="3">Cumulative Impact: Medium - The Proposed Project's lighting, when combined with other light sources in the area, could contribute to an overall increase in light pollution. However, with effective mitigation, this cumulative impact can be managed.</td></tr>
<tr><td colspan="3">Residual Risk: Low - With the proposed mitigation measures in place, the residual risk of significant light pollution from the facility should be minimised. Some localised light spill might still occur, but its impact should be limited.</td></tr>
</table>

Impact: Visual Exposure during Operation		
Nature: The proposed Glencore Lydenburg Solar PV Facility, given its expansive layout and the terrain of the site, will be a noticeable addition to the landscape. Visual exposure pertains to the extent to which the facility becomes a dominant or noticeable feature in the visual landscape for viewers at various distances and from different vantage points.		
	Before Mitigation	**After Mitigation**
Extent	Area (2)	Area (2)
Duration	Long-Term (4)	Long-Term (4)
Intensity	Medium (3)	Low (2)
Frequency	Continuous (5)	Continuous (5)
Probability	Definite (5)	Probable (3)
Significance	Medium (90)	Medium (64)
Status:	Negative - The facility's structures, especially the solar panels, can stand out in the predominantly open grassland and agricultural setting, making them more noticeable and potentially affecting the visual amenity of the area.	
Reversibility:	Medium - While the visual exposure is directly tied to the operational phase, once the facility is decommissioned, the landscape can be restored to its original state, though some traces or changes might remain.	
Irreplaceable loss of resources?	No - The visual change is temporary for the lifespan of the facility, and the original landscape character can be largely restored post-decommissioning.	
Can impacts be mitigated?	Yes	
Mitigation Measures: • Natural Screening: At key points of sensitivity such as nearby residents and travellers along the R36, vegetative barriers like trees and shrubs may be introduced around the facility's perimeter to help blend it into the natural environment and reduce its visual prominence. • Low-Profile Design: Opt for low-profile solar panel mounting systems to minimise the height and visual intrusion of the panels. • Non-Reflective Materials: Use non-reflective materials for infrastructure to reduce the visual contrast with the surrounding environment. • Colour Selection: Choose colours for infrastructure that blend with the natural landscape, reducing visual contrast. • Community Engagement: Engage with the local community to understand their visual preferences and incorporate feedback into the design where feasible. • Landscaping: Introduce landscaping efforts post-construction to help the facility blend more seamlessly with the surrounding environment.		

Cumulative Impact: Medium - The facility will introduce a new visual element to the landscape, and when combined with existing structures and developments, there could be a cumulative visual change. However, with effective mitigation, this cumulative impact can be managed.
Residual Risk: Low to Medium - With the proposed mitigation measures in place, the residual risk of significant visual exposure from the facility should be reduced. However, given the Glencore Lydenburg Solar PV Facility's size and the open nature of the landscape, some level of visual exposure will remain.

8.2.3 Decommissioning Phase

Table 11: Potential Impacts during the Decommissioning Phase

Impact: Landscape Character and Visual Amenity during Decommissioning		
Nature: The decommissioning phase involves the removal of the solar panels, infrastructure, and any other related structures from the site. This process will temporarily disrupt the landscape, potentially leading to a transient alteration in the visual character of the area. The removal process might expose previously covered or altered grounds, leading to a temporary visual contrast in the landscape.		
	Before Mitigation	**After Mitigation**
Extent	Area (2)	Area (2)
Duration	Short-Term (2)	Short-Term (2)
Intensity	Medium (3)	Low (2)
Frequency	Continuous (5)	Continuous (5)
Probability	Almost Certain (4)	Probable (3)
Significance	Medium (63)	Low (48)
Status:	Negative initially, transitioning to Neutral – The initial stages of decommissioning will involve dismantling, which might appear disruptive. However, as the site is restored, the visual amenity will gradually return to its pre-construction state.	
Reversibility:	High – The visual changes due to decommissioning are temporary. Once restoration efforts are complete, the landscape is expected to revert to its original state or a state close to it.	
Irreplaceable loss of resources?	No – The decommissioning process is designed to restore the landscape, ensuring no permanent loss of visual resources.	
Can impacts be mitigated?	Yes	
Mitigation/Enhancement Measures: • Gradual Dismantling: Instead of removing all infrastructure at once, consider a phased approach. This can help to gradually transition the landscape back to its original state, reducing the shock of sudden change.		

• Community Engagement: Engage with the local community and stakeholders to understand their views and preferences. This can help to guide the decommissioning process in a way that is sensitive to local visual preferences. • Re-use of Infrastructure: Where possible, consider re-using some of the infrastructure for other purposes. For example, access roads could be left in place for use by local landowners, if appropriate and agreed upon. • Phased Decommissioning: Implement a phased approach to decommissioning to minimise the area of disturbance at any given time. • Site Restoration: Prioritise immediate restoration of areas once the infrastructure is removed, including re-vegetation with native species. • Minimise Ground Disturbance: Use techniques that minimises ground disturbance during the removal of infrastructure. • Waste Management: Ensure all materials, especially non-biodegradable ones, are properly disposed of or recycled, leaving no remnants behind. • Monitoring: Post-decommissioning, monitor the site's recovery and implement any necessary interventions to ensure successful landscape restoration.
Cumulative Impact: Low - Given that the goal of decommissioning is to restore the site, the cumulative visual impact is expected to be minimal, especially when combined with other existing structures and developments.
Residual Risk: Low - With the proposed mitigation measures and a focus on site restoration, the residual risk of significant visual disruption from the decommissioning process should be minimal.

Impact: Site Restoration during Decommissioning		
Nature: Site restoration refers to the process of returning the project site to its original or near-original state after the decommissioning of the proposed Glencore Lydenburg Solar PV Facility. This involves the removal of infrastructure, remediation of any disturbed soils, and re-establishment of native vegetation. The aim is to ensure that the land can revert to its prior use, whether that be agriculture, natural habitat, or another purpose.		
	Before Mitigation	**After Mitigation**
Extent	Area (2)	Area (2)
Duration	Short-Term (2)	Short-Term (2)
Intensity	Low (2)	Medium (3)
Frequency	Continuous (5)	Continuous (5)
Probability	Probable (3)	Almost Certain (4)
Significance	Low (48)	Medium (63)

Status:	Positive - The intention behind site restoration is to benefit the environment by rehabilitating the land and minimising long-term visual impacts.
Reversibility:	High - The changes made during the decommissioning and restoration phase are intended to be permanent, with the land reverting to its original state or a state close to it.
Irreplaceable loss of resources?	No - Proper site restoration ensures that there's no permanent loss of resources, and the land can be used as it was before the project commenced.
Can impacts be mitigated?	Yes
Enhancement Measures: • Native Vegetation: Use native and local plant species for re-vegetation to ensure ecological compatibility and enhance biodiversity. • Soil Conservation: Employ techniques to prevent soil erosion and promote soil health during and after restoration. • Water Management: Ensure proper drainage and water management to prevent waterlogging or erosion. • Regular Monitoring: Conduct regular site inspections to assess the success of restoration efforts and intervene where necessary. • Community Engagement: Engage with the local community to gather feedback on restoration efforts and address any concerns. • Waste Management: Ensure all decommissioned materials are properly disposed of or recycled, leaving no remnants behind.	
Cumulative Impact: Low - The restoration process aims to negate the impacts of the Glencore Lydenburg Solar PV Facility, resulting in minimal cumulative effects when combined with other developments or natural features.	
Residual Risk: Low - With diligent restoration efforts and ongoing monitoring, the residual risk of negative impacts from the restoration process should be minimal.	

8.3 Cumulative Impact Assessment

The potential cumulative impacts that were identified for the construction, operational and decommissioning phases, are discussed in **Table 12**.

Table 12: Cumulative Impacts Identified for the Construction Operational and Decommissioning Phases

Impact: Cumulative Impact		
Nature: The potential cumulative visual impact of the proposed Glencore Lydenburg Solar PV Facility on the visual quality of the landscape.		
	Overall impact of the proposed project considered in isolation (with mitigation)	**Cumulative impact of the project and other projects within the area (with mitigation)**
Area (2)	Area (2)	Region (3)
Long-Term (4)	Long-Term (4)	Long-Term (4)
Medium (3)	Low (2)	Medium (3)
Continuous (5)	Continuous (5)	Continuous (5)
Almost Certain (4)	Probable (3)	Probable (3)
Medium (81)	Medium (64)	Medium (80)
Status (positive, neutral, or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	
Generic best practise mitigation/management measures:		
<u>Planning:</u> Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint where possible. <u>Operations:</u> Maintain the general appearance of the facility as a whole. <u>Decommissioning:</u> Remove infrastructure not required for the post-decommissioning use. Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.		

Residual Impacts
The visual impact will be removed after decommissioning, provided the Proposed Project infrastructure is removed. Failing this, the visual impact will remain.

The proposed Glencore Lydenburg Solar PV Facility is part of a growing network of renewable energy developments within the Thaba Chweu Local Municipality and the broader Ehlanzeni District Municipality in Mpumalanga Province. These proposed projects will collectively contribute to the region's transition towards renewable energy and will have a cumulative impact on the visual environment. The REEA Cumulative Map (Figure 19) illustrates the proximity and distribution of these renewable energy projects relative to the Glencore Lydenburg Solar PV Facility, emphasizing their combined influence on the area's visual landscape.

A notable energy project within the vicinity includes:

- The Proposed Sabie Site Co-Generation Facility located near Sabie, which is within the Ehlanzeni District Municipality (12/12/20/2573; 12/12/20/2573/AM1).

These projects are distributed across the region, each contributing to the cumulative visual impact on the landscape. As multiple renewable energy developments are concentrated within this relatively confined area, a comprehensive visual impact management strategy becomes essential. Such a strategy must address the collective visual effects by considering the strategic placement of solar panels, the use of non-reflective materials to reduce glare, effective landscaping to integrate these facilities into the surrounding environment, and ongoing monitoring of visual impacts throughout the lifespan of the projects.

The combined visual presence of these renewable energy projects will alter the visual character of the region, particularly for residents, travellers, and other visual receptors within close proximity to these developments. Mitigating these impacts through thoughtful design and effective communication with stakeholders will be crucial to ensuring the successful integration of the Glencore Lydenburg Solar PV Facility into the region’s evolving landscape.

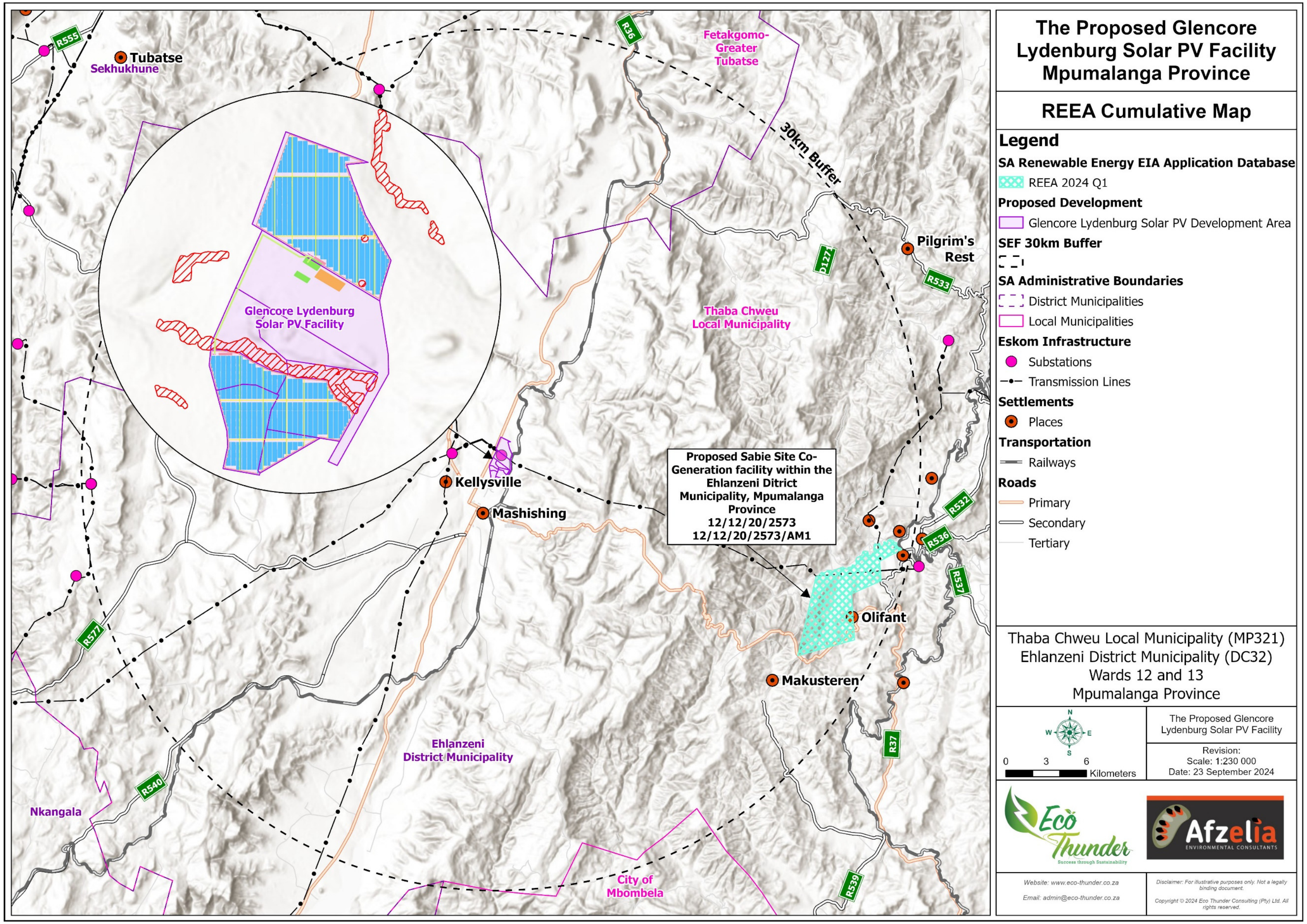

Figure 19: Cumulative Map

8.4 Mitigation Measures for Visual Impacts

One of the key strategies to mitigate the visual impacts of the solar energy facility is the use of natural screening methods. This involves the strategic placement and maintenance of vegetation to obscure or soften the view of the facility from sensitive viewpoints.

Vegetation, particularly trees and shrubs, can serve as an effective visual screen, helping to blend the facility into the natural landscape and reduce its visual prominence. However, the success of this strategy depends on careful planning and consideration of various factors, as illustrated in the image below.

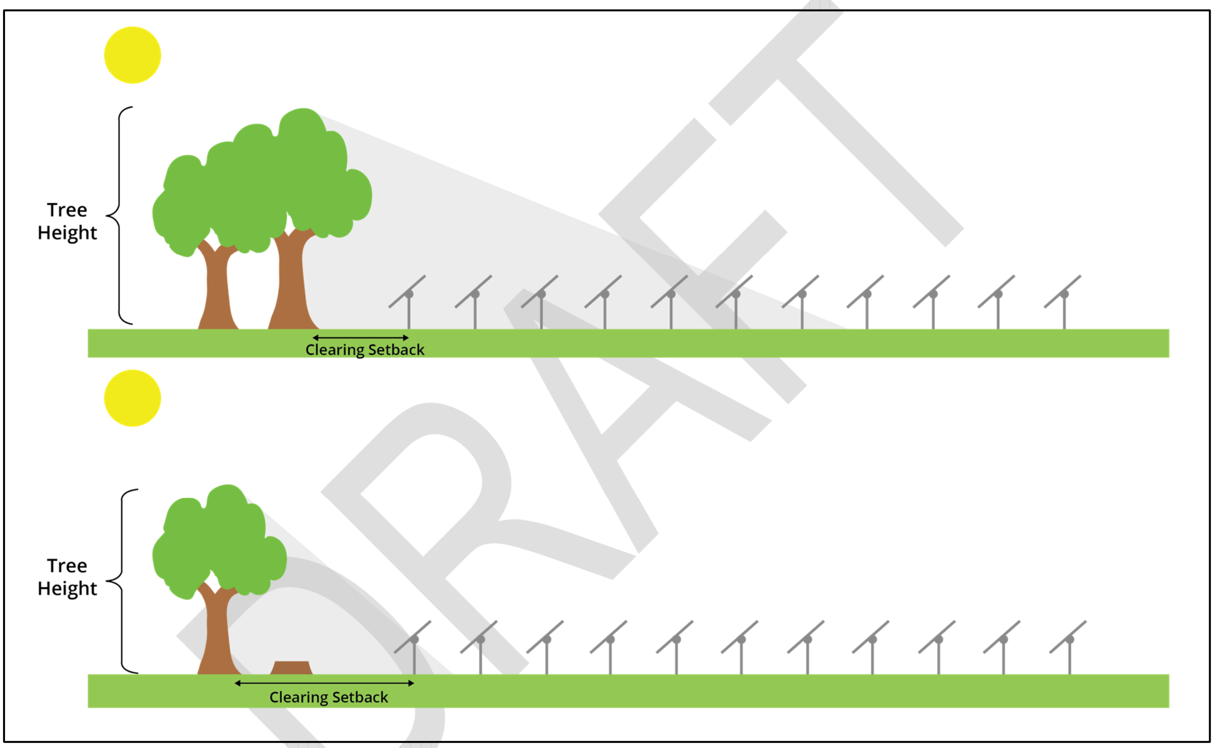

Figure 20: Vegetation Visual Screen

The image above demonstrates the importance of considering tree height and clearing setbacks from the solar PV panels when using vegetation as a visual screen. The height of the trees should be sufficient to obscure the view of the panels, but not so tall as to overshadow the panels and affect their performance. Similarly, the clearing setback must be enough to prevent the trees from encroaching on the panels, while still providing an effective visual screen.

By carefully selecting and positioning vegetation, we can create a natural screen that not only mitigates the visual impact of the facility, but also enhances the overall aesthetic of the landscape. This strategy, combined with other mitigation measures, will help to ensure that the solar energy facility is a visually integrated part of the local environment.

8.5 International Finance Corporation

In the VIA for the Glencore Lydenburg Solar PV Facility, as detailed in Section 4.1.2, a key requirement was identified to ensure compliance with the IFC Performance Standards and other international guidelines throughout the assessment process. This requirement underscores the commitment to not only identify and assess potential visual impacts but also to adopt a mitigation hierarchy to anticipate, avoid, minimise, and where residual impacts remain, compensate, or offset for risks and impacts to the environment.

The VIA process has been comprehensive, considering the unique characteristics of the Glencore Lydenburg Solar PV Facility, its environment, and the potential visual impacts during the operational phase. Mitigation measures have been proposed based on best practices, international standards, and the specific context of the project.

Now that the Impact Assessment and Mitigation section of the VIA has been completed, we can conclude that the VIA is compliant with the IFC Performance Standards. Table 13 provides a detailed breakdown of how each IFC Performance Standard has been addressed, considered, or resolved in the VIA report. This demonstrates the project's commitment to adhering to international standards and ensuring the minimisation of visual impacts to the greatest extent possible.

Table 13: IFC Performance Standard in the VIA

PERFORMANCE STANDARD	INTENT AND OBJECTIVE	REQUIREMENTS	PROJECT SPECIFIC APPLICABILITY
IFC PS 1	Identify and assess potential environmental and social risks and impacts of the project.	Identification of Risks and Impacts, Management Programmes, Organisational Capacity and Competency, Emergency Preparedness and Response, Monitoring and Review, Stakeholder Engagement, External Communication and Grievance Mechanism, Ongoing Reporting to Affected Communities.	The proposed Glencore Lydenburg Solar PV Facility should utilise insights from the VIA to address potential visual impacts on surrounding landscapes, especially the nearby residents and communities. Based on these findings, it is recommended to institute tailored management programs that focus on minimising visual disruptions. The project should also consider establishing a dedicated communication channel for stakeholders to ensure transparent and prompt addressing of concerns

PERFORMANCE STANDARD	INTENT AND OBJECTIVE	REQUIREMENTS	PROJECT SPECIFIC APPLICABILITY
IFC PS 3	Avoid and minimise adverse impacts on human health and the environment by avoiding or minimising pollution from project activities.	Resource Efficiency, Pollution Prevention	The proposed Glencore Lydenburg Solar PV Facility should be designed to harness optimal solar energy, emphasising resource efficiency. The VIA has highlighted potential areas of visual pollution, and it is recommended that design modifications prioritise the preservation of the region's visual integrity. The project should adopt advanced technologies and best practices to prevent any form of pollution, ensuring harmonious integration into the landscape.
IFC PS 6	Protect and conserve biodiversity.	Protection and Conservation of Biodiversity, Management of Ecosystem Services, Sustainable Management of Living Resources	The proposed Glencore Lydenburg Solar PV Facility is situated in a region with diverse visual characteristics. The VIA suggests that measures should be implemented to protect native vegetation. The project should prioritise the preservation of existing grasslands and scattered trees.

PERFORMANCE STANDARD	INTENT AND OBJECTIVE	REQUIREMENTS	PROJECT SPECIFIC APPLICABILITY
IFC PS 8	Protect cultural heritage from adverse impacts of project activities and support its preservation.	Protection of Cultural Heritage in Project Design and Execution, Project's Use of Cultural Heritage	The proposed Glencore Lydenburg Solar PV Facility should consider the cultural heritage of the local area in its planning and design. The project should commit to protecting and preserving any cultural heritage sites found in the project area. Mitigation measures should be implemented to avoid any adverse impacts on cultural heritage. The project should ensure that its activities do not adversely affect cultural heritage sites and should support the preservation of these sites.
IFC EHS Guidelines	Identify the risks posed by power generation and distribution projects to create visual impacts on Housing/farming communities.	Placement of powerlines and the design of substations with due consideration to landscape views and important environmental and community features.	The proposed Glencore Lydenburg Solar PV Facility's design should consider the VIA's recommendations to ensure that powerlines and substations are strategically placed to minimise visual impacts. Special attention should be given to nearby housing and farming communities. The project should align with the IFC EHS Guidelines, emphasising landscape integration, community considerations, and the prevention of visual pollution.

9 Environmental Impact Statement and Conclusion

The Proposed Glencore Lydenburg Solar PV Facility, developed by Glencore South Africa (Pty) Ltd, is located near Mashishing, Mpumalanga Province. The proposed facility will generate up to 300MW of electricity, primarily to supply the Lydenburg Smelter and other operations. The project includes the development of associated infrastructure such as BESS, an on-site substation, and power lines to connect to the existing electrical grid.

The VIA considered the site's location within a protected area, the Lydenburg Nature Reserve, which raises the visual sensitivity due to its environmental and recreational significance. Despite this, the presence of existing industrial infrastructure, including the Lydenburg Smelter, has altered the natural landscape, reducing the sensitivity of parts of the reserve to additional developments.

Key findings from the VIA include:

- The site has a moderate VAC due to the presence of existing industrial developments, which help absorb visual changes from the new facility. However, portions of the landscape, particularly areas with limited vegetative cover or near natural features, will need specific mitigation measures.
- he project's location within the Lydenburg Nature Reserve elevates its visual sensitivity, particularly from key viewpoints within the reserve and nearby recreational areas. Additionally, the Potloodspruit River, which runs along the northern boundary of the project site, adds ecological and visual significance. Appropriate mitigation measures are necessary to reduce visual impacts from both the natural features of the reserve and surrounding sensitive receptors, such as Mashishing (~2 km away).
- Recommended mitigation strategies include:
  - Strategic placement of infrastructure to avoid prominent areas and reduce visibility from key viewpoints.
  - Implementation of vegetation screening, especially near visual corridors, to blend the development with the natural landscape.
  - The use of materials and colours that harmonise with the surrounding environment to reduce visual contrast.
  - Preservation of natural landforms and vegetation where possible to maintain the visual integrity of the nature reserve.
- Given the site's location within a nature reserve, ongoing consultation with relevant authorities and local stakeholders, including landowners and residents, will be crucial to ensure that visual and environmental impacts are effectively managed.
- Cumulative visual impacts, particularly from the existing industrial infrastructure within and around the reserve, were considered. The existing industrial elements, such as power

lines and the Lydenburg Smelter, already influence the visual landscape, helping to mitigate the relative visual intrusion of the new facility. However, the project will need to ensure that additional visual clutter is minimised through careful design and placement.

The VIA concludes that receptors within 1 km of the buildable area, particularly those within the nature reserve or in nearby residential areas, are likely to experience the highest levels of visual intrusion. Beyond this zone, the visual impact diminishes with distance. Although the open landscape offers limited natural screening, proposed mitigation measures, including vegetative buffers, will help reduce visual exposure.

In conclusion, while the location of the Proposed Glencore Lydenburg Solar PV Facility within the Lydenburg Nature Reserve increases the sensitivity of the project, the VIA has identified no fatal visual flaws that would prevent the project from proceeding. The successful implementation of recommended mitigation measures, combined with stakeholder engagement, will help integrate the project into its surroundings while minimising its visual and environmental impacts.

The project is recommended for environmental authorisation, subject to the implementation of the mitigation measures outlined in the VIA and compliance with the Environmental Management Programme (EMPr). The VIA specialist should review the final project layout to ensure that it adheres to the specific recommendations outlined in this assessment.

10 References

Australian Government Department of Infrastructure, Transport, Regional Development and Communications. (n.d.). Environmental Assessments.

Civil Aviation Authority, UK. (n.d.). Visual Impact.

Department of Agriculture, Land Reform and Rural Development (n.d.). Department of Agriculture, Land Reform and Rural Development.

Department of Environmental Affairs (DEA), South Africa. (2010). Environmental Impact Assessment Regulations.

Department of Environmental Affairs (2017). Environmental Impact Assessment Regulations, 2017.

Department of Environmental Affairs (2017). Environmental Impact Assessment Regulations Listing Notice 1, 2017.

Department of Environmental Affairs (2017). Environmental Impact Assessment Regulations Listing Notice 2, 2017.

Department of Environmental Affairs (2017). Environmental Impact Assessment Regulations Listing Notice 3, 2017.

Department of Environmental Affairs (DEA), South Africa. (2017). Environmental Impact Assessment Guideline for Renewable Energy Projects.

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

Thaba Chweu Local Municipality (n.d.). Thaba Chweu Local Municipality.

Ehlanzeni District Municipality (n.d.). Ehlanzeni District Municipality.

Federal Highway Administration. (n.d.). Visual Impact Assessment for Highway Projects.

International Finance Corporation (IFC). (2012). Guidance Notes to Performance Standards on Environmental and Social Sustainability.

International Finance Corporation (IFC). (2012). Performance Standards on Environmental and Social Sustainability.

International Finance Corporation. (2015). Utility-Scale Solar Photovoltaic Power Plants: A Project Developer's Guide.

Landscape Institute and Institute of Environmental Management and Assessment. (2013). Guidelines for Landscape and Visual Impact Assessment. 3rd Edition.

Ministry for the Environment, New Zealand. (n.d.). Quality Planning - Landscape.

Mpumalanga Tourism & Parks Agency (n.d.). Mpumalanga Tourism & Parks Agency.

Mpumalanga Tourism & Parks Agency (n.d.). Mpumalanga Tourism & Parks Agency.

Scottish Government. (n.d.). Landscape and Visual Impact Assessment.

SolarPower Europe. (n.d.). EPC Best Practice Guidelines Version 2.0.

SolarPower Europe. (n.d.). Operations and Maintenance Best Practice Guidelines Version 5.0.

South African Civil Aviation Authority (n.d.). South African Civil Aviation Authority.

South African Council for the Landscape Architectural Profession (SACLAP). (n.d.). Guidelines and Policies.

South African Heritage Resources Agency (n.d.). South African Heritage Resources Agency.

South African Heritage Resources Agency (2022). Visual Impact Assessment for the Proposed Camden I Wind Energy Facility.

South African Heritage Resources Agency (2022). Visual Impact Assessment for the Proposed Coleskop Solar PV Facility.

South African Heritage Resources Agency (2022). Visual Impact Assessment for the Proposed Halfgewonnen Solar PV Facility.

South African Heritage Resources Agency (2022). Visual Impact Assessment for the Proposed Serval Solar PV Facility.

South African Heritage Resources Agency (2022). Visual Impact Assessment for the Proposed Ummbila Wind Energy Facility.

South African National Biodiversity Institute (n.d.). Vegetation Map of South Africa.

South African National Parks (n.d.). GIS Data.

South African National Parks (n.d.). South African National Parks.

South African Photovoltaic Industry Association (SAPVIA). (n.d.). Guidelines and Best Practices.

South African Wind Energy Association (SAWEA). (n.d.). Guidelines and Best Practices.

South African National Parks (SANParks). (n.d.). GIS Data.

South African Wind Energy Association (SAWEA). (n.d.). Guidelines and Best Practices.

South African Heritage Resources Agency. (2022). Visual Impact Assessment for the Proposed Coleskop Solar PV Facility.

South African Heritage Resources Agency. (2022). Visual Impact Assessment for the Proposed Halfgewonnen Solar PV Facility.

South African Heritage Resources Agency. (2022). Visual Impact Assessment for the Proposed Serval Solar PV Facility.

South African Heritage Resources Agency. (2022). Visual Impact Assessment for the Proposed Ummbila Wind Energy Facility.

South African Heritage Resources Agency. (2022). Visual Impact Assessment for the Proposed Camden I Wind Energy Facility.

U.S. Environmental Protection Agency. (n.d.). National Environmental Policy Act (NEPA) Review Process.

UK Government. (n.d.). Environmental Impact Assessment.

Appendix A: Specialist CV

Appendix B: Site Sensitivity Verification

Appendix C: VIA Best Practice Guideline

Appendix D: IFC Guideline

SPECIALIST DECLARATION FORM – AUGUST 2023

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

REPORT TITLE

PROPOSED GLENCORE LYDENBURG SOLAR PHOTOVOLTAIC FACILITY AT THE LYDENBURG SMELTER, MPUMALANGA PROVINCE

Kindly note the following:

1. This form must always be used for assessment that are in support of applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting, where this Department is the Competent Authority.
2. This form is current as of August 2023. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.dffe.gov.za/documents/forms.
3. An electronic copy of the signed declaration form must be appended to all Draft and Final Reports submitted to the department for consideration.
4. The specialist must be aware of and comply with '*the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the act, when applying for environmental authorisation - GN 320/2020)*', where applicable.

1. SPECIALIST INFORMATION

Title of Specialist Assessment	Visual Impact Assessment
Specialist Company Name	Eco Thunder Consulting (Pty) Ltd
Specialist Name	Brogan Geldenhuys
Specialist Identity Number	9309020020083
Specialist Qualifications:	Bachelor of Industrial Engineering
Professional affiliation/registration:	ILASA, GISSA, IAIAsa, IAP2
Physical address:	11 Ruby Close, Witkoppen, Sandton, Johannesburg, 2068
Postal address:	PO Box 2055 Fourways
Postal address	N/A
Telephone	010 157 8682
Cell phone	064 655 2752
E-mail	brogan@eco-thunder.co.za

2. DECLARATION BY THE SPECIALIST

I, Brogan Geldenhuys declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
  - any decision to be taken with respect to the application by the competent authority; and;
  - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.

BGeldenhuys

Signature of the Specialist

Eco Thunder Consulting (Pty) Ltd

Name of Company:

01 Oct 2024

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, _ Brogan Geldenhuys__________, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Eco Thunder Consulting (Pty) Ltd

Name of Company

01 October 2024

Date

Signature of the Commissioner of Oaths

2024 -10 - 01

Date

SOUTH AFRICAN POLICE SERVICE
COMMUNITY SERVICE CENTRE
2024 -10- 01
BRACKENDOWNS EASTRAND
SOUTH AFRICAN POLICE SERVICE