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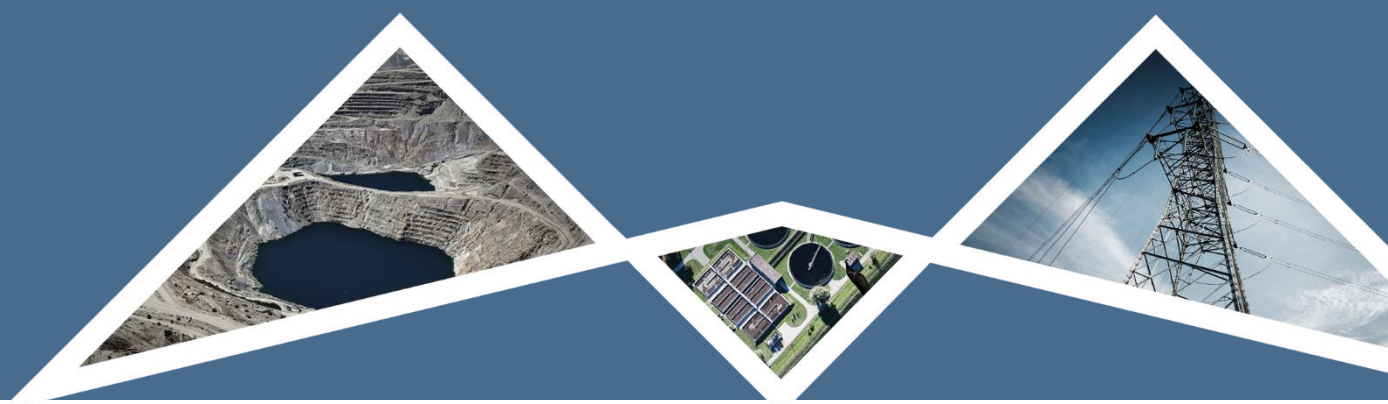
# ENVIRONMENTAL IMPACT ASSESSMENT REPORT

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

REF: 14/12/16/3/3/2/2538



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## DOCUMENT CONTROL

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## REVISION AND AMENDMENTS

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# List of Abbreviations

AEL: Air Emissions License

BA: Basic Assessment

BPG: Best Practice Guideline

CA: Competent Authority

DEA: Department of Environmental Affairs

DEAT: Department of Environmental Affairs and Tourism

DFFE: Department of Forestry, Fisheries and Environment

DWS: Department of Water and Sanitation

DMRE: Department of Mineral Resources and Energy

DWAF: Department of Water Affairs and Forestry

EAP: Environmental Assessment Practitioner

ECA: Environment Conservation Act

EIA: Environmental Impact Assessment

EIMS: Environmental Impact Management Service (Pty) Ltd

EMPr: Environmental Management Programme Report

GHG: Greenhouse Gas

GIS: Geographical Information System

I&APs: Interested and Affected Parties

IBA: Important Bird Area

IDP: Integrated Development Plan

IEM: Integrated Environmental Management

KPI: Key Performance Indicator

LED: Local Economic Development

MR: Mining Right

MPRDA: Mineral and Petroleum Resources Development Act

NDP: National Development Plan

NEMA: National Environmental Management Act

NEMAQA: National Environmental Management: Air Quality Act

NFA: National Forests Act

NFEPA: National Freshwater Ecosystem Priority Areas

NHRA: National Heritage Resources Act

NPAES: National Protected Areas Expansion Strategy

NWA: National Water Act

MP DARDLEA: Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs

PDP: Provincial Development Plan

PPP: Public Participation Process

PV: Photovoltaic

RE: Renewable Energy

REDZ: Renewable Energy Development Zones

SAHRA: South African Heritage Resources Agency

SAHRIS: South African Heritage Resources Information System

SAWS: South African Weather Service

SDF: Spatial Development Framework

SEMA: Specific Environmental Management Act

SPLUMA: Spatial Planning and Land Use Management Act

SWMP: Stormwater Management Plan

UIF: Unemployment Insurance Fund

# 1 EXECUTIVE SUMMARY

Glencore is responsibly sourcing the commodities that advance everyday life. Glencore's current portfolio of minerals enables the transition to a low-carbon economy, while meeting society's energy needs as it progresses through the transition. The transition away from fossil fuels by the energy-intensive mining sector towards renewable, clean energy sources is at the top of the global Glencore agenda. The focus is not only to reduce the sector's carbon footprint as a whole, but also to ensure energy availability for the growing mining economies.

Although the mining sector contributes to global carbon emissions, it is also leading a just transition to a low carbon economy by deploying new clean energy technology within its operations, as well as by mining critical minerals and metals which a low-carbon economy needs.

As part of this transition, Glencore Lydenburg Smelter, an operation by Glencore South Africa (Pty) Ltd (the applicant) wishes to develop a Solar Photovoltaic (PV) Energy Generation Facility at the Lydenburg Smelter. The facility will have a maximum generation capacity of 300 megawatts (MW). The electricity generated from the facility will be used at the Lydenburg smelter or will be wheeled to other Glencore operations. Other possible infrastructure will include an on-site switching station, access roads, energy storage system and an 132kV power line. The proposed PV facility is located in Thaba Chweu Local Municipality (Ward 12 and 13), Ehlanzeni District Municipality, Mpumalanga Province. It was determined that an Environmental Authorization (EA) is required for the proposed activities at the PV facility. A full Environmental Impact Assessment (EIA) process is being undertaken in support of the application for EA. This report aims to comply with the requirements of Appendix 3 of the Environmental Impact Assessment Regulations, 2014, promulgated under the National Environmental Management Act (NEMA- Act 107 of 1998) and fulfils the requirements of an EIA Phase Report.

**PURPOSE OF THE EIA REPORT**

The purpose of the EIA report is to:

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted Scoping report;
- Identify the location of the development footprint within the approved site as contemplated in the accepted Scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- Determine nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives and the degree to which these impacts can be reserved, may cause irreplaceable loss of resources and can be avoided, managed or mitigated;
- identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted Scoping report based on the lowest level of environmental sensitivity identified during the assessment;
- identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted Scoping report through the life of the activity;
- identify suitable measures to avoid, manage or mitigate identified impacts; and
- identify residual risks that need to be managed and monitored.

**PUBLIC PARTICIPATION PROCESS**

A Public Participation Plan (PP Plan) has been prepared in accordance with the requirements of the NEMA, and the Directions issued by the department of Forestry, Fisheries and the Environment (DFFE) in GN 650 of 5 June

2020) in terms of the Disaster Management Act (Act 57 of 2002). The purpose of this PP Plan is to obtain agreement from the relevant Competent Authority on the public engagement and participation for the abovementioned project. A copy of the plan can be made available upon request.

The Public Participation Process (PPP) for the proposed project has been undertaken in accordance with the requirements the NEMA in line with the principles of Integrated Environmental Management. The PPP commenced on the 23 November 2023 with an initial notification and call to register to Interested and Affected Parties (I&APs). The comments received from I&APs during the initial call to register and commenting period to date have been captured in the Public Participation Report in Appendix C, and a summary of the issues raised and sections addressing the issues is presented in Table 15 (Section 8.6).

The Scoping Report was made available for public review and comment for a period of 30 days from the 30th 23 February 2024 to 22 April 2024. Comments received during the Scoping Report review period were collated and added to the Public Participation Report and the summary in Table 15 (Section 8.6).

Comments received during this EIA Report review period will also be collated and added to the Public Participation Report and the summary in Table 15 will be updated accordingly for inclusion in the finalised EIA Report to be submitted to the CA.

This EIA Report will be made available for public review and comment for a period of 30 days

**PROJECT ALTERNATIVES AND ENVIRONMENTAL IMPACT ASSESSMENT**

A Scoping assessment was undertaken to identify all the potential risks and impacts associated with each phase of the proposed PV project as well as potentially feasible alternatives. Each of the identified risks and impacts at the various project phases were assessed. The assessment criteria (see Section 10.1 for the EIMS Impact Assessment Methodology) include the nature, extent, duration, magnitude / intensity, reversibility, probability, cumulative impact, and irreplaceable loss of resources.

After considering the broad range of alternative types that exist (i.e., location, process, technology, and activity options), process, site layout and design alternatives were the only reasonable options identified. Process alternatives, known as technological and equipment alternatives, are implemented to achieve project goals. For solar energy, three technologies—Photovoltaics (PV), Concentrating Solar Power (CSP), and Solar Heating and Cooling (SHC)—were evaluated, with PV preferred due to its lower cost, minimal environmental impact, and suitability for large-scale production. Design options included standalone and grid-connected systems, with grid-connected being more cost-effective. PV panels such as bifacial, polycrystalline, and monocrystalline were considered, with bifacial preferred for generating up to 300MW. Lithium-ion batteries were chosen for energy storage due to efficiency, despite environmental impacts. Layout alternatives followed a sensitivity-based approach to avoid sensitive areas, optimizing the facility's design and minimizing environmental and social impacts.

There is currently environmental and social sensitivities that requires avoidance within the project area which are the heritage sensitive areas and various wetlands. Refer to Figure 32 .

Various impacts have been identified in relation to the proposed project and these have been subjected to a Scoping level impact assessment. No impacts were determined to have a high final significance. The following impacts were determined to have a potentially moderate positive / negative final significance (see Section 10.2 for full list of identified impacts and the significance of each):

- Negative Impacts:
    - Impact on terrestrial biodiversity;
    - Impacts on avifauna during operations;
    - Visual impacts associated with construction and operation phases;
    - Soil compaction during construction;
    - Job Losses (Decommissioning Phase);

  - Potential social unrest;
  - Influx of non-local jobseekers

- Positive Impacts:
  - Employment Creation (Construction and Operational Phases).
  - Rehabilitation after decommissioning of the facility.
  - Reduced impacts on carbon footprint.

The identified potential impacts of moderate to high significance will be further assessed during the EIA phase of the project. Potential mitigation measures have been identified and will be refined based on input from the Environmental Assessment Practitioner (EAP), public consultation, and specialist assessments during the EIA phase of the project. The associated EMPr will identify appropriate mitigation mechanisms for avoidance, minimisation and / or management of the negative impacts and enhancement of the positive impacts.

Mitigation measures have been identified and based on input from the Environmental Assessment Practitioner (EAP), public consultation, and specialist assessments during the EIA phase of the project. The associated EMPr (Appendix E) identifies appropriate mitigation mechanisms for avoidance, minimisation and / or management of the negative impacts and enhancement of the positive impacts thereof.

# 2 INTRODUCTION

Glencore (Pty) Ltd (the applicant) is one of the world's largest globally diversified natural resource companies. Glencore's four coal operations are located in the coal-rich province of Mpumalanga, while ferroalloys mines and smelters can be found across the northern part of South Africa, in the North West Province and Limpopo.

Glencore proposes to develop a Photo Voltaic (PV) facility in Lydenburg, Mpumalanga Province. Subsequently, Glencore has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the independent Environmental Assessment Practitioner (EAP) to assist with undertaking the required authorisation processes (including the statutory public participation), and to compile and submit the required documentation in support of application for Environmental Authorisation (EA) in accordance with the National Environmental Management Act, 1998 (Act 107 of 1998 – NEMA) Environmental Impact Assessment (EIA) Regulations, 2014 as amended.- Listed activity/ies in Table 1. The proposed project involves the development of a PV facility with a capacity of up to 300 megawatts (MW) to provide power to Lydenburg smelter or will be wheeled to other Glencore operations. Other possible infrastructure will include an on-site switching station, access roads, energy storage system and 132kV power line. The proposed project is located on Portion 143 of Farm 30 Potloodspruit, Portions 114, 457 and 471 of Farm 31 Townlands of Lydenburg, Portion 1 of Lydenburg Smelter Erf 6099, Lydenburg Smelter Erf 2540 and Lydenburg Smelter Erf 2541 within Thaba Chweu Local Municipality (Ward 12 and 13), Ehlanzeni District Municipality, Mpumalanga Province. The electricity generated from the facility will be used at the Lydenburg smelter or will be wheeled to other Glencore operations.

Table 1: NEMA Listed Activities Relevant to Project

| Listing Notice | Activity Description | Description |
|---|---|---|
| GN.R. 983, Activity 11 | The development of facilities or infrastructure for the transmission and distribution of electricity—<br>(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts. | The study area is located outside urban areas or industrial complexes and entails the development of a single 2km long 132kV Power line from Start point: 25° 3'35.48"S; 30°28'11.79"E, Med point: 25° 3'40.01"S; 30°27'51.05"E, Endpoint: 25° 4'4.20"S; 30°27'41.87"E 2 x 0.75ha on-site battery energy storage facility, 2 x on-site switching stations and approximately 0.6ha expansion of Eskom Yard for an additional feeder bay associated with the PV facility. |
| GN.R. 984, Activity 1 | The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs —<br>(a) within an urban area; or<br>(b) on existing infrastructure. | The proposed project involves the development of a new PV facility with a maximum capacity of 300MW to provide power for the mining operations. |

| Listing Notice | Activity Description | Description |
|---|---|---|
| GN.R. 984, Activity 15 | The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-<br>(i) the undertaking of a linear activity; or<br>(ii) maintenance purposes undertaken in accordance with a maintenance management plan. | The proposed Solar PV facility will require clearing of indigenous vegetation. The proposed study area is 375ha and approximately 195ha of indigenous vegetation will be cleared for the development of the proposed PV facility. |
| GN.R. 985, Activity 4 | The development of a road wider than 4 meters with a reserve less than 13.5 meters.<br>f. Mpumalanga<br>i. Outside urban areas:<br>(aa) A protected area identified in terms of NEMPAA, excluding disturbed areas;<br>(bb) National Protected Area Expansion Strategy Focus areas;<br>(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;<br>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;<br>(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas, where such areas comprise indigenous vegetation. | The proposed development is located within an ecological support area protected area buffer, a National Protected Area Expansion Strategy (NPAES) and within 5km from the Lydenburg Nature Reserve. There are 15 new proposed internal service and/or maintenance roads. The access roads have a total length of approximately 13.5km and are 7m wide. |
| GN.R. 985, Activity 12 | The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.<br>f. Mpumalanga<br>i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;<br>ii. Within critical biodiversity areas identified in bioregional plans; | The proposed development area falls within an ecological support area, protected area buffer and within a National Protected Area Expansion Strategy (NPAES). The proposed Solar PV facility will require clearing of indigenous vegetation of approximately 195ha. Therefore, the threshold of clearance of 300m$^2$ or more of indigenous vegetation within an ESA, protected area buffer and NPAES will be triggered. |

## 2.1 REPORT STRUCTURE

This report has been compiled in accordance with the 2014 NEMA EIA Regulations, as amended. A summary of the report structure, and the specific sections that correspond to the applicable regulations, is provided in Table 2 below.

Table 2: Report Structure

| Environmental Regulation | Description – NEMA Regulation 982 (2014) as amended | Section in Report |
|---|---|---|
| **Appendix 3(a):** | Details of –<br>i. The Environmental Assessment Practitioner (EAP) who prepared the report; and<br>ii. The expertise of the EAP, including a curriculum vitae; | Section 2.2<br>Section 2.3 |
| **Appendix 3(b):** | The location of the activity. Including –<br>i. The 21-digit Surveyor General code of each cadastral land parcel;<br>ii. Where available, the physical address and farm name;<br>iii. Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties; | Section 3 |
| **Appendix 3(c):** | A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is –<br>i. A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or<br>ii. On a land where the property has not been defined, the coordinates within which the activity is to be undertaken; | Section 3 |
| **Appendix 3(d):** | A description of the scope of the proposed activity, including –<br>i. All listed and specified activities triggered;<br>ii. A description of the activities to be undertaken, including associated structures and infrastructure; | Section 4<br>Section 5 |
| **Appendix 3(e):** | A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context; | Section 5 |
| **Appendix 3(f):** | A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted Scoping report; | Section 6 |

| Environmental Regulation | Description – NEMA Regulation 982 (2014) as amended | Section in Report |
|---|---|---|
| **Appendix 3(g):** | A motivation for the preferred development footprint within the approved site as contemplated in the accepted Scoping report; | Section 7 |
| **Appendix 3(h):** | A full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted Scoping report, including: –<br>(i) details of the development footprint alternatives considered;<br>(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;<br>(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;<br>(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;<br>(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts-<br>• (aa) can be reversed;<br>• (bb) may cause irreplaceable loss of resources; and<br>• (cc) can be avoided, managed or mitigated;<br>(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;<br>(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;<br>(viii) the possible mitigation measures that could be applied and level of residual risk;<br>(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such; and<br>(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted Scoping report; | Section 7,<br>Section 8<br>Section 8.6<br>Section 10, |

| Environmental Regulation | Description – NEMA Regulation 982 (2014) as amended | Section in Report |
|---|---|---|
| **Appendix 3(i)** | A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted Scoping report through the life of the activity, including-<br>(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and<br>(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures; | Section 10.1<br>Section 10.2 |
| **Appendix 3(j)** | An assessment of each identified potentially significant impact and risk, including-<br>(i) cumulative impacts;<br>(ii) the nature, significance and consequences of the impact and risk;<br>(iii) the extent and duration of the impact and risk;<br>(iv) the probability of the impact and risk occurring;<br>(v) the degree to which the impact and risk can be reversed;<br>(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and<br>(vii) the degree to which the impact and risk can be mitigated; | Section 10.2 |
| **Appendix 3(k):** | Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report; | Section 12 |
| **Appendix 3(l):** | An environmental impact statement which contains-<br>(i) a summary of the key findings of the environmental impact assessment:<br>(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted Scoping report indicating any areas that should be avoided, including buffers; and<br>(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives | Section 12.2<br>Section 11 Section 7 |

| Environmental Regulation | Description – NEMA Regulation 982 (2014) as amended | Section in Report |
|---|---|---|
| **Appendix 3(m)** | Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation; | Section 12.2.1 |
| **Appendix 3(n)** | The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment; | Section 7 |
| **Appendix 3(o)** | Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation; | Section 12.2.1 |
| **Appendix 3(p)** | A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed; | Section 13 |
| **Appendix 3(q)** | A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation; | Section 12 |
| **Appendix 3(r)** | Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised; | N/A |
| **Appendix 3(s)** | An undertaking under oath or affirmation by the EAP in relation to-<br>(i) the correctness of the information provided in the reports;<br>(ii) the inclusion of comments and inputs from stakeholders and I&APs;<br>(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and<br>(iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties; | Section 0 |
| **Appendix 3(t)** | Where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts; | N/A |
| **Appendix 3(u)** | An indication of any deviation from the approved Scoping report, including the plan of study, including- | N/A |

| Environmental Regulation | Description – NEMA Regulation 982 (2014) as amended | Section in Report |
|---|---|---|
| | (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and<br>(ii) a motivation for the deviation; | |
| **Appendix 3(v)** | Any specific information that may be required by the competent authority; and | N/A |
| **Appendix 3(w)** | Any other matters required in terms of section 24(4)(a) and (b) of the Act. | N/A |

## 2.2 DETAILS OF THE EAP

EIMS has been appointed by Glencore (Pty) Ltd as the Independent EAP and to assist in preparing and submitting the EA application, Scoping and EIA Reports and undertaking a Public Participation Process (PPP) in support of the proposed PV Facility. The contact details of the EIMS consultant who compiled this EIA Report are as follows:

- Name of the consultant: Matshego Keikelame
- Tel No.: 011 789 7170
- Fax No.: 086 571 9047
- E-mail address: lydenburgpv@eims.co.za

## 2.3 EXPERTISE OF THE EAP

### 2.3.1 EAP QUALIFICATIONS

In terms of Regulation 13 of the EIA Regulations (GN R. 982) as amended, an independent EAP, must be appointed by the applicant to manage the application. EIMS has been appointed by the Applicant as the EAP to assist with compiling the necessary reports and undertaking the statutory consultation processes, in support of the proposed project. EIMS is compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations, as well as Section 1 of the NEMA. This includes, *inter alia*, the requirement that EIMS is:

- Objective and independent;
- Has expertise in conducting EIAs;
- Comply with the NEMA, the environmental regulations and all other applicable legislation;
- Considers all relevant factors relating to the application; and
- Provides full disclosure to the applicant and the relevant environmental authority.

The Curriculum Vitae (indicating the experience with environmental impact assessment and relevant application processes) of the consultant that is involved in the EIA process and the compilation of this EIA Report is presented in Appendix A.

### 2.3.2 SUMMARY OF THE EAP'S PAST EXPERIENCE

EIMS is a private and independent environmental management-consulting firm that was founded in 1993. EIMS has in excess of 28 years' experience in conducting EIAs, including many EIAs for mines and mining related projects. Please refer to the EIMS website (www.eims.co.za) for examples of EIA documentation currently available.

John von Mayer is a senior consultant at EIMS and has been involved in numerous significant projects the past 14 years. He has experience in Project Management, small to large scale Environmental Impact Assessments, Environmental Auditing, Water Use Licensing, and Public Participation with a particular focus on renewable energy and mining projects.

### 2.3.3 SPECIALIST CONSULTANTS

The following specialist studies were the identified specialist studied deemed essential by the EAP and DFFE:

- Soil and Agricultural Compliance Statement;
- Aquatic Biodiversity and Wetlands Impact Assessment;
- Heritage & Palaeontological Impact Assessment;
- Visual Impact Assessment;
- Social Impact Assessment ;

- Civil Aviation Compliance Statement;
- RFI Compliance Statement;
- Avifauna Impact Assessment; and
- Terrestrial Biodiversity (flora and fauna).

No additional specialist studies were identified through use of the Department of Environmental Affairs' Screening Tool. Impacts were assessed according to the EIMS pre-defined impact significance rating methodology (Section 10).

# 3 DESCRIPTION OF THE PROPERTY

Table 3 provides a description of the property details and size of the proposed PV facility footprint as well as the distance to the nearest towns. The proposed project will be located within the mine area. See Figure 1 for the locality of the proposed PV facility.

Table 3: Locality details

| | |
|---|---|
| **Property** | The proposed project is located on: Portion 143 of Farm 30 Potloodspruit; Portion 114 of Farm 31 Townlands of Lydenburg; Portion 457 of Farm 31 Townlands of Lydenburg; Portion 471 of Farm 31 Townlands of Lydenburg; Lydenburg Smelter Portion 1 of Erf 6099; Lydenburg Smelter Erf 2540; and Lydenburg Smelter Erf 2541. |
| **Property ownership** | All properties are owned by the applicant (Glencore Pty Ltd) |
| **21-digit Surveyor General Code** | T0JT00000000003100099, T0JT00000000003100080, T0JT00000000003100103, T0JT00000000003100114, T0JT00000000003100143, T0JT00000000003100457, and T0JT00000000003100471 |
| **Application Area (Ha)** | The directly affected properties comprise an area of 3 750 000$m^2$ (375ha) for Site. |
| **Magisterial District** | Thaba Chweu Local Municipality (Ward 12 and 13), Ehlanzeni District Municipality, Mpumalanga Province. |
| **Distance and direction from nearest towns** | The site is located approximately 2km north of Lydenburg town central area. The Southern Section Center Point is 25° 4'26.76"S; 30°28'0.83"E and the Northern Section Center Point 25° 3'20.54"S; 30°28'17.19"E.. |
| **Surrounding land uses** | The proposed development area is separated into portions by the Smelter, namely, the southern section and the northern section with the Smelter in the center (see Figure 1). The area surrounding the study area is largely open veld to the east and west, industries and residential areas to the south, homesteads, and small lodging areas to the north. See Figure 2 for a map of the landcover in and around the proposed development sites |

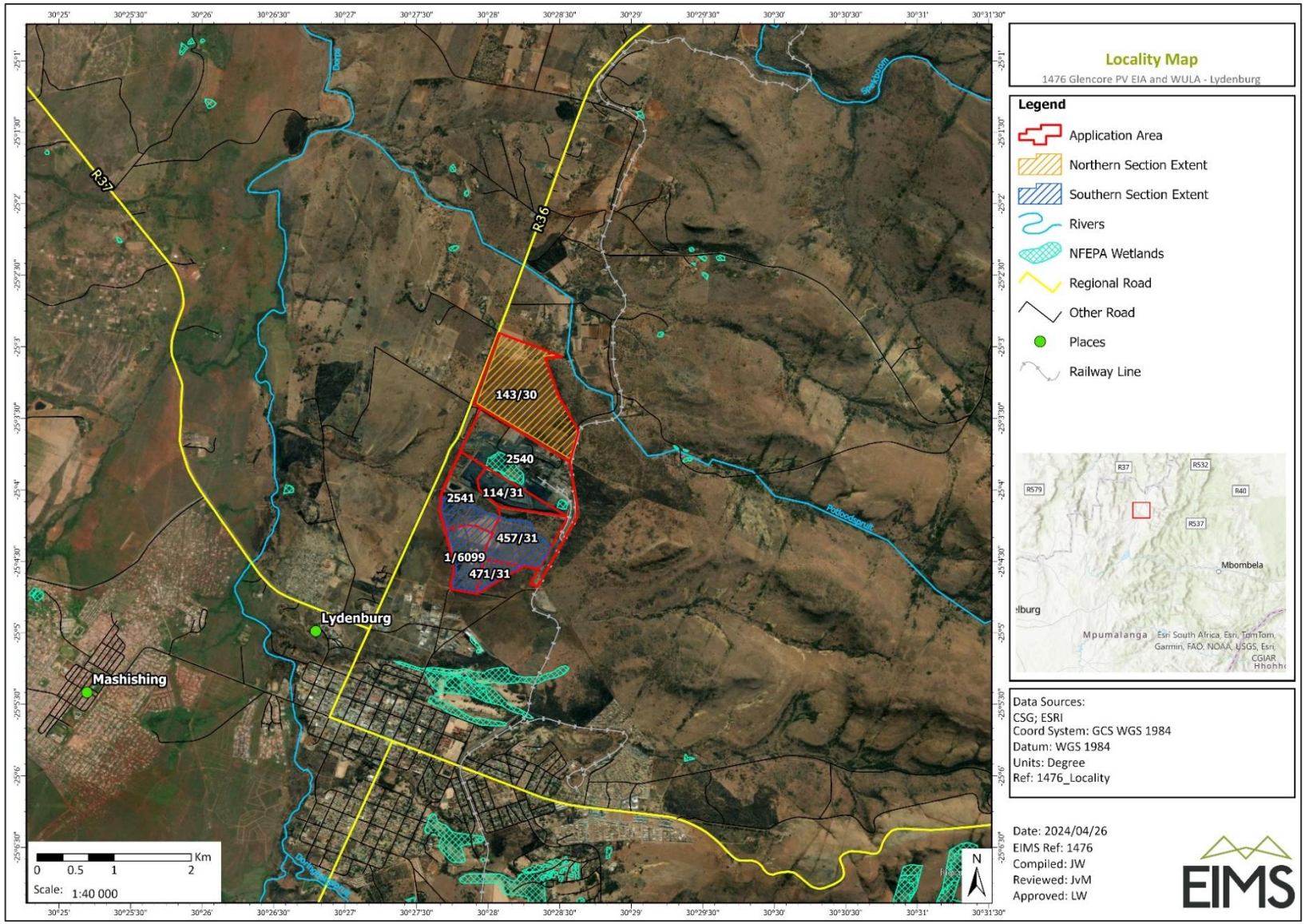


Figure 1: Aerial imagery indicating the proposed PV facility location

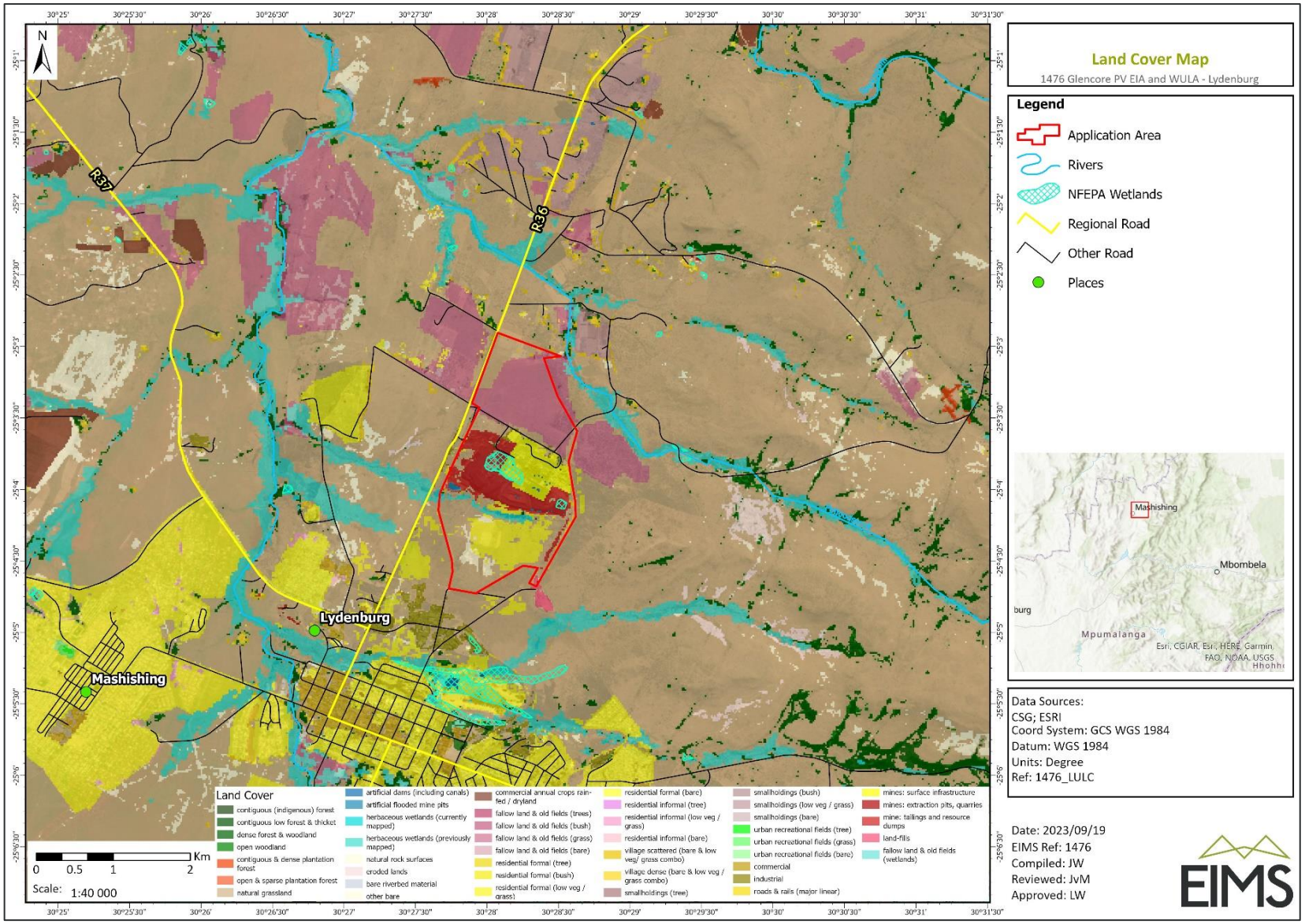


Figure 2: Land cover in and around the proposed PV sites (based on 2020 DFFE EGIS landcover data).

# 4 DESCRIPTION AND SCOPE OF THE PROPOSED PROJECT

The section below provides a detailed description for the proposed project. Most of the key information presented in this chapter was obtained from the applicant. The aim of the project description is to describe the proposed activities planned to take place at the PV facility project area. Furthermore, the project description is designed to facilitate the understanding of the proposed project related activities which are anticipated to lead to the preliminary impacts identified and assessed in this Scoping Report, and for which management measures have been designed. These impacts and mitigations have now been further refined in this EIA report.

## 4.1 PROJECT DESCRIPTION

The applicant proposes the development of a Solar Photovoltaic (PV) Energy Generation Facility at the Lydenburg Smelter. The generation capacity will have a maximum of 300MW. The electricity generated from the facility will be used at the Lydenburg smelter or will be wheeled to other Glencore operations. The proposed PV facility is located in Thaba Chweu Local Municipality (Ward 12 and 13), Ehlanzeni District Municipality, Mpumalanga Province. The proposed facility will include the following infrastructure indicated in Table 4 and indicated in Figure 3.

Table 4: Proposed infrastructure

<table>
<tr><th>Infrastructure</th><th>Length / footprint</th><th>Coordinates</th></tr>
<tr><td>Northern PV Panels</td><td>105ha</td><td>North Corner: 25° 2'54.64"S; 30°28'4.70"E<br>West Corner: 25° 3'23.60"S; 30°27'54.04"E<br>South Corner: 25° 3'47.84"S; 30°28'34.08"E<br>East Corner: 25° 3'2.98"S; 30°28'27.42"E<br>Central Point: 25°03'20.54"S; 30°28'17.19"E</td></tr>
<tr><td>Southern PV Panels</td><td>90ha</td><td>North Corner: 25° 4'5.30"S; 30°27'41.06"E<br>West Corner: 25° 4'41.30"S; 30°27'45.51"E<br>South Corner: 25° 4'42.63"S; 30°27'56.08"E<br>East Corner: 25° 4'13.60"S; 30°28'17.68"E<br>Central Point: 25° 4'26.76"S; 30°28'0.83"E</td></tr>
<tr><td>132kV Powerline</td><td>Single 2km long</td><td>Start point: 25° 3'35.48"S; 30°28'11.79"E<br>Med point: 25° 3'40.01"S; 30°27'51.05"E<br>Endpoint: 25° 4'4.20"S; 30°27'41.87"E</td></tr>
<tr><td>7m wide Access Roads</td><td>13.5km</td><td>There are 15 new internal Access Roads (AR) proposed in the Northern (NAR) and Southern (SAR) PV facility sites collectively.
<table>
<tr><th>Name</th><th>Start point</th><th>Med point</th><th>Endpoint</th></tr>
<tr><td colspan="4">Northern Section</td></tr>
<tr><td>NAR 1</td><td>25°03'8.00"S; 30°28'1.03"E</td><td>25°03'17.38"S; 30°28'1.03"E</td><td>25°03'27.18"S; 30°28'1.09"E</td></tr>
<tr><td>NAR 2</td><td>25°02'55.39"S; 30°28'6.81"E</td><td>25°03'14.88"S; 30°28'6.72"E</td><td>25°03'30.72"S; 30°28'6.77"E</td></tr>
<tr><td>NAR 3</td><td>25°02'57.96"S; 30°28'14.20"E</td><td>25°03'17.47"S; 30°28'14.23"E</td><td>25°03'33.29"S; 30°28'14.28"E</td></tr>
<tr><td>NAR 4</td><td>25°03'0.80"S; 30°28'21.68"E</td><td>25°03'19.50"S; 30°28'21.75"E</td><td>25°03'39.61"S; 30°28'21.72"E</td></tr>
<tr><td>NAR 5</td><td>25°03'14.90"S; 30°28'27.31"E</td><td>25°03'28.90"S; 30°28'27.34"E</td><td>25°03'42.88"S; 30°28'27.27"E</td></tr>
<tr><td>NAR 6</td><td>25°03'27.19"S; 30°28'32.96"E</td><td>25°03'37.17"S; 30°28'32.79"E</td><td>25°03'46.35"S; 30°28'32.88"E</td></tr>
<tr><td>NAR 7</td><td>25°03'8.12"S; 30°28'1.00"E</td><td>25°03'8.12"S; 30°28'13.84"E</td><td>25°03'7.99"S; 30°28'24.91"E</td></tr>
<tr><td>NAR 8</td><td>25°03'27.13"S; 30°28'1.03"E</td><td>25°03'27.36"S; 30°28'18.66"E</td><td>25°03'27.19"S; 30°28'32.96"E</td></tr>
<tr><td colspan="4">Southern Section</td></tr>
<tr><td>SAR 1</td><td>25°04'4.41"S; 30°27'49.93"E</td><td>25°04'24.29"S; 30°27'49.86"E</td><td>25°04'41.81"S; 30°27'49.92"E</td></tr>
</table></td></tr>
</table>

| Infrastructure | Length / footprint | Coordinates | | | |
|---|---|---|---|---|---|
| | | SAR 2 | 25°04'8.84"S; 30°27'57.44"E | 25°04'24.85"S; 30°27'57.39"E | 25°04'41.91"S; 30°27'57.40"E |
| | | SAR 3 | 25°04'11.32"S; 30°28'4.99"E | 25°04'23.40"S; 30°28'5.03"E | 25°04'37.26"S; 30°28'4.89"E |
| | | SAR 4 | 25°04'12.86"S; 30°28'10.53"E | 25°04'23.32"S; 30°28'10.56"E | 25°04'34.25"S; 30°28'10.49"E |
| | | SAR 5 | 25°04'14.18"S; 30°28'18.05"E | 25°04'23.38"S; 30°28'17.99"E | 25°04'31.68"S; 30°28'18.05"E |
| | | SAR 6 | 25°04'19.45"S; 30°27'43.79"E | 25°04'19.54"S; 30°28'2.49"E | 25°04'19.46"S; 30°28'20.89"E |
| | | SAR 7 | 25°04'31.90"S; 30°27'46.30"E | 25°04'31.85"S; 30°28'1.00"E | 25°04'31.98"S; 30°28'13.94"E |
| **Northern on-site battery energy storage facility including switching station** | 0.7ha | North Corner: 25°03'32.02"S; 30°28'11.78"E<br>West Corner: 25°03'32.91"S; 30°28'11.12"E<br>South Corner: 25°03'36.53"S; 30°28'17.02"E<br>East Corner: 25°03'35.66"S; 30°28'17.73"E | | | |
| **Southern on-site battery energy storage facility including switching station** | 0.72ha | North Corner: 25°04'4.10"S; 30°27'41.07"E<br>West Corner: 25°04'5.19"S; 30°27'41.09"E<br>South Corner: 25°04'5.16"S; 30°27'48.25"E<br>East Corner: 25°04'4.08"S; 30°27'48.24"E | | | |
| **Laydown Area** | 2.3ha | North Corner: 25° 3'37.96"S; 30°28'15.79"E<br>West Corner: 25° 3'40.23"S; 30°28'14.01"E<br>South Corner: 25° 3'44.81"S; 30°28'21.76"E<br>East Corner: 25° 3'42.57"S; 30°28'23.60"E | | | |
| **Expansion of Northern Eskom Yard** | 1.15ha | North Corner: 25° 3'33.52"S; 30°28'11.82"E<br>West Corner: 25° 3'35.43"S; 30°28'10.27"E<br>South Corner: 25° 3'38.23"S; 30°28'14.70"E<br>East Corner: 25° 3'36.20"S; 30°28'16.28"E | | | |
| **Expansion of Southern Eskom Yard** | 0.6ha | North Corner: 25° 3'38.45"S; 30°28'8.30"E<br>West Corner: 25° 3'39.73"S; 30°28'7.37"E<br>South Corner: 25° 3'42.13"S; 30°28'11.50"E<br>East Corner: 25° 3'40.91"S; 30°28'12.45"E | | | |

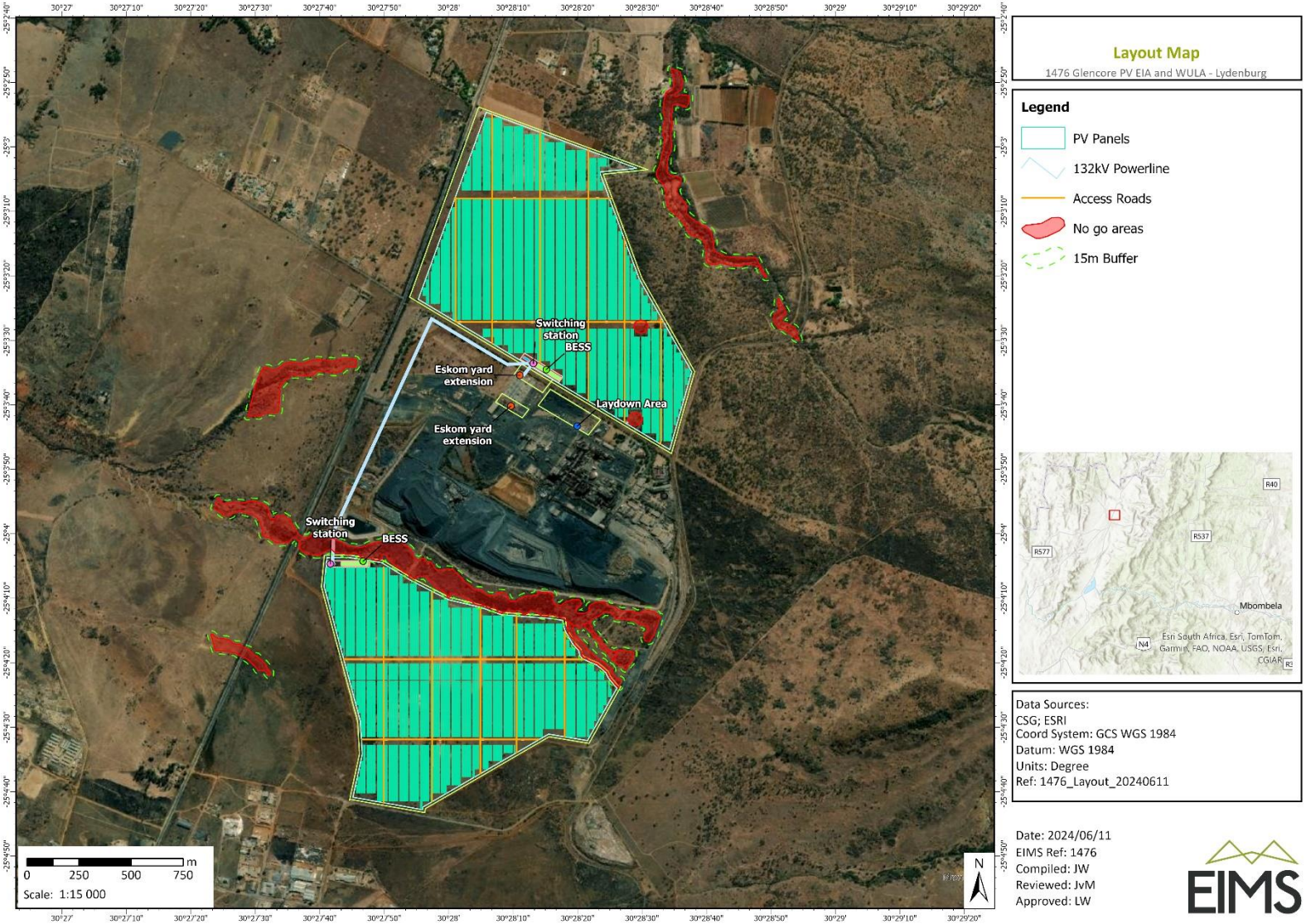


Figure 3: Layout Map of the proposed PV facility

A PV plant is designed to produce bulk electrical power from solar radiation. The solar power plant uses solar energy to produce electrical power. Therefore, it is a conventional power plant. Solar energy can be used directly to produce electrical energy using solar PV panels or alternatively using concentrated solar energy. When using concentrated solar energy, the radiation energy of solar is first converted into heat (thermal energy) and this heat is used to drive a conventional generator. This method is difficult and not efficient to produce electrical power on a large scale. Hence, to produce electrical power on a large scale, solar PV panels are used, similar to the design of the proposed PV Facility. The major components of the solar photovoltaic system are listed and discussed Table 5

Table 5: Major components of the solar photovoltaic system

| Component | Description |
|---|---|
| **Photovoltaic (PV) panel** | A PV system consists of PV panels (**Figure 4**) that encase the solar cells. PV panels or Photovoltaic panel is a most important component of a solar power plant. It is made up of small solar cells. This is a device that is used to convert solar photon energy into electrical energy. Generally, silicon is used as a semiconductor material in solar cells. The typical rating of silicon solar cells is 0.5 V and 6 Amp and it is equivalent to 3 W power. The number of cells is connected in series or parallel and makes a solar module. |
| **Inverter** | The output of the solar panel is in the form of Direct Current (DC). The most of load connected to the power system network is in the form of Alternating Current (AC). Therefore, an inverter is used to convert DC output power into AC power in solar power plants |
| **Energy storage devices** | Various types of energy storage devices are available i.e. Mechanical, electromagnetic, electrochemical and thermal. These systems are used to store energy generated by the solar power plants to be used at a later stage. The storage components need to meet the demand and variation of the load. This component is used especially when the sunshine is not available. These devices are managed with an energy management system to enable maximum effective utilisation of the available energy. |
| **System balancing component** | It is a set of components used to control, protect and distribute power in the system. These devices ensure that the system working in proper condition and utilize energy in the proper direction. And it ensures maximum output and security of other components of a solar power plant. |

Figure 4: Representative example of a stationary photovoltaic array (MIT, 2020)

## 4.2 PHOTO VOLTAIC PRINCIPLE

Solar cells (Figure 4) are solid-state semiconductor devices that convert light into direct-current electricity. The top layer of the panels is made from a mixture of silicon and phosphorous mixture, which gives it a negative charge. The inner layer, which constitutes the majority of the panel, is a mix of silicon and boron, giving it a positive charge. Where these negative and positively charged layers meet, an electric field (called a junction) is created. A top protective and anti-reflective layer of glass is applied to the surface of the PV panels, to protect the sensitive PV layers below and to prevent photons from reflecting off the panel resulting in lost energy. As the sun's light (photons) hits the solar cell, they are absorbed into the junction, which "pushes" electrons in the silicon out of the way. When sufficient photons are absorbed, the electrons are pushed past the junction and flow freely to an external circuit (see Figure 5).

The panels will be mounted on metal frames with a height of approximately 3-5 m above the ground, supported by rammed, concrete or foundations. The facility will either be a fixed PV facility where the solar panels are stationary; or a tracking PV facility where the solar panels rotate to track the sun's movement.

In photovoltaic technology the power conversion source is via photovoltaic modules that convert light directly to electricity. This differs from the other large-scale solar generation technology, concentrated solar power, which uses heat to drive a variety of conventional generator systems. Solar panels produce DC electricity, so solar parks need conversion equipment to convert this to AC, which is the form transmitted by the electricity grid. This conversion is done by inverters. To maximise their efficiency, solar power plants also incorporate maximum power point trackers, either within the inverters or as separate units. These devices keep each solar array string close to its peak power point (refer to Figure 5).

A fundamental characteristic of a photovoltaic system is that power is produced only while sunlight is available. For systems in which the photovoltaics is the sole generation source, storage is typically needed since an exact match between available sunlight and the load is limited to a few types of systems. By far the most common type of storage is chemical storage, in the form of a battery. Batteries store and produce energy as needed. In PV systems, they capture surplus energy generated by PV systems to allow the storage of energy for use later in the day. The proposed PV facility may also include an energy storage component.

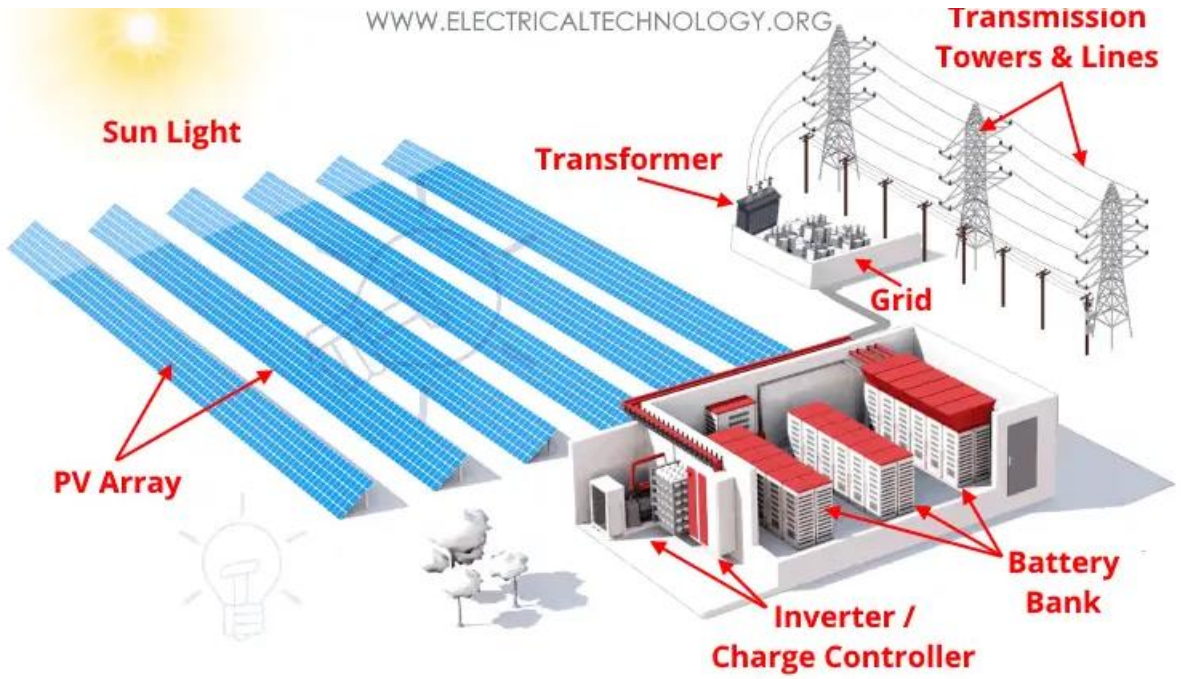


Figure 5: Example of Proposed PV Facility process (Electrical Technology, 2021).

# 5 POLICY AND LEGISLATIVE CONTEXT

This section provides an overview of the governing legislation identified which may relate to the proposed project. A summary of the applicable legislation is provided in Table 6 below. The primary legal requirement for this project stems from the need for an EA to be granted by the competent authority, in accordance with the requirements of the NEMA. In addition, there are numerous other pieces of legislation governed by many acts, regulations, standards, guidelines and treaties on an international, national, provincial and local level, which should be considered in order to assess the potential applicability of these for the proposed project. More detail on the legislative framework is presented below.

Table 6: Applicable legislation and guidelines overview

| Applicable Legislation, Policies and Guidelines | Description of Legislation, Policy or Guideline | Relevance to the Proposed Project |
|---|---|---|
| **Constitution of the Republic of South Africa (Act 108 of 1996)** | The constitution of any country is the supreme law of that country. The Bill of Rights in chapter 2 section 24 of the Constitution of South Africa Act (Act 108 of 1996) makes provisions for environmental issues and declares that:<br>"Everyone has the right -<br>a) to an environment that is not harmful to their health or well-being; and<br>b) to have the environment protected, for the benefit of present and future<br>c) generations, through reasonable legislative and other measures that:<br>i. prevent pollution and ecological degradation;<br>ii. promote conservation; and<br>iii. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development". | This EIA is conducted to fulfil the requirement of the Bill of Rights. |
| **National Environmental Management Act (Act 107 of 1998 – NEMA); and the EIA Regulations (2014, as amended)** | The NEMA (1998) requires that a project of this nature must undergo a Scoping and Environmental Impact Assessment (EIA); an Environmental Management Programme (EMPr) must also be compiled. Regulations applicable to this project include the following: | Various NEMA listed activities are triggered that require a full Scoping and EIA process. |

| Applicable Legislation, Policies and Guidelines | Description of Legislation, Policy or Guideline | Relevance to the Proposed Project |
|---|---|---|
| | • EIA Regulations GN R. 982 (2014, as amended) in terms of the NEMA;<br>• EIA Regulations GN R. 983 (2014, as amended) in terms of the NEMA;<br>• EIA Regulations GN R. 984 (2014, as amended) in terms of the NEMA; and | |
| **National Water Act (Act 36 of 1998 )** | The NWA recognises that water is a scarce and unevenly distributed national resource which must be managed encompassing all aspects of water resources. | If any water use authorisation is required an application will be lodged with the Department Water and Sanitation (DWS). The proposed development requires a Water Use Authorisation, likely through a General Authorisation. The applicability and process to be followed will be confirmed with the competent authority for water resources (The Department of Water and Sanitation abbreviated as DWS) |
| **Mineral and Petroleum Resources Development Act (Act 28 of 2002)** | Section 53(1) provides that: S*ubject to subsection (2), any person who intends to use the surface of any land in any way which may be contrary to any object of [the MPRD Act] or which is likely to impede any such object must apply to the for approval in the prescribed manner.* | Section 53 approval may be required for sterilization of mineral resources in the areas proposed for the PV facility. |
| **Specific Environmental Management Acts (SEMAs)** | The SEMAs refer to specific portions of the environment where additional legislation over and above the NEMA (1998) as amended, is applicable. | Specialist studies, baseline description for the environmental Scoping and Impact Assessment process, as well as the EMPr will take into account any applicable SEMAs. |
| **National Heritage Resources Act (Act 25 of 1999 )** | The NHRA aims to promote good management of cultural heritage resources and encourages the nurturing and conservation of cultural legacy so | A heritage impact assessment completed in 2013 found no heritage resources at the site proposed for the solar facility. |

| Applicable Legislation, Policies and Guidelines | Description of Legislation, Policy or Guideline | Relevance to the Proposed Project |
|---|---|---|
| | that it may be bestowed to future generations. | |
| **Environment Conservation Act (No. 73 of 1989) (ECA)** | The Noise Control Regulations in terms of Section 25 of the ECA contain regulations applicable for the control of noise in the Provinces of Limpopo, North West, Mpumalanga, Northern Cape, Eastern Cape, and KwaZulu-Natal.<br>The National Dust Control Regulations prescribe monitoring procedures and reporting requirements. Dust will be generated during construction and will be managed in accordance with these Regulations. | Noise impacts are expected to be associated with the construction and decommissioning phases of the project. Considering the location of the development area in relation to residential areas and provided that appropriate mitigation measures are implemented, construction noise is unlikely to present a significant intrusion to the local community. There is therefore no requirement for a noise permit in terms of the legislation. |
| **The Electricity Regulation Act (2006)** | Establishes a national regulatory framework for the electricity supply industries. | The Act also provides for licenses and registration with respect to electricity generation and transmission. |
| **National Forests Act (No. 84 of 1998) (NFA)** | According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the National Forests Act (No. 84 of 1998) was published in GNR 734. | A licence is required for the removal of protected trees. It is therefore necessary to conduct a survey that will determine the number and relevant details pertaining to protected tree species present in the development footprint for the submission of relevant permit applications to the authorities prior to the disturbance of any protected tree species. |
| **National Veld and Forest Fires Act (Act 101 of 1998)** | Chapter 4 of the NVFFA places a duty on owners to prepare and maintain firebreaks. Chapter 5 of the Act places a duty on all owners to acquire equipment and have available personnel to fight fires. | This Act will be applicable during the construction and operation of the facility, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and trained personnel for firefighting purposes. |

| Applicable Legislation, Policies and Guidelines | Description of Legislation, Policy or Guideline | Relevance to the Proposed Project |
|---|---|---|
| **Mineral and Petroleum Resources Development Act (Act 28 of 2002)** | Section 53 of the MPRDA provides a mechanism for ensuring that, inter alia, the mining of mineral resources is not detrimentally affected through the use of the surface of land and which may, for example, result in the sterilisation of a mineral resource. | A S53 application may be required if the project results in sterilization of a mineral resource. |
| **The National Development Plan 2030 (2012)** | The National Development Plan (NDP) 2030 is a plan prepared by the National Planning Commission in consultation with the South African public which is aimed at eliminating poverty and reducing inequality by 2030. | The NDP aims to provide a supportive environment for growth and development, while promoting a more labour-absorbing economy. The development of the PV facility supports the NDP through the development of energy-generating infrastructure which will not lead to the generation of GHGs and will result in economic development and growth of the area surrounding the development area |
| **The Spatial Planning and Land Use Management Act (SPLUMA)** | The Spatial Planning and Land Use Management (Act 16 of 2013 – SPLUMA) is set to aid effective and efficient planning and land use management, as well as to promote optimal exploitation of minerals and mineral resources. The SPLUMA was developed to legislate for a single, integrated planning system for the entire country. | If any rezoning application is required this will be handled through a separate rezoning application which does not form part of this EIA process. |
| **White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)** | The White Paper on Renewable Energy Policy supplements Government's predominant policy on energy as set out in the White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The policy recognises the potential of RE and aims to create the | The country relies heavily on coal to meet its energy needs due to its abundant, and fairly accessible and affordable coal resources. Renewable energy resources can be sustainable alternatives to fossil fuels. |

| Applicable Legislation, Policies and Guidelines | Description of Legislation, Policy or Guideline | Relevance to the Proposed Project |
|---|---|---|
| | necessary conditions for the development and commercial implementation of renewable energy technologies. | |
| **Integrated Environmental Management Information Guidelines Series:** | This series of guidelines was published by the DEA and refers to various environmental aspects. Applicable guidelines in the series for the proposed project include:<br>• Guideline 5: Companion to NEMA EIA Regulations, 2010;<br>• Guideline 7: Public participation; and<br>• Guideline 9: Need and desirability.<br>Additional guidelines published in terms of the NEMA EIA Regulations, 2014 (as amended), in particular:<br>• Guideline 3: General Guide to EIA Regulations, 2006;<br>• Guideline 4: Public Participation in support of the EIA Regulations, 2006; and<br>• Guideline 5: Assessment of alternatives and impacts in support of the EIA Regulations, 2006. | The guidelines will be used throughout the environmental Scoping and Impact Assessment process. |
| **Best Practise Guidelines (BPGs)** | The BPG series refers to publications by the then Department of Water Affairs and Forestry (DWAF), now the DWS, providing best practice principles and guidelines relevant to certain aspects of water management. | Best practice guidelines relevant to the proposed facility include the following:<br>• BPG H2: Pollution Prevention and Minimisation of Impacts;<br>• BPG G1: Storm Water Management;<br>• BPG G4: Impact Prediction. |

| Applicable Legislation, Policies and Guidelines | Description of Legislation, Policy or Guideline | Relevance to the Proposed Project |
|---|---|---|
| **Best Practice Guidelines Birds & Solar Energy (2017)** | The guidelines recognise the impact that solar energy may have on birds, through for example the alteration of habitat, the displacement of populations from preferred habitat, and collision and burn mortality associated with elements of solar hardware and ancillary infrastructure; and the fact that the nature and implications of these effects are poorly understood. | The guidelines will be used throughout the environmental Scoping and Impact Assessment process. |

## 5.1 APPLICABLE NATIONAL LEGISLATION

The legal framework within which the proposed PV facility operates is governed by many Acts, Regulations, Standards and Guidelines on an international, national, provincial and local level. Legislation applicable to the project includes (but is not limited to) those discussed below.

### 5.1.1 CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA, 1996

The constitution of any country is the supreme law of that country. The Bill of Rights in chapter 2 section 24 of the Constitution of South Africa Act (Act No. 108 of 1996) makes provisions for environmental issues and declares that: *"Everyone has the right -*

*a) to an environment that is not harmful to their health or well-being; and*

*b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:*

*i. prevent pollution and ecological degradation;*

*ii. promote conservation; and*

*iii. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".*

The State must therefore respect, protect, promote and fulfil the social, economic and environmental rights of everyone and strive to meet the basic needs of previously disadvantaged communities. The Constitution therefore recognises that the environment is a functional area of concurrent national and provincial legislative competence, and all spheres of government and all organs of state must cooperate with, consult and support one another if the State is to fulfil its constitutional mandate. The application for Environmental Authorisation for the proposed PV facility will ensure that the environmental right enshrined in the Constitution contributes to the protection of the biophysical and social environment.

### 5.1.2 THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA)

The main aim of the National Environmental Management Act, 1998 (Act 107 of 1998 – NEMA) is to provide for co-operative governance by establishing decision-making principles on matters affecting the environment. In terms of the NEMA EIA Regulations, the applicant is required to appoint an EAP to undertake the EIA process, as well as conduct the public participation process towards an application for EA. In South Africa, EIAs became a legal requirement in 1997 with the promulgation of regulations under the Environment Conservation Act (ECA). Subsequently, NEMA was passed in 1998. Section 24(2) of NEMA empowers the Minister and any MEC, with the concurrence of the Minister, to identify activities which must be considered, investigated, assessed and reported

on to the competent authority responsible for granting the relevant EA. On 21 April 2006, the Minister of Environmental Affairs and Tourism (now DFFE) promulgated regulations in terms of Chapter 5 of the NEMA. These regulations, in terms of the NEMA, were amended in June 2010 and again in December 2014 as well as April 2017 and June 2021. The 2014 NEMA EIA Regulations (as amended) are applicable to this project.

The objective of the EIA Regulations is to establish the procedures that must be followed in the consideration, investigation, assessment and reporting of the listed activities that have been identified to be triggered by the proposed development. The purpose of these procedures is to provide the competent authority with adequate information to make decisions which ensure that activities which may impact negatively on the environment to an unacceptable degree are not authorised, and that activities which are authorised are undertaken in such a manner that the environmental impacts are managed to acceptable levels.

In accordance with the provisions of Sections 24(5) and Section 44 of the NEMA the Minister has published Regulations (GN R. 982) pertaining to the required process for conducting EIAs in order to apply for, and be considered for, the issuing of an EA. These EIA Regulations provide a detailed description of the EIA process to be followed when applying for EA for any listed activity. The Regulations differentiate between a simpler Basic Assessment (BA) Process (required for activities listed in GN R. 983 and GN R. 985) and a more complete EIA process (activities listed in GN R. 984). In the case of the proposed PV facility, there are activities triggered under GN R. 984 and as such a full EIA process is necessary. Table 7 presents all the anticipated listed activities under the NEMA 2014 EIA Regulations (as amended) that are applicable to this project.

Table 7: Listed activities in terms of the NEMA EIA Regulations (2014) as amended

| Notice | Activity Number and Activity Description | Description |
|---|---|---|
| Listing Notice 1 (GN327): Activity 11 | The development of facilities or infrastructure for the transmission and distribution of electricity—<br>(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts. | The study area is located outside urban areas or industrial complexes and entails the development of single 2km long 132kV Power line, 2 x 0.75ha on-site battery energy storage facility, 2 x on-site switching stations and approximately 0.6ha expansion of Eskom Yard for an additional feeder bay associated with the PV facility. |
| Listing Notice 2 (GN327): Activity 1 | The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs-<br>(a) within an urban area; or<br>(b) on existing infrastructure | The proposed project involves the development of a new PV facility with a maximum capacity of 300MW to provide power for the mining operations. |
| Listing Notice 2 (GN327): Activity 15 | The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-<br>(i) the undertaking of a linear activity; or<br>(ii) maintenance purposes undertaken in accordance with a maintenance management plan | The proposed Solar PV facility will require clearing of indigenous vegetation. The proposed study area is 375ha and approximately 195ha of indigenous vegetation will be cleared for the development of the proposed PV facility. |

| Notice | Activity Number and Activity Description | Description |
|---|---|---|
| Listing Notice 3 (GN985): **Activity** 4 | The development of a road wider than 4 meters with a reserve less than 13.5 meters.<br>f. Mpumalanga<br>i. Outside urban areas:<br>(aa) A protected area identified in terms of NEMPAA, excluding disturbed areas;<br>(bb) National Protected Area Expansion Strategy Focus areas;<br>(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;<br>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;<br>(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas, where such areas comprise indigenous vegetation | The proposed development is located within an ecological support area protected area buffer, a National Protected Area Expansion Strategy (NPAES) and within 5km from the Lydenburg Nature Reserve. There are 15 new proposed internal service and/or maintenance roads. The access roads have a total length of approximately 13.5km and are 7m wide |
| Listing Notice 3 (GN985): Activity 12 | The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.<br>f. Mpumalanga<br>i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;<br>ii. Within critical biodiversity areas identified in bioregional plans;. | The proposed development area falls within an ecological support area, protected area buffer and within a National Protected Area Expansion Strategy (NPAES). The proposed Solar PV facility will require clearing of indigenous vegetation of approximately 195ha. Therefore, the threshold of clearance of 300m$^2$ or more of indigenous vegetation within an ESA, protected area buffer and NPAES will be triggered. |

An environmental Scoping and Impact Assessment process is reserved for activities which have the potential to result in significant impacts which are complex to assess. Scoping and Impact Assessment studies accordingly provide a mechanism for the comprehensive assessment of activities that are likely to have more significant

environmental impacts. Figure 6 below provides a graphic representation of all the components of a full EIA process.

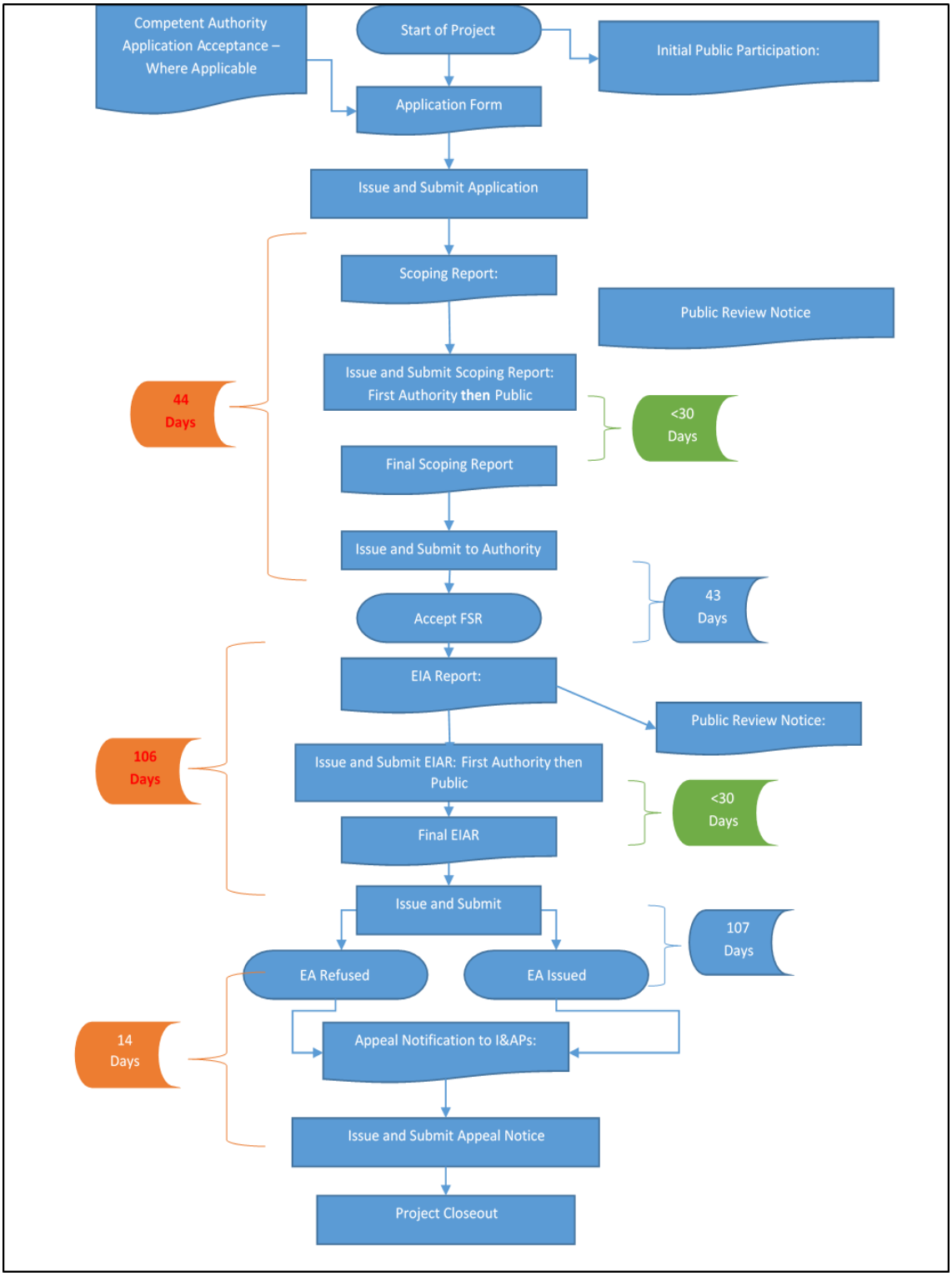


Figure 6: EIA process diagram

### 5.1.3 NEMA Environmental Impact Assessment Regulations, 2014 as Amended

In terms of section 24(2) of NEMA, the Minister and or any MEC in concurrence with the Minister may identify activities that require authorisation as these activities may negatively affect the environment. The Act requires that in such cases the impacts must be considered, investigated and assessed before their implementation, and reported to the organ of state charged by law with authorising, permitting, or otherwise allowing the implementation of an activity. The NEMA EIA Regulations guide the processes required for the assessment of impacts of Listed Activities.

The requirement for the undertaking of Environmental Impact Assessments and Basic Assessments began in 1997 with the promulgation of the EIA Regulations under the Environment Conservation Act, 1989 (ECA) (Act No. 73 of 1989). These were followed by the 2006, 2010 and 2014 regulations. Table 8 is a summary of the progression of the EIA regulations to date.

Table 8: Summary of the South African EIA regulations from inception to date

| EIA Regulations | Government Gazette |
|---|---|
| EIA Regulations promulgated in terms of the ECA, Act No 73 of 1989 | GNR 1182 & 1183: Government Gazette No 18261, 5 September 1997 |
| Amendment of the ECA EIA Regulations | GNR 670 and GNR 672 of 10 May 2002, Government Gazette No 23401 |
| 2006 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998 | GNR 385, 386 and 387 Government Gazette No 28753, Pretoria, 21 April 2006 |
| 2010 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998 | GNR 543, 544, 545 and 546 Government Gazette No 33306, Pretoria, 18 June 2010 |
| 2014 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998 | GNR 982, 983, 984 and 985 Government Gazette No 38282, Pretoria, 04 December 2014 |
| Current<br>Amendment of the 2014 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998 | GNR 982, 983, 984 and 985 Government Gazette No 44701, Pretoria, 2021 as amended |

The scoping and EIA process for the proposed PV Facility is undertaken in terms of the NEMA EIA Regulations, 2014, as amended.

### 5.1.4 THE NATIONAL WATER ACT (NWA)

The National Water Act, 1998 (Act 36 of 1998 – NWA) makes provision for two types of applications for water use licences, namely individual applications and compulsory applications. The NWA also provides that the responsible authority may require an assessment by the applicant of the likely effect of the proposed licence on the resource quality, and that such assessment be subject to the NEMA EIA Regulations. A person may use water if the use is:

- Permissible as a continuation of an existing lawful water use (ELWU);
- Permissible in terms of a general authorisation (GA);
- Permissible under Schedule 1; or
- Authorised by a licence.

These water use processes are described in Figure 7 below.

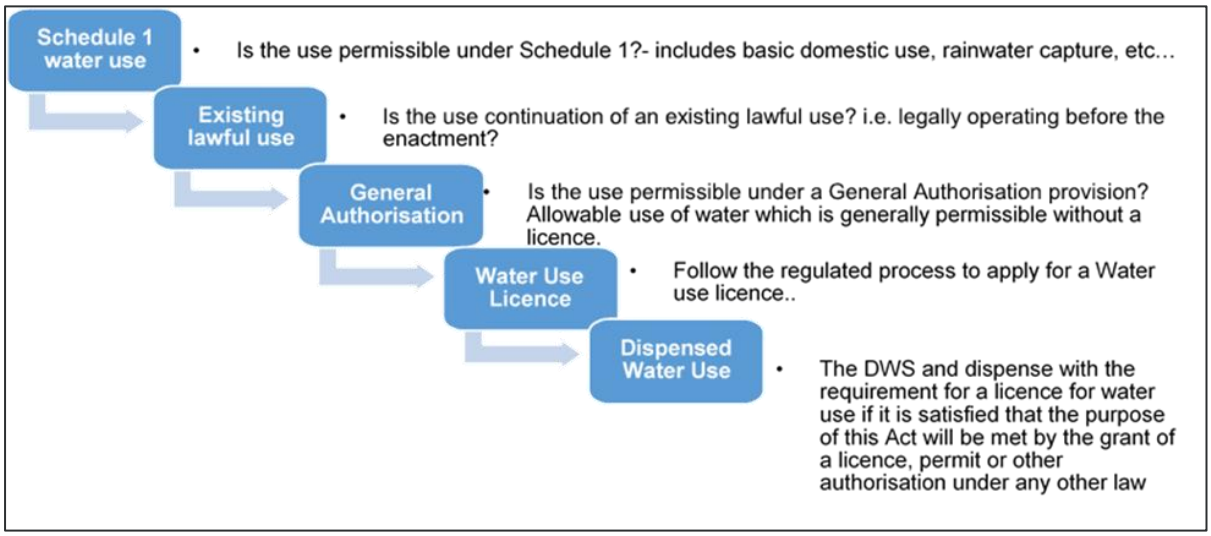


Figure 7: Authorisation processes for new water uses

The NWA defines 11 water uses. A water use may only be undertaken if authorised by the DWS. Water users are required to register certain water uses that took place on the date of registration, irrespective of whether the use was lawful or not. The water uses for which an authorisation or licence can be issued include:

a) Taking water from a water resource;

b) Storing water;

c) Impeding or diverting the flow of water in a watercourse;

d) Engaging in a stream flow reduction activity contemplated in section 36;

e) Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);

f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduits;

g) Disposing of waste in a manner which may detrimentally impact on a water resource;

h) Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;

i) Altering the bed, banks, course or characteristics of a watercourse;

j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and

k) Using water for recreational purposes.

Based on site preliminary assessment, the proposed development will trigger NWA Section 21(c) and (i) activities. Therefore, the proposed development requires a Water Use Authorisation, likely through a General Authorisation. The process to be followed will be undertaken during this EIA Phase.

### 5.1.5 THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT (NEMWA)

The applicable waste act is no. 59 of 2008: National Environmental Management: Waste Act, 2008 (NEM:WA). On 2 June 2014, the National Environmental Management: Waste Amendment Act came into force.

Section 16 of the NEMWA must be considered which states as follows:

1. A holder of waste must, within the holder's power, take all reasonable measures to-

    *a)* "*Avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated;*

    *b) Reduce, re-use, recycle and recover waste;*

    *c) Where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;*

    *d) Manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour, or visual impacts;*

    *e) Prevent any employee or any person under his or her supervision from contravening the Act; and*

    f) *Prevent the waste from being used for unauthorised purposes.*"

Waste can be defined as either hazardous or general in accordance with Schedule 3 of the NEMWA (2014) as amended. "Schedule 3: Defined Wastes" has been broken down into two categories – Category A being hazardous waste; and Category B being general waste. Furthermore, the NEMWA provides for specific waste management measures to be implemented, as well as providing for the licensing and control of waste management activities. For this project based on the current proposed infrastructure, no Waste Management License is expected to be required. General waste handling, storage and disposal will be required during construction and operation. The National Norms and Standards for the Storage of Waste (GNR 926) published under Section 7(1)(c) of NEM:WA will need to be considered in this regard. The general principles of responsible waste management listed above will be incorporated into the requirements in the EMPr to be implemented for this project.

### 5.1.6 NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT (NEMBA)

The National Environmental Management Biodiversity Act (Act No. 10 of 2004 – NEMBA) provides for the management and conservation of South Africa's biodiversity within the framework of the NEMA as well as the protection of species and ecosystems that warrant national protection. Within the framework of this act, various regulations are promulgated which provide specific requirements and management measures relating to protecting threatened ecosystems, threatened or protected species as well as the control of alien and invasive species. A summary of these regulations is presented below.

#### *5.1.6.1* NATIONAL LIST OF ECOSYSTEMS THAT ARE THREATENED AND NEED OF PROTECTION (GN 1002 OF 2011)

The NEMBA provides for listing of threatened or protected ecosystems in one of the following categories:

- Critically Endangered (CR) ecosystems, being ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation;

- Endangered (EN) ecosystems, being ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems;
- Vulnerable (VU) ecosystems, being ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems; and
- Protected ecosystems, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed as critically endangered, endangered or vulnerable.

The Biodiversity Specialist hasassessed for threatened or protected ecosystems within the study area and provided recommendations on how the development should or should not proceed based on the findings of the assessment.. Permits for protected species under the NEMBA may also be required.

#### *5.1.6.2* THREATENED OR PROTECTED SPECIES REGULATIONS (GN R 152 OF 2007)

The purpose of these regulations is to -

(a) further regulate the permit system set out in Chapter 7 of the Biodiversity Act insofar as that system applies to restricted activities involving specimens of listed threatened or protected species;

(b) provide for the registration of captive breeding operations, commercial exhibition facilities, game farms, nurseries, scientific institutions, sanctuaries and rehabilitation facilities and wildlife traders;

(c) provide for the regulation of the carrying out of a specific restricted activity, namely hunting;

(d) provide for the prohibition of specific restricted activities involving specific listed threatened or protected species;

(e) provide for the protection of wild populations of listed threatened species; and

(f) provide for the composition and operating procedure of the Scientific Authority.

#### *5.1.6.3* ALIEN AND INVASIVE SPECIES LIST

This Act is applicable since it protects the quality and quantity of arable land in South Africa. Loss of arable land should be avoided and declared Weeds and Invaders in South Africa are categorised according to one of the following categories, and require control or removal:

- Category 1a Listed Invasive Species: Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be combated or eradicated;
- Category 1b Listed Invasive Species: Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled;
- Category 2 Listed Invasive Species: Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be; and
- Category 3 Listed Invasive Species: Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice.

The provisions of this Act will be considered and where relevant incorporated into the proposed mitigation measures and requirements of the EMPr.

### 5.1.7 THE NATIONAL ENVIRONMENTAL MANAGEMENT AIR QUALITY ACT (NEMAQA)

The National Environmental Management: Air Quality Act (Act No. 39 of 2004 as amended – NEMAQA) is the main legislative tool for the management of air pollution and related activities. The Object of the Act is:

- To protect the environment by providing reasonable measures for –
    i. the protection and enhancement of the quality of air in the republic;
    ii. the prevention of air pollution and ecological degradation; and
    iii. securing ecologically sustainable development while promoting justifiable economic and social development; and
    iv. Generally, to give effect to Section 24(b) of the constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and well-being of people.

The NEMAQA mandates the Minister of Environment to publish a list of activities which result in atmospheric emissions and consequently cause significant detrimental effects on the environment, human health and social welfare. All scheduled processes as previously stipulated under the Air Pollution Prevention Act (APPA) are included as listed activities with additional activities being added to the list. The updated Listed Activities and Minimum National Emission Standards were published on the 22nd November 2013 (Government Gazette No. 37054). The activities at the proposed PV facility are not expected to trigger the requirement for an Air Emissions License (AEL) in terms of NEMAQA.

### 5.1.8 THE NATIONAL GREEN HOUSE GASES EMISSION REPORTING REGULATIONS, 2017

Dustfall On 14 March 2014, the following six Green House Gases (GHGs) were declared as priority air pollutants in South Africa:

- Carbon dioxide (CO2)
- Methane (CH4)
- Nitrous Oxide (N2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulphur hexafluoride (SF6)

National GHG Emission Reporting Regulations (Government Gazette No. 40762 of 3 April 2017), as amended (General Notice 994 in Government Notice 43712 of 11 September 2020), were published by the DFFE. A person identified as a Category A data provider in terms Annexure 1 of these regulations, must register their facilities using the online South African Greenhouse Gas Reporting System (SAGERS) (https://ghgreporting-public.environment.gov.za/GHGlanding/). Once registered the data provider must submit a GHG emissions inventory, activity data and report in the required format given under Annexure 3 of these regulations on an annual basis. All data must be provided annually, by the 31 March of the following year. Based on the EAPs preliminary assessment, the proposed PV facility will not trigger GHG listed activities. However, any changes to the project description which may trigger such listed activities, the applicant would need to quantify and report on the proposed plant's GHG emissions by the 31 March of each year.

### 5.1.9 NATIONAL DUST CONTROL REGULATIONS

Dustfall is assessed for nuisance impact and not for inhalation health impact. The National Dust Control Regulations (Department of Environmental Affairs, 2013) prescribes measures for the control of dust in residential and non-residential areas. Acceptable dustfall rates are measured (using American Standard Testing Methodology (ASTM) D1739:1970 or equivalent) at and beyond the boundary of the premises where dust originates. In addition to the dustfall limits, the National Dust Control Regulations prescribe monitoring

procedures and reporting requirements. Dust will be generated during construction and will be managed in accordance with these Regulations.

### 5.1.10 NOISE CONTROL REGULATIONS

In terms of section 25 of the ECA, the National Noise Control Regulations (GN R. 154 – NCRs) published in Government Gazette No. 13717 dated 10 January 1992, were promulgated. The NCRs were revised under GN R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations.

The NCRs will need to be considered in relation to the potential noise that may be generated mainly during the construction and decommissioning phases of the proposed project. The two key aspects of the NCRs relate to disturbing noise and noise nuisance.

Section 4 of the Regulations prohibits a person from making, producing or causing a disturbing noise, or allowing it to be made produced or caused by any person, machine, device or apparatus or any combination thereof. A disturbing noise is defined in the Regulations as "*a noise level which exceeds the zone sound level or if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more*."

Section 5 of the NCRs in essence prohibits the creation of a noise nuisance. A noise nuisance is defined as "*any sound which disturbs or impairs or may disturb or impair the convenience or peace of any person.*" Noise nuisance is not anticipated as the proposed PV facility will not generate noise apart from some limited noise during construction activities.

### 5.1.11 ENVIRONMENT CONSERVATION ACT (ECA)

The Environment Conservation Act (Act 73 of 1989 – ECA) was, prior to the promulgation of the NEMA, the backbone of environmental legislation in South Africa. To date the majority of the ECA has been repealed by various other Acts, however Section 25 of the Act and the Noise Regulations (GN R. 154 of 1992) promulgated under this section are still in effect. These Regulations serve to control noise and general prohibitions relating to noise impact and nuisance. Section 05 of CARA provides for the prohibition of the spreading of weeds. Regulation 15 of GN R1048 published under CARA provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur. Regulation 15E of GN R1048 published under CARA provides requirement and methods to implement control measures for different categories of alien and invasive plant species.

### 5.1.12 NATIONAL HERITAGE RESOURCES ACT (NHRA)

The NHRA aims to promote good management of cultural heritage resources and encourages the nurturing and conservation of cultural legacy so that it may be bestowed to future generations.

### 5.1.13 NATIONAL VELD AND FOREST FIRE ACT

While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of the Solar PV Facility, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and trained personnel for firefighting purposes.

### 5.1.14 NATIONAL FORESTS ACT (NFA)

A licence is required for the removal of protected trees in terms of the NFA, (Act 84 of 1998). It is therefore necessary to conduct a survey that will determine the number and relevant details pertaining to protected tree species present in the development footprint for the submission of relevant permits to authorities prior to the disturbance of these individuals.

### 5.1.15 THE CONSERVATION OF AGRICULTURAL RESOURCES, 1983

The Conservation of Agricultural Resources (Act 43 of 1983) aims to provide for the conservation of the natural agricultural resources of the Republic by the maintenance of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the

vegetation and the combating of weeds and invader plants. In order to achieve the objectives of this Act, control measures related to the following may be prescribed to land users to whom they apply:

- The cultivation of virgin soil;
- The utilisation and protection of land which is cultivated;
- The irrigation of land;
- The prevention or control of waterlogging or salination of land;
- The utilisation and protection of vleis, marshes, water sponges, water courses and water sources;
- The regulating of the flow pattern of run-off water;
- The utilisation and protection of the vegetation;
- The grazing capacity of veld, expressed as an area of veld per large stock unit;
- The maximum number and the kind of animals which may be kept on veld;
- The prevention and control of veld fires;
- The utilisation and protection of veld which has burned;
- The control of weeds and invader plants;
- The restoration or reclamation of eroded land or land which is otherwise disturbed or denuded;
- The protection of water sources against pollution on account of farming practices;
- The construction, maintenance, alteration or removal of soil conservation works or other structures on land; and
- Any other matter which the Minister may deem necessary or expedient in order that the objects of this Act may be achieved.

Further, different control measures may be prescribed in respect of different classes of land users or different areas or in such other respects as the Minister may determine. Preliminary impacts on the agriculture and soil, biodiversity and water resources have been identified with regards to this project, and mitigation and management measures recommended. These will be updated during the EIA phase of this project with more site-specific information from the specialist studies.

### 5.1.16 THE ELECTRICITY REGULATION ACT

The Electricity Regulation Act (Act 4 of 2006) establishes a national regulatory framework for the electricity supply industries and introduces the National Energy Regulator as the custodian and enforcer of the National Electricity Regulation Framework. The Act also provides for licenses and registration in this regard.

### 5.1.17 THE SPATIAL PLANNING AND LAND USE MANAGEMENT ACT, 2013

The Spatial Planning and Land Use Management Act, No.16 of 2013, has been in effect since July 2015. Essentially SPLUMA applies to the governance of how land is used, which is significant for developers who are applying for land developments. The objectives of the act are to:

- provide for a uniform, effective and comprehensive system of spatial planning and land use management for the Republic;
- ensure that the system of spatial planning and land use management promotes social and economic inclusion;
- provide for development principles and norms and standards;
- provide for the sustainable and efficient use of land;

- provide for cooperative government and intergovernmental relations amongst the national, provincial and local spheres of government; and
- redress the imbalances of the past and ensure that there is equity in the application of spatial development planning and land use management systems.

All affected properties are zoned for industrial use except for farm portion 143/30 which is zoned agricultural. However, a rezoning process is currently in progress to rezone this property to industrial as well.

### 5.1.18 OTHER POTENTIALLY APPLICABLE NATIONAL ACTS, PLANS AND GUIDELINES

The purpose of the National Energy Act (No. 34 of 2008) is to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, while taking environmental management requirements into account. The National Energy Act will not find significant application during the course of the EIA for the PV facility since all the electricity generated from the facility will be used at the mine the project will be excluded from energy planning in the country.

Similarly the Integrated Resource Plan for Electricity (IRP) 2010-2030 (2019) is not considered applicable to this project as the electricity generated will not go into the national grid but will be used at the mine.

The White Paper on Renewable Energy Policy supplements Government's predominant policy on energy as set out in the White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The policy recognises the potential of renewable energy and aims to create the necessary conditions for the development and commercial implementation of RE technologies.

## 5.2 RENEWABLE ENERGY DEVELOPMENT ZONES (REDZ)

Government Notice No. 114 in Government Gazette No. 41445 of 2018 identified 8 renewable energy development zones important for the development of large-scale wind and solar photovoltaic facilities. The Government Notice included procedure to be followed when applying for environmental authorisation for large scale wind and solar photovoltaic energy facilities when occurring in these REDZs. The sites proposed for the Lydenburg PV facility fall outside of the REDZ zones and therefore the REDZ will not be applicable for the PV facility project.

## 5.3 CLIMATE CHANGE BILL, 2018

On 08 June 2018, the Minister of Environmental Affairs published the Climate Change Bill ("the Bill") for public comment. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans. The PV facility proposed consists of a renewable energy generation facility and would not result in the generation or release of emissions during its operation.

## 5.4 BEST PRACTICE GUIDELINES BIRDS & SOLAR ENERGY, 2017

The Best Practice Guidelines Birds & Solar Energy (2017) proposed by the Birds and Renewable Energy Specialist Group contain guidelines for assessing and monitoring the impact of solar generation facilities on birds in Southern Africa. The guidelines recognise the impact that solar energy may have on birds, through for example the alteration of habitat, the displacement of populations from preferred habitat, and collision and burn mortality associated with elements of solar hardware and ancillary infrastructure; and the fact that the nature and implications of these effects are poorly understood.

The guidelines are aimed at Environmental Assessment Practitioners (EAPs), avifaunal specialists, developers and regulators and propose a tiered assessment process, including:

- Preliminary avifaunal assessment – an initial assessment of the likely avifauna in the area and possible impacts, preferably informed by a brief site visit and by collation of available data; also including the design of a site-specific survey and monitoring project should this be deemed necessary.

- Data collection – further accumulation and consolidation of the relevant avian data, possibly including the execution of baseline data collection work (as specified by the preliminary assessment), intended to inform the avian impact study.
- Impact assessment – a full assessment of the likely impacts and available mitigation options, based on the results of systematic and quantified monitoring if this was deemed a requisite at preliminary assessment.
- Monitoring – repetition of baseline data collection, plus the collection of mortality data. This helps to develop a complete before and after picture of impacts, and to determine if proposed mitigation measures are implemented and are effective or require further refinement. Monitoring may only be necessary for projects with the potential for significant negative impacts on birds (i.e. large area affected and / or vulnerable species present).

In terms of the guidelines the quantity and quality of baseline data required to inform the assessment process at each site should be set in terms of the size of the site and the predicted impacts of the solar technology in question, the anticipated sensitivity of the local avifauna (for example, the diversity and relative abundance of priority species present, proximity to important flyways, wetlands or other focal sites) and the amount of existing data available for the area.

## 5.5 LOCAL AND PROVINCIAL PLANNING TOOLS

According to the 2022 – 2027 IDP for the Thaba Chweu Local Municipality, Local Economic Development (LED) promotes and facilitates industrial development, enterprise development, skills development, economic transformation and poverty alleviation directed at five (5) focus areas:

- Enterprise Development;
- Rural Development;
- Economic Skills and Capacity Development;
- Industrial Development and Investment Facilitation; and
- Knowledge Management.

The municipality has identified renewable energy generation (particularly solar technologies) as potential opportunities in the utilities sector for the LED. Therefore, solar development is supported in terms of the municipality's current local planning tools.

In addition, the generation of renewable energy is supported at a provincial level. The Mpumalanga Economic Growth and Development Path (MEGDP) is predominantly based on the National Development Plan (NDP) and attempts to align with the vision, objectives and priorities of a united South Africa by 2030. Provincial Priority Area 2 (economic infrastructure) aims to expand renewable energy with special reference to solar power (solar power heaters and solar photovoltaic technologies) This is in line with the NDP which aims to increase employment and growth through the use of renewable electricity.

## 5.6 PERIOD FOR WHICH AUTHORIZATION IS REQUIRED

The authorisation will be required for the duration of the activities on-site. Construction is expected to commence within 5 years of the EA being granted.

# 6 NEED AND DESIRABILITY OF THE PROPOSED PROJECT

This section will examine the need and desirability of the proposed PV facility project.

## 6.1 PV FACILITY PROJECT BENEFITS

The proposed PV facility will allow for favourable economic impacts on the local economy. The construction phase will create approximately 200 (20 skilled and 180 unskilled) new employment opportunities (excluding indirect opportunities). Around 20 unskilled opportunities will be created in the operational phase with 10 skilled employees to be recruited.

The main aim of the proposed PV facility is to enable the applicant to provide electricity for their own use at the smelter as well as allowing them to reduce their relative carbon footprint. Based on the analysis provided, it can be concluded that the proposed PV facility is in accordance with national energy planning policy with respect to renewable energy which has links to climate change, environmental impact and energy security/flexibility considerations. Moreover, the concept of a solar energy project is broadly supported in local economic planning documents. Considered as a whole, the IDP and SDF recognise the importance of integrated and diversified development. The concept of a solar energy project is thus broadly supported.

Current energy supply in South Africa is primarily coal-based and, although these resources will last for more than a century if used at current rates, large power plants will need to be replaced over the next 30 years. Coal and other fossil fuels, including oil, produce Carbon Dioxide when burned to produce energy. It is now widely accepted that climate change, partially caused by human-generated Carbon Dioxide, is to blame for the higher-than-usual incidence of extremely damaging weather experiences (e.g., storms, droughts, melting polar icecaps). Local air pollution is strongly related to energy supply options, with coal and oil products being major contributors to urban and rural air pollution. One of the primary reasons for promoting renewable energy developments is the desire to make South Africa compliant with international treaties regarding climate-change effects. Renewable energy options are a sustainable energy supply option that can significantly reduce reliance on fossil fuels. Other advantages include employment creation, proximity to point-of-use, minimal demand for water and less reliance on concentrated sources of energy. Greater use of renewable energy would also reduce South Africa's economic vulnerability to the variable costs of imported fuels. International and local communities are increasingly trying to find ways to shift economies towards greater reliance on renewable energy. Greater uptake of renewable energy would furthermore reduce the global risk of climate change, one of the factors taken into account in designing the conservation network in South Africa.

## 6.2 NEED AND DESIRABILITY ANALYSIS

The needs and desirability analysis component of the "*Guideline on need and desirability in terms of the Environmental Impact EIA Regulations (Notice 819 of 2014*)" includes, but is not limited to, describing the linkages and dependencies between human well-being, livelihoods and ecosystem services applicable to the area in question, and how the proposed development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage sites, opportunity costs, etc.). Table 9 below presents the needs and desirability analysis undertaken for the proposed project.

Table 9: Needs and desirability analysis for the proposed PV Facility

| Ref No. | Question | Answer |
|---|---|---|
| **1** | **Securing ecological sustainable development and use of natural resources** | |
| **1.1** | How were the ecological integrity considerations taken into account in terms of: Threatened Ecosystems, Sensitive and vulnerable ecosystems, Critical Biodiversity Areas, Ecological Support Systems, Conservation Targets, Ecological drivers of the ecosystem, Environmental Management Framework, Spatial Development Framework (SDF) and global and international responsibilities. | Based on desktop information including the National Web-Based Environmental Screening Tool Report, the study area was assessed to be located within 32m of wetland, an Ecological Support Area (ESA) protected area buffer, a National Protected Area Expansion Strategy (NPAES) and within 5km from the Lydenburg Nature Reserve. After further desktop analysis of the proposed project area, as well as a site visit, a terrestrial biodiversity assessment (flora, fauna and avifaunal), wetlands and aquatics assessments were considered necessary and should be undertaken during the EIA Phase. These studies will assist in identifying any Threatened Ecosystems, Sensitive and vulnerable ecosystems, Critical Biodiversity Areas, Ecological Support Areas, Conservation Targets and Ecological drivers of the ecosystem. Where sensitive species or ecosystem drivers were identified, relevant mitigation measures were put forward to prevent or minimise the impacts. The findings and impact assessment will be discussed during the EIA Phase.<br><br>The proposed development aligns with the Thaba Chweu Local Municipality (TCLM) Spatial Development Framework (SDF) and Integrated Development Plan (IDP) which both aim to build growth within the municipality through renewable infrastructure and projects.<br><br>The project impacts were assessed according to the EIMS pre-defined impact significance rating methodology (Section 10). Detailed specialist studies (terrestrial and a biodiversity assessment as well as an avifaunal and heritage assessment) have been undertaken in the EIA phase.<br><br>The conclusions of these studies, the identified impacts and associated mitigation measures have been further assessed in the EIA phase and the results thereof included in this EIA Report and accompanying EMPr. Any potential benefits and motivation for the proposed project is presented in this section. |
| **1.2** | How will this project disturb or enhance ecosystems and / or result in the loss or protection of biological diversity? What measures were explored to avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts? | Refer to baseline ecological information in Section 9, and the impact assessment and mitigation measures in Section 10 of this EIA Report. Efforts will be made to avoid the identified impacts/ disturbance to sensitive environmental constraints where possible.<br><br>In summary, this development will take place in a site mostly grassland with scattered areas that are disturbed and degraded due to anthropogenic activities, such as clearing of vegetation, presence of alien and invasive plant species, and fragmentation due to the presence of the mining infrastructure such as the existing CMI Smelter and |

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| | | access roads, providing supporting infrastructure to the mining environment in the form of renewable energy, influencing the overall carbon footprint of the activities positively.<br><br>The implementation of the EMPr will ensure that negative impacts are avoided, managed, and mitigated as far as possible, as well as ensure that the positive impacts are enhanced as far as possible. |
| **1.3** | How will this development pollute and / or degrade the biophysical environment? What measures were explored to either avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts? | Refer to the alternatives considered for this project in Section 7, the baseline ecological information in Section 9, and the impact assessment and mitigation measures in Section 10 of this EIA Report.<br><br>The implementation of the EMPr will ensure that negative impacts are avoided, managed, and mitigated as far as possible, as well as ensure that the positive impacts are enhanced as far as possible. |
| **1.4** | What waste will be generated by this development? What measures were explored to avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and / or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste? | See Section 7 for alternatives considered. No significant amount of waste will be generated from the construction and operation of the PV facility. It is anticipated that waste generated during the construction phase will be mainly packaging, general construction rubble and domestic waste; however, the waste generated during operational phase will mainly be in the form of domestic waste.<br><br>Detailed mitigation measures in relation to waste management have been included in the EMPr. |
| **1.5** | How will this project disturb or enhance landscapes and / or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts? | According to the PalaeoMap of SAHRIS the Palaeontological Sensitivity of the proposed area of the project footprint occurs in an area with insignificant palaeo-sensitivity. In addition no deep drilling or excavations will be required for construction of the PV facility. Should any paleontological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.<br><br>An HIA was undertaken for the proposed PV facility sites and **four** heritage features and resources were identified. These consist of three Iron Age/ agro-pastoral sites (LS001, LS003 and LS004), and one structure which is and old school building (LS002). Mitigation measures for managing the impacts on these heritage resources have been included in the EMPr as suggested by the Heritage Specialist. The implementation of these EMPr mitigation measures will ensure the effective management of the impacts on the heritage resources. |
| **1.6** | How will this project use and / or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural | The proposed PV facility is a renewable energy resource-based project. The proposed development aligns with the Thaba Chweu Local Municipality SDF and IDP which both aim to build growth within the municipality through renewable infrastructure and projects. It is noted that due to the nature of this project, no non-renewable resources will be depleted, apart from a small amount of water to be used for the cleaning of the panels. |

| Ref No. | Question | Answer |
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| | resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts? | |
| **1.7** | How will this project use and / or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and / or impacts on the ecosystem jeopardise the integrity of the resource and / or system considering carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts? | The project area has been transformed/disturbed from its original state by the surrounding mining land-use and the subsequent disturbance since. The project area has an overall low environmental sensitivity as confirmed by the specialist investigations which have been conducted. Where medium environmental sensitivities were identified, these can be reduced to acceptably low rating through the implementation of the mitigation measures outlined in the EMPr.<br><br>One of the main benefits of the proposed PV facility is that the plant will generate energy that produces no greenhouse gas emissions from fossil fuels and reduces some types of air pollution, thus positively affecting the surrounding environment. |
| **1.7.1** | Does the proposed project exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? | The PV facility will reduce dependency on resources as the electricity generated will be used at the mine. This will lower the dependency on the Eskom grid for the mine. |
| **1.7.2** | Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used? | PV panels are used to replace other sources of electricity that usually have a much greater environmental impact. The main component of most PV modules is silicon. This isn't intrinsically harmful, but the manufacturing process does involve toxic chemicals that need to be carefully controlled and regulated to prevent environmental damage. Solar PV panels have a roughly 30-year lifetime. A large stock of raw materials and other valuable components are projected as PV panel wastes on end of life. These wastes may be recycled or used for repurposing solar PV panels. |
| **1.7.3** | Do the proposed location, type and scale of development promote a reduced dependency on resources? | PV panels are used to replace other sources of electricity that usually have a much greater environmental impact. The proposed PV facility will generate up to 300MW of electricity from renewable energy source immediately south and north of the smelter where the electricity is required. It will, therefore, reduce dependency on the Eskom grid and serve to provide the mine with the required electricity. |

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| **1.8** | **How were a risk-averse and cautious approach applied in terms of ecological impacts** | |
| **1.8.1** | What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)? | Detailed terrestrial, avifauna and heritage assessment were undertaken during the EIA phase of this project. Refer to Section 13 for the discussion of assumptions, limitation and uncertainties.<br>It is unlikely that any gaps/limitations/assumptions will result in a large increase in the risk. |
| **1.8.2** | What is the level of risk associated with the limits of current knowledge? | The level of risk is low due to the location of the proposed project, within the mine. |
| **1.8.3** | Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development? | Sufficient information was gathered prior to the onset of this process to indicate that positive impacts will outweigh low risk for the proposed project. The proposed project will positively influence the local economy through job creation. |
| **1.9** | **How will the ecological impacts resulting from this development impact on people's environmental right in terms following?** | |
| **1.9.1** | Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts? | Refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report.<br>Detailed specialist studies were undertaken to investigate the impacts of the Solar PV plant on the environmental rights of the community.<br>In summary, due to the nature of the proposed project it should not negatively affect amenity, water quality, cause nuisance or have significant negative environmental impacts as per Section 10 of this report. The implementation of the EMPr will assist in minimising or managing any impacts as far as possible. The development of a renewable (solar) energy plant will also contribute to energy generation through clean renewable energy source and thus reduction of dependency on the Eskom grid. |
| **1.9.2** | Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts? | Refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report.<br>The main positive impacts will be to the local economy as a result of job creation as well as the generation of clean renewable energy. The implementation of the EMPr will assist in enhancing the positive impacts of the proposed project. |
| **1.10** | Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to | Refer to baseline ecological information in Section 9, and the impact assessment and mitigation measures in Section 10 of this EIA Report. |

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| | the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)? | The proposed project is expected to have a minimal negative effect on human wellbeing and livelihoods. No eco-system services or ecological services are to be significantly impacted on in the area surrounding the proposed facility based on the terrestrial biodiversity assessment conducted for the project. |
| **1.11** | Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area? | Refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report.<br><br>Due to its nature, is anticipated that the proposed project will have limited negative as well as some positive impacts on the environment as a whole. Limited negative impacts on the ecological integrity is expected as a result of the establishment of the solar PV plant. Positive impacts will result from the development's potential contribution to job creation and energy generation through clean renewable energy source and thus reduction of dependency on the Eskom grid. |
| **1.12** | Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations? | Refer to Section 7 for details of the alternatives considered, as well as this section of the EIA Report for the advantages and disadvantages of the proposed activity. |
| **1.13** | Describe the positive and negative cumulative ecological / biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area? | Refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report.<br><br>Positive impacts identified include:<br>• Limited potential contribution to renewable energy goals and GHG reduction;<br>• Limited job creation potential; and<br>• Increase in energy generation from clean renewable sources and reduction in dependency on the Eskom grid.<br><br>Negative impacts identified include:<br>• Loss of indigenous vegetation from the site alternative 1 area;<br>• Proliferation of alien invasive vegetation; and<br>• The project may result in a disruption of the current open space corridor used by the species that occur on the site as well as the surrounding properties. |

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| **2** | **Promoting justifiable economic and social development** | |
| **2.1** | **What is the socio-economic context of the area, based on, amongst other considerations, the following?** | |
| **2.1.1** | The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks or policies applicable to the area. | The municipality has identified renewable energy generation (particularly solar technologies) as potential opportunities in the utilities sector for the LED in the 2022 - 2027 IDP. Therefore, solar development is supported in terms of the municipality's current local planning tools. |
| **2.1.2** | Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.), | According to the latest Spatial Development Framework for the TCLM the safeguarding of existing resources and creating opportunities for renewable energy development have been identified as strategies to achieve high growth in the municipality. |
| **2.1.3** | Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and | The preferred location for the facility is within the mine area and is surrounded by existing mine infrastructure. The proposed project aligns with the surrounding land uses as it falls within the mine area and the electricity generated will be used at the mine.. |
| **2.1.4** | Municipal Economic Development Strategy ("LED Strategy"). | The municipality has identified renewable energy generation (particularly solar technologies) as potential opportunities in the utilities sector for the LED in the 2022 - 2027 IDP. The proposed PV facility will create job opportunities for the local community as far as reasonably possible. |
| **2.2** | Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area? | Job creation for local residents as far as reasonably possible. Most of the unskilled job opportunities will be during the construction phase of the project.<br>Refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report. |
| **2.2.1** | Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs? | The proposed development aligns and compliments the LM KPI4: local economic to help create job opportunities for local contractors and SMMEs. |
| **2.3** | How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities? | Refer to the public participation process undertaken to date in Section 8 of this EIA Report Public participation and consultation will continue during the EIA phase as previously described in the accepted Scoping Report.<br>Furthermore, refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report. |

| Ref No. | Question | Answer |
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| | | The EIA phase included a suite of detailed specialist assessments. These were undertaken to assist in quantifying the impact of the project on the environment surrounding the development. It has been concluded that, due to the scale and nature of the proposed development, the contribution towards addressing specific needs and interests of the local communities will be limited and temporary. |
| **2.4** | Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term? | The proposed facility will create some job opportunities. The facility will be required as long as mining continues as is therefore considered sustainable. |
| **2.5** | **In terms of location, describe how the placement of the proposed development will:** | |
| **2.5.1** | Result in the creation of residential and employment opportunities in close proximity to or integrated with each other. | The proposed project location is close to several towns and residential areas and will prioritise job opportunities for the local community as far as reasonably possible. |
| **2.5.2** | Reduce the need for transport of people and goods. | The close proximity of the preferred development location to residential areas will reduce the need for transportation of potential local employees. It is expected that transport of goods will mostly be kept locally. |
| **2.5.3** | Result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport), | The proposed project will have no significant effect on public transport. |
| **2.5.4** | Compliment other uses in the area, | The PV facility is located within the mining area and is expected to compliment the mining land use as the power generated will be used at the mine. |
| **2.5.5** | Be in line with the planning for the area. | Refer to item 2.1.2 of this table (above). |
| **2.5.6** | For urban related development, make use of underutilised land available with the urban edge. | Not applicable. The proposed PV facility will be situated outside an urban area. |
| **2.5.7** | Optimise the use of existing resources and infrastructure. | Site Alternative S2 is located on top of an existing TSF. At site S1, no existing infrastructure exists on the proposed site location which can be used for the PV facility. |
| **2.5.8** | Opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk | Refer to Section 4 of this EIA Report. |

| Ref No. | Question | Answer |
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| | infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement). | |
| **2.5.9** | Discourage "urban sprawl" and contribute to compaction / densification. | The size of the proposed development is small in scale and as such urban sprawl is not expected because of the development. The town of Lydenburg is located in close proximity to the site for the PV facility and employment from these surrounding communities is recommended where possible. |
| **2.5.10** | Contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs. | Refer to items 2.5.7 to 2.5.9 of this table (above). |
| **2.5.11** | Encourage environmentally sustainable land development practices and processes. | Effort will be made towards being environmentally sustainable in the long term. |
| **2.5.12** | Consider special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.). | See item 1.7.3 of this table (above). |
| **2.5.13** | The investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential). | The proposed project will allow for contribution to the local, regional and national Gross Domestic Product (GDPs), and also to the local communities through employment of workers and local contractors. |
| **2.5.14** | Impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area. | An HIA was conducted in 2024. A total of **four** heritage features and resources were identified. These consist of three Iron Age/ agro-pastoral sites and one structure which is and old school building.The impacts will be lowered if the proposed mitigation measures are carried out. |
| **2.5.15** | In terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement? | The proposed project will contribute to other infrastructure projects in the area, specifically other infrastructure at the mine itself. |
| **2.6** | **How was a risk-averse and cautious approach applied in terms of socio-economic impacts** | |
| **2.6.1** | What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)? | Refer to Section 13 of this report. |
| **2.6.2** | What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, | The level of risk is low as the project is not expected to have far reaching negative impacts on socio-economic conditions should the recommended mitigation and management measures be implemented and adhered to. |

| Ref No. | Question | Answer |
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| | economic vulnerability and sustainability) associated with the limits of current knowledge? | |
| **2.6.3** | Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development? | As the proposed project is a new development a cautious approach has been applied. An extensive public participation process was undertaken in the Scoping phase and continues during the EIA phase to ensure that the local community and relevant authorities were notified of the proposed project. |
| **2.7** | **How will the socio-economic impacts resulting from this development, impact on people's environmental right in terms following:** | |
| **2.7.1** | Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts? | Refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report.<br><br>The proposed project will have minimal positive socio-economic impacts due to the scale and nature of the project. The project will lead to limited job opportunities for the local communities. The negative impacts may include dust and noise generation which may lead to nuisance for the surrounding communities. However, these negative impacts will be minimal and limited to the construction phase.<br><br>The implementation of the EMPr will however ensure that negative impacts are avoided, managed and mitigated as far as possible. |
| **2.7.2** | Positive impacts. What measures were taken to enhance positive impacts? | Refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report. |
| **2.8** | Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)? | Refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report.<br><br>The proposed development will have a minimal impact on human-wellbeing and ecosystem services due to the location. Human livelihoods will however be positively impacted because of employment opportunities. No indirect ecological impacts are expected as a result of socio-economic impacts, there will be some direct ecological impacts. These impacts will be lowered if the proposed mitigation measures are carried out. |
| **2.9** | What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations? | Refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report. Additionally, see item 2.8 of this table (above). |
| **2.10** | What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be | Refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report. |

| Ref No. | Question | Answer |
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| | distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered? | The preferred alternative is considered the best practicable environmental option as it is located within the mine area. |
| **2.11** | What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination? | By conducting a Scoping and EIA process, with an adequate public participation process, the applicant ensures that equitable access to the environment has been considered. Refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report. |
| **2.12** | What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle? | Refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report. |
| **2.13** | **What measures were taken to:** | |
| **2.13.1** | Ensure the participation of all interested and affected parties. | Refer to the public participation process undertaken to date in Section 8 of this EIA Report. Public participation and consultation will continue during the EIA phase as described in the accepted Scoping Report.<br><br>Advertisements as well as site notices were distributed in and around the project area in English and Setswana to assist in understanding the project. The notices and advertisements included contact details for easy access to the public participation specialist if any additional information is required by anyone from the public. The public is encouraged to participate and provide input which will then be recorded and submitted with the relevant reports to the competent authority.<br><br>The Scoping Report was made available on the at a local public place and the EIMS website after completion, and all registered I&APs were notified of the report availability. |
| **2.13.2** | Provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, | |
| **2.13.3** | Ensure participation by vulnerable and disadvantaged persons, | |
| **2.13.4** | Promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means, | |

| Ref No. | Question | Answer |
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| **2.13.5** | Ensure openness and transparency, and access to information in terms of the process, | Focus group and public meetings were undertaken by EIMS during the Scoping phase and all registered I&APs were invited to the meetings.<br><br>The EIA report will be made available on the at a local public place and the EIMS website after completion, and all registered I&APs will be notified of the report availability. |
| **2.13.6** | Ensure that the interests, needs and values of all interested and affected parties were considered, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, | |
| **2.13.7** | Ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein will be promoted? | |
| **2.14** | Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)? | Refer to the public participation process undertaken to date in Section 8 of this EIA Report. Public participation and consultation will continue during the EIA phase as described in the accepted Scoping Report.<br><br>Furthermore, refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report. |
| **2.15** | What measures have been taken to ensure that current and / or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected? | Workers at the facility will be educated on a regular basis through toolbox talks on the environmental and health risks that may occur within their work environment, and adequate measures will be taken to ensure that the appropriate personal protective equipment is issued to workers based on the areas that they work in as well as the requirements of their job. |
| **2.16** | **Describe how the development will impact on job creation in terms of, amongst other aspects:** | |
| **2.16.1** | The number of temporary versus permanent jobs that will be created. | The expected travel distance for labourers is expected to be approximately 2km. It is expected that approximately 30 people will be employed from the first year of operation at the facility. |

| Ref No. | Question | Answer |
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| **2.16.2** | Whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area). | |
| **2.16.3** | The distance from where labourers will have to travel. | |
| **2.16.4** | The location of jobs opportunities versus the location of impacts. | |
| **2.16.5** | The opportunity costs in terms of job creation. | |
| **2.17** | **What measures were taken to ensure:** | |
| **2.17.1** | That there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment. | The Scoping and EIA process requires governmental departments to communicate regarding any application. In addition, all relevant Departments and key stakeholders have been notified about the project by the EAP and registered as Interested and Affected Parties who will continue to be notified and engaged with regarding the project throughout the EIA process. |
| **2.17.2** | That actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures. | The Scoping and EIA process requires governmental departments to communicate regarding any application. In addition, all relevant Departments and key stakeholders have been notified about the project by the EAP and registered as Interested and Affected Parties who will continue to be notified and engaged with regarding the project throughout the EIA process. |
| **2.18** | What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage? | Refer to the public participation process undertaken to date in Section 8 of this EIA Report. Public participation and consultation will continue during the EIA phase as described in the accepted Scoping Report.<br><br>Furthermore, refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report. |
| **2.19** | Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left? | Refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report. |
| **2.20** | What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental | The EMPr aims to identify measures to avoid pollution and environmental degradation wherever possible. Where it is not possible to avoid environmental degradation measures are stipulated to manage potential impacts arising from the proposed project, and measures to remedy the<br><br>effects of unavoidable degradation and pollution. |

| Ref No. | Question | Answer |
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| | damage or adverse health effects will be paid for by those responsible for harming the environment? | |
| **2.21** | Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations? | Refer to Section 7 for details of alternatives considered in this EIA Report. |
| **2.22** | Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area? | Refer to the identified impacts, their assessment and recommended mitigation measures in Section 10 of this EIA Report.<br>The cumulative impacts identified include but are not limited to:<br>• Limited potential contribution to renewable energy goals and GHG reduction;<br>•Limited job creation potential; and<br>•Increase in energy generation from clean renewable sources and reduction in dependency on the Eskom grid.<br>• Proliferation of alien invasive vegetation; and<br>• The project may result in a disruption of the current open space corridor used by the species that occur on the site as well as the surrounding properties. |

# 7 PROJECT ALTERNATIVES

In terms of the EIA Regulations published in Government Notice (GN) R982 of 2014, as amended, feasible and reasonable alternatives must be identified and considered within the environmental assessment process. An alternative is defined as "…in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the:

a) property on which or location where it is proposed to undertake the activity;

b) type of activity to be undertaken;

c) design or layout of the activity;

d) technology to be used in the activity;

e) operational aspects of the activity; and

f) Includes the option of not implementing the activity."

In terms of Section 24 of NEMA, the proponent is required to demonstrate that alternatives have been described and investigated in sufficient detail during the EIA process. It is important to highlight that alternatives must be practical, feasible, reasonable and viable to cater for an unbiased approach to the project and in turn to ensure environmental protection. In order to ensure full disclosure of alternative activities, it is important that various role players contribute to their identification and evaluation. Stakeholders have an important contribution to make during the EIA Process and each role is detailed as follows:

The role of the environmental assessment practitioner is to:

- encourage the proponent to consider all feasible alternatives;
- Identify reasonable alternatives;
- provide opportunities for stakeholder input to the identification and evaluation of alternatives;
- document the process of identification and selection of alternatives;
- provide a comprehensive consideration of the impacts of each of the alternatives; and
- document the process of evaluation of alternatives.

The role of the proponent is to:

- assist in the identification of alternatives, particularly where these may be of a technical nature;
- disclose all information relevant to the identification and evaluation of alternatives;
- be open to the consideration of all reasonable alternatives; and
- be prepared for possible modifications to the project proposal before settling on a preferred option.

The role of the public is to:

- assist in the identification of alternatives, particularly where local knowledge is required;
- be open to the consideration of all reasonable alternatives; and
- recognise that there is rarely one favoured alternative that suits all stakeholders and that alternatives will be evaluated across a broad range of criteria, including environmental, social and economic aspects.

Table 10 outlines the various alternative types that are considered for the development. The extent of the applicability of each of these is further presented. It must be highlighted that the alternatives presented in the table are derived from both the EIA Regulations (2014) as amended as well as the Department of Environmental Affairs and Tourism's (now Department of Environmental, Fisheries and Forestry) 2004 Integrated Environmental Information Series on the Criteria for determining alternatives in EIA. Where the alternative is

applicable to the project, it will be further discussed in this Report. The alternatives discussed further in this report are as follows:

- The No-Go Option;
- Process alternatives; and
- Design alternatives.

Table 10: Project alternatives as per NEMA EIA Regulations, 2014 as amended

| ALTERNATIVE | COMMENT |
|---|---|
| **No-go Option** | The 'no-go' alternative is sometimes referred to as the 'no-action' alternative (Glasson *et al.,* 1999) and at other times the 'zero-alternative'. It assumes that the activity does not go ahead, implying a continuation of the current situation or the status quo. This alternative must be discussed on all projects as it allows for an assessment of impacts should the activity not be undertaken. **This alternative is discussed in this report.** |
| **Activity alternatives** | These are sometimes referred to as project alternatives, although the term activity can be used in a broad sense to embrace policies, plans and programmes as well as projects. Consideration of such alternatives requires a change in the nature of the proposed activity. This would entail a process where a different project is proposed instead of the PV facility. **There is one proposed activity and no other activity alternative. Therefore, this alternative will not be discussed in this report.** |
| **Location / property alternatives** | Location alternatives could be considered for the entire proposal or for a component of a proposal, for example the location of a processing plant within the property boundary. The latter is sometimes considered under site layout alternatives. A distinction should also be drawn between alternative locations that are geographically quite separate, and alternative locations that are in proximity. In the case of the latter, alternative locations in the same geographic area are often referred to as alternative sites. Based on the proposed development, the PV facility if defined within the southern and northern section within the mining area with no alternative sites considered and therefore **the location/property alternatives are not applicable to this project.** |
| **Process alternatives** | Various terms are used for this category, including technological alternative and equipment alternative. The purpose of considering such alternatives is to include the option of achieving the same goal by using a different method or process. An industrial process could be changed, or an alternative technology could be used. These are also known as technological and equipment alternative and will be discussed as they are applicable to the PV facility. **These will be discussed in this report.** |
| **Demand alternatives** | Demand alternatives arise when a demand for a certain product or service can be met by some alternative means. This is applicable to the demand for a product or service. An example of this would be where there is a need to provide housing units. Examples of alternatives can be through managing demand through various methods or providing additional housing through either single dwelling residential units or mixed-use developments. Specific to the proposed project, **alternatives regarding the demand are not applicable and will not be discussed in this report.** |
| **Scheduling alternatives** | These are sometimes known as sequencing or phasing alternatives. In this case an activity may comprise several components, which can be scheduled in a different order or at different times and as such produce different impacts. **These are not applicable to the project and will not be discussed.** |
| **Input alternatives** | By their nature, input alternatives are most applicable to industrial applications that may use different raw materials or energy sources in their processes. Considering that the proposed development is a PV facility which does not involve the conversion of raw materials into finished products, **input alternatives are not applicable to the project and will not be discussed.** |
| **Routing alternatives** | Consideration of alternative routes generally applies to linear developments such as power lines, transport, and pipeline routes. Although the proposed development also entails the development |

| ALTERNATIVE | COMMENT |
|---|---|
| | of a powerline as PV facility, the powerline is short and limited to the site extent. **Therefore, routing alternatives will not be covered in this report.** |
| **Site layout alternatives** | Site layout alternatives permit consideration of different spatial configurations of an activity on a particular site. This may include particular components of a proposed development or may include the entire activity. Only one proposed layout was available at the time of compilation of this report, based on this, **site layout alternatives will be covered in this report.** |
| **Scale alternatives** | In some cases, activities that can be broken down into smaller units can be undertaken on different scales. For example, a housing development within an overall mixed-used development could have the option of 1 000, 2 000 or 4 000 housing units. Each of these scale alternatives may have different impacts. However, the proposed PV facility cannot be broken down into smaller units. **For this reason, scale alternatives will not be discussed in this report.** |
| **Design alternatives** | This entails the consideration of different designs for aesthetic purposes or different construction materials to optimise local benefits and sustainability would constitute design alternatives. In such cases, all designs are assumed to have different impacts. Generally, the design alternatives could be incorporated into the project proposal and so be part of the project description and need not be evaluated as separate alternatives. **Based on project description and background information, design alternatives were identified and will be discussed in this report**. |
| **Operational alternatives** | The Operational Alternative is where you can specify controls on the operational aspects of the project such as pressure pipes, pumps, as well as valves. In the case of the proposed PV facility, **no feasible operational alternatives were identified and are not discussed in this report.** |

## 7.1 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.

Photovoltaic (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. Concentrating solar power (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 11 below.

Table 11: 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. |

| Advantage | Disadvantage |
|---|---|
| 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 development 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 have reduced environmental impacts.

## 7.2 SITE LAYOUT ALTERNATIVES

In determining the most appropriate sites for the establishment of the new photovoltaic plant, various options were investigated. This site selection process considered the following criteria:

- The location of the mine activities for which the power from the PV facility is required;
- The availability and accessibility of primary resources required for the operation of the facility, such as sun (i.e. the required Direct Normal Insolation);
- Availability of land to locate the site and associated infrastructure; and
- The availability and accessibility of infrastructure for the provision of services, manpower and social structure for the construction and operation of the facility.

A sensitivity-based approach was also adopted in assessing layout alternatives for the proposed PV facility. This approach ensured that the environmental and social sensitivities of the selected sites were carefully considered, with the aim of minimizing potential impacts while optimizing the facility's design and operational efficiency. With regards to layout alternatives, no additional alternatives have been identified and applied for.

## 7.3 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.

### 7.3.1 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 12

#### *7.3.1.1* STANDLONE SYSTEM

The stand system is an independent power plant. It is not connected with a grid. It is directly connected with the load. This type of plant is used in a place where a grid is not available like forest, hilly area etc. This type of plant can be used as a power backup plant when the power of the grid is not available, this plant is used to supply the load. A battery and charge controller is an optional part of this system. But in most cases, the battery and charge controller is used with this system to increase reliability. DC loads can directly connect with this plant. But in the case of AC load, the inverter is required to convert DC power into AC power. Generally, this type of system is not used to generate electrical power in bulk amounts. This type of plant use to operate small loads or in emergency conditions only.

#### *7.3.1.2* GRID-CONNECTED SYSTEM

Known as a grid-connected power plant. In this system, a greater number of solar panels are used to generate more power. And it requires a large area to build a power plant. The grid power is in the form of AC. And if we need to supply power to the grid, we need the output of solar plants similar to the power of the grid. In this system, the most important condition is that the output frequency and voltage must be matched with the grid's frequency and voltage. And also, the power quality maintains the grid standard.

Table 12: 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 | Grid-tied system will still result in minimal charges that will still reflect on the electricity bill |
| A grid-tied solar system always provides access to electricity – whether or not there is sunlight | |
| The grid-connected PV system has a low gestation period | |

Based on the indicated advantages and disadvantages of the different types of PV plants as well as the project description especially pertaining to generating up to 300MW of electricity only for the smelter, a hybrid connected system which will merge the standalone and grid-connected system approach would be favourable for the development

### 7.3.2 TYPES OF SOLAR PANEL

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 13.

#### *7.3.2.1* BIFACIAL SOLAR PANELS

A bifacial solar cell is any photovoltaic solar cell that can produce electrical energy when illuminated on either of its surfaces, front or rear. Solar cells in bifacial solar panels are exactly the same as in monofacial solar panels. The only real difference is how the panel is made. Whereas traditional monofacial solar panels have an opaque backsheet, Bifacial solar panels have a reflective back or dual panes of glass holding the solar cells in place. Exposing the solar cells to sunlight at the back as-well as the front. Bifacial modules come in many designs, some are framed while others are frameless. Some are dual-glass, and others use clear backsheets. Most use monocrystalline cells, but there are polycrystalline designs. The one thing that is constant is that power is produced from both sides. There are frameless, dual-glass modules that expose the backside of cells but are not bifacial. True bifacial modules have contacts/busbars on both the front and back sides of their cells.

#### *7.3.2.2* MONOCRYSTALLINE SOLAR PANELS

Monocrystalline solar panels—or mono panels—are made from a single silicon crystal. These are the most common type of solar panels for residential systems because they're more efficient and better suited for roofs with limited space. There are two kinds of monocrystalline panels: passivated emitter and rear contact (PERC) panels and bifacial panels. PERC panels have a conductive layer added to the backside of cells to increase energy absorptions, whereas bifacial panels can absorb light on both sides and at a higher rate than PERC panels. For this reason, PERC panels are most commonly used for rooftop installations while bifacial panels are typically reserved for ground-mounted systems that leave both sides of the panels exposed. Bifacial panels are also used on awnings, canopies, and rack-mounted installations on white commercial roofs with high albedo, or the fraction of light that a surface reflects. Monocrystalline panels are mostly solid black but have some white space throughout. The black design makes them less noticeable on a rooftop.

#### *7.3.2.3* POLYCRYTALLINE SOLAR PANELS

Polycrystalline panels are made using earlier solar technology, so they are more affordable than the newer monocrystalline variety. However, because the technology is older, polycrystalline panels are not as efficient as their modern counterpart. Polycrystalline panels have a blue hue that's somewhat marbled in appearance, so there are some variations in colour and consistency among panels. Polycrystalline panels are made of silicon solar cells, the same as monocrystalline panels. The difference is in the cooling process for polycrystalline panels, which creates multiple crystals rather than just one.

#### *7.3.2.4* THIN-FILM SOLAR PANELS

Thin-film solar cells are less efficient than monocrystalline and polycrystalline varieties, so they're more often used in large industrial solar installations in which space is not a constraint. Thin-film panels can also be a good option for small or bigger solar projects. Thin-film panels have the best appearance among the three panel types. They are completely black, flat, and flexible in shape and size, so they blend easily on many landscapes. They also do not require the scaffolding that monocrystalline and polycrystalline panels often do. However, thin-film panels are not very efficient. They have higher overall costs and increased instances of panel issues, failures, and degradation over time, which is why they are not ideal for residential installations.

Table 13: 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 |

Based on the indicated advantages and disadvantages of the different types of solar panels used in for PV as well as the project description especially pertaining to generating up to a maximum off 300MW of electricity, bifacial solar panels, followed by polycrystalline solar panels are the most favourable followed by monocrystalline solar panels and lastly, polycrystalline solar panels. However, it must be noted that although bifacial and/or polycrystalline solar panels are preferred, the environmental impacts associated with all the different types of panels are largely similar so the choice of panel type would not have a major significance.

### 7.3.3 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.

#### *7.3.3.1* BATTERY ENERGY STORAGE SYSTEMS

The 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 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). Lithium-ion batteries are a type of rechargeable battery commonly used for Solar Power Facilities. They operate by moving lithium ions between two electrodes: the anode (usually made of graphite) and the cathode (typically a lithium metal oxide). During charging, lithium ions move from the cathode to the anode through an electrolyte, while electrons flow through an external circuit, storing energy generated by the solar panels. When discharging, the process reverses, with ions returning to the cathode and electrons providing power to the grid or facility. These batteries are cost effective, easily available and they are not assembled from site. Although associated with a higher risk of fires, when compared to other types of battery storages, they are known for their high energy density, efficiency, and voltage, making them ideal for solar energy storage

#### *7.3.3.2* THERMAL ENERGY STORAGE SYSTEMS

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).

### *7.3.3.3* MECHANICAL ENERGY STORAGE SYSTEMS

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 electro-chemical 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 14

Table 14: 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 |

| Advantage | Disadvantage |
|---|---|
| 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 since 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, the technological advances have decreased the occupational hazards and the accidents have been reduced | Long construction lead time and technology type can be dependent on regional topography |

It can be seen from Table 14 above that each energy storage device has its pros and cons. The type of energy device used is largely dependent on the type of nature of the project, scale and budget. The preferable energy storage was assessed considering the storage capacity, efficiency, potential environmental impacts and maintenance requirements.

## 7.4 NO-GO ALTERNATIVE

The **no-go alternative** option means 'do nothing' or the option of not undertaking the proposed PV facility project or any of its activities, consequently leading to the continuation of the current land-use, which is leaving the location as an open unutilized space. As such, the 'do nothing' alternative or keeping the current status quo of the site with no construction or operation activities occurring on-site and also provides the baseline against which the impacts of other alternatives should be compared. Leaving the area undeveloped would not have any significant environmental or social benefits and would also not create any additional negative environmental impacts.

# 8 STAKEHOLDER ENGAGEMENT

The Public Participation Process (PPP) is a requirement of several pieces of South African legislation and aims to ensure that all relevant Interested and Affected Parties (I&APs) are consulted, involved and their opinions are taken into account, and a record included in the reports submitted to relevant authorities. The process aims to ensure that all stakeholders are provided an opportunity as part of a transparent process which allows for a robust and comprehensive environmental study. The PPP for the proposed project needs to be managed sensitively and according to best practises in order to ensure and promote:

- Compliance with international best practise options;
- Compliance with national legislation;
- Establish and manage relationships with key stakeholder groups; and
- Encourage involvement and participation in the environmental study and authorisation / approval process.

As such, the purpose of the PPP and stakeholder engagement process is to:

- Provide an opportunity for I&APs to obtain clear, accurate and comprehensible information about the proposed activity, its alternatives or the decision and the environmental impacts thereof;
- Provide I&APs with an opportunity to indicate their viewpoints, issues and concerns regarding the activity, alternatives and / or the decision;
- Provide I&APs with the opportunity to suggest ways of avoiding, reducing or mitigating negative impacts of an activity and enhancing positive impacts;
- Enable the applicant to incorporate the needs, preferences and values of I&APs into the activity;
- Provide opportunities to avoid and resolve disputes and reconcile conflicting interests;
- Enhance transparency and accountability in decision-making;
- Identify all significant issues for the project; and
- Identify possible mitigation measures or environmental management plans to minimise and / or prevent environmental impacts associated with the project.

The PPP for this project has been undertaken in accordance with the requirements of the NEMA, as well as in line with the principles of Integrated Environmental Management (IEM). IEM implies an open and transparent participatory process, whereby stakeholders and other I&APs are afforded an opportunity to comment on the project.

## 8.1 LEGAL COMPLIANCE

The PPP must comply with several important sets of legislation that require public participation as part of an application for authorisation or approval, namely:

- The National Environmental Management Act (Act No. 107 of 1998 – NEMA);
- The National Water Act (Act No. 36 of 1998).

Adherence to the requirements of the above-mentioned Acts will allow for an Integrated PPP to be conducted, and in so doing, satisfy the requirement for public participation referenced in the Acts. The details of the Integrated PPP followed are provided below.

## 8.2 GENERAL APPROACH TO PUBLIC PARTICIPATION

The PPP has been undertaken in accordance with the requirements of the NEMA (and the NWA where applicable) as well as in line with the principles of Integrated Environmental Management (IEM). IEM implies an

open and transparent participatory process, whereby stakeholders and other I&APs are afforded an opportunity to comment on the project.

## 8.3 IDENTIFICATION OF INTERESTED AND AFFECTED PARTIES

The I&AP databases compiled for various past environmental authorisation processes in the vicinity of the proposed facility have been utilised towards compiling a pre-notification register of key I&APs to be notified of the Environmental Authorisation Application. The I&AP database includes amongst others: landowners, communities, regulatory authorities and other specialist interest groups. Additional I&APs have been registered during the initial notification and call to register period. The I&APs database will continue to be updated throughout the duration of the EIA process. A full list of I&APs is attached in Appendix C.

### 8.3.1 LIST OF ORGANS OF STATE IDENTIFIED AND NOTIFIED

The following Government Authorities were notified of the proposed project:

- Airports Company South Africa
- Department of Agriculture, Land Reform and Rural Development
- Department of Agriculture, Land Reform and Rural Development and Environment
- Department of Agriculture, Rural Development, Land & Environmental Affairs: Mpumalanga Provincial Government (DARDLEA)
- Department of Forestry, Fisheries and the Environment
- Department of Mineral Resources and Energy
- Department of Mineral Resources and Energy: Mpumalanga
- Ehlanzeni District Municipality
- Eskom
- Mpumalanga Department of Co-operative Governance & Traditional Affairs;
- Mpumalanga Department of Economic Development and Tourism
- Mpumalanga Department of Public Works, Roads and Transport
- Mpumalanga Department of Social Development
- Mpumalanga Economic Growth Agency
- Mpumalanga Provincial Heritage Resources Authority
- Mpumalanga Tourism and Parks Agency (MTPA)
- National Department of Water and Sanitation
- SENTECH SOC Ltd
- South African Civil Aviation Authority
- South African Heritage Resources Agency (SAHRA)
- Thaba Chweu Local Municipality
- Transnet

### 8.3.2 OTHER KEY STAKEHOLDERS IDENTIFIED AND NOTIFIED

The following key stakeholders have been identified and notified of the proposed project:

The following key stakeholders have been identified and notified of the proposed project:

- Birdlife South Africa;
- Endangered Wildlife Trust;
- Eskom SOC Ltd.;
- South African National Biodiversity Institute.
- Council of Geoscience;

- South African Civil Authority;
- Conservation South Africa; and
- Transnet SOC Limited.

## 8.4 INITIAL NOTIFICATION OF I&APS

The PPP commenced on the 23rd of November 2023 with an initial notification and call to register. Initial call to register notifications were conducted as presented below.

### 8.4.1 REGISTERED LETTERS, FAXES AND EMAILS

Registered letters, emails and facsimiles (faxes) were prepared and distributed to the identified relevant authorities, affected and adjacent landowners and legal occupiers, ward councillors and other pre-identified key stakeholders. The notification documents included the following information:

- The purpose of the proposed project;
- Details of the NEMA and NWA Regulations that are anticipated to be applicable and must be adhered to;
- List of anticipated activities to be authorised;
- Location and extent of activities to be authorised;
- Details of the affected properties (including a locality map or an indication of where the locality map may be viewed or obtained);
- Brief but sufficient detail of the intended operation to enable I&APs to assess/ surmise what impact the project will have on them or on the use of their land (if any);
- Initial call to register duration; and
- Contact details of the EAP.

In addition, a registration form was included in the registered letters, emails and facsimiles distributed to I&APs and it included a request for the following information from I&APs:

- Provide information on how they consider that the proposed facility will impact on them or their socio-economic conditions;
- Make proposals as to how the potential impacts on identified environmental features, their infrastructure, and socio-economic concerns may be managed, avoided or mitigated;
- Details of the landowner and information on lawful occupiers;
- Details of any communities existing within the area;
- Details of any Tribal Authorities within the area;
- Details of any other I&APs that need to be notified;
- Details on any land developments proposed; and
- Any specific comments or concerns regarding the proposed application for environmental authorisation.

Proof of the registered letters, emails and facsimiles that were distributed during the initial notification and call to register period are attached in Appendix C.

### 8.4.2 SITE NOTICES AND POSTERS

Six (6) size A2 site notices (English Setswana and Afrikaans) were placed along, within and surrounding the perimeter of the proposed project area and its surroundings on the 23rd of November 2023. The on-site notices and posters included the following information:

- Project name;
- Applicant name;
- Project location;
- Description of the environmental authorisation application process;
- Legislative requirements; and
- Relevant EAP contact person details for the project.

Please refer Appendix C for proof of site notice and poster placement.

### 8.4.3 NEWSPAPER ADVERTISEMENTS

One advertisement (English, Setswana and Afrikaans) was placed on the 23rd of November 2023 in the Steelburger/Lydenburg Newspaper with circulation in the vicinity of the project area. The details of the advertisements are presented below.

The newspaper advertisement included the following information:

- Project name;
- Applicant name;
- Project location;
- Description of the environmental authorisation application process;
- Legislative requirements; and
- Relevant EAP contact person details for the project..

## 8.5 NOTIFICATION OF AVAILABILITY OF SCOPING REPORT

Notification regarding the availability of the Scoping Report for public review was given in the following manner:

- Registered letters with details on where the Scoping Report was made available from, as well as the duration of the public review comment period, were distributed to all registered I&APs (which includes key stakeholders, affected and surrounding landowners, and registered occupiers);
- Facsimile notifications with information similar to that in the registered letter described above, were distributed to all registered I&APs; and
- Email notifications with a letter attachment containing the information described above were also distributed to all registered I&APs.

The Scoping Report was made available for public review and comment for a period of over 30 days between February and April 2024 due to changes in the relevant competent authority for the application which was discovered after the DSR was made available for public review and comment. The Scoping Report was made available for public review at the following venues:

- Lydenburg Public Library; and
- Various Tribal Authority Offices in the area;
- Electronic copies will be available on the EIMS website (www.eims.co.za/public-participation/).

## 8.6 ISSUES AND REPONSES

Issues raised to date have been addressed in a transparent manner and the full details (such as the comment received, the name of the I&AP who commented, the issue raised and the main aspect of the raised issue, as well as the response provided to the I&AP) included in the Public Participation Report (Appendix C). Refer to Table 15 for a summary.

Table 15: Summary of issues raised by I&APs

| Issue/ Comment Raised | Aspect Affected | Summary of EAP Response |
|---|---|---|
| Request for site layout plan | EA Application | Site Layout plan has been included in the FSR and Application Form |
| Request for elaborating and specifying the project aspect linked to the identified triggered listed activity | EA Application | Application form and listed activities section in the FSR have been amended effectively and submitted together with the FSR. |
| Request for Hardcopy of the Report for Mpumalanga Parks and Tourism Agency | Public Participation | Hardcopy will be provided to the MPTA during the public review period. |
| Requests to be Registered as I&APs | Public Participation | I&APs have been added to the project I&AP database. |
| Ensuring DARLEA and MPTA are consulted during the process. | Public Participation | All I&APs and Key stakeholders will be adequately consulted during the PP process. |
| Request from the South African Civil Aviation Authority (SACAA) for an application with the Air Traffic and Navigation Services (ATNS) to be made. SACAA was informed that the applicant would be notified of the request and, if necessary, the applicant will submit an application prior to commencement. A CAA Compliance Statement was undertaken | Public Participation | A meeting held with ATNS where they requested that an obstacle evaluation assessment be completed prior to construction commencing |
| Request from the Thaba Chweu Social Labour Plan Forum representative for the agreement (paper trail) between the DFFE and DARDLEA regarding the agreement that the DFFE is the new Competent Authority. | EA Application | EIMS communicated by DARDLEA |
| Letter of Approval from SENTECH SOC Ltd stating that there would be limited degradation of SENTECH transmitted Terrestrial UHF/VHF Television (TV), and/or FM radio services in the planned deployment area and that they grant the applicant approval to proceed with construction at the site | EA Application | Response and conditions noted and included in RFI compliance statement . |

# 9 ENVIRONMENTAL ATTRIBUTES AND BASELINE

This section of the EIA Report provides a description of the environment that may be affected by the proposed PV facility. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, the proposed project have been described. Baseline information sourced from various spatial datasets utilised to prepare the environmental attributes baseline below.

## 9.1 CLIMATE AND TEMPERATURE

The climatic conditions prevailing in Lydenburg are characterized by a warm and moderate temperature. In winter, there is much less rainfall in Lydenburg than in summer. According to Köppen and Geiger, this climate is classified as Cwb. The optimal temperature for solar panels is around 25°C. Solar panels perform best under moderate temperatures, as higher or lower temperatures can reduce efficiency. For every degree above 25°C, a solar panel's output can decrease by around 0.3% to 0.5%, affecting overall energy production. The mean yearly temperature observed in Lydenburg is recorded to be 15.2°C. This is approximately 10°C less than the optimal temperature for solar panels which makes the installation of the BESS very crucial to the PV facility's optimal performance throughout the year. Figure 8 shows the monthly average temperatures for Lydenburg (Weatherspark, 2023).

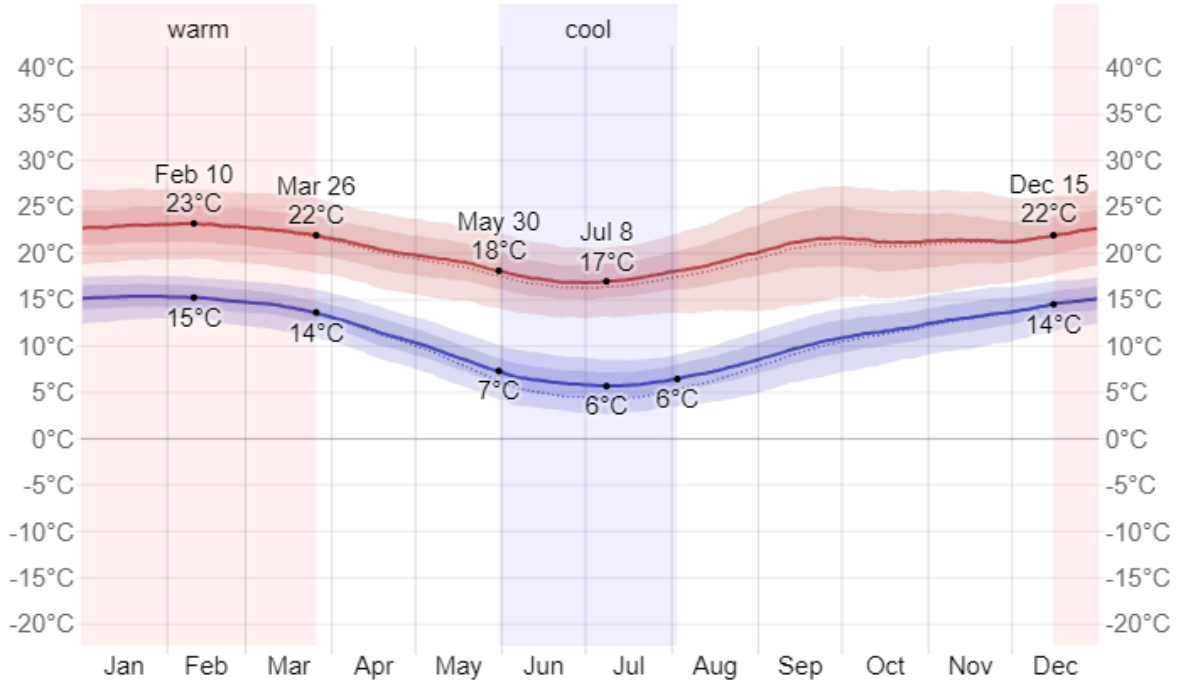


Figure 8: Average annual temperatures for Lydenburg (Weatherspark, 2023).

The length of the day in Lydenburg varies over the course of the year. In 2023, the shortest day is June 21, with 10 hours, 35 minutes of daylight; the longest day is December 22, with 13 hours, 42 minutes of daylight. The earliest sunrise is at 4:59 AM on November 30, and the latest sunrise is 1 hour, 44 minutes later at 6:44 AM on July 4. The earliest sunset is at 5:15 PM on June 8, and the latest sunset is 1 hour, 38 minutes later at 6:53 PM on January 13. Daylight saving time (DST) is not observed in Lydenburg during 2023. Figure 9 below presents a compact representation of the sun's elevation (the angle of the sun above the horizon) and azimuth (its compass bearing) for every hour of every day in the reporting period. The horizontal axis is the day of the year, and the vertical axis is the hour of the day. For a given day and hour of that day, the background colour indicates the azimuth of the sun at that moment. The black isolines are contours of constant solar elevation.

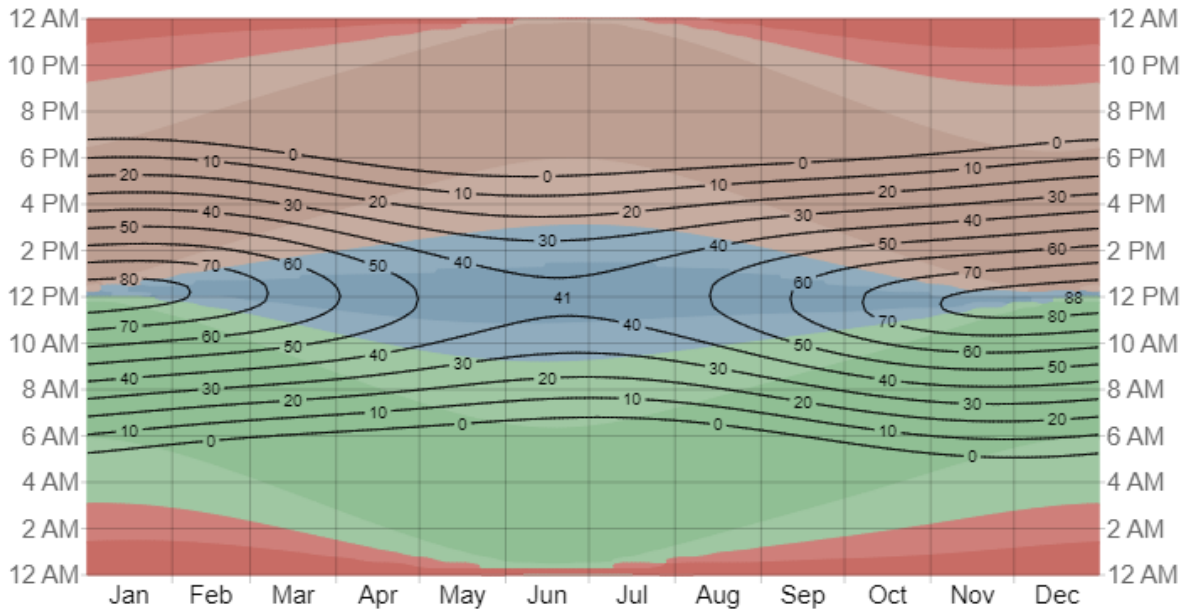


Figure 9: Solar elevation and azimuth over the course of the year 2023 for Lydenburg (Weatherspark, 2023).

## 9.2 RAINFALL AND CLOUD COVER

A wet day is one with at least 1mm of liquid or liquid-equivalent precipitation. The chance of wet days in Lydenburg varies very significantly throughout the year. Approximately 854mm of rainfall occurs on a yearly basis. The rainy season lasts for 5.5 months, from October 14 to March 29, with a greater than 28% chance of a given day being a wet day (see Figure 10). The month with the most wet days in Lydenburg is December, with an average of 16.5 days with at least 1mm of precipitation. The drier season lasts for *6.5* months, from March 29 to October 14. The month with the fewest wet days in Lydenburg is July, with an average of 0.7 days with at least 1mm of precipitation. The most common form of precipitation throughout the year is rain alone, with a peak probability of 55% in December (see Figure 10).

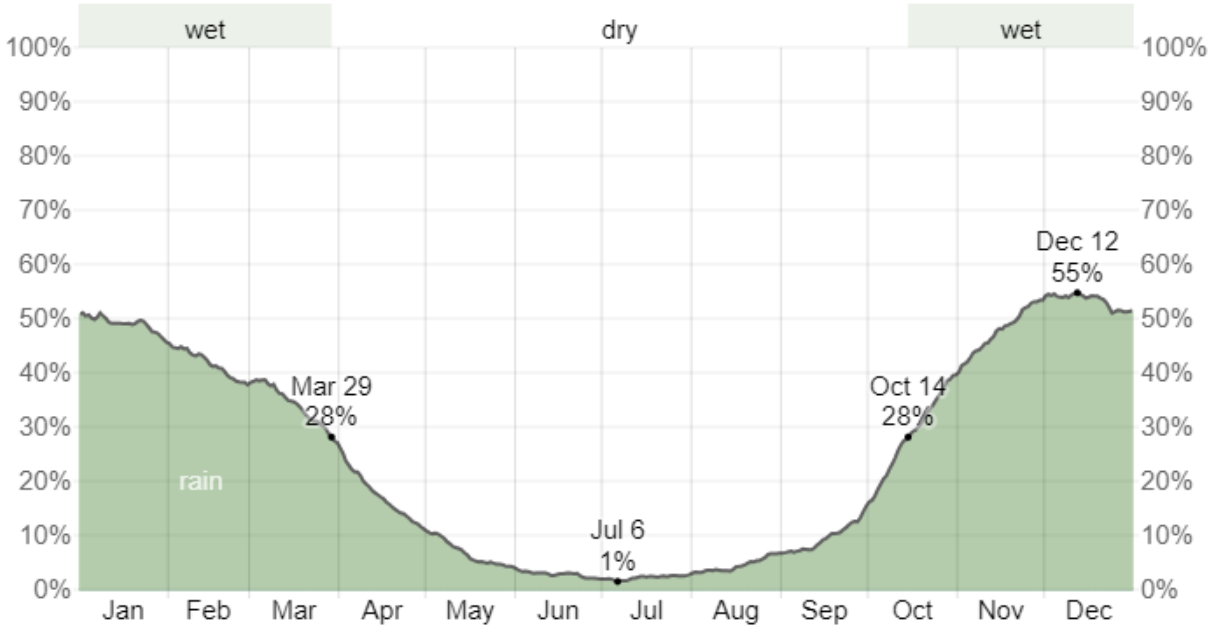


Figure 10: Average chance of precipitation for Lydenburg (Weatherspark, 2023).

The rainy period of the year lasts for 8.5 months, from September 1 to May 17, with a sliding 31-day rainfall of at least 13mm. The month with the most rain in Lydenburg is January, with an average rainfall of 119mm.

The rainless period of the year lasts for 3.5 months, from May 17 to September 1. The month with the least rain in Lydenburg is July, with an average rainfall of 5mm (see Figure 11 obtained from Weatherspark, 2023). Solar panels can still operate in the rain, but their power output depends on cloud coverage. Heavy rain clouds will most likely hinder energy production, but rainfall provides a safe and easy way to clean solar panels. Rain actually helps to keep your panels operating efficiently by washing away any dust or dirt.

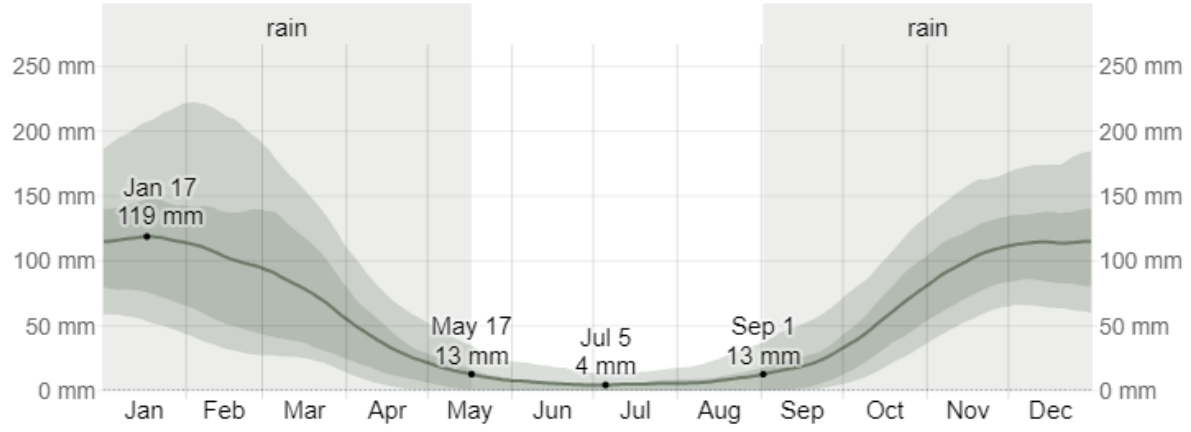


Figure 11: Average rainfall for Lydenburg (Weatherspark, 2023).

In Lydenburg, the average percentage of the sky covered by clouds experiences significant seasonal variation over the course of the year. The clearer part of the year in Lydenburg begins around March 11 and lasts for 7.1 months, ending around October 14. The clearest month of the year in Lydenburg is June, during which on average the sky is clear, mostly clear, or partly cloudy 92% of the time. The cloudier part of the year begins around October 14 and lasts for 4.9 months, ending around March 11. The cloudiest month of the year in Lydenburg is December, during which on average the sky is overcast or mostly cloudy 44% of the time.

## 9.3 SOLAR ENERGY

This section discusses the total daily incident shortwave solar energy reaching the surface of the ground over a wide area, taking full account of seasonal variations in the length of the day, the elevation of the Sun above the horizon, and absorption by clouds and other atmospheric constituents. Shortwave radiation includes visible light and ultraviolet radiation. This section is important for the proposed development as it shows the potential solar energy which can be absorbed by the solar panels.

The average daily incident shortwave solar energy experiences significant seasonal variation over the course of the year. The brighter period of the year lasts for 4.6 months, from October 15 to March 3, with an average daily incident shortwave energy per square meter above 6.8 kWh. The brightest month of the year in Lydenburg is January, with an average of 7.3 kWh. The darker period of the year lasts for 2.7 months, from May 10 to July 31, with an average daily incident shortwave energy per square meter below 4.9 kWh. The darkest month of the year in Lydenburg is June, with an average of 4.3 kWh (see Figure 12).

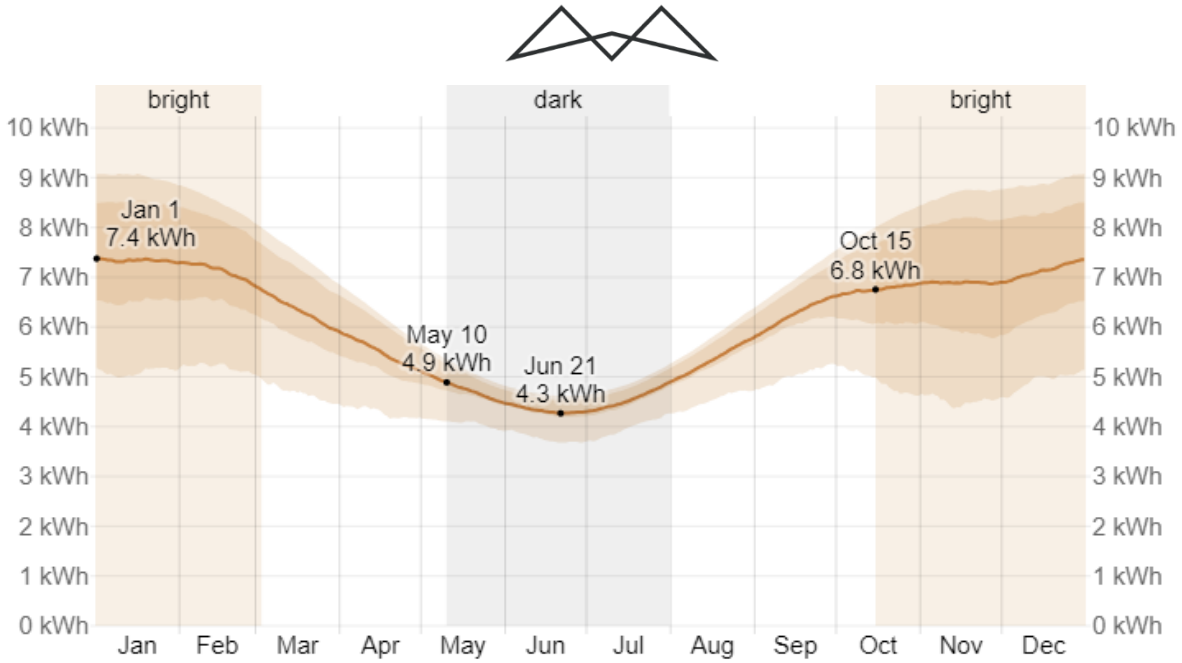


Figure 12: Average daily shortwave solar energy reaching the ground per square meter (Weatherspark, 2023).

## 9.4 TOPOGRAPHY

Lydenburg is located at the base of the Long Tom Pass on the banks of the Sterkspruit River. The average elevation of Lydenburg is 1,410 meters above sea level (m.a.s.l). The topography within 3km of Lydenburg contains only modest variations in elevation, with a maximum elevation change of 142 meters. Within 16km, contains only modest variations in elevation (1,148m). Within 80km also contains extreme variations in elevation (1,919m).

## 9.5 GEOLOGY

Based on the Geological Map Data obtained from the Council for Geosciences, the study area forms part of the Pretoria Group; Silverton Formation; comprised of the Machadodorp, Lydenburg and Boven Members. These members consist of basic lavas, mudstones, laminated shales, tuff, agglomerate and hornfels (see Figure 23). These lithologies have been intruded by dolerite dykes and extruded over with diabase sills.

Based on the Jasper Müller Associates CC (2006) Geology Report, the area is located on the sediments and volcanics of the Transvaal Sequence that form the Highveld Areas and the Escarp. The Transvaal Sequence overlies the basement rocks of the Lowveld Region to the far west. Intrusive into the Transvaal rocks and exposed to the east, are the basic layered rocks of the Rustenburg Layered Suite of the Bushveld Complex. The strata of the Transvaal Sequence have a regional dip ranging between 10 and 25 degrees to the west. Numerous basic dykes and sills of various ages are present throughout the study area and (contact) metamorphism of shale to hornfels, is locally largely attributable to these sills.

The members of the Pretoria Group that are relevant to the study area are Lydenburg Works are indicated below:

- Pretoria Group - Silverton Formation - Boven Member - Greenish, fine-grained, shale and mudstone with tuff and subordinate carbonate layers, hornfels in places.
- Pretoria Group - Silverton Formation - Machadodorp Member - Very finegrained tuff, coarser grained agglomerate and basic lava.
- Pretoria Group - Silverton Formation - Lydenburg Member - Greenish, finegrained, laminated shale and subordinate mudstone, inter-layered carbonate layers rare, hornfels in places

Informally and collectively referred to as Transvaal Diabase, the Marico Diabase Suite rocks are intrusive into all horizons of the Transvaal Sequence, mainly on the southern side of the Bushveld Complex and more particularly on the south-eastern side. The Maruleng Diabase sills are largely confined to the margin of the Bushveld

Complex, while the Lydenburg Diabase occurs farther out. The diabase sills vary in thickness from 1 m to over 300 m. They are particularly prolific in the strata of the Pretoria Group where intrusion of the thicker sills occurred, characteristically at the contact between shales and quartzites and often over long distances of strike (Jasper Müller Associates CC, 2006)., and thus it is not anticipated that any palaeontological resources will be negatively impacted by the proposed activity.

## 9.6 SOIL AND LAND CAPABILITY

Based on the Soil and Agriculture Compliance Statement eight soil forms were identified throughout the 50 m buffered area namely Lichtenburg, Nkonkoni, Vaalbos, Glenrosa, Grabouw, Witbank, Johannesburg and Cartref soil forms, with the Glenrosa soil form being the most dominant soil form over the area Figure 25. Hydromorphic soils were identified within the area, namely Cartref.

The Lichtenburg and Nkonkoni soil forms are regarded to be most important in the study area as they demonstrate the most sensitive land capabilities. The Lichtenburg soil form consists of an orthic topsoil horizon on top of a red apedal horizon with a hard plinthic horizon below. The Nkonkoni soil form has an orthic topsoil on top of a red apedal horizon underlain with a lithic horizon. The Vaalbos soil form has an orthic topsoil horizon with a red apedal horizon with a hard rock substratum below. The Glenrosa soil form consist of an orthic horizon with a lithic horizon below. The Cartref soil form consist of an orthic topsoil horizon with an albic horizon underlain with a lithic horizon below. The Grabouw soil forms are physically distributed Anthrosols with some original horizons still visible but in a disturbed state. The Witbank soil forms are transported technosols from the mine excavated material covering either mined areas or undisturbed natural soils, material is mixed to distinguish the individual original diagnostic horizons. The Johannesburg soil form is an urban technosols on urban waste sites uncovered or covered urban waste with ex-natural soils or liners and topsoil.

The most sensitive land capability of the above-mentioned soil forms has been determined to be class “II” and the other identified soils to be “III”, “V”, ““VI” and “VII”. A climate capability level 7 has been assigned to the area given the low Mean Annual Precipitation (MAP) and the high Mean Annual Potential Evapotranspiration (MAPE) rates. By using the determined land capability for the most sensitive soil and the determined climate capability, a land potential of “L4” was calculated for the dominant sensitive soil. According to Smith (2006), the “L4” land potential level is characterised by moderate potential. Moderately regular and/or moderate to severe to moderate limitations are expected due to soil, slope, temperatures or rainfall. Appropriate permission is required before ploughing virgin land.

## 9.7 CULTURAL AND HERITAGE RESOURCES

The objective of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) is to introduce an integrated system for the management of national heritage resources. The Act defines a ‘heritage resource’ as any place or object of cultural significance (aesthetic, architectural, historical, scientific, social, spiritual, linguistic, or technological value or significance). The identification, evaluation and assessment of any cultural heritage site, artefact or find in South Africa is required by this Act. This section of the report presents the heritage status of the proposed PV facility in Lydenburg.

According to the national web-based environmental screening tool (DFFE Screening Tool Report), the proposed development is located within an area of *very high* relative archaeological and cultural heritage theme sensitivity. An assessment of the NHRA and preliminary project information revealed that the proposed development triggers Section 38(1) of the NHRA. Therefore, a Heritage Impact Assessment is required and has been undertaken in the EIA Phase. The South African Heritage Resources Agency (SAHRA), the Mpumalanga Provincial Heritage Resources Authority (MHRA) and Association of Southern African Professional Archaeologists (ASAPA) are I&APs in the project and will be provided with a copy of the report for review and comment.

The HIA Study found that a total of **four** heritage features and resources were identified. These consist of three Iron Age/ agro-pastoral sites (**LS001, LS003 and LS004**), and one structure which is and old school building **(LS002).** See Figure 13**,** Figure 14**,** Figure 14 and Figure 15.

The school structure (**LS003**) is not noted as not older than 60 years. The structure has two rooms is built with brick and has a corrugated iron roof. Cement lintels are above the three large windows on either side of the two centred doors. The structure is not conservation-worthy.

Three Iron Age/Agro-pastoral sites were located. **LS001** is a complex stone walled Bokoni homestead and is graded as Grade IIIA. Site **LS001** Is a classic example of a complex Bokoni homestead. The inner ring-wall, which was identified, separated the domestic area from the livestock area, which occurs in the centre. The inner ring had two clear entrances, which is also a unique feature in precolonial South Africa, according to Delius *et al* (2014). "*This inner ring would allow for a controlled movement of cattle where some can remain in the central enclosure while others can be moved through its opposite entrance, into the walled passage which in turn gives access to the attached enclosures"* (Delius *et al,* 2014 pp74). The walled passage described by Delius *et al* (2014) was also identified at this site.

**LS002** was very disturbed and overgrown. It was, therefore, difficult to assess the structure and pattern. There were middens and grinding stones in the vicinity. Site **LS002** has a grading of IIIA.

The Bokoni stone ruins are one of the richest visible and enduring forms of heritage from any group of people living in South Africa before the beginning of colonial times (Delius *et al* 2014). The remains provide historians and archaeologists with the possibility of reconstructing in detail this now-extinct way of life (Delius *et al* 2014). **LS001** and **LS002** are, therefore graded as Grade IIIA and should be avoided with a 30m buffer. If the sites are affected directly, the sites **LS001** and **LS002** will need to be documented during a Phase II mitigation procedure before a destruction permit can be applied for at the South African Heritage Resources Agency.

**LS004** is a single stone wall. The area was also heavily overgrown and it was difficult to discern any structure or patterning to the site. **LS004** is graded as Grade IIIC. The chance find procedure must be followed in proximity to this site. No other mitigation measures are required.

The possibility of stillborn burials around the structures **LS001** and **LS002** must be considered. As per African custom stillborn children are buried against the outside wall/foundation or inside the house. The structures (**LS001 and LS002**) must then be provisionally grade as Grade IIIA in regard to burials. As per SAHRA guidelines, all burial grounds and graves should be retained and avoided with a buffer zone of 30m. If this is not possible, the graves could be relocated after completion of a detailed grave relocation process that includes a thorough stakeholder engagement component, adhering to the requirements of s36 of the NHRA and its regulations as well as the National Health Act and its regulations.

Figure 13: View of stone walls at LS001

Figure 14: View of stone walls at LS002

Figure 15: Lower grinding stone at LS002

Figure 16: School building at LS003

## 9.8 PALAEONTOLOGY

Cultural Heritage in South Africa, including all heritage resources, is protected by the National Heritage Resources Act (Act 25 of 1999) (NHRA). Heritage resources as defined in Section 3 of the Act include "all objects recovered from the soil or waters of South Africa, including archaeological and **palaeontological objects** and material, meteorites and rare geological specimens". Palaeontological heritage is exceptional and non-renewable and is protected by the NHRA. Palaeontological resources and may not be unearthed, broken moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

According to the Palaeontological study, the proposed Glencore Lydenburg PV Facility is largely underlain by the Silverton Formation of the Pretoria Group (Transvaal Supergroup) as well as Quaternary superficial sediments. The Pretoria Group sedimentary rocks in and near the study area are extensively intruded, and locally metamorphosed, by sills of diabase. The diabase has no palaeontological significance. However, the existence of the diabase rocks would have had a thermal metamorphic effect on nearby sediments and would decrease the chance of fossil preservation. According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Silverton Formation (Pretoria Group, Transvaal Supergroup) is High, that of the Quaternary Superficial sediments are Low, while that of the diabase is Zero. Updated geology (2014, Council of Geosciences, Pretoria) indicates that the proposed study area is only underlain by the Silverton Formation (Pretoria Group, Transvaal Supergroup).

it is concluded that fossil heritage of scientific and conservational interest in the development footprint is rare. This is in contrast with the High Sensitivity allocated to the development area by the SAHRIS Palaeosensitivity Map and DFFE Screening Tool. **A medium Palaeontological Significance has been allocated for the construction phase of the PV development pre-mitigation and a low significance post mitigation**. The construction phase will be the only development phase impacting Palaeontological Heritage and **no significant impacts are expected to impact the Operational and Decommissioning phases**. The No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, will have a Neutral impact on the Palaeontological Heritage of the development. The **Cumulative impacts of the development is considered to be medium pre- mitigation and Low post mitigation and falls within the acceptable limits for the project**. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. **The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.** It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

## 9.9 SURFACE WATER

South Africa is divided into nineteen (19) Water Management Areas (WMAs). The delegation of water resource management from central government to catchment level is achieved by establishing Catchment Management Agencies (CMAs) at WMA level. Each CMA progressively develops a Catchment Management Strategy (CMS) for the protection, use, development, conservation, management and control of water resources within its WMA. This is to ensure that on a regional scale, water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all persons. The main instrument that guides and governs the activities of a WMA is the CMS which, while conforming to relevant legislation and national strategies, provides detailed arrangements for the protection, use, development, conservation, management and control of the region's water resources. According to the DWS water management areas delineations, the proposed PV facility is situated in the Olifants Water Management Area (Tertiary Drainage Region B42).

A wetland site visit was conducted on the for the proposed development areas. During the site visit, five HGM units were identified within the Project Area which were classified as a channelled valley-bottoms (HGM 1 & HGM 4), unchanneled valley bottoms (HGM 2 & HGM 5), and a wetland seep (HGM 3) (Figure 17)(Figure 23). Only wetlands at an appreciable level of risk in relation the proposed development were assessed further. Therefore HGM 4 and 5 were excluded from further assessment as the wetland occurs within the 500m Project Area only and is not anticipated to be impacted by the proposed development. HGM 1, 2 and 3 are located south of the smelter and flows into a perennial river west of the project area of influence. Along with these wetlands multiple drainage lines were also identified within the proposed site (Figure 23).

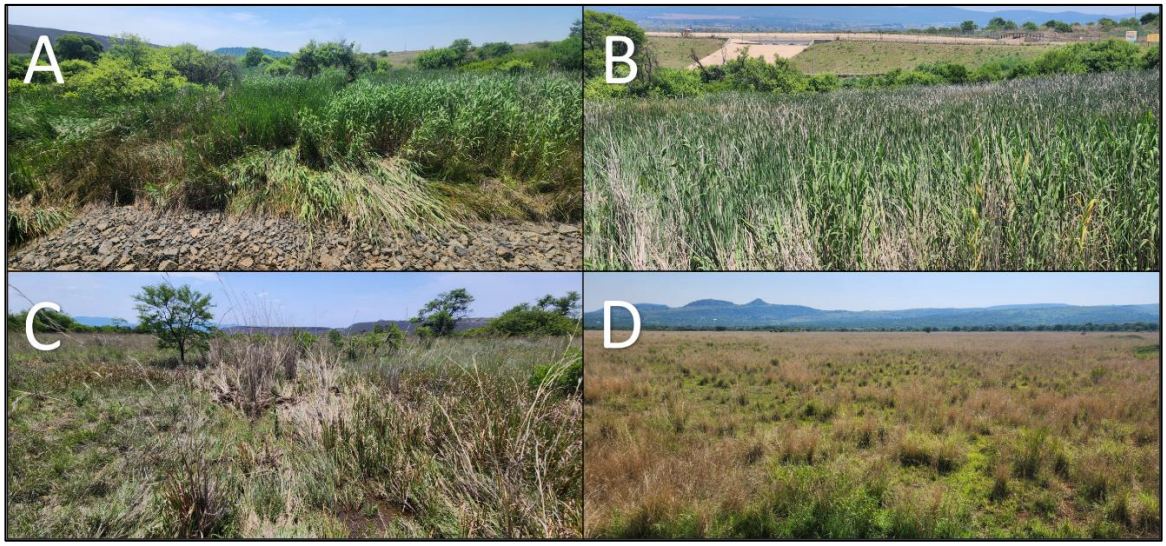


Figure 17: Photographical evidence of the different wet areas. A & B) Channelled valley-bottom; C) Unchanneled Valley Bottom wetland, and D) Wetland seep

The ecosystem services provided by the wetland units identified on site were assessed and rated using the WET-EcoServices method (Kotze *et al.,* 2008). The average ecosystem service score for HGM 1 was determined to be "Moderately High" and HGM 2 and HGM 3 was determined to be "Intermediate".

Table 16: Summary of Ecosystem service scores for HGM 1

| Wetland Unit | | | | | HGM 1 | HGM 2 | HGM 3 |
|---|---|---|---|---|---|---|---|
| Ecosystem Services Supplied by Wetlands | Indirect Benefits | Regulating and supporting benefits | Flood attenuation | | 2.5 | 2.1 | 1.0 |
| | | | Streamflow regulation | | 2.8 | 2.2 | 0.9 |
| | | | Water Quality enhancement benefits | Sediment trapping | 2.2 | 2.0 | 2.2 |
| | | | | Phosphate assimilation | 2.3 | 1.9 | 1.8 |
| | | | | Nitrate assimilation | 2.4 | 1.8 | 1.6 |
| | | | | Toxicant assimilation | 2.6 | 1.8 | 1.7 |
| | | | | Erosion control | 2.8 | 2.1 | 1.1 |
| | | | Carbon storage | | 2.3 | 2.0 | 2.1 |
| | Direct Benefits | **Biodiversity maintenance** | | | 2.1 | 2.1 | 2.1 |
| | | Provisioning benefits | Provisioning of water for human use | | 1.1 | 1.0 | 0.6 |
| | | | Provisioning of harvestable resources | | 1.0 | 1.0 | 0.6 |
| | | | Provisioning of cultivated foods | | 0.5 | 0.5 | 0.5 |
| | | Cultural benefits | Cultural heritage | | 1.0 | 1.0 | 1.0 |
| | | | Tourism and recreation | | 1.1 | 1.1 | 1.1 |
| | | | Education and research | | 2.8 | 1.8 | 1.4 |
| **Overall** | | | | | 29.6 | 24.4 | 19.7 |
| **Average** | | | | | 2.0 | 1.6 | 1.3 |
| **Class** | | | | | **Moderately High** | **Intermediate** | **Intermediate** |

HGM 1 score the highest scores for ecosystem services due to the wetland type and the location of the wetland. HGM 1 was classified as being a channelled valley bottom located south of the smelter and its associated stockpiles. The wetland has high volumes of hydrophyte vegetation and thus plays an important role in streamflow regulations and flood attenuations. Due to the location of the wetlands high volumes of nitrates, phosphates and toxicants flows into the system through runoff from the stockpiles and will thus play an important role in the assimilation and providing cleaner water downstream. The wetland however does not provide high resources for humans, but the vegetation does provide habitat to animals.

Although HGM 2 will also play an important role in streamflow regulation and flood attenuation it scored lower ecosystem services scores due to the location of the wetland. The wetland is located away from the smelters activities with HGM 1 between the activities and the wetland. The wetland thus does not play such a big role in the assimilation of nitrates, phosphates, and toxicants as HGM 1. The wetland also has less hydrophyte cover lowering the erosion control of the wetland. The wetland does however provide habitat to multiple species and do provide some resources for humans to use.

HGM 3 scored the lowest ecosystem services scores due to the type of wetland and the location of the wetland. The wetland was classified as a seep wetland which is not known for their ability to help with streamflow regulation and flood attenuation, the wetland did however score well in sediment trapping and carbon storage. HGM 3 also scored high scores for biodiversity maintenance due to the hydrophyte vegetation providing resources and habitat for multiple species.

The wetlands are located within private land, therefore the tourism potential as well as the ability to be used for cultural practices is essentially non-existent attributed to lack of access by the public. Furthermore, the wetlands

have been transformed with only limited hydrophytes remaining which reduces the potential to be used for harvestable building resources or cultivated foods.

The results of the ecological IS assessment are shown in Table 17 Various components pertaining to the protection status of a wetland are considered for the IS, including Strategic Water Source Areas (SWSA), the NFEPA wetland vegetation (wet veg) threat status and the protection status of the wetland. The IS for all the HGM units were calculated to be "Moderate".

Table 17: The IS results for the delineated HGM unit

| HGM Type | NFEPA Wet Veg | | | NBA Wetlands | | | SWSA (Y/N) | Calculated IS |
|---|---|---|---|---|---|---|---|---|
| | Type | Ecosystem Threat Status | Ecosystem Protection Level | Wetland Condition | Ecosystem Threat Status 2018 | Ecosystem Protection Level | | |
| **Channelled valley-bottom** | Mesic Highveld Grassland Group 7 | Critically Endangered | Not Protected | D/E/F Largely Modified | Critically Endangered | Not Protected | N | **Moderate** |
| **Unchannelled Valley Bottom** | Mesic Highveld Grassland Group 7 | Critically Endangered | Not Protected | D/E/F Largely Modified | Critically Endangered | Not Protected | N | **Moderate** |
| **Hillslope Seep** | Mesic Highveld Grassland Group 7 | Least Threatened | Not Protected | C Moderately Modified | Critically Endangered | Poorly Protected | N | **Moderate** |

## 9.10 TERRESTRIAL BIODIVERSITY AND VEGETATION

Terrestrial biodiversity is the variety of life forms on the land surface of the Earth. High biodiversity is an indicator of a healthy ecosystem, which is directly linked to human health. Animals and plants are responsible for many vital services our lives depend on, including:

- oxygen production;
- water regulation;
- soil retaining; and
- providing flood protection.

Biodiversity is both a part of nature and affected by it. Some biodiversity loss is because of events such as seasonal changes or ecological disturbances (wildfires, floods, etc.), but these effects are usually temporary, and ecosystems have managed to adapt to these threats. Human-driven biodiversity loss, in contrast, tends to be more severe and long-lasting. The human-made climate crisis is leading to environmental destruction, habitat loss, and species extinction. Terrestrial biodiversity is decreasing rapidly through habitat loss: a process where a natural habitat becomes incapable of supporting its native species, which are consequently displaced or killed. In the recent past, there have Increased efforts implemented to prevent further loss of terrestrial biodiversity and the ecosystem services they provide. The characteristics and implications of the terrestrial biodiversity within the Lydenburg site are discussed below

### 9.10.1 ECOLOGICALLY IMPORTANT LANDSCAPE FEATURES

The following features Table 18 describe the general area and habitat, this assessment is based on spatial data that are provided by various sources such as the provincial environmental authority and SANBI.

Table 18: Desktop and background spatial features examined.

| Desktop Information Considered | Relevant/Irrelevant |
|---|---|
| Critical Biodiversity Area | Irrelevant. The study area does not transect CBAs. |
| Ecosystem Threat Status | Irrelevant. The study area is located within the Lydenburg Thornveld vegetation which is a least concerned status. |
| Ecosystem Protection Level | Irrelevant. The Lydenburg Thornveld vegetation is not a protected ecosystem. |
| **Protected Areas** | Relevant. The study area is within an ESA: Protected Area buffer and also adjacent to the Lydenburg Nature Reserve area. |
| **National Protected Area Expansion Strategy** | Relevant. The study area transects a National Protected Area Expansion Strategy area. |
| Important Bird and Biodiversity Areas | Irrelevant. The study area does not transect Important Bird and Biodiversity Areas. However, the study area is approximately 4km southwest of the Kruger to Canyon Biosphere Reserve. |
| South African Inventory of Inland Aquatic Ecosystems | Irrelevant. The study area does not transect any nor is within close proximity of South African Inventory of Inland Aquatic Ecosystems. |
| National Freshwater Ecosystem Priority Areas | Irrelevant. The study area does not transect any nor is within close proximity of National Freshwater Ecosystem Priority Areas. |
| Strategic Water Source Areas | Irrelevant. The study area does not transect Strategic Water Source Areas (SWSA). The closest SWSA is approximately 5km northeast of the proposed development site. |

### 9.10.2 MPUMALANGA BIODIVERSITY SECTOR PLAN

Mpumalanga is a province well known for its globally important biodiversity, its wealth of natural resources and spectacular natural vistas. Its terrestrial ecosystems are characterised by high levels of both plant and animal diversity and a significant number of unique species that are not known to occur anywhere else outside the province. Mpumalanga's freshwater ecosystems are also home to important biodiversity and represent high value ecological infrastructure for delivering water for human use. Mpumalanga's biodiversity and ecological infrastructure is a valuable, though vulnerable, asset that could be a rich source of natural solutions to the challenges posed by poverty, unemployment, and climate change. But, for this potential to be realised, there is a need for accurate and up-to-date scientific information that is effectively interpreted and made available to end-users. Well-informed policies and legislation that safeguards important biodiversity and ecological infrastructure, together with well-capacitated institutions that are responsible for effective management and governance of biodiversity assets are also needed.

The Mpumalanga Biodiversity Sector Plan (MBSP) is such a spatial tool which serves to provide such information to end-users and guide decision making to ensure that the biodiversity objectives are achieved. The MBSP covers the whole province, which is divided into three District Municipalities: Ehlanzeni, Gert Sibande, and Nkangala, and forms part of a broader set of national biodiversity planning tools and initiatives that are provided for in national legislation and policy. The MBSP is based on an objective planning approach which considers national and provincial biodiversity targets while trying to avoid conflict with competing land uses. Planning for climate change is a common thread throughout the MBSP where it has been explicitly considered and incorporated into the spatial priorities. It supports the principles of integrated development planning and integration with Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs). It comprises a set of maps of biodiversity priority areas accompanied by contextual information and land-use guidelines that make the most recent and best quality biodiversity information available for use in land-use and development planning, environmental assessment and regulation, and natural resource management.

Both terrestrial and freshwater biodiversity priority areas are identified in the MBSP, either as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs). These CBA and ESA areas must be considered and taken into account in processes that will result in a change in land use and will also form part of the geographic areas in which certain activities will require environmental authorisation in terms of Listing Notice 3 of the NEMA EIA Regulation, 2014 as amended. According to the MBSP, the project area mostly overlaps with 'ESA Protected Areas Buffer' (see Figure 22).

The site has been transformed mainly due to the mining and small grazing activities which have disturbed the fauna and floral habitats. Based on previous biodiversity studies undertaken for the smelter (Jasper Müller Associates, 2006), the grasslands were found to possess medium to high vegetation species diversity as well as a low percentage of invader species. This provides a greater variety of habitat for flora and fauna species. Even though the impact on floral species is anticipated to relatively *medium-low*, the extent of the site and potential presence of important biodiversity cannot be excluded. Therefore, this area is classified as moderately disturbed, with a medium ecological quality and a Terrestrial Biodiversity Impact Assessment will be undertaken during the EIA phase.

### 9.10.3 THE NATIONAL BIODIVERSITY ASSESSMENT

The National Biodiversity Assessment (NBA) was completed as a collaboration between the SANBI, the DEA and other stakeholders, including scientists and biodiversity management experts throughout the country over a three-year period. The purpose of the NBA is to assess the state of South Africa's biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors.

The two headline indicators assessed in the NBA are ecosystem threat status and ecosystem protection level which are discussed in more detail in the sub-sections below.

#### *9.10.3.1* ECOSYSTEM THREAT STATUS

Ecosystem threat status outlines the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function and composition, on which their ability to provide ecosystem services ultimately depends. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Threatened (LT), based on the proportion of each ecosystem type that remains in good ecological condition. According to the National Vegetation Data (2018) obtained from SANBI, the proposed development site is located within the Lydenburg Grassland (Figure 24).

The Lydenburg Grassland was previously known as the North-eastern Mountain Sourveld (Acocks 1953) and North-Eastern Mountain Grassland (Low & Rebelo 1996). According to Mucina & Rutherford (2006), this vegetation unit is situated in a broad band between the high-lying mountains from just north of Ohrigstad, tapering southwards through Lydenburg to as far south as the area in the vicinity of the Kwena Dam. This vegetation unit occurs at lower levels at the foot of the mountains and on undulating plains. This is open, frost-hardy woodland. Structurally this unit comprises closed grassland which is almost always wooded, sometimes densely so in rocky areas and less so in frost-ridden valleys where *Vachellia karroo* is still able to persist. Many woody plants have evolved a *suffrutex* habit (*Argyrolobium wilmsii*), where aerial parts die back to an underground rootstock during cold winters. It is a transition zone between the high lying grasslands and the warmer and drier bushveld areas.

According to Mucina & Rutherford (2006), Lydenburg Thornveld is listed as vulnerable ecosystem. The conservation target is 27% and 2% is protected (Gustav Klingbiel and Ohrigstad Dam Nature Reserves). A total of 22% of this unit has been transformed mainly by dryland and irrigated cultivation. Rainfall is generally too low for aforestation or plantations. Erosion from very low (45%), low (26%) and moderate (18%). It must be noted that according to the NBA 2018 dataset from SANBI, Lydenburg Thornveld is currently classified as a least concerned ecosystem threat status.

#### *9.10.3.2* ECOSYSTEM PROTECTION LEVEL

Ecosystem protection level tells us whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as not protected (NP), poorly protected (PP), moderately protected (MP) or well protected (WP), based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act. The project area was superimposed on the ecosystem protection level map to assess the protection status of terrestrial ecosystems associated with the development (Figure). The proposed development overlaps with poorly protected ecosystem.

### 9.10.4 TERRESTRIAL BIODIVERSITY HABITATS

A habitat refers to the place or environment where a plant or animal naturally or normally lives and grows. Based on information taken from the Terrestrial Biodiversity Compliance Statement attached in Appendix D There ae three Terrestrial Biodiversity Habitat was identified namely, Mining, Transformed Grassland and Degraded Grassland. Mining habitat unit includes all areas that maintain little to no native vegetation and/or where anthropogenic activity has substantially modified the area's primary ecological functions and species composition. This habitat unit no longer maintains its functional ecological integrity and does not contribute to ecosystem services. This habitat unit is characterised by areas used for mining related activities. No fauna or flora SCC were recorded or are expected to occur in this habitat unit.

The transformed Grassland habitat unit comprises transformed, recovering grasslands that have previously been exposed to anthropogenic disturbances attributed to agricultural practices (particularly livestock farming). Although some portions were dominated by Invasive Alien Species (IAPs) such as *Ricinus communis*, *Melia azerdach*, and *Solanum mauritianum*, most of the area was dominated by indigenous grass species (e.g., *Panicum maximum*, *Themeda triandra*, and *Urochloa mosambicensis*). Further, there were numerous termite mounds occurring throughout this habitat unit which are important vectors of nutrient cycling, contributing to improved ecosystem functionality. No flora SCCs were recorded or are expected to occur within this habitat unit. Although no fauna SCCs were recorded, it is possible that certain sensitive species (specifically avifauna and cryptic herpetofauna species) do have the potential to occur within this habitat unit but remained undetected at the time of the field survey.

The Degraded Grassland habitat unit is characterised by degraded grassland vegetation exposed to high levels of anthropogenic impact attributed to the mining activities occurring adjacent to the area. Although small portions of this habitat unit include indigenous plant species, large areas are dominated by IAPs. Further, numerous settlings ponds are located throughout this habitat unit. No fauna or flora SCCs were detected or are expected to occur within this habitat unit. See Figure 18 depicting pictures from site.

Mining Habitat

Transformed Grassland

Degraded Grassland

Figure 18: Mining, Transformed and Degraded Habitat

The different habitat types within the project area were delineated and identified based on observations made during the field survey, and information from available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of SCC and their ecosystem processes.

Site Ecological Importance (SEI) a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present in the project area) and Receptor Resilience (RR) (its resilience to impacts) was determined for the habitats and is indicated in Table 19 below.

Table 19: Summary of the Lydenburg habitat types and corresponding Site Ecological Importance (SEI)(The Biodiversity Company, 2023).

| Habitat Type | Conservation Importance (CI) | Functional Integrity (FI) | Biodiversity Importance (BI) | Mitigation | Receptor Resilience (RR) | Site Ecological Importance (SEI) Guidelines for interpreting SEI in the context of the proposed development activities |
|---|---|---|---|---|---|---|
| **Degraded Grassland** | **Low**<br><50% of receptor contains natural habitat with the potential | **Low**<br>Several minor and major current negative | **Low** | N/A | **Medium**<br>Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of | **Low**<br>Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | to support SCC. | ecological impacts. | | | the receptor functionality. | |
| **Mining** | **Very Low**<br>No natural habitat remaining. | **Very Low**<br>Several minor and major current negative ecological impacts. | **Very Low** | N/A | **High**<br>Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality | **Very Low**<br>Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities. |
| **Transformed Grassland** | **Medium**<br>> 50% of receptor contains natural habitat with potential to support SCC. | **Medium**<br>Only narrow corridors of good habitat connectivity. Mostly minor current negative ecological impacts, with some major impacts and a few signs of minor historical disturbance. | **Medium** | N/A | **Medium**<br>Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality | **Medium**<br>Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities. |
| | | | | Vegetation beneath PV panels retained and results of ecological site walkdown suggest the absence of SCCs. | **High**<br>Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality | **Low**<br>Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities. |

### 9.10.5 SCREENING TOOL VS SPECIALIST ASSIGNED SENSITIVITIES

The allocated sensitivities for each of the relevant themes can either disputed or validated for the overall Project Area by the EAP or Specialist. Terrestrial Ecologist was appointed to dispute and/or validate the DFFE Screening Tool Report findings highlighted in the Terrestrial Biodiversity Compliance Statement attached (**Appendix C**).

Table 20 indicates a summary of the screening tool vs specialist assigned sensitivities. A summative explanation for each result is provided as relevant. The specialist-assigned sensitivity ratings are based largely on the SEI process followed in the previous section, and consideration is given to any observed or likely presence of SCC or protected species. The screening tool sensitivities:

- Terrestrial Biodiversity Theme sensitivity is Very High for the project area (**Appendix H**).
- Animal Theme sensitivity is High for the project area (**Appendix H**); and
- Plant Theme sensitivity is Medium for the project area (**Appendix H**).

Table 20: Summary of the screening tool vs specialist assigned sensitivities (The Biodiversity Company, 2024).

| Screening Tool Theme | Screening Tool | Specialist | Tool Validated or Disputed by Specialist - Reasoning |
|---|---|---|---|
| **Animal Theme** | High | **Medium** | Disputed – Most of the receiving habitat is degraded, and most of the Project Area has been modified. Although no flora and fauna SCC were recorded, it is possible that fauna (specifically avifauna and herpetofauna) SCC may occur within the transformed grassland habitat unit. |
| **Plant Theme** | Medium | **Low** | Disputed – Large portions of the receiving habitat are severely degraded, and most of the Project Area has been modified. AIP species are dominant throughout the Project Area. No flora SCC were recorded, nor expected. |
| **Terrestrial Theme** | Very High | **Low** | Disputed – Despite overlapping with ESA ecosystems, the receiving habitat has been modified and is consequently degraded and does not represent ESA ecosystems anymore. |

The Terrestrial Biodiversity Compliance Statement led to a disputing of the 'Very High' classification for the terrestrial biodiversity theme sensitivity as allocated by the National Environmental Screening Tool. The Project Area is instead assigned an overall 'Low' sensitivity with the degraded grassland habitat unit being assigned the same 'Low' sensitivity rating, and the habitat unit wherein mining activities are recorded being assigned a 'Very Low' sensitivity rating. The transformed grassland habitat unit that has previously been exposed to anthropogenic pressures attributed to livestock farming was originally assigned a 'Medium' sensitivity rating owing to the presence of indigenous flora species that were previously listed. However, if indigenous vegetation beneath the PV panels is retained, and pending the completion of an ecological site walkdown to located potential flora and fauna SCCs that may occur within the Project Area, this sensitivity will be reduced to 'Low.'

## 9.11 AVIFAUNA

According to the study that was undertaken for the Lydenburg smelter by Jasper Müller Associates (2006), no endangered, vulnerable or rare species were observed in the area. Potential vulnerable species might, however, occur in the region. According to the study, Lydenburg is a site of low importance for threatened mammal, bird, amphibian and reptile species. It also has a medium-low intrinsic biodiversity value in terms of specific species and a medium intrinsic biodiversity value in terms of important communities.

According to the specialist assessment two avifaunal field surveys were completed. The first avifaunal field survey was conducted to determine the presence of Species of Conservation Concern (SCC). A total of 34 species were observed during the first field survey and no SCC were recorded during this first survey period. Five (5) of the species observed within the Project Area are regarded as priority species (Table 21 and Figure 19)

Table 21: Summary of Priority Species recorded within and around the proposed development (The Biodiversity Company, 2024).

| Common Name | Scientific Name | Collision | Electrocution | Disturbance/Habitat Loss |
|---|---|---|---|---|
| **Black-winged Kite** | *Elanus caeruleus* | x | x | |

| | | | | |
|---|---|---|---|---|
| **Egyptian Goose** | *Alopochen aegyptiaca* | x | x | |
| **Hadeda Ibis** | *Bostrychia hagedash* | | x | |
| **Helmeted Guineafowl** | *Numida meleagris* | | x | |
| **Pied Crow** | *Corvus albus* | | x | |


Figure 19: Photos of Risk Species found within the Project Area A) Black-winged Kite and B) Egyptian Goose

The second avifaunal field survey was made to cover all the different habitat types, within the limits of time and access. A total of 40 species were observed during the second field survey and no SCC were recorded during this first survey period. Five (5) of the species observed within the Project Area are regarded as priority species (Table 22 and Figure 20).

Table 22: Summary of Priority Species recorded within and around the proposed development (The Biodiversity Company, 2024)

| Common Name | Scientific Name | Collision | Electrocution | Disturbance/Habitat Loss |
|---|---|---|---|---|
| **Black-winged Kite** | *Elanus caeruleus* | x | x | |
| **Brown Snake Eagle** | *Circaetus cinereus* | x | x | |
| **Helmeted Guineafowl** | *Numida meleagris* | | x | |
| **Pied Crow** | *Corvus albus* | | x | |
| **South African Shelduck** | *Tadorna cana* | x | x | x |


Figure 20: Photos of Risk Species found within the Project Area; A) Helmeted Guineafowl and B) Brown Snake Eagle

Flight analysis is also important for species that exhibit diel movement between roosting and foraging sites to prevent the risk of collision with infrastructure. A very condensed version of flight path analysis was done, the aim of this was to determine if there is a general direction of most birds on site. No specific flight paths were noted and no active nest sites of Priority Species or SCC were recorded.

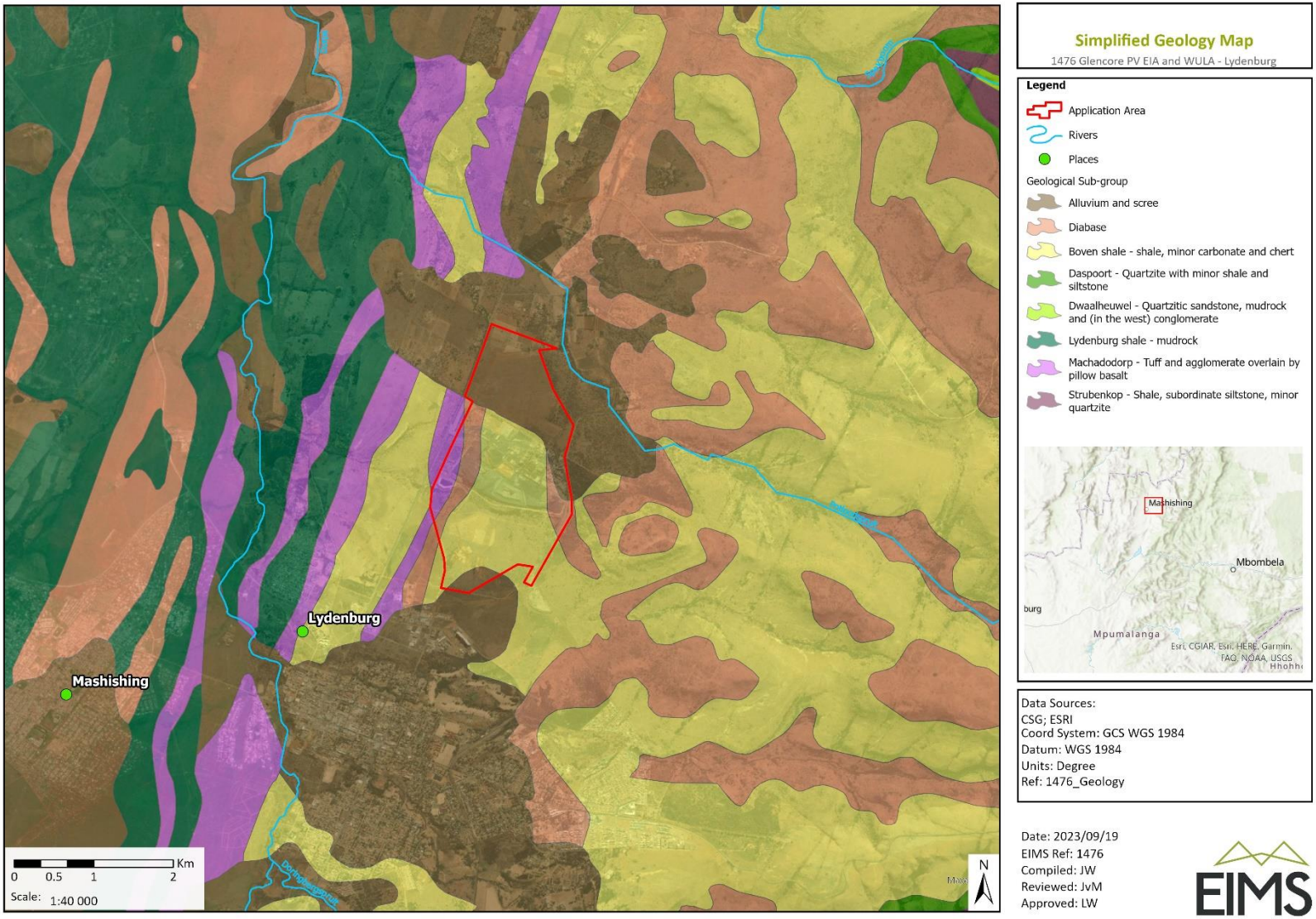


Figure 21: Lydenburg Geological Map.

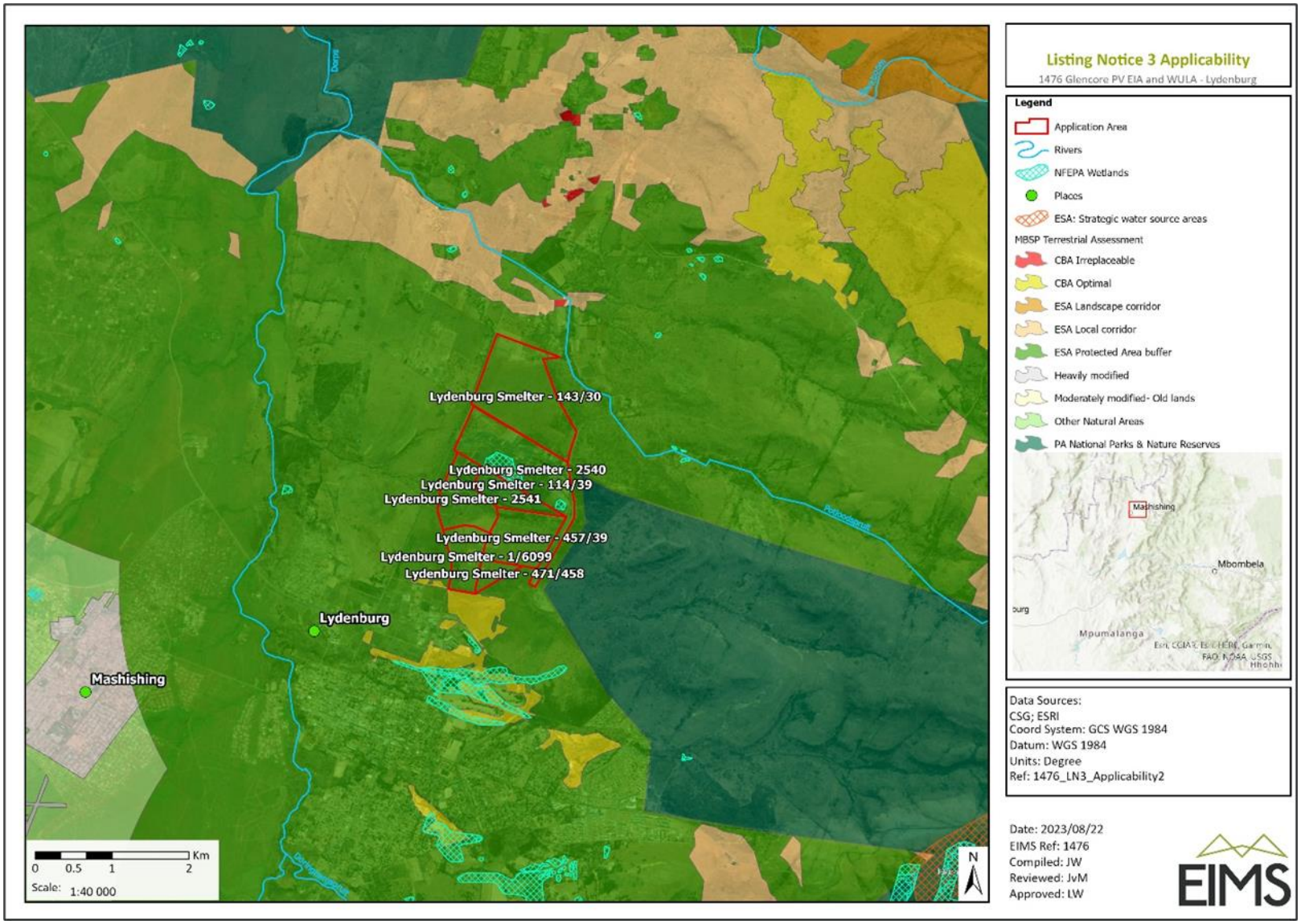


Figure 22: Site Conservation Plan Map

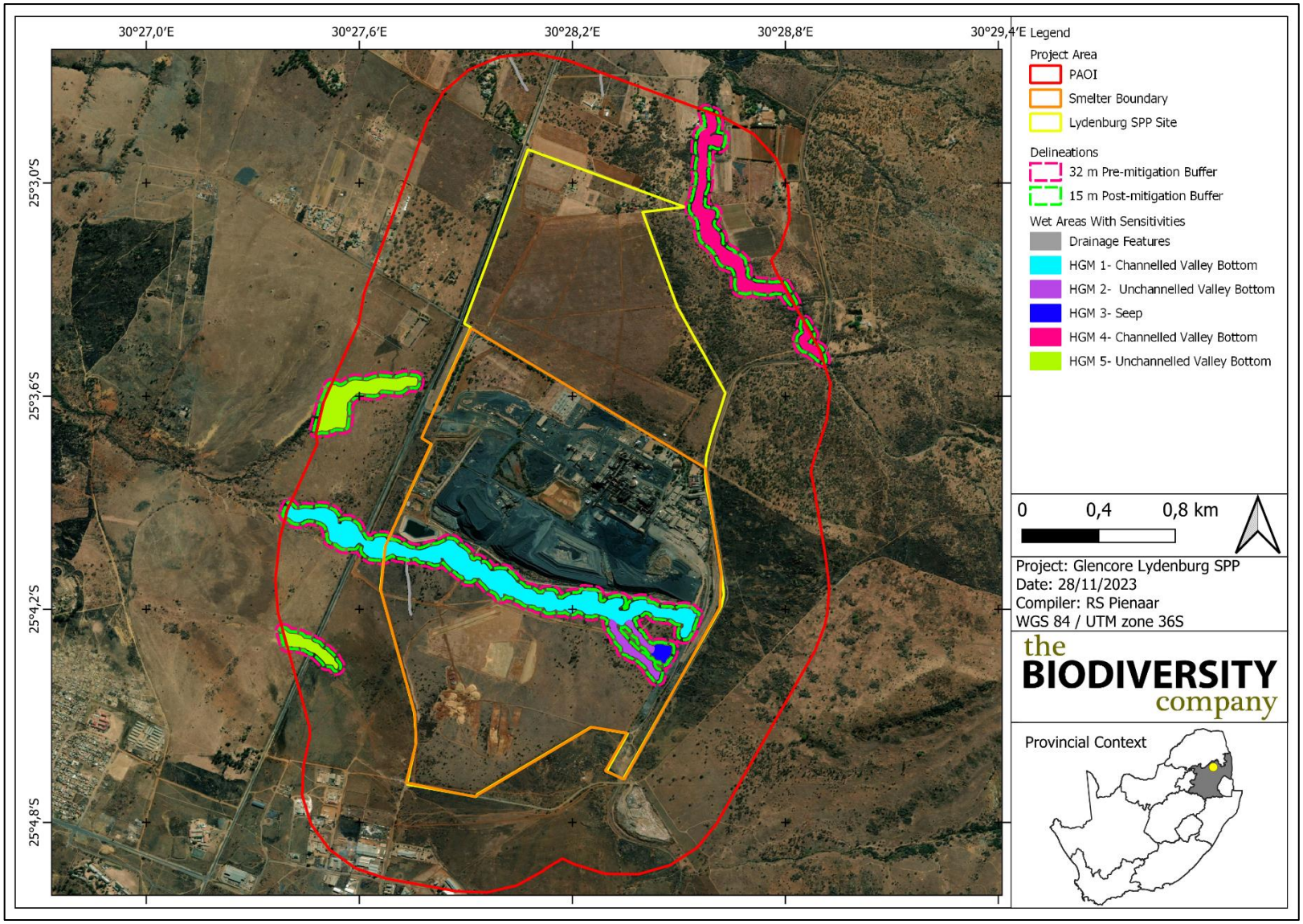


Figure 23: Delineation and location of the different HGM units identified within the Project Area.

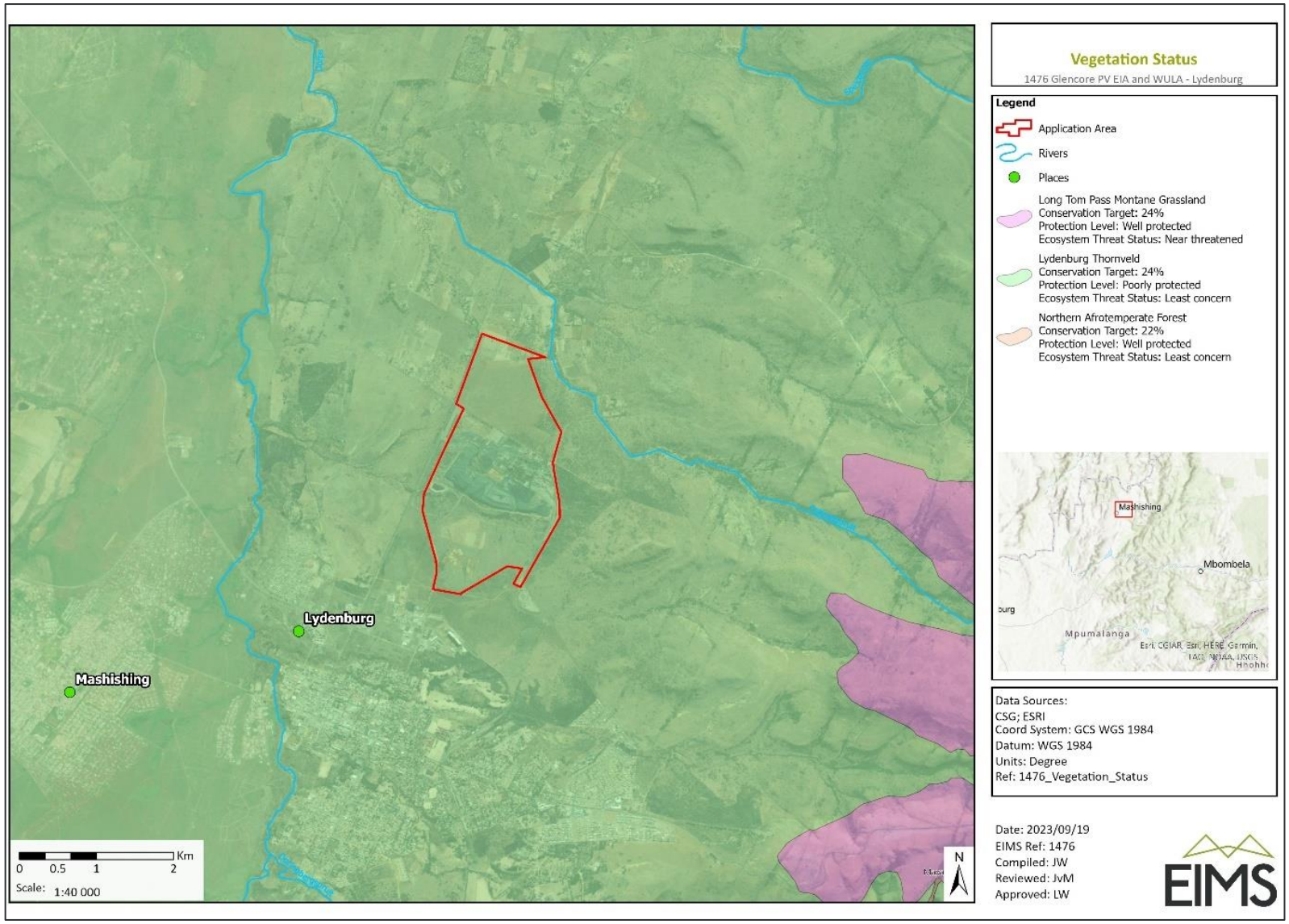


Figure 24: Site Vegetation Status Map

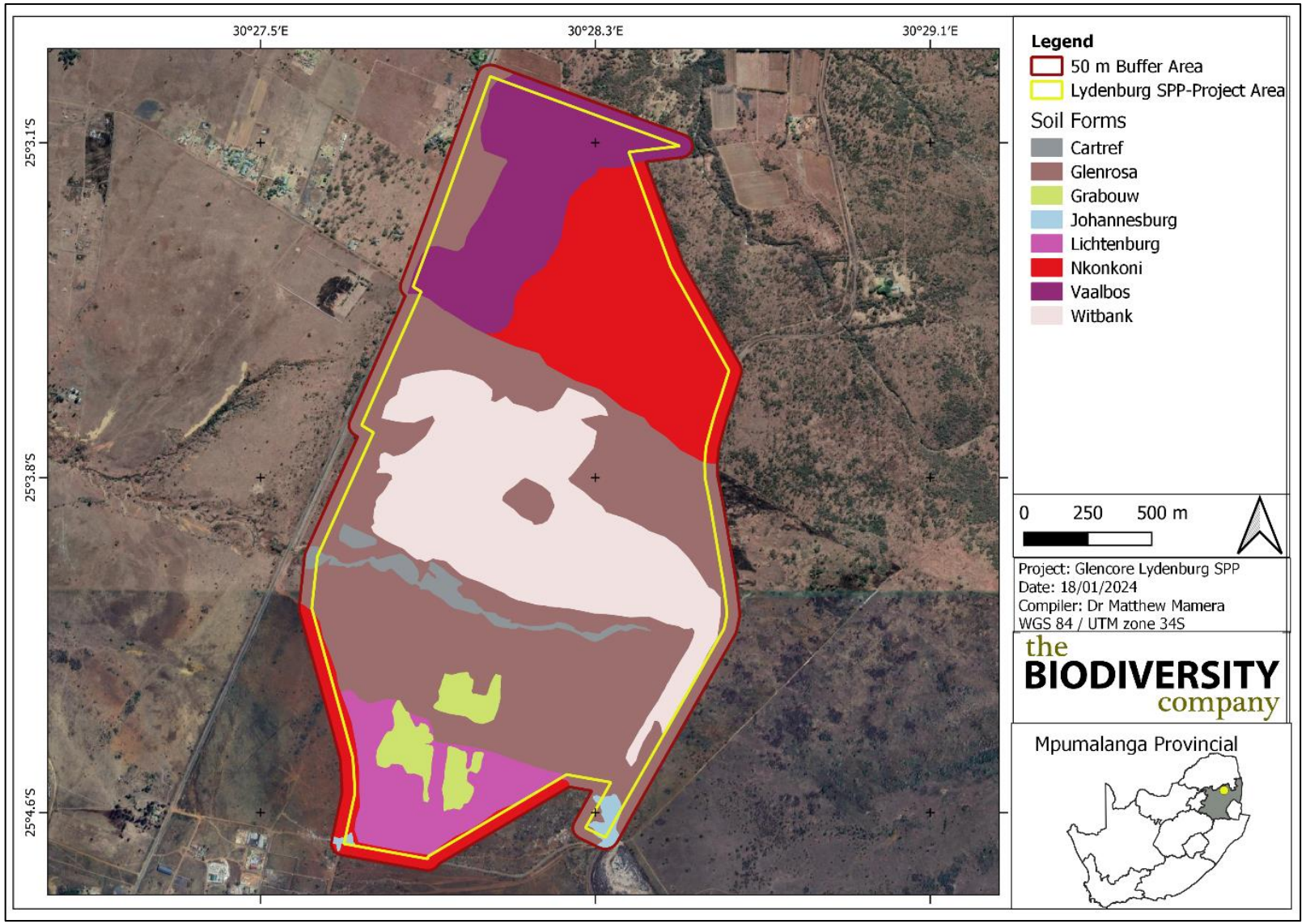


Figure 25: Soil types covering the study area.

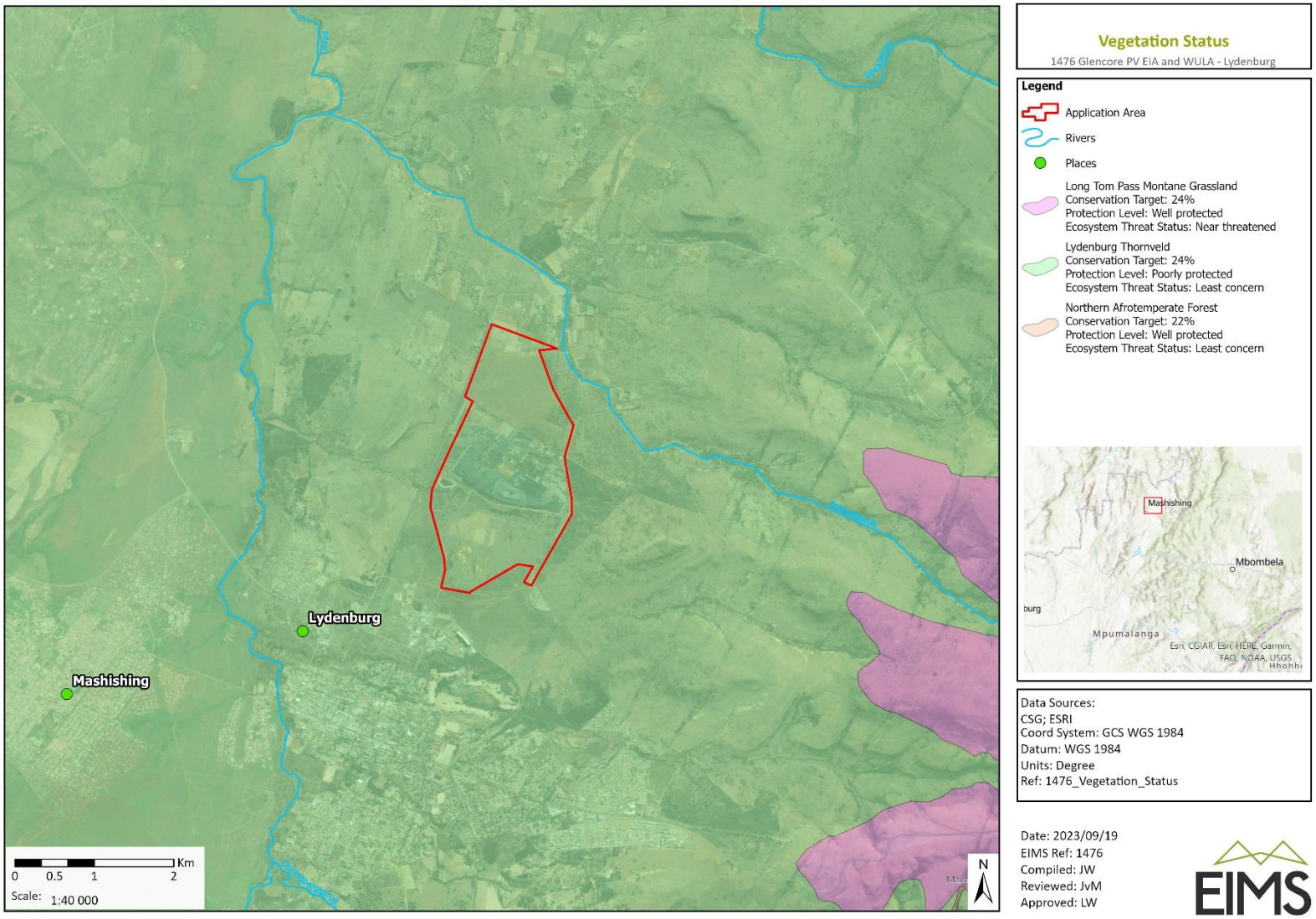


Figure 26: Study area vegetation

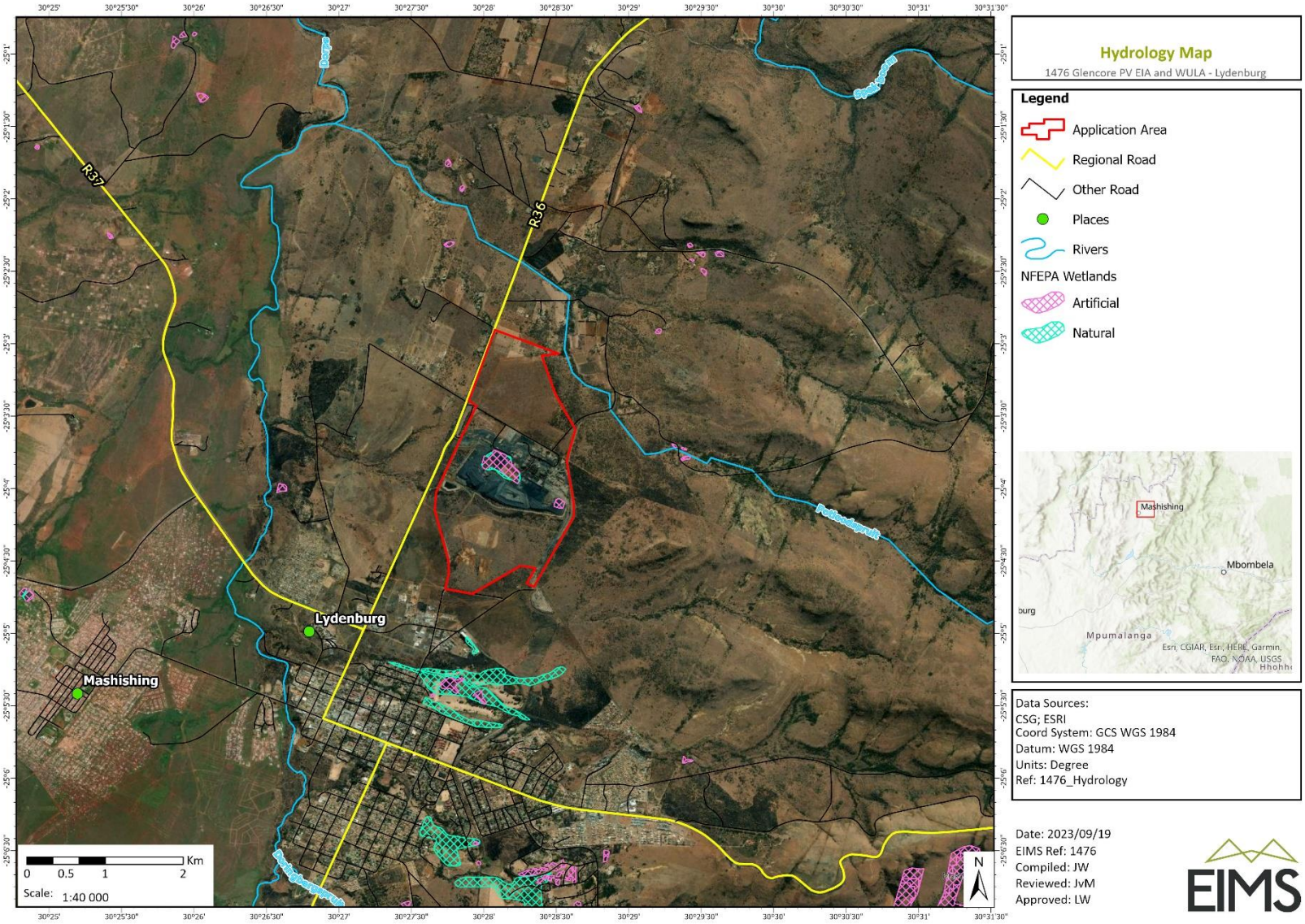


Figure 27: Hydrological Features Surrounding the proposed project area.

## 9.12 SURROUNDING LAND USES AND DEMOGRAPHICS

### 9.12.1 LAND USES

Thaba Chweu Local Municipality area comprises of urban, rural and tribal areas (villages), which each have its own characteristics. Accordingly, land use in the rural areas are mainly characterised by forestry and other agricultural and farming uses, mining as well as tourism attractions that form an integral part of the spatial structure of these areas. In this regard the area is well known for the many areas of geological and historical interest, scenic beauty and natural vegetation, such as waterfalls; passes; gorges; rivers; dams, etc. The municipality as a result boasts several nature reserves as proclaimed. According to the integrated development plan and deeds offices, the properties owned by the applicant are demarcated for industrial use except for farm portion 143/30 which is zoned agricultural. However, a rezoning process is currently in progress to rezone this property to industrial as well.

The study area is separated into two portions by the Smelter, namely, the southern section and the northern section with the Smelter in the centre (see Figure 1). The area surrounding the study area is largely open veld to the east and west, industries and residential areas to the south, homesteads, and small lodging establishment to the north. See Figure 2 for a map of the landcover in and around the proposed development sites. The extended surrounding areas including residentials areas, protected areas, mining, grasslands and agricultural fields. Based on the Global Land Cover SHARE (GLC-SHARE) 2014 database by Latham et al., (2014), the area within 3 kilometers of Lydenburg is covered by grassland (73%) and artificial surfaces (25%), within 16 kilometers by grassland (60%) and cropland (21%), and within 80 kilometers by grassland (34%) and cropland (33%).

### 9.12.2 DEMOGRAPHICS AND EMPLOYMENT STATISTICS

#### *9.12.2.1* EHLANZENI DISTRICT MUNICIPALITY

The information presented in this section was summarized from the Department of Cooperative Governance and Traditional Affairs (CoGTA) (2020), StatsSA, 2016 by Wazimap and the TCLM IDP 2022-2027. The Ehlanzeni District Municipality is one of the three district municipalities that form part of the Mpumalanga province. Municipality is bordered by Mozambique and Swaziland in the east, Gert Sibande District in the south, Mopani and Sekhukhune Districts of Limpopo in the north and Nkangala District Municipality in the west. The district comprises four local municipalities of Bushbuckridge, City of Mbombela, Nkomazi and Thaba Chweu. The municipality also comprises a District Management Area (DMA) in the southern part of Kruger National Park. With the incorporation of Bushbuckridge into Ehlanzeni the total area coverage of the district is approximately 27,895.47 $Km^2$.

The district is based in Nelspruit the provincial capital of Mpumalanga. Its main route the N4 Maputo corridor transverse the district from the east of Maputo harbour – that is in Mozambique – through Gauteng province to the North-West Province in the west; and the R40 Maputo sub-corridor transverse the district from Barberton in the south linking Swaziland to Phalaborwa that is Limpopo Province in the north.

According to the CoGTA (2020), with the population of 1 856 753 people in 2019, the Ehlanzeni District Municipality houses about 40% of Mpumalanga province's population and 3.2% of South Africa's total population. The number of people without any schooling in the District stands at 47.8%. In 2018, there were 1.24 million people living in poverty, using the upper poverty line definition, across the Ehlanzeni District. The percentage of people living in poverty has however decreased from 74.85% in 2008 to 67.27% in 2018. In the Ehlanzeni District Municipality, the economic sectors that recorded the largest number of employment in 2019 were the trade sector with a total of 111 000 employed people or 24.1% of total employment in the district municipality. The community services sector with a total of 102 000 (22.2%) employs the second highest number of people relative to the rest of the sectors. The electricity sector with 3 100 (0.7%) is the sector that employs the least number of people in Ehlanzeni District Municipality, followed by the mining sector with 7 760 (1.7%) people employed (see Figure 28 obtained from CoGTA, 2020).

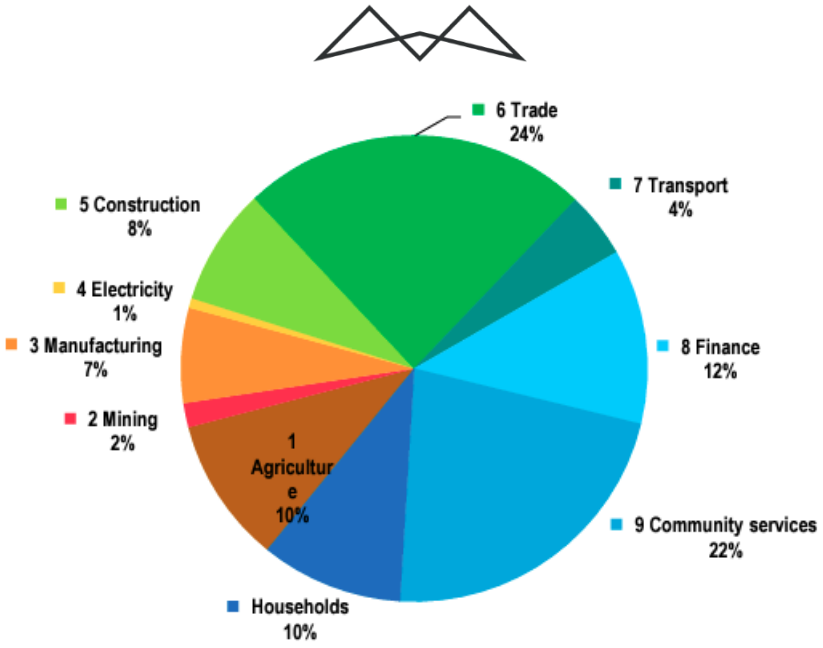


Figure 28: Total Employment Composition of Ehlanzeni District Municipality (CoGTA, 2020).

In 2019, there were a total number of 262 000 people unemployed in Ehlanzeni, which is an increase of 118 000 from 144 000 in 2009. The total number of unemployed people within Ehlanzeni constitutes 43.41% of the total number of unemployed people in Mpumalanga Province. The Ehlanzeni District Municipality experienced an average annual increase of 6.15% in the number of unemployed people, which is worse than that of the Mpumalanga Province which had an average annual increase in unemployment of 5.39% (CoGTA, 2020).

#### *9.12.2.2* THABA CHWEU LOCAL MUNICIPALITY

Thaba Chweu Local Municipality (TCLM) is located on the western part of the district and it derives its name from Sesotho meaning “white mountain” as the municipal area is surrounded by mountains and it is also misty. Its extent is 5 719km² and the escarpment that runs through Thaba Chweu divides the locality into eastern and western halves. The western half (Lydenburg area) is dominated by agricultural and farming activities, while forestry is the main economic activity of the eastern half (Sabie/Graskop area). Thaba Chweu is one of the major tourist attraction areas in South Africa. Mashishing (previously Lydenburg) is the oldest town in the province, and a hub of heritage where the famous Lydenburg Heads, which are said to date back to 400AD, were found in the 1950s. Also found here are old stone houses. Most of all, this is the home of trout fishing. Graskop is home to the Three Rondavels, The Blyde Canyon, Potholes, God’s Window, The Pinnacle, Berlin, Lisbon, and Graskop Falls, all of which are World Heritage Sites, and form the Panorama Route. In the Sabie area, when travelling east of Mashishing through the Long Tom Pass, there are hectares of pine plantations. These mountains are part of the Drakensberg Mountain Range. The main economic sectors are mining, forestry, agriculture, business services, and tourism (CoGTA, 2020).

According to the Census results of Stats SA the TCLM population size in 2011 was 98387, 2016 it stood at 101 895, and in 2019 projections for 2022 were standing at 121 966 (TCLM, 2021). According to these statistics there is an increase in population size from 2011 to 2022 and we will experience a further increase in the population. This is due to migration and the high unemployment rate across all the neighbouring provinces/towns leading people to flock into Thaba Chweu as there are a few economic pull factors into the area (TCLM, 2021). Similarly to the district and provincial dynamics, TCLM the dominant race within TCLM is Black African with 84,962, over 80% of the population and followed by White group with just under 15% of the population (see Figure 29).

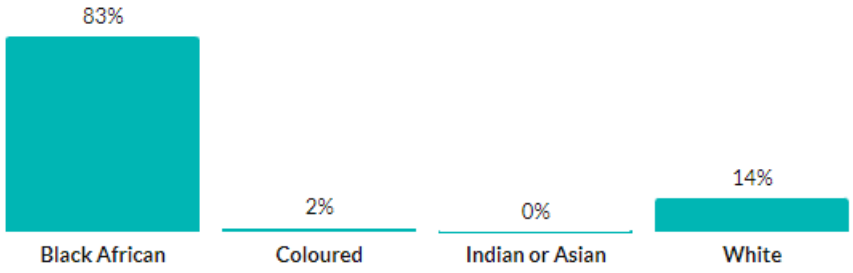


Figure 29 Population by race (Wazimap-StatsSA, 2016).

The graph above (Figure 29**)** presents the status quo in terms of the percentage of ethnic/race groups within TCLM. It shows that blacks/black people are the most dominant in the year 1996, 2001 and 2011 followed by whites/white people. This means that the municipal planning in terms of socioeconomic related up-liftment programmes and projects must target groups or speak or respond to the race with the highest percentage. The municipal plans have taken note of this information and are responding (through prioritisation of programmes and projects) to these figures through its relevant sector plans. Although there is still a huge backlog for most black households for basic infrastructure provision. The IDP development approach has identified all areas with black/black people dominance for basic service delivery back-log intervention and to address some of the- socio-economic challenges facing this race although the impact will be realised over a medium to long term period. Sepedi is the language most spoken at home, a little higher than the figure in Ehlanzeni (39.31%) and more than 1.5 times the figure in Mpumalanga (23.81%). The other more common languages in the area are Siswati and Afrikaans (see Figure 30). Language plays a key role in the PPP and has been factored into the communication methods implemented for this project.

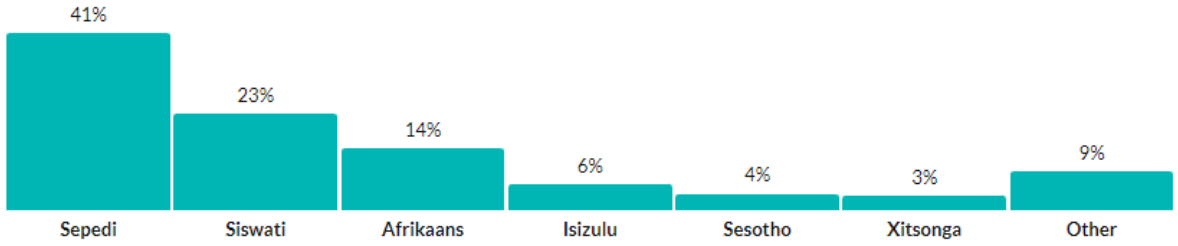


Figure 30: Population by language most spoken (Wazimap-StatsSA, 2016).

According to the socio-economic profile conducted by the department of economic development and tourism the provincial poverty rate stood at 50,2% in 2020 and this was seen last in 2009 on the poverty rate. The recorded percentage is due to the unemployment rate of the economically active group. The unemployment rate of Thaba Chweu in 2020 was 30,9% which increased from 24,2 in 2016. The table below outlines the poverty rate of Thaba Chweu as in 2015 and it outlined that it was at 21,0 which was an increase from 18,9% in 2011. This indicates that the poverty rate is continuously increasing as people migrate into Thaba Chweu at the quest of socio-economic benefits (TCLM, 2016).

## 9.13 SITE SPECIFIC PHOTOGRAPHS

Photographs were taken in all eight major directions from approximately the center of both the northern and southern sections of the proposed project area to give a visual indication of the site-specific attributes. The table of figures below, Table 23, includes all the photos in the eight major directions.

Table 23: Table of figures showing photos of the status quo of the proposed project area

**Northern Section (Northern Property)**

**Existing building structures.**

**Generally low laying grass.**

**Thick vegetation along the eastern boundary.**

**Subsistence farming and agricultural activities.**

**Smelter Plant Area (Central Properties)**

**Main access road and existing services including Eskom Switching station.**

**Smelter Plant, currently non-operational.**

**Internal gravel roads and areas of thick intact vegetation.**

**Disturbed, low laying grass, pockets of shrubs and tailings facility.**

**Southern Section (Southern Property)**

**Existing building structures.**

**Large scar of cleared vegetation and exposed soil (bare land).**

**Low laying grassland with alien vegetation towards the centre and areas of thick intact vegetation towards the edges.**

**Thick intact vegetation which links to the vegetation of the nature reserve adjacent to the study area.**

# 10 ENVIRONMENTAL IMPACT ASSESSMENT

This section aims to identify and do a preliminary assessment on the potential environmental impacts associated with the proposed PV facility. This impact assessment will be used to guide the identification and selection of preferred alternatives, and management and mitigation measures, applicable to the proposed activities. The preliminary assessment will also serve to focus the subsequent EIA phase on the key issues and impacts.

## 10.1 PROCEDURE

The impact significance rating methodology, as presented herein and utilised for all EIMS Impact Assessment Projects, is guided by the requirements of the NEMA EIA Regulations 2014 (as amended). The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/ likelihood (P) of the impact occurring. The ER is determined for the pre- and post-mitigation scenario. In addition, other factors, including cumulative impacts and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the ER to determine the overall significance (S). The impact assessment will be applied to all identified alternatives.

### 10.1.1 DETERMINATION OF ENVIRONMENTAL RISK

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER). The environmental risk is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and Reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$C = \frac{(E + D + M + R) * N}{4}$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 24 below.

Table 24: Criteria for Determining Impact Consequence.

| Aspect | Score | Definition |
|---|---|---|
| Nature | - 1 | Likely to result in a negative/ detrimental impact |
| | +1 | Likely to result in a positive/ beneficial impact |
| Extent | 1 | Activity (i.e. limited to the area applicable to the specific activity) |
| | 2 | Site (i.e. within the development property boundary) |
| | 3 | Local (i.e. the area within 5 km of the site) |
| | 4 | Regional (i.e. extends between 5 and 50 km from the site) |
| | 5 | Provincial / National (i.e. extends beyond 50 km from the site) |
| Duration | 1 | Immediate (<1 year) |
| | 2 | Short term (1-5 years) |
| | 3 | Medium term (6-15 years) |

| | | |
|---|---|---|
| | 4 | Long term (15-65 years), the impact will cease after the operational life span of the project) |
| | 5 | Permanent (>65 years), no mitigation measure of natural process will reduce the impact after construction) |
| Magnitude/ Intensity | 1 | Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected) |
| | 2 | Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected) |
| | 3 | Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way, moderate improvement for +ve impacts) |
| | 4 | High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease, high improvement for +ve impacts) |
| | 5 | Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease, substantial improvement for +ve impacts) |
| Reversibility | 1 | Impact is reversible without any time and cost. |
| | 2 | Impact is reversible without incurring significant time and cost. |
| | 3 | Impact is reversible only by incurring significant time and cost. |
| | 4 | Impact is reversible only by incurring prohibitively high time and cost. |
| | 5 | Irreversible Impact. |

Once the C has been determined, the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/ scored as per Table 25.

Table 25: Probability Scoring.

| | | |
|---|---|---|
| Probability | 1 | Improbable (the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%), |
| | 2 | Low probability (there is a possibility that the impact will occur; >25% and <50%), |
| | 3 | Medium probability (the impact may occur; >50% and <75%), |
| | 4 | High probability (it is most likely that the impact will occur- > 75% probability), or |
| | 5 | Definite (the impact will occur), |

The result is a qualitative representation of relative ER associated with the impact. ER is therefore calculated as follows:

$$\boldsymbol{ER = C \; x \; P}$$

Table 26: Determination of Environmental Risk.

| | | | | | | |
|---|---|---|---|---|---|---|
| Consequence | 5 | 5 | 10 | 15 | 20 | 25 |
| | 4 | 4 | 8 | 12 | 16 | 20 |
| | 3 | 3 | 6 | 9 | 12 | 15 |
| | 2 | 2 | 4 | 6 | 8 | 10 |
| | 1 | 1 | 2 | 3 | 4 | 5 |
| | | 1 | 2 | 3 | 4 | 5 |
| | | Probability | | | | |

The outcome of the environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in Table 27.

Table 27: Environmental Risk Scores.

| ER Score | Description |
|---|---|
| <9 | Low (i.e. where this impact is unlikely to be a significant environmental risk/ reward). |
| ≥9 ≤17 | Medium (i.e. where the impact could have a significant environmental risk/ reward), |
| >17 | High (i.e. where the impact will have a significant environmental risk/ reward). |

The impact ER will be determined for each impact without relevant management and mitigation measures (pre-mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed/mitigated.

### 10.1.2 IMPACT PRIORITISATION

Further to the assessment criteria presented in the section above, it is necessary to assess each potentially significant impact in terms of:

- Cumulative impacts; and
- The degree to which the impact may cause irreplaceable loss of resources.

To ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impact ER (post mitigation). This prioritisation factor does not aim to detract from the risk ratings but rather to focus the attention of the decision-making authority on the higher priority/significance issues and impacts. The PF will be applied to the ER score based on the assumption that relevant suggested management/mitigation impacts are implemented.

Table 28: Criteria for Determining Prioritisation.

| | | |
|---|---|---|
| Cumulative Impact (CI) | Low (1) | Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change. |
| | Medium (2) | Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change. |

| | | |
|---|---|---|
| | High (3) | Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/ definite that the impact will result in spatial and temporal cumulative change. |
| **Irreplaceable Loss of Resources (LR)** | Low (1) | Where the impact is unlikely to result in irreplaceable loss of resources. |
| | Medium (2) | Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited. |
| | High (3) | Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions). |

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 5. The impact priority is therefore determined as follows:

$$\boldsymbol{Priority = CI + LR}$$

The result is a priority score which ranges from 2 to 6 and a consequent PF ranging from 1 to 1.5 (Refer to Table 29).

Table 29: Determination of Prioritisation Factor.

| Priority | Prioritisation Factor |
|---|---|
| 2 | 1 |
| 3 | 1.125 |
| 4 | 1.25 |
| **5** | 1.375 |
| **6** | 1.5 |

In order to determine the final impact significance, the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is an attempt to increase the post mitigation environmental risk rating by a factor of 0.5, if all the priority attributes are high (i.e. if an impact comes out with a high medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a high significance).

Table 30: Final Environmental Significance Rating.

| Significance Rating | Description |
|---|---|
| <-17 | High negative (i.e. where the impact must have an influence on the decision process to develop in the area). |
| ≥-17, ≤-9 | Medium negative (i.e. where the impact could influence the decision to develop in the area). |
| >-9, < 0 | Low negative (i.e. where this impact would not have a direct influence on the decision to develop in the area). |
| 0 | No impact |

| | |
|---|---|
| >0, <9 | Low positive (i.e. where this impact would not have a direct influence on the decision to develop in the area). |
| ≥9, ≤17 | Medium positive (i.e. where the impact could influence the decision to develop in the area). |
| >17 | High positive (i.e. where the impact must have an influence on the decision process to develop in the area). |

The significance ratings and additional considerations applied to each impact will be used to provide a quantitative comparative assessment of the alternatives being considered. In addition, professional expertise and opinion of the specialists and the environmental consultants will be applied to provide a qualitative comparison of the alternatives under consideration. This process will identify the best alternative for the proposed project.

## 10.2 IDENTIFICATION AND ASSESSMENT OF IMPACTS

Potential environmental impacts were identified during the Scoping phase and have been assessed in the EIA phase. These impacts were identified by the EAP, the appointed specialists, as well as information received from the public. Section 10 provides the list of impacts identified during the Scoping phase and assessed during EIA phase. Moreover Table 31 presents the combined details of the impact assessment calculations undertaken towards determining the pre- and post-mitigation impact significance, as well as the final significance scores.

Without proper mitigation measures and continual environmental management, most of the identified impacts may potentially become cumulative, affecting areas outside of their originally identified zone of impact. The potential cumulative impacts have been identified, evaluated, and mitigation measures suggested which have been updated during the detailed EIA phase level of investigation. When considering cumulative impacts, it is vitally important to bear in mind the scale at which different impacts occur. There is potential for a cumulative effect at a broad scale, as well as finer scale effects occurring in the area surrounding the activity. The main impacts which have a cumulative effect on a regional scale are related to the transportation vectors that they act upon. At a finer scale, there are also impacts that have the potential to result in a cumulative effect, although due to the smaller scale at which these operate, the significance of the cumulative impact is lower in the broader context.

### 10.2.1 PLANNING PHASE IMPACTS

#### *10.2.1.1* IMPACTS ON EXISTING INFRASTRUCTURE AND SERVICES

During the planning phase, existing infrastructure and services in and around the proposed location for the PV facility could be impacted on by the proposed activities. Construction could lead to the destruction of existing infrastructure. Overuse or pollution of water sources within the study area could negatively effect on surrounding land users. The significance of the impact, however, is rated as medium negative before and low negative after mitigation as the proposed activities are located within the mining area and is largely surrounded by mine infrastructure. The only other infrastructure potentially affected would be the infrastructure related to the homestead and/or subsistence farming in the northern section.

(i) Mitigation measures

- Identify all infrastructure and services within proximity of the proposed facility during the planning phase and attempt to plan around the identified infrastructure and services as far as reasonably possible.
- Communicate with surrounding land users to help identify existing infrastructure and services within the area.

(ii) Cumulative Impacts

- Destruction of existing infrastructure or obstruction of existing services during construction could impact on surrounding land users within the vicinity of the proposed PV facility.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss on existing infrastructure or services are foreseen as a result of the proposed activity. If existing infrastructure is damaged or services hindered, it will incur a cost to the applicant.

#### *10.2.1.2* IMPACTS DUE TO COMMUNICATION INEFFICIENCY

Communication is important as to notify I&APs about the proposed project and activities. It will give them clarity on how their livelihoods or businesses could possibly be impacted on by the proposed activities. Open and clear communication will allow I&APs to comment on any queries or concerns that they might have as well as to inform the EIA. Communication will also allow the local community of possible vacancies. If communication is not transparent it could lead to uninformed decisions by the applicant, uprisings by an unhappy community and an incomplete EIA which could lead to an ungranted Environmental Authorisation. The impact significance is rated as being medium negative before mitigation, but low negative if the mitigation measures are applied.

(i) Mitigation measures

- Clear and transparent communication with the authorities and all affected and surrounding I&APs about the proposed project and activities as well as possible vacancies.
- Keep a register with any complaints from stakeholders/ I&APs and address them appropriately.

(ii) Cumulative Impacts

- Non-transparent communication could lead to bad decision making which might affect livelihoods in the surrounding community.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected as a result of communication inefficiency during the planning phase.

#### *10.2.1.3* IMPACTS ON HERITAGE AND PALAEONTOLOGICAL RESOURCE

The fieldwork for the updated HIA undertaken in 2024 identified total of four heritage features and resources were identified. These consist of three Iron Age/ agro-pastoral sites (LS001, LS003 and LS004), and one structure which is and old school building (LS002). Site **LS001** and **LS002** are likely related to the Bakoni and are significant regarding better understanding the complex settlement patterns of these sites that occur throughout the Mpumalanga escarpment area, and therefore have great research value. Site **LS001** is in a good state of preservation and worthy of conservation, or at the least subject to a phase II mitigation. Site **LS002** is disturbed and not worthy of conservation, however, due to the grinding stones and possible middens present, should also be subject to phase II mitigation. The school structure (**LS003**) is not presented on the 1969 first edition maps, but is on the 1988 second edition topographic maps, and is therefore not older than 60 years.

The pre-mitigation impact on the identified archaeological sites located within the application area is calculated as HIGH negative. Implementation of the recommended mitigation measures will reduce the impact to MEDIUM positive.

The pre-mitigation impact on the identified structures located within the footprint of the exploration area is calculated as LOW negative. Implementation of the recommended mitigation measures will reduce the impact to LOW positive

(i) Mitigation measures

- All burial grounds and graves should be retained and avoided with a **buffer zone of 30m** as per SAHRA guidelines. If this is not possible, the graves could be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of s36 of the NHRA and its regulations as well as the National Health Act and its regulations.

- The school has no conservation value and requires no further mitigation. Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA
- Implement a chance to find procedures in case where possible heritage finds are uncovered

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of impacts on heritage and palaeontological resources during Planning.

(iii) Irreplaceable loss of Resources

- Although unlikely, if any palaeontological resources are unearthed and destroyed, it will be irreplaceable.

#### *10.2.1.4* IMPACTS ON SOIL

The primary impacts in the Project Area include Loss of land capability. The impacts during the planning phase are both manageable and minor, with effective mitigation strategies. The location of the site is within the existing mine area for the smelter and is almost entirely surrounded by mining infrastructure. Therefore it is not feasible for the site to be used for agricultural purposes while there are operational activities.

(i) Mitigation measures

- A stormwater management plan must be developed and implemented for the project; and
- If soil erosion is detected, the area must be stabilised using geo-textiles and facilitated re-vegetation

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of impacts on heritage and palaeontological resources during planning phase.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected as a result of impact on soil during the Planning phase.

#### *10.2.1.5* IMPACTS ON TERRESTRIAL BIODIVERSITY AND AVIFAUNA

The primary impacts in the Project Area include habitat degradation, loss, and fragmentation due to ongoing mining activities, negatively affecting both terrestrial and avifaunal biodiversity. Risks to bird species include habitat loss, collisions, and electrocution. Water Resources were rated “high” sensitivity due to their resilience, despite disturbances. These negative impacts can be reduced through mitigation measures like retaining indigenous vegetation and minimizing infrastructure-related risks to wildlife.

(i) Mitigation measures

- The design of the proposed transmission line must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins *et al.,* 2017).
- Infrastructure must be consolidated where possible in order to minimise the amount of ground and air space used.
- All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution, and
- Any exposed parts must be covered (insulated) to reduce electrocution risk.
- If fencing is required: wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area

- Any holes/deep excavations must be dug in a progressive manner and shouldn't be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in. Holes must be subsequently inspected for fauna prior to backfilling

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of impacts on heritage and palaeontological resources during planning phase.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected as a result of impact on soil during the planning phase.

#### *10.2.1.6* SOCIAL IMPACTS

The primary impacts in the project area include effects on cultural heritage, spirit, and sense of place. Three Iron Age/Agro-pastoral Bokoni homestead sites were found, rich in heritage and requiring a 30-meter buffer zone. These sites may contain stillborn burials, which must be preserved or relocated following strict guidelines. The area's high heritage sensitivity emphasizes protecting these cultural assets.

The "spirit of place," which draws tourism and reflects the area's unique heritage and biodiversity, will be affected by noise, visual changes, and construction activities. Visual impacts like vegetation clearing, glare from solar panels, and increased traffic will alter the sense of place. However, these impacts will be temporary during construction, and as the community adapts, the visual effects will lessen, with the benefits of renewable energy and job creation compensating over time.

(i) Mitigation measures

- All mitigation measures contained in the Heritage Impact Assessment (PGS Heritage Impact Assessment, 2024) must be implemented.
- Infrastructure must be consolidated where possible in order to minimise the amount of ground and air space used.

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of impacts on heritage and palaeontological resources during planning phase.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected as a result of impact on soil during the Planning phase.

### 10.2.2 CONSTRUCTION PHASE IMPACTS

#### *10.2.2.1* IMPACT ON TERRESTRIAL BIODIVERSITY AND AVIFAUNA

The Project Area is predominantly made up of modified, degraded habitat units attributed to the ongoing mining activities recorded. Although the PAOI falls within ESA ecosystems, ongoing disturbances and impacts associated with the aforementioned activity will impede on the long-term recovery of the site to a more natural state. Completion of the terrestrial biodiversity assessment led to a disputing of the 'Very High' classification for the terrestrial biodiversity theme sensitivity as allocated by the National Environmental Screening Tool. The Project Area is instead assigned an overall 'Low' sensitivity with the degraded grassland habitat unit being assigned the same 'Low' sensitivity rating, and the habitat unit wherein mining activities are recorded being assigned a 'Very Low' sensitivity rating. The transformed grassland habitat unit that has previously been exposed to anthropogenic pressures attributed to livestock farming was originally assigned a 'Medium' sensitivity rating owing to the presence of indigenous flora species that were previously listed. However, if indigenous vegetation beneath the PV panels is retained, and pending the completion of an ecological site walkdown to located potential flora and fauna SCCs that may occur within the Project Area, this sensitivity will be reduced to 'Low

Avifaunal habitats could also be affected by the proposed construction of the facility. Vegetation in the area is still mostly in a natural state. Unmitigated, the development of this site could have a negative impact to the

surrounding habitats. The sites may support a number of general avifauna species, and the development will still lead to habitat loss and fragmentation.

Based on the SABAP2 and CWAC data, 335 avifauna species are expected for the Project Area and surrounds. Of these, 17 are considered SCC, with two species having a high likelihood of occurrence (the Lanner Falcon and the Southern Bald Ibis) and nine species having a moderate likelihood of occurrence. No SCC were observed during the surveys however, seven (7) risk species were recorded. These risk species are susceptible to collisions, electrocutions, and habitat loss.

Four Avifaunal habitats were delineated, namely Degraded Thornveld, Degraded Grassland, Transformed, and Water Resources. Majority of the project area was found to be either medium or very low sensitivity disputing the screening tool High sensitivity, with only Water Resources being regarded as a high sensitivity habitat. This rating is based on the resource resilience and the overall disturbed state of the habitat. The collision risk, electrocution risk and loss of habitat are the main impacts, should these be successfully mitigated the overall impact rating can be reduced.

(i) Mitigation measures

- Where possible, existing access routes and walking paths must be made use of.
- All laydown, chemical toilets etc. should be restricted to low sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction/closure phase has been concluded. No storage of vehicles or equipment will be allowed outside of the designated project areas.
- A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment
- Cement must be mixed in a designated area on a liner away from water sources and buffers and that successful rehabilitation of the construction areas can take place.
- Any materials may not be stored for extended periods of time and must be removed from the project area once the construction/closure phase has been concluded. No storage of vehicles or equipment will be allowed outside of the designated project areas.
- The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments and signs must be put up to enforce this.
- Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals.
- All areas to be developed must be walked through prior to any activity to ensure no nests or fauna species are found in the area. Should any species of conservation concern not move out of the area or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken. Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion.
- High sensitivity areas must be avoided for the PV development while the gridline might span these areas and no pylon may be placed in them.
- All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting, or hunting terrestrial species, and owls, which are often persecuted out of superstition. Signs must be put up to enforce this.

- Bird Flappers and diverters must be placed along the whole powerline route, this must be done at 5 m intervals. Overhead cables/lines must be fitted with industry standard bird flight diverters in order to make the lines as visible as possible to collision-susceptible species. Shaw et al (2021) demonstrated that large avifauna species mortality was reduced by 51% (95% CI: 23–68%). Recommended bird diverters such as flapping devices (dynamic device) and thickened wire spirals (static device) that increase the visibility of the lines should be fitted 5 m apart. The Inotec BFD88 bird diverter is highly recommended due to its visibility under low light conditions when most species move from roosting to feeding sites. Any OHLs must be of a design that minimizes electrocution risk by using adequately insulated 'bird friendly' monopole structures, with clearances between live components of 2 m or greater. The design of the proposed transmission line must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins et al., 2017).
- As far as possible, solar panels must be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both below and above-ground biodiversity.

(ii) Cumulative Impacts

- No cumulative impacts are expected on flora and fauna during the construction phase.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected during the construction phase.

#### *10.2.2.2* NOISE GENERATION

Noise will be generated during the construction phase as a result of construction vehicles and heavy machinery working on-site. Noise relating to the construction phase of this project can be described as a nuisance rather than having environmental or health implications. The impact significance is rated as low negative before and after mitigation, as the proposed activities will take place within the mine vicinity where which is already subject to existing noises from the mining processes.

(i) Mitigation measures

- Ensure that all construction vehicles and equipment are in a good working condition as to not generate unnecessary noise.
- The provisions of the South African National Standards (SANS) 10103 (The measurement and rating of environmental noise with respect to annoyance and to speech communication), must be complied with.
- The Environment Conservation Act (Act 73 of 1989) (ECA), Section 25 of the Act and the Noise Regulations (GNR 154 of 1992) promulgated under this section, are still in effect. These regulations serve to control noise and general prohibitions relating to noise impact and nuisance. These regulations need to be complied with.

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of noise during the construction phase.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected as a result of noise during the construction phase.

#### *10.2.2.3* IMPACTS ON SOIL

The most sensitive Lichtenburg and Nkonkoni soil forms found in the proposed project area are characterised by a land potential "4" and ultimately a "Medium" sensitivity due to the poor climate present. The Vaalbos and Cartref soil forms which were also identified within the project area consist of a "Medium" sensitivity. The Glenrosa, Grabouw, Witbank and Johannesburg soil forms which were also identified within the project area

consist of a “Low” sensitivity. The proposed PV development area will have an acceptable negative impact on the agricultural production capability of the area. By field work observation, it is evident that there is active agriculture or crops present and that some of these areas are actively cultivated for the proposed PV area. However, most of these areas are now historical crop fields used for small livestock grazing or grasslands. Further to this, no working irrigation infrastructure, such as centre pivots or drip irrigation are present within the project area and irrigated agricultural is currently not practised in the area. Considering the soil properties, agricultural potential as well as the current land use of the proposed PV development area, the area has a “Medium” agricultural sensitivity.

(i) Mitigation measures

- Bunded (surface sealed with plastic or other impermeable material) areas should be established for:
    - The storage of fuels, oils and hydraulics;
    - The storage of raw materials, such as sand, stone and cement; and
    - Vehicle maintenance.
- All servicing/ maintenance of construction vehicles that could cause harm to the environment must be done off-site. No servicing of construction vehicles is allowed on site, except for minor repairs to prevent further environmental pollution or damage.
- All working fronts must be provided with a spill containment kit to contain and collect spills.
- Any evidence of erosion, scouring, sedimentation, and/or undercutting must be rectified and rehabilitated immediately.
- Speed limits must be put in place to reduce erosion.
- Where possible, existing access routes and walking paths must be made use of.
- Areas that are denuded during construction need to be e-vegetated with indigenous vegetation to prevent the erosion during flood events and strong winds.
- Should erosion become a problem during construction, then diversion berms and drains should be constructed to divert run-off away from exposed areas.
- A detailed Stormwater Management Plan (SWMP) needs to be prepared.
- Adequate stormwater drainage and management is required to prevent soil erosion.

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of impact on soil during the construction phase.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected as a result of impact on soil during the construction phase.

#### *10.2.2.4* IMPACT ON HERITAGE AND PALAEONTOLOGICAL RESOURCES

The fieldwork for the updated HIA undertaken in 2024 identified total of four heritage features and resources were identified. These consist of three Iron Age/ agro-pastoral sites (LS001, LS003 and LS004), and one structure which is and old school building (LS002). Refer to Figure 31.

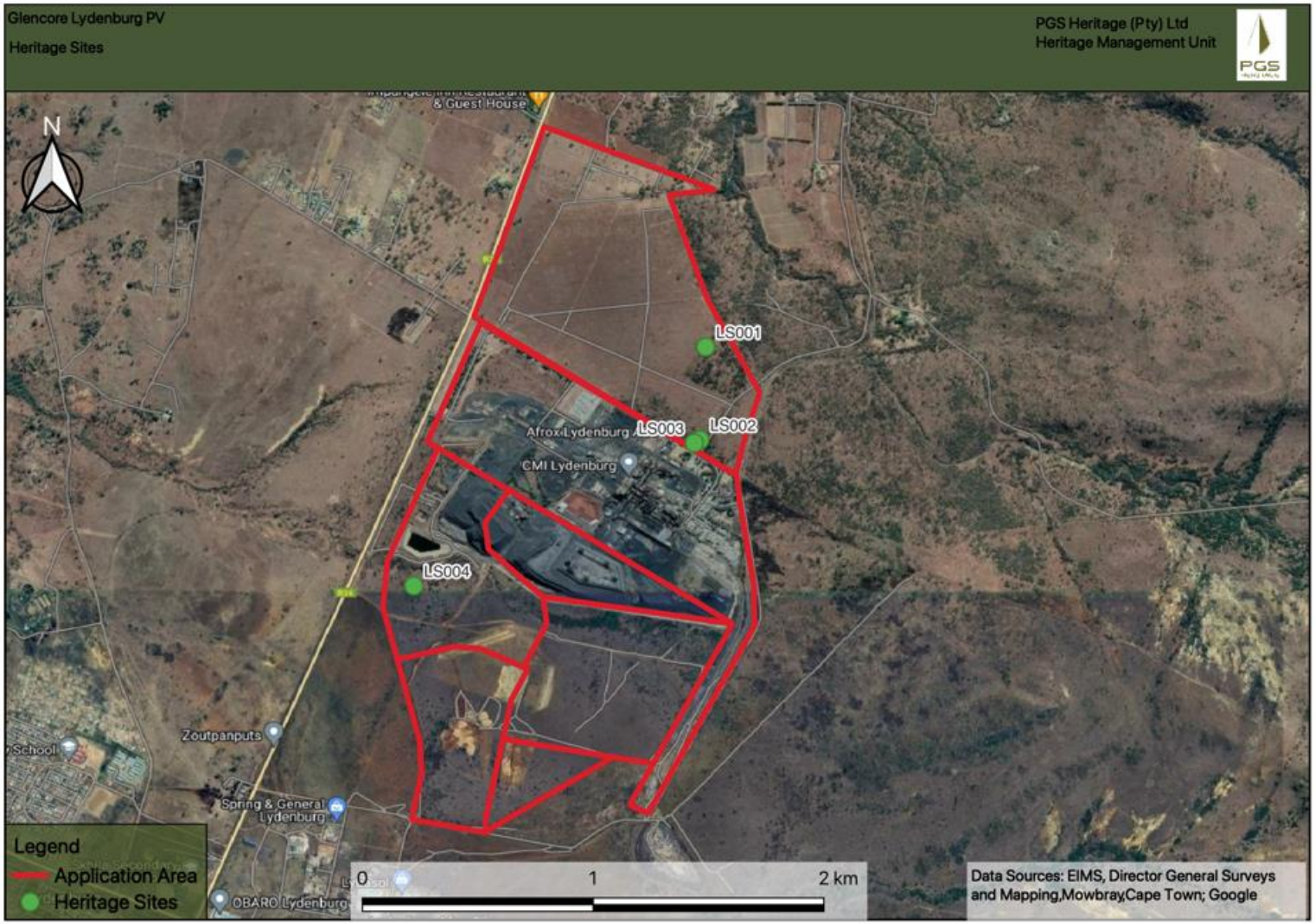


Figure 31: Identified heritage resources within the Project area.

The school structure (LS003) is not presented on the 1969 first edition maps, but is on the 1988 second edition topographic maps, and is therefore not older than 60 years. Three Iron Age/Agro-pastoral sites were located. LS001 is a complex stone-walled Bokoni homestead and is graded as Grade IIIA. Site LS001 Is a classic example of a complex Bokoni homestead. The inner ring-wall, which was identified, separated the domestic area from the livestock area, which occurs in the centre. The inner ring had two clear entrances, which is also a unique feature in precolonial South Africa, according to Delius *et al* (2014). **LS002** was very disturbed and overgrown. It was, therefore, difficult to assess the structure and pattern. There were middens and grinding stones in the vicinity. Site **LS002** has a grading of IIIA.

The Bokoni stone ruins are one of the richest visible and enduring forms of heritage from any group of people living in South Africa before the beginning of colonial times (Delius *et al* 2014). The remains provide historians and archaeologists with the possibility of reconstructing in detail this now-extinct way of life (Delius *et al* 2014). **LS001** and **LS002** are, therefore graded as Grade IIIA and should be avoided with a 30m buffer. If the sites are affected directly, the sites **LS001** and **LS002** will need to be documented during a Phase II mitigation procedure before a destruction permit can be applied for at the South African Heritage Resources Agency.

**LS004** is a single stone wall. The area was also heavily overgrown, and it was difficult to discern any structure or patterning to the site. **LS004** is graded as Grade IIIC. The chance find procedure must be followed in proximity to this site. No other mitigation measures are required.

The possibility of stillborn burials around the structures **LS001** and **LS002** must be considered. As per African custom stillborn children are buried against the outside wall/foundation or inside the house. The structures (**LS001 and LS002**) must then be provisionally grade as Grade IIIA in regard to burials. As per SAHRA guidelines, all burial grounds and graves should be retained and avoided with a buffer zone of 30m. If this is not possible, the graves could be relocated after completion of a detailed grave relocation process that includes a thorough stakeholder engagement component, adhering to the requirements of S36 of the NHRA and its regulations as well as the National Health Act and its regulations

The pre-mitigation impact on the identified archaeological sites located within the application area is calculated as HIGH negative and only focused during the planning phase. Implementation of the recommended mitigation measures will reduce the impact to MEDIUM positive.

The pre-mitigation impact on the identified structures located within the footprint of the exploration area is calculated as LOW negative and only focused during planning phase. Implementation of the recommended mitigation measures will reduce the impact to Low positive.

The proposed project location is largely underlain by the Silverton Formation of the Pretoria Group (Transvaal Supergroup) as well as Quaternary superficial sediments. The Pretoria Group sedimentary rocks in and near the study area are extensively intruded, and locally metamorphosed, by sills of diabase. The diabase has no palaeontological significance. However, the existence of the diabase rocks would have had a thermal metamorphic effect on nearby sediments and would decrease the chance of fossil preservation. According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Silverton Formation (Pretoria Group, Transvaal Supergroup) is High, that of the Quaternary Superficial sediments are Low, while that of the diabase is Zero. Updated geology (2014, Council of Geosciences, Pretoria) indicates that the proposed study area is only underlain by the Silverton Formation (Pretoria Group, Transvaal Supergroup).

Based on desktop research it is concluded that fossil heritage of scientific and conservational interest in the development footprint is rare. This is in contrast with the High Sensitivity allocated to the development area by the SAHRIS Palaeosensitivity Map and DFFE Screening Tool. **A medium Palaeontological Significance has been allocated for the construction phase of the PV development pre-mitigation and a low significance post mitigation**. The construction phase will be the only development phase impacting Palaeontological Heritage and **no significant impacts are expected to impact the Operational and Decommissioning phases**. The No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, will have a Neutral impact on the Palaeontological Heritage of the development.

The Cumulative impacts of the development is considered to be medium pre- mitigation and Low post mitigation and falls within the acceptable limits for the project. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources. It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils

(i) Mitigation measures

- If unearthed, under no circumstances shall any heritage, archaeological or paleontological artefact/ feature be removed, destroyed or interfered with by anyone on the site, unless such removal has been authorised by the heritage authorities. Implement a chance find procedures in case of possible heritage finds are uncovered.
- Site **LS001** and **LS002** are likely related to the Bakoni and are significant regarding better understanding the complex settlement patterns of these sites that occur throughout the Mpumalanga escarpment area, and therefore have great research value. Site **LS001** is in a good state of preservation and worthy of conservation, or at the least subject to a phase II mitigation. Site **LS002** is disturbed and not worthy of conservation, however, due to the grinding stones and possible middens present, should also be subject to phase II mitigation.
- All burial grounds and graves should be retained and avoided with a **buffer zone of 30m** as per SAHRA guidelines. If this is not possible, the graves could be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of s36 of the NHRA and its regulations as well as the National Health Act and its regulations.
- Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or paleontological artefacts as set out in the NHRA (Act No 25 of 1999) Section 51 (1).

(ii) Cumulative Impacts

- The cumulative impacts of the proposed development are assessed as medium pre-mitigation and low post-mitigation regarding palaeontological heritage. These impacts fall within acceptable limits for the project, indicating that the proposed development will not lead to damaging effects on the palaeontological resources in the area.

(iii) Irreplaceable loss of Resources

- Although unlikely, if any palaeontological resources are unearthed and destroyed, it will be irreplaceable.

#### *10.2.2.5* WASTE MANAGEMENT IMPACTS

Waste management impacts were rated as having a low negative significance before and after mitigation. Domestic waste, construction waste and sewage are all waste types that need to be considered during construction. One ton per month of solid waste (rubble) is expected to be generated during construction.

(i) Mitigation measures

- Waste management must be a priority and all waste must be collected and stored effectively.
- The Contractor should inform all site staff to the use of supplied ablution facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities.
- No waste releases into the environment should be permitted.
- The toilets shall be of a neat construction and shall be provided with doors and locks and shall be secured to prevent them from falling over.

- The contractor shall always supply toilet paper at all toilets. Toilet paper dispensers shall be provided in all toilets.
- A dedicated waste collection and storage facility must be prepared, and this should be emptied and collected wastes disposed of on a regular basis. Wastes must be disposed of at suitably licensed waste disposal facilities.
- Contaminated water, and effluents must be prevented from entering the local environment (soil and water), adequately stored in protected and where necessary bunded areas, and disposed of at a suitably licensed disposal facility.
- Vermin / weatherproof bins must be provided in enough numbers and capacity to store domestic waste. These bins must be kept closed to reduce odour build-up and emptied regularly to avoid overfilling and other associated nuisances.
- Each active construction site must be checked daily to ensure that the site is free from litter and unnecessary wastes.
- Hazardous substances, if applicable, must be stored in a secure location, isolated from direct contact with the soils and covered where necessary.
- No waste is to be left on site whether it is biodegradable or not. Unutilised, construction materials are to be removed once construction has ended.

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of waste management impacts during construction.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected as a result of waste management impacts during construction.

#### *10.2.2.6* DUST GENERATION

Dust will be generated as a result of movement of heavy machinery and vehicles on-site during construction. The impact significance was rated as being low negative before and after mitigation.

(i) Mitigation measures

- Haul vehicles carrying potentially dusty material should be covered with a tarp to prevent dust.
- Dust suppression techniques must be implemented on all exposed surfaces during periods of high wind

(ii) Cumulative Impacts

- The additional dust expected to be generated during the construction phase will have a cumulative effect on the overall dust in the area from the mining activities.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected as a result of dust generation during construction.

#### *10.2.2.7* SOCIAL IMPACTS

The proposed Solar PV facility presents several socio-economic and environmental impacts, particularly for nearby communities like Mashishing. Many residents, unable to afford transportation, often walk to work or school, and students resort to hitchhiking. Poor road conditions, especially in townships, combined with increased traffic from construction activities, elevate concerns about pedestrian safety. Additionally, dust generated during construction is a significant health risk, particularly for those with respiratory conditions.

Theft and vandalism pose serious threats to the project, given the area's high crime rates, driven by unemployment and economic disparities. Expensive materials such as solar panels and electrical equipment are

particularly vulnerable, potentially leading to project delays and increased costs.Personal safety concerns may rise with the influx of construction workers, as local communities fear an increase in crime. Unsuccessful job seekers or individuals with criminal intent may contribute to opportunistic crimes such as burglaries and muggings, exacerbating the community's existing social issues, including drug abuse, prostitution, and teenage pregnancies.

There is also potential for community unrest, as residents may feel excluded from employment opportunities. This exclusion could lead to protests or even sabotage of the project infrastructure if expectations around local hiring are not met. The influx of job seekers is likely to place additional strain on already overburdened infrastructure and services, such as housing, water, sanitation, and healthcare. Informal settlements with illegal utility connections further strain municipal services. The Solar PV facility also offers economic benefits, particularly in terms of job creation. During the construction phase, jobs (will be created, with additional employment opportunities during the operational phase.

The project area is also rich in heritage, with three identified Iron Age/Agro-pastoral sites linked to the Bokoni homestead. These sites require protection with a 30-meter buffer zone, and any discovered graves must follow legal relocation procedures. The area is considered to have high heritage sensitivity, and efforts must be made to preserve its cultural significance.The "spirit of place" in the area, characterized by its unique heritage and biodiversity, may be impacted by noise, dust, and visual changes during construction. These impacts, though significant, are expected to be temporary. Over time, the community is likely to adjust to the presence of the solar panels, particularly as the benefits of renewable energy and job creation become more evident.

(i) Mitigation measures

- The applicant and contractors should prioritise the utilisation of local service providers, wherever feasible, for the procurement of building materials, accommodation, meals, fuel, and other relevant services. This approach supports local economic development and ensures broader community benefits from the project.
- Where possible, the applicant should assist local BBBEE-compliant companies with completing and submitting the required tender forms and associated information.
- The applicant should consult the Thaba Chweu Local Economic Development divisions on establishing a local database of service providers.
- Local contractors, who are compliant with Broad-Based Black Economic Empowerment (BBBEE) criteria should be given preference.
- Gender equality must be promoted, in both the awarding of employment opportunities and remuneration.
- Provide training in solar technology and maintenance during both the construction and operational phases to empower local workers and increase employability
- All works must be undertaken in accordance with the Occupational Health and Safety Act 85 of 1993

(ii) Cumulative Impacts

- No cumulative impacts are expected.

(iii) Irreplaceable loss of Resources

No irreplaceable loss of resources is expected during construction

### *10.2.2.8* VISUAL IMPACTS

The construction activities and infrastructure for the proposed Glencore Lydenburg Solar PV Facility will temporarily change the visual character of the landscape in the Mpumalanga Province. The area, known for its open grasslands, will be dotted with construction equipment, temporary storage facilities, and initial solar structures. During the construction phase, these changes will be especially noticeable to residents and travellers within a 1 km radius.

Dust generation will be a significant issue, as construction activities disturb the soil in the open grasslands. Winds will carry this dust, affecting nearby residents and travellers, especially those along the R36 and R37 highways. This could temporarily impact their daily activities, health, and overall quality of life. Additionally, noise and vibrations from construction vehicles and machinery will add to the disruption in the area.

The construction process will also place added pressure on local infrastructure, particularly roads. The movement of heavy construction vehicles, equipment, and materials may cause wear and tear, potentially requiring road widening. Increased traffic could lead to congestion, delays, and safety risks for local residents and travellers along the R36 and R37.

(i) 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 as far as possible.
- 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
- 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
- Dust Suppression: Regularly water down the construction site, especially during dry and windy conditions, to minimise dust generation.
- 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
- 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. Introduce landscaping efforts post-construction to help the facility blend more seamlessly with the surrounding environment.

(ii) Cumulative Impacts

- 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.

- 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

(iii) Irreplaceable loss of Resources

- 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.

## 10.2.3 OPERATIONAL PHASE IMPACTS

### *10.2.3.1* IMPACT ON TERRESTRIAL BIODIVERSITY

Operation of the PV facility could have impacts on terrestrial biodiversity. Erosion, dust, fire, alien vegetation introduction and proliferation as well as poor waste management resulting in increase in pest numbers could impact on flora and fauna. The significance of these impacts is considered to be of low significance because the area has been altered from its original state however the project can still affect species in the surrounding area

(i) Mitigation measures

- A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment.
- It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.
- A fire management plan needs to be complied and implemented to restrict the impact fire might have on the surrounding areas.
- Any individual of the protected plants that was observed needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. Preferably, the plants can be relocated within the property without a permit or otherwise left unharmed.
- No trapping, killing, or poisoning of any wildlife is to be allowed and Signs must be put up to enforce this. Monitoring must take place in this regard.
- Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons

(ii) Cumulative Impacts

- No cumulative impacts are expected on flora and fauna during the operations phase.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of biodiversity resources is expected during operations.

### *10.2.3.2* IMPACT ON AVIFAUNA

The operational phase includes the following impacts (Table 31): collisions with infrastructure associated with the PV Facility and powerlines; electrocution due to infrastructure associated with the PV Facility; direct mortality from road kills, persecution, or poaching of avifauna species and collection of eggs; pollution of water sources and surrounding habitat due to cleaning products of the PV panels; heat radiation from the BESS and PV panels; and encroachment of Invasive Alien Plants into disturbed areas.

(i) Mitigation measures

- As far as possible power cables within the project area should be thoroughly insulated and preferably buried.
- Any exposed parts must be covered (insulated) to reduce electrocution risk.
- All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution.
- Consider the use of bird deterrent devices to limit collision risk.
- Post-construction monitoring should follow the BirdLife South Africa best practice guidelines for solar energy facilities (BirdLife South Africa, 2017). If monitoring results indicate excessive bird fatalities, then adaptive mitigations should be implemented. Before implementation, these should be discussed with the avifaunal specialist and ECO and could include the retrofitting/incorporation of additional visual cues/diverters to existing PV panels/infrastructure. This is especially pertinent based on the possible occurrence of SCC such as vultures.

(ii) Cumulative Impacts

- Loss of habitat for species including migratory species will be cumulative.
- Loss of corridors or habitat
- Loss of corridors or habitat

(iii) Irreplaceable loss of Resources

- Loss of habitat of indigenous species.

#### *10.2.3.3* VISUAL IMPACT

The operational phase of the proposed Solar PV Facility will introduce a new visual element to the landscape, marked by rows of solar panels. This will be a significant change from the existing environment and may disrupt the visual harmony and sense of place that residents and travelers currently associate with the region. The facility will become a permanent feature, potentially influencing how people perceive and experience the area.

Due to the flat nature of the site, the solar facility will be highly visible to nearby residents and travelers, affecting their daily visual experience and altering their connection to the landscape. The level of visibility will vary based on distance and vantage points, but the presence of the facility will undoubtedly transform the visual character of the region.

Operational, safety, and security lighting will be necessary for the facility, particularly during nighttime hours, to ensure safe and efficient operations. However, this new source of light could result in light pollution, especially in areas previously devoid of artificial lighting. This could affect the nighttime landscape and reduce the visibility of the night sky for residents and travelers along the R36 and R37.

Overall, the expansive layout of the Glencore Lydenburg Solar PV Facility will make it a noticeable and dominant feature in the landscape, with its visual impact varying depending on the viewer's distance and perspective.

(i) 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.
- 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.
- 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.

(ii) Cumulative Impacts

- 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.

(iii) Irreplaceable loss of Resources

- The sense of place is subjective and can evolve over time. While the landscape's visual character changes, no tangible resources are irrevocably lost.

#### *10.2.3.4* EMPLOYMENT CREATION

Employment creation will be a high positive impact on the local community before and after mitigation (enhancement). Approximately 20 unskilled opportunities will be created in the operational phase with 10 skilled employees to be recruited.

(i) Mitigation measures

- Employ people from the surrounding local communities as reasonably possible.
- Utilise existing community structures if available, to act as a communication link between the local community and the applicant for informing the local community of job opportunities.
- Glencore must maintain continuous dialogue with local communities through regular public meetings and consultations.
- Ensure transparency in procurement and recruitment processes, in conjunction with community leaders in decision-making to prevent social unrest.
- Create or update clear channels for grievance reporting and feedback to address community concerns promptly.
- Glencore should revisit and update their skills development plan to develop skills in the community to enable sourcing a greater portion of local labour. A Community Liaison Officer who is trusted by the community and has the necessary skills and education must be appointed before construction commences.

(ii) Cumulative Impacts

- The creation of employment opportunities will assist in reaching the ELM goal of reducing unemployment as well as positively contribute to certain livelihoods in the community through income generation.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is anticipated as a result of employment creation.

#### *10.2.3.5* IMPACTS ON HEALTH AND SAFETY

Improper installation of the pre-assembled battery energy storage systems can create fire hazards. If the BESS is not installed properly, it can lead to incorrect wiring, overloading of circuits, or improper ventilation, all of which can cause overheating and thermal runaway. In addition, the gasses that ae released from battery energy storage systems are highly flammable and toxic. The type of gas released depends on the battery chemistry involved but typically includes gases such as: carbon monoxide, carbon dioxide, lithium, hydrogen, methane, ethane, and other hydrocarbons. If the gas can reach its lower explosive limit before finding an ignition source, then there is the potential for an explosion. The impact on health and safety during the operation phase was identified as being medium negative before mitigation and low negative after mitigation. All employees need to be subject to a safe and healthy working environment and the smelter will be required to update its existing health and safety.

(i) Mitigation measures

- Continuous monitoring of the temperature of the batteries, limit the charging rate, avoid overcharging, and keep the ambient temperature within a safe range;
- Install a fail-safe mechanism to prevent the batteries from reaching extreme conditions and exploding;
- Keep all flammable materials away from the BESS area and have fire combat equipment in the area;
- Have certified fire and explosive first respondents personnel readily available on site;
- The speed limit on private/ unregulated roads (access roads) of haul trucks should be limited to 30km/h and all traffic rules on regulated roads should be adhered to.
- Employees must be made aware of their specific responsibilities in terms of the environmental impacts i.e. controlling noise levels, reducing dust, etc.
- Employees must be made aware that no alcohol/drugs are allowed on site and no workers under the influence are permitted on site.

- Employees must be made aware that no fires will be permitted on site.
- The required PPE shall always be worn on site.
- Access to the site should be controlled.
- No person shall be allowed to stay on the site after working hours, except for any security that might be patrolling at night.

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of health and safety impacts during production.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected as a result of health and safety impacts during production.

#### *10.2.3.6* WASTE MANAGEMENT IMPACTS

Waste management impacts were rated as having a low negative significance before and after mitigation. Domestic waste and sewage as well as waste from the battery energy storage facility are waste types that need to be considered during operation.

(i) Mitigation measures

- No waste releases into the environment should be permitted.
- A dedicated waste collection and storage facility must be prepared, and this should be emptied and collected wastes disposed of on a regular basis. Wastes must be disposed of at suitably licensed waste disposal facilities.
- Contaminated water, and effluents must be prevented from entering the local environment (soil and water), adequately stored in protected and where necessary bunded areas, and disposed of at a suitably licensed disposal facility.
- Vermin / weatherproof bins must be provided in enough numbers and capacity to store domestic waste. These bins must be kept closed to reduce odour build-up and emptied regularly to avoid overfilling and other associated nuisances.
- Each active area must be checked daily to ensure that the site is free from litter and unnecessary wastes.
- Hazardous substances, if applicable, must be stored in a secure location, isolated from direct contact with the soils and covered where necessary.

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of waste management impacts during production.

(iii) Irreplaceable loss of Resources.

- No irreplaceable loss of resources is expected as a result of waste management impacts during production.

#### *10.2.3.7* STORMWATER IMPACTS

Stormwater runoff after a rainfall event needs to be managed on site. This impacted was rated as medium negative before mitigation and low negative after mitigation.

(i) Mitigation measures

- A detailed SWMP needs to be prepared.

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of stormwater during operations.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected as a result of stormwater during production.

### *10.2.3.8* IMPACT ON SOIL

The impact on soil during operation is related to Battery Energy Storage Systems (BESS) posing potential contamination risks to the soil, particularly if they involve the leakage or improper disposal of hazardous materials. The most common concerns relate to the chemicals used in the batteries, such as heavy metals and electrolytes. The impact is considered to be low negative before and after mitigation. This is because the area is surrounded by mining infrastructure and is designated for mining use; thus, no potential agricultural land will be impacted on.

(i) Mitigation measures

- Raw material stockpile should be placed on a cemented or bunded surface.
- All working fronts must be provided with a spill containment kit to contain and collect spills.
- Any evidence of erosion, scouring, sedimentation, and/or undercutting must be rectified and rehabilitated immediately.
- Should erosion become a problem during operation, then diversion berms and drains should be constructed to divert run-off away from exposed areas.
- Adequate stormwater drainage and management is required to prevent soil erosion.
- Install secondary containment systems, such as bunding or spill trays, around the BESS to catch any leaks or spills before they contact the soil or water.
- Regularly inspect BESS units for signs of damage, leakage, or degradation. Monitoring systems that detect leaks early can prevent extensive contamination.
- Develop and implement emergency response procedures for spills, including the use of absorbent materials, neutralizing agents, and safe waste removal methods

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of impact on soil during the construction phase.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected as a result of impact on soil during the operational phase.

### *10.2.3.9* SOCIAL IMPACTS

Despite the limited job openings during its operation phase, the Solar PV project presents opportunities for skills development for residents. By implementing training initiatives during operation phases, workers can acquire valuable skills in solar technology, construction, maintenance, and safety protocols, addressing the community's need for development. This training could lead to permanent employment opportunities in the renewable energy sector or related fields. Additionally, the project aims to enhance energy access, decreasing reliance on costly and unreliable energy sources, which may result in lower electricity costs and improved energy security while increasing the employability of local workers in the expanding green energy sector.

(i) Mitigation measures

- Local contractors, who are compliant with Broad-Based Black Economic Empowerment (BBBEE) criteria should be given preference.
- Gender equality must be promoted, in both the awarding of employment opportunities and remuneration.

- Provide training in solar technology and maintenance during both the construction and operational phases to empower local workers and increase employability.
- Partner with local training institutions to develop programs that equip residents with necessary solar energy skills such as Technical Vocational Education and Training (TVET) college. This can help to align the curriculum with industry needs, enhancing the relevance of educational programs.
- Develop a transparent communication strategy to keep the community informed about project developments and opportunities.

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of social impact operational phase.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected during the operational phase.

## 10.2.4 DECOMMISSIONING PHASE IMPACTS

Please note that the holder of the Environmental Authorisation (EA), if granted, will have to apply for a separate EA for the decommissioning phase as required under Listing Notice 1, Activity 31 of the NEMA as amended. This will necessitate the need to reassess and consider the below mentioned, and any additionally identified impacts at such time when decommissioning is considered.

### *10.2.4.1* IMPACT ON TERRESTRIAL BIODIVERSITY AND AVIFAUNA

Decommissioning phase impacts on terrestrial biodiversity and avifauna will be identical to the construction phase impacts listed in section 10.2.2.1 above.

(i) Mitigation measures

- As per section 10.2.2.1 above (construction phase terrestrial biodiversity and avifauna impacts).

(ii) Cumulative Impacts

- No cumulative impacts are expected on flora and fauna during the construction phase.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected during the construction phase.

### *10.2.4.2* DUST GENERATION

Some dust will be generated as a result of movement of heavy machinery and vehicles on-site during decommissioning. The impact significance was rated as being low negative before and after mitigation.

(i) Mitigation measures

- As per Section 10.2.2.6 above (construction phase dust generation)

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of dust generation during construction.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected as a result of dust generation during construction.

### *10.2.4.3* NOISE GENERATION

Noise will be generated during the decommissioning phase as a result of vehicles working on-site. Noise relating to the decommissioning phase of this project can be described as a nuisance rather than having environmental or health implications. The impact significance is rated as low negative before and after mitigation, as the proposed activities will take place within the mine area, which is subject to existing noises from mining activities.

(i) Mitigation measures

- As per section 10.2.2. above (construction phase noise generation).

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of noise during the decommissioning phase.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected as a result of noise during the decommissioning phase.

#### *10.2.4.4* WASTE MANAGEMENT IMPACTS

Waste management impacts were rated as having a low negative significance before and after mitigation. Domestic waste, construction waste and sewage are all waste types that need to be considered during decommissioning.

(i) Mitigation measures

- As per Section 10.2.3.6 above (construction phase waste management impacts).

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of waste management impacts during decommissioning.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected as a result of waste management impacts during decommissioning.

#### *10.2.4.5* JOB LOSSES

As a result of the facilities closing down and being decommissioned, employees that worked during the production phase of this project no longer be able to hold their working position at the facility. This impact was rated with a moderate negative significance before and after the mitigation.

(i) Mitigation measures

- Ensure contributions are made for employees to the Unemployment Insurance Fund (UIF).

(ii) Cumulative Impacts

- Employees that had a position at the facility will have to go without a working income until they can find another position.
- Contribution to unemployment within the local municipality due to decommissioning.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected as a result of job losses during decommissioning.

#### *10.2.4.6* VISUAL IMPACTS

The decommissioning phase of the proposed Glencore Lydenburg Solar PV Facility will involve the removal of solar panels, infrastructure, and other related structures from the site. This process will temporarily disrupt the landscape, causing a short-term alteration in its visual character. The removal might expose areas that were previously covered or modified, creating a noticeable contrast in the landscape.

Site restoration will focus on returning the project site to its original or near-original condition after decommissioning. This includes removing infrastructure, rehabilitating disturbed soils, and re-establishing native vegetation. The goal is to ensure the land can return to its previous use, whether for agriculture, natural habitat, or another purpose

(i) Mitigation measures

- 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.
- 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.
- 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.
- Implement a phased approach to decommissioning to minimise the area of disturbance at any given time.
- Prioritise immediate restoration of areas once the infrastructure is removed, including re-vegetation with native species.
- Use techniques that minimises ground disturbance during the removal of infrastructure.
- Ensure all materials, especially non-biodegradable ones, are properly disposed of or recycled, leaving no remnants behind.
- Post-decommissioning, monitor the site's recovery and implement any necessary interventions to ensure successful landscape restoration.
- Use native and local plant species for re-vegetation to ensure ecological compatibility and enhance biodiversity.
- Employ techniques to prevent soil erosion and promote soil health during and after restoration.
- Ensure proper drainage and water management to prevent waterlogging or erosion.
- 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.
- Ensure all decommissioned materials are properly disposed of or recycled, leaving no remnants behind

(ii) Cumulative Impacts

- 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..

(iii) Irreplaceable loss of Resources

- 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.

## 10.2.5 REHABILITATION AND CLOSURE PHASE IMPACTS

### *10.2.5.1* REHABILITATION IMPACTS

The nature of the site does not require any major rehabilitation of the environment. However, the property will need to be rehabilitated to the extent of which it was before construction, including revegetation. This impact was rated as medium positive before and after mitigation.

(i) Mitigation measures

- Ensure the ground is levelled out on the site.
- No waste should be left on the site.
- The site should resemble a pre-construction state.

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of rehabilitation.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected as a result of rehabilitation.

### 10.2.6 NO-GO ALTERNATIVE

The no-go alternative option means 'do nothing' or the option of not undertaking the proposed PV facility project or any of its activities, consequently leading to the continuation of the current land-use, which is leaving the location as open space within the mine area. As such, the 'do nothing' alternative or keeping the current status quo of an empty open space with no activities occurring on-site also provides the baseline against which the impacts of all other alternatives were compared.

#### *10.2.6.1* IMPACT ON TERRESTRIAL BIODIVERSITY AND AVIFAUNA

This impact was rated as being low positive. No terrestrial biodiversity impacts will occur however the project area is located within the mine area and is in a modified state due to the presence of mining activities and alien Invasive plant species, resulting in a moderate - low habitat sensitivity.

#### *10.2.6.2* IMPACT ON SOIL

This impact was rated as being high positive. Although the soil will not be disturbed as a result of the construction, production or decommissioning phases if the no-go alternative is considered, the impact on soil is still considered high positive, as the area within the mine will stay vacant and the land in the north will continue with agricultural activities.

#### *10.2.6.3* IMPACT ON HERITAGE AND PALAEONTOLOGICAL RESOURCES

The impact on heritage and palaeontological resources if the no-go option is considered was rated as positive. The fieldwork for the updated HIA undertaken in 2024 identified a total of four heritage features and resources were identified. These consist of three Iron Age/ agro-pastoral sites **(LS001, LS003 and LS004),** and one structure which is and old school building (LS002).

The pre-mitigation impact on the identified archaeological sites located within the application area is calculated as HIGH negative and only focused during the planning phase. Implementation of the recommended mitigation measures will reduce the impact to MEDIUM positive.

The pre-mitigation impact on the identified structures located within the footprint of the exploration area is calculated as LOW negative and only focused during planning phase. Implementation of the recommended mitigation measures will reduce the impact to LOW positive. However, the construction of the PV facility will not require deep excavations, which minimises the chance of uncovering any palaeontological resources

#### *10.2.6.4* EMPLOYMENT CREATION AND SCOIO-ECONOMIC

Employment creation was rated as being medium negative before any mitigation measures if the no-go option is considered. If the area remains undeveloped it will serve no purpose and will hinder the possibilities of employment for the local community. The proposed project will create approximately 15 employment opportunities during the first year of operations. If the PV facility goes ahead the impact on employment creation will be considered high positive. The no-go alternative would mean the potential job creation associated with construction and operation would not be realized. impacts of pursuing the No-go Option are both positive and negative as follows:

The benefits would be that there is no change in status quo in terms of the negative impacts described above during all project phases which would be experienced by neighbours, society, and the landscape – namely through disruption, noise, social unrest, road safety, and strain on municipal services. The negative impacts were highlighted as aspects that will increase the existing socio-economic challenges. The impact is therefore neutral.

There would also be an opportunity loss in terms of job creation, skills development and associated economic multipliers for the local economy. The impact is therefore negative. There will be no development on the archaeological site and the grave will not be affected. There will be no new impacts and the status quo of the site will be maintained.

In summary, choosing the no-go development option would mean South Africa misses a valuable opportunity to address its energy demands through clean, renewable sources. As one of the highest per capita carbon emitters globally, this choice would carry a negative social cost. While it may not entirely hinder the growth of renewable energy projects in the country, it would result in the loss of socio-economic benefits that local communities could otherwise gain from the proposed solar PV facilities.

#### *10.2.6.5* NOISE GENERATION AND VISUAL IMPACT

Noise generation was rated as low positive. If the no-go option is considered, there will be no noise generation other than the existing noises within the surrounding mining area.

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.

## 10.3 SUMMARY OF POTENTIAL IMPACTS

A summary of all the identified impacts, their associated phase, as well as their impact calculations and significance are presented in Table 31 below.

Table 31: Significance rating of identified impacts.

| | | Pre-Mitigation | | | | | | | Post Mitigation | | | | | | | | Priority Factor Criteria | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Impact | Phase | Nature | Extent | Duration | Magnitude | Reversibility | Probability | Pre-mitigation ER | Nature | Extent | Duration | Magnitude | Reversibility | Probability | Post-mitigation ER | Confidence | Cumulative Impact | Irreplaceable loss | Priority Factor | Final score |
| Loss of land capability | Planning | -1 | 1 | 1 | 1 | 2 | 1 | -1,25 | -1 | 1 | 1 | 1 | 1 | 1 | -1 | Low | 1 | 1 | 1,00 | -1 |
| Impacts on Existing Infrastructure and Services | Planning | -1 | 1 | 2 | 2 | 3 | 2 | -4 | -1 | 1 | 2 | 1 | 2 | 2 | -3 | Medium | 2 | 1 | 1,13 | -3,375 |
| Impacts Due to Communication Inefficiency | Planning | -1 | 3 | 4 | 4 | 3 | 3 | -10,5 | -1 | 3 | 2 | 2 | 2 | 2 | -4,5 | Medium | 2 | 1 | 1,13 | -5,0625 |
| Archaeological sites | Planning | -1 | 3 | 5 | 5 | 5 | 4 | -18 | 1 | 3 | 5 | 2 | 5 | 2 | 7,5 | High | 1 | 3 | 1,25 | 9,375 |
| Structures | Planning | -1 | 3 | 5 | 2 | 5 | 1 | -3,75 | 1 | 3 | 5 | 1 | 5 | 1 | 3,5 | High | 1 | 3 | 1,25 | 4,375 |
| Impacts on cultural heritage, spirit, and sense of place | Planning | -1 | 3 | 2 | 4 | 3 | 4 | -12 | -1 | 3 | 2 | 3 | 2 | 3 | -7,5 | Medium | 1 | 3 | 1,25 | -9,375 |
| Impact on community participation and decision-making | Planning | -1 | 3 | 4 | 5 | 4 | 5 | -20 | -1 | 3 | 4 | 4 | 3 | 3 | -10,5 | High | 3 | 2 | 1,38 | -14,4375 |
| Altered Landscape and Sense of Place | Construction | -1 | 2 | 3 | 3 | 5 | 5 | -16,25 | -1 | 2 | 3 | 2 | 5 | 4 | -12 | High | 2 | 1 | 1,13 | -13,5 |
| Visibility of the Facility to Residents during Construction | Construction | -1 | 2 | 3 | 3 | 5 | 5 | -16,25 | -1 | 2 | 3 | 2 | 5 | 4 | -12 | High | 2 | 1 | 1,13 | -13,5 |
| Dust and Construction Impact during Construction | Construction | -1 | 1 | 3 | 3 | 5 | 5 | -15 | -1 | 1 | 3 | 2 | 5 | 3 | -8,25 | High | 2 | 1 | 1,13 | -9,28125 |
| Impact on Local Infrastructure and Traffic | Construction | -1 | 2 | 3 | 3 | 5 | 4 | -13 | -1 | 2 | 3 | 2 | 5 | 3 | -9 | High | 2 | 1 | 1,13 | -10,125 |
| Habitat destruction within the project footprint | Construction | -1 | 3 | 1 | 4 | 3 | 4 | -11 | -1 | 2 | 1 | 2 | 2 | 3 | -5,25 | High | 2 | 2 | 1,33 | -7 |
| Destruction, degradation and fragmentation of surrounding habitats | Construction | -1 | 3 | 1 | 4 | 3 | 4 | -11 | -1 | 2 | 1 | 2 | 2 | 2 | -3,5 | High | 2 | 2 | 1,33 | -4,6666 |
| Displacement/emigration of avifauna community (including SCC) due to noise pollution | Construction | -1 | 4 | 1 | 3 | 2 | 4 | -10 | -1 | 2 | 1 | 2 | 2 | 3 | -5,25 | High | 2 | 2 | 1,33 | -7 |
| Direct mortality from persecution or poaching of avifauna species and collection of eggs | Construction | -1 | 3 | 1 | 3 | 3 | 4 | -10 | -1 | 2 | 1 | 2 | 1 | 1 | -1,5 | High | 1 | 2 | 1,17 | -1,75 |
| Direct mortality from increased vehicle and heavy machinery traffic | Construction | -1 | 3 | 1 | 3 | 3 | 3 | -7,5 | -1 | 1 | 1 | 2 | 1 | 1 | -1,25 | High | 1 | 2 | 1,17 | -1,4583 |
| Soil compaction | Construction | -1 | 3 | 3 | 4 | 3 | 4 | -13 | -1 | 2 | 2 | 2 | 3 | 3 | -6,75 | Medium | 2 | 3 | 1,38 | -9,28125 |
| Impact on Terrestrial Biodiversity and Avifauna | Construction | -1 | 3 | 2 | 4 | 3 | 3 | -9 | -1 | 3 | 2 | 2 | 3 | 3 | -7,5 | Medium | 2 | 1 | 1,13 | -8,4375 |
| Noise Generation | Construction | -1 | 2 | 2 | 2 | 2 | 4 | -8 | -1 | 2 | 2 | 1 | 1 | 3 | -4,5 | Medium | 1 | 1 | 1,00 | -4,5 |
| Impact on Soil | Construction | -1 | 2 | 2 | 2 | 2 | 4 | -8 | -1 | 2 | 2 | 1 | 1 | 2 | -3 | Medium | 1 | 1 | 1,00 | -3 |
| Impact on Heritage and Palaeontological Resources | Construction | -1 | 2 | 5 | 4 | 5 | 4 | -16 | -1 | 1 | 5 | 1 | 5 | 1 | -3 | High | 1 | 2 | 1,13 | -3,375 |
| Employment Creation | Construction | 1 | 3 | 2 | 2 | 1 | 5 | 10 | 1 | 3 | 2 | 3 | 1 | 5 | 11,25 | Medium | 1 | 1 | 1,00 | 11,25 |
| Dust Generation | Construction | -1 | 2 | 2 | 2 | 2 | 3 | -6 | -1 | 2 | 2 | 1 | 1 | 2 | -3 | Medium | 1 | 1 | 1,00 | -3 |
| Waste Management Impacts | Construction | -1 | 2 | 2 | 3 | 2 | 3 | -6,75 | -1 | 2 | 2 | 2 | 1 | 2 | -3,5 | Medium | 1 | 1 | 1,00 | -3,5 |
| Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community; | Construction | -1 | 1 | 2 | 2 | 2 | 2 | -3,5 | -1 | 2 | 2 | 1 | 2 | 2 | -3,5 | High | 1 | 1 | 1,00 | -3,5 |
| Introduction of alien and invasive species, especially plants; | Construction | -1 | 1 | 2 | 3 | 2 | 2 | -4 | -1 | 1 | 2 | 1 | 2 | 2 | -3 | High | 1 | 1 | 1,00 | -3 |
| Direct disturbance / degradation / loss to wetland soils or vegetation due to the construction of the solar facility | Construction | -1 | 1 | 2 | 3 | 2 | 2 | -4 | -1 | 1 | 2 | 1 | 2 | 2 | -3 | High | 1 | 1 | 1,00 | -3 |

| | | Pre-Mitigation | | | | | | | Post Mitigation | | | | | | | | Priority Factor Criteria | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Displacement of the indigenous faunal community due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching). | Construction | -1 | 1 | 3 | 3 | 2 | 2 | -4,5 | -1 | 1 | 2 | 2 | 2 | 2 | -3,5 | High | 1 | 1 | 1,00 | -3,5 |
| Palaeontology | Construction | -1 | 2 | 5 | 2 | 5 | 1 | -3,5 | 1 | 2 | 5 | 1 | 5 | 1 | 3,25 | High | 1 | 3 | 1,25 | 4,0625 |
| Loss of fossil heritage | Construction | -1 | 1 | 4 | 2 | 4 | 2 | -5,5 | -1 | 1 | 4 | 1 | 4 | 2 | -5 | High | 1 | 3 | 1,25 | -6,25 |
| Direct disturbance / degradation / loss to wetland soils or vegetation due to the construction of the solar facility. | Construction | -1 | 1 | 1 | 3 | 3 | 3 | -6 | -1 | 1 | 1 | 2 | 2 | 2 | -3 | High | 1 | 1 | 1,00 | -3 |
| Proliferation of alien invasive species due to surrounding disturbances. | Construction | -1 | 2 | 2 | 3 | 2 | 4 | -9 | -1 | 2 | 2 | 2 | 2 | 2 | -4 | High | 1 | 1 | 1,00 | -4 |
| Pollution and littering through inappropriate management of domestic and Industrial waste. | Construction | -1 | 1 | 1 | 3 | 2 | 2 | -3,5 | -1 | 1 | 1 | 2 | 2 | 2 | -3 | High | 1 | 1 | 1,00 | -3 |
| Altered hydrology due to hardened surfaces and stormwater channelling. | Construction | -1 | 2 | 2 | 3 | 2 | 4 | -9 | -1 | 2 | 2 | 2 | 2 | 2 | -4 | High | 1 | 1 | 1,00 | -4 |
| Increased erosion and sedimentation. | Construction | -1 | 1 | 2 | 3 | 2 | 4 | -8 | -1 | 1 | 2 | 2 | 2 | 2 | -3,5 | High | 1 | 1 | 1,00 | -3,5 |
| Potential contamination of wetlands with machine oils/pesticides/insecticides/herbicides and construction materials. | Construction | -1 | 1 | 1 | 3 | 2 | 2 | -3,5 | -1 | 1 | 1 | 2 | 2 | 2 | -3 | High | 1 | 1 | 1,00 | -3 |
| Health Implication | Construction | -1 | 4 | 5 | 4 | 3 | 4 | -16 | -1 | 4 | 5 | 3 | 3 | 3 | -11,25 | High | 3 | 2 | 1,38 | -15,468 |
| Psychological impact due to poverty and lack of opportunities | Construction | -1 | 3 | 2 | 3 | 2 | 4 | -10 | -1 | 3 | 2 | 2 | 2 | 2 | -4,5 | High | 2 | 2 | 1,25 | -5,625 |
| Physical impacts on road safety | Construction | -1 | 3 | 2 | 4 | 3 | 4 | -12 | -1 | 3 | 2 | 3 | 3 | 3 | -8,25 | High | 2 | 2 | 1,25 | -10,312 |
| Health impacts due to dust | Construction | -1 | 2 | 2 | 3 | 2 | 4 | -9 | -1 | 2 | 2 | 2 | 2 | 3 | -6 | High | 1 | 1 | 1,00 | -6 |
| Impact on the safety of property and equipment | Construction | -1 | 3 | 2 | 4 | 3 | 4 | -12 | -1 | 3 | 2 | 3 | 2 | 3 | -7,5 | High | 2 | 2 | 1,25 | -9,375 |
| Impact on personal safety and security | Construction | -1 | 3 | 2 | 4 | 3 | 5 | -15 | -1 | 3 | 2 | 3 | 3 | 4 | -11 | High | 2 | 2 | 1,25 | -13,75 |
| Increase in community unrest | Construction | -1 | 3 | 2 | 4 | 3 | 5 | -15 | -1 | 3 | 2 | 3 | 3 | 4 | -11 | High | 2 | 2 | 1,25 | -13,75 |
| Increase in social ills | Construction | -1 | 3 | 2 | 4 | 2 | 4 | -11 | -1 | 3 | 2 | 3 | 2 | 3 | -7,5 | High | 2 | 2 | 1,25 | -9,375 |
| Increase in social ills | Construction | -1 | 3 | 2 | 4 | 2 | 4 | -11 | -1 | 3 | 2 | 3 | 2 | 3 | -7,5 | High | 2 | 2 | 1,25 | -9,375 |
| Increased pressure on infrastructure and services | Construction | -1 | 3 | 2 | 4 | 4 | 4 | -13 | -1 | 3 | 2 | 3 | 3 | 3 | -8,25 | High | 2 | 1 | 1,13 | -9,28125 |
| Creation of employment opportunities | Construction | 1 | 3 | 2 | 3 | 2 | 4 | 10 | 1 | 3 | 2 | 4 | 5 | 5 | 17,5 | High | 3 | 2 | 1,38 | 24,0625 |
| Reduced unemployment and social unrest rates | Construction | 1 | 3 | 2 | 3 | 3 | 4 | 11 | 1 | 3 | 2 | 4 | 2 | 5 | 13,75 | High | 3 | 1 | 1,25 | 17,1875 |
| Skills development | Construction | 1 | 3 | 2 | 4 | 5 | 4 | 14 | 1 | 3 | 2 | 5 | 5 | 5 | 18,75 | High | 3 | 1 | 1,25 | 23,4375 |
| Knock-On effect on local business | Construction | 1 | 3 | 2 | 3 | 2 | 4 | 10 | 1 | 3 | 2 | 4 | 4 | 5 | 16,25 | High | 3 | 1 | 1,25 | 20,3125 |
| Potential for social unrest | Construction | -1 | 3 | 2 | 4 | 3 | 4 | -12 | -1 | 3 | 2 | 3 | 3 | 3 | -8,25 | High | 2 | 2 | 1,25 | -10,3125 |
| competition for jobs | Construction | -1 | 3 | 2 | 4 | 3 | 4 | -12 | -1 | 3 | 2 | 3 | 3 | 3 | -8,25 | High | 2 | 1 | 1,13 | -9,28125 |
| Influx of non-local job seekers | Construction | -1 | 3 | 2 | 4 | 3 | 4 | -12 | -1 | 3 | 2 | 3 | 2 | 3 | -7,5 | High | 3 | 2 | 1,38 | -10,3125 |
| Impacts on cultural heritage, spirit, and sense of place | Construction | -1 | 3 | 2 | 4 | 3 | 4 | -12 | -1 | 3 | 2 | 3 | 3 | 3 | -8,25 | Medium | 2 | 3 | 1,38 | -11,34375 |
| Impact on community participation and decision-making | Construction | -1 | 3 | 4 | 4 | 4 | 5 | -18,75 | -1 | 3 | 4 | 4 | 3 | 3 | -10,5 | High | 3 | 2 | 1,38 | -14,4375 |
| Creation of employment opportunities | Operation | 1 | 3 | 4 | 3 | 2 | 4 | 12 | 1 | 3 | 4 | 4 | 2 | 5 | 16,25 | High | 2 | 1 | 1,13 | 18,28125 |
| Altered Landscape and Sense of Place | Operation | -1 | 2 | 4 | 3 | 5 | 5 | -17,5 | -1 | 2 | 4 | 2 | 5 | 3 | -9,75 | High | 2 | 1 | 1,13 | -10,968 |
| Visibility of the Facility to Residents | Operation | -1 | 2 | 4 | 3 | 5 | 5 | -17,5 | -1 | 2 | 4 | 2 | 5 | 3 | -9,75 | High | 2 | 1 | 1,13 | -10,968 |
| Potential Visual Impact of Operational, Safety, and Security Lighting | Operation | -1 | 2 | 4 | 3 | 5 | 4 | -14 | -1 | 1 | 4 | 2 | 5 | 3 | -9 | High | 2 | 1 | 1,13 | -10,125 |
| Visual Exposure | Operation | -1 | 2 | 4 | 3 | 5 | 5 | -17,5 | -1 | 2 | 4 | 2 | 5 | 3 | -9,75 | High | 2 | 1 | 1,13 | -10,968 |
| Altered hydrology due to hardened surfaces and stormwater channelling. | Operation | -1 | 2 | 2 | 3 | 2 | 4 | -9 | -1 | 2 | 2 | 2 | 2 | 2 | -4 | High | 1 | 1 | 1,00 | -4 |
| Increased erosion and sedimentation. | Operation | -1 | 1 | 2 | 3 | 2 | 4 | -8 | -1 | 1 | 2 | 2 | 2 | 2 | -3,5 | High | 1 | 1 | 1,00 | -3,5 |

| | | Pre-Mitigation | | | | | | | Post Mitigation | | | | | | | | Priority Factor Criteria | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Potential contamination of wetlands with machine oils/pesticides/insecticides/herbicides and construction materials. | Operation | -1 | 1 | 1 | 3 | 2 | 2 | -3,5 | -1 | 1 | 1 | 2 | 2 | 2 | -3 | High | 1 | 1 | 1,00 | -3 |
| Pollution and littering through inappropriate management of domestic and Industrial waste. | Operation | -1 | 1 | 1 | 3 | 2 | 2 | -3,5 | -1 | 1 | 1 | 2 | 2 | 2 | -3 | High | 1 | 1 | 1,00 | -3 |
| Continued proliferation of Alien Invasive species. | Operation | -1 | 2 | 2 | 3 | 2 | 3 | -6,75 | -1 | 2 | 2 | 2 | 2 | 2 | -4 | High | 1 | 1 | 1,00 | -4 |
| Collisions with infrastructure associated with the PV Facility and powerlines | Operation | -1 | 3 | 4 | 4 | 3 | 4 | -14 | -1 | 2 | 4 | 2 | 2 | 2 | -5 | High | 2 | 3 | 1,38 | -6,875 |
| Electrocution due to infrastructure associated with the PV Facility | Operation | -1 | 3 | 4 | 4 | 3 | 4 | -14 | -1 | 2 | 4 | 2 | 2 | 2 | -5 | High | 2 | 3 | 1,38 | -6,875 |
| Direct mortality from roadkills, persecution or poaching of avifauna species and collection of eggs | Operation | -1 | 3 | 4 | 3 | 3 | 3 | -9,75 | -1 | 1 | 4 | 2 | 1 | 1 | -2 | High | 1 | 2 | 1,13 | -2,25 |
| Pollution of water sources and surrounding habitat due to cleaning products of the PV panels | Operation | -1 | 3 | 4 | 4 | 3 | 3 | -10,5 | -1 | 2 | 4 | 2 | 2 | 1 | -2,5 | High | 2 | 2 | 1,25 | -3,125 |
| Heat radiation from the BESS and PV panels | Operation | -1 | 3 | 4 | 3 | 3 | 3 | -9,75 | -1 | 1 | 4 | 2 | 2 | 1 | -2,25 | High | 1 | 2 | 1,13 | -2,5312 |
| Encroachment of Invasive Alien Plants into disturbed areas | Operation | -1 | 3 | 4 | 4 | 3 | 3 | -10,5 | -1 | 1 | 4 | 2 | 2 | 1 | -2,25 | High | 2 | 2 | 1,25 | -2,8125 |
| Impact on Terrestrial Biodiversity | Operation | -1 | 3 | 4 | 3 | 2 | 3 | -9 | -1 | 3 | 4 | 2 | 2 | 3 | -8,25 | Medium | 2 | 2 | 1,25 | -10,312 |
| Impact on Avifauna | Operation | -1 | 3 | 4 | 3 | 2 | 3 | -9 | -1 | 3 | 4 | 1 | 2 | 3 | -7,5 | Medium | 2 | 2 | 1,25 | -9,375 |
| Visual Impact | Operation | -1 | 3 | 4 | 1 | 2 | 4 | -10 | -1 | 2 | 4 | 1 | 1 | 4 | -8 | Medium | 1 | 1 | 1,00 | -8 |
| Noise Generation | Operation | -1 | 2 | 4 | 2 | 2 | 3 | -7,5 | -1 | 2 | 4 | 1 | 1 | 2 | -4 | Medium | 1 | 1 | 1,00 | -4 |
| Employment Creation | Operation | 1 | 3 | 4 | 2 | 5 | 5 | 17,5 | 1 | 3 | 4 | 2 | 5 | 5 | 17,5 | Medium | 2 | 1 | 1,13 | 19,6875 |
| Impact on Health and Safety | Operation | -1 | 2 | 4 | 4 | 4 | 4 | -14 | -1 | 2 | 4 | 2 | 1 | 2 | -4,5 | Medium | 1 | 1 | 1,00 | -4,5 |
| Waste Management Impacts | Operation | -1 | 2 | 4 | 3 | 2 | 3 | -8,25 | -1 | 2 | 4 | 2 | 1 | 2 | -4,5 | Medium | 1 | 1 | 1,00 | -4,5 |
| Stormwater Impacts | Operation | -1 | 3 | 4 | 3 | 2 | 3 | -9 | -1 | 3 | 4 | 2 | 1 | 2 | -5 | Medium | 1 | 1 | 1,00 | -5 |
| Stormwater Impacts | Operation | -1 | 3 | 4 | 4 | 3 | 3 | -10,5 | -1 | 3 | 4 | 3 | 2 | 2 | -6 | Medium | 1 | 1 | 1,00 | -6 |
| Impact on Soil | Operation | -1 | 2 | 2 | 2 | 2 | 4 | -8 | -1 | 2 | 2 | 1 | 1 | 2 | -3 | Medium | 1 | 1 | 1,00 | -3 |
| Soil erosion, Land degradation | Operation | -1 | 2 | 3 | 2 | 3 | 2 | -5 | -1 | 2 | 2 | 2 | 2 | 2 | -4 | Low | 2 | 3 | 1,38 | -5,5 |
| Impacts from Storage of Hazardous Materials | Operation | -1 | 2 | 3 | 4 | 4 | 3 | -9,75 | -1 | 2 | 2 | 2 | 2 | 2 | -4 | Medium | 1 | 1 | 1,00 | -4 |
| Continued fragmentation and degradation of habitats and ecosystems | Operation | -1 | 1 | 2 | 2 | 2 | 2 | -3,5 | -1 | 1 | 2 | 1 | 2 | 1 | -1,5 | High | 1 | 1 | 1,00 | -1,5 |
| Spread of alien and/or invasive species | Operation | -1 | 2 | 3 | 2 | 2 | 2 | -4,5 | -1 | 2 | 2 | 2 | 2 | 1 | -2 | High | 1 | 1 | 1,00 | -2 |
| Ongoing displacement and direct mortalities of the faunal community due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, erosion, etc.). | Operation | -1 | 1 | 2 | 2 | 2 | 2 | -3,5 | -1 | 1 | 2 | 1 | 2 | 1 | -1,5 | High | 1 | 1 | 1,00 | -1,5 |
| Landscape Character and Visual Amenity | Decommissioning | -1 | 2 | 2 | 3 | 5 | 4 | -12 | -1 | 2 | 2 | 2 | 5 | 3 | -8,25 | Medium | 1 | 1 | 1,00 | -8,25 |
| Site Restoration | Decommissioning | 1 | 2 | 2 | 2 | 5 | 3 | 8,25 | 1 | 2 | 2 | 3 | 5 | 4 | 12 | High | 1 | 1 | 1,00 | 12 |
| Direct disturbance / degradation / loss to wetland soils or vegetation due to the construction of the solar facility. | Decommissioning | -1 | 1 | 1 | 3 | 2 | 3 | -5,25 | -1 | 1 | 1 | 2 | 2 | 2 | -3 | High | 1 | 1 | 1,00 | -3 |

| | | Pre-Mitigation | | | | | | | Post Mitigation | | | | | | | | Priority Factor Criteria | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Proliferation of alien invasive species due to surrounding disturbances. | Decommissioning | -1 | 2 | 2 | 3 | 2 | 4 | -9 | -1 | 2 | 2 | 2 | 2 | 2 | -4 | High | 1 | 1 | 1,00 | -4 |
| Pollution and littering through inappropriate management of domestic and Industrial waste. | Decommissioning | -1 | 1 | 1 | 3 | 2 | 2 | -3,5 | -1 | 1 | 1 | 2 | 2 | 2 | -3 | High | 1 | 1 | 1,00 | -3 |
| Altered hydrology due to hardened surfaces and stormwater channelling. | Decommissioning | -1 | 2 | 2 | 3 | 2 | 4 | -9 | -1 | 2 | 2 | 2 | 2 | 2 | -4 | High | 1 | 1 | 1,00 | -4 |
| Increased erosion and sedimentation. | Decommissioning | -1 | 1 | 1 | 3 | 2 | 4 | -7 | -1 | 1 | 1 | 2 | 2 | 2 | -3 | High | 1 | 1 | 1,00 | -3 |
| Potential contamination of wetlands with machine oils/pesticides/insecticides/herbicides and construction materials. | Decommissioning | -1 | 1 | 1 | 3 | 2 | 2 | -3,5 | -1 | 1 | 1 | 2 | 2 | 2 | -3 | High | 1 | 1 | 1,00 | -3 |
| Impact on Terrestrial Biodiversity and Avifauna | Decommissioning | -1 | 3 | 2 | 3 | 3 | 3 | -8,25 | -1 | 3 | 2 | 2 | 3 | 3 | -7,5 | Medium | 2 | 1 | 1,13 | -8,4375 |
| Dust Generation | Decommissioning | -1 | 2 | 2 | 2 | 2 | 3 | -6 | -1 | 2 | 2 | 1 | 1 | 2 | -3 | Medium | 1 | 1 | 1,00 | -3 |
| Noise Generation | Decommissioning | -1 | 2 | 2 | 2 | 2 | 4 | -8 | -1 | 2 | 2 | 1 | 1 | 3 | -4,5 | Medium | 1 | 1 | 1,00 | -4,5 |
| Employment Creation | Decommissioning | 1 | 3 | 1 | 2 | 1 | 5 | 8,75 | 1 | 3 | 1 | 3 | 1 | 5 | 10 | Medium | 1 | 1 | 1,00 | 10 |
| Waste Management Impacts | Decommissioning | -1 | 2 | 2 | 3 | 2 | 3 | -6,75 | -1 | 2 | 2 | 2 | 1 | 2 | -3,5 | Medium | 1 | 1 | 1,00 | -3,5 |
| Soil erosion, Land degradation | Decommissioning | -1 | 2 | 2 | 2 | 3 | 3 | -6,75 | -1 | 2 | 2 | 1 | 3 | 2 | -4 | Low | 2 | 2 | 1,25 | -5 |
| Job Losses | Decommissioning | -1 | 2 | 5 | 1 | 5 | 5 | -16,25 | -1 | 2 | 5 | 1 | 4 | 5 | -15 | Medium | 2 | 1 | 1,13 | -16,875 |
| Direct mortality due to earthworks, vehicle collisions and persecution | Decommissioning | -1 | 3 | 1 | 3 | 3 | 3 | -7,5 | -1 | 1 | 1 | 2 | 2 | 1 | -1,5 | Medium | 1 | 2 | 1,13 | -1,6875 |
| Continued habitat degradation due to Invasive Alien Plant encroachment and erosion | Decommissioning | -1 | 3 | 1 | 4 | 3 | 4 | -11 | -1 | 1 | 1 | 2 | 2 | 1 | -1,5 | Medium | 2 | 2 | 1,25 | -1,875 |
| Soil erosion, Land degradation | Rehab and closure | -1 | 2 | 2 | 2 | 2 | 2 | -4 | -1 | 2 | 2 | 1 | 2 | 1 | -1,75 | Low | 1 | 2 | 1,13 | -1,96875 |
| Rehabilitation Impacts | Rehab and closure | 1 | 2 | 4 | 2 | 1 | 5 | 11,25 | 1 | 2 | 4 | 3 | 1 | 5 | 12,5 | Medium | 1 | 1 | 1,00 | 12,5 |

# 11 SENSITIVITY MAPPING

Environmental sensitivity mapping provides a strategic overview of the environmental, cultural and social assets in a region. The sensitivity mapping technique integrates numerous datasets (base maps and shapefiles) into a single consolidated layer making use of Geographic Information System (GIS) software and analysis tools. Environmental sensitivity mapping is a rapid and objective method applied to identify areas which may be particularly sensitive to development based on environmental, cultural and social sensitivity weightings – which is determined by specialists' input within each respective field based on aerial or ground-surveys. Therefore, the sensitivity mapping exercise assists in the identification of sensitive areas within and surrounding the proposed PV facility area. The sensitivity map consists of information provided from specialist investigations undertaken as part of the EIA phase.

This sensitivity mapping approach allows for the proposed PV facility activities to be undertaken whilst protecting identified sensitive environmental areas/ features. Furthermore, environmental sensitivity is used to aid in decision-making during consultation processes, forming a strategic part of Environmental Assessment processes.

The specialist assessments for the proposed project reveal key findings and sensitivities across multiple environmental dimensions. The Terrestrial Biodiversity Compliance Statement identified three habitat types: Mining, Transformed Grassland, and Degraded Grassland. The mining areas, heavily modified by human activity, lack native vegetation and no longer provide ecosystem services. The Transformed Grassland contains a mix of invasive alien species and indigenous grasses, with some ecological functions maintained, such as nutrient cycling through termite mounds, although no significant flora or fauna Species of Conservation Concern (SCC) were found. Degraded Grasslands, impacted by adjacent mining activities, are dominated by invasive species and settling ponds, with no expected occurrence of flora or fauna SCCs.

Two avifaunal field surveys were conducted. The first recorded 34 species, including five priority species, but no SCCs were found. The second survey covered all habitat types, documenting 40 species with five priority species, but again no SCCs were detected. The wetland study identified five Hydrogeomorphic (HGM) units within the project area: two channelled valley-bottoms (HGM 1 & 4), two unchannelled valley-bottoms (HGM 2 & 5), and one wetland seep (HGM 3). Only HGM 1, 2, and 3, located south of the smelter and draining into a nearby perennial river, were assessed for potential impacts, as HGM 4 and 5, located within 500 meters of the project area, are not expected to be affected by the development. Additionally, several drainage lines were identified within the site

The Heritage Impact Assessment found four heritage resources, including three Iron Age/agro-pastoral sites (LS001, LS003, and LS004) and an old school building (LS002). LS001 is likely linked to the Bakoni people and is well-preserved, making it valuable for research and worthy of conservation or mitigation. LS002, although disturbed, contains grinding stones and middens, warranting phase II mitigation. LS003, a school structure, was built after 1969 and has less historical value but still requires consideration.

The Soil and Agricultural study identified the Lichtenburg and Nkonkoni soil forms as the most sensitive, with a land potential rating of "4" and "Medium" sensitivity, affected by the region's poor climate. Vaalbos and Cartref soils also showed medium sensitivity, while Glenrosa, Grabouw, Witbank, and Johannesburg soil forms have low sensitivity. The land capability study correlated with these findings, indicating "Moderate Low" to "Moderate High" sensitivities.

The Palaeontological Assessment noted that the project area is mainly underlain by the Silverton Formation of the Pretoria Group, which has high palaeontological sensitivity. However, Quaternary superficial sediments in the area have low sensitivity, and diabase intrusions, which have no palaeontological significance, reduce fossil preservation potential. The updated geology from the Council of Geosciences confirmed that the study area is only underlain by the Silverton Formation. Refer to Figure 32 for the final sensitivity map for the project which highlights several areas designated as "no-go" zones due to their environmental and heritage significance.

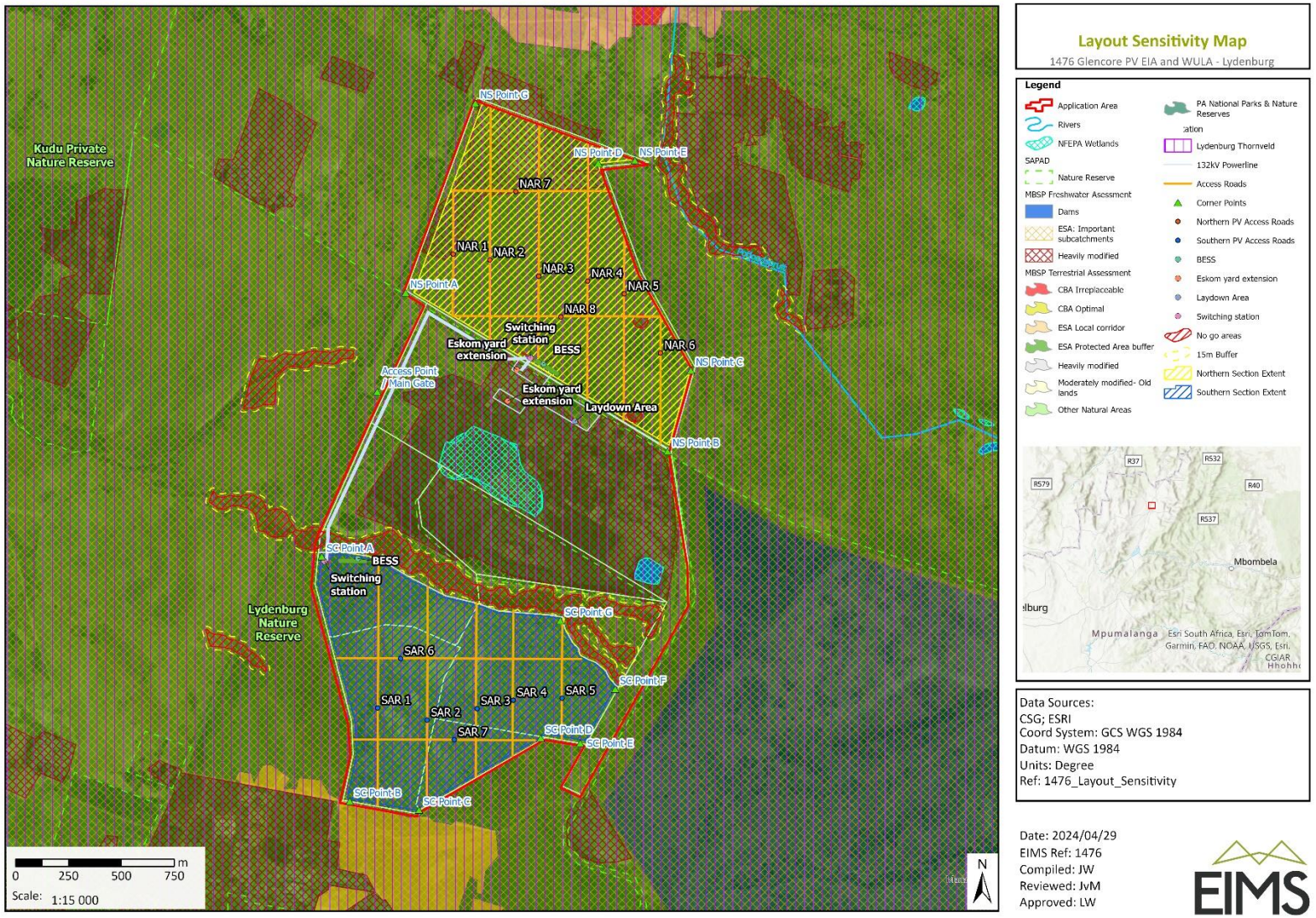


Figure 32: Sensitivity map

# 12 CONCLUSIONS AND RECOMMENDATIONS

This section describes the conclusions from the various specialist studies conducted for the PV facility.

The baseline **aquatics assessment** of the project area identified three HGM units: channelled valley-bottom, unchannelled valley bottom, and seep wetlands. These wetlands are classified as Class C (Moderately Modified) to Class D (Largely Modified) in terms of their present ecological state. Despite their modified condition, the wetlands still provide "Moderately High" to "Intermediate" levels of ecosystem services. The calculated pre-mitigation buffer for these wetlands is 32 meters, which can be reduced to 15 meters post-mitigation. All HGM units are of "Moderate" importance and sensitivity. The wetlands are currently at a "Moderate Risk" prior to mitigation, which can be reduced to "Low Risk" with the implementation of recommended mitigation measures. The impact assessment further supports that pre-mitigation impacts on wetlands will be moderate, but adherence to buffers and other mitigation measures will reduce these impacts to low. No fatal flaws were identified for the project. Based on the results and conclusions presented in the report, it is expected that the proposed activities will pose low residual risks on the wetlands provided that the mitigatory measures are implemented. It is the specialist opinion that the proposed project may be favourably considered for authorisation.

In terms **of terrestrial biodiversity**, the project is predominantly modified and degraded due to ongoing mining activities. Although within ESA ecosystems, these disturbances hinder long-term recovery. The Project area is reclassified to overall "Low" sensitivity, with specific habitat units rated from "Very Low" to "Medium." It is essential to retain indigenous vegetation beneath the PV panels and conduct an ecological site walkdown to identify potential species of conservation concern (SCCs). An Alien Invasive Plant (AIP) management plan is crucial to prevent their spread to surrounding natural areas. It is the opinion of the specialist included herein that the project may be favourably considered, provided that the mitigation measures presented in this report be implemented correctly, along with the recommendations below. The location, state and size of the ecosystem means that it is unlikely that any functional habitat or SCCs will be lost because of the impacts arising from the proposed activities.

The **avifauna impact assessment** identified 335 expected avifauna species, including 17 SCC, within the project area. Field surveys recorded no SCC but noted seven risk species susceptible to collisions, electrocutions, and habitat loss. The majority of the project area is of medium or very low sensitivity, with only water resources rated as high sensitivity. Mitigation measures can reduce the risks of collision, electrocution, and habitat loss. It is the opinion of the specialist that the development can be favourably considered should the mitigation measures and management actions be implemented. High sensitivity areas must be avoided as much feasibly possible.

The proposed PV development is expected to have an acceptable negative impact on the **agricultural production** capability of the area. Measures include restricting vegetation clearance to authorized areas, timing land clearing to coincide with construction activities, developing a stormwater management plan, and stabilizing areas where soil erosion is detected. The land capability and agricultural potential range from low to moderate, with medium agricultural sensitivity. The proposed PV development area will have an acceptable negative impact on the agricultural production capability of the area. The proposed development can be favourably considered for authorisation.

**Paleontological** resources in the area include the Silverton Formation, which has medium significance pre-mitigation and low significance post-mitigation. The construction phase will be the only phase impacting paleontological heritage, with no significant impacts expected during operational and decommissioning phases. The project can proceed without further paleontological studies unless new fossils are discovered.

The **heritage impact assessment** identified four features: three Iron Age/agro-pastoral sites and one non-conservation-worthy old school building. Sites LS001 and LS002 are graded as Grade IIIA and should be avoided with a 30-meter buffer due to potential burials. If directly affected, these sites will require documentation and a Phase II mitigation procedure. Site LS004 requires a chance find procedure in proximity. The development footprint is not considered sensitive in terms of heritage resources.

Based on these findings, it is recommended to maintain a pre-mitigation buffer of 32 meters and a post-mitigation buffer of 15 meters around wetlands and non-perennial drainage features. Indigenous vegetation beneath the PV panels should be retained, and an ecological site walkdown should identify potential SCCs. Implementing an AIP management plan is essential. Mitigation measures for avifauna should be followed to reduce collision, electrocution, and habitat loss risks. Vegetation clearance and land preparation should be restricted to authorized and immediate construction areas, and a stormwater management plan should be developed. Monitoring for fossil discoveries during construction is advised, and if any are found, appropriate actions should be taken. Heritage sites LS001 and LS002 should be avoided with a 30-meter buffer, or a Phase II mitigation procedure should be conducted if unavoidable. It is the combined considered opinion of the heritage specialists that the proposed project **will** have a direct impact on the identified heritage resources, rated as being of low to high heritage significance. Sites LS001 and LS002 are Bokoni homesteads which represent valued historical heritage, and it is recommended that the sites should be avoided with a 30m buffer or need to be documented during a Phase II mitigation procedure before a destruction permit can be applied for at the South African Heritage Resources Agency. With the implementation of recommended mitigation measures, the overall impact on heritage resources will be reduced to acceptable positive levels during the project activities.

The **visual assessment** 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.

The Solar PV project provides an opportunity for Glencore to address some of the **socio-economic** issues faced in the area as well as to develop a progressive relationship with the community. The project will create significant employment opportunities and add to cleaner energy production, reduce the load on that national power grid, and pave the way towards a just transition, which are positive impacts. However, this will require a comprehensive and transparent approach to community engagement, ensuring that the local population is not just consulted but actively included in decision-making processes. From a SIA perspective the project is unlikely to introduce significant new impacts, as many of the concerns raised are issues already being experienced by the community At this stage, none of the identified social impacts are so severe that they warrant halting the project, and most of the impacts can be mitigated. It is therefore recommended that the proposed project be approved, provided that the enhancement and mitigation measures outlined in the report, particularly those addressing negative impacts on Socio-Cultural Networks and Community Health and Safety are addressed. The approval should also occur on the condition that Glencore enhance and update its existing grievance mechanism and community engagement plan before the project commences.

## 12.1 PREFERRED ALTERNATIVES

During the Scoping Phase, process, layout and design alternatives were the only reasonable options identified and were pre-assessed. Process alternatives, known as technological and equipment alternatives, are implemented to achieve project goals. These can be mechanical, chemical, or biological, suited to specific developments. For harnessing solar energy, three primary technologies exist: Photovoltaics (PV), concentrating solar power (CSP), and solar heating and cooling (SHC). PV converts sunlight directly to electricity using semiconductors, while CSP uses mirrors to concentrate solar energy to drive turbines, storing thermal energy

for electricity generation. PV was preferred for its lower cost, less obtrusiveness, and reduced environmental impact, though it requires significant area for large-scale production.

Design alternatives for the project included standalone and grid-connected systems, with standalone systems being independent and suitable for off-grid areas but costly and maintenance-intensive. Grid-connected systems are cost-effective, integrating with the grid, and providing continuous electricity. PV panel types included bifacial, monocrystalline, polycrystalline, and thin-film, each with unique advantages and disadvantages. Bifacial panels, followed by polycrystalline and monocrystalline, are favourable for generating up to 300MW, however environmental impacts would be similar for all three types and therefore no preference for PV panel types could be determined.

Energy storage is essential to balance demand and production, and **lithium-ion batteries** are the preferred choice for this project. This preference is due to their high efficiency, energy density, and widespread adoption, despite some environmental impacts. Other options, such as thermal storage using methods like molten salt, offer long-term solutions but are expensive and less efficient. Mechanical storage systems, including pumped storage hydropower and compressed air, provide robust alternatives but require high maintenance and have long lead times.

The site layout alternative involved **a sensitivity-based approach** in assessing layout alternatives for the proposed PV facility. This approach ensured that the environmental and social sensitivities of the selected sites were carefully considered, with the aim of minimizing potential impacts while optimizing the plant's design and operational efficiency. The proposed layout is the most preferred as it avoids sensitive areas and considers them as no-go areas.

The **no-go** alternative for the proposed project involves the option of not conducting any further development on currently vacant land. Although this would mean that the potential negative environmental impacts of construction and operational phases would be avoided, but the positive impact of job creation and optimal use of land that has already been disturbed would be forgone. Thus, the no social or environmental impacts would result from the no-go alternative Leaving the area undeveloped would not have any significant environmental or social benefits, however no environmental fatal flaws have been identified and sensitive areas are avoided in the current layout. The no-go alternative is not preferred as this would mean the positive impacts associated with the project would be foregone, and this would also affect Glencore's future goal of reaching net zero carbon for their Lydenburg operations.

## 12.2 ENVIRONMENTAL IMPACT STATEMENT

The findings of the specialist studies conclude that there are no environmental fatal flaws that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. It is the opinion of the EIA project team that the significance levels of the majority of identified negative impacts can generally be reduced by implementing the recommended mitigation measures. Based on the nature and extent of the proposed and the predicted impacts as a result of the construction, operation and closure of the facility, the findings of the EIA, and the understanding of the mostly low - moderate post-mitigation significance level of potential environmental impacts, it is the opinion of the EIA project team that the environmental impacts associated with the application for the proposed project can be mitigated to an acceptable level and the project should be authorized.

### 12.2.1 CUMULATIVE IMPACT STATEMENT

Without proper mitigation measures and continual environmental management, most of the identified impacts may potentially become cumulative, affecting areas outside of their originally identified zone of impact. The potential cumulative impacts have been identified, evaluated, and mitigation measures suggested and have been updated during the investigation.

The impact significance rating methodology, as provided by EIMS, is guided by the requirements of the NEMA EIA Regulations 2014 (as amended). The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/ likelihood of the impact occurring.

This determines the environmental risk. In addition, other factors, including cumulative impacts and potential for irreplaceable loss of resources, are used to determine a prioritisation factor which is applied to the ER to determine the overall significance of each impact. Therefore, cumulative impacts have already been taken into consideration with respect to the significance rating of each identified impact in the report

When considering cumulative impacts, it is important to bear in mind the scale at which different impacts occur. There is potential for a cumulative effect at a broad scale, such as regional deterioration of air quality, as well as finer scale effects occurring in the area surrounding the activity. The main impacts which have a potential moderate cumulative effect on the project regional scale were noted to be terrestrial biodiversity, avifauna and soils erosion impacts during construction and operation as well as various social impacts during operation. No high significance cumulative impacts were identified.

It has been further noted that within the 30km radius of the proposed project, the impacts of the proposed development will be cumulative with PV projects as identified by the Screening tool. Refer to Figure 33 for map showing Renewable Energy Developments within 30km of the proposed development area. Only two proposed co-generation facilities are located at the edge of the 30km buffer around the Lydenburg PV site.

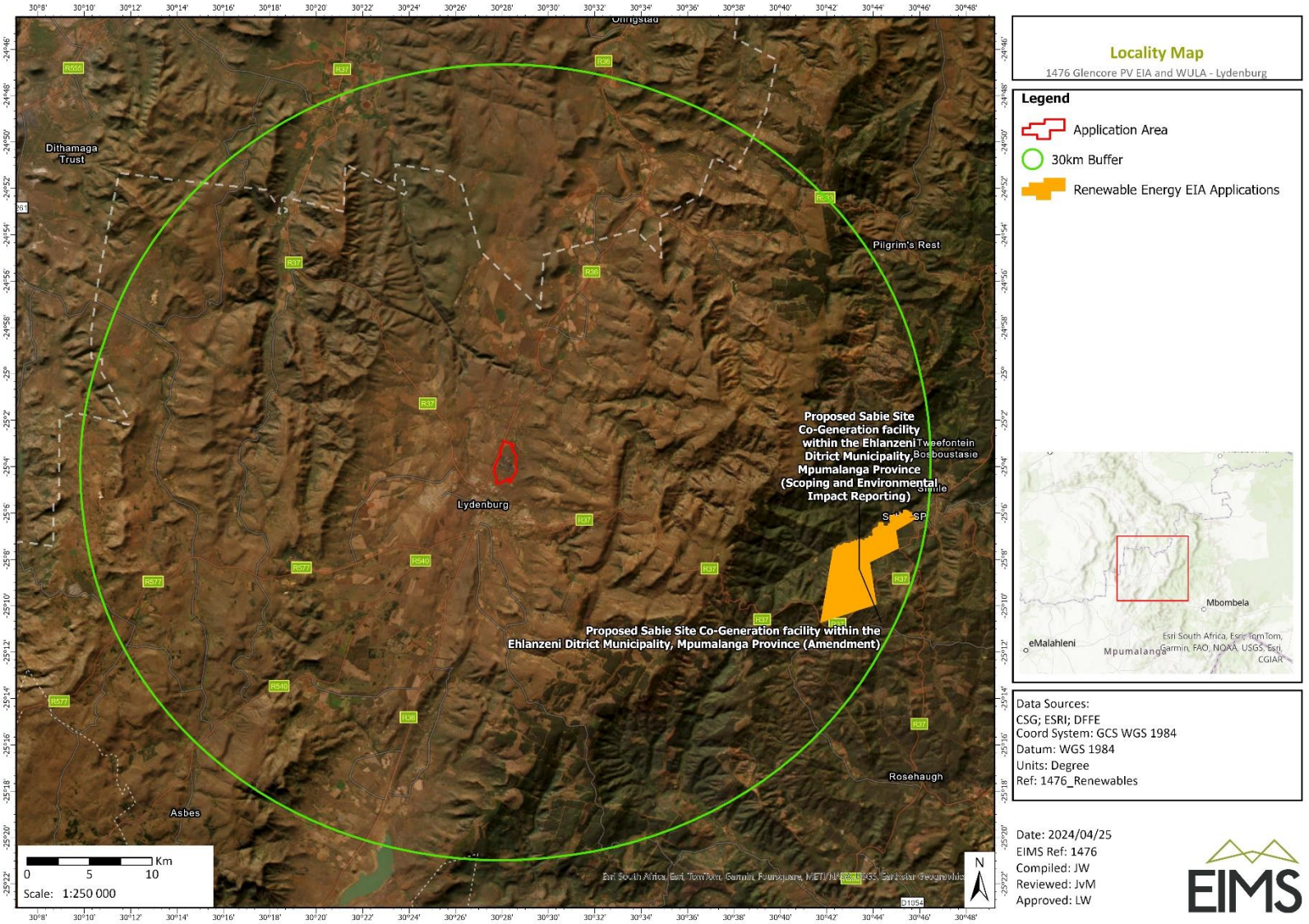


Figure 33: Renewable Energy applications within 30km of the proposed Lydenburg PV project

## 12.3 RECOMMENDATIONS FOR INCLUSION IN ENVIRONMENTAL AUTHORIZATION

A comprehensive list of mitigation measures from the EAP and the appointed specialists has been included in the mitigation management plan on the EMPr. However, the following key recommendations are made:

- The preferred technology for the on-site energy storage system is lithium-ion battery storage.
- Construction working hours during construction to be restricted to 07h00 to 18h00 weekdays and 09h00 to 16h00 on weekends. If possible, work should not be done during public holidays and Sundays to prevent nuisance to nearby occupiers.
- Ensure that all construction vehicles and industrial equipment are in a good working condition as to not generate unnecessary noise.
- Ensure that all high sensitivity no-go areas are avoided and that no construction work takes place in these areas.
- A detailed Stormwater Management Plan (SWMP) needs to be prepared and implemented.
- Retain indigenous vegetation underneath the panels as far as reasonably practical.
- Hazardous materials should be stored in appropriate containers to avoid any leakage/ spillages. These materials should also be stored in a suitably identified area. Bunded (surface sealed with plastic or other impermeable material) areas should be established for the storage of fuels, oils and hydraulics, raw materials (such as sand, stone and cement) and vehicle and plant maintenance.
- During construction it is imperative that indigenous vegetation beneath the PV panels be retained
- An Alien Invasive Plant management plan must be implemented as a priority to prevent the further spread and proliferation of AIP species to the surrounding natural areas.
- All areas to be developed must be walked through prior to any activity to ensure no nests or fauna species are found in the area. Should any Species of Conservation Concern not move out of the area, or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.
- Bird Flappers and diverters must be placed along the whole powerline route, this must be done at 5 m intervals.
- Post-construction monitoring should follow the BirdLife South Africa best practice guidelines for solar energy facilities (BirdLife South Africa, 2017). If monitoring results indicate excessive bird fatalities, then adaptive mitigations should be implemented.
- An alien management plan must be prepared and implemented quarterly for up to 2 years after the construction phase.
- Glencore must complete the relevant obstacle assessment and obtain approval from ATNS for the PV project prior to construction commencing.
- Limit vegetation removal to the disturbance footprint only.
- Wetland buffers must be implemented within the proposed project area
- Appropriate measures must be implemented to prevent excessive noise and vibration. No construction is to occur at night to avoid disturbance to amphibians.
- All recommendations and mitigations in the accompanying EMPr must be implemented. An Environmental Control Officer is to oversee the implementation of the EMPr.
- If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol must be implemented by the ECO/site manager in charge of these

developments. These discoveries ought to be protected (if possible, *in situ*) and the ECO/site manager must report to SAHRA so that mitigation (recording and collection) can be carry out by a paleontologist.

- If unearthed, under no circumstances shall any heritage, archaeological or paleontological artefact/ feature be removed, destroyed or interfered with by anyone on the site, unless such removal has been authorised by the heritage authorities.
- It is recommended that heritage sites LS001 and LS002 should be avoided with a 30m buffer or otherwise need to be documented during a Phase II mitigation procedure before a destruction permit can be applied for at the South African Heritage Resources Agency.
- During construction employ people from the surrounding local communities and SMMEs as far as reasonably possible.
- Ensure transparency in procurement and recruitment processes, in conjunction with community leaders in decision-making to prevent social unrest.
- Glencore should revisit and update their skills development plan to develop skills in the community to enable sourcing a greater portion of local labour. A Community Liaison Officer who is trusted by the community and has the necessary skills and education must be appointed before construction commences.

# 13 ASSUMPTIONS, LIMITATIONS AND UNCERTAINTIES

Certain assumptions, limitations, and uncertainties are associated with the EIA Phase. This report is based on information that is currently available and, as a result, the following limitations and assumptions are applicable:

- The EIA process and report is based on the technical information and process description provided by the client;
- The EIA Report is based on a project description taken from drawings and design specifications for the proposed PV facility that have not yet been finalised, and which are likely to undergo a number of iterations and refinements before they can be regarded as definitive;
- The description of the baseline environment has been obtained from desktop analysis and specialist reports. The assumptions and limitations applicable to the individual specialist studies are outlined within each of the respective specialist reports appended to this report.;
- The fieldwork conducted for the Heritage Impact Assessment may not reveal all heritage resources due to factors like underground sites and vegetation cover, though most of the study area was accessible. Focus was placed on areas not previously disturbed by farming. If additional heritage features are found during the project construction phase, a heritage specialist must be contacted, and the items should not be disturbed. This includes graves and burial sites, which must follow specific procedures if discovered.
- The geological maps of the area primarily focus on geological features rather than palaeontological heritage. Many remote regions in South Africa remain unexplored by palaeontologists, resulting in data that largely relies on aerial imagery. Additionally, the locality and geological information available in museums and university databases are often outdated, with previous data not always well-documented. To supplement this information, Comparable Assemblage Zones from other regions are utilized to infer the presence of fossils in areas that have not been previously studied. Consequently, when similar Assemblage Zones and geological formations are analyzed during desktop studies, it is generally assumed that exposed fossils may exist within the project footprint
- Findings, recommendations and conclusions provided in this report, and all specialist reports, are based on the authors' best scientific and professional knowledge and information available at the time of compilation.
- The visual impact assessment follows the guidelines set by the Western Cape Department of Environmental Affairs and Development Planning. It is based on the premise that all required stakeholder consultations, including with local communities, authorities, and other interested parties, have been or will be carried out according to legal standards, ensuring that their perspectives and concerns are appropriately addressed.
- Not every individual in the community could be interviewed therefore only key people in the community were approached for discussion during the Social Impact Assessment phase. Additional information was obtained using existing data.
- Social impacts are not site-specific but take place in the communities surrounding the proposed development.
- This agricultural potential assessment and avifaunal assessment indicates that the handheld GPS utilized may have inaccuracies of up to 5 meters, which means that all delineations could also be off by this margin. Additionally, the assessment did not evaluate heavy metal levels or analyse the fertility of the classified soils in question.
- Any changes to the area or lack of GIS information related to the avifaunal assessment could have impacted the surveyed region and the resulting findings. Although significant effort was made to cover as much of the project area as possible, it is possible that some species present were not recorded during the field investigations due to their elusive nature.

- The wetland assessment concentrated on the spatial files provided by the client, and any alterations to the area or missing GIS information could have impacted the surveyed region. For areas that were inaccessible, assessments within the larger 500 m project area were conducted using desktop analysis only

# UNDERTAKINGS

## 13.1 UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

I **Matshego Keikelame** herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and Interested and Affected Parties has been correctly recorded in the report.

Signature of the EAP

Date: 30 September 2024

## 13.2 UNDERTAKING REGARDING LEVEL OF AGREEMENT

I **Matshego Keikelame** herewith undertake that the information provided in the foregoing report is correct, and that the level of agreement with Interested and Affected Parties and stakeholders has been correctly recorded and reported herein.

Signature of the EAP

Date: 30 September 2024

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# 15 APPENDICES

Appendix A: EAP CV

Appendix B: Maps

Appendix C: Public Participation

Appendix D: Specialist Studies

Appendix E: EMPr

Appendix F: Generic Powerline EMPr