ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

Proposed Photovoltaic Energy Facility for Anglo American Platinum, Limpopo

Environmental Impact Report

LEDET REF NO: 12/1/9/2-W89

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PERTINENT INFORMATION TO THIS APPLICATION

No.	Project aspect	Description
1	**Description of the activity**	Anglo American Platinum Ltd (Anglo) proposes to construct an alternating current photovoltaic (PV) Solar Energy Facility (SEF), for their Platinum Mine in Mogalakwena region of Limpopo Province. The proposed PV facility would consist of the following: 1. **A solar farm,** comprising of numerous rows of PV modules mounted on steel tracking mounts and footings (concrete or driven into the ground) with associated support infrastructure, including inverters, to generate up to 120MWac; 2. **Internal access roads for servicing and maintenance of the site;** 3. **Access roads** for use during construction; 4. Temporary equipment **laydown areas** for use during construction; 5. **Buildings**, including a connection building, control building, guard cabin; 6. **Weather stations** within the fenced perimeter of the site; and 7. **Perimeter fencing** 8. **Substation and/or switchyard located at the solar farm,** to convert the power from solar farm voltage to transmission voltage 9. **Overhead transmission line/s**, to transmit power from the solar farm to the mine (described in more detail below) 10. **Existing substations and/or switchyard located at the mine**, to convert the power from transmission voltage to mine voltage (11 kV)
2	**Municipality**	Mogalakwena Local Municipality of the Waterberg District Municipality.
3	**Applicant**	Mogalakwena Mine Solar Power (Pty) Ltd
	Property details	Farm Armoede 823 (Remainder of Portion 3) (Surveyor General 21 Digit Code: T0LR0000000082300003)
4	**Size of the site**	Approximately 766 ha
5	**Development footprint**	Estimated total of 295 ha
6	**Capacity of the facility (in MW_{ac})**	Maximum 120 MW

No.	Project aspect	Description
7	**Type of technology**	A renewable energy facility comprising of numerous rows of single axis tracking PV modules with associated support infrastructure to generate up to 120 MW electricity.
8	**Structure heights**	• Solar PV panels: ≤ 5m maximum height • On-site substation ≤ 10m in height • Control building: ≤ 10m in height • Weather stations: ≤ 4m in height • On-site transmission line/s approximately 25 m above ground level
10	**Power line/s (e.g. number of overhead power line/s required, route/s, voltage, height, servitude width, etc.)**	• There will be two overhead power line routes, each containing either of the following: 1. 3 x 66kV powerlines **or**; 2. 1 x 132kV powerlines
11	**Other infrastructure (e.g. additional infrastructure, details of access roads, extent of areas required for laydown of materials and equipment, etc.)**	Other associated infrastructure will include the following: • Internal roads for servicing and maintaining of the facility; • Stormwater infrastructure; • Buildings, including a substation building, control room, maintenance building / storeroom, security hut; • Weather stations within the fenced perimeter of the site; • Perimeter fencing; and • Laydown area and construction yard.

EXECUTIVE SUMMARY

Anglo American Platinum Limited (hereto refer to as Anglo) seeks to appoint an Independent Power Producer (IPP) for the development, financing, ownership, construction, operation, and maintenance of a Solar photovoltaic (PV) Facility (The Project). The PV Facility will supply energy on an exclusive basis to the Anglo's Mogalakwena Mine in Limpopo, South Africa in terms of a Power Purchase Agreement with an operating term of 25 years, as may be extended or amended in accordance with the terms of the PPA. The Project will not be transferred to Anglo or its selected nominee on the expiry or early termination of the Term.

This IPP shall be chosen through a Request for Proposal (RfP) process, which is currently underway and nearing completion. The optimal Solar PV generation capacity shall be determined by the IPP based on their own calculations

The key objectives of the Project (in no particular order) are to:

- Develop the market for platinum group metals through the commercial-scale use of environmentally-friendly hydrogen fuel cells;
- Build Company experience and repeatable processes in preparation for the anticipated further installation of solar PV generation equipment near the Mine and, potentially, at other operations owned by the Company;
- Empower a broader group of people and facilitate Local Community upliftment by ensuring appropriate Local Community participation through:
    - active participation and skills transfer;
    - shareholding;
    - job creation for Local Community members;
    - Local procurement; and
    - corporate social investment expenditure into projects for the Local Community;
- Procure a cost-effective Project, that provides increased energy cost certainty over time;
- Diversify the energy mix of the Mogalakwena Mine; and
- Reduce the environmental impact of the Mogalakwena Mine.

The proposed site for development is on the Farm Armoede 823 (Remainder of Portion 3) near the Mogalakwena Mine. The proposed site is located east of the N11 main road, 27 km outside of the town Mokopane in the Limpopo Province. The proposed Armoede site is divided into three portions: north, central and southern (green, orange and blue respectively in **Error! Reference source not found.**). The proposed site area is approximately 295 ha (excluding the powerlines) in size and is located directly east of the N11.

The 21-digit Surveyor-General code of the property on which the PV facility is proposed is T0LR00000000082300003 (Farm no. 3/823).

Typical PV facility components will include:

- **A solar farm,** comprising of numerous rows of PV modules mounted on steel tracking mounts and footings (concrete or driven into the ground) with associated support infrastructure, including inverters, to generate up to 120 MW. The extent of this area is expected to be approximately 295 ha;
- Internal access roads for servicing and maintenance of the site;
- Temporary equipment **laydown areas** for use during construction with an approximate extent of 7 ha;
- **Buildings**, including a connection building, control building, guard cabin with a size of -0.5 ha;

- **Weather stations** within the fenced perimeter of the site;
- Perimeter fencing;
- **Substation and/or switchyard located at the solar farm,** coveringh an area of 1ha, to convert the power from solar farm voltage to transmission voltage;
- **Overhead transmission line/s (OHL)**, to transmit power from the solar farm to the mine (described in more detail below). The northern transmission line corridor is approximately 4.66 in length while the southern corridor is approximately 7.55km in length; and
- **Substation and/or switchyard located at the mine**, to convert the power from transmission voltage to mine voltage (11 kV)
-

Note that the EIA aims to approve transmission line corridors instead of specific transmission line layouts, as final route layouts and designs will be determined by the appointed Preferred Bidder in consultation with Eskom and Anglo. These transmission corridors have been assessed by the EIA specialists and their findings will be used to inform the final placement of the transmission pylons.

The following additional infrastructure is expected to form part of the PV plant:

- Access and inside roads/paths – An access road to the site as well as internal roads between the PV arrays would need to be constructed.
- Trenching – all DC and AC wiring within the PV plant must be buried underground.
- Inverter/transformer building. The number of buildings will be dependent on the size of plant and inverters chosen. Alternatively, a pre-packaged inverter/transformer housed in a concrete substation for outdoors can be utilised.
- Guard house– One (1) brick building of approximately 100m^2 on the perimeter of the plant.
- Control room - The control room will contain switchgear and monitoring equipment for the PV plant.
- Connection to transmission lines: The grid connection requires transformation of the voltage. The normal components and size of a distribution rated electrical substation will be required.
- A small switching station for the plant will be located on the outside of the control room.
- Foundations to support the PV panels.

The Mogalakwena Mine operates 24 hours per day. Therefore, the mine is a large consumer of grid-supplied electricity from Eskom. Anglo wishes to develop the proposed PV solar energy facility to reduce the cost of energy for the mining operations. Currently, Eskom's power supply is uncertain, inconsistent and increasingly expensive. It is anticipated that Eskom's tariffs will escalate rapidly in the short to medium-term. This, together with the uncertainty of reliable electricity supply poses a risk to the future of the Mogalakwena Mine.

The key intended outcomes of the project are:

- **Improved financial viability for the Mogalakwena Mine**. This means that, over the life of the project, the project will create a net saving in energy costs for the mine;
- **Energy cost predictability for the Mogalakwena Mine**. This means that the mine is able to make reasonable long-term predictions as to the cost of energy from the project;
- **Community Involvement.** This implies the inclusion of local communities living around the mine to enable them to benefit from the project's implementation in tangible ways, as part of a more general drive to create employment and improve the communities' economic sustainability;

- **Reduced Carbon Footprint:** Anglo, and specifically Mogalakwena Mine, would like to reduce its carbon footprint, by reducing the quantity of non-renewable forms of energy purchased.
- **Energy Security:** This implies an ability to maintain mine operations in the event of an interruption of power from the grid.
- **Mining Charter Compliance:** Anglo would like to contribute to the achievement (and, if possible, out-performance) of the Mining Charter requirements.

Bearing in mind these objectives, it is also important to consider that there are other outcomes that the proposed project cannot deliver. These are:

- **Energy Security:** an ability to maintain mine operations in the event of an interruption of power from the grid. Solar plants cannot store energy or dispatch energy on demand, and battery storage was not found to be viable. However, the proposed project does diversify electricity supply, and thus contributes to Anglo's understanding of the nature of energy supply contracts.
- **Energy for the Community:** Many of the local communities are already electrified, but a natural desire for the project would be to provide energy directly to the local communities, as a clear, tangible benefit. However, any such supply of energy has significant regulatory impacts (the need to be a Regional Electricity Distributor, amongst others), and may have limited benefit, given that the solar plant only generates energy during the daytime. Any communities that require electrification are likely to be better served through a dedicated off-grid electrification project, similar to that undertaken for the Zenzele Trust.
- **Prevention of incursion:** The limited site options available mean that the project cannot be sited to limit local communities' incursion onto mine land, except by chance.
- **Employment creation:** It is expected that a maximum of 30 permanent full-time jobs will be created for the local community during the operational phase. Therefore, expectations of large-scale job creation are unrealistic.

The need for renewable energy is well documented and reasons for the desirability of solar energy include:

- Utilising the most abundant natural resource available to South Africa;
- Meeting nationally appropriate emission targets in line with global climate change commitments under the Paris Accord;
- Enhancing energy security by diversifying generation; and
- Creating a more sustainable economy.

Since the project proposal is for the development of a PV facility (i.e. the generation of electricity from a renewable resource) and the capacity will be more than 20 Megawatts (MW), it is considered a "listed activity" in terms of the NEMA 2014 EIA Regulations (GN No. R 982 to 985 of 2014). As such, a Scoping and EIR process is required in accordance with these Regulations.

The EIA process typically follows three distinct phases, namely the Application Phase, the Scoping Phase and the EIR Phase, with two stages of public participation (associated with the Scoping and EIR phases, respectively), followed by decision-making and implementation. The current phase of the EIA process is the EIA phase. This Environmental Impact Report (EIR) will be made available for a 30 day public review period after which all comments received will be added to the EIR before it is submitted to the competent authority (CA), namely the Limpopo Department of Economic Development, Environment and Tourism (LEDET).

Impacts identified during the EIA have been summarised below based on their negative or positive outcomes. Note that certain impacts may initially be negative in nature but, by implementing the recommended mitigation measures, have the potential of resulting in positive impacts.

Summary of negative impacts

Impacts on terrestrial and avifaunal environments

- Loss of floral, faunal and avifaunal SCC within the development footprint
- Loss of floral, faunal and avifaunal habitat within the development footprint
- Loss of floral, faunal and avifaunal diversity within the development footprint
- Loss of favourable floral and faunal habitat outside of the development footprint
- Soil contamination
- Loss of floral and faunal SCC individuals due to improper relocation management and monitoring
- Ongoing or permanent loss of floral, faunal and avifaunal habitat and diversity during the operational phase
- Loss of floral habitat, medicinal flora, and SCC, as well as overall species diversity within the local area

Impacts on aquatic environment

- Removal of vegetation within the development footprint and associated disturbances to soil
- Modification of hydrological function and water quality
- Changes to the freshwater geomorphological processes and sedimentation
- Loss of aquatic biota
- Loss of freshwater habitat

Impacts on landscape and visual environment

- Impacts on landscape character and sense of place
- Impact on visual intrusion and VAC
- Impact on visual exposure and visibility
- Impacts due to nigh-time lighting

Heritage and Palaeontological impacts

- Impacts on burial grounds and graves
- Impact on possible graves and homesteads not yet identified or unmarked
- Impact on stone age and Iron Age sites
- Loss of fossil heritage

Social impacts

- Environmental impacts with social dimensions such as dust, noise and visual impacts
- Relocation
- Loss of livelihoods
- Community safety impacts due to increased traffic
- Increased pressure on physical infrastructure

Traffic impacts

- Increased traffic volumes resulting in a reduction in road capacity
- Increased public transport demand and activity
- Increase in road safety risks

Summary of positive impacts

Positive impacts are mainly related to the social and socio-economic benefits that are expected to be brought to the community. These are related to the following impacts:

- Community expectations of benefits
- Community resistance to the proposed project
- Community relations, perceptions and uncertainty about how the project will affect their lives
- Job creation and economic opportunities
- Community shareholding

LIST OF ACRONYMS

CBA	Critical Biodiversity Areas
C-Plan	Conservation Plan
CR	Critically Endangered
DFFE	Department of Forest, Fisheries and the Environment
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EDL	Ephemeral Drainage Line
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMF	Environmental Management Framework
EMPr	Environmental Management Programmes
EN	Endangered
ESA	Ecological Support Areas
GN	Government Notice
HIA	Heritage Impact Assessment
IDP	Integrated Development Plan
LC	Least Concern
LEDET	Limpopo Department of Economic Development, Environment and Tourism
LM	Local Municipality
LSA	Later Stone Age
MLM	Mogalakwena Local Municipality
MSA	Middle Stone Age
MW	Megawatt
MW_{ac}	Megawatt Alternating Current
NEMA	National Environmental Management Act (No. 107 of 1998)
NERSA	National Energy Regulator of South Africa
NWA	National Water Act (Act No 36 of 1998)
OHL	Over Head Line
PCU	Power Conversion Unit
PES	Present Ecological State
POC	Probability of Occurrence
PPP	Public Participation Process
PTK	Pad-mounted Transformer Kiosk
PV	Photovoltaic
SACLAP	South African Council for the Landscape Architectural Profession
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SCC	Species of Conservation Concern
SIA	Social Impact Assessment
SPV	Special Purpose Vehicle
TIA	Traffic Impact Assessment
ToR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
VU	Vulnerable

NEMA REQUIREMENTS WITH REFERENCE TO RELEVANT SECTIONS OF THIS REPORT

The Environmental Impact Assessment (EIA) process undertaken to date has culminated in the production of this Environmental Impact Report (EIR), which provides detailed information relevant to the project.

Table 1-1 illustrates how the structure of the EIR addresses applicable requirements for information in terms of National Environmental Management Act (Act No. 107 of 1998) (NEMA).

Table 1-1: NEMA required content of the EIR

Appendix 3	Content as required by NEMA	Section /Appendix
3 (1)(a)	An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include details of – (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including curriculum vitae	Section 1.3 and Appendix A
3 (1)(b)	The location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including— (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; and (iii) where the required information in items (i) and (ii) is not available, the co-ordinates of the boundary of the property or properties;	Section 3.1
3 (1)(c)	a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is— (i) a linear activity, a description and co-ordinates of the corridor in which the proposed activity or activities is to be undertaken; (ii) on land where the property has not been defined, the co-ordinates within which the activity is to be undertaken;	Section 3.1
3 (1)(d)	A description of the scope of the proposed activity; including – (i) all listed and specified activities triggered and being applied for; and (ii) a description of the associated structures and infrastructure related to the development;	Section 2.4 Section 3.2
3 (1)(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 2
3 (1)(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 3.6
3 (1)(g)	a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Section 3.7
3 (1)(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—	Section 3.7 Section 6 Section 4

Appendix 3	Content as required by NEMA	Section /Appendix
	(i) details of the development footprint alternatives considered; (ii) details of the public participation process undertaken; (iii) a summary of the issues raised by I&APs and responses; (iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(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— (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Section 5
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks	Appendix F
	(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;	Section 5
	(viii) the possible mitigation measures that could be applied and level of residual risk;	Section 5 and EMPr in Appendix I
	(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such; and (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 3.7 Section 8
3 (1)(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— (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (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 3.7
3 (1)(j)	An assessment of each identified potentially significant impact and risk, including— (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be mitigated;	Section 5
3 (1)(k)	Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an	Section 5 Section 8

Appendix 3	Content as required by NEMA	Section /Appendix
	indication as to how these findings and recommendations have been included in the final assessment report;	
3 (1)(l)	An environmental impact statement which contains— (i) a summary of the key findings of the EIA; (ii) a map at an appropriate scale including the proposed activity and its associated infrastructure, environmental sensitivities and areas of avoidance; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Section 8
3 (1)(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 6 and 8
3 (1)(n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Section 3.7 Sectio 8
3 (1)(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 8.4
3 (1)(p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 1.2
3 (1)(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 8.4
3 (1)(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
3 (1)(s)	An undertaking under oath or affirmation by the EAP in relation to— (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (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;	Appendix B
3 (1)(t)	Where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Section 5 EMPr in Appendix I
3 (1)(u)	An indication of any deviation from the approved scoping report, including the plan of study, including— (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and (ii) a motivation for the deviation;	N/A
3 (1)(v)	Any specific information that may be required by the competent authority; and	Section 7.2
3 (1)(w)	Any other matters required in terms of section 24(4)(a) and (b) of the Act.	N/A

1 INTRODUCTION

This section provides a brief overview of the proposed project and the legislated Environmental Impact Assessment (EIA) process to be followed. It also guides the reader as to where certain information may be found within the document and lists the assumptions and limitations that pertain to the compilation of this report.

Anglo American Platinum Ltd (hereto referred to as Anglo) proposes to develop a 70 - 90 Megawatt (MW) alternating current (MW_{ac}) Photovoltaic (PV) solar energy facility in order to reduce the Mogalakwena Mine Solar Power (Pty) Ltd (Mogalakwena Mine) consumption of the grid supplied power by procuring locally generated solar power. The solar energy facility will be run by a third-party power producer, which will be procured through a Special Purpose Vehicle (SPV), which will be set up by Anglo in parallel to the procurement process. Anglo will commence the long lead-time permitting arrangements through the SPV and will transfer ownership of the SPV to the preferred bidder to allow them to continue the project development process. The process of procuring the preferred bidder is currently underway.

All the electricity generated by the proposed PV facility will be consumed by Mogalakwena Mine. The PV energy facility and associated infrastructure are proposed to be developed on the preferred site situated on the Remainder of Portion 3 of the Farm Armoede 823 farm (referred to as Site 1) with two alternatives (namely Gillimberg and Groenfontein, referred to as Site 2 and Site 3 respectively). The proposed site is located east of the N11 main road, 27 km north west of the town of Mokopane in the Limpopo Province (**Error! Reference source not found.**).

The National Environmental Management Act (No. 107 of 1998) (NEMA), and the EIA Regulations of Government Notice (GN) No. 982 of 2014, required an Environmental Authorisation (EA) from the environmental competent authority before the project can proceed. The EIA process has been carried out in terms of the above-mentioned regulations. Anglo appointed Zutari (Pty) Ltd (Zutari) as the independent environmental consultant to, firstly, undertake Screening and Scoping phases of the proposed project. The EIA phase appointment of Zutari was subsequently also confirmed by Anglo. Important to note is that the Preferred Bidder has not yet been appointed by Anglo. Detailed designs (which will be done by the Preferred Bidder) have therefore not yet been received.

Section 24(C)(1) of NEMA provides that "when listing or specifying activities in terms of section 24(2) the Minister [of Environment, Forestry and Fisheries], or an MEC with the concurrence of the Minister [of Environment, Forestry and Fisheries], must identify the competent authority (CA) responsible for granting environmental authorisations in respect of those activities". Each of the Listing Notices to the Environmental Impact Assessment Regulations, 2014 ("EIA Regulations") provides that:

"The competent authority in respect of the activities listed in this part of the Notice is the competent authority in the province in which the activity is to be undertaken, unless-

(a) it is an application for an activity contemplated in section 24C(2) of the Act, in which case the competent authority is the Minister or an organ of state with delegated powers in terms of section 42(1) of the Act; or

(b) the listed or specified activity is or is directly related to-

i. prospecting or exploration of a mineral or petroleum resource; or

ii. extraction and primary processing of a mineral or petroleum resource;

in which case the competent authority is the Minister responsible for mineral resources"

This is in line with section 24C(2A) of NEMA, which provides that the Minister of Mineral Resources and Energy is the competent authority if the activity is directly related to:

- prospecting or exploration of a mineral or petroleum resource; or
- extraction and primary processing of a mineral or petroleum resource.

Accordingly, in order to establish whether the Minister of Mineral Resources and Energy or the Minister of Environment, Forestry and Fisheries is the CA, regard must be had to the requirements of section 24(C)(2A) and whether the establishment of the Project is directly related to mining activities. With this in mind, discussions with DMR and LEDET have confirmed that the CA for the proposed project is LEDET. LEDET confirmed their agreement via email on 9 October 2020 (refer to Appendix C). The Scoping Report was submitted to LEDED on 25 February 2021. LEDET subsequently approved the Scoping Report on 12 April 2021 (refer to Appendix C8).

The proposed Solar PV facility is the subject of this EIR. This report serves to document the EIA Phase of the EIA process and is structured as follows:

Section 1	Introduces the EIA process, notes the assumptions, uncertainties and limitations, and confirms the independence of the Environmental Assessment Practitioner (EAP).
Section 2	Describes the legislation and policy framework for the EIA process, as well as the listed activities.
Section 3	Describes the proposed project and the identified alternatives. In addition, it also provides a motivation of the need for the proposed Mogalakwena Mine Solar Power PV facility.
Section 4	Provides a description of the receiving environment as a basis for the determination of the detailed specialist studies required to support the EIR phase of the project.
Section 5	Describes the assessment of potential impacts that have been determined by the EAP with the input of specialist assessments.
Section 6	Describes the mitigation measures proposed by the appointed specialists.
Section 7	Describes the Public Participation Process (PPP) that has been conducted to date, and that will be undertaken during the remainder of the EIA process.
Section 8	This section provides a summary of the alternatives and impacts, provides the EAPs recommendations and concludes the report. It also briefly touches on a few key procedural aspects going forward.

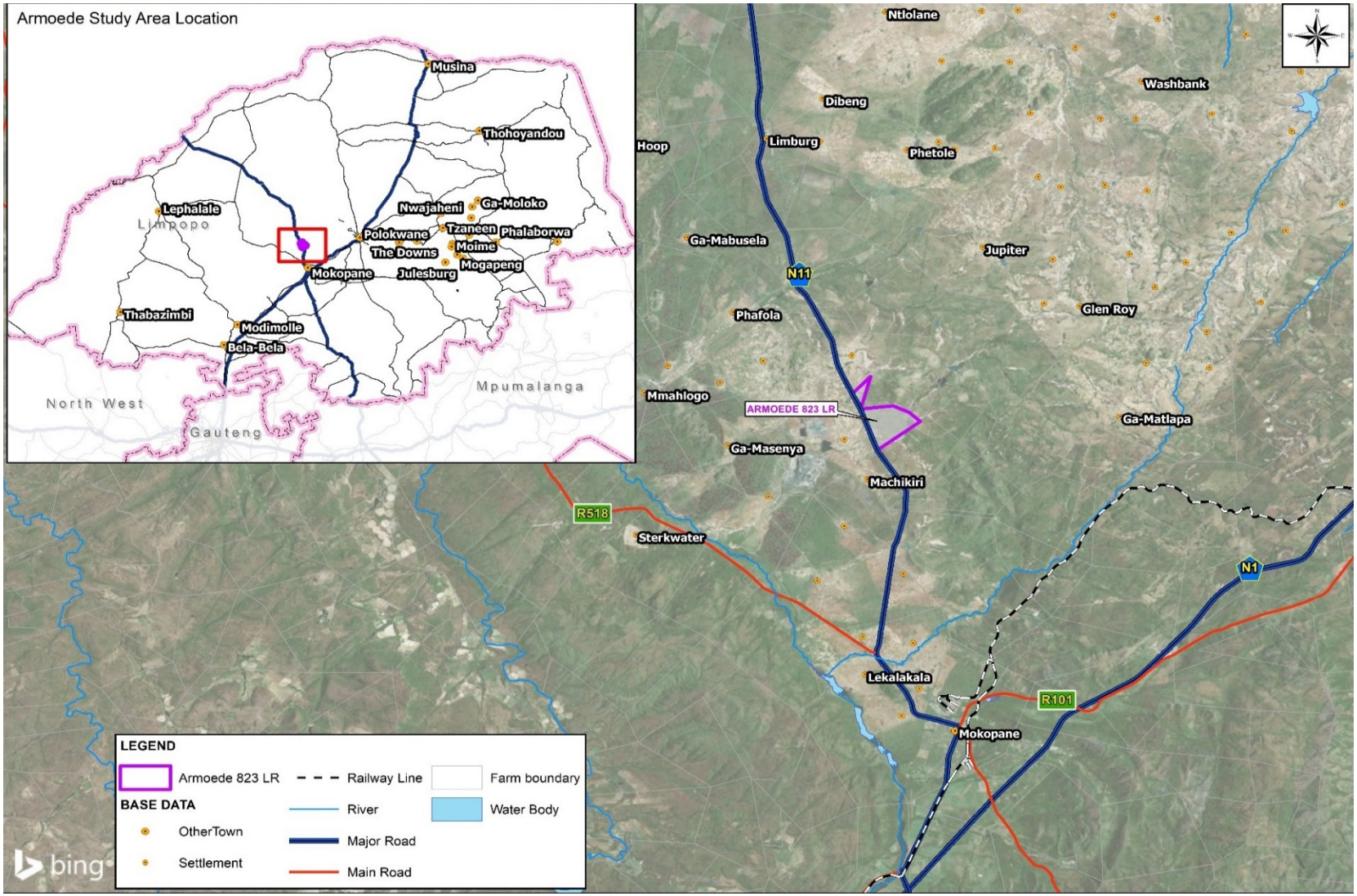


Figure 1-1: Regional locality map of the proposed Anglo American PV facility

1.1 EIA Process and Approach

Since the project proposal is for the development of a PV facility (i.e. the generation of electricity from a renewable resource) and the capacity will be more than 20 Megawatts (MW), it is considered a "listed activity" in terms of the NEMA 2014 EIA Regulations (GN No. R 982 to 985 of 2014). As such, a Scoping and EIR process is required in accordance with these Regulations.

The EIA process typically follows three distinct phases, namely the Application Phase, the Scoping Phase and the EIR Phase, with two stages of public participation (associated with the Scoping and EIR phases, respectively), followed by decision-making and implementation. **Error! Reference source not found.** illustrates the regulatory process to be followed. The current phase of the EIA process has been highlighted in bold.

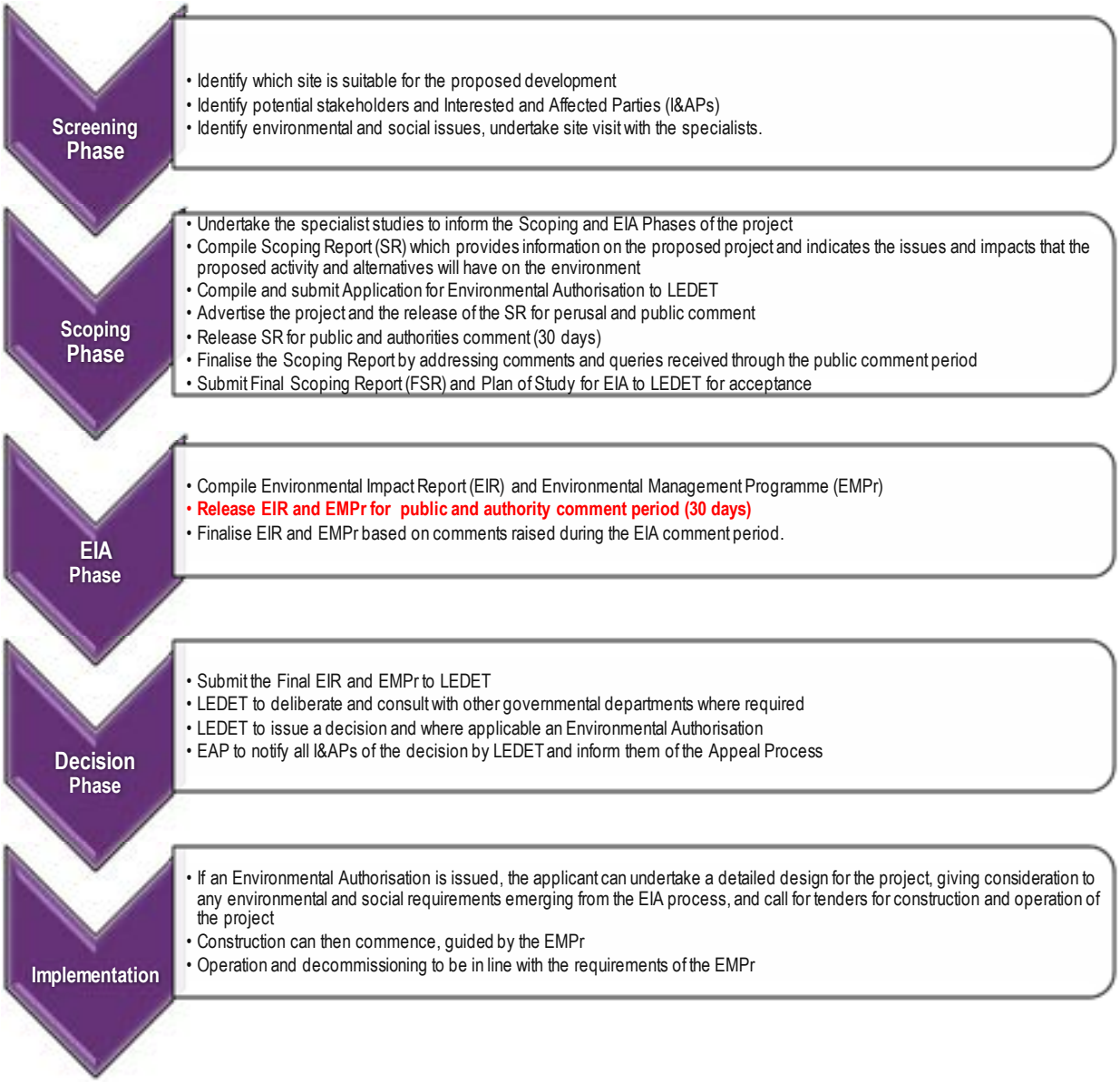


Figure 1-2: EIA process to be followed for the proposed PV facility for Mogalakwena Mine

1.1.1 Application Phase

The application phase entails the submission of a signed EIA Application Form to notify the CA of the proposed PV facility. As indicated in Figure 1-2 above, the Application Form has been submitted to LEDET prior to the requisite 30-day public participation comment period. LEDET acknowledged receipt of the application on 11 November 2020 (see Appendix C). The full application is provided in Appendix I.

1.1.2 Screening Phase

A pre-application screening of three alternative sites was conducted prior to application (refer to Section 3.7.1) to confirm the suitability of the sites and to determine the preferred site on which to base the detailed assessments for inclusion in the Scoping and EIR phases. The Screening Phase consisted of the following components:

- Desktop review of the biophysical and social characteristics of the area;
- Various site visits were undertaken to determine the preferred site. The initial site visit was undertaken on 23 March 2018 to assess Site 3 (Groenfontein). Site 2 (Gillimberg) was visited on 1 February 2019 and Site 1 (Armoede) was initially visited on 2 October 2019.
- Screening of the preferred site was undertaken according to the national web-based screening tool of the Department of Forest, Fisheries and the Environment (DFFE) and is attached as Appendix H.

The information gathered during the Screening Phase was used in refining the Plan of Study for the EIA process (Appendix H).

1.1.3 Scoping Phase

Scoping in the EIA process is the procedure used for determining the extent of, and approach to, the EIR Phase and involves the following key tasks:

- Further identification and involvement of relevant authorities and I&APs in order to elicit their interest in the project;
- Identification and selection of feasible alternatives to be taken through to the EIA phase;
- Identification of significant issues/ impacts associated with each alternative to be examined in the EIR, and mitigation measures that can be applied.
- Determination of specific Terms of Reference (ToR) for any additional specialist studies required in the EIR Phase (i.e. the Plan of Study for the EIR).

Various methods and sources were utilised to identify the potential social and environmental aspects associated with the proposed project and to develop the ToR for the specialist studies. The sources of information for the preparation of this report include, amongst others, the following:

- Collection of information regarding the project, as provided by Anglo:
  - Project description;
  - Methodology for construction of the various project components;
  - Methodology during operations;
  - Expected timetable for project development;
  - Maps and figures, outlining the proposed facilities; and

- Technical information relating to design.

- Other relevant EIRs;
- Environmental baseline surveys for this site and surrounding areas;
- A second site visit to Armoede took place on 17 September 2020.
- Consultation with the project team; and
- Consultation with I&APs, including authorities.

During the Scoping Phase, the Scoping Report must be subjected to at least a 30-day PPP. Accordingly, the Scoping Report was made available for public comment and review – initially from 2 November 2020 to 11 December 2020, but then extended to 27 January 2021, in terms of Regulation 3(7) of GN R 982 of 2014. On completion of the public comment period, the Scoping Report was updated and finalised, taking cognisance of comments received and issues raised by I&APs.

Thereafter, the Scoping Report was completed and submitted to the LEDET for review on 25 February 2021. LEDET accepted the Scoping Report and Plan of Study for EIA on 14 April 2021.

1.1.4 The EIA Phase

The Scoping Phase is followed by the EIA Phase, which is informed by the specialist investigations on the preferred site. This phase culminates in a comprehensive EIR that documents the outcome of the impact assessments. To achieve this, the EIA process must be undertaken in line with the approved plan of study for EIA, as set out in the Scoping Report. The environmental impacts, mitigation and closure outcomes as well as the residual risks of the proposed activity must also be set out in the EIR.

The objective of the EIA process is to, through a consultative process:

a) 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;

b) Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

c) Identify the location of the development footprint within the preferred site 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;

d) Determine the
   - Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
   - Degree to which these impacts
     i. Can be reversed;
     ii. May cause irreplaceable loss of resources; and
     iii. Can be avoided, managed or mitigated;

e) Identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;

f) Identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity;

g) Identify suitable measures to avoid, manage or mitigate identified impacts; and

h) Identify residual risks that need to be managed and monitored.

Table 1-1 sets out the required content of the EIR and also indicates where such content is located in this report.

Furthermore, an Environmental Management Programmes (EMPrs) are required to accompany the EIR and to describe the impact management objectives, including management statements, and to identify the impacts and risks that need to be avoided, managed and mitigated as identified through the EIA process. Three EMPr are attached in Appendix I of this EIR:

- An EMPr for the PV plant area;
- An EMPr for the transmission lines (based on the standard EMPr for transmission lines required by the EIA regulations); and
- An EMPr for the substation (based on the standard EMPr for substations required by the EIA regulations).

1.2 Assumptions, Limitations and Gaps in Knowledge

In undertaking this investigation and compiling the EIR, the following assumptions and limitations apply:

- It is assumed that the information provided by Anglo is accurate and unbiased, and that no information that could change the outcome of the EIA process has been withheld.
- The scope of this investigation is limited to identifying and assessing the environmental impacts associated with the proposed PV facility and associated infrastructure to generate energy for the mining operations of the proposed PV plant. The project does not include any infrastructure upgrades, which may be required from Eskom to allow capacity in the local grid for the proposed project.
- There will be no accommodation for the construction or operational phase staff on the site.
- Anglo will follow relevant legislation related to closure and decommissioning of the facility once it reaches the end of its life.

1.3 Independence and Details of the EAP

The requirement for independence of the environmental consultant is aimed at reducing the potential for bias in the environmental process. Neither Zutari nor any of its sub-consultants are subsidiaries of Anglo, nor is Anglo a subsidiary to Zutari. Furthermore, none of these parties have any interests in secondary or downstream developments that may arise out of the authorisation of the proposed project.

Zutari has selected a team of highly experienced specialists and multi-disciplinary practitioners in order to execute this project in a professional and unbiased manner. A synopsis of the qualifications and experience of Zutari's Environmental Assessment team this project is provided hereunder. Full CVs are available in Appendix A.

The EAP, **Mr Reuben Heydenrych**, has extensive experience in the project management of various small and large-scale infrastructural and environmental projects. He is employed as an Environmental Practitioner at Zutari's Tshwane office. He successfully completed the EIA process for a proposed 200 MW solar PV plant at Westonaria for Sibanye Gold (now Sibanye Stillwater) in 2016. He has also participation in numerous EIAs for renewable energy projects,

including wind, hydro and solar, either in the capacity as manager of the EIA or as independent reviewer in due diligence processes, He has been involved in EIA processes in South Africa and in various other African countries, as required by relevant national legislation and in terms of international requirements as EIA team leader and team member. These projects have included exemptions, scoping, and full EIAs for projects such as rezoning, filling stations, water and sewage pipelines, roads (national, provincial and municipal), residential developments, game lodges, telecommunications structures, mines, infrastructure in sensitive environments and industrial processes. Reuben also has experience in environmental advisory services and strategic environmental management, including strategic environmental assessments, environmental scans, environmental feasibility studies and environmental management frameworks (EMFs); EMPrs for the construction and operational phases of infrastructure developments and environmental auditing, including due diligence assessments, ISO 14001 systems development and auditing, legal compliance and waste management audits.

He obtained a Master's in Philosophy: Environmental Management from the University of Cape Town, South Africa in 1993 and a Bachelors' Degree in Landscape Architecture from the University of Pretoria, South Africa, in 1991. Reuben is registered as a professional landscape architect with the South African Council for the Landscape Architectural Profession (SACLAP).

Mrs Candice Dürr, one of the project members, was appointed by Zutari's Tshwane office as an Environmental Consultant. Candice has over 7 years of environmental science-related experience and has a Bachelor of Science degree in Environmental and Biological Sciences with an Honours degree in Environmental Management.

2 LEGAL FRAMEWORK

This section provides an overview of the legal documents, policy documents, and guidelines to consider when undertaking an EIA process. The EIA is being undertaken in accordance with relevant South African environmental legislation and takes into consideration international best practice.

2.1 Relevant Legislation

Refer to Table 2-1 below for the primary legislation applicable to the project and the applicability thereof.

Table 2-1: Relevant legislation and the applicability thereof

Legal Requirements		
Legislation considered	**Relevant Organ of State / authority**	**Aspect of Project**
The Republic of South Africa Constitution Act (Act No. 108 of 1996) ("the Constitution")	The Constitutional Court	The environmental right contained in Section 24 of the Constitution provides that everyone is entitled to an environment that is not harmful to his or her well-being.
National Environmental Management Act (Act No. 107 of 1998) (NEMA)	Competent Authority (LEDET)	NEMA establishes the principles for decision-making on matters affecting the environment. Section 2 of the Act sets out the National Environmental Management principles which apply to the actions of organs of state that may significantly affect the environment. Furthermore, Section 28(1) states that *"every person who causes or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring".* If such pollution or degradation cannot be prevented, then appropriate measures must be taken to minimise or rectify such pollution or degradation. The applicant has the responsibility to ensure that the proposed activity and EIA process conform to the principles of NEMA. In developing the EIA process, Zutari has been cognisant of this need, and accordingly the EIA process has been undertaken in terms of NEMA and the EIA Regulations[1]. Several listed activities in these regulations are triggered, as indicated in **Error! Reference source not found.** to **Error! Reference source not found.**.
National Water Act	Department of Water and	The NWA provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and

[1]GN No. R 982, 983, 984, and 985 in Government Gazette No.38282 of 4 December 2014.

Legal Requirements		
Legislation considered	**Relevant Organ of State / authority**	**Aspect of Project**
(Act No. 36 of 1998) (NWA)	Sanitation (DWS)	authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and that a person can only be entitled to use water if the use is permissible under the NWA. Section 21 of the NWA specifies the water uses which require authorisation from the DWS in terms of the NWA before they may commence. Anglo will apply for Water Use Licences or General Authorisation registrations required in terms of the Section 21 of the NWA itself.
National Heritage Resources Act (Act No. 25 of 1999) (NHRA)	South African Heritage Resources Agency (SAHRA)	In terms of the NHRA, any person who intends to undertake "any development which will change the character of a site exceeding 5,000 m^2 in extent, or involving three or more existing erven or subdivisions thereof", "the construction of a road powerline, pipeline exceeding 300 m in length" or "the rezoning of site larger than 10,000 m^2 in extent…" must at the very earliest stages of initiating the development notify the responsible heritage resources authority, namely SAHRA or the relevant provincial heritage agency. These agencies would, in turn, indicate whether or not a full Heritage Impact Assessment (HIA) would need to be undertaken. Section 38(8) of the NHRA specifically excludes the need for a separate HIA where the evaluation of the impact of a development on heritage resources is required in terms of an EIA process. Accordingly, since the impact on heritage resources would be considered as part of the EIA process outlined here, no separate HIA would be required. SAHRA or the Limpopo Provincial Heritage Resources Authority (LIHRA), will review the heritage assessments and provide comments to the LEDET, which would consider these comments in their final environmental decision. However, should a permit be required for the damaging or removal of specific heritage resources such as palaeontological or archaeological objects, a separate application for such destruction would need to be submitted to the relevant heritage agency for approval.
Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA)	Department of Agriculture	The CARA provides for the conservation of agricultural resources through limiting the sub-division of agricultural land, maintaining the production potential of land, combating and preventing erosion, preventing the weakening or destruction of water sources, protecting vegetation, and combating weeds and invader plants. As such, as part of the EIA process, recommendations should be made to ensure that measures are implemented to maintain the agricultural production of land (if possible).
South African National Roads Agency Limited and National	SANRAL	SANRAL, in terms of its authority under the National Roads Act, 1998 has the competence over planning of the N11 route which passes the site. SANRAL has planned upgrades of the N11, which is adjacent to the proposed site. Two interchanges

Legal Requirements		
Legislation considered	**Relevant Organ of State / authority**	**Aspect of Project**
Roads Act (Act No. 7 of 1998)		have been proposed near the site at the existing N11/ Bakenberg Road intersection and of N11/ Ga-Sekhaolelo Access Road intersection. These two intersections are about 2.8 km apart and to comply with Class 1 intersection spacing standards, in-between intersection will have to be closed and no direct access to individual property would be allowed. Therefore, access to the site can only be obtained off the eastern legs of the proposed interchanges. Provided that site access points comply with SANRAL requirements, it is not anticipated that any other approvals will be needed from SANRAL.
National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM: BA)	DEFF and LEDET	The NEM:BA aims to conserve and manage the country's biodiversity via protecting species and ecosystems, specifically those which are threatened or considered to be critically endangered. It also serves to regulate the management of alien vegetation. In terms of NEM:BA a list of endangered, critically endangered, vulnerable, and protected species has been promulgated (Section 6, Table 3 of the Act), which calls for an EIA process, should any of the listed species be identified on the site and need to be removed. An ecological impact assessment, comprising a wetland assessment, floral assessment and faunal assessment, has been undertaken to determine if any listed species are located on the proposed site.
The National Energy Act (Act No. 34 of 2008)	Department of Mineral Resources and Energy (DMRE)	One of the objectives of this Act is to promote sustainable development of renewable energy infrastructure. The proposed project will contribute to this objective and generate energy from a renewable resource.
Spatial Planning and Land Use Management Act, 2013 (SPLUMA)	Mogalakwena Local Municipality	The land parcels on which the proposed PV facility is planned will need appropriate zoning for the development of a solar PV plant according to the municipality's town planning scheme.
Electricity Regulation Act (Act No. 4 of 2006) (as amended)	National Energy Regulator of South Africa (NERSA)	The Act provides a national regulatory framework for the electricity supply industry. The Act requires registration and licensing of anyone wanting to generate, transmit, reticulate, distribute, trade, or import and export electricity. Anglo is interacting directly with NERSA regarding the transmission line linkages with the proposed PV facility.

2.2 Relevant Policies

The following policies, although not directly applicable to the proposed project, were also considered:

- Policies regarding greenhouse gas and carbon emissions;
- White Paper on the Energy Policy of the Republic of South Africa (1998);
- White Paper on Renewable Energy (2003);
- NERSA Renewable Energy Feed In Tariff (REFIT) Guidelines (2009).
- National Integrated Resource Plan (IRP) (2010) and Update Report (2013).
- The National Development Plan 2030 (2012).

2.3 Relevant Guidelines

This EIA process is informed by the series of national Environmental Guidelines2, where applicable and relevant:

- EIA Guideline for Renewable Energy Projects (DEA, 2015).
- Waterberg Environmental Management Framework, 2011
- Scoping, Integrated Environmental Management Information Series 2 (DEAT, 2002).
- Stakeholder Engagement, Integrated Environmental Management, Information Series 3 (DEAT, 2002).
- Guidelines to minimise the impact on birds of Solar Facilities and Associated Infrastructure in South Africa (Smit, 2012).
- Guideline on Need and Desirability, EIA Guideline and Information Document Series (Department of Environmental Affairs and Development Planning (DEA&DP), 2013)[3].

2.4 Listed Activities in terms of NEMA

The proposed project will trigger a number of listed activities in terms of the 2014 EIA Regulations. These activities require authorisation in the form of an Environmental Authorisation from the LEDET prior to commencement. Listed Activities in GN No. 984 of 2014 require authorisation through a Scoping and EIR process, whilst those listed in GN No. 983 and GN No. 985 of 2014 require a Basic Assessment (unless they are being assessed under a Scoping and EIR process). The listed activities applicable to this project and being applied for in this EIA process are listed in Table 2-2 to Table 2-4.

Table 2-2: Applicable listed activities in terms of GN No. 983 of 2014

GN R983 of 2014 (Basic Assessment)		
No.	**Listed activity**	**Relevance of the activity**
11	The development of facilities or infrastructure for the transmission and distribution of electricity- (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;	On-site infrastructure including underground cabling or overhead lines for distribution of electricity, with a capacity of up to 132kV would be required to connect the proposed PV facility to substations. The proposed facility is situated outside of the urban edge.

[2] Note that these Guidelines have not yet been subjected to the requisite public consultation process as required by Section 74 of R385 of NEMA.
[3] Although this guideline is written for the Western Cape, it remains the only one available on the issue of need and desirability amongst the nine provincial authorities and two national authorities (DEFF and DMRE).

GN R983 of 2014 (Basic Assessment)		
No.	**Listed activity**	**Relevance of the activity**
12	The development of- (a) buildings exceeding 100 square metres in size; (b) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	The PV facility would require buildings and supporting infrastructure such as a connection building, control building, guard cabin. It is anticipated that these would exceed occupy an area of up to 0.5ha (5000m^2). There are ephemeral drainage lines and watercourses on site. If the proposed facility buildings and/ or infrastructure are located within 32 m of a watercourse and cover more than 100 m^2 and cross water bodies, then activities (x) and (xii) would be triggered.
19	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse;	Localised infilling of the drainage lines may occur to regulate stormwater drainage and provide a level surface for the PV panels.
24	The development of- (ii) a road with a reserve wider than 13,5 metres, or where no reserve exists where the road is wider than 8 metres;	The existing road N11 will be used to access the site. It is not anticipated that any new roads will have to be constructed to gain access to the site. The width of internal gravel roads within the PV plant area will not exceed 6m. **Thus, this activity will not be applicable.**

Table 2-3: Applicable listed activities in terms of GN No. 985 of 2014

GN R984 of 2014 (Scoping and Environmental Impact Report)		
No	**Listed Activity**	**Relevance of the 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 Facility or infrastructure is for photovoltaic installations and occurs a) within an urban area.	The proposed PV facility is located outside an urban area and would have a generation capacity of up to 120MW

Table 2-4: Applicable listed activities in terms of GN No. 985 of 2014

GN R985 of 2014 (Provincial Basic Assessment activities)		
No	**Listed Activity**	**Relevance of the Activity**
4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. (e) In Limpopo: (aa) A protected area identified in terms of NEMPAA, excluding disturbed areas. (bb) National Protected Area Expansion Strategy Focus areas. (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (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.	The N11 road will be used to access the site. It is not anticipated that any new roads will have to be constructed to gain access to the site. Internal gravel roads may be constructed to facilitate servicing and maintenance of the site. These gravel roads will be wider than 4 m but . The site falls within portions of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). The Witvinger Nature Reserve is situated approximately 3.4km south east of the preferred site. This corresponds with the National Protected Areas Expansion Strategy (NPAES, 2009) and the Limpopo C-Plan, which includes buffers around protected areas. The buffer for a protected area is 5km from the proclaimed boundary of a nature reserve, implying that the site falls within this regulatory buffer.
10	The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.	It is anticipated that less than 30 m^3 of dangerous goods (such as fuels needed during the construction phase) will be temporarily stored on site. **Thus, this activity will not be applicable.**
14	The development of — (ii) structures with a physical footprint of 10 square metres or more; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; e. In Limpopo (i) Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies;	The proposed solar farm will have various infrastructure on site as listed below: • Solar PV panels • An on-site substation • Control building • Weather stations • On-site transmission lines The on-site substation is expected to occupy an area of 1ha (10,000m^2) The site falls within 5km from a protected area (Witwinger Nature Reserve) and CBAs.

GN R985 of 2014 (Provincial Basic Assessment activities)		
No	**Listed Activity**	**Relevance of the Activity**
	(bb) National Protected Area Expansion Strategy Focus areas; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (hh) Areas within 10 kilometres from national parks or world heritage sites or 5kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.	

3 DESCRIPTION OF THE PROPOSED PROJECT

The purpose of this chapter is to provide an overview of the proposed PV facility and the activities associated with the various phases of the project. A description of the feasible project alternatives follows this introduction, after which the motivation for the project is described.

3.1 Site Location and Extent

The proposed site for development is on the Farm Armoede 823 (Remainder of Portion 3) near the Mogalakwena Mine. The proposed site is located east of the N11 main road, 27 km outside of the town Mokopane in the Limpopo Province. The proposed Armoede site is divided into three portions: north, central and southern (green, orange and blue respectively in **Error! Reference source not found.**). The proposed site area is approximately 295 ha in size (excluding the powerline corridors) and is located directly east of the N11.

The 21-digit Surveyor-General code of the property on which the PV facility is proposed is T0LR00000000082300003 (Farm no. 3/823).

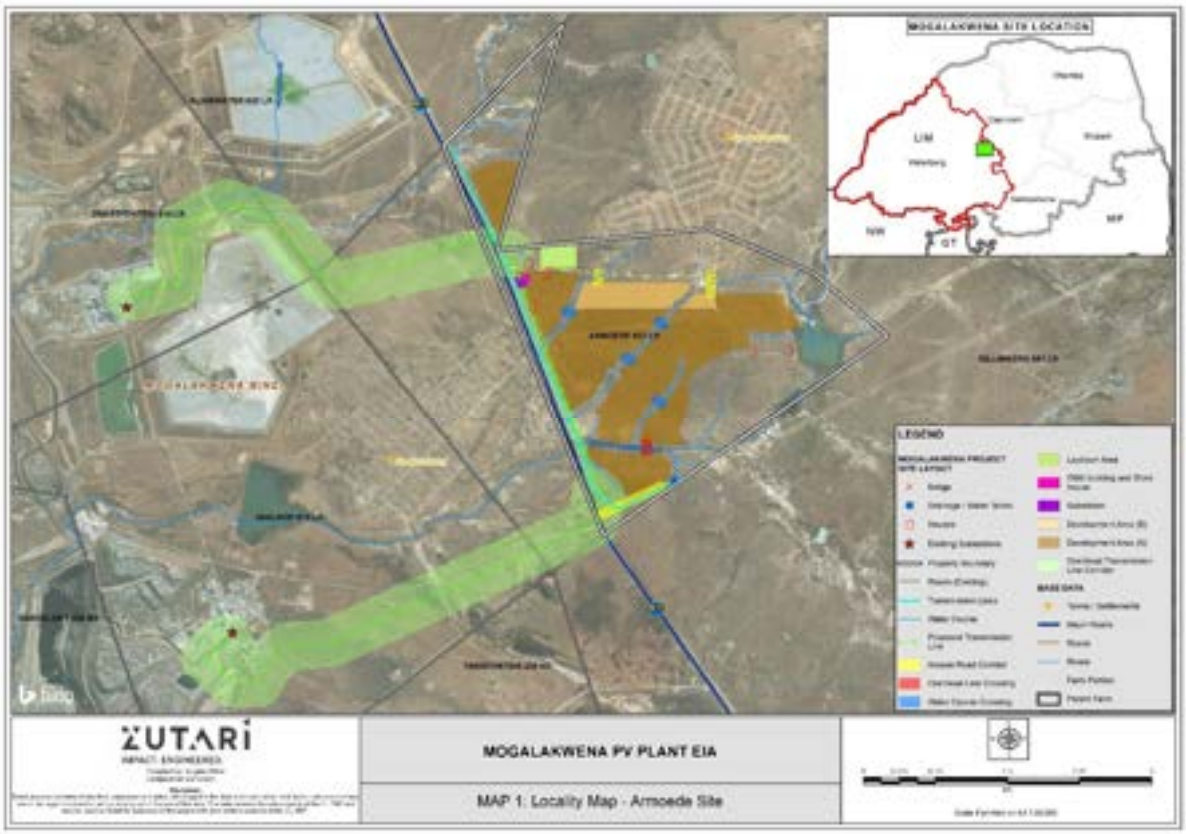


Figure 3-1: Locality map of the Armoede site and transmission corridors showing the mine location and adjacent settlements

Figure 3-2: Panoramic view of the northern portion of the site showing the N11 to the right, looking south and east

Figure 3-3: View of the northern portion of the site looking south east, showing Ga-Sekhaolela in the background

Figure 3-4: Panoramic view of the northern portion of the site, looking east and south, showing a powerline and water pipeline servitude in the foreground adjacent to the N11

Figure 3-5: Panoramic view of the central portion of the site looking east from the N11

Figure 3-6: Panoramic view of an eroded portion of the central site, which is used for dumping and sand mining, close to a watercourse, looking south

Figure 3-7: Panoramic view of a cleared portion of the southern site, looking north and east

Figure 3-8: View of a structure in the middle of the site (looking southeast)

3.2 Components of the PV Facility

Typical PV facility components will include:

- **A solar farm,** comprising of numerous rows of PV modules mounted on steel tracking mounts and footings (concrete or driven into the ground) with associated support infrastructure, including inverters, to generate up to 120 MW. The extent of this area is expected to be approximately 273 ha;
- Internal access roads for servicing and maintenance of the site;
- Temporary equipment **laydown areas** for use during construction (7 ha);
- **Buildings**, including a connection building, control building, guard cabin (0.5ha);
- **Weather stations** within the fenced perimeter of the site; and
- Perimeter fencing
- **Substation and/or switchyard located at the solar farm,** to convert the power from solar farm voltage to transmission voltage (1ha)
- **Overhead transmission line/s (OHL)**, to transmit power from the solar farm to the mine (described in more detail below). The northern transmission line corridor is approximately 4.66km in length while the southern corridor is approximately 7.55km in length.
- **Substation and/or switchyard located at the mine**, to convert the power from transmission voltage to mine voltage (11 kV)

3.2.1 PV Modules

The solar PV panels use materials that convert solar radiation directly into electricity. Photovoltaic solar cells are divided into two distinct groups: Traditional crystalline silicon solar cells and thin film solar cells. The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as a / the photovoltaic effect. The crystalline silicon solar cells are made from monocrystalline or polycrystalline silicon. The thin film technologies are comprised of thinner layers of semiconductor material which are produced using a splutter process. Photovoltaic solar power plants comprise of solar modules connected together to form solar arrays for the production of electricity. Direct current electricity is produced from the solar array which in turn is connected to inverters for conversion to alternating current. Power

from the inverters is then stepped up via transformers to voltages suitable for injection into the national grid or directly to consumers.

The size of the PV modules vary between different PV technology types, but can typically be between two to four square metres (m^2) each and sufficiently durable to last in excess of 20 years. These modules are arranged in arrays, and the arrays are typically placed on mounting structures that are either fixed or tracking. The solar panels produce Direct Current (DC) electricity that runs through an inverter to produce Alternating Current (AC) electricity. The electricity can then be evacuated to a substation/s to supply the mine in a 'behind the meter' grid connection arrangement. Figure 3-9 illustrates a typical PV module.

Figure 3-9: Typical PV modules[4]

3.2.2 Inverters and Transformers

In utility scale PV plants, solar PV modules are connected in series to form PV strings which produce DC power at a low voltage (typically 1000 – 1500 V). This DC voltage is transformed into AC voltage via the use of an inverter. Inverters are also key to the synchronisation and integration of the DC system into the grid. There are primarily three types of inverters, namely:

- Central inverters,
- String inverters, and
- Micro inverters.

For central inverters, the inverter and the transformer are typically housed together in a Power Conversion Unit (PCU). A central unit in the form of a shipping container is provided that is fully equipped and houses the inverter (sometimes multiple inverters) along with an LV/MV

[4] http://www.seia.org/policy/solar-technology (accessed: 14 February 2016)

transformer. There are numerous PCU types available that vary significantly across manufacturers however the basic requirements typically allow the inclusion of the following:

- Inverters;
- Inverter (LV/MV) step-up transformer;
- MV Switchgear;
- Auxiliary transformer;
- LV Auxiliary distribution board;
- PCU Earthing;
- UPS; and
- SCADA communication cubicle;

For plants that use string inverters, a central unit containing a distribution board for collecting the inverters and an LV/MV transformer is required. This unit is referred to as the Pad-mounted Transformer Kiosk (PTK).

Unlike string inverters that transform power for a string of PV modules, micro inverters transform the power of each module individually. For large scale projects, this translates to higher initial equipment and control and instrumentation costs as well as complex maintenance.

3.2.3 Mounting Systems

Solar power plants can either have fixed tilt systems or tracking systems. Tracking systems are expected to be the mounting system of choice and are described below.

Tracking Systems

The proposed solar PV plant is proposed to have a single axis tracking PV installation, which has the benefit of tracking the sun's movement throughout the day to maximise the energy collected. This is accomplished by changing the incident angle, resulting in more energy attained by a tracking system as opposed to a fixed PV system. Within tracking PV, there are many options that are available:

- Single-axis trackers, which follow the sun's azimuth east-west each day;
- Single-axis tracking with fixed tilt, which follow the sun's azimuth east-west each day and is tilted at a fixed angle year-round depending on the latitude of the location;

Figure 3-10: A single axis tracking system

3.2.4 Additional Infrastructure

The following additional infrastructure is expected to form part of the PV plant:

- Access and inside roads/paths – An access road to the site as well as internal roads between the PV arrays would need to be constructed.
- Trenching – all DC and AC wiring within the PV plant must be buried underground.
- Inverter/transformer building. The number of buildings will be dependent on the size of plant and inverters chosen. Alternatively, a pre-packaged inverter/transformer housed in a concrete substation for outdoors can be utilised.
- Guard house– One (1) brick building of approximately 100m^2 on the perimeter of the plant.
- Control room - The control room will contain switchgear and monitoring equipment for the PV plant.
- Connection to transmission lines: The grid connection requires transformation of the voltage. The normal components and size of a distribution rated electrical substation will be required.
- A small switching station for the plant will be located on the outside of the control room.
- Foundations to support the PV panels.

3.2.5 Transmission Lines and Substations

It is envisaged that the proposed PV facility would require an on-site substation and/switchyard, which will convert power from solar farm voltage to transmission voltage. There will be overhead transmission lines to transmit power from the solar farm to two existing substations on the mine. There will be two transmission corridors for the overhead transmission lines, as illustrated in Figure 3-11.

- Northern Transmission Corridor (North Substation):
  - Overhead transmission line options with voltages ranging from 66kV up to 132 kV from the PV facility to connect to the existing north substation. This power line will be approximately 4.8km in length.
- Southern Transmission Corridor (South Substation):

- Overhead transmission line options with voltages ranging from 66kV up to 132 kV from the PV facility to connect to the existing south substation. This power line will be approximately 4.5km in length.

Coordinates of the centrelines of the routes for these lines are shown in the tables below, at intervals 250m apart.

Table 3-1: Centreline coordinates for the Northern transmission line corridor

Northern Transmission Line Route				
Points @ 250m apart	ET_X	ET_Y	Lat	Long
1	-8267.5793	-2652998.778	23° 58' 45.494" S	28° 55' 7.538" E
2	-8028.6961	-2652925.057	23° 58' 43.102" S	28° 55' 15.990" E
3	-7839.138	-2652812.915	23° 58' 39.461" S	28° 55' 22.698" E
4	-7826.1265	-2652563.254	23° 58' 31.346" S	28° 55' 23.163" E
5	-7813.1149	-2652313.593	23° 58' 23.232" S	28° 55' 23.628" E
6	-7628.7567	-2652169.024	23° 58' 18.536" S	28° 55' 30.152" E
7	-7412.1174	-2652044.255	23° 58' 14.484" S	28° 55' 37.817" E
8	-7180.8371	-2652091.127	23° 58' 16.011" S	28° 55' 45.997" E
9	-6946.7776	-2652178.197	23° 58' 18.845" S	28° 55' 54.275" E
10	-6793.6356	-2652375.802	23° 58' 25.270" S	28° 55' 59.689" E
11	-6640.4937	-2652573.406	23° 58' 31.696" S	28° 56' 5.102" E
12	-6487.3518	-2652771.011	23° 58' 38.121" S	28° 56' 10.516" E
13	-6273.7289	-2652865.382	23° 58' 41.191" S	28° 56' 18.072" E
14	-6040.1751	-2652779.831	23° 58' 38.414" S	28° 56' 26.335" E
15	-5807.1923	-2652689.172	23° 58' 35.470" S	28° 56' 34.578" E
16	-5574.2095	-2652598.514	23° 58' 32.526" S	28° 56' 42.820" E
17	-5341.2266	-2652507.855	23° 58' 29.583" S	28° 56' 51.063" E
18	-5108.2438	-2652417.196	23° 58' 26.639" S	28° 56' 59.305" E
19	-4863.5134	-2652402.799	23° 58' 26.173" S	28° 57' 7.962" E
20	-4702.8902	-2652413.321	23° 58' 26.517" S	28° 57' 13.644" E

Table 3-2: Centre coordinates for the Southern transmission line corridor

Southern Transmission Line Route				
Points @ 250m apart	ET_X	ET_Y	Lat	Long
1	-7368.1611	-2656538.201	24° 0' 40.553" S	28° 55' 39.290" E
2	-7543.6147	-2656714.722	24° 0' 46.287" S	28° 55' 33.079" E
3	-7395.4271	-2656899.145	24° 0' 52.284" S	28° 55' 38.319" E
4	-7188.613	-2657005.378	24° 0' 55.740" S	28° 55' 45.635" E
5	-7025.4209	-2656875.463	24° 0' 51.520" S	28° 55' 51.412" E
6	-6861.2695	-2656691.229	24° 0' 45.535" S	28° 55' 57.223" E
7	-6636.5907	-2656613.113	24° 0' 42.999" S	28° 56' 5.174" E
8	-6388.13	-2656585.413	24° 0' 42.103" S	28° 56' 13.966" E
9	-6162.1736	-2656480.469	24° 0' 38.695" S	28° 56' 21.963" E
10	-5937.7139	-2656370.388	24° 0' 35.120" S	28° 56' 29.907" E
11	-5713.2541	-2656260.307	24° 0' 31.545" S	28° 56' 37.850" E
12	-5488.7943	-2656150.226	24° 0' 27.970" S	28° 56' 45.794" E
13	-5264.3346	-2656040.145	24° 0' 24.394" S	28° 56' 53.737" E
14	-5039.8748	-2655930.064	24° 0' 20.819" S	28° 57' 1.680" E
15	-4815.415	-2655819.983	24° 0' 17.244" S	28° 57' 9.623" E
16	-4590.9553	-2655709.902	24° 0' 13.668" S	28° 57' 17.566" E
17	-4366.4955	-2655599.821	24° 0' 10.092" S	28° 57' 25.509" E
18	-4142.0357	-2655489.74	24° 0' 6.517" S	28° 57' 33.452" E
19	-3917.576	-2655379.659	24° 0' 2.941" S	28° 57' 41.394" E
20	-3827.6788	-2655165.611	23° 59' 55.984" S	28° 57' 44.577" E
21	-3847.9122	-2654925.244	23° 59' 48.171" S	28° 57' 43.863" E
22	-3929.4216	-2654688.905	23° 59' 40.489" S	28° 57' 40.982" E
23	-4010.9309	-2654452.566	23° 59' 32.806" S	28° 57' 38.101" E
24	-4092.4403	-2654216.226	23° 59' 25.124" S	28° 57' 35.219" E
25	-4173.9497	-2653979.887	23° 59' 17.441" S	28° 57' 32.338" E
26	-4255.459	-2653743.548	23° 59' 9.758" S	28° 57' 29.457" E
27	-4336.9684	-2653507.209	23° 59' 2.076" S	28° 57' 26.576" E
28	-4418.4778	-2653270.869	23° 58' 54.393" S	28° 57' 23.695" E
29	-4499.9871	-2653034.53	23° 58' 46.711" S	28° 57' 20.815" E
30	-4581.4965	-2652798.191	23° 58' 39.028" S	28° 57' 17.934" E
31	-4663.0059	-2652561.852	23° 58' 31.345" S	28° 57' 15.053" E
32	-4679.2388	-2652514.784	23° 58' 29.815" S	28° 57' 14.480" E

Note that the EIA aims to approve transmission line corridors (at 500m wide per transmission line) instead of specific transmission line layouts, as final route layouts and designs will be determined by the appointed Preferred Bidder in consultation with Eskom and Anglo. These transmission corridors have been assessed by the EIA specialists and their findings will be used to inform the final placement of the transmission pylons. Refer to Section 4 for more detailed information pertaining to these assessments.

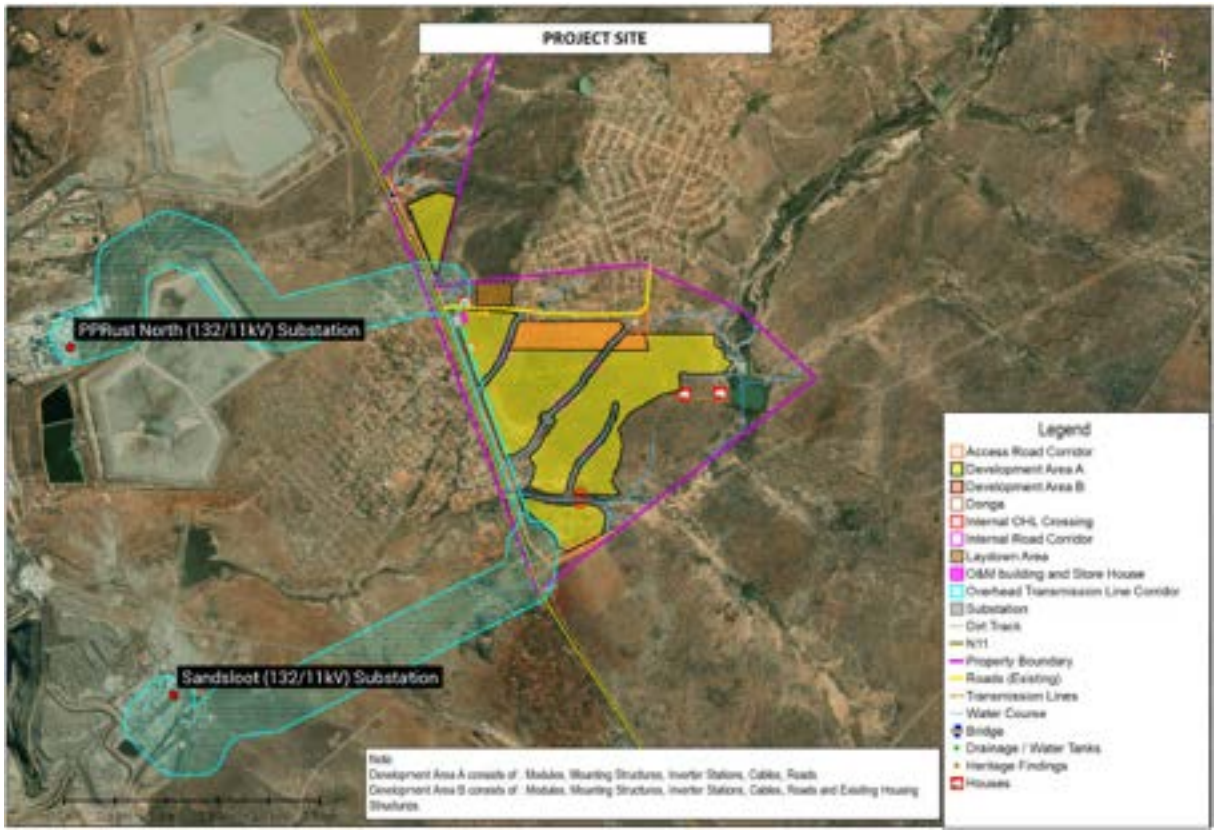


Figure 3-11: Locality map indicating the proposed site and transmission corridors

3.3 Construction Activities

Construction of the proposed PV facility is planned to start construction in 2021 and to be operational by the end of 2023, assuming all necessary authorisations are obtained.

The activities for the construction a PV facility are as follows:

- Establishment of access roads:

During the construction period internal roads need to be established; however, these roads will only be temporary. There are a number of permanent roads that need to be established for operation and will be gravel based. Existing roads will be used, where possible.

- Site preparation:

Vegetation would need to be cleared for the footprint of the infrastructure as well as for the access roads to the site/internal roads and the laydown of the yard, etc. Topsoil stripping from the construction of access roads and infrastructure would need to be stockpiled and used to rehabilitated areas of the construction footprint.

- Transportation of equipment and components to the site:

The main component of the proposed facility would be transported by road to the site. Excavators, graders, trucks and compacting equipment will need to be brought to the site.

- Establishment of workshops, temporary laydown areas and construction camps:

Once all the equipment has been brought to the site a dedicated laydown and equipment camps will be established. Fuel will most likely be stored on site during construction; appropriate mitigation measures must be employed to ensure no pollution occurs as a result.

- Construction of the PV array:

The foundations for the PV panel array will be excavated. Another option would be to use a ramming system for the support structure which does not require excavation but is dependent on the geotechnical condition of the ground. Concrete and aggregates would need to be brought to the site. Trenches would also need to be excavated for underground connection of the panels to the inverters and subsequently to the plant substation.

- Site rehabilitation:

Removal of all construction equipment from the site and rehabilitation of areas where reasonable and practical.

3.4 Operational Activities

The PV solar facility's operational lifespan is estimated at approximately 20-25 years. The facility would create many permanent employment opportunities ranging from for skilled to unskilled. The typical activities during the operational phase would be as follows:

- Operation of the electrical infrastructure and PV panels:

Incoming solar radiation will be converted by the PV panels into electrical energy; associated inverters will convert this electrical energy into alternating current. This alternating current will be stepped up via transformers to grid voltage and transmitted via overhead cables to the substation. Electrical and mechanical routine maintenance will also be carried out.

- Cleaning of PV panels:

To ensure maximum radiation exposure by the PV panels, they need periodic cleaning, since dust, dirt, pollen, and bird droppings can reduce the efficiency of PV panels. Panels generally need to be cleaned quarterly, but the frequency depends on weather conditions. Some softeners may be added to the washing water.

- Site security:

Security will be stationed on the site 24 hours per day. The entire development area will be fenced off and security cameras will be installed.

3.5 Decommissioning Phase

The PV facility's life span is expected to be 20 to 25 years after commissioning. The possibility of upgrading the proposed facility to more advanced technologies, to extend its operational lifespan, would be investigated towards the end of this period. Should the facility undergo expansion or significant upgrading, an environmental authorisation may be required in accordance with the prevailing legislation at that time.

Should decommissioning be considered, it would potentially take 6 to 12 months to complete. The impacts of the decommissioning phase generally correlate closely with impacts identified for the construction phase. After disconnecting the PV infrastructure from the electricity network, the PV module components would be removed and recycled / resold as far as possible. The structures would be dismantled and the concrete pile foundations (if used) would be removed. All underground cables would be excavated and removed and buildings would be demolished and removed, unless they can be used for different purposes.

The rehabilitation of the disturbed areas would form part of the decommissioning phase, with the aim of restoring the land as close as possible to its pre-development vegetation conditions or to another suitable use e.g. grazing. The restoration activities would include the following:

- Removal of all foreign materials and debris;
- Reshaping of the land to conform with the natural topography, if necessary;

- Breaking up compaction (ripping / scarifying) where required, loosening the soil and the redistribution of topsoil;
- Replanting with a suitable indigenous grass seed mix. Alternatively the total footprint can immediately be reintroduced to crop farming;
- Light irrigation to re-establish a biological soil crust and trigger germination and early growth; and
- Removal of alien vegetation for a period of no less than 1 year, or as otherwise prescribed by a rehabilitation specialist.

3.6 Project Need and Desirability

The Mogalakwena Mine operates 24 hours per day. Therefore, the mine is a large consumer of grid-supplied electricity from Eskom. Anglo wishes to develop the proposed PV solar energy facility to reduce the cost of energy for the mining operations. Currently, Eskom's power supply is uncertain, inconsistent and increasingly expensive. It is anticipated that Eskom's tariffs will escalate rapidly in the short to medium-term. This, together with the uncertainty of reliable electricity supply poses a risk to the future of the Mogalakwena Mine.

The key intended outcomes of the project are:

- **Improved financial viability for the Mogalakwena Mine**. This means that, over the life of the project, the project will create a net saving in energy costs for the mine;
- **Energy cost predictability for the Mogalakwena Mine**. This means that the mine is able to make reasonable long-term predictions as to the cost of energy from the project;
- **Community Involvement.** This implies the inclusion of local communities living around the mine to enable them to benefit from the project's implementation in tangible ways, as part of a more general drive to create employment and improve the communities' economic sustainability;
- **Reduced Carbon Footprint:** Anglo, and specifically Mogalakwena Mine, would like to reduce its carbon footprint, by reducing the quantity of non-renewable forms of energy purchased.
- **Energy Security:** This implies an ability to maintain mine operations in the event of an interruption of power from the grid.
- **Mining Charter Compliance:** Anglo would like to contribute to the achievement (and, if possible, out-performance) of the Mining Charter requirements.

Bearing in mind these objectives, it is also important to consider that there are other outcomes that the proposed project cannot deliver. These are:

- **Energy Security:** an ability to maintain mine operations in the event of an interruption of power from the grid. Solar plants cannot store energy or dispatch energy on demand, and battery storage was not found to be viable. However, the proposed project does diversify electricity supply, and thus contributes to Anglo's understanding of the nature of energy supply contracts.
- **Energy for the Community:** Many of the local communities are already electrified, but a natural desire for the project would be to provide energy directly to the local communities, as a clear, tangible benefit. However, any such supply of energy has significant regulatory impacts (the need to be a Regional Electricity Distributor, amongst others), and may have limited benefit, given that the solar plant only generates energy during the daytime. Any communities that require electrification are

likely to be better served through a dedicated off-grid electrification project, similar to that undertaken for the Zenzele Trust.

- **Prevention of incursion:** The limited site options available mean that the project cannot be sited to limit local communities' incursion onto mine land, except by chance.
- **Employment creation:** It is expected that a maximum of 30 permanent full-time jobs will be created for the local community during the operational phase. Therefore, expectations of large-scale job creation are unrealistic.

The DEA&DP Guideline for Need and Desirability (2013)[5] highlights the obligation for all proposed activities that trigger the EIA regulations to be considered in light of (amongst others) the National Framework for Sustainable Development[6], the spatial planning context, broader societal needs, and financial viability. This information allows the authorities to contemplate the strategic context of a decision on the proposed project. This section seeks to provide the context within which the need and desirability of the proposed activity should be considered.

The need for renewable energy is well documented and reasons for the desirability of solar energy include:

- Utilising the most abundant natural resource available to South Africa;
- Meeting nationally appropriate emission targets in line with global climate change commitments under the Paris Accord;
- Enhancing energy security by diversifying generation; and
- Creating a more sustainable economy.

3.6.1 Utilising resources available to South Africa

As illustrated in Figure 3-12, the Mogalakwena Mine received between 1972 kW/ hour/ m^2 and 2018 kW/ hour/ m^2 radiation in the period from 1994 to 2018. Thus, the proposed site has a considerable solar resource potential.

South Africa generates most of its electricity from coal, of which there is currently a ready supply. However, the 2010 Integrated Resource Plan (IRP) (Department of Energy, 2019) has highlighted the need for expansion of renewable electricity generation. Provision has been made for 6000MW capacity to be generated by solar PV by 2030. The current percentage of annual energy contribution made by solar PV is listed as 6.3% of MWh with a total installed capacity of 10.52% of MW.

[5] This guideline, although written for the Western Cape, has been used as a best practice tool since it is the most recent guideline on need and desirability.

[6] Republic of South Africa (2008) People – Planet – Prosperity: A National Framework for Sustainable Development in South Africa. Pretoria: Department of Environmental Affairs (DEA), Republic of South Africa [Internet]. Available from: http://www.environment.gov.za [Accessed 29 March2011].

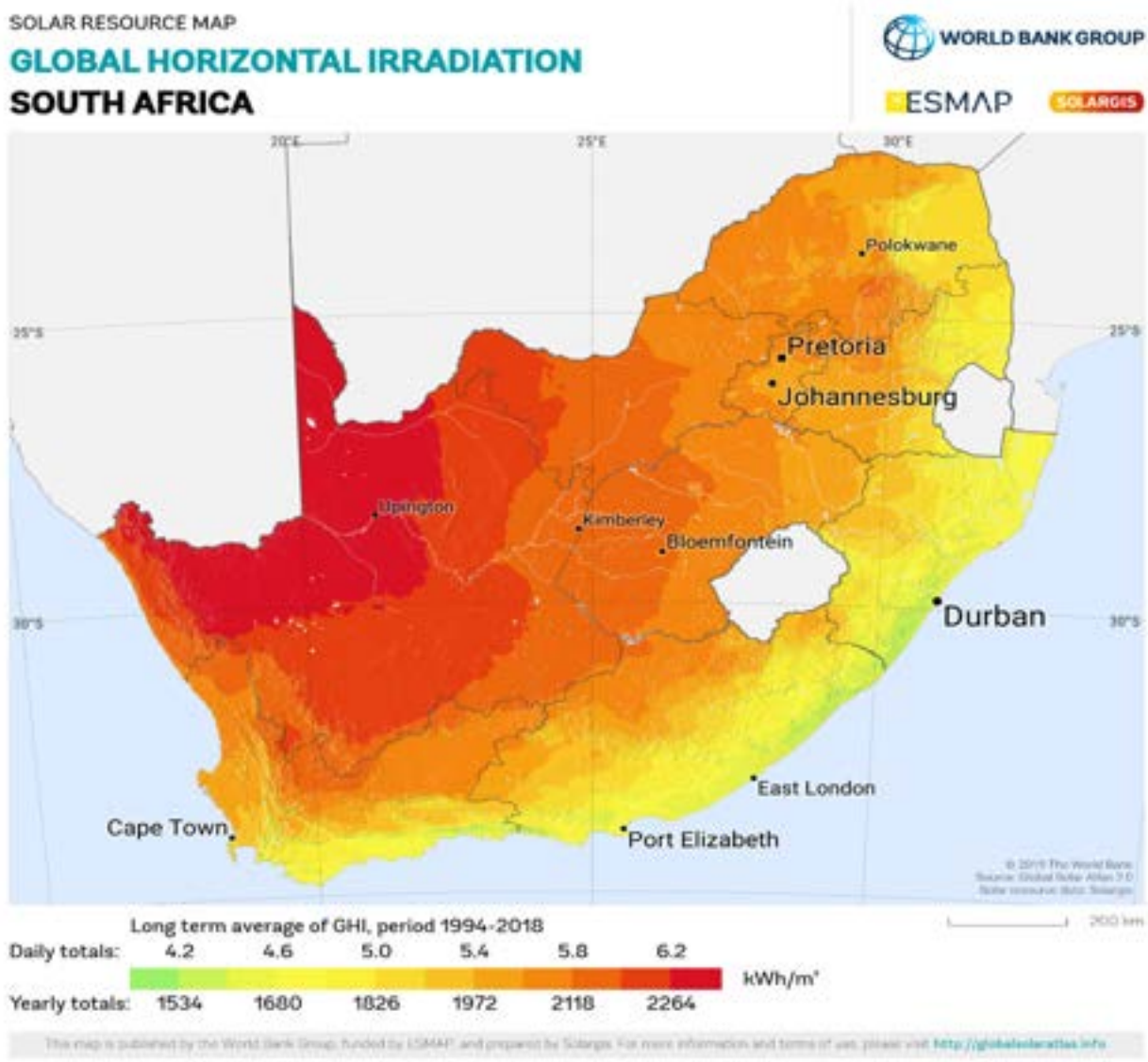


Figure 3-12: Global Horizontal Irradiation for South Africa (source: http://solargis.info/doc/free-solar-radiation-maps-GHI, accessed on 20 October 2020)

3.6.2 Meeting Emission Targets in line with Global Climate Change Commitments

As can be seen by the numerous policies and legislation described in Section **Error! Reference source not found.**, the need for renewable energy is well-documented. Due to concerns such as climate change, and the on-going exploitation of non-renewable resources, there is increasing international pressure on countries to increase their share of renewable energy generation. As a result, the 2019 Integrated Resource Plan has proposed a target for 7.9 GW of solar PV, 11.4 GW of wind and 0.6 GW of concentrated solar installed capacity by 2030 (Department of Energy, 2019). The proposed PV project is expected to contribute positively towards climate change mitigation.

Renewable energy is recognized internationally as a major contributor in protecting the climate, nature and the environment, as well as providing a wide range of environmental, economic and social benefits that can contribute towards long-term global sustainability.

Solar energy is a source of "green" electricity as for every unit of "green" electricity used instead of traditional coal powered stations, the following benefits area realised:

- Saving water;
- Avoiding Sulphur Dioxide (SO_2) emissions;
- Avoiding Carbon Dioxide (CO_2) emissions including transmission losses; and
- Avoiding ash production.

3.6.3 Enhancing Energy Security by Diversifying Generation

The establishment of the proposed PV facility would lighten the load on the existing Eskom electricity grid in the area by providing additional electricity supply during the day. Moreover, the project would contribute towards meeting the national energy target for the introduction of renewable energy into South Africa, as set by the Department of Energy (DoE). Should the proposed PV facility be developed, improved grid stability would benefit the Mokopane Region and the Limpopo Province.

The proposed project would also have international significance, as it contributes to South Africa being able to meet its international obligations by aligning domestic policy with internationally agreed strategies and standards, such as those set by the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, to both of which South Africa is a signatory.

3.6.4 Community Development

The need to improve the people's quality of life, and especially for the poor, through job creation is critical in South Africa, particularly after the economic impact of COVID-19. A portion of the Special Purpose Vehicle (SPV) company to be formed to construct and operate the proposed plant will be owned by a community trust. Thereby, income from the sale of electricity to Mogalakwena Mine will go directly towards community upliftment projects. Further community involvement would be achieved through direct employment or indirectly through service industries e.g. catering and accommodation.

Numerous studies and reports have attempted to quantify the employment creation potential of renewable energy per unit of power installed or generated. AGAMA Energy (2003) published a study that found that solar PV has the largest employment creation potential of all the renewable technologies, as indicated in Table 3-3.

Table 3-3: Renewable energy employment potential in terms of the gross direct jobs created per GWh for various technologies (Agama Energy, 2003).

Employment per Gigawatt Hour (GWh)						
Technology	Fuel	Manufacture	Installation	O&M	Other	Total
	/GWh	/GWh	/GWh	/GWh	/GWh	/GWh
Solar thermal	0	3	7	0.4	0	10.4
Solar PV	0	32.9	21.2	4.4	3.5	**62**
Wind	0	8.4	1.3	2.6	0.3	12.6
Bio-energy	0	3.55	3.55	7.2	0	14.3
Hydro	0	8.4	1.3	2.6	0.3	12.6

3.6.5 Need and Desirability Checklist

Specific need and desirability questions raised by the DEA&DP need and desirability guideline are addressed in Table 3-4 below.

Table 3-4: Responses to questions in the Need and Desirability Guideline: Timing

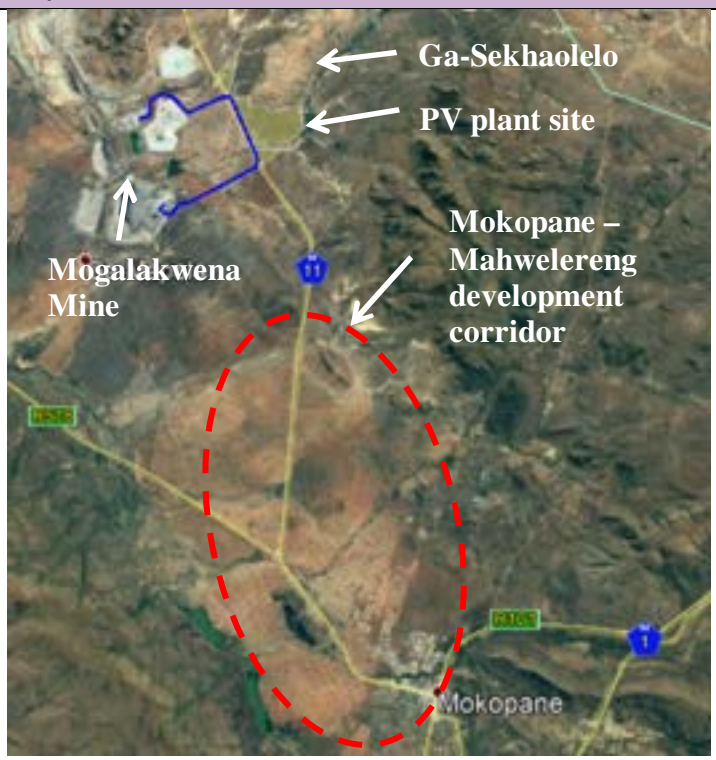
Question	Response
1. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved Spatial Development Framework (SDF) agreed to by the relevant environmental authority i.e. is the proposed development in line with the projects and programmes identified as priorities within the Integrated Development Plan (IDP)?	Mogalakwena Local Municipality (MLM) produced an Integrated Development Plan for its area of jurisdiction in 2009 (Mogalakwena Local Municipality, 2009). This includes a Spatial Development Framework (SDF), which refers to the Waterberg Environmental Management Framework. Mogalakwena Local Municipality (MLM) advertised in March 2019 that it was in the process of reviewing the 2009 SDF[7]. However, no further development of this plan is evident, and has probably stalled due to the MLM having been placed under administration in December 2019[8]. Thus, although it is old and no longer necessarily reflects current socio-economic realities, the 2009 version of the SDF appears to remain the currently valid and approved version. The vision according to the MLM's Draft Integrated Development Plan (IDP) 2019/2020 is: "To be the best energy hub and ecotourism destination in Southern Africa", and the mission, "To invest in a constituency of talented human capital who are motivated and innovative to build a sustainable economy in the field of energy, minerals and eco-tourism for the benefit of all our communities." Some of the municipal priority issues listed in the IDP include: ► Municipal Health and Environmental Management ► Air Quality ► Local Economic Development and Tourism ► Community Participation and Good Governance ► Electricity The Mogalakwena Mine Solar PV Project is in line with these priorities. The primary environmental spatial planning tool for the Waterberg region is the Environmental Management Framework (EMF), which was officially adopted and gazetted in 2011 and is referred to in District and Municipal IDPs. The "Desired State" section of the EMF identifies environmentally preferred environmental conditions and land uses, based on an analysis of data layers for the region, including geology, soils, land uses, flora, climate, protected areas, etc. As indicated in Figure 3-18 and 3-19, the project location is in EMF Zone 3 (*Game and cattle farming areas with a commercial focus*). This is based on the information for the areas at the time of compilation in 2010. The EMF indicates that "*This zone represents areas with largely natural vegetation that is used extensively for grazing by game and/or cattle*." The EMF encourages tourism, cattle and game farming in this zone and discourages large scale commercial and retail development, service infrastructure, and housing. "No urbanisation of any kind should be allowed in this zone" (Environomics, 2010). The EMF identifies a number of undesirable activities, including mining, industry, golf courses, urbanisation, and energy generation, excluding "those that provide carbon free energy to the local area on disturbed areas in a manner that does not have a negative impact on the sense of place of the area, being particularly sensitive to not breaking the skyline or impeding on views". A solar PV plant would conform to these criteria as it provides carbon-

[7] http://www.mogalakwena.gov.za/mogalakwena-admin/pages/sites/mogalakwena/documents/noticeboard/SDF%20AND%20LUS%20INVITATION%20TO%20%20INTERESTED%20PARTIES.pdf **– accessed on 20 October 2020**

[8] https://reviewonline.co.za/333143/coghsta-places-mogalakwena-municipality-administation/ **and** https://diepos.co.za/115985/decision-place-municipality-administration-welcomed/ **- accessed on 20 October 2020**

Question	Response
	free energy and its low visual profile would not disturb the sense of place, which is already heavily influenced by the mine west of the site and the residential areas north, west and south of the site. Despite the EMF's recommendations, there has been substantial residential development around the site since 2010 (as indicated above in Figure 3-13 to Figure 3-15), and the site is one of the few areas east of Mogalakwena Mine that remains mostly unaffected by residential development. Furthermore, the Terrestrial and Aquatic Impact Assessment (Appendix E3) confirms that the site is a mixture of Disturbed and Mixed Bushveld habitat. Therefore, it is argued in this Scoping Report that the game and cattle farming land use proposed in the EMF no longer remains valid, based on current site conditions and development pressures.
2. Should development, or if applicable, expansion of the town/ area concerned in terms of this land use (associated with the activity being applied for) occur at this point in time?	The proposed solar PV plant is located between Mogalakwena Mine and the rural settlement of Ga-Molekana (west of the site), Ga-Sekhaolelo (north east of the site), Sekuruwe (north of the site) and is located directly adjacent to (east of) the N11. Development pressure in this area is high, with many new semi-formal and informal settlements establishing around the site. If it were not for the development of a solar PV facility, it is highly likely (as indicated in the Social Impact Assessment), that development pressure will result in the settlement of the site in the near future. Therefore, there is no reason suggest that the site would remain undeveloped and protected from residential encroachment if the status quo were to be officially maintained. It would in all probability be only a matter of a few years before development overtakes this the site. Historical satellite imagery between 2007 and 2020 indicates how residential expansion has taken place in this area.  Figure 3-13 Satellite image of surrounding development in 2007. It can be seen that the area north of the site is still undeveloped at this stage.

Question	Response
	 Figure 3-14 Satellite image of surrounding development in 2012, with Ga-Sekhaolelo north-east of the site  Figure 3-15 Satellite image of surrounding development in 2020, showing further expansion of Ga-Sekhaolelo up to the boundary of the site Urban development is also expanding from the south along the N11 in the Mokopane-Mahwelereng development corridor (between Mogalakwena Mine and Mokopane).

Question	Response
	 Figure 3-16 Satellite image of showing the Mokopane-Mahwelereng development corridor
3. Does the community/ area need the activity and the associated land use concerned (is it a societal priority)?	As indicated in the Social Impact Assessment, the unemployment rate in the community is high and there are few economic opportunities in this region, apart from tourism (primarily in the Waterberg Biosphere) and mining. The Mogalakwena Mine is one of the primary sources of employment in the area. Ninety three percent of employees at the mine are from local communities[9]. The community does not need the development directly, since the development will provide electricity only to Mogalakwena Mine, but the community will benefit indirectly from the development because it will advance the economic sustainability of the mine, thereby potentially enabling it to remain operational for longer and provide employment to the community for longer. The development will also indirectly improve the stability of electricity delivery to residents of the area and promote the stability of the Eskom grid by reducing the potential for load-shedding.
4. Are there necessary services with appropriate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	Few additional services will be required for the proposed PV plant, particularly during the operational phase. The mine has its own waste disposal facility at which construction waste can be disposed. Very little operational waste will be generated. Water will be trucked in as needed for washing of the PV panels. During the construction phase, existing electrical distribution lines will be used to provide electricity for construction. Septic tanks on the site will be serviced by a contractor. Since only 30 people are expected to be employed during operation, the volume of sewage produced will be negligible. Overall, it is highly unlikely that additional pressure would be placed on existing services.

[9] **https://southafrica.angloamerican.com/our-stories/mogalakwena**

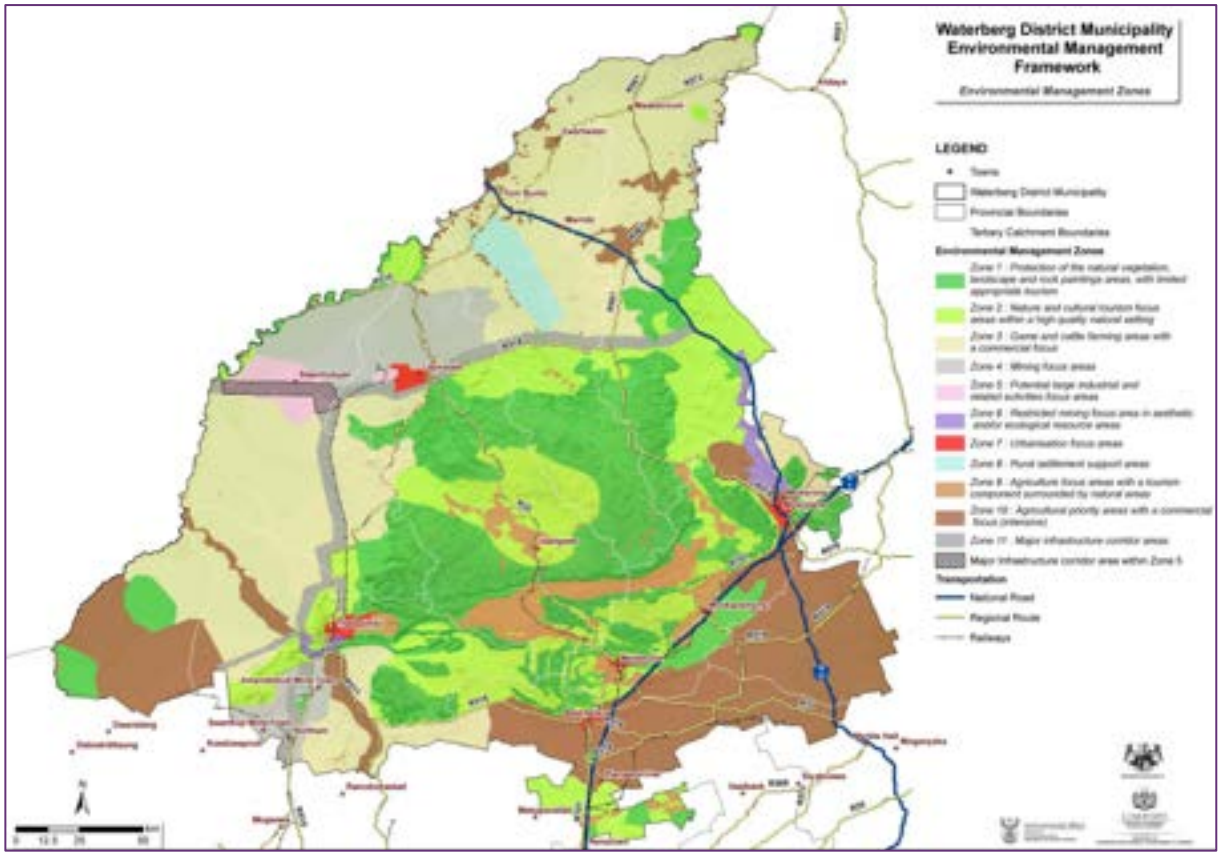
Question	Response
5. Is this development provided for in the infrastructure planning of the municipality, and if not, what will the implication be on the infrastructure planning of the municipality (priority and placements of services)?	No. Once the proposed PV facility is operational, there would be a very limited requirements for municipal services. Hence the project is anticipated to have negligible implications for municipal infrastructure planning.
6. Is this project part of a national programme to address an issue of national concern or importance?	Yes. The establishment of the proposed Mogalakwena PV plant would contribute to strengthening the Eskom electricity grid by reducing the demand on it. It would also contribute to the achievement of renewable energy generation targets in the Integrated Resource Plan and reduce the mine's carbon footprint, by substituting the use of coal-fired electricity with renewable (solar) electricity.

Table 3-5: Responses to questions in the Need and Desirability Guideline: Placing

Question	Response
1. Is the development the best practicable environmental option (BPEO) for this land/ site?	Yes. The proposed site is suitable and feasible and the assessment of alternatives indicates that none of the alternative sites, including this one, have any environmental or social fatal flaws. The Armoede site has the added benefit that the community would benefit financially from the operation of the proposed development. This is not the case with alternative sites that are owned by the Mogalakwena Mine. The proposed site will not be permanently transformed and can be returned to agricultural use if the facility is decommissioned.
2. Would the approval of this application compromise the integrity of the existing approved Municipal IDP and SDF as agreed to by the relevant authorities?	No. The activity is broadly in line with the objectives of the Waterberg District Municipality's 2019/2020 Draft Integrated Development Plan, which has the following respective vision and mission: "*To be the best energy hub and ecotourism destination in Southern Africa*" and "*To invest in a constituency of talented human capital who are motivated and innovative to build a sustainable economy in the field of energy, minerals and eco-tourism for the benefit of all our communities*." The project would contribute to the achievement of the energy aspects of this mission and vision. The proposed PV facility would create direct job opportunities for the local community, as the construction and operation of the proposed PV facility would require a wide range of skill levels, and would indirectly provide greater security for the sustainable continuation of mining activities and hence for long-term employment opportunities, as well as improving electricity delivery to the community by reducing the demand on the Eskom grid. Section 5.4.2 of the Mogalakwena IDP Update (Mogalakwena Local Municipality, 2020) mentions that the major constraints with respect to municipal electricity provision are **funding of projects** (specifically for maintenance of existing infrastructure) and the **electrification of low cost housing**, which mostly occur in the Eskom supply area, and which is constrained by insufficient capacity on the main feeder lines to the villages. Thus, meeting National Government's "electricity for all" targets cannot always be met. Reduced demand on the Eskom grid will facilitate meeting the municipal goal of electricity provision.
3. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in Environmental Management Framework (EMF)), and if so, can it be justified in terms of sustainability considerations?	Please refer to the response to Question 1 in Table 3-4. Although the Waterberg EMF, which was compiled in 2010, indicates that the site is suitable for game and cattle farming only, the EMF no longer reflects the current state of urbanisation and development pressures around the site.
4. Do location factors favour this land use (associated with the activity applied for) at this place?	Yes. The electricity produced by the proposed development would be used directly by Mogalakwena Mine. The site was chosen for its proximity to the mine, which ensures

Question	Response
	that capital costs of the project and losses along the transmission lines are minimised. It is also beneficial in terms of intended community ownership of the site. An examination of the technically feasible site alternatives was undertaken in the screening phase. During this phase a number of sites were investigated to determine the most suitable and feasible site for further detailed investigation.
5. How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/ natural environment)?	Potential impacts associated with the proposed project have been assessed and are discussed in this report (refer to Section **Error! Reference source not found.**). No naturally sensitive sites will be affected by the proposed PV facility, since it is proposed to be established on the areas of lowest biophysical sensitivity. It has only one possible grave site and one historical homestead that may be affected.
6. How will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc.)?	The project is not expected to affect health negatively, although the project will have negative impacts on quality of life through its visual impacts.
7. Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?	The socio-economic impacts have been considered (refer to Section **Error! Reference source not found.**) and a Social Impact Assessment is proposed for the EIR phase. A potential opportunity cost of the proposed project is the loss of future agricultural production from the site where the facility is proposed to be constructed. The site is currently used for grazing and is not suited for cultivated agriculture, due to a lack of water for irrigation. Refer to the Agricultural Statement (Appendix E9) for an assessment of the potential impact on agriculture. This study concludes that "*The significance of this impact, in terms of its effect on agricultural production, is assessed as negligible. This is because the site is not currently used for agricultural production and due to its location in an area of expanding urban development and mining activity, is not likely to ever be used for agricultural production, even in the absence of the proposed development.*"
8. Will the proposed land use result in unacceptable cumulative impacts?	No. There are no other known similar developments in this region. The existing transformation of the area around Mogalakwena Mine and along the development corridor between this mine and Mokopane adjacent to the N11 has already substantially transformed the environment, such that the character of the area is already mostly urbanized.

Table 3-6: Waterberg EMF Environmental Management Zones



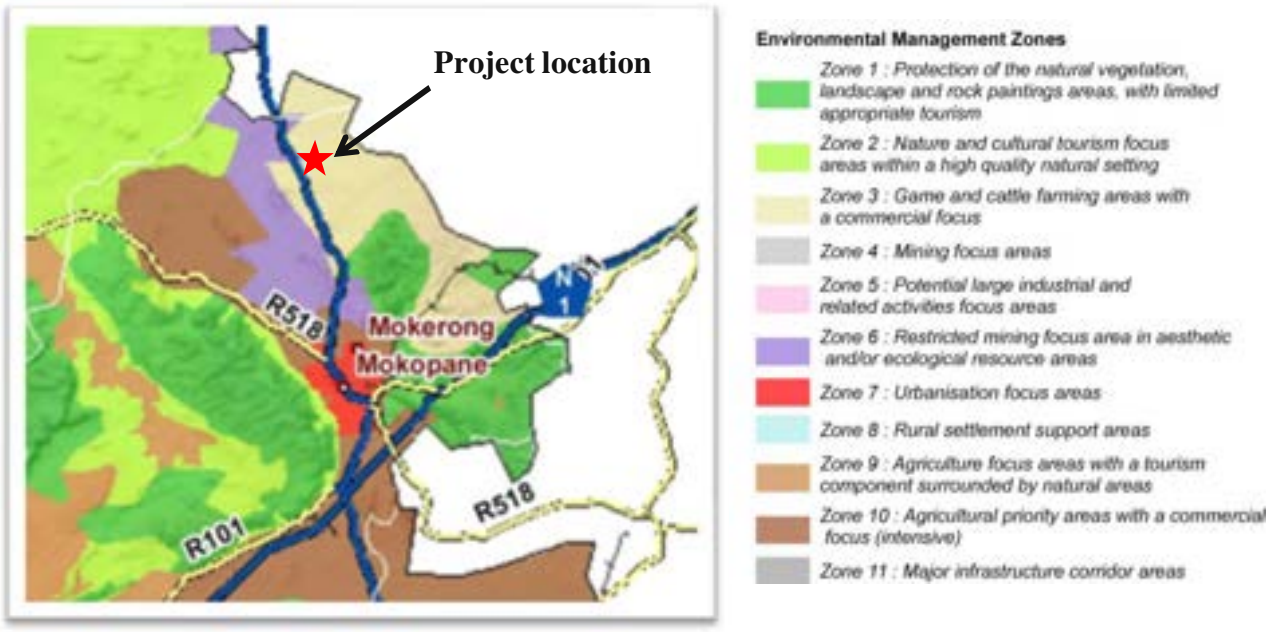


Figure 3-17: Extract from the Waterberg EMF for the project area

3.7 Project Alternatives

NEMA requires that alternatives be considered during the EIA process, specifically as part of the Scoping phase (previous phase). A short summary of the assessment of alternatives as

completed as part of the Scoping phase is provided in this section before detailing the preferred alternative as required in the EIA phase (this phase).

According to DEAT (2004) "an alternative can be defined as a possible course of action, in place of another, that would meet the same purpose and need".

The DEA&DP Guideline on Alternatives (2013)[10] states that "every EIA process must identify and investigate alternatives, with feasible and reasonable alternatives to be comparatively assessed. If, however, after having identified and investigated alternatives, no feasible and reasonable alternatives were found, no comparative assessment of alternatives, beyond the comparative assessment of the preferred alternative and the option of not proceeding, is required during the assessment phase. What would, however, have to be provided to the Department in this instance is proof that an investigation was undertaken and motivation indicating that no reasonable or feasible alternatives other than the preferred option and the no-go option exist."

The 2014 EIA Regulations (GN No. R982) provide the following definition:

"Alternatives", 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 the activity is proposed to be undertaken;

(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 (**No-Go** alternative).

In addition to the list above, the DEA&DP Guidelines on Alternatives (2013) also consider the following as alternatives:

(a) **Demand alternatives:** Arises when a demand for a certain product or service can be met by some alternative means (e.g. the demand for electricity could be met by supplying more energy or using energy more efficiently by managing demand).

(b) **Input alternatives:** Input alternatives are applicable to applications that may use different raw materials or energy sources in their process (e.g. Industry may consider using either high sulphur coal or natural gas as a fuel source).

(c) **Routing alternatives:** Consideration of alternative routes generally applies to linear developments such as powerline servitudes, transportation and pipeline routes.

(d) **Scheduling and timing alternatives:** Where a number of measures might play a part in an overall programme, but the order in which they are scheduled will contribute to the overall effectiveness of the end result.

(e) **Scale and magnitude alternatives:** Activities that can be broken down into smaller units and can be undertaken on different scales (e.g. for a housing development there could be options of 10, 15 or 20 housing units. Each of these alternatives may have different impacts.

The following types of alternatives were deemed the most pertinent to the proposed project and were considered during the Scoping Phase:

- Location alternatives;

[10] This guideline has been used as a best practice tool since it is the most recent guideline on alternatives.

- Technology alternatives; and
- The no-go alternative

3.7.1 Summary of location alternatives as assessed during the Scoping phase

Various types of alternatives were assessed for the proposed project. The assessment of these alternatives started during the Screening phase and was finalised with the conclusion of the Scoping phase. However, due to the complexity of the proposed project and due to various concerns raised by affected community members, a summary of the assessed location alternatives is again provided below.

3.7.1.1 Screening phase

Anglo initially identified three sites for the development of the proposed PV facility based on the following main criteria:

- Land availability and ownership;
- Size of the property; and
- Distance to existing substations

These sites vary in size and are located on different farm portions. The details of these sites are presented in Table 3-7 and the sites are identified in Figure 3-18.

Table 3-7 | Details of the three proposed site alternatives

Site	Property details	Size
Site 1	Farm Armoede 823 LR (Remainder of Portion 3) east of the N11, 27km north of Mokopane.	Approximately 766ha
Site 2	Farm Gillimberg 861 LR (0) 25 km north of Mokopane	Approximately 748 ha
Site 3	Farm Groenfontein 227 KR (portions 20) 25 km north of Mokopane about 12 km South west of the Mogalakwena Mine.	Approximately 223 ha

Although the Armoede site was confirmed to be the preferred alternative in the Scoping Report, LEDET has requested designs for the alternative sites of Gillimberg and Groenfontein as well (see section 7.2). Therefore, designs for the layouts of the PV panel arrays and the transmission line alignments for these sites are provided in Figure 3-19 to Figure 3-24). In all cases, transmission lines would need to connect to both the existing northern and southern substations on the mine.

Since the Gillimberg alternative includes three sites, designs are provided for all three these sites. Some of these sites have extensive areas that were highlighted to be environmentally sensitive during screening. For instance, Gillimberg Site B has a large linear rocky habitat that divides the site into western and eastern portions (Figure 3-22).

A comparison of the suitability of the Armoede, Gillimberg and Groenfontein sites, based on the screening level environmental and technical information, is provided in

3.7.1.2 Scoping phase

A site selection process was undertaken to ensure that resources employed during the EIA process are focused on the site(s) that is/are technically (including financially), biophysically and socially suitable.

The factors that were considered in site selection included the following:

- Environmental (heritage, terrestrial and aquatic biodiversity)
- Points of interest
- Land cover
- Slope
- Mining plans
- Other intended uses of land
- Avoidance of resettlement
- Ability to conclude long-term lease agreement

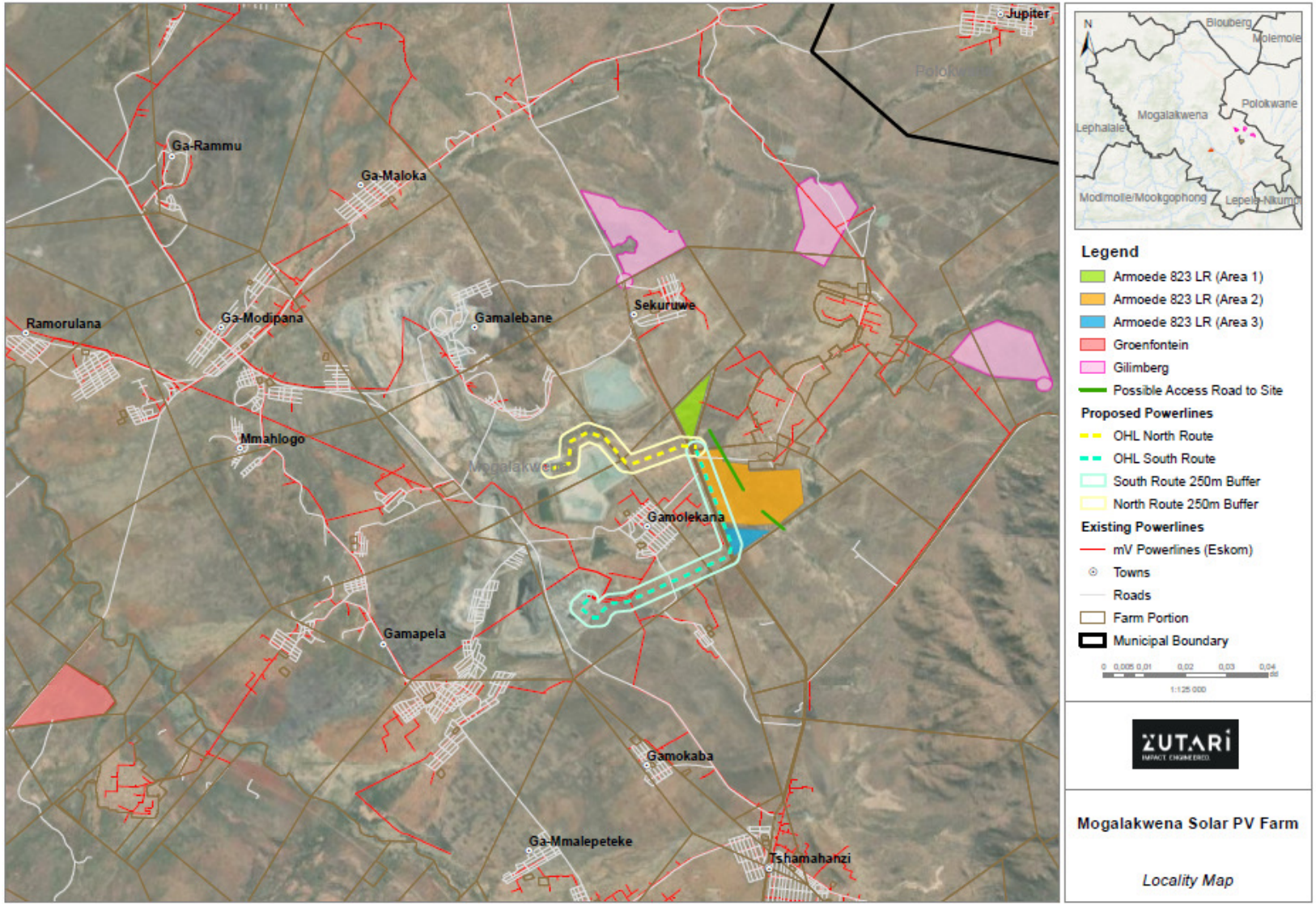


Figure 3-18: Locality map indicating the three alternative sites considered for the proposed project

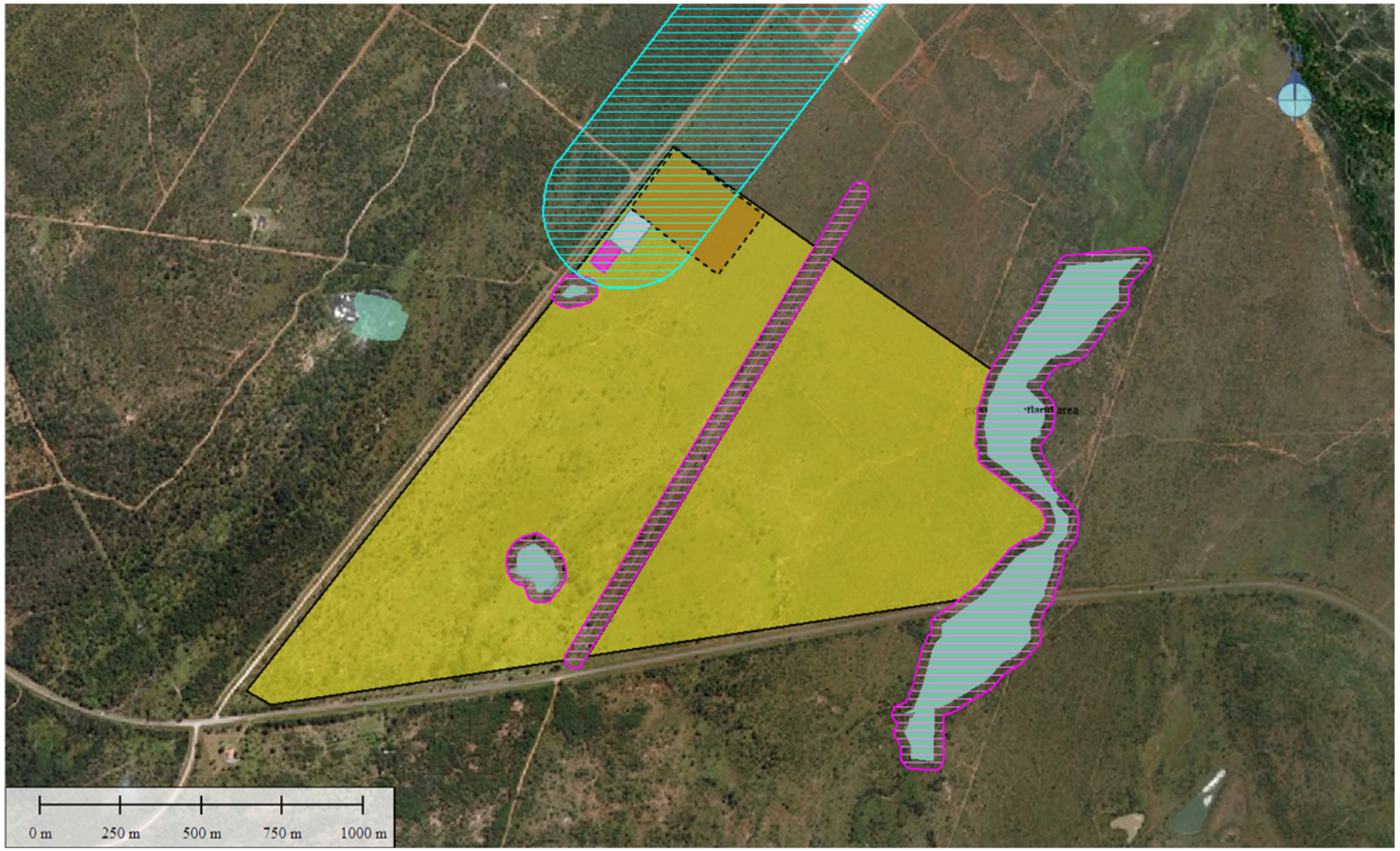


Figure 3-19 Conceptual layout for the Groenfontein site, showing developable area (yellow) considering environmental sensitivities identified during the screening phase

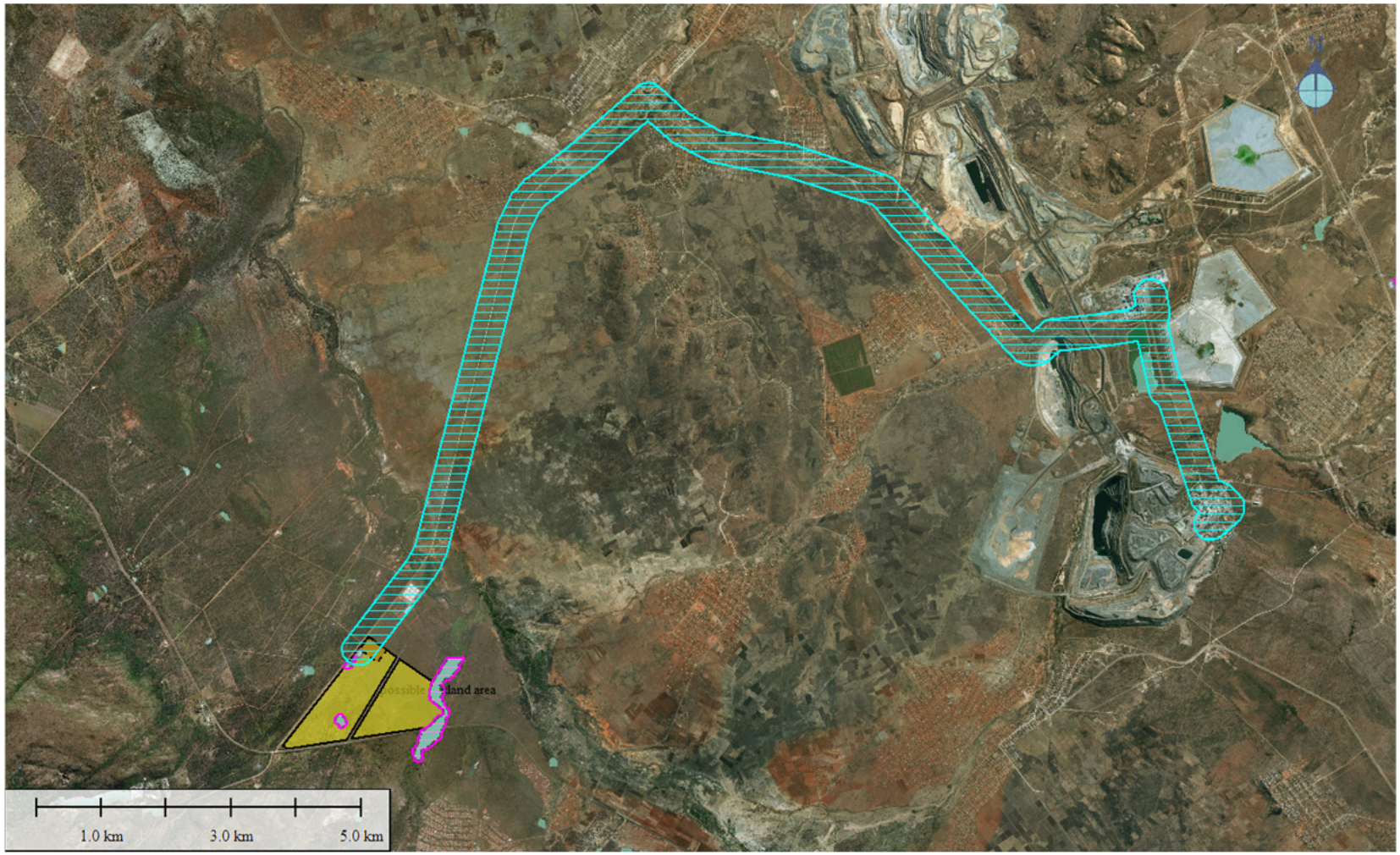


Figure 3-20 Conceptual alignment of transmission line corridors (light blue hatched area) from the Groenfontein site to the mine's existing substations

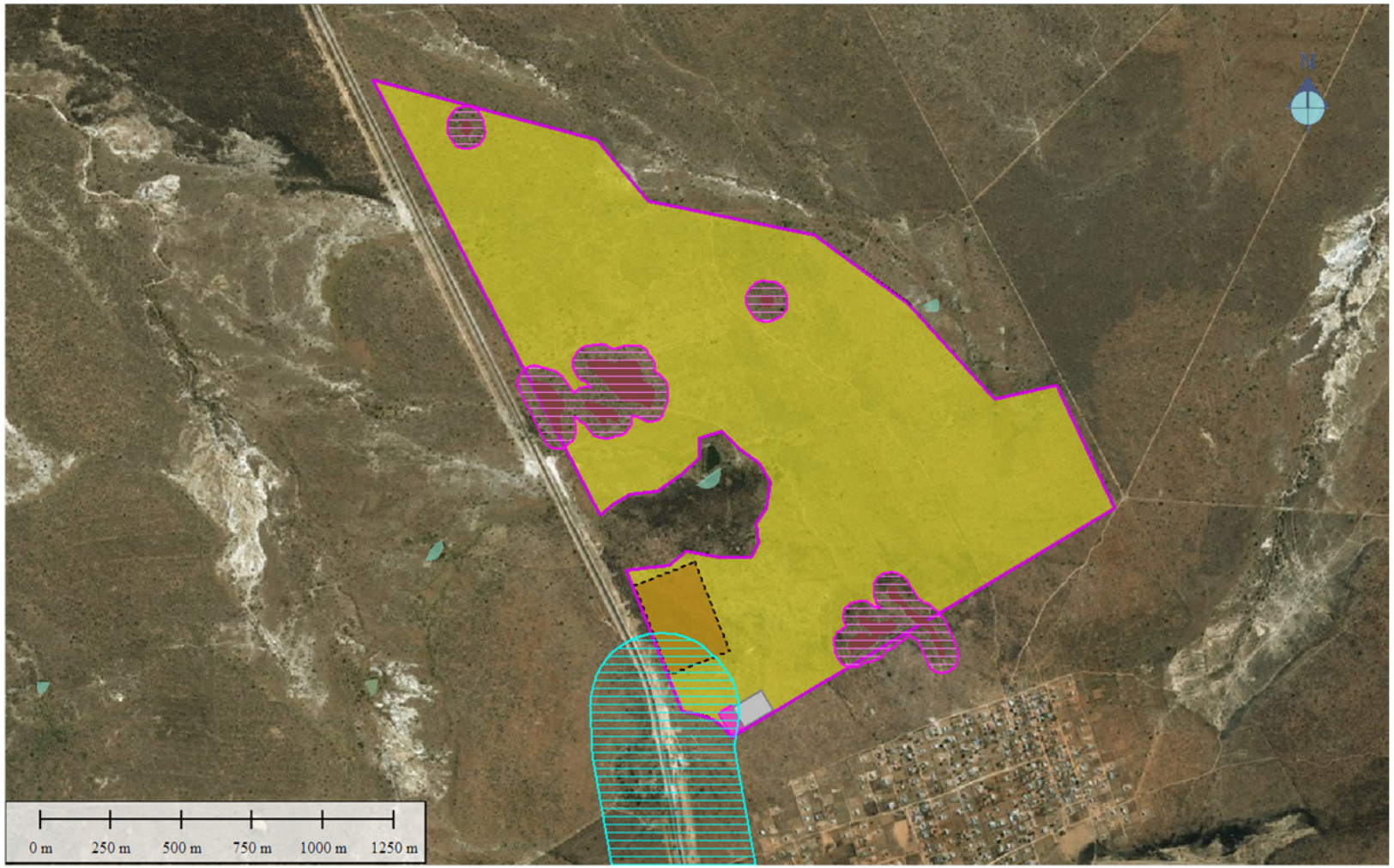


Figure 3-21 Conceptual layout for Gillimberg site A, showing developable area (yellow) considering environmental sensitivities identified during the screening phase

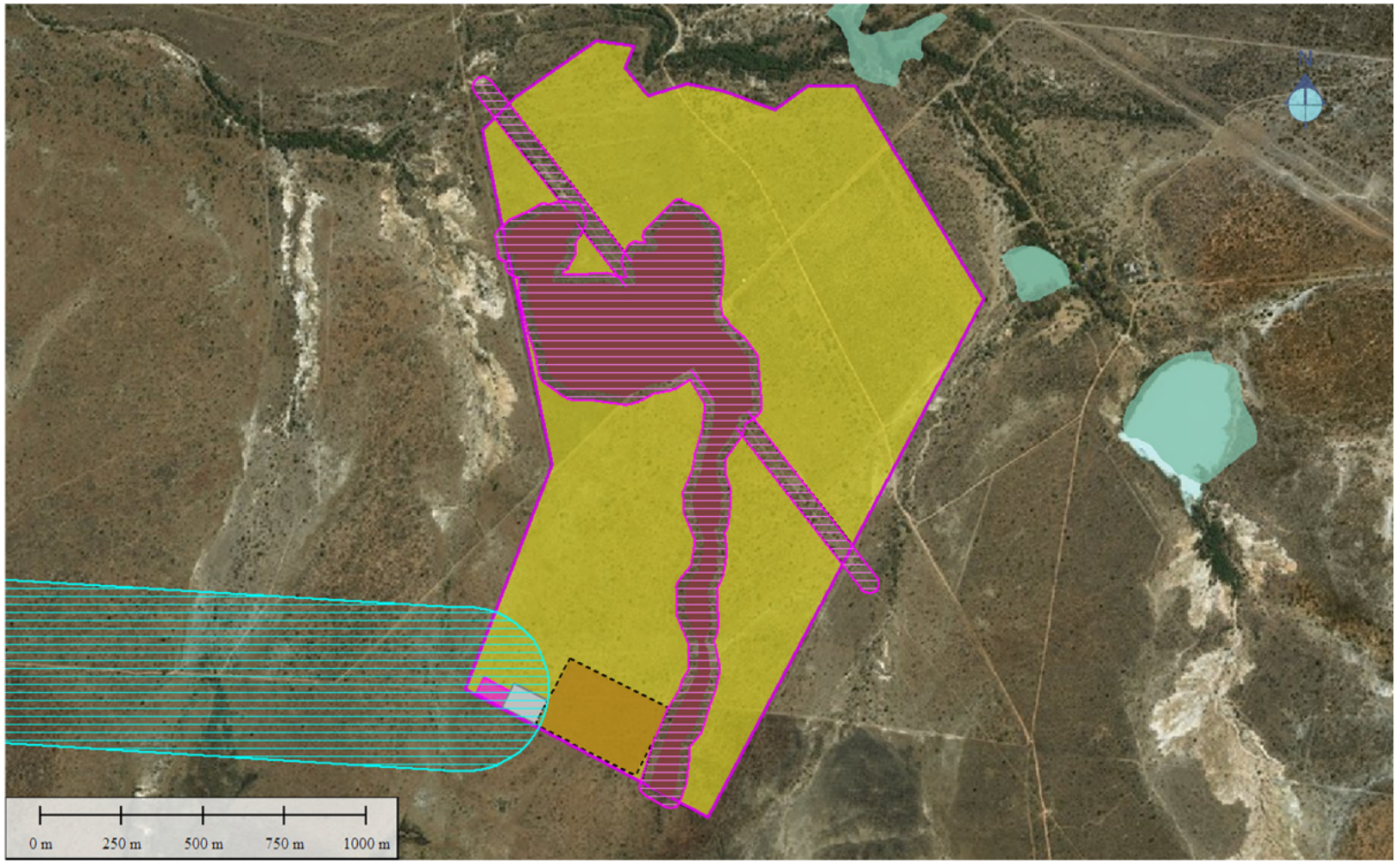


Figure 3-22 Conceptual layout for Gillimberg site B, showing developable area (yellow) considering environmental sensitivities identified during the screening phase

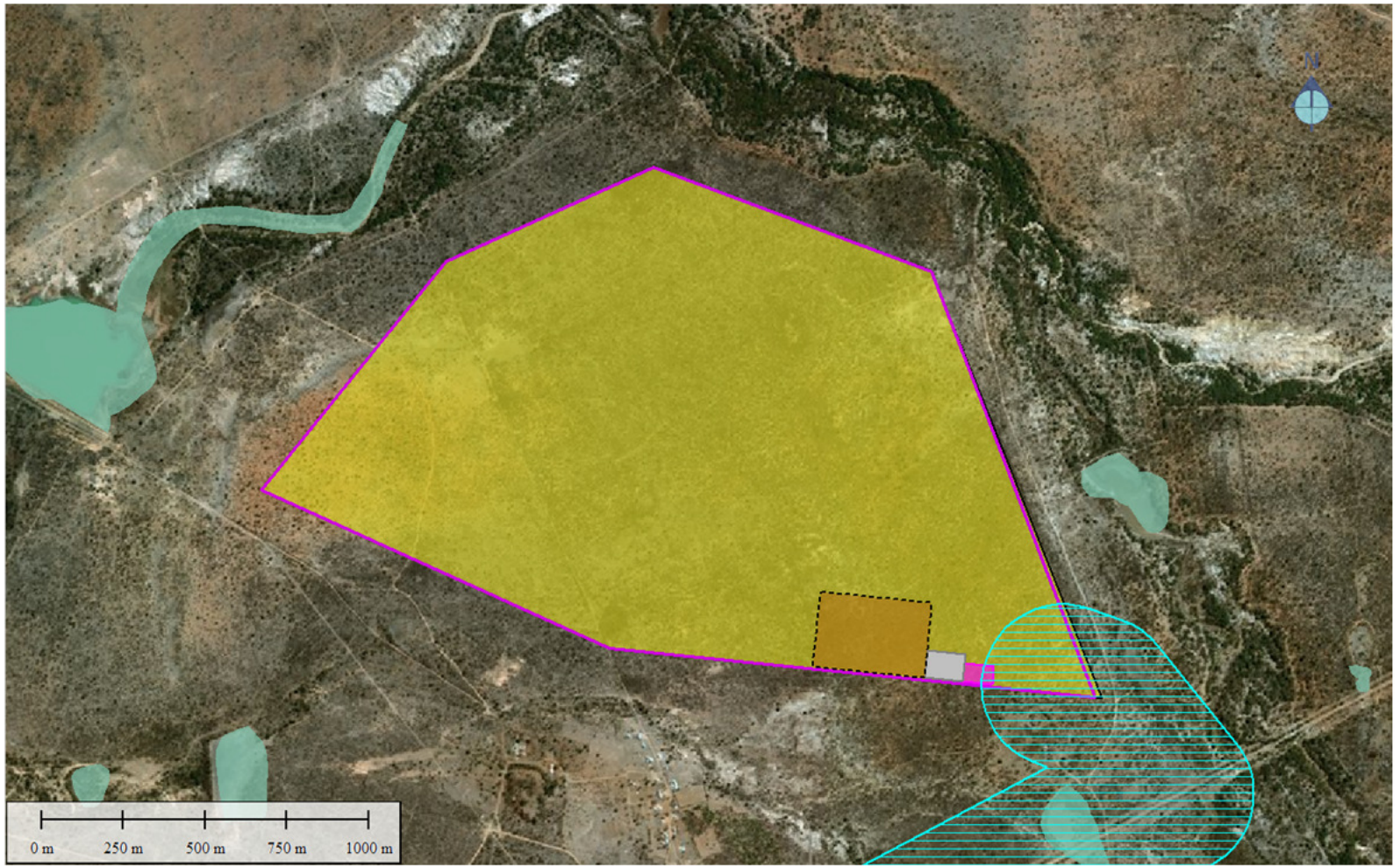


Figure 3-23 Conceptual layout for Gillimberg site C, showing developable area (yellow) considering environmental sensitivities identified during the screening phase

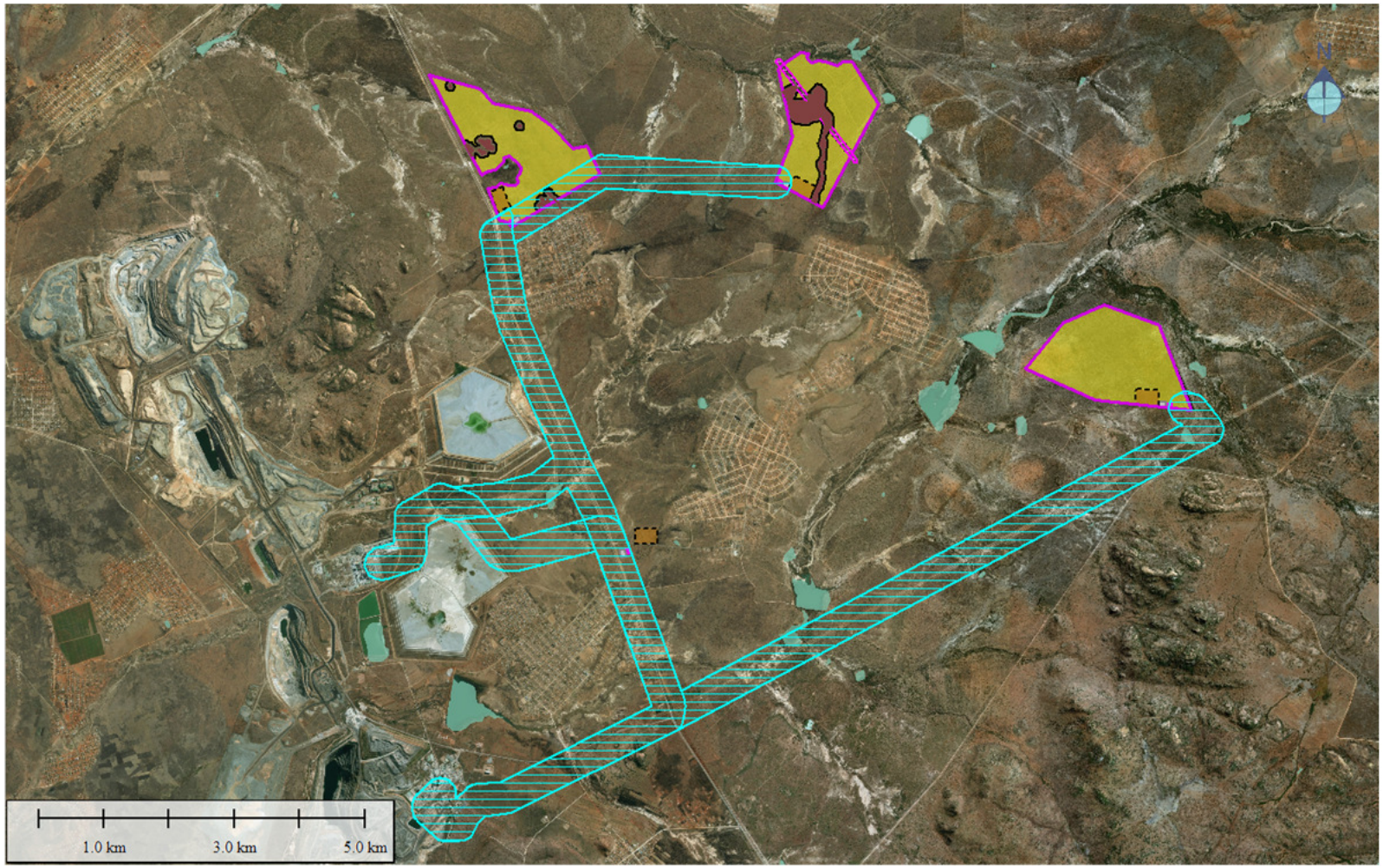


Figure 3-24 Conceptual alignment of transmission line corridors (light blue hatched area) from the Gillimberg sites to the mine's existing substations

Table 3-8 Comparison of site suitability based on conceptual designs and screening level environmental information

Site suitability factor	Armoede	Gillimberg	Groenfontein
Heritage	Northern portion (Land parcel 1) • Contains two heritage sites (surface scatter of Middle Stone Age lithics) Central portion (Land parcel 2) • Contains three heritage sites (including a possible grave and a homestead. Social consultation, test excavation and / or grave relocation may be needed. Southern portion (Land parcel 3) • No heritage sites identified Fieldwork completed in 2020 for the Scoping Report identified a total of 7 heritage features on Armoede, including the above-mentioned sites.	Western portion (Land parcel 1) • This parcel contains two heritage sites (a structure and an African homestead) Central portion (Land parcel 12) • This parcel contains 28 heritage sites, including mostly structures, African homesteads and one grave. Eastern portion (Land parcel 3) • The parcel contains three heritage sites (a structure and two stone walls)	• Three heritage sites were recorded: a farmstead, undecorated potsherds and Middle Stone Age lithics, the latter in a disturbed (ploughed) area.
Aquatic ecology	• Numerous ephemeral drainage lines • The Groot Sandsloot River is situated along the boundary of Parcels 2 and 3.	Portion A includes an ephemeral drainage line. All portions include limited areas of seasonal floodplains.	• The freshwater habitat (on the eastern boundary) is in a modified ecological condition due to overgrazing and trampling by cattle. • There are numerous ephemeral drainage features
Terrestrial ecology	• All portions contain protected trees e.g. *Boscia albitrunca* and *Sclerocarya birrea* ssp. *caffra* Northern portion (Land parcel 1) • The northern portion is considered 'other natural' and not environmentally sensitive • Numerous ephemeral drainage sites Central portion (Land parcel 2) • Disturbed conditions due to historic transformations	• All portions contain protected trees e.g. *Sclerocarya birrea* ssp. *caffra* Western portion (Land parcel 1) • Vegetation is intact, with few alien and invasive species. • Some historic cultivation • Rocky habitats and ephemeral drainage lines can provide habitats for species of conservation concern Central portion (Land parcel 2)	• All portions contain protected trees e.g. *Sclerocarya birrea* ssp. *Caffra* • Freshwater habitat and mixed bushveld habitats are present • Rocky outcrops areas can provide habitats for species of conservation concern, including succulents, forbs and small fauna.

Site suitability factor	Armoede	Gillimberg	Groenfontein
	• The central and south eastern portion of the central portion include an Critical Biodiversity Area 1 (CBA1) and Ecological Support Area 1 (ESA1). • The southern boundary of the central land parcel is associated with ephemeral drainage lines and rocky habitat units – high potential for floral and faunal Species of Conservation Concern (SCC) - to be excluded from the proposed development. <u>Southern portion (Land parcel 3)</u> • Generally low species diversity and large areas have been cleared. • A small portion falls within a CBA1 and the majority is within an ESA1 area. • Small rocky habitats with potential for floral SCC occur in this portion	• More disturbed than Land Parcel A due to cultivation • Large rocky areas could provide habitats for species of conservation concern <u>Eastern portion (Land parcel 3)</u> • Lower tree diversity that was mainly represented by thorn trees • The eastern portion has a denser woody layer with a high bird abundance • Small rocky areas could provide habitats for species of conservation concern	
Length of transmission lines to northern substation	4.66 km	Site A: 7.8 km; Site B: 12.0 km; Site C: 17.2 km	19.5 km
Length of transmission lines to northern substation	7.55 km	Site A: 12.8 km; Site B: 17.0 km; Site C: 14.0 km	22.9 km
Total length of transmission lines	12.21 km	Site A: 20.6 km; Site B: 29.0 km; Site C: 31.2 km	42.4 km
Available developable area considering environmental constraints	273 ha	Site A: 231 ha; Site B: 153 ha; Site C: 254 ha	203 ha

Based on the factors in the above table, the following conclusions were reached regarding the relative environmental suitability of the alternative sites:

- All sites have aquatic systems, including a combination of ephemeral watercourses, streams and seasonal floodplains. The largest watercourse is the Groot Sandsloot River on the boundary between Parcels 1 and 2 on Armoede. All aquatic systems can be avoided with judicious planning.
- From a terrestrial perspective:
  - All sites have protected tree species;
  - Parcel 2 of Gillimberg has one of the highest potentials for species of conservation concern due to a large rocky area. Portion A of Gillimberg has a similar but smaller rocky area;
  - Portions of Armoede Portion 2 and 3 include Ecological Support Areas and Critical Biodiversity Areas by the Limpopo C-Plan, however these areas occur only on small portions of the sites and can be avoided.
  - Groenfontein has fairly undisturbed bushveld but includes rocky outcrops that can provide habitat for species of conservation concern.
- From a heritage perspective:
  - Armoede has five heritage sites spread across three parcels, including one possible grave.
  - Gillimberg has 33 heritage sites spread across three parcels, but Parcel B contains the largest number, including one grave, African homesteads and other structures.
  - Groenfontein includes a farmstead, undecorated potsherds and Middle Stone Age lithics.
- Length of transmission lines:
  - Armoede has the shortest length of transmission lines (12.2km), followed by Gillimberg site A (20.6km), Gillimberg site B (29.0km), Gillimberg site C (31.2km), and Groenfontein (42.4 km)
  - Even though the transmission lines alignments preferentially follow roads and farm boundaries, the longer the length of transmission lines, the greater the potential for additional impacts on such as on heritage sites, loss of usable land and resettlement.
- Available developable area:
  - Armoede has the largest developable area (273 ha), followed by Gillimberg site C (254 ha), Gillimberg site A (231 ha), Groenfontein (203 ha) and Gillimberg site B (153 ha).
  - Since power generation capability for a PV plant is directly proportional to the available developable area (a general rule of thumb is that 2.5ha is required for 1MW generation), the larger sites are technically preferable.

The findings by the heritage and biodiversity specialists that participated in the environmental screening (the same specialists as those participating in the Scoping and EIA phases) concluded that, although all three sites contained biophysical and heritage sensitivities and constraints, **none of the sites had any sensitivities that could be regarded as fatal flaws.**

Parcel B of Gillimberg has arguably the largest risk of significant impacts due to the combination of large numbers of heritage sites and the large rocky outcrop, which has the potential to host species of conservation concern. From a biophysical and social perspective, this is the least suitable site.

Of the remaining two sites, the potential biophysical risks on Groenfontein and Armoede are similar. Although Armoede contains portions of both CBAs and ESAs, these areas occur only on small portions of the sites and can be avoided, thus resulting in Armoede potentially causing less environmental disturbance within sensitive areas when compared to Groenfontein. Furthermore, Armoede has probably some of the most intensively grazed of the alternative sites, with other signs of disturbance like sand mining, dumping of waste and tree felling, due to its proximity to settlements and to the N11 road. Development on such disturbed areas is preferable to development in a comparatively undisturbed area like Groenfontein.

The decision on the preferred site, subsequent to the environmental screening of all three proposed alternatives, was also influenced by socio-economic factors (see Table 3-9).

Table 3-9 Screening level comparison of socio-economic factors for alternative sites

Site suitability factor	Armoede	Gillimberg	Groenfontein
Social impacts	• The land is used for grazing cattle and collecting firewood; • Some livelihood activities may be affected; and • Developments close to communities may create opportunities for upliftment e.g. job opportunities or compensation for loss of use of the land or displacement.	• The land is used for grazing cattle and collecting firewood; • Some livelihood activities may be affected; • Cultural / historic impacts could be significant, especially if the central site is used; and • Site access roads are dusty, thus nuisance and visual impacts are likely to be significant.	• The site is far from any settlements, is owned by Anglo and has no obvious current uses by communities.
Site location and transmission of power relative to the mine	• The furthest and closest parcels are respectively 5 km and 3.3 km from the mine; • Least transmission losses; • Financial benefit of constructing shorter transmission line.	• The furthest and closest parcels are respectively 10 km and 5.8 km from the mine; • Moderate transmission losses; • Higher cost than Armoede for construction of longer transmission line.	• The site is 12-13 km from the mine (furthest); • Highest transmission losses; • Highest cost for construction of longest transmission line

Social impacts on the Gillimberg and Armoede sites are similar since they are both close to settlements and are used by communities for livelihood activities like firewood collection and grazing. The Groenfontein site was predicted to have very limited social impacts but on the same basis will have little motivation for community upliftment or compensation.

However, a significant factor in the choice of the preferred site at Armoede was the potential community benefits. Of all the sites considered, Armoede was chosen because it provides the highest potential for benefitting the communities who have been historically disadvantaged by resettlement. Anglo is currently in the process of detailed negotiations for the transfer of the farm Armoede, currently owned by Anglo, to the Armoede community. This is being done with

the objective of ensuring that the appointed IPP will lease this land from the community, thereby providing lasting financial benefits and upliftment to the community.

Considering the combination of technical, environmental and social benefits, and the fact that Armoede is the closest site to the mine (with the least potential for transmission losses), has the largest available area for PV panels, **Armoede was selected as the preferred site** for further investigation during this EIA phase. Thus, the impact assessment and environmental descriptions that follow in this EIR are focused on the Armoede site.

3.7.2 Preferred alternatives

Subsequent to the alternatives assessment as detailed above, the following preferred alternatives have been assessed in further detail as part of this EIA phase. Chapter 4 details the receiving environment as assessed by the specialists. Based on the findings of the specialist studies during the EIA phase, adjustments of the location and routes within the Transmission line corridors have been considered to minimise and avoid environmental and social impacts. These are discussed below.

3.7.2.1 Preferred Location

The Armoede Site is the preferred alternative, as confirmed in the Scoping Report. The following details have informed the design of the project.

Ecological considerations:

No threatened ecosystem or CBA habitat will be directly impacted by the proposed development. However, a CBA1 is located immediately east of the focus area and is thus susceptible to edge effects. Effective mitigation measures must be implemented to reduce the potential impacts from associated edge effects on the CBA habitat.

The proposed development will directly impact ESA habitat, particularly ESA1 habitat and to a lesser extent ESA2 habitat. ESAs are important features in the greater landscape and provide unique conditions for flora and important ecological functionality within the ecosystem. Due to their ecological importance, it is recommended that impacts to ESAs be minimised as far as possible and kept to approved areas only.

The proposed infrastructure area will impact on two habitat units of increased sensitivity, i.e., the Rocky Habitat and the Freshwater Habitat (including both subunits). The following recommendations are thus proposed:

Freshwater Habitat: it is proposed that the proposed infrastructure development i) be placed outside of the Seep Wetland Habitat subunit, and ii) where Riverine Habitat will be traversed (e.g., within the southern OHL Transmission Corridor and the Internal OHL crossings), appropriate measures should be taken to minimise the impacts on the habitat subunit. Bridges and culverts should be used so to ensure that the (seasonal) flow of water through the nearby drainage lines are not negatively impacted.

Rocky Habitat: It is advised that infrastructure placement within the Development area 1 and the proposed southern OHL Transmission Corridor be designed to avoid the Rocky Habitat as far as is possible. Layouts can be designed to effectively exclude the Rocky Habitat by placing infrastructure i) out of the Rocky Habitat within Development Area 1 and ii) closer to the existing roads, thereby minimising the impacts on this habitat.

Heritage considerations:

All identified heritage resources must be avoided as far as possible, especially within the transmission corridors, where pylon placement should consider these sensitivities in the design phase.

3.7.2.2 Technology Alternative

Type of PV Module:

The preferred alternatives are either monocrystalline or polycrystalline silicon modules. The choice of alternative is dependent on their technical factors, since neither of these technologies has any direct environmental advantage over the other. The Preferred Bidder is to decide which of these two PV modules is to be used during the detailed design phase.

Mounting Method:

Single-axis tracking is preferred, since it produces an energy output approximately 20% higher than the fixed angle system, requires fewer panels than a fixed system (thus reducing its footprint) and it produces more energy in the early mornings when the peak tariff is used, but is not as complex and costly as a dual axis system. It has a further advantage that its visual impacts are lower than dual axis tracking system, which has twice the height of a single axis tracking system.

3.7.2.3 Inverter Alternative

Neither String Inverters nor Central Inverters have any obvious direct advantages in terms of environmental impacts. In this case, too, the choice of alternative is dependent on their technical factors and the preferred bidder is to decide which of these inverters is to be used during the detailed design phase. Neither options is a better or worse environmental option.

3.7.2.4 Routing Alternatives for the Transmission corridors

The power generated by the proposed project will be transferred to the Mogalakwena Mine via OHLs. Once the IPP has been appointed, the size and exact route layout of these powerlines will be confirmed.

The EIA process aims to authorise the construction of both the following lines withing these 500m corridors:

1. Three 66kV OHL to be constructed parallel within each of the two corridors; or
2. One 132kV OHL to be constructed within each of the two corridors.

Sensitivities for these corridors are shown in Figure 3-25 and Figure 3-26.

As such, the EIA phase resulted in the thorough assessment of the proposed corridors of 500m wide for both the Northern and Southern corridors. These assessments will inform the route layout and will ensure that sensitivities are avoided as far as possible. The following sensitivities were determined during the field assessments:

- Heritage resources identified as per Figure 4-21. All identified heritage resources must be avoided as far as possible and pylon placement should consider these sensitivities in the design phase.
- The majority of the southern OHL corridor and the central portion of the project boundary falls within a **Category 1 Ecological Support Area (ESA)**. These are natural, near natural and/or degraded areas that are selected to support CBAs by maintaining ecological processes. Therefore, it is recommended that the OHL proposed to be constructed within this OHL transmission corridor be informed by specialist input to ensure minimal ecological impact on the ESA area.
- The small remaining portion of the southern OHL transmission corridor falls within a **Category 2 ESA.** ESA 2s are areas that are no longer intact but potentially retain significant importance from a process perspective (e.g., maintaining landscape connectivity). Again, it is recommended that specialist input be considered during the

design phase of the OHL within the approved OHL transmission corridor. Refer to Figure 4-2.

- It is advised that infrastructure placement within the proposed southern OHL transmission corridor be designed to avoid the Rocky Habitat as far as is possible. Layouts can be designed to effectively exclude the Rocky Habitat by placing infrastructure closer to the existing roads, thereby minimising the impacts on this habitat.

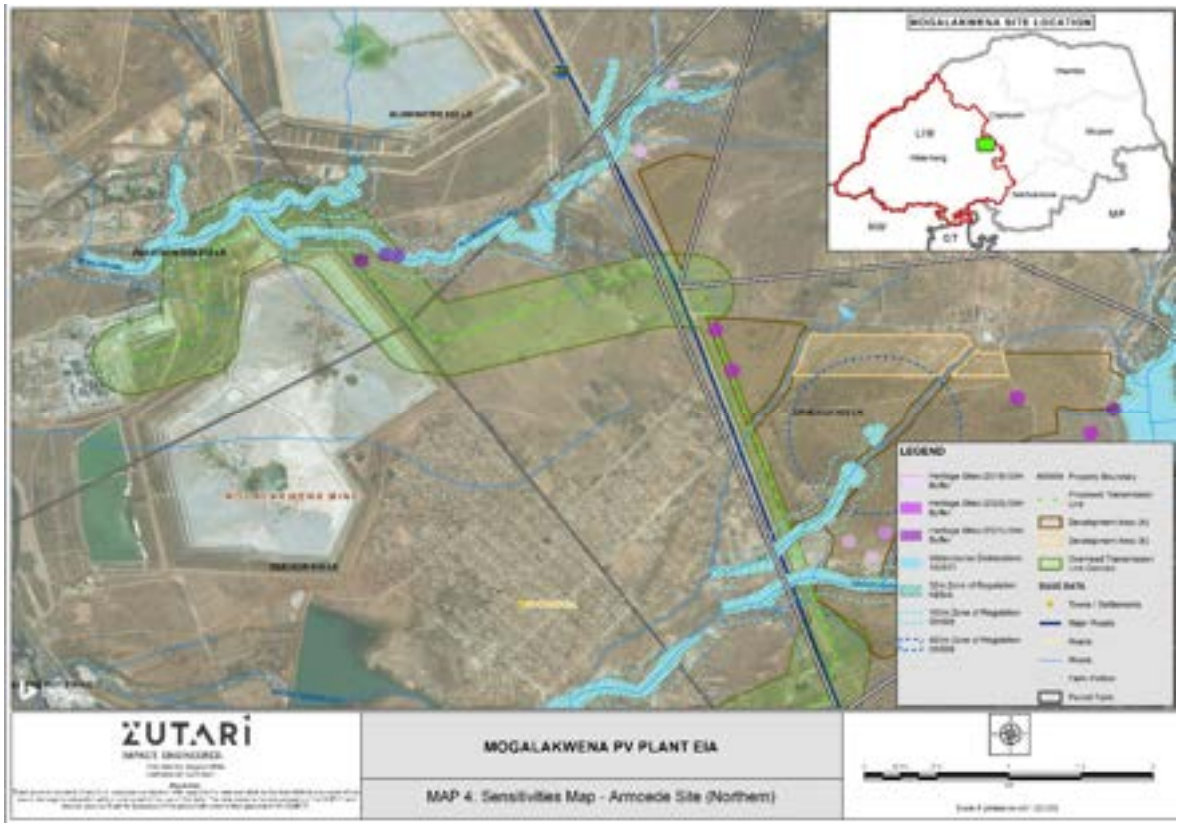


Figure 3-25 Site sensitivities of the northern transmission corridor

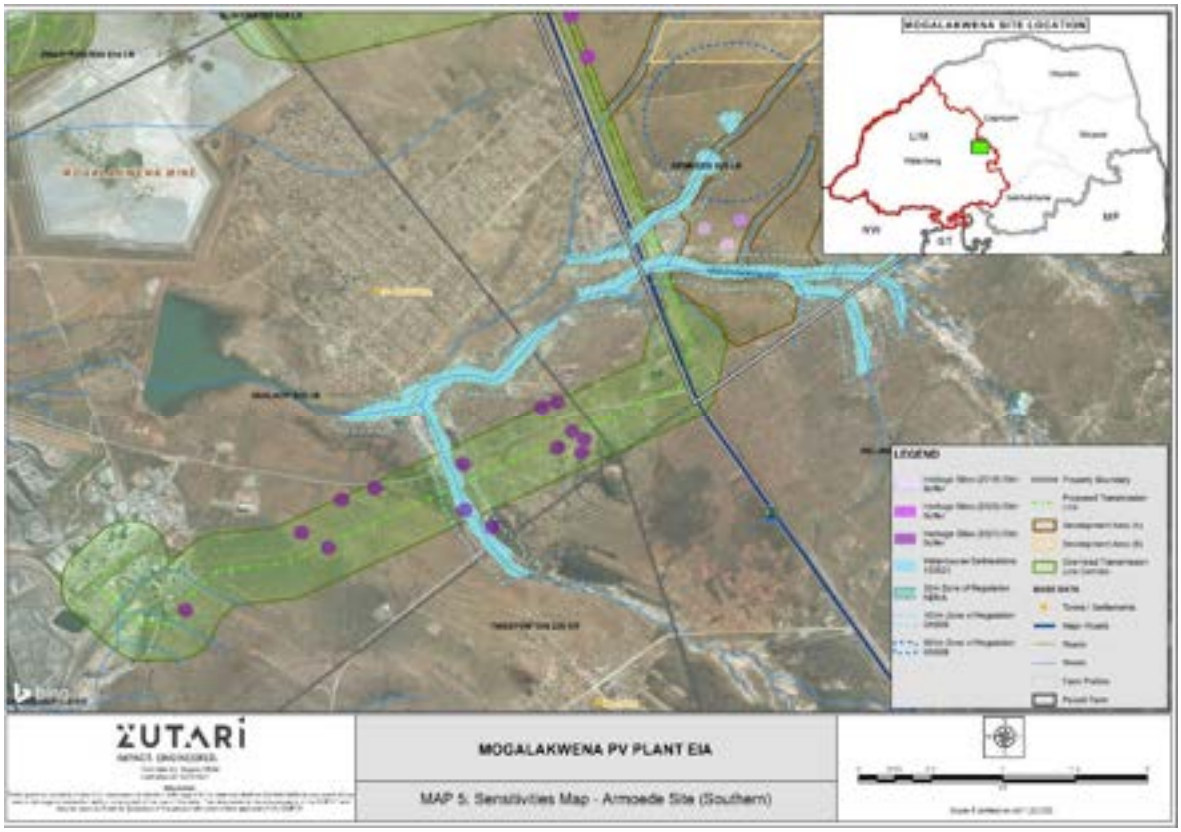


Figure 3-26 Site sensitivities of the southern transmission corridor

3.8 The No-Go Alternative

Based on current information, neither the preferred site (Armoede) nor either of the alternative sites that have been considering during screening have any environmental fatal flaws or significant red flags.

The project is designed to reduce Mogalakwena Mine's reliance on grid-based electricity, which is primarily generated from coal-fired Eskom power stations. The project has several potential environmental and socio-economic benefits, including improving the mine's cost energy predictability, community involvement, reduced carbon footprint for the mine, improved energy security for the mine (thus enhancing the potential to extend the life of mine and provide lasting socio-economic benefits to employees and the community) and improved Mining Charter compliance.

Therefore, from environmental and social perspectives, there is no reason to consider the no-go alternative.

4 DESCRIPTION OF THE RECEIVING ENVIRONMENT

This chapter describes the existing conditions of the receiving environment and serves as a baseline by which to compare the predicted impacts that the proposed project may have on this environment. This section has been compiled with inputs from Specialist Assessments conducted during the Scoping Phase (desktop) and EIA phase (field assessments).

4.1 Terrestrial Environment

Scientific Terrestrial Services (STS) was appointed to conduct a biodiversity assessment covering terrestrial and aquatic environments. The findings of the terrestrial biodiversity assessment is summarised in this section. The aquatic biodiversity assessment is covered in the next section. For the full assessment of terrestrial and aquatic biodiversity, refer to Appendix 1 and 2.

The development areas 1 and 2, the corridors for the access roads, internal roads, internal overhead transmission lines (OHL) and two OHLs connecting to existing substations will collectively be referred to as the "focus area".

To determine the Present Ecological State of the focus area and capture comprehensive data with respect to faunal and floral taxa, the following methodology was used:

- Maps and digital satellite images were consulted prior to the field assessment in order to determine broad habitats, vegetation types and potentially sensitive sites;
- Relevant databases considered during the assessment of the study area included the South African National Biodiversity Institute (SANBI) Threatened Species Programme (TSP), the Limpopo Conservation Plan (2013), Mucina and Rutherford (2012), National Biodiversity Assessment (2011), Important Bird Areas in conjunction with the South African Bird Atlas Project (SABAP 2) (2015), International Union for Conservation of Nature (IUCN), Pretoria National Herbarium Computer Information Systems (PRECIS) and the National Freshwater Ecosystem Priority Area (NFEPA); and
- Field assessments which took place from 1 – 4 June 2021 to "ground-truth" the results of the desktop assessment.

4.1.1 Vegetation and topography

According to Mucina and Rutheford (2018) the focus area is situated in the Central Bushveld Bioregion which is within the Savanna Biome. The vegetation type associated with the focus area is the Makhado Sweet Bushveld (SVcb 20) as shown in Figure 4-1. Slightly to moderately undulating plains sloping generally down to the north, with some hills in the southwest. Short and shrubby bushveld with a poorly developed grass layer. The area is transitional between the higher-lying Polokwane Plateau and the lower-lying vegetation units of the Limpopo River Valley.

4.1.2 Climate

The focus area falls within the summer rainfall region of Limpopo. The rainfall period occurs from November to February and is characterised by very dry winters. The highest rainfall occurs in January and December. The average rainfall declines from east to west.

4.1.3 Geology and soils

The area is underlain by the gneisses and migmatites of the Hout River Gneiss (Randian Erathem) and the potassium-deficient gneisses of the Goudplaats Gneiss (Swazian Erathem). Sandstones and mudstones of the Matlabas Subgroup (Mokolian Waterberg Group) are also found. Soils include deep, greyish sands, eutrophic plinthic catenas, red yellow apedal freely drained soils with high base status, clayey in bottomlands. Land types mainly Bd, Bc, Ae and Ia.

4.1.4 Conservation

Mucina and Rutherford (2006) describes the vegetation type as vulnerable. However, this status has been updated in the 2018 Final Vegetation Map of South African, Lesotho and Swaziland (SANBI, 2018a) to being of Least Concern (LC).

The target conservation is 19%. About 1% is statutorily conserved, mainly in the Bellevue Nature Reserve. Some 27% is transformed, mainly by cultivation, with some urban and built-up areas. The southwestern half of the unit has densely populated rural communities. Erosion is low to high.

According to the National Biodiversity Act (2018) the majority of the project boundary and small portions of the OHL corridors fall within the remaining extent of the Makhado Sweet Bushveld which is currently Least Concerned and Poorly Protected.

Ecosystem types are categorised[11] as “not protected”, “poorly protected”, “moderately protected” and “well protected” based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act, 2003 (Act No. 57 of 2003), and compared with the biodiversity target for that ecosystem type.

The study area is not situated within a threatened ecosystem, according to the National Threatened Ecosystem Database (2011). The purpose of listing protected ecosystems is primarily to preserve witness sites of exceptionally high conservation value. The first national list of threatened terrestrial ecosystems for South Africa was gazetted on 9 December 2011 (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GoN 1002), 9 December 2011).

According to the South Africa Protected Areas Database (SAPAD, 2020_Q3) and the National Protected Areas Expansion Strategy Database (NPAES, 2009) the Witvinger Nature Reserve (a formally protected area) is situated approximately 2.7 km south east of the study area, which is managed by the LEDET. This corresponds with the Limpopo C-Plan database which included buffers around protected areas as defined in “Listing Notice 3” (National Environmental Management Act, 1998 (Act No. 107 of 1998).

The South Africa Conservation Areas Database (SACAD, 2020_Q3) does not indicate the presence of any additional conservation areas within 10 km of the study area.

[11] The ecosystem protection level status is assigned using the following criteria:

i. If an ecosystem type has more than 100% of its biodiversity target protected in a formal protected area either A or B, it is classified as Well Protected;
ii. When less than 100% of the biodiversity target is met in formal A or B protected areas it is classified it as Moderately Protected;
iii. If less than 50% of the biodiversity target is met, it is classified it as Poorly Protected; and
iv. If less than 5% it is Hardly Protected.

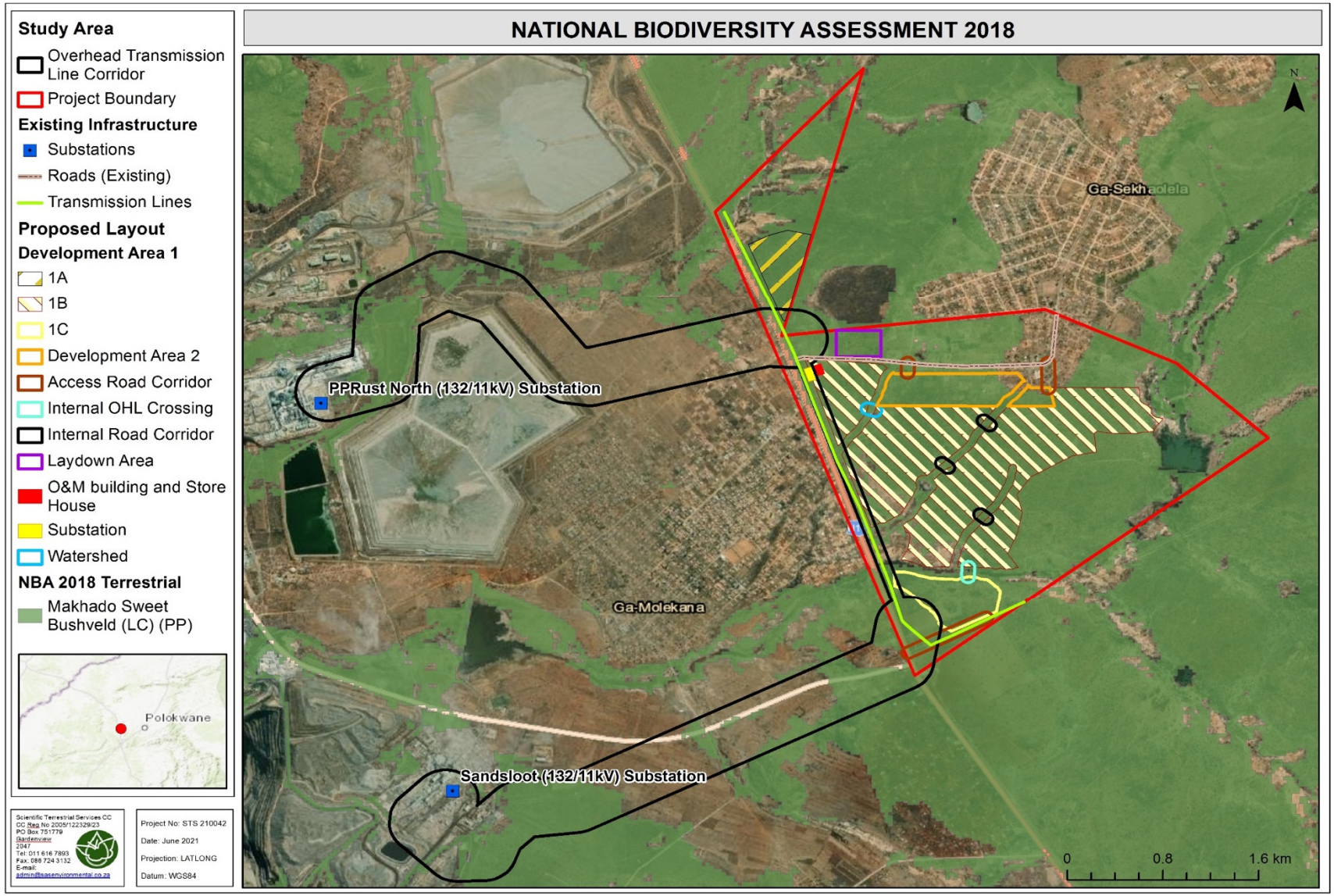


Figure 4-1: Vegetation type associated with the study area, according to the National Biodiversity Assessment (NBA, 2018)

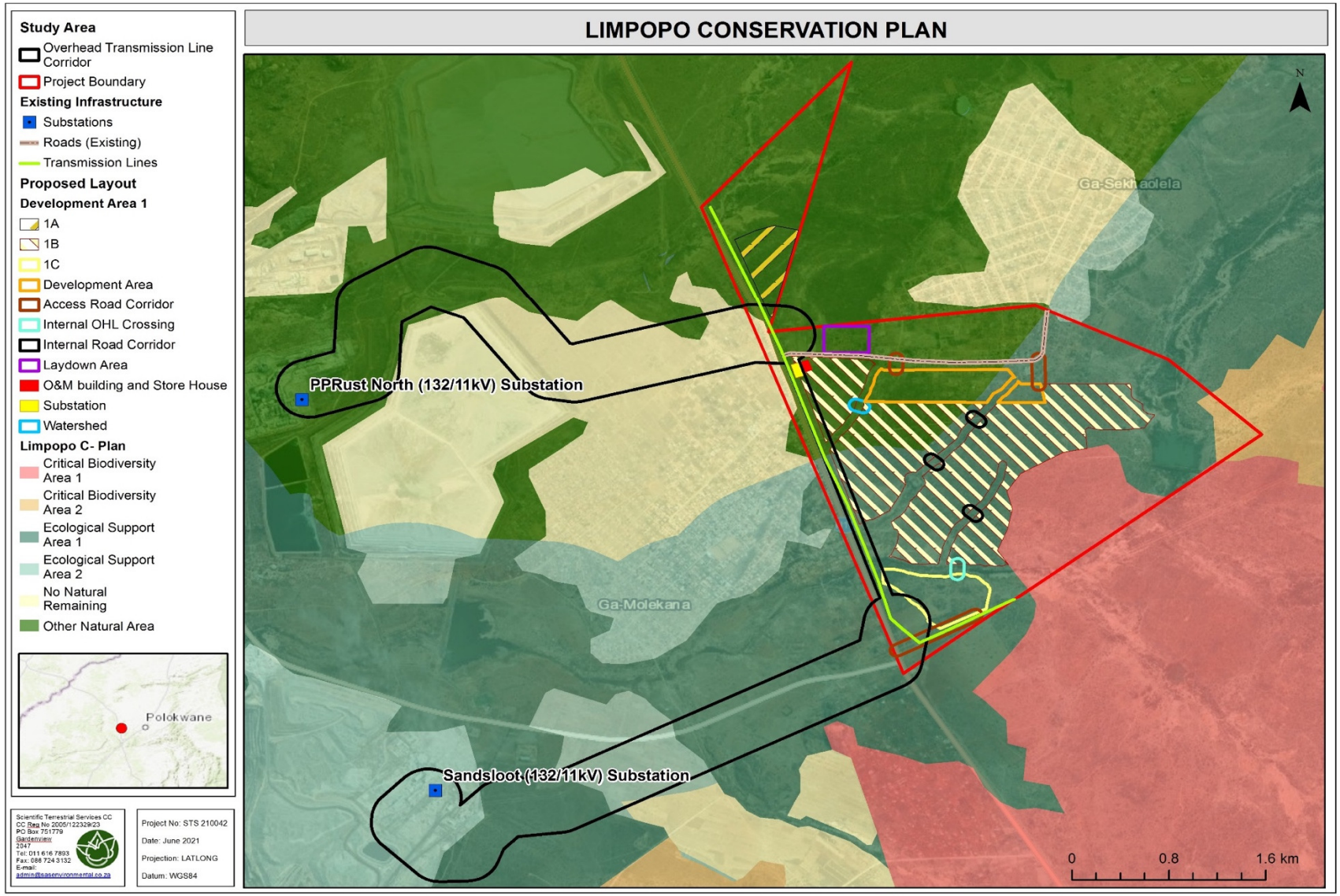


Figure 4-2: The study area in relation to the Limpopo Conservation Plan Version 2 (2013) categories

4.1.5 Limpopo Conservation Plan

4.1.5.1 Critical Biodiversity Areas:

Figure 4-2 indicates the conservation priorities for the focus area in terms of the Limpopo Conservation Plan v2 (2013) (C-plan). A small south-eastern portion of the study area falls within a **Category 1 Critical Biodiversity Area (CBA)**. These are Irreplaceable Sites required to meet biodiversity pattern and / or ecological processes targets. Incompatible land-uses described for a Category 1 CBA include mining, industrial and infrastructure (roads, power lines, pipelines). However, it should be noted that, as the Limpopo C-plan was used as a tool to determine the preferred site layout of the proposed project, the current proposed layout footprint **does not** fall within the CBA.

A small eastern portion of the project boundary falls within a **Category 2 CBA**. CBA 2s are considered “optimal” best design selected sites, areas selected to meet biodiversity pattern and/or ecological process targets. Alternative sites may be available to meet targets. Again, it should be noted that the proposed layout footprint of the PV Solar Plant does not fall within the CBA.

4.1.5.2 Ecological Support Areas:

The majority of the southern OHL corridor and the central portion of the project boundary falls within a **Category 1 Ecological Support Area (ESA)**. These are natural, near natural and/or degraded areas that are selected to support CBAs by maintaining ecological processes. Land management recommendations include the implementation of appropriate zoning and land management guidelines to avoid impacting on ecological processes and the avoidance of intensification of land use and fragmentation of natural landscapes. Therefore, it is recommended that the OHL proposed to be constructed within this OHL corridor be informed by specialist input to ensure minimal ecological impact on the ESA area.

The small remaining portion of the southern OHL Corridor falls within a **Category 2 ESA.** ESA 2s are areas that are no longer intact but potentially retain significant importance from a process perspective (e.g., maintaining landscape connectivity). Land management recommendations include the maintenance of current-land use and the avoidance of any intensification of the current land-use which may result in additional impact on ecological processes. Again, it is recommended that specialist input be considered during the design phase of the OHL within the approved OHL corridor.

4.1.5.3 Other Natural Areas:

The remaining northern portion of the project boundary and a portion of the northern OHL Corridor falls within an area considered to be **other natural areas**. These are natural and intact areas but are not required to meet targets, nor have they been identified as Critical Biodiversity Areas or Ecological Support Areas.

No management objectives, land management recommendations or land-use guidelines are prescribed. These areas are nevertheless subject to all applicable town and regional planning guidelines and policy. Where possible existing “Not Natural” areas should be favoured for development before "Other natural areas" are considered.

4.1.5.4 No Natural Remaining:

The majority of the northern OHL Corridor falls within an area considered **No Natural Habitat Remaining**. These are areas with no significant direct biodiversity value. These are either not natural areas or degraded natural areas that are not required as ESA. These areas include intensive agriculture, urban, industry; and human infrastructure. No management objectives, land management recommendations or land-use guidelines are prescribed.

4.1.6 National web-based screening tool

The National weeb-based screening tool (2020) is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas. The different sensitivity ratings pertaining to the Plant (and Animal) Protocols are described below:

- **Very High:** Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 km^2 are considered Critical Habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under Critically Endangered (CR), Endangered (EN), or Vulnerable (VU) D criteria of the IUCN or species listed as Critically/ Extremely Rare under South Africa's National Red List Criteria. For each species reliant on a Critical Habitat, all remaining suitable habitat has been manually mapped at a fine scale.
- **High:** Recent occurrence records for all threatened (CR, EN, VU) and/or rare endemic species are included in the high sensitivity level.
- **Medium:** Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level.
- **Low:** Areas where no SCC are known or expected to occur.

For the terrestrial biodiversity theme, the study area is considered to have an overall sensitivity of very high. The northern portion of the study area has a low sensitivity, while the southern portion has a very high sensitivity. The triggered sensitivity features include CBA Categories 1 and 2 and ESA Categories 1 and 2. Land Parcel 1 has a low sensitivity in terms of terrestrial biodiversity. Refer to Figure 4-3.

For the animal species theme, the study area is considered to have an overall sensitivity of medium. The entire northern OHL Corridor and the majority of the southern OHL Corridor and portions of the project boundary has a low sensitivity. Species identified by the EIA Screening tool include: *Anthene minima minima* (hairtail butterfly), *Dasymys robertsii (*Robert's shaggy rat) and *Sagittarius serpentarius* (Secretary bird). Refer to Figure 4-4.

For the plant species theme, the entire study area is considered to have a low sensitivity.

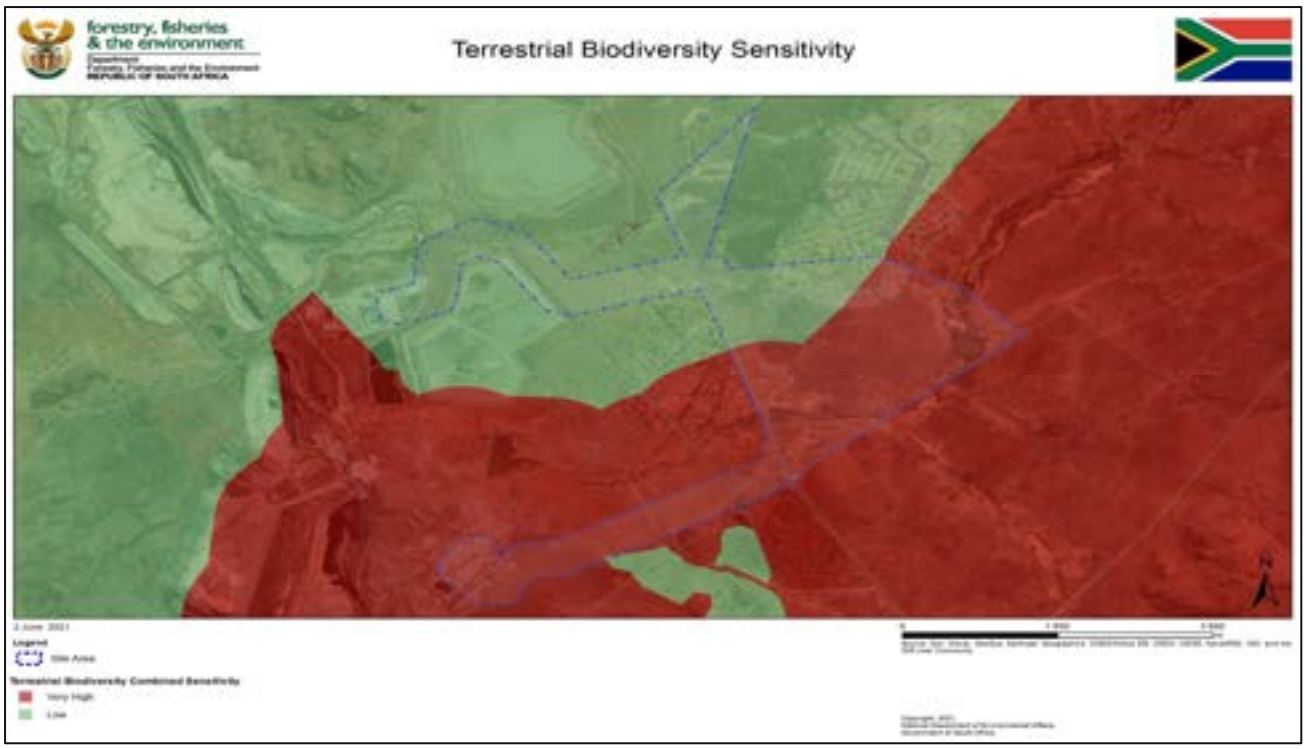


Figure 4-3: Terrestrial Biodiversity Theme sensitivity map generated by the National Web-based Screening Tool

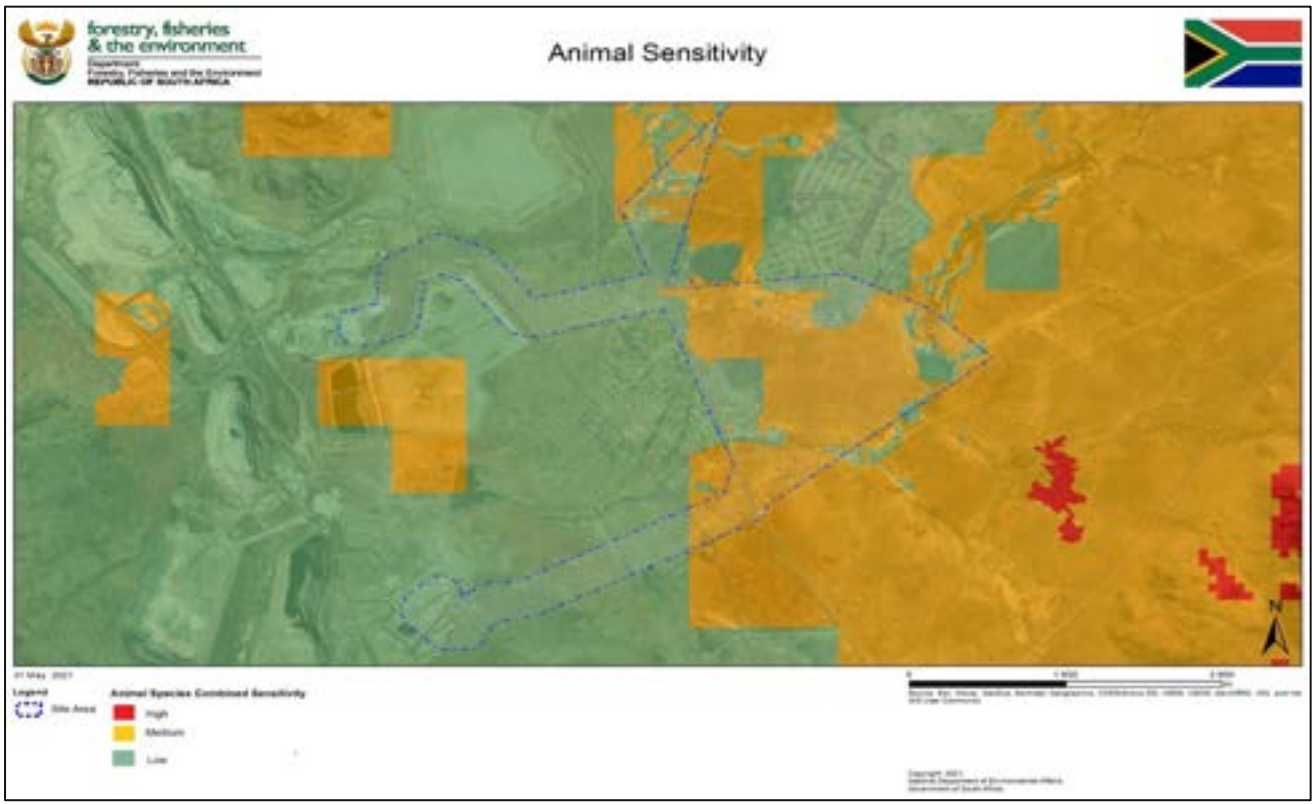


Figure 4-4: Animal Species Theme sensitivity map generated by the National Web-based Screening Tool

4.1.7 Floral Environment

The purpose of the floral assessment was to define the floral ecology of the focus area, to identify and map areas of increased Ecological Importance Sensitivity (EIS) and to describe the Present Ecological State (PES) of the focus area. The primary objective of the floral assessment is not to compile an exhaustive species list but rather to ensure that sufficient data are collected to describe all the vegetation communities present in the area of interest, to optimise the detection of species of conservation concern (SCC) and to assess habitat suitability for other potentially occurring SCC (SANBI, 2020).

4.1.7.1 Broadscale vegetation characteristics

Mucina and Rutherford (2006) describe the Makhado Sweet Thornveld as having slightly to moderately undulating plains generally sloping to the north, with some hills towards the south-west. This vegetation type is generally described as short and shrubby bushveld with a poorly developed grass layer.

4.1.7.2 Ground-truthed vegetation characteristics

Overall, the habitat within the focus area ranged from well-vegetated areas to transformed areas in which indigenous vegetation1 was scarce. The biodiversity of the focus area can thus be defined under five broad habitat units as described below (Figure 4-5). These habitat units were distinguished based on species composition, vegetation structure, ecological function, physical nature of the environment and habitat condition. The five broad habitat units are discussed in the tables below:

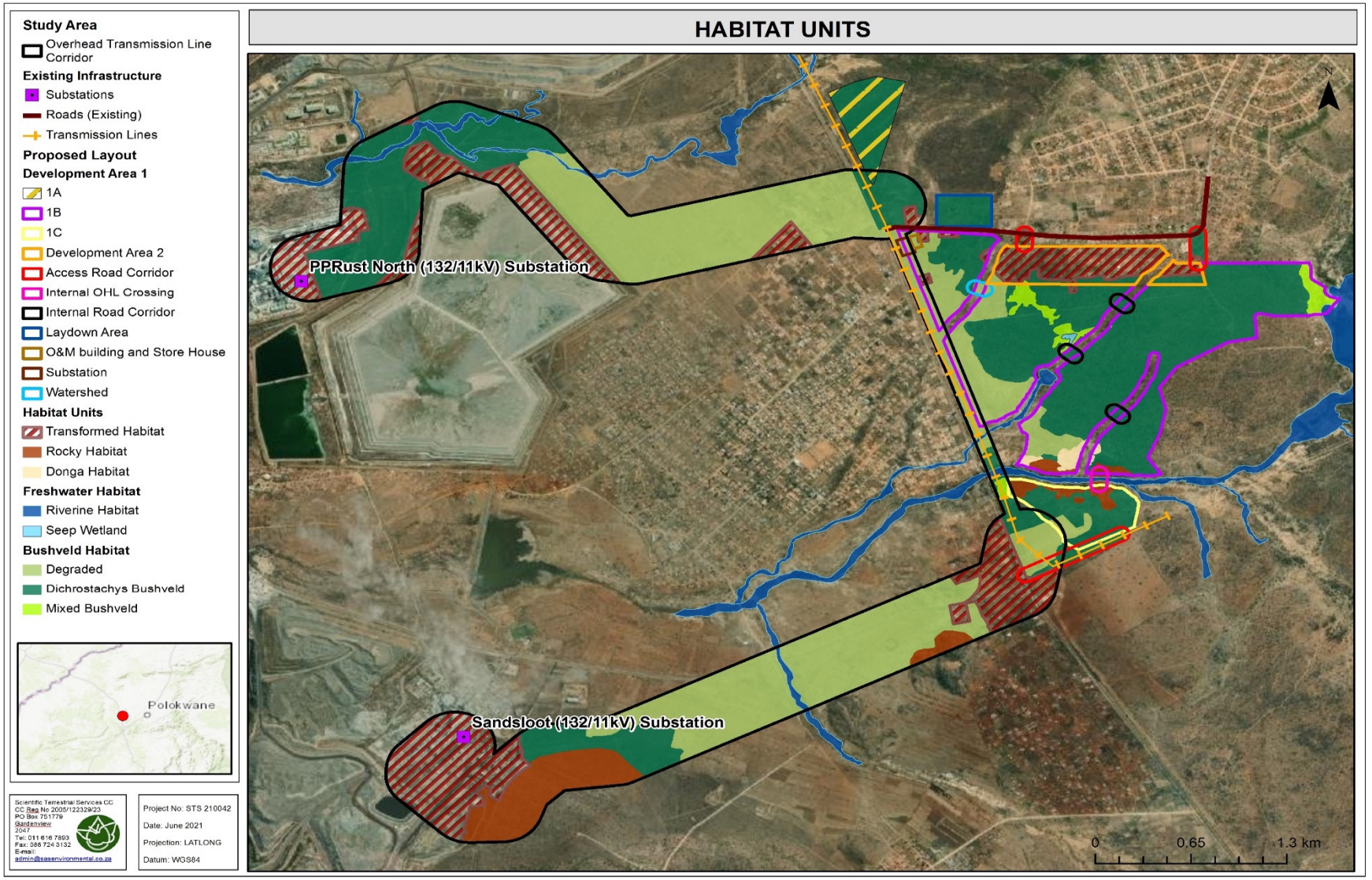


Figure 4-5: Habitat units and associated infrastructure layout within the focus area

Bushveld Habitat:

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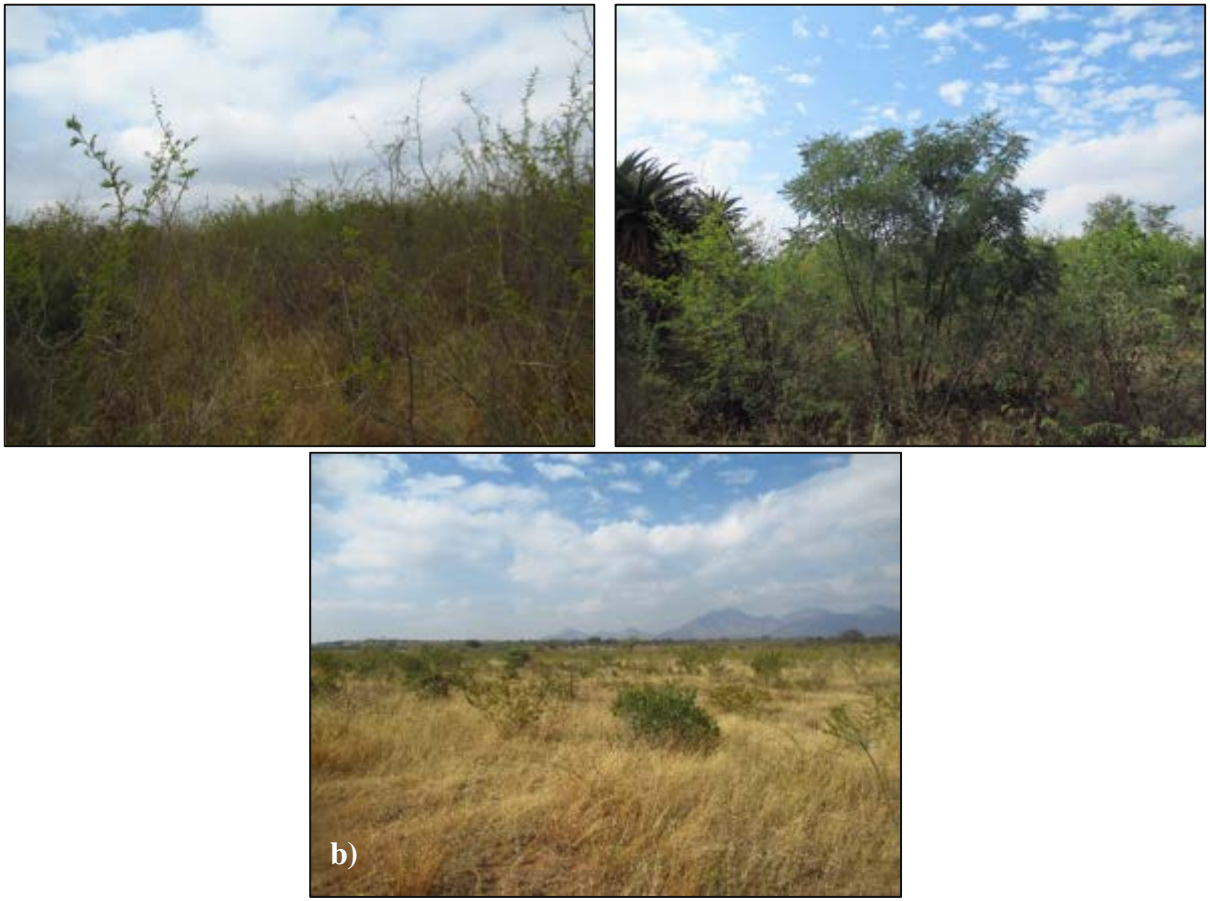

Representative pictures illustrating the subunits of the Bushveld Habitat Unit, namely a) *Dichrostachys* Bushveld, b) Mixed Bushveld, and c) Degraded Bushveld.
***DICHROSTACHYS* BUSHVELD SUBUNIT**
HABITAT OVERVIEW | **SPECIES OVERVIEW**

This habitat subunit comprises the largest extent of the Bushveld Habitat unit and consists of the largest area within the focus area. Indigenous floral species dominate within the habitat subunit, although AIP species were recorded throughout. The subunit is largely encroached, with the major encroaching species being *Dichrostachys cinerea*. Given the anthropogenic influences experienced, e.g., firewood collection, altered fire regimes, historic cultivation, current overutilisation of the focus area for grazing purposes, and the overall encroached nature of the subunit, the *Dichrostachys* Bushveld subunit is no longer considered to be representative of the reference vegetation type, i.e., the Makhado Sweet Thornveld vegetation. Vegetation structure: The vegetation structure can be described as**, closed woodland** (as per Diagram A1 in Appendix A of the floral specialist report, attached in Appendix E of this EIR) that is largely encroached by thorny, woody species, particularly *D. cinerea*. Overall, the habitat unit supported a moderately low to moderate species diversity.	Compositional characteristics of the habitat unit: ➢ Dominant grass species included *Heteropogon contortus, Aristida congesta* subsp. *barbicollisis*, *Panicum maximum*, *Melinis repens*, *Eragrostis rigidior*, *Brachiaria nigropedata*, and *Eragrostis trichophora;* ➢ Representative forb and herb species included *Harpagophytum zeyheri* subsp. *zeyheri, Chamaecrista absus, Leucas sexdentata, Geigeria burkei,* and *Tephrosa* sp. ➢ The woody layer was well represented where *Dichrostachys cinerea* dominated. Other common species included *Senegalia erubescens, Vachellia gerrardii*, *Combretum apiculatum, Ziziphus mucronata* and *Grewia flava;* ➢ Common succulent species recorded included *Aloe marlothii* and *Euphorbia ingens;* and ➢ *AIPs were somewhat prominent within the habitat subunit. Common species recorded included Tagetes minuta, Bidens pilosa, Schkuhria pinnata, Cereus jamacaru*, *Zinnia peruviana, Xanthium strumarium, Opuntia ficus-indica and Agave sisalana* were recorded. Refer to Appendix C of the floral specialist report (attached in Appendix E of this EIR) for a list of species recorded within this Habitat Subunit.
MIXED BUSHVELD SUBUNIT	
HABITAT OVERVIEW	**SPECIES OVERVIEW**
This habitat subunit comprises the smallest extent of the Bushveld Habitat Unit. The overall species richness of this Habitat subunit was higher than that of the *Dichrostachys* and Degraded Bushveld subunits and supported a moderate species richness. Floral species mainly comprised of indigenous floral species; however, occasional AIP species are evident within the subunit. This subunit is utilised for grazing purposes and is currently overgrazed in several areas. Although not representative of the reference vegetation type, this subunit does share a slight affinity in terms of species composition with the Makhado Sweet Thornveld	Compositional characteristics of the subunit: ➢ Dominant grass species identified within the subunit included *Aristida congesta* subsp. *congesta*, *Brachiaria nigropedata, Digitaria eriantha, Eragrostis rigidior*, *Heteropogon contortus, Panicum maximum, Themeda triandra* and *Urochloa mosambicensis;* ➢ Representative forb, and herb species included *Abutilon angulatum* subsp. *angulatum, Harpagophytum zeyheri* subsp. *zeyheri, Indigophera*

vegetation. However, given the level of anthropogenic influence (e.g., firewood collection and altered fire regimes and grazing pressures from domestic animals), the subunit is not considered to be fully representative of the reference vegetation types in the relative corresponding areas. Vegetation structure: The vegetation structure can be described as **open to closed woodland** (as per Diagram A1 in Appendix A of the floral specialist report, attached in Appendix E of this EIR) that is dominated by a mix of both thorny and broad-leaf woody species.	*sp., Zornia glochidiata, Senna italica* subsp. *arachioides* and *Kyphocarpa angustifolia;* ➢ The woody layer was well represented by a mix of thorny species (e.g., *Dichrostachys cinerea, Vachellia karroo, Vachellia permixta*, and *Ormocarpum trichocarpum*) and broad-leaf woody species (e.g., *Searsia lancea, Combretum molle, Combretum zeyheri, Terminalia sericea, Vangauria infausta, Grewia flavescens* and *Grewia flava);* ➢ Common succulent species recorded included *Sansevieria aethiopica, Kalanchoe thyrsiflora* and *Aloe marlothii;* and ➢ *AIPs were not prominent within the habitat subunit, although occasional individuals of Tagetes minuta, Bidens pilosa, Zinnia peruviana, Opuntia ficus-indica and Agave sisalana* were recorded. ➢ Refer to **Appendix C** of the floral specialist report, attached in Appendix E of this EIR for a list of species recorded within this Habitat Subunit.
DEGRADED BUSHVELD SUBUNIT	
HABITAT OVERVIEW	**SPECIES OVERVIEW**
This habitat subunit comprised the second largest extent of the Bushveld Habitat Unit and supported a low diversity of floral species. This subunit is largely degraded in nature and has historically been subjected to severe edge effects, including dumping, soil disturbance (attributed to vegetation clearing and excavation activities), severe historic and current grazing pressures, AIP infestation, firewood collection, and frequent fires. This subunit is characterised have a high abundance of weedy, pioneer species, most of which being either alien and invasive plants (AIPs) or species that thrive within disturbed conditions. The high levels of anthropogenic influence experienced within this subunit, e.g., firewood collection, altered fire regimes, historic cultivation, current overutilisation of the focus area for grazing purposes, and the overall encroached nature of the subunit, has resulted in a vegetation community that is no longer considered to be representative of the reference vegetation type, i.e., the Makhado Sweet Thornveld vegetation.	Compositional characteristics of the habitat unit: ➢ Dominant grass species included *Heteropogon contortus, Digitaria eriantha*, *Panicum maximum*, *Brachiaria nigropedata*, *Aristida stipitata*, *Tragus berteronianus* and *Melinis repens;* ➢ Representative forb and herb species included *Laggera decurrens, Dicoma tomentosa, Zornia glochidiala, Vernonia* sp., *Dicerocaryum senecioides* and *Senna italica* subsp. *arachioides;* ➢ The woody layer was largely scattered and open. Common woody species recorded within this subunit included *Dichrostachys cinerea* (fairly dominant), *Terminalia sericea, Mundelea sericea, Vachellia permixta* and *Euclea undulata;* ➢ Common succulent species recorded included *Aloe marlothii* and *Aloe cf. ammophila;* and

Vegetation structure: The vegetation structure can be described as **sparse to open woodland** (as per Diagram A1 in Appendix A of the floral specialist report, attached in Appendix E of this EIR) that is largely degraded in nature. *D. cinerea* is a common woody species recorded within this subunit. Although dominant, D. cinerea is not as prolific as in the *Dichrostachys* Bushveld subunit, rather forming open stands throughout this subunit. Overall, the habitat unit supported a species diversity.	➢ *AIPs were prominent within the habitat subunit. Common species recorded included Tagetes minuta, Bidens pilosa, Zinnia peruviana, Schkuhria pinnata, Cereus jamacaru, Xanthium strumarium, Opuntia ficus-indica and Agave sisalana* were recorded. Refer to **Appendix C** of the floral specialist report, attached in Appendix E of this EIR for a list of species recorded within this Habitat Subunit.
Species of Conservation Concern and Presence of Unique Landscapes (CBAs, ESAs, Protected Areas, Indigenous Forest, etc)	
Presence of Unique Landscapes	This habitat Unit is situated within **ESA1**[12] and **ESA2** habitat. Although the *Dichrostachys* Bushveld and the Degraded Bushveld subunits have been degraded and encroached in nature, they still have the propensity to support ecological processes (e.g., dispersal and connective corridors). The subunits were located within the following ESA Habitat: • The *Dichrostaychs* Bushveld subunit is located within both ESA1 and ESA2 habitat; • The Mixed Bushveld subunit is located within ESA1 habitat; and • The Degraded Bushveld subunit is located within both ESA1 and ESA2 habitat. The Limpopo Department of Economic Development, Environment & Tourism (LEDET) has specific land-use guidelines set out for terrestrial biodiversity areas which are likely to affect the proposed development based on the following land management recommendations: areas identified as **ESA1** and **ESA2** should have their current land-use maintained. Intensification of the current land-use which may result in additional impact on ecological processes should be avoided. The overall degraded and altered nature of the *Dichrostachys* Bushveld and Degraded Bushveld subunits has resulted in little unique habitat being provided by these subunits. However, the Mixed Bushveld subunit does provide more unique habitat for floral species as it is currently less degraded than the remaining Bushveld subunits. As such, the propensity of the Mixed Bushveld subunit to provide more unique habitat within the focus area, as well as the surrounding area, is higher than the *Dichrostahys* and Degraded Bushveld subunits.
Species of Conservation Concern	No threatened floral SCC were recorded on site during the June 2021 field assessment. In terms of Section 56 of the National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA), threatened species are Red Data Listed (RDL) species falling into the Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Protected (P) categories of ecological status.

[12] ESA1 = Natural areas not identified as CBA which are important for supporting ecological processes; and
ESA2 = Non-natural areas still important for supporting ecological processes.

The National Web-based Environmental Screening Tool indicated that the focus area is in an area of **Low Sensitivity** from a Plant Species Theme perspective. As such, no SCC were expected to be associated with this habitat unit according to the screening tool.

The Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003) (LEMA) provides a list of Specially Protected Species (Schedule 11) and Protected Species (Schedule 12) for the Limpopo Province. These species were also considered as part of the SCC assessment for the focus area because they are considered important provincially. Provincially protected species recorded and the Probability of Occurrence (POC) calculations for LEMA protected species are presented below for each of the Habitat Subunits:

- *Dichrostachys* Bushveld:
  - ***Huernia* cf. *zebrina* subsp. *magnifolia* (POC = Confirmed; Status = LC);**
  - *Boscia foetida* subsp. *minima* (POC = Medium; Status = LC); and
  - *Spirostachys africana* (POC = Medium; Status = LC).
- Mixed Bushveld:
  - ***Huernia* cf. *zebrina* subsp. *magniflora* (POC = Confirmed, Status = LC);**
  - *Boscia foetida* subsp. *minima* (POC = Medium; Status = LC);
  - *Stapelia gigantea* (POC = Medium, Status = LC);
  - *Scadoxus puniceus* (POC = Medium, Status = LC); and
  - *Spirostachys africana* (POC = Medium; Status = LC).
- Degraded Bushveld:
  - *Boscia foetida* subsp. *minima* (POC = Medium; Status = LC);
  - *Spirostachys africana* (POC = Medium; Status = LC).

Additionally, several protected tree species, as per the National Forest Act, 1998 (Act No. 84 of 1998) (NFA), were included in the SCC assessment and several species were observed within the Habitat unit. The POC calculations for these species are presented below the habitat subunits:

- *Dichrostachys* Bushveld:
  - ***Sclerocarya birrea* subsp. *caffra* (POC = Confirmed; Status = LC);**
  - ***Boscia albitrunca* (POC = Confirmed; Status = LC);**
  - ***Combretum imberbe* (POC = Confirmed; Status = LC);**
  - ***Elaeodendron transvaalense* (POC = Confirmed, Status = NT); and**
  - *Vachellia erioloba* (POC = Confirmed; Status = LC).
- Mixed Bushveld:
  - ***Sclerocarya birrea* subsp. *caffra* (POC = Confirmed; Status = LC);**

	- ***Elaeodendron transvaalense*** **(POC = Confirmed, Status = NT);** - ***Vachellia erioloba*** **(POC = Confirmed; Status = LC); and** - *Boscia albitrunca* (POC = High; Status = LC). ➢ Degraded Bushveld: - ***Sclerocarya birrea*** **subsp. *caffra* (POC = Confirmed; Status = LC); and** - ***Boscia albitrunca*** **(POC = Confirmed; Status = LC);** The Threatened or Protected Species (TOPS) List as per the 2007 Regulations provides a list of protected species for the Limpopo Province. Suitable habitat was identified for the following species within the focus area: ➢ *Dichrostachys* & Mixed Bushveld subunits: - ***Harpagophytum zeyheri*** **subsp*. zeyheri* (POC = Confirmed; Status = LC).** ➢ Degraded Bushveld: - *Harpagophytum zeyheri* subsp*. zeyheri* (POC = Medium; Status = LC). Permits from the LEDET and authorisation from the Department of Forestry, Fisheries, and the Environment (DFFE) should be obtained to remove, cut, or destroy any of the above-mentioned protected and/or threatened species before any vegetation clearing may take place.
Reference photos of flora within this habitat unit	



Top, from left to right: *Sansevevieria aethiopica* (recorded in the Dichrostachys Bushveld & Mixed Bushveld Subunits), *Boscia foetida* cf. subsp. filipes, and *Vachellia permixa* (*B. foetida* subsp. *filipes* and *V. permixa* were well represented species within the Bushveld Habitat Unit).



Bottom, from left to right*: Terminalia sericea* (a commonly recorded species within the Mixed Bushveld & Degraded Bushveld Subunits)*; Kalanchoe thyrsiflora* (species recorded within the Mixed Bushveld)*; Aloe Marlothii* (a common succulent species occasionally recorded throughout the Bushveld Habitat Unit).

In conclusion, the Mixed Bushveld subunit is moderately important from a floral ecological importance and resource management perspective. The remaining subunits, including the *Dichrostachys* Bushveld and Degraded Habitat subunits are of a moderately low importance form a floral ecological perspective.

Key considerations:

- The reference vegetation type, as per Mucina & Rutherford (2006), included the **Makhado Sweet Bushveld.** Given the i) encroached and overgrazed state of the *Dichrostachys* Bushveld habitat subunit and ii) the modified and disturbed nature of the Degraded Bushveld subunit, these subunits are no longer considered representative of the reference vegetation type. The remaining area within the Bushveld Habitat Unit, namely the Mixed Bushveld subunit, although not fully representative, does share an affinity with the reference vegetation type in terms of species composition. However, given the degree of altered fire regimes and heavy grazing pressure that exists throughout this subunit, it is not considered to be fully representative of the reference vegetation type, although it is currently in an overall moderate ecological state. Fire and herbivory are considered important ecological drivers of savanna systems (O'Connor et al. 2014). Compositional and structural changes to floral communities are often associated with altered fire and herbivory regimes. Given that herbivory and fire within the focus area are often anthropogenically altered, the associated composition within the Bushveld Habitat unit may subsequently change in response to the altered fire and herbivory regimes.
- Overall, the Bushveld Habitat Unit provides suitable habitat to sustain viable populations of several floral SCC. Provincially protected (i.e., LEMA) and nationally protected (i.e., NFA) species are anticipated to be found within the Bushveld Habitat Unit. However, threatened RDL species are less likely to be anticipated within the Habitat Unit. If the proposed PV Plant is authorised, all floral SCC that were marked during the field investigation should be relocated to suitable habitat outside the direct footprint (as far as is feasible). Good record-keeping will be necessary to record this process and to document all successes and failures associated with the relocation.
- In terms of the National Web-based Environmental Screening Tool outcome, the Bushveld Habitat Unit matches the areas deemed as low Sensitivity assigned to the Plant Species Theme. Given the location of this Bushveld Habitat within areas identified as "ESA1" and "ESA2", the High Sensitivity assigned to the Terrestrial Biodiversity Theme by the screening tool can be confirmed.

Due to the area already being exposed to disturbances and edge effect impacts from neighbouring settlements and subsistence farming practices, this habitat unit is susceptible to bush encroachment and AIP proliferation. Care must be taken to limit edge effects on the surrounding natural areas. Furthermore, it is recommended that a bush encroachment and AIP species management plan be developed to manage both the proliferation of bush encroachment and AIPs within the habitat unit as a whole.

Freshwater Habitat Unit

REFERENCE PHOTOS	
 a)	 b)
Representative pictures illustrating the habitat associated with a) the Seep Wetland Subunit and b) the Riverine Habitat Subunit.	
SEEP WETLAND SUBUNIT OVERVIEW	
HABITAT OVERVIEW	SPECIES OVERVIEW

The Seep Wetland Habitat subunit is located within the central section of the focus area. The overall species richness of this Habitat Unit was moderate. Floral species mainly comprised of indigenous floral species, although occasional AIP species are evident within the subunit. This habitat unit has been somewhat impacted by edge effects (particularly from grazing pressure and AIP infestation); however, the habitat is still in an overall moderate ecological condition. Vegetation structure: The Seep Wetland Habitat supported a well-structured graminoid layer and comprised of occasional AIP and weedy herbaceous species. The Seep Wetland Habitat can be described as **moist**, **short to tall, open grassland** (as per Diagram A1 in Appendix A of the floral specialist report, attached in Appendix E of this EIR).	Compositional characteristics of the subunit: ➢ Dominant graminoid species identified within the habitat unit included *Sporobolus africanus, Schizachyrium jeffreysii*, *Eragrostis lehmanniana*, *Cyperus laevigatus* and *Cyperus sexangularis;* ➢ The woody layer was largely absent although occasional individuals of *Ziziphus mucronata* and *Seasrisa lancea* were recorded; and ➢ *AIPs were not prominent within the habitat unit*. Examples of species occasionally recorded within the subunit included *Tagetes minuta, Bidens pilosa, Xanthium strumarium* and *Schkuhria pinnata*. Refer to **Appendix C** of the floral specialist report, attached in Appendix E of this EIR for a list of species recorded within this Habitat Subunit.
RIPARIAN SUBUNIT OVERVIEW	
HABITAT OVERVIEW	**SPECIES OVERVIEW**
This habitat subunit comprised the largest extent of the Freshwater Habitat. The floral community was weakly to strongly riparian[13] in nature (as the species composition and structure varied from the surrounding Bushveld areas). The rockier nature and presence of seasonal water flow within the neighbouring drainage lines provide habitat for a higher diversity of floral species which results in a community composition that is different from the surrounding habitat. Overall, species richness within this habitat subunit was moderately high. Vegetation structure: The vegetation structure can be described as **closed woodland** (as per Diagram A1 in Appendix A of the floral specialist report, attached in Appendix E of this EIR) that supported a moderately high species richness.	Compositional characteristics of the subunit: ➢ Dominant graminoid species identified within the habitat unit included *Triraphis andropogonoides, Chloris virgata, Phragmites australis, Melinis repens*, *Bothriochloa insculpta*, *Eragrostis lehmanniana*, *Fingerhuthia africana* and *Sporobolus africanus;* ➢ The woody layer was well structured and common species recorded within the subunit included *Tarchonanthus camphoratus, Olea europaea* subsp. *africana, Dodonaea viscosa, Ziziphus mucronata* and *Seasrisa lancea*; and

[13] "**riparian habitat**" (as per the National Water Act, 1998 (Act No. 36 of 1998) includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.

	➢ *AIPs were not prominent within the habitat unit*. Examples of species occasionally recorded within the subunit included *Tagetes minuta, Bidens pilosa,* and *Xanthium strumarium*. Refer to **Appendix C** of the floral specialist report, attached in Appendix E of this EIR for a list of species recorded within this Habitat Subunit.
Species of Conservation Concern and Presence of Unique Landscapes (CBAs, ESAs, Protected Areas, Indigenous Forest, etc.)	
Presence of Unique Landscapes	This habitat Unit (including both subunits) is situated within **ESA1** habitat. The Freshwater Habitat has the propensity to support ecological processes (e.g., dispersal and connective corridors) within the ecosystem and thus the presence of ESA habitat within the Freshwater Habitat can be confirmed. The Limpopo *Department* of Economic. Development, Environment & Tourism (LEDET) has specific land-use guidelines set out for terrestrial biodiversity areas which are likely to affect the proposed development based on the following land management recommendations: areas identified as **ESA1** and **ESA2** should have their current land-use maintained. Intensification of the current land-use which may result in additional impact on ecological processes should be avoided. Both the Seep Wetland and the Riverine Habitat Subunits are considered unique within the greater landscape as they provide movement and dispersal corridors for both fauna and flora. Overall, the Freshwater Habitat Unit provides habitat for species that favour wetter conditions and thus provides habitat for a different set of species than that supported by the surrounding Habitat Units. Furthermore, this habitat, particularly the Riverine Habitat, potentially provides corridors to connect to other sensitive habitat (i.e., freshwater habitat) outside of the focus area.

Species of Conservation Concern	No threatened floral SCC were recorded on site during the May 2021 field assessment. The National Web based Environmental Screening Tool indicated that the focus area to of **Low Sensitivity** from a Plant Species Theme perspective. As such, no RDL species are expected to be associated with this habitat unit. No RDL were identified within the habitat unit and none are likely to be identified within the habitat unit given the overall impacted nature of the area (specifically from edge effects associated with the nearby mine and AIP infestation). Suitable habitat to support a LEMA protected species is available within this Habitat Unit. In particular, the following species have a possibility of being recorded within each of the habitat subunits: ➢ Seep Wetland: - *Spirostachys africana* (POC = Medium; Status = LC). ➢ Riverine Habitat: - *Boscia foetida* subsp. *minima* (POC = Medium; Status = LC); - *Scadoxus puniceus* (POC = Medium, Status = LC); and - *Spirostachys africana* (POC = Medium; Status = LC). Suitable habitat to support a NFA protected species is available within this Habitat Unit. In particular, the following species were recorded or have a possibility of being recorded within the Freshwater Habitat subunits: ➢ Riverine Habitat: - ***Elaeodendron transvaalense* (POC = Confirmed, Status = NT); and** - *Pittosporum viridiflorum* (POC = High; Status = LC). No suitable habitat to support floral SCC as per the TOPS List was identified within the Habitat Unit. If SCC were to be encountered within the Habitat Unit, then permits from the LEDET and authorisation from the DFFE should be obtained to remove, cut, or destroy any of the above-mentioned protected and/or threatened species before any vegetation clearing may take place.
Some reference photos of flora within this habitat unit	



Top: From left to right: *Tarchonanthus camphoratus* (a common woody species recorded within the Riverine Habitat), *Cyperus rupestris* (dominant graminoid species recorded within the Seep Wetland Habitat Unit), *Elaeodendron transvaalense* (NFA protected tree recorded within the Riverine Habitat).


From left to right: *Carissa bispinosa* (woody species recorded within the Riverine Habitat subunit), *Xanthiuim strumarium* (a common AIP (NEMBA Category 1b[14]) recorded within the Riverine Habitat subunit).

[14] **1a: Category 1a –** Invasive species that require compulsory control.

1b: Category 1b – Invasive species that require control by means of an invasive species management programme.

2: Category 2 – Commercially used plants that may be grown in demarcated areas if there is a permit and that steps are taken to prevent their spread.

3: Category 3 – Ornamentally used plants that may no longer be planted; existing plants may remain, except within the flood line of watercourses and wetlands, if all reasonable steps are taken to prevent their spread (Bromilow, 2001).

In conclusion, this habitat unit is considered important from a floral ecological and resource management perspective.

- This Habitat Unit is unique within the focus area and within the greater surrounding areas. Edge effects, including dumping impacts from the nearby settlements as well as impacts from grazing, have occurred within the Habitat Unit. Despite this, the Habitat Unit is in an overall moderate ecological condition. The Habitat Unit is unlikely to support RDL species or SCC as per the TOPS List. However, suitable habitat is available to support NFA and LEMA protected species, namely *Elaeodendron transvaalense, Boscia foetida* subsp. *minima, Scadoxus puniceus* and *Spirostachys africana.*
- In terms of the National Web-based Environmental Screening Tool outcome, the Freshwater Habitat Unit matches the low Sensitivity assigned to the Plant Species Theme. Given the location of this Habitat Unit within "ESAs" the high Sensitivity assigned to the Terrestrial Biodiversity Theme by the screening tool can be confirmed.
- If the proposed PV Plant is authorised, permits will need to be applied for from the relevant authorities for the removal / relocation of all floral SCC that were marked during the field investigation. Good record-keeping will be necessary to record this process and to document all successes and failures associated with the relocation of any SCC.
- Infrastructure layout plans should be designed to minimise impacts to the Freshwater Habitat. It is advised that the Seep Wetland Subunit be excluded from the PV development area. Where Riverine Habitat will be traversed (e.g., within the southern OHL Transmission Corridor and the Internal OHL crossings), appropriate measures should be taken to minimise the impacts on the habitat subunit. Bridges and culverts should be used so to ensure that the (seasonal) flow of water through the nearby drainage lines are not negatively impacted.
- Due to the area already being exposed to disturbances and edge effect impacts from informal housing and subsistence farming practices, this habitat unit is susceptible to AIP proliferation. Care must be taken to limit edge effects on the surrounding natural areas. Furthermore, it is recommended that an AIP species management plan be developed to manage AIP proliferation within the Freshwater Habitat Unit.

Rocky Habitat:

REFERENCE PHOTO/S	
  **Representative pictures illustrating the habitat associated with the Rocky Habitat Unit.**	
HABITAT OVERVIEW	**SPECIES OVERVIEW**
The rocky Habitat is the third smallest habitat Unit within the focus area and is located within areas identified for the southern OHL Transmission Corridor and Development Area 1. The vegetation associated with the Rocky habitat was more diverse than the surrounding habitat units, which can be attributed to the heterogenous environments associated with rocky areas. Although large trees were present, this habitat unit was largely dominated by short to medium sized shrubs. This habitat Unit has been subjected to some anthropogenic influences (especially because of its location near the mine) and associated edge effects including firewood collection and current overutilisation for grazing purposes. Despite the human influences this subunit has	Compositional characteristics of the habitat unit: ➢ Dominant grass species included *Brachiaria nigropedata*, *Heteropogon contortus, Aristida stipitata*, *Aristida congesta* subsp. *barbicollis, Cymbopogon caesius,* and *Fingerhuthia africana* ➢ Representative forb and herb species included *Dicoma tomentosa, Geigeria burkei, Aptosimum lineare, Blepharis subvolubilis* subsp. *subvolubilis,* and *Leonotis nepetifolia* var. *nepetifolia;* ➢ The woody layer, including trees and shrubs, was well represented. Common woody species recorded within this subunit included *Mundelea sericea, Vachellia permixta, Euclea undulata, Diospyros lycoides, Lippia javanica,* and *Petalidium oblongifolium;*

experienced, the habitat is in a relatively good ecological condition, with very few alien species observed. Vegetation structure: The vegetation structure can be defined as **closed to open shrubland** (as per Diagram A1 in Appendix A of the floral specialist report, attached in Appendix E of this EIR)**.** Floral diversity was intermediate to moderately high within this habitat unit.	➢ Common succulent species recorded included *Aloe marlothii* and *Aloe greatheadii;* and ➢ *AIPs were rarely recorded within the habitat unit. Species occasionally recorded included Tagetes minuta, Bidens pilosa,* and *Zinnia peruviana*. Refer to **Appendix C** of the floral specialist report, attached in Appendix E of this EIR for a list of species recorded within this Habitat Subunit.
Species of Conservation Concern and Presence of Unique Landscapes (CBAs, ESAs, Protected Areas, Indigenous Forest, etc)	
Presence of Unique Landscapes	This habitat Unit is situated within **ESA1** habitat: The Limpopo *Department* of Economic. Development, Environment & Tourism (LEDET) has specific land-use guidelines set out for terrestrial biodiversity areas which are likely to affect the proposed development based on the following land management recommendations: areas identified as **ESA1** and **ESA2** should have their current land-use maintained. Intensification of the current land-use which may result in additional impact on ecological processes should be avoided. The Rocky Habitat provides unique habitat for floral species that have an affinity for rocky areas. As such, the propensity of the habitat to provide more unique habitat both within the focus area, as well as the surrounding area, is high.
Species of Conservation Concern	No RDL floral SCC were recorded on site during the June 2021 field assessment. The National Web-based Environmental Screening Tool indicated that the focus area is in an area of **Low Sensitivity** from a Plant Species Theme perspective. As such, no SCC were expected to be associated with this habitat unit according to the screening tool. The LEMA provides a list of Specially Protected Species (Schedule 11) and Protected Species (Schedule 12) for the Limpopo Province. Provincially protected species recorded and the POC calculations for LEMA protected species are presented below for the Habitat Unit: - *Huernia* cf. *zebrina* subsp. *magniflora* (POC = High, Status = LC); - *Stapelia gigantea* (POC = High, Status = LC); - *Orbea carnosa* subsp. *keithii* (POC = High, Status = LC); - *Boscia foetida* subsp. *minima* (POC = Medium; Status = LC); - *Scadoxus puniceus* (POC = Medium, Status = LC); and - *Spirostachys africana* (POC = Medium; Status = LC).

	Additionally, several protected tree species, as per the NFA were observed within the Habitat unit. The POC calculations for these species are presented below the habitat subunits: - ***Sclerocarya birrea* subsp. *caffra* (POC = Confirmed; Status = LC);** - ***Elaeodendron transvaalense* (POC = Confirmed, Status = NT);** - *Erythrophysa transvaalensis* (POC = High; Status = LC); - *Boscia albitrunca* (POC = Medium; Status = LC); and - *Combretum imberbe* (POC = Medium; Status = LC). The Threatened or Protected Species (TOPS) List as per the 2007 Regulations provides a list of protected species for the Limpopo Province. Suitable habitat was identified for the following species within the focus area: - *Harpagophytum zeyheri* subsp. *zeyheri* (POC = High; Status = LC). Permits from the LEDET and authorisation from the DFFE should be obtained to remove, cut, or destroy any of the above-mentioned protected and/or threatened species before any vegetation clearing may take place.
Reference photos of flora within this habitat subunit	

From left to right: *Petalidium oblongifolium* (a dominant shrub within the Habitat Unit), *Aptosimum lineare* (a common herb within the Habitat unit), and *Vachellia permixa* (a thorny tree recorded within the Habitat Unit).

In conclusion, this habitat unit is important from a floral ecological importance and resource management perspective.

Key considerations:

- This Habitat Unit is unique within the focus area and within the greater surrounding areas. The Habitat Unit has been subjected to edge effects, including firewood collection and current overutilisation for grazing purposes. Despite the human influences this habitat has experienced, it is in a good ecological condition, with very few alien species observed. The Habitat Unit is unlikely to support RDL species. Two NFA protected tree species, namely Sclerocarya birrea subsp. caffra and Elaeodendron transvaalense were recorded within the Habitat Unit. Furthermore, suitable habitat is available to support several other protected species (as per the NFA, TOPS and LEMA), namely Huernia cf. zebrina subsp. magniflora, Stapelia gigantea, Orbea carnosa subsp. keithii, Boscia foetida subsp. minima, Scadoxus puniceus, Spirostachys Africana, Boscia albitrunca and Combretum imberbe.
- In terms of the National Web-based Environmental Screening Tool outcome, the Rocky Habitat Unit matches the low Sensitivity assigned to the Plant Species Theme, especially as the propensity of the Habitat Unit to support RDL species is low. Given the location of this Habitat Unit within “ESAs” the high Sensitivity assigned to the Terrestrial Biodiversity Theme by the screening tool can be confirmed.
- It is advised that infrastructure placement within the Development area 1 and the proposed southern OHL Transmission Corridor be designed to avoid the Rocky Habitat as far as is possible. Layouts can be designed to effectively exclude the Rocky Habitat by placing infrastructure i) out of the Rocky Habitat within Development Area 1 and ii) closer to the existing roads thereby minimising the impacts on the associated habitat.
- If the proposed PV Plant is authorised, all floral SCC that were marked during the field investigation should be relocated to suitable habitat outside the direct footprint (as far as is feasible). Good record-keeping will be necessary to record this process and to document all successes and failures associated with the relocation.
- Due to the area already being exposed to disturbances and edge effect impacts from both the neighbouring settlements as well as the mine, this habitat unit is susceptible to AIP proliferation. Care must be taken to limit edge effects on the surrounding natural areas. Furthermore, it is recommended that an AIP species management plan be developed to manage AIP proliferation within the Habitat Unit and surrounding areas.

Donga Habitat:

REFERENCE PHOTO/S	
 **Representative pictures illustrating the habitat and the somewhat stony nature of the soil associated with the Donga Habitat Unit.**	
HABITAT OVERVIEW	**SPECIES OVERVIEW**
The Donga Habitat is the second smallest habitat unit within the focus area. This habitat unit was characterised by steep-sided erosion gulley's that have formed within the landscape. This habitat, which consisted of lose, sandy, somewhat stony soils that are prone to erosion due to the biophysical nature thereof. Overall, vegetation cover within this habitat is scarce. Species diversity was moderately low, with indigenous species being most dominant and AIP species only occasionally observed. Vegetation structure: The vegetation structure can be defined **sparse shrubland** (as per Figure A1 in Appendix A of the floral specialist report, attached in Appendix E of this EIR)**.** Floral diversity was low within this habitat unit.	Compositional characteristics of the habitat: ➢ Dominant grass species included *Aristida congesta* subsp. *congesta, Eragrostis rigidior, Aristida stipitata and Fingerhuthia africana* ➢ Forb and herb species were uncommon. Representative species included included *Geigeria burkei, Blepharis subvolubilis* subsp. *subvolubilis,* and *Dicerocaryum senecioides;* ➢ The woody layer, including trees and shrubs, was sparse. Common woody species recorded within this subunit included *Dodonaea viscosa, Carissa bispinosa, Euclea undulata, Diospyros lycoides* and *Eleaodendron transvaalense;* ➢ *AIPs were rarely recorded within the habitat unit. Species occasionally recorded included Tagetes minuta* and *Bidens pilosa*. Refer to **Appendix C** of the floral specialist report, attached in Appendix E of this EIR for a list of species recorded within this Habitat Unit.

Species of Conservation Concern and Presence of Unique Landscapes (CBAs, ESAs, Protected Areas, Indigenous Forest, etc)	
Presence of Unique Landscapes	This Habitat Unit is situated within **ESA1** habitat: The Limpopo *Department* of Economic. Development, Environment & Tourism (LEDET) has specific land-use guidelines set out for terrestrial biodiversity areas which are likely to affect the proposed development based on the following land management recommendations: areas identified as **ESA1** and **ESA2** should have their current land-use maintained. Intensification of the current land-use which may result in additional impact on ecological processes should be avoided. The Donga Habitat provides unique habitat for floral species that have an affinity for lose sandy soils, that seasonally experience increased moisture levels and can withstand increased levels of erosion.
Species of Conservation Concern	No RDL floral SCC were recorded on site during the June 2021 field assessment. The National Web-based Environmental Screening Tool indicated that the focus area is in an area of **Low Sensitivity** from a Plant Species Theme perspective. As such, no SCC were expected to be associated with this habitat unit according to the screening tool. The LEMA provides a list of Specially Protected Species (Schedule 11) and Protected Species (Schedule 12) for the Limpopo Province. Provincially protected species recorded and the POC calculations for LEMA protected species are presented below for the Habitat Unit: - ***Huernia* cf. *zebrina* subsp. *magniflora* (POC = Confirmed, Status = LC);** - *Stapelia gigantea* (POC = Medium, Status = LC); - *Orbea carnosa* subsp. *keithii* (POC = Medium, Status = LC); - *Boscia foetida* subsp. *minima* (POC = Medium; Status = LC); and - *Spirostachys africana* (POC = Medium; Status = LC). Additionally, several protected tree species, as per the NFA were observed within the Habitat unit. The POC calculations for these species are presented below the habitat subunits: - ***Elaeodendron transvaalense* (POC = Confirmed, Status = NT); and** - *Boscia albitrunca* (POC = Medium; Status = LC). The Threatened or Protected Species (TOPS) List as per the 2007 Regulations provides a list of protected species for the Limpopo Province. Suitable habitat was identified for the following species within the focus area: - *Harpagophytum zeyheri* subsp. *zeyheri* (POC = High; Status = LC).

	Permits from the LEDET and authorisation from the DFFE should be obtained to remove, cut, or destroy any of the above-mentioned protected and/or threatened species before any vegetation clearing may take place.
Reference photos of flora within this habitat subunit	

From left to right: *Huernia* cf. *zebrina* subsp. *magniflora* (a LEMA protected species recorded within the Habitat Unit), *Eleaodendron transvaalense* (a NFA protected tree recorded within the Habitat Unit), and *Carissa bispinosa* (woody species occasionally recorded within the Donga Habitat Unit).

This habitat unit is considered to be of moderately low importance from a floral ecological importance and resource management perspective.

Key considerations:

- This Habitat Unit is somewhat unique within the focus area and within the greater surrounding areas. The Habitat Unit has been subjected to edge effects, including AIP establishment and current overutilisation for grazing purposes. Despite the human influences this habitat has experienced, it is in a moderate ecological condition, with very few alien species observed. The Habitat Unit is unlikely to support RDL species. One NFA protected tree species, namely Elaeodendron transvaalense and one LEMA protected species, namely Huernia cf. zebrina subsp. magniflora were recorded within the Habitat Unit. Furthermore, suitable habitat is available to support several other protected species (as per the NFA, TOPS and LEMA), namely Stapelia gigantea, Orbea carnosa subsp. keithii, Boscia foetida subsp. minima, Spirostachys africana and Boscia albitrunca.
- In terms of the National Web-based Environmental Screening Tool outcome, the focus area was assigned a low Sensitivity for the Plant Species Theme. The low species diversity recorded within this habitat unit confirms the sensitivity predicted by the screening tool. Given the location of this Habitat Unit within “ESAs” the high Sensitivity assigned to the Terrestrial Biodiversity Theme by the screening tool can be confirmed.
- If the proposed PV Plant is authorised, all floral SCC that were marked during the field investigation should be relocated to suitable habitat outside the direct footprint (as far as is feasible). Good record-keeping will be necessary to record this process and to document all successes and failures associated with the relocation.
- Due to the area already being exposed to disturbances and edge effect impacts from both the neighbouring settlements and grazing pressures, as well as the lose soils that are easily disturbed, this habitat unit is susceptible to increased erosion and potential AIP proliferation. Care must be taken to limit edge effects on the surrounding natural areas.

Transformed Habitat:

REFERENCE PHOTO/S	
  **Representative pictures illustrating the habitat associated with the Transformed Habitat Unit.**	
HABITAT OVERVIEW	**SPECIES OVERVIEW**
This habitat unit includes areas associated with the surrounding settlements (e.g., infrastructure associated with houses and buildings), and associated mining development within the focus area. Due to anthropogenic activities this habitat unit has an altered physical environment. Vegetation composition is largely associated with species that favour disturbed habitats. Vegetation structure: The vegetation structure can be defined as **transformed habitat in which no specific vegetation structure was evident.** Floral diversity was moderately low to low throughout the habitat unit.	Compositional characteristics of the habitat: ➢ Dominant grass species included *Melinis repens, Heteropogon contortus, Panicum maximum* and *Digitaria eriantha*; ➢ Forb and herb species were uncommon. Representative species included *Dicoma tomentosa, Senna italica* subsp*. arachoides, Gomphocarpus fruticosus* and *Dicerocaryum senecioides;* ➢ Common woody species recorded within this subunit included *Asparagus laricinus, Combretum apiculatum, Dichrostachys cinerea* and *Psiadia punctulata;* ➢ *AIPs were prominent within this habitat unit. Species recorded included Schkuhria pinnata, Xanthium strumarium, Opuntia ficus-indica, Tagetes minuta and Bidens Pilosa.* Refer to **Appendix C** of the floral specialist report, attached in Appendix E of this EIR for a list of species recorded within this Habitat Unit.
Species of Conservation Concern and Presence of Unique Landscapes (CBAs, ESAs, Protected Areas, Indigenous Forest, etc)	
Presence of Unique Landscapes	None. The floral communities are indicative of acutely disturbed habitat.

Species of Conservation Concern	No RDL floral SCC or protected species as per the LEMA or the TOPS List were recorded within this Habitat Unit during the June 2021 field assessment. The National Web-based Environmental Screening Tool indicated that the focus area is in an area of **Low Sensitivity** from a Plant Species Theme perspective. As such, no SCC were expected to be associated with this habitat unit according to the screening tool. A NFA protected tree was observed within the Habitat unit. - ***Sclerocarya birrea* subsp. *caffra* (POC = Confirmed, Status = LC).** Permits from the LEDET and authorisation from the DFFE should be obtained to remove, cut, or destroy any of the above-mentioned protected and/or threatened species before any vegetation clearing may take place. Refer to **Appendix B** of the floral specialist report, attached in Appendix E of this EIR for the complete floral SCC assessment results.
Reference photos of flora within this habitat subunit	
  From left to right: *Opuntia ficus-indica* (a NEMBA Category 1b AIP[15]), and *Dichrostachys cinerea* (indigenous species frequently recorded within the Transformed Habitat Unit).	

[15] **NEMBA Category:**

1a: Category 1a – Invasive species that require compulsory control.

1b: Category 1b – Invasive species that require control by means of an invasive species management programme.

2: Category 2 – Commercially used plants that may be grown in demarcated areas if there is a permit and that steps are taken to prevent their spread.

3: Category 3 – Ornamentally used plants that may no longer be planted; existing plants may remain, except within the flood line of watercourses and wetlands, if all reasonable steps are taken to prevent their spread (Bromilow, 2001).

This habitat unit is not considered to be important from a floral ecological importance and resource management perspective.

Key considerations:

- Due to its transformed nature, and associated shift in compositional characteristics of this habitat unit from its original state, the habitat unit is not considered represent the reference vegetation type, namely the Makhado Sweet Bushveld. This Habitat Unit does not provide suitable habitat to sustain viable populations of floral SCC. The proposed development of the PV plant within this habitat unit is unlikely to disrupt any significant ecological processes or impede any ecological corridors (from a purely floral perspective).
- In terms of the National Web-based Environmental Screening Tool outcome, these areas match the Low Sensitivity assigned to the Plant Species Theme. This Habitat Unit was identified within areas identified as “ESA2” and “Other Natural Areas”. The transformed and altered nature of this habitat unit thus does not support the high Sensitivity assigned to the Terrestrial Biodiversity Theme by the screening tool within areas of this habitat unit.
- Due to the area already being exposed to disturbances and edge effect impacts from nearby settlement expansion and mining activities, this habitat unit is susceptible to extensive AIP proliferation. Care must be taken to limit edge effects on the surrounding natural areas. Furthermore, it is recommended that an AIP species management plan be developed to manage AIP proliferation within Transformed Habitat Unit, and the focus area as a whole.

4.1.7.3 Alien and invasive plant species

South Africa has released several Acts legislating the control of alien species. Currently, invasive species are controlled by the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) – Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated 25 September 2020. AIPs defined in terms of NEMBA are assigned a category and listed within the NEMBA List of Alien and Invasive Species (2020) in accordance with Section 70(1)(a) of the NEMBA:

- **Category 1a** species are those targeted for urgent national eradication;
- **Category 1b** species must be controlled as part of a national management programme, and cannot be traded or otherwise allowed to spread;
- **Category 2** species are the same as category 1b species, except that permits can be issued for their usage (e.g., invasive tree species can still be used in commercial forestry, providing a permit is issued that specifies where they may be grown and that permit holders “*Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to Regulation 3*”); and
- **Category 3** are listed invasive species that can be kept without permits, although they may not be traded or further propagated, and must be considered a Category 1b species if they occur in riparian zones.

A total of 16 species were recorded within the focus area. Of the 10 AIPs recorded during the field assessment, eight species are listed under NEMBA Category 1b, one is listed under NENBA Category 2 and one species was listed under NEMBA Category 3. The remaining six species are not listed under NEMBA. However, these species, namely *Bidens pilosa, Zinnia*

peruviana, Tagetes minuta, *Hibiscus trionum*, *Schkuhria pinnata* and *Euphorbia heterophylla* are considered problem plants[16] and are deemed to have a negative impact on indigenous floral communities within the focus area.

Due to the extent of AIPs within the focus area, it is highly recommended that the Alien and Invasive Species Control and Management Plan in place is regularly updated to reflect the new AIP regulations[17] and AIP species lists[18] and implemented to ensure the further loss of indigenous floral communities do not occur.

4.1.7.4 Floral sensitivity

The National Web-Based Online Screening Tool identified the focus area to be in a low sensitivity area for the Plant Species Theme. The Terrestrial Biodiversity Theme was identified as having a high sensitivity. Figure 4-6 conceptually illustrates the areas considered to be of varying ecological sensitivity and how they will be impacted by the proposed infrastructure development. The areas are depicted according to their sensitivity in terms of the presence or potential for floral SCC, habitat integrity and levels of disturbance, threat status of the habitat type, the presence of unique landscapes and overall levels of diversity).

16 A problem plant is any plant, shrub or tree which has a negative environmental impact in a particular locality and result in the subsequent loss of biodiversity, and (potential) excessive water consumption. These species, which can be native, have not been listed or classified as alien or invasive plants by the current South African. *The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA).*

17 Government Notice (GN) number R.1020: Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated September 2020 as it relates to the NEMBA.

18 GN number 1003: Legislation to come into force on the 1st of June 2021: Government Notice number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 September 2020, as it relates to the NEMBA.

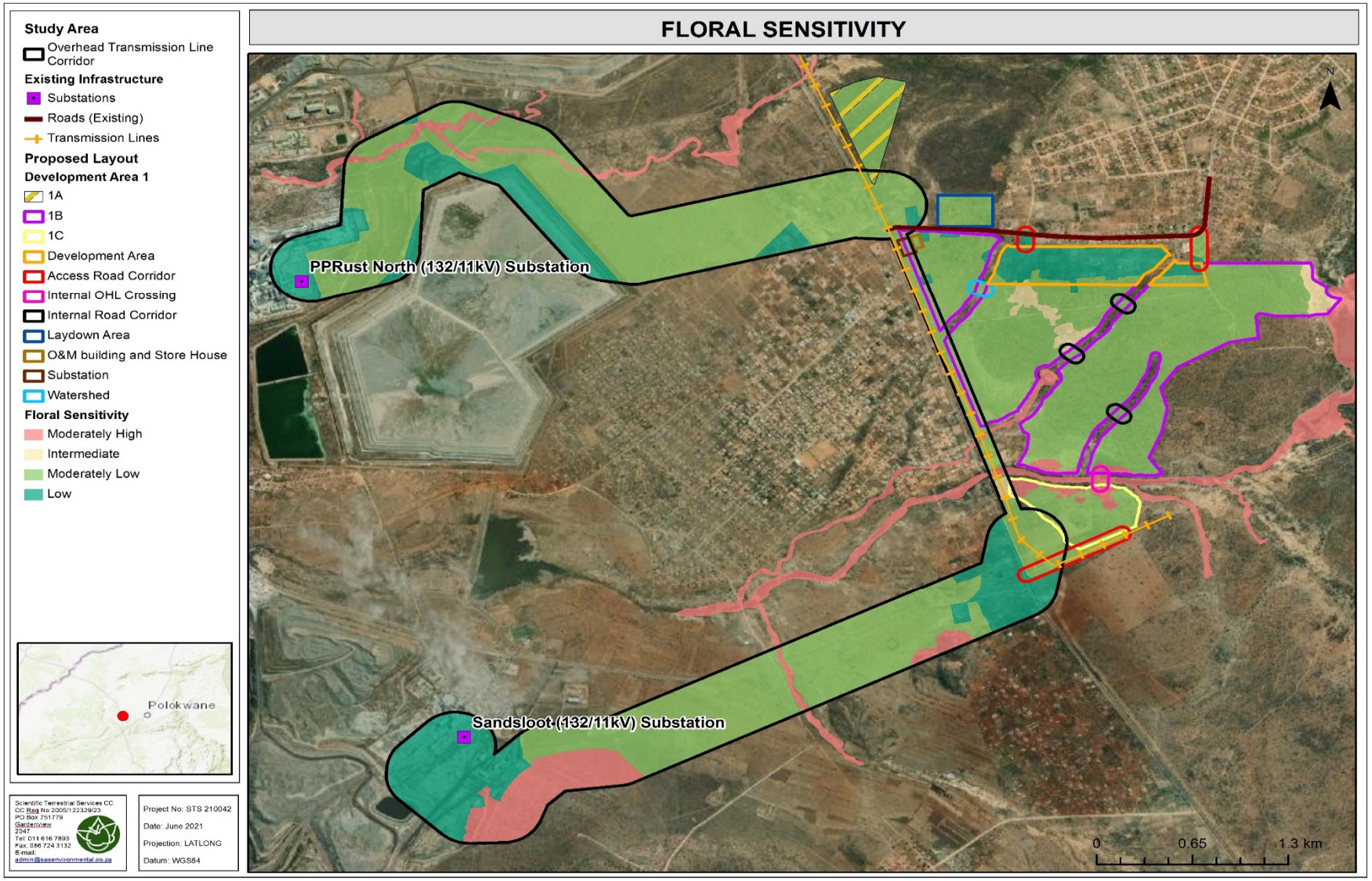


Figure 4-6: Habitat sensitivity associated with focus area as identified during the field assessment

4.1.8 Faunal Environment

A faunal assessment was conducted to determine the faunal ecological status of the focus area. A reconnaissance 'walkabout' was initially undertaken to determine the general habitat types found throughout the focus area, following this, specific study sites were selected that were considered to be representative of the habitats found within the focus area, with special emphasis being placed on areas that may potentially support faunal SCC. Sites were investigated on foot in order to identify the occurrence of fauna within the focus area. Camera traps were used to increase the likelihood of capturing and observing mammal species, notably nocturnal and reclusive mammals. The faunal categories covered in this assessment are mammals, reptiles, amphibians, general invertebrates and arachnids.

The faunal habitats are consistent with the five habitats identified and discussed in the floral assessment, section 4.1.7. The field assessment results as discussed in the below tables have been grouped into the following three criteria:

i. Mammals
ii. Herpetofauna
iii. Invertebrates

4.1.8.1 Mammals

Photograph Notes:

Top: Left – (African Mole rat heaps, LC) were observed in several localities within the focus area. Centre – scat of *Lepus saxatilis* (African Scrub Hare, LC) and a quill from *Hystrix africaeaustralis* (African Porcupine, LC) observed in the bushveld habitat. Right – the scat of (Black-backed Jackal, LC) observed near a drainage line associated with the riverine habitat in the northern portion of the focus area. **Centre:** Left – scat of *Sylvicapra grimmia* (Bush duiker, LC) was widespread in the focus area. Centre – spoor of a domestic herd dog, which were widespread in the focus area. Right – the scat of *Aonyx capensis* (Cape, Clawless Otter, NT) observed downstream of a large dam situated outside eastern border of the proposed development footprint.
Bottom: Left – many cattle paths, covered with human boot prints, dog prints, and dung of cattle, goats and donkeys run throughout the focus area, indicating widespread and frequent disturbance by existing anthropogenic related activities. Centre – burrows of varying sizes, from small to fairly large were observed throughout the focus area which are likely used by smaller mammal species. Right – Rocky habitat, while disturbed, may provide suitable habitat for brown hyena, was observed in the focus area, within the corridor buffer of the southern proposed powerline.

Mammal Species of Conservation Concern (SCC)

Species	Habitat and Resources in the Focus area	Conservation Status	POC
Felis lybica (African Wild Cat)	The distribution range of this species overlaps the focus area and has a wide habitat tolerance but frequents tall grass and thick bush, which is present in the Bushveld habitat in the focus area.	VU (Limpopo)	Medium
Panthera pardus (Leopard)	Leopards occur in a wide range of habitats, including bushveld and cliffs which are present in the area surrounding the focus area. They are able to live amidst high human densities (Singh 2005) and readily prey on livestock and domestic animals (Mukherjee et al. 2001), which is available in the focus area.	VU (IUCN)	Medium
Parahyaena brunnea (Brown Hyena)	Its distribution range overlaps the focus area, and it is able to survive close to human settlements.. It is primarily a scavenger of a wide range of vertebrate remains, and as such will be sustained by the carcasses of livestock that utilise the focus area.	NT	Medium

	Species	Habitat and Resources in the Focus area	Conservation Status	POC

Mammalian SCC continued	*Dasymys robertsii* (Robert's Shaggy Rat)	Prefers swamps and wet areas along rivers and streams, which will become available during summer in Freshwater Habitat in the focus area	DD	Medium
Mammal Discussion	No mammalian SCC were observed in the direct focus area. Although the SCC, *Aonyx capensis* (Cape, Clawless Otter, NT) was observed in the adjacent freshwater systems but outside of the footprint and as such, development is unlikely to impact on the species required habitat. Overall, mammalian diversity in the focus area is considered to be moderate and restricted to resilient, common species that are adapted to a variety of habitats and can persist amongst disturbance. The encroachment of existing informal settlements into the focus area poses a major threat and deterrent to most wildlife and would play a significant role in limiting overall mammal abundance and diversity levels, including the presence of the abovementioned SCC. Cows, donkeys and goats that are associated with subsistence livestock farming of the surrounding informal communities have outcompeted larger game species that could potentially occupy the area. During the field assessment, herdsmen along with their dogs and livestock regularly pass through the focus area. As such, the focus area is considered to be notably disturbed from a mammal species perspective, with many mammals have likely been lost to subsistence hunting and a decreased in suitable food resources. As a result of intense overgrazing and resultant thick bush encroachment, the veld condition has been degraded for grazers. While there is an abundance of grass in the focus area, it is dominated by unpalatable species, therefore, the capacity of the focus area to support large wild grazers is considerably depleted. Only browsers, such as *Tragelaphus strepsiceros* (Greater Kudu, LC), which was observed during the field assessment, will benefit from available browsing within the bushveld habitat, and if they occur on site, they will be in areas away from increased human habitation due to threats from poaching and hunting. The lack of large herbivores and continuous human persecution is likely the reason why no large mammalian predators were observed on site. There was, however, evidence of small to medium mammal abundance, which will attract mesopredators, such as *Canis mesomelas* (Black-backed Jackal, LC) into the focus area. Overall, considering the abovementioned conditions, the focus area is considered to have low conservation value from a mammal perspective. Bushveld habitat is available for savannah dwelling mammals, but it is limited by bush encroachment making access through these areas difficult. The drainage lines (associated with the Riverine Habitat) that run concurrently amidst the focus area, may provide suitable movement corridors, through which larger mammals may move more easily, especially when dry (due to the ephemeral nature of these systems). Other areas within the focus area or just outside of it, that are considered important to mammals on site, are the Freshwater Habitat and the four dams \ situated outside of the focus area, and Rocky habitat in the corridor buffer of the southern proposed powerline route. The wetland and dams, although frequently disturbed by humans and livestock, are an important freshwater resource, whilst the rocky cliffs along the southern OHL, may provide refuge for mammals associated with rocky habitat. As such, it is recommended to keep the development footprint and possible edge effects away from these areas, as far as possible, to maintain mammalian movement corridors and resources.		
Business Case and Conclusion - Invertebrates	Due to the highly disturbed condition of most habitats within the focus area the proposed solar development, is unlikely to have a significant impact on mammal communities, as mammal species observed on site were of low abundance and diversity and those that are within the focus area will likely move into the adjacent habitats, away from disturbance. Nonetheless, the proponent should consider maintaining movement corridors and areas within or in close proximity to the focus area, that are considered to be important to preserve existing mammalian diversity amidst development. These areas include all areas associated with the freshwater habitat located in the central, eastern and southern portion of the focus area) and the rocky cliff located within the corridor buffer of the southern OHL. Edge effects and impacts associated with the proposed development should be prevented from encroaching into these sensitive areas.			

4.1.8.2 Herpetofauna

Photograph Notes:	
Top: Left – areas of ponding such as pictured are situated along drainage lines that runs between the middle and southern portions of the focus area, provide suitable amphibian breeding habitat and may attract higher amphibian diversity to the focus area. Centre – a wetland located in the central portion of the focus area, provides additional amphibian habitat. Right – the frog, *Ptychadena anchietae* (Anchieta's Ridged Frog, LC) was observed at the dam between the middle portions of the focus area. **Middle:** Left – ideal rocky habitat for reptiles is present along the southern proposed powerline route. Centre and right – termite mounds provide ideal habitat in which amphibians and reptiles may aestivate during the winter **Bottom – not observed** – Left to right representative photographs of the	

SCC *Python natalensis*, *Pyxicephalus adspersus* and *Homoroselaps dorsalis* which all have a medium probability of occurance within the focus area.

Herpetofauna SCC

Species	Habitat and Resources in the Focus Area	Conservation Status	POC
Python natalensis Southern African Python	May occur in rocky outcrops in Bushveld habitat	VU (Limpopo, 2004)	Medium
Homoroselaps dorsalis (Striped Harlequin Snake)	This species known to shelter in termiteria mounds, which were present in Bushveld.	R (Limpopo, 2004)	Medium
Pyxicephalus adspersus (Giant African Bullfrog)	Occurs in dry savannas. When not breeding, it can travel up to 4 km from water, foraging for insects at night and as such, may venture into the focus area. Their breeding habitat, in the form of shallow, stagnant temporary waters in wetlands and pans, are present in or close to the focus area. Adults may be buried beneath the soil in the dry season.	NT (RSA)	Medium

Herpetofauna Discussion	Reptile and amphibian species are notoriously hard to detect, owing to their secretive nature, and as a result, only one common amphibian and no reptiles were observed during the field assessment. As reptile habitat (rocky outcrops) and amphibian (four dams and one wetland) habitat were observed within or in close proximity to the focus area, it is anticipated that a higher diversity of common herpetofauna will inhabit the area during the summer months, with the POC of the three SCC described above. A limited number of amphibians are expected to occur within the focus area, as all freshwater habitat, with the exception of the wetland, are located outside the focus area and therefore are excluded from the proposed solar development footprint. However, some species, such as the African Giant Bullfrog and toads listed in Appendix C of the fauna specialist report, attached in Appendix E of this EIR, are capable of travelling far from water, and may venture into the focus area to forage or to aestivate in termitaria. The wetland in the central portion of the focus area, is considered important amphibian habitat that may host higher amphibian diversity in the wet season. Food resources in the focus area, are not considered to be a limiting factor for herpetofauna.
Business Case and Conclusion	Fewer than expected herpetofaunal species were observed furing the field assessment, however, a higher diversity is anticipated in the summer months, owing to increased habitat, temperature and food resources. As such, installation of the proposed solar plant and associated infrastructure may impact potentially occurring herpetofaunal species as a result of widespread vegetation clearing that will lead to the direct habitat loss, and may disturb habitats that are located immediately outside of the footprint area. As a result, herpetofauna may become displaced as they are forced to migrate out of the areas of disturbance. The movement of herpetofauna out of the disturbance footprint areas will result in higher levels of competition for food resources and habitat,

	which can lead to a decrease in herpetofaunal abundance levels, including potential SCC. Additionally, the increased movement of vehicles traveling to and from the focus area as well as increased conflict with humans will likely increase the risk of persecution for herpetofauna species.

4.1.8.3 Invertebrates

Photograph Notes:

Top: Left - *Phymateus viridipes* (Green Stinkweed Locust, NYBA), centre – the pupae of a *Sphodromantis gastrica* (Common Green Mantid, NYBA) and right – a robber fly of the Subfamily Asilidae were all observed in the Degraded bushveld habitat in the northern portion of the focus area. **Middle:** Butterfly species: Left - *Belenois aurota* (Brown-veined Butterfly, LC), centre - *Hamanumida daedalus* (Guineafowl Butterfly, LC), and right - *Colotis euippe* (Smoky Orange, LC). **Bottom:** Some of the arachnid species observed within the focus area include Left - *Trichonephila senegalensis* (Banded-legged Orb-web spider, NYBA), centre – a burrow of a baboon spider (*Ceratogyrus* , P); Right – scorpion species belonging to the genus *Uroplectes* spp observed in rocky habitat along the southern OHL transmission line corridor.

Invertebrate SCC

Species	Habitat and Resources in the Focus Area	Conservation Status	POC
Ceratogyrus darlingi (Horned Baboon Spider)	Occupy round, silk-lined burrows in lightly wooded areas, beneath rocks and logs. One such burrow was observed in the bushveld habitat	VU & P according to NEMBA: TOPS 2007	Confirmed
Opistophthalmus glabrifrons (Rough Burrower)	It burrows under rocks and in open grasslands in bushveld habitat. It is active on warm nights.	P according to NEMBA: TOPS 2007	Medium

Invertebrate Discussion

Observed invertebrate diversity was considerably lower than expected, which is significantly influenced by the cold, dry season, in which the field assessment was conducted. Many insects are inactive during the winter, as they survive this period as larvae, or are in low abundances as a result of low temperatures and food resources. Considering the availability of bushveld, grassland, sandy and rocky microhabitats in the focus area, it is anticipated that invertebrate diversity will be substantially higher following rains in the summer season. All invertebrates observed are considered common widespread species The burrow of *Ceratogyrus darlingi* (Horned Baboon Spider, P&VU) was found in the *Dichrostachys* bushveld habitat and is a notable find. This species is a slow-moving species that does not venture far from its burrow. Earth works and vegetation clearance will pose a significant threat to this species. *Opistophthalmus glabrifrons* (Rough burrowing scorpion, P) may also occur on site as suitable habitat is available

Business Case and Conclusion - Invertebrates	The proposed development and associated infrastructure will lead to widescale loss of habitat and food resources, reducing the diversity of insects and arachnids that were observed on the focus area or will occur during the summer months. In general, and with the exception of one arachnid SCC, species observed were commonly occurring and may persist in the surrounding landscape but will be faced with increased competition and potential lack of resources, putting strain on future insect populations. Development impact will be high in rocky habitats, where arachnids may occur as habitat clearing is likely to be extensive or disturbance levels high. The arachnid, *Ceratogyrus darlingi* (Horned Baboon Spider, P&VU) is confirm ed to occur on site

	and development poses a major risk to this species due to its poor dispersal abilities and inability to flee disturbance. The loss of insect abundance and diversity will have a negative cascading effect on other faunal species in the focus area. Please refer to section 5.4. for a detailed list of recommended mitigatory measures.

4.1.8.4 Faunal sensitivity

Figure 4-11 conceptually illustrates the faunal ecological sensitivity for the various areas and includes the burrow location of the Horned Baboon Spider found in the focus area during the specialist field assessment. The areas are depicted according to their sensitivity in terms of the presence or potential for faunal SCC, habitat integrity, levels of disturbance and overall levels of diversity.

4.2 Avifaunal Environment

An avifaunal assessment was conducted to determine whether any avifaunal SCCs and associated habitat for these species are present within the focus area. All sensitive landscapes were identified and considered, including possible habitat for such species.

Once again, the five broad habitats as detailed in section 4.1 were identified.

For avifauna, vegetation structure as opposed to actual species richness, is widely acknowledged as the primary determinant of bird communities (Skowno & Bond 2003; Wichmann *et al.* 2009; Burgess *et al.* 2011; Smith *et al.* 2017). The habitat is mostly thornveld savanna, comprising of mostly dense almost thicket like stands of homogenous *Dichrostachys* sp. and Acacias. Some portions within the Mixed Bushveld habitat reflected more open bushveld with higher broadleaf tree diversity with a taller structure. Open areas dominated by grasses, with some shrubs and taller trees, occurred within Degraded bushveld Habitat locations which were historically utilised for agriculture resulting in homogenous floral compositions.

4.2.1 Results for avifaunal species

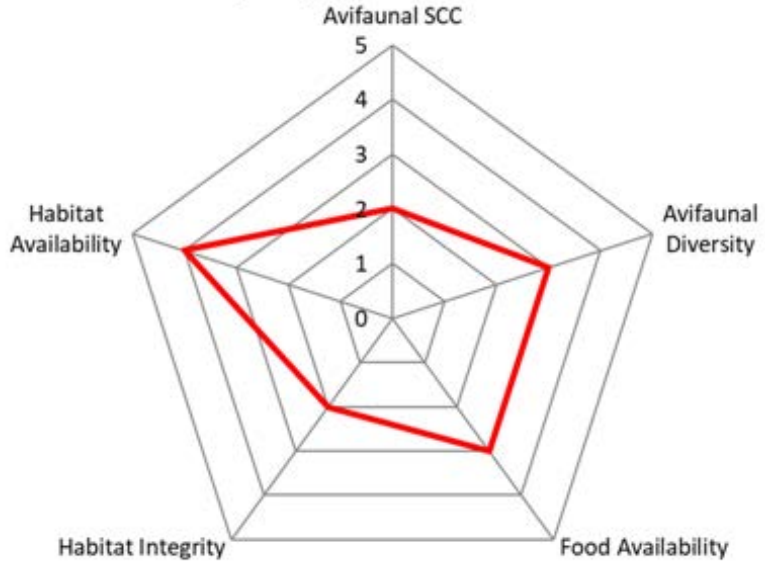
Table 4-1 summarises the field observations that were made during the site visit in May 2021, with regards to overall avifaunal diversity, food availability, habitat integrity, habitat availability, general comments and business case and conclusion. Figure 9 below provides a visual representation of the above-mentioned habitat units.

Table 4-1: Summary of results for avifaunal species

Class: Aves	Habitat Sensitivity:	Intermediate

Notes on photographs:
Top: General habitat characteristics noted during the field investigation. Left - Open Degraded Bushveld and Dense *Dichrostachys* Bushveld in the foreground and background respectively. Right - Donga and Riverine Habitat. **Middle:** Left to right – *Merops pusilus* (Little Bee-eater), *Estrilda erythronotos* (Black-faced Waxbill) and *Uraeginthus granatinus* (Violet-eared Waxbill). **Bottom**: Left to right – *Bradornis mariquensis* (Marico Flycatcher), *Erythropygia paena* (Kalahari Scrub Robin) and *Bubulcus ibis* (Cattle Egret).

Avifaunal Sensitivity Graph:



Faunal SCC/	No SCC were observed during the field investigation. Several SCC do have distribution	**Business Case and Conclusion:**

Endemics/TOPS/	ranges which overlay the focus area, these include: *Necrosyrtes monachus* (Hooded Vulture), *Gyps africanus* (White-backed Vulture), *Polemaetus bellicosus* (Martial Eagle), *Aquila rapax* (Tawny Eagle), *Gyps coprotheres* (Cape Vulture), *Torgos tracheliotos* (Lappet-faced Vulture), *Mycteria ibis* (Yellow-billed Stork), *Neotis denhami* (Denham's Bustard), *Aquila verreauxii* (Verreauxs' Eagle), *Nettapus auratus* (Pygmy Goose), *Gorsachius leuconotus* (White-backed Night Heron), *Eupodotis senegalensis* (White-bellied Korhaan), *Sigattarius serpentarius* (Secretarybird), *Cocinia nigra* (Black Stock), *Oxyura maccoa* (Maccoa Duck), *Anthropoides paradiseus* (Blue Crane), *Alcedo semitorquata* (Half-collared Kingfisher), *Certhilauda chuana* (Short-clawed Lark), *Coracias garrulus* (European Roller), *Falco biarmicus* (Lanner Falcon), *Ciconia abdimii* (Abdim's Stork) and *Leptoptilos crumeniferus* (Marabou Stork). On-site characteristics are considered suitable for *Certhilauda chuana* (Short-clawed Lark) and *Coracias garrulus* (European Roller).	The avifaunal habitat sensitivity for the focus area is considered to be intermediate. Although a large contingent of SCC do have ranges which overlap the focus area, this area is not known as an important breeding, foraging or roosting location for any of the SCC. Two species are deemed likely to utilise the site for foraging or breeding purposes, *Certhilauda chuana* (Short-clawed Lark) and the eastern population of *Certhilauda chuana* (Short-clawed Lark), known to occur in the Polokwane Plateau. The focus area just marginally occurs on the south western boundary of the Plateau. The habitat in the Degraded Bushveld and margins of Transformed Habitat may be favorable to this species yet the constant presence of humans and domestic cats and dogs is not favorable for this species. *Coracias garrulus* (European Roller), a non-breeding migrant, may utilise the area to forage yet records do not indicate this area as important for the species. The National Web Based Screening Tool indicated that *Sagittarius serpentarius* (Secretary bird) potentially occurs within the focus area. The Degraded Bushveld is suitable habitat for the species yet the constant human presence and movement of domestic animals reduce the POC of this species occurring here to Low. Most SCC which have ranges that overlay the focus area, have wide ranges and often respond to favourable environmental conditions (grazing, fire, rainfall or invertebrate outbreaks) and as such may find suitable habitat within the focus area intermittently. The proposed activities will increase the risk of birds colliding with or being electrocuted by PV infrastructure, powerlines or when perching or nesting on pylons which can also be a fire risk. Potential impacts arising from the proposed activities are unlikely to impact on SCC diversity or abundance as a reduction in suitable habitat is limited to two species. Provided that mitigation measures stipulated in this report are adhered to the risk of bird collisions with powerlines is low.
Faunal Diversity	The avifaunal diversity associated with the focus area was intermediate and comprised mainly of common avifaunal species. The timing of the survey did restrict the observed species assemblage to resident species, reducing the potential diversity of the species list. Since habitat structure is often considered the primary determinant of bird assemblages it is anticipated that the largely homogenous grassland structure of the focus area will be mirrored by a relatively narrow assemblage of birds. Portions of habitat along drainage lines and on the east of the focus area in the Freshwater Habitat did harbour more rich species assemblages. Species within the focus area include: Cape turtledove (*Streptopelia capicola*), *Microcarbo africanus* (Reed Cormorant), *Merops pusilus* (Little Bee-eater), *Estrilda erythronotos* (Black-faced Waxbill), *Uraeginthus granatinus* (Violet-eared Waxbill), *Bradornis mariquensis* (Marico Flycatcher), *Erythropygia paena* (Kalahari Scrub Robin), *Bubulcus ibis* (Cattle Egret), *Euplectes albonotatus* (White-winged Widowbird), *Euplectes orix* (Southern Red Bishop), *Ploceus velatus* (Southern Masked Weaver), *Macronyx capensis* (Cape Longclaw), *Charadrius tricollaris* (Three-banded Plover), *Cisticola tinniens* (Levaillant's Cisticola), *Cisticola aberrans* (Lazy Cisticola), *Cisticola juncidis* (Zitting Cisticola), *Fulica cristata* (Red-knobbed Coot), *Saxicola torquatus* (African Stonechat), *Alopochen aegyptiaca* (Egyption Goose), *Lanius collaris* (Common Fiscal), *Burhinus capensis* (Spotted Thick-knee),	

	Ardea cinerea (Grey Heron), *Ardea melanocephala* (Black-headed Heron), *Anas undulata* (Yellow-billed Duck), *Euplectes afer* (Yellow-crowned Bishop) and *Elanus caeruleus* (Black-shouldered Kite). Please refer to Appendix C of the fauna specialist report, attached in Appendix E of this EIR for the full list of species identified on site.
Food Availability	The focus area is considered to have an intermediate abundance of forage for avian species. Diverse flora in the drainage lines and Freshwater habitat do provide more variable forage albeit only a small part of the focus area. The broad *Dichrostachys* Bushveld habitat unit offers sufficient food for the avian assemblage within the focus area, with the interspersed Freshwater habitat promoting year-round access to water and an important niche habitat for numerous invertebrate prey. It is unlikely forage is a limiting factor within the largely natural habitats for smaller passerines. Large raptors will have high competition for food as a result of competing domestic dogs and will have limited opportunity to hunt within the dense *Dichrostachys* Bushveld. Vultures which require mammal carcasses will not find suitable forage due to the absence of carnivores. Where settlements exist or in degraded areas, Transformed Habitat and Degraded Bushveld, different niche opportunities exist for avifauna and urban adaptor species which are common and widely occurring dominated, yet, lowered forage abundances and opportunities are expected for more rare species. The route which the proposed powerline will traverse is largely transformed from historic agriculture and as limited clearance of vegetation will occur minimal habitat alterations and impacts to forage are anticipated. Forage suitability and availability here will be patchy and more favourable to granivores. Insect abundances were low at the time of the field investigation reducing forage for many passerines while fruiting also appeared restricted to drainage lines and along the verges of Freshwater habitat. Forage for large perch hunting raptors was noted in low abundances and is expected to have been reduced due to domestic hunting animals (cats and dogs).
Habitat Integrity	The focus area is comprised of natural habitat which is exposed to heavy grazing, interspersed with rural settlements and mining areas with some portions recovering from various historic disturbances, drastically reducing the integrity of the focus area. The focus area is surrounded by a mosaic of mining areas, agricultural areas, rural settlements and more natural Bushveld reducing the intactness of the broader area.
Habitat Availability	Habitat availability is considered moderately high within the focus area where the PV facility and much of the associate infrastructure is proposed, however, many of these portions are exposed to a high degree of edge effects from neighbouring settlements, mining of from historically cultivated locations. Much of the proposed powerline routes transverse historically cultivated areas which of now recovering. These locations provide suboptimal habitat for more niche specific fauna representative of the region. The broad thornveld habitat with open more grass dominated habitat offers suitable habitat for bushveld species and those preferring more open grassland habitat. As little human activities are currently occurring here availability of habitat is moderately high. The Transformed Habitat will be of little value yet may increase rodent abundances which are an important component of accipiter diets. The dense sheltered areas with high tree abundance increase habitat availability and shelter for many avifaunal species who require these features for nesting and foraging. The focus area offers habitat of similar structure, which is a primary determinant of bird species assemblages, throughout and as such it is not anticipated that a highly diverse assemblage of birds will occur here.

4.2.2 Avifaunal SCC assessment

During field assessments, it is not always feasible to identify or observe all species within an area, largely due to the secretive nature of many avian species, possible low population numbers or varying habits of species. As such, and to specifically assess an area for faunal SCC, a Probability of Occurrence (POC) matrix is used, utilising a number of factors to determine the probability of faunal SCC occurrence within the focus area. Species listed in Appendix F of the avifaunal assessment report (Appendix E of this EIR) or other regional listings, whose known distribution ranges and habitat preferences include the focus area were taken into consideration. Only species anticipated to have a medium or high probability of occurring within the focus area have been listed in the avifaunal assessment report. This list of species includes:

Necrosyrtes monachus (Hooded Vulture), *Gyps africanus* (White-backed Vulture), *Polemaetus bellicosus* (Martial Eagle), *Aquila rapax* (Tawny Eagle), *Gyps coprotheres* (Cape Vulture), *Torgos tracheliotos* (Lappet-faced Vulture), *Mycteria ibis* (Yellow-billed Stork), *Neotis denhami* (Denham's Bustard), *Aquila verreauxii* (Verreauxs' Eagle), *Nettapus auratus* (Pygmy Goose), *Gorsachius leuconotus* (White-backed Night Heron), *Eupodotis senegalensis* (White-bellied Korhaan), *Sagittarius serpentarius* (Secretarybird), *Cocinia nigra* (Black Stock), *Oxyura maccoa* (Maccoa Duck), *Anthropoides paradiseus* (Blue Crane), *Alcedo semitorquata* (Half-collared Kingfisher), *Certhilauda chuana* (Short-clawed Lark), *Coracias garrulus* (European Roller), *Falco biarmicus* (Lanner Falcon), *Ciconia abdimii* (Abdim's Stork) and *Leptoptilos crumeniferus* (Marabou Stork) have distribution ranges which encompass the focus area. Of these species only *Certhilauda chuana* (Short-clawed Lark) and *Coracias garrulus* (European Roller) may potentially inhabit the focus area.

Due to the habitat unit associated with the focus area there is a likelihood for avifaunal SCCs occurring within the focus area. Should the nests of any avifaunal SCC as listed above and in Appendix F of the avifaunal assessment report, be encountered during the course of the proposed development activities, all operations must be stopped immediately, and an avifaunal specialist must be consulted in order to advise on the best way forward.

4.2.3 Sensitivity mapping

The figures below conceptually illustrate the areas considered to be of increased ecological sensitivity. The areas are depicted according to their sensitivity in terms of the presence or potential for avifaunal SCC, habitat integrity and levels of disturbance, threat status of the habitat type, the presence of unique landscapes and overall levels of diversity. Table 4-2 presents the sensitivity of each identified habitat unit along with an associated conservation objective and implications for development.

Table 4-2: A summary of sensitivity of each habitat unit and implications for development

Sensitivity	Habitat Unit	Development Implications
Low Sensitivity	**Transformed Habitat and Donga Habitat** Conservation Objective for areas of Low Sensitivity: Optimise development potential.	These habitats are deemed to be of low sensitivity for avifauna due to their altered state, absence of vegetation and lack of heterogeneity. Development within these areas is unlikely to lead to high impacts to avifaunal habitat or species diversity provided mitigation measures are implemented, as discussed in Section 6.4.
Moderately Low	**Degraded Bushveld** Conservation Objective for areas of Low Sensitivity:	The habitat sensitivity of this unit is considered moderately low as it has been degraded as a result of historic agricultural activities, erosion and as a result of heavy grazing. The unit comprises of homogenous vegetation with limited forging and shelter opportunities for most avifauna. Development within these habitat units is not expected to have

Sensitivity	Habitat Unit	Development Implications
	Optimise development potential while improving biodiversity intactness of surrounding natural habitat and managing edge effects.	a significant negative impact on the local or regional ecology of the area, provided mitigation measures are adhered to.
Intermediate Sensitivity	***Dischrostachys* Bushveld, Rocky Habitat and Mixed Bushveld Habitat** Conservation Objective: Preserve and enhance the biodiversity of the habitat unit and the surrounds while optimising development potential	Areas of intermediate sensitivity include those that have avoided impacts for agriculture or other landscape transforming factors ensuring natural habitat has persisted, with varying degrees of degradation as a result of encroachment and overgrazing. From an avifaunal perspective it is likely that mostly common species who have broad habitat requirement are likely to utilize this unit for breeding though most avifauna within the vicinity will forage here. The relatively homogenous structure and composition of the vegetation, broadly ***Dischrostachys* Bushveld** reduces its appeal to SCC who will readily favour less encroached intact habitats where no historic disturbances have occurred. Development within these areas are less likely to have significant impacts on avifaunal communities within the focus area. It remains important that edge effect impacts on areas outside of the direct footprint be strictly managed to increase/maintain ecological functionality. Mitigation measures included within this report should be adhered to limit ecological impacts.
Moderately High Sensitivity	**Freshwater Habitat** Conservation Objective: Preserve and enhance the biodiversity of the habitat unit, limit development and disturbance	These areas are of moderately high sensitivity from an avifaunal perspective. The sensitivity generally reflects the absence of any large-scale human disturbances ensuring that these systems have moderately high integrity and remain ecologically functional. These habitats offer enough forage and breeding locations for their respective avian communities and only show minor disturbances by alien species invasion and edge effects. These habitats also provide access to water resources and act as important corridors for smaller bird species within the landscape. Due to these habitat units providing suitable habitat for avifauna and because of their importance of conduits for movement, they are of increased species richness, ecological functionality and sensitivity from an avifaunal perspective and development within this habitat unit should be avoided and alternatives should be considered. Additionally, by being saturated for much of the year, these areas provide valuable niche habitat. Any disturbance to these areas is not recommended and should be avoided as far as possible. Where areas of moderately high sensitivity occur in CBAs or Protected Areas, there is a conflict between the intended land use and the conservation requirements for the region and the establishment of the proposed infrastructure should only occur where historic and current agricultural activities have occurred.

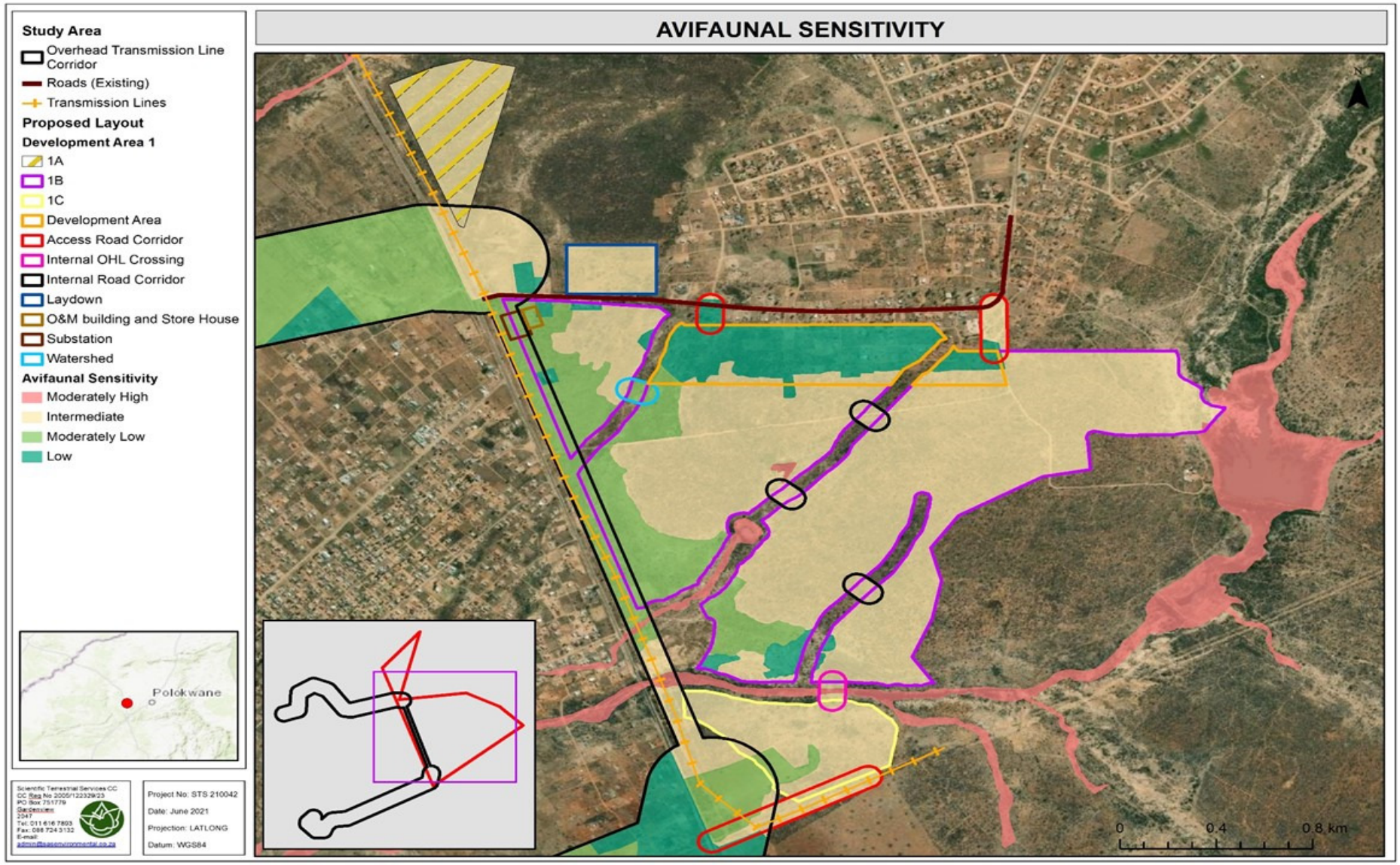


Figure 4-7: Avifaunal sensitivity map of the proposed PV Plant section

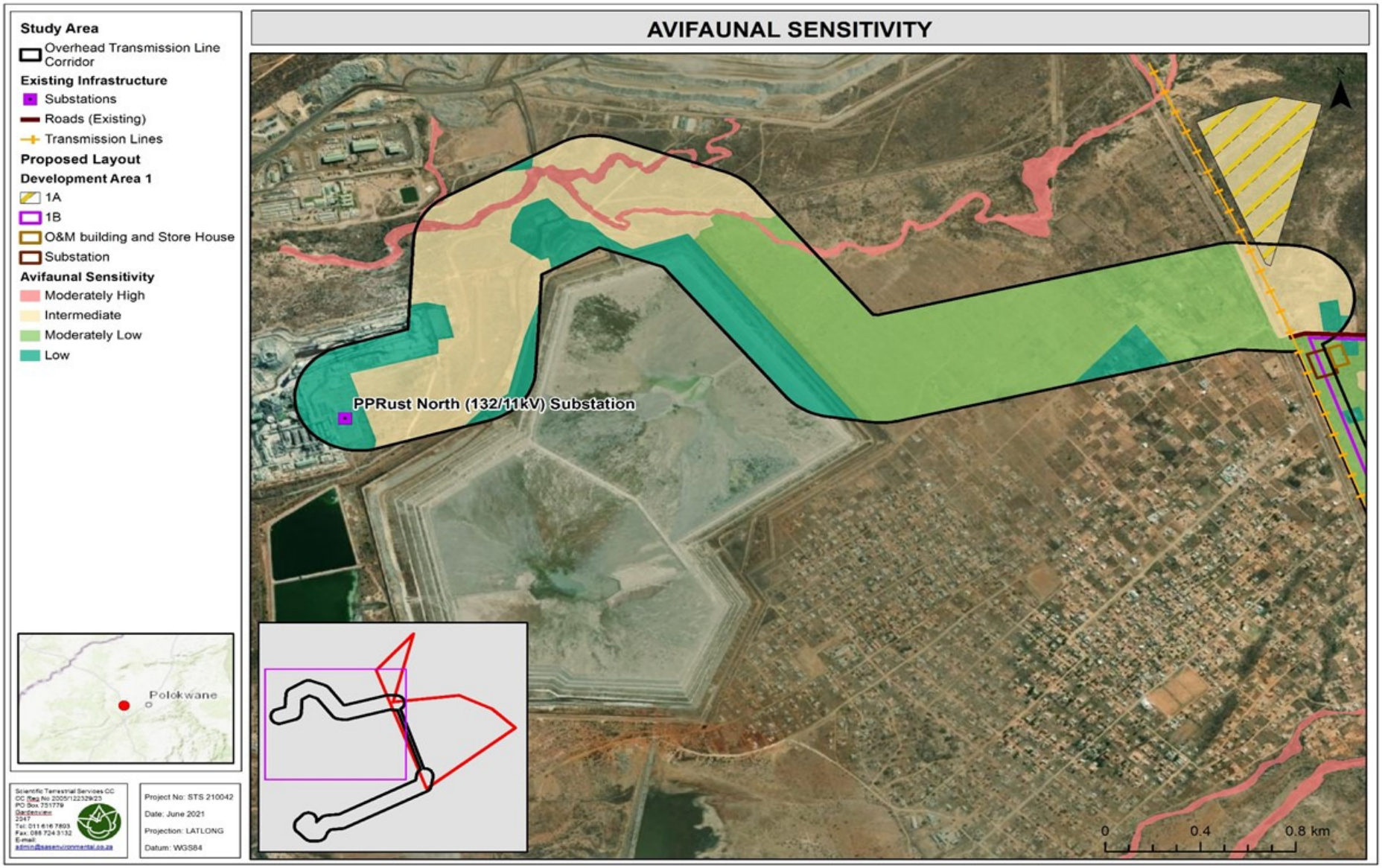


Figure 4-8: Avifaunal sensitivity map of the northern transmission corridor

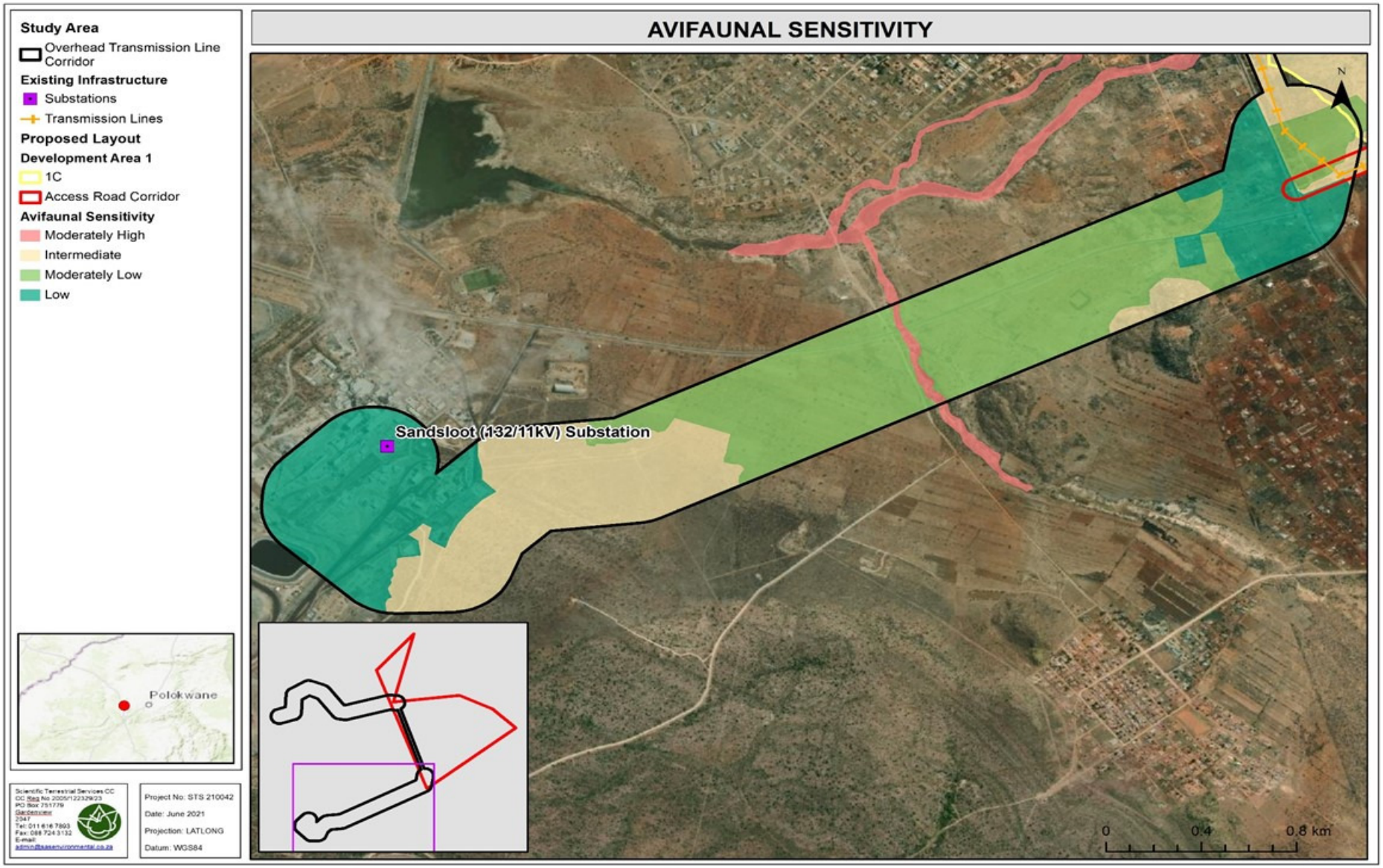


Figure 4-9: Avifaunal sensitivity map of the southern transmission corridor

4.3 Agricultural Environment

Johann Lanz was appointed as an independent agricultural specialist to provide the Agricultural Compliance Statement. The objective and focus of an Agricultural Compliance Statement is to assess whether or not the proposed development will have an unacceptable agricultural impact or not, and based on this, to make a recommendation on whether it should be approved or not.

4.3.1 Sensitivity mapping

In terms of the gazetted agricultural protocol, a site sensitivity verification must:

1. confirm or dispute the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.;
2. contain a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity.

Agricultural sensitivity, in terms of environmental impact, is a direct function of the capability of the land for agricultural production. This is because a negative impact, or exclusion of agriculture, on land of higher agricultural capability is more detrimental to agriculture than the same impact on land of low agricultural capability. The general assessment of agricultural sensitivity that is employed in the national web-based environmental screening tool, identifies all arable land that can support viable production of cultivated crops, as at least high sensitivity. This is because there is a scarcity of arable production land in South Africa.

The screening tool classifies agricultural sensitivity according to only two independent criteria – the land capability rating and whether the land is cultivated or not. All cultivated land is classified as at least high sensitivity, based on the logic that if it is under cultivation, it is indeed suitable for cultivation, irrespective of its land capability rating.

Uncultivated land is classified by the screening tool in terms of its land capability rating, as per the 2017 DAFF updated and refined land capability mapping for South Africa. Land capability is defined as the combination of soil, climate and terrain suitability factors for supporting rain fed agricultural production. It is an indication of what level and type of agricultural production can sustainably be achieved on any land. The higher land capability values (≥8 to 15) are likely to be suitable as arable land for the production of cultivated crops, while lower values are only likely to be suitable as non-arable, grazing land, or at the lowest extreme, not even suitable for grazing.

A map of the proposed development area overlaid on the screening tool sensitivity is given in the below figure. The land capability of the investigated site varies from 6 to 8, a value range that gives medium agricultural sensitivity. The small-scale differences in land capability (pixels) across the project area are not very significant and are a function of how the land capability data is generated by modelling, rather than actual meaningful differences in agricultural potential on the ground.

The agricultural sensitivity, as identified by the screening tool, was confirmed by this assessment. The motivation for confirming the sensitivity is that the climate, soils and terrain correspond to the ratings of land capability and consequent definitions of the different screening tool sensitivity categories. Rainfall is approximately 520 mm per annum and evaporation is approximately 1,440 mm per annum. The land type data shows that a fairly high proportion of the soils are shallow on underlying rock. The land is likely to be marginal for the cultivation of crops.

4.3.2 Land use

The site is situated in a cattle and subsistence farming area. The property is currently owned by Anglo, but is proposed to be transferred to community ownership. The property has never been used for cultivation. The only agricultural activity on the site is informal grazing. Land across the N11 road has been used for small plots of subsistence cultivation.

Loss of agricultural potential by occupation of the land by the energy facility is the only possible agricultural impact of the proposed development on the proposed site. However, the site is not currently used for agricultural production and due to its location in an area of expanding urban development and mining activity, is not likely to ever be used for agricultural production, even in the absence of the proposed development. The significance of this impact in terms of its effect on agricultural production is therefore negligible.

Although the overhead transmission lines cross an area that has been used for small plots of subsistence cultivation, they have no agricultural impact because this cultivation and any other agricultural activities that are viable in this environment can continue completely unhindered underneath transmission lines.

4.3.3 Allowable development limits

The purpose of the agricultural protocol is to conserve valuable agricultural land for agricultural production by steering non-agricultural development away from higher potential agricultural land and onto lower potential land. The criteria by which land is valued is its suitability for the production of cultivated crops. There is a scarcity of arable production land in South Africa. Therefore, if land is suitable for the production of cultivated crops, its conservation for agriculture should be prioritised. If it is not, there is no need to conserve it for agricultural use.

Figure 4-10 The proposed development property (dark blue outlines) overlaid on agricultural sensitivity, as given by the screening tool (green = low; yellow = medium; red = high; dark red = very high). The overhead transmission corridors are shown with light blue outlines.

The agricultural protocol achieves its purpose, in relation to renewable energy developments on agricultural land, by imposing allowable development limits on different agricultural sensitivity categories of land. The allowable development footprint is the area of a particular sensitivity category of land that can be directly occupied by the physical footprint of a renewable energy development. There are six different allowable development footprints, defined according to a combination of land capability and cultivation status, as specified in Table 4-3, below.

Table 4-3: Allowable development limits as specified in the agricultural protocol

Allowable footprint category	Agricultural Sensitivity	Allowable footprint (ha/MW)	Definition of category
1	Very high	0.00	Very high land capability (11-15); or irrigated land; or dryland horticulture or viticulture
2	High	0.20	High land capability (8-10) on existing fields
3	High	0.25	Medium land capability (6-7) on existing fields
4	High	0.30	Low land capability (1-5) on existing fields
5	Medium	0.35	High land capability (8-10) outside of existing fields
6	Medium	2.50	Medium land capability (6-7) outside of existing fields
	Low		Low land capability (1-5) outside of existing fields

Solar energy is effectively prevented by the limits, from being developed on any land other than land of category 6 in Table 1 above, unless an exception is made to the limits for a particular site. The land capability rating across the site varies from 6 to 8, with 8 occupying approximately half of the site. Those parts of the site with land capability values of 8 fall into category 5 in Table 1 above. Because of this, a solar energy development on the site requires that an exception is granted to the allowable development limits.

4.3.4 Motivation for exceeding the allowable development limits

The site is not currently used for agricultural production and due to its location in an area of expanding urban development and mining, is not likely to ever be used for agricultural production, even in the absence of the proposed development. As a result, the agricultural impact of the proposed development is negligible. Given that the purpose of the development limits is to preserve potential for agricultural production, it makes sense to allow development on this site which has little to no potential for agricultural production anyway.

4.4 Aquatic Environment

An aquatic assessment was conducted to define the ecology in terms of the freshwater ecosystems characteristics, to map these ecosystems, to discuss key ecological drivers and to define the PES and EIS for these ecosystems. The assessment took the following approach:

- A desktop study was conducted, in which possible freshwater ecosystems were identified for on-site investigation, and relevant national and provincial databases were consulted;
- The field assessment was undertaken in June 2021 to ground-truth the freshwater ecosystems associated with the proposed Mogalakwena PV infrastructure. During the assessment, four freshwater ecosystems were identified to be associated with the

Mogalakwena the PV infrastructure, two were classified as rivers (Mohlosane River and Groot Sandsloot River), a seep wetland and various ephemeral drainage lines (EDL's) within the investigation area;

- They were then classified according to the Ollis et al. (2013) classification system; and
- The characteristics of the freshwater ecosystems were defined including the PES, EIS, REC, RMO and BAS.

4.4.1 Freshwater ecosystems

The following freshwater ecosystems were identified to potentially be at risk from the proposed Mogalakwena PV infrastructure:

- The Groot-Sandsloot River is located along the southern edge of the project boundary and will be traversed by the Internal OHL. In addition, the Development Areas 1B and 1C are located within the regulated zone (100m GN509) of this freshwater ecosystem;
- The Mohlosane River is located within the project boundary but will not be traversed by the proposed infrastructure associated with the proposed Mogalakwena PV project;
- A single seep wetland located east of the N11 highway within the project boundary; and
- Various ephemeral[19] drainage lines (EDLs) associated with the Groot-Sandsloot River and the Mohlosane River are located within the project boundary.

These freshwater ecosystems were classified according to the Classification System (Ollis *et al.*, 2013) as Inland Systems, falling within the Limpopo Plain Aquatic Ecoregion. The wetland vegetation group associated with the study area was the Central Bushveld Group 4 which is considered to be Vulnerable according to Mbona *et al.* (2015). At Levels 3 (Landscape Unit) and 4 (HGM Type) of the Classification System, the systems were classified as per the summary in the table below.

[19] Ephemeral systems flow for less time than they are dry. Flow or flood for short periods of most years in a five-year period, in response to unpredictable high rainfall events. Support a series of pools in parts of the channel. Flow is absent between 26%-75% of the year.

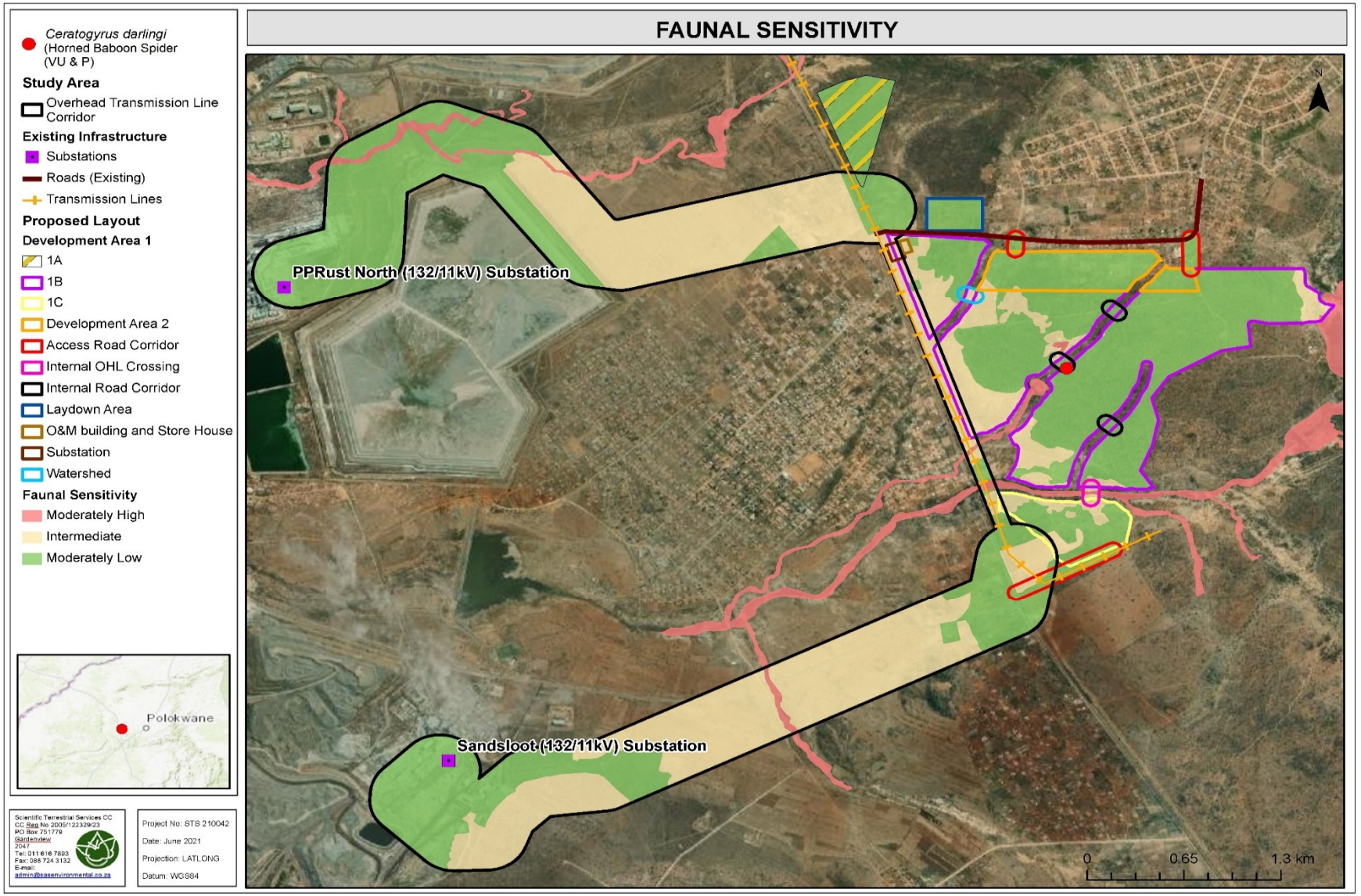


Figure 4-11: Overview of the faunal habitat sensitivity map for the focus area, showing burrow location of the SCC Ceratogyrus Horned baboon spider)

Table 4-4: Characterisation of the freshwater ecosystems according to the Classification System (Ollis et. al., 2013)

Freshwater Ecosystem	Level 3: Landscape unit	Level 4: HGM Type
Ephemeral Drainage Lines, Mohlosane and Groot-Sandsloot Rivers.	**Valley floor:** The base of a valley, situated between two distinct valley side-slopes.	**River**: A linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water. A river is taken to include both the active channel and the riparian zone as a unit.
Seep Wetland	**Slope:** An inclined stretch of ground typically located on the side of a mountain, hill or valley, not forming part of a valley floor. Includes scarp slopes, mid-slopes and foot-slopes.	**Seep wetland**: A wetland located on gently to steeply sloping land and dominated by colluvial (i.e gravity-driven), unidirectional movement of water and material down-slope.

According to Ollis *et al*., (2013) rivers are characterised by "concentrated, unidirectional flow within a distinct active channel, either permanently or periodically. Although the riparian zone associated with the EDL's was less well-defined and absent in some sections, the alluvial soil deposits and the terrain setting clearly indicate a distinct active channel that receives periodic flows and formed the basis of classification for the ephemeral systems.

In addition, water flows intermittently within these EDL's, conveying water from the upgradient catchment area into the downgradient tributaries and eventually into the Mohlosane and the Groot-Sandsloot Rivers. As such, they were considered as watercourses due to their importance for hydrological functioning and were therefore included in this assessment.

The following indicators were used to delineate the boundaries of the temporary zones associated with the identified freshwater ecosystems:

- Terrain units were used as the primary indicator, as the terrain of the study area, particularly low-lying areas where water is likely to collect and/or move through the landscape;
- Vegetation was utilised as the secondary indicator, particularly along the Mohlosane and the Groot-Sandsloot Rivers which possessed a distinct riparian zone. Vegetation along the EDLs associated with these rivers was less distinctive, however, still provided an indication of the presence and position of movement of increased volumes of water within the system;
- The presence of alluvial soil deposits along the Mohlosane, Groot-Sandsloot Rivers and the various EDLs was a useful indicator in conjunction with topography and vegetation in delineating the boundary associated with the freshwater ecosystems.

Aerial photographs associated with the proposed Mogalakwena PV infrastructure were obtained from the Department of Rural Development and Land Reform's (DRDLR) National Geo-spatial Information database (**http://cdngiportal.co.za/cdngiportal/**) to further aid in the identification and delineation of the various features identified during the site assessment. In addition, historical aerial photography and digital satellite imagery are considered useful tool in showing how land has been transformed due to anthropogenic activities within a landscape.

The delineated freshwater ecosystems are shown in Figure 4-12. Table 4-5 to Table 4-8 provide a summary of the four identified freshwater ecosystems.

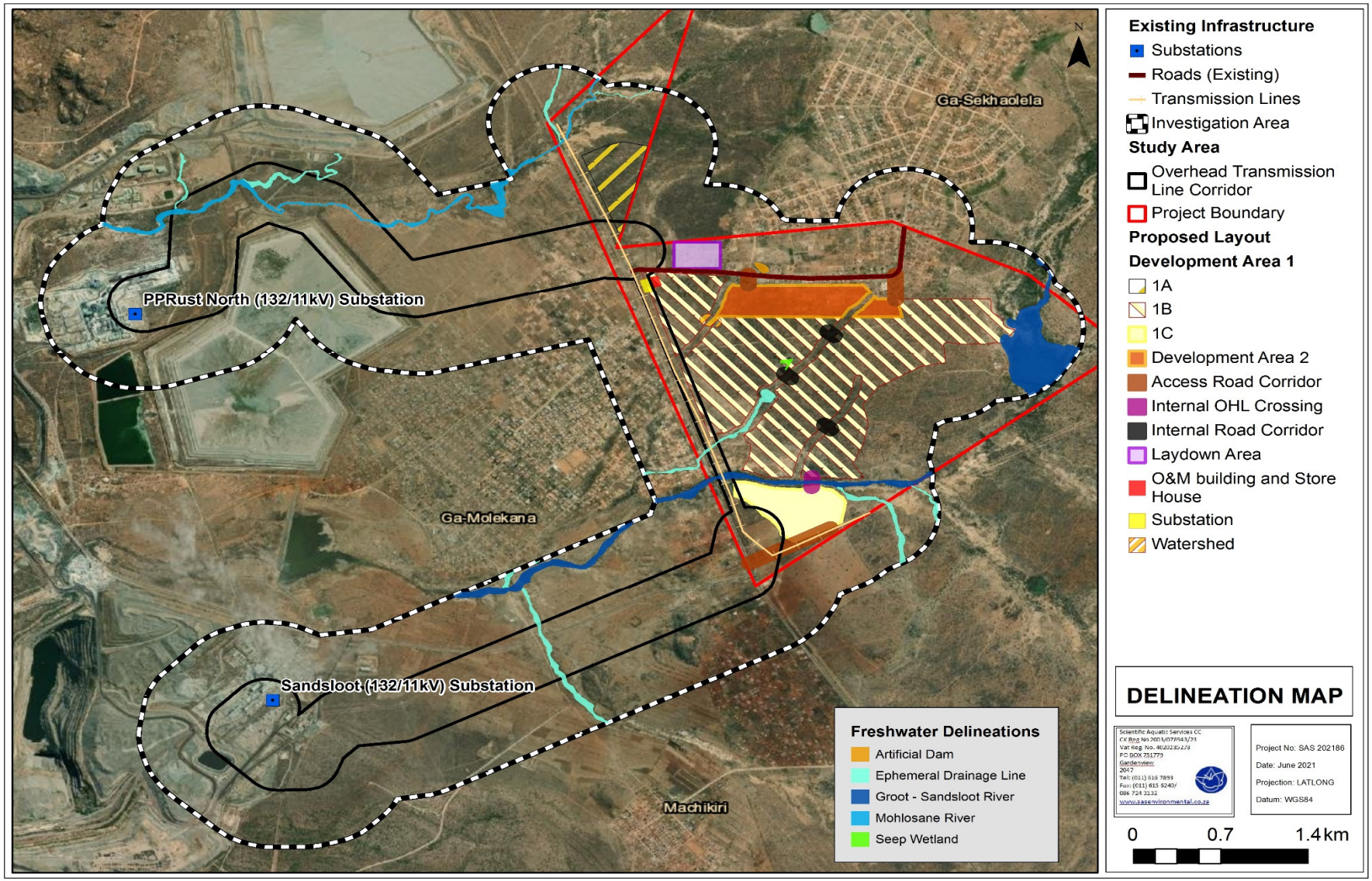
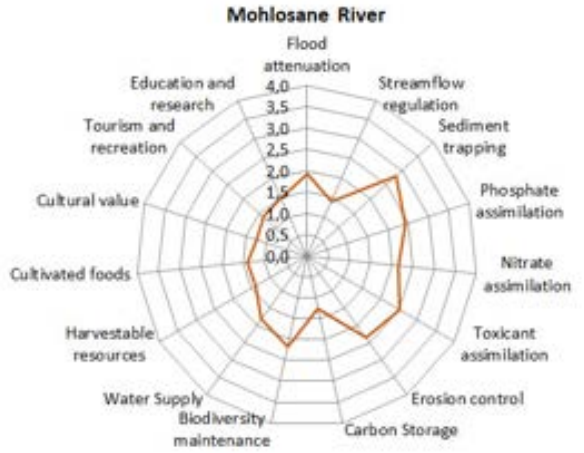


Figure 4-12: The location of the delineated freshwater ecosystems

Table 4-5: Summary of the assessment of the Mohlosane River

<table>
<tr><td colspan="2">Ecological & socio-cultural service provision graph:
 
</td><td colspan="2"> 
Figure 4-13: Representative photographs of the Mohlosane River showing presence of erosion and underlying bedrock.</td></tr>
<tr><td>IHI and VEGRAI discussion</td><td>Riparian IHI Category: C (Moderately modified)
VEGRAI Category: C/D
The Mohlosane River was dry during the site assessment owing to the non-perennial nature of the system. Non-perennial rivers are known to flow intermittently, for at least nine months of the year (Rossouw et al., 2005). The primary modifier of the Mohlosane River is the soil erosion which has been ongoing for decades as evident in historical images. This has resulted in severe incision, channel bank instability and formation of gullies leading to increased sediment deposition. The riparian zone was poorly defined within some areas and the non-marginal zone was vegetated primarily by grasses.</td><td>Ecoservice provision</td><td>Intermediate (Score – 1.8)
The ecoservice provision by the system was assessed to be intermediate, this was due to provision of eco-services such as flood attenuation, streamflow regulation, phosphate, nitrate and toxicant assimilation, erosion control, biodiversity maintenance, water supply, sediment trapping, toxicant assimilation. Erosion control and streamflow regulation are also provided by the system but to a much lesser degree. It should be noted that the relatively high scores obtained for sediment trapping and assimilation of nitrates, phosphates and toxicants are due to the increased opportunity of the Mohlosane River to perform these functions given its location in relation to mining activities in the area. Despite being located within a largely rural area, the ability of the system to provide direct services to humans was considered limited.</td></tr>
<tr><td>EIS discussion</td><td>EIS Category: Moderate
The EIS of the Mohlosane River was ascertained to be ‘Moderate’, largely due to the biodiversity support and the hydro-functional importance (i.e. provisioning of services such as flood attenuation, sediment trapping, phosphate and nitrate assimilation, toxicant assimilation and erosion control) of the river. The use of the Mohlosane River for direct human benefits were noted to be largely limited, although historical impoundment of the system within the upper reaches indicate provision of water for human use is important during periods of flow. Given the communities reliance on the cattle, it is clear that this system is an important source of water for livestock when surface water is present.</td><td>REC, RMO & BAS Category</td><td>REC:C/D
BAS: C
RMO: Maintain

As per the method of assessment (for the REC), “A watercourse may receive the same class for the PES as the REC if the watercourse is deemed in good condition, and therefore must stay in good condition. Otherwise, an appropriate REC should be assigned in order to prevent any further degradation as well as enhance the PES of the watercourse”. The Mohlosane River was</td></tr>
</table>

			assigned a REC of a category C with an RMO for the condition to be maintained. Given the proximity of the Mohlosane River to the mine, the river was assigned a BAS of a category C.
Freshwater ecosystem drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):			
The hydrological regime of the Mohlosane River has been by impacted by erosion and gully formation which has resulted in the alteration of the natural timing and delivery of water and sediment to the lower reaches of the system. The presence of dams within the upper reaches of the system has also resulted in reduction of flows to the downstream reaches and alteration of flow pattern and timing within the system. The presence of mining infrastructure, specifically tailings storage facilities and haul roads within the lower reaches of the system has also impacted on the hydrological regime of the system. During the June 2021 assessment, the assessed reach of the Mohlosane River was dry and as such no assessment of water quality was conducted. Where standing pools were present, these areas were used as cattle watering holes. Given the small volume and potential effects of evapoconcentration this water would not represent the natural water quality of a large system such as the Mohlosane River. The primary modifiers of the geomorphology within the Mohlosane River are stream bank and stream bed erosion which is particularly likely to occur after an intense rainfall event. Given the non-perennial nature of the Mohlosane River, the sediment regime and geomorphological contributors are only likely to occur when the river contains flowing surface water. Given the steepness of the system within some reaches due to impacts of erosion, it is likely that during periods of flow, the capacity of the system to deliver sediment downstream is increased which further intensifies formation/expansion of gullies. The Mohlosane is likely to provides some degree of habitat types for terrestrial, riverine and more tolerant aquatic biota, more typically when the river is in flow and contains surface water. Current conditions indicated limited use of the Mohlosane River by biota, however this is likely to change during the river's perennial cycle. The riparian vegetation community varied in species composition and structure although it was consistently distinct from the adjacent upland vegetation, with small stretches of the system possessing vegetation which is indicative of increased soil moisture (such as *Fingerhuthia africana*). The majority of the assessed reach was found to comprise predominantly indigenous flora, including *Euclea crispa, Searsia leptodictya* and *Combretum apiculatum*. However, some encroachment (specifically of *Dichrostachys cineara*) is evident in those reaches more prone to disturbance (STS 2021).		
Extent of modification anticipated	**None** The Mohlosane River will not be traversed by the proposed Mogalakwena PV infrastructure, as such, alteration to habitat and in specific the hydrological and geomorphological regimes were considered unlikely. Given the non-perennial nature of the system, possible edge effects could be further avoided should all construction activities especially those nearest to the freshwater environments be undertaken during the winter/dry season when flow is absent (non-rainfall periods).		
Business Case:			
	The Mohlosane River will not be traversed by the proposed infrastructure and as such the impact significance to this system is considered to be low. Despite this, it is highly recommended that the riparian zone and the associated 1: 100 year floodline be demarcated as "no-go areas"; this is not only important for the ecological functioning of the system but also more important for the protection of the PV infrastructure associated with the project which will be at risk should the floodline not be respected during infrastructure planning.		

Table 4-6: Summary of the assessment of the Groot-Sandsloot River

Ecological & socio-cultural service provision graph:	

Figure 4-14: Representative photographs of the Groot-Sandsloot River and associated dam (left) located east of the proposed Mogalakwena PV infrastructure

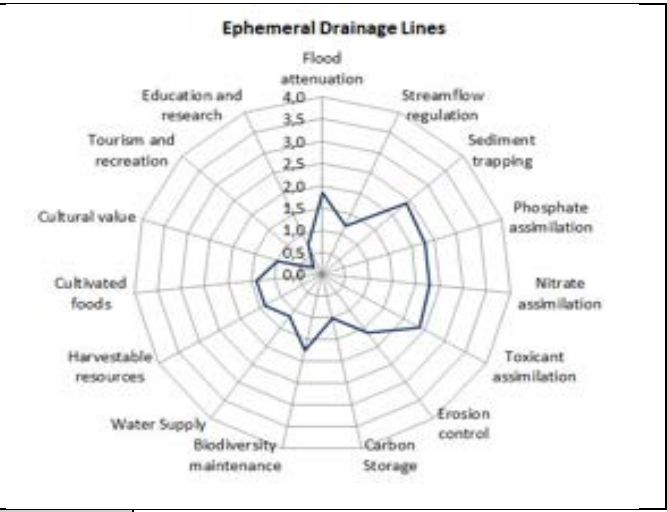
<table>
<tr><td colspan="2"> 
</td><td colspan="2"></td></tr>
<tr><td>IHI and VEGRAI discussion</td><td>Riparian IHI Category: C (Moderately modified)
VEGRAI Category: C
The hydraulic regime of the Groot-Sandsloot River has been altered by an impoundment upstream of the study area and infrastructure within the active channel, specifically the N11 road crossing. The presence of gravel access roads has resulted in fragmentation of the system whereby the poorly designed culverts and sedimentation have impeded flow to some degree. Primary impacts on the system include transformation of some portions of the riparian and non-marginal vegetation zone by encroachment of Dichrostachys cinerea. In addition, the top-soil layer within parts of the Groot-Sandsloot was very shallow and bedrock was exposed within the active channel indicating significant historical sediment laden runoff during periods of heavy rainfall.</td><td>Ecoservice provision</td><td>Intermediate (Score – 1.8)
The ecological service provisioning of the Groot-Sandsloot River was assessed to be intermediate for provisioning of ecoservices such as erosion control, flood attenuation, sediment trapping, phosphate, nitrate and toxicant assimilation. As a result of the notable transformation of habitat within some reaches of the system due to soil erosion impacts and encroaching by anthropogenic activities, some faunal habitat has been lost. However, the presence of instream dams also improves the river's capacity to provide a diversity of habitat for bird species.</td></tr>
<tr><td>EIS discussion</td><td>EIS Category: Moderate
The Groot-Sandsloot River was assessed to be of moderate Ecological Importance and Sensitivity (EIS) largely due to the hydro-functional importance (i.e. provisioning of services such as flood attenuation, sediment trapping, phosphate and erosion control) of the river. The direct human benefits of the Groot-Sandsloot River are also considered to be of moderate ecological importance and sensitivity as a result of the provision of water for human use and harvestable resources. In addition, the presence of the dams and reeds along the dam has also improved the freshwater ecosystems ability to provide a diversity of some habitat for bird species.</td><td>REC, RMO & BAS Category</td><td>REC:C
BAS: C
RMO: Maintain
The Recommended Management Objective (RMO) for the Groot-Sandsloot River based on the PES and the EIS scores is to maintain the ecological integrity of the system. No further degradation should be permitted and as such mitigation measures should be implemented during the construction and operational phases of the proposed Mogalakwena PV infrastructure. Furthermore, portions of the river to be affected by the proposed Mogalakwena PV (whether directly or by edge effects) should be rehabilitated once the infrastructure installation has been completed. This rehabilitation must ensure that within the affected portions, the natural topography is reinstated to avoid formation of preferential flow paths.</td></tr>
</table>

Freshwater ecosystem drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):			
The hydrological regime of the system has been impacted to a degree by various informal road crossings which have fragmented the system or resulted in partial hydraulic disconnection of the system within some areas. The impoundments within the upper reach of the system although considered important for provision of habitat have also impacted on the natural retention and distribution of flow and sediment to downstream reaches of the river. During the June 2021 assessment, water quality was assessed at three points along the system, which included upstream of the dam, at the dam and downstream of the dam. Specific in-situ parameters measured included pH, Dissolved Oxygen (DO) and Electrical Conductivity (EC). The EC measured at each assessment point respectively was 58.5 mS/m, 62.8 mS/m and 109.4 mS/m indicating an increase in a downstream direction. High EC measured downstream is likely due to increased evapoconcentration of salts since flow was limited below the dam where measurements were done. Despite the observed soil erosion being considered largely natural, the extent of sand mining (unauthorised activities not associated with Mogalakwena Mine) within the active channel is deemed to be a significant contributor to altered geomorphological processes, exacerbating the extent and severity of the erosion / incision, however this is not located within the proposed footprint of the PV infrastructure. This in turn results in altered sediment loads being transported to the downstream areas, which may in turn affect channel competency (further bank incision and/or bed scouring, as well as sediment deposition) and possible water quality alterations. The habitat within the Groot-Sandsloot River has been modified by impacts such as overgrazing and trampling of cattle causing bush encroachment (particularly *Dichrostachys cinerea*) along the banks of the river and erosion within other portions of the river (STS 2021). The presence of the dam has encouraged utilisation by faunal species and the vegetation cover of *Typha capensis* and *Phragmites australis* along the dam where sediment deposits and allows for reed establishment provides a degree of foraging and feeding habitat for less sensitive avifauna, mammals, reptiles and invertebrates.		
Extent of modification anticipated	**None** The Groot-Sandsloot River will not be directly traversed by the proposed Mogalakwena PV infrastructure although some sections of the proposed infrastructure (solar PV footprint areas) along the dam will encroach within frequently saturated areas associated with the dam. It is recommended that the layout is amended to ensure that these areas are avoided to protect both the freshwater ecosystem and the infrastructure. In addition, potential edge effects could be minimised by ensuring that all construction activities especially those nearest to the freshwater environments are undertaken during the winter/dry season when flow is minimal (non-rainfall periods), this is considered ideal from both a freshwater point of view and for ensuring that safer working conditions are maintained.		
Business Case:			
	The proponent has provided a proposed layout that avoids directly encroaching on the Groot-Sandsloot River and this reduces the potential impact significance to the system to a low impact. As mentioned above for the Mohlosane River, it is highly recommended that the riparian zone and the associated 1: 100 year floodline and the dam full supply level be demarcated as "no-go areas", this is not only important for the ecological functioning of the system but also more important for the protection of the PV infrastructure associated with the project which will be at risk should the floodline not be respected during infrastructure planning.		

Table 4-7: Summary of the assessment of the various ephemeral drainage lines (EDLs)

Ecological & socio-cultural service provision graph:	

Figure 4-15: Representative photographs of the ephemeral drainage line (EDLs) associated with the proposed Mogalakwena



PES and VEGRAI discussion	**Riparian IHI PES Category: C (Moderately modified)** **VEGRAI Category: C** During the June 2021 assessment, the EDLs were mostly dry. Identified impacts associated with the EDLs include the transformation of some portions of the riparian and non-marginal zone to due to encroaching informal and peri-urban residential areas. The EDLs where characterised by deposition of alluvial sediment which is typical of systems of this nature. Some of the EDLs were relatively shallow and bedrock was exposed within the active channel. Other impacts include informal road crossings traversing the EDLs and trampling by domestic livestock.	**Ecoservice provision**	**Intermediate (Score – 1.5)** The EDLs were found to provide an intermediate degree of ecological service provisioning. Ecological services provided by these systems included sediment trapping, flood attenuation, erosion control and to a degree phosphate assimilation. The opportunity to provide ecological services such as cultivated foods and harvestable resources was high owing to the level of poverty in the area, however limited effectiveness due to the lack of multiple harvestable resources. In addition, due to the prolonged absence of flows in these systems, their effectiveness for providing water supply for communities is very limited.
EIS discussion	**EIS Category: (Moderate)** The EDLs were shown be of moderate EIS. This was largely attributed to the landscape scale of the EDLs including the vegetation type and context of the ecological integrity within the landscape. The EIS was also in part due to the hydro-functional importance of the EDLs including flood attenuation, sediment trapping and assimilation of toxicants, nitrates and phosphates as previously discussed. Given the nature of flow of the EDLs socio-cultural services were all noted to be largely limited, particularly direct provision of water for human use.	**REC, RMO & BAS Category**	**REC: C** **BAS: C** **RMO: Maintain** Based on the PES and the EIS of the EDLs, the Recommended Management Objective (RMO) of the EDLs is to maintain the ecological condition of the systems and appropriate mitigation measures must be implemented to ensure that the significance of impacts is minimised as much as possible. Where the EDLs will be traversed by the proposed infrastructure and where trenching will be undertaken and unless directional drilling approaches are used, suitable rehabilitation measures must be implemented immediately following completion of construction activities.

Freshwater ecosystem drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):

Given the hydrological nature (flows only in response to unpredictable high rainfall events), the EDLs were mostly without flows at the time of the assessment. Observed erosion and gully formation within some of the EDLs has resulted in the alteration of the natural timing and delivery of water and sediment to the lower reaches of these systems.

In-situ water quality parameters were not measured as the EDLs were dry at the time of the June 2021 assessment. Given the absence of impacts such as mining infrastructure (i.e tailings dams) along the EDLs the water quality in the area would only be impacted by domestic activities. Although flow was absent within the EDLs, one of these systems had an instream dam which contained water, although this is mostly used for

cattle and does not represent water quality of the EDLs, *in-situ* water quality parameters such as EC, pH and DO were sampled. These parameters were measured as follows 40.6 mS/m, 8.85 and 85.2% respectively, indicating fair water quality conditions. In terms of habitat provision, the EDLs were limited in their ability to provide habitat for aquatic species (both faunal and floral) due to the absence of flows for prolonged periods. The vegetation communities within parts of the system have also been impacted by overgrazing of livestock (donkeys, goats and cows) and this has likely contributed to the observed transformation of some portions of the riparian and non-marginal vegetation zone and significant encroachment of *Dichrostachys cinerea*.	
Extent of modification anticipated	**Low** According to the current layout provided by the proponent, the extent of modification anticipated on the EDLs is considered to be low. The layout has been largely optimised to avoid the EDLs, as such reducing any potential impacts to these systems.
Business Case:	
	As mentioned above, the layout provided by the proponent avoids directly encroaching with the EDLs which reduces the potential impact significance. The extent of some EDLs has been reduced due to deposition of sediment from surrounding areas and upon observation during the field work, sections of the EDLs did not show characteristics of conveying water, however this may likely still have floodlines that are applicable to them.

Table 4-8: Summary of the assessment of the seep wetland associated with the Mogalakwena PV infrastructure

Ecological & socio-cultural service provision graph:

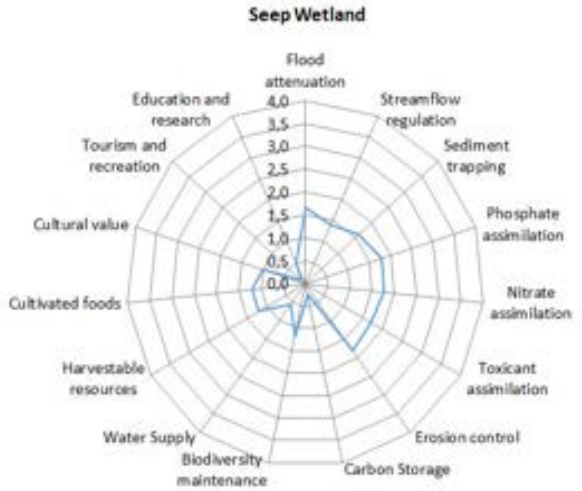


Figure 4-16: Representative photographs of the seep wetland associated with the proposed Mogalakwena PV infrastructure (Left). The soil sampled within the site shows indicators of a fluctuating water table (mottles) associated with frequent saturation.

PES Discussion	**PES Category: C (Largely Modified)** The seep wetland was observed to be surrounded by mostly woody vegetation (especially *Dichrostachys cinerea*). The presence of the woody vegetation has likely impacted on the water inputs into the seep wetland. The primary modifiers noted	**Ecoservice provision**	**Intermediate (Score – 1.8)** The ecological service provision by the seep wetland was assessed to be intermediate due to services such as sediment trapping, nitrate assimilation and erosion control. The seep covers a very small footprint (0.40 ha) and was not observed to have diversity of habitat available, as a

	were impacts to the vegetation, primarily as a result of grazing and trampling by domestic livestock. The resulting reduction in natural vegetation cover has led to encroachment by floral species associated with disturbance, however this is not considered to be severe. Other impacts include a gravel road adjacent to the seep which has likely impacted on the natural extent of functional wetland area.		result it was considered limited in terms of habitat provision for biodiversity support. However, the ecoservice provision of the system is largely seasonal and is strongly influence by presence of surface water within the wetland.
EIS discussion	**EIS Category: Moderate** The ecological importance and sensitivity (EIS) of the wetland was assessed to be moderate. The seep wetland likely provides, although limited some habitat, foraging and migratory sites for various faunal species on a seasonal basis especially when surface water is present. According to a local resident, during summer periods water saturates the wetland and the pools that form are able to accommodate amphibians and macro-invertebrates.	**REC, RMO & BAS Category**	**REC:C** **BAS: C** **RMO: Maintain** The Recommended Management Objective (RMO) for the seep wetland based on the PES and the EIS scores is to maintain the ecological integrity of the system. No further degradation should be permitted and as such it is recommended that the proposed Mogalakwena PV infrastructure avoids encroaching on the wetland. In addition, any edge effects must be rehabilitated to ensure the natural topography is reinstated to avoid formation of preferential flow paths.
Freshwater ecosystem drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):			
Very few impacts to the hydraulic regime and geomorphological processes were observed to be occurring on the seep wetland during the site assessment, with the exception of the gravel road adjacent to the wetland and minimal topsoil disturbances caused by trampling of livestock. *In-situ* water quality parameters were not measured as there was no surface water present at the time of the June 2021 assessment. Given the absence of activities which would significantly alter water quality (mining infrastructure) the water quality within the wetland is considered to be fair when present. In addition, according to a local resident, the major driver of the wetland is groundwater seepage which results in the presence of stagnant water particularly during the dry season. The geomorphology within the wetland was considered largely unimpacted (apart from impacts associated with cattle trampling) and this was due to the good vegetation cover provided by the short grasses and sedges identified within the wetland. The seep wetland had a good vegetation cover which was dominated by various grasses and sedges. The grass layer was dominated by grasses commonly found in moisture rich/wet areas which included species such as *Sporobolus africanus, Cynodon dactylon, Chloris virgata* and *Brachiaria nigropedata*. In addition, alien and encroacher species such as *Bidens Pilosa* and *Zanthium strumarium* were also found to be dominated within the seep.		
Extent of modification anticipated	**Medium** The seep wetland will be traversed by the Development Area 1(B) that is associated with the proposed Mogalakwena PV infrastructure. It is strongly recommended that the design of the PV infrastructure be reconsidered to avoid encroaching within this freshwater ecosystem to avoid any potential modification to the wetland.		
Impact Significance & Business Case:			
Medium	The proposed Mogalakwena PV infrastructure poses a medium-risk impact to the seep wetland given that the system is located within the proposed Development area 1(B) according to the current layout design. Realignment of the development area footprint should be considered in-line with the mitigation hierarchy to ensure the wetland is avoided. This is considered important for the safety of the infrastructure too, since it is not ideal for any structures to be within areas which are periodically saturated.		

4.4.2 Aquatic Ecological Assessment

The instream aquatic ecological assessment presents the results of two aquatic survey points (Table 4-9), conducted in early June and at a when the Groot Sandsloot was characterised by absence of significant flow.

Table 4-9: Geographic co-ordinates for the assessment points located on the Groot Sandsloot River

Site Name	Description	Co-ordinates	
		South	East
Mogalakwena UPS	The upstream biomonitoring point is located on the assessed Groot Sandsloot River, upstream of the dam.	23°59'34.97"S	28°57'37.24"E
Mogalakwena DS	The downstream biomonitoring point is located on the assessed Groot Sandsloot River, along the N11 highway.	23°58'40.37"S	28°59'1.83"E

During the time of the assessment flow at the downstream site was limited and depth was relatively shallow (0.3 – 0.6 m) with very slow to moderate flows. The upstream site was sampled immediately upstream of the dam, and due to the impoundment of the dam, the depth at which the upstream point was sampled was deeper (>1 m). No odour was present at the time of the assessment at both sites and proliferation of algae was observed to be significant only at the downstream site. Table 4-10 to Table 4-11 summarises the results of the assessment site located upstream of the Groot Sandsloot River.

Key for spatial and temporal water quality and macro-invertebrate comparisons: Negative value = decrease; Positive value = increase; Normal text = no significant change; **Bold** text = significant change (compared to guideline); Red text = significant deterioration; Blue text = significant improvement.

Table 4-10: Results of the assessment site located upstream of the Groot Sandsloot River

<table>
<tr><th colspan="2">Groot Sandsloot River Upstream</th><th colspan="4">*In situ* physico-chemical water quality</th><th colspan="4">Aquatic macro-invertebrate community integrity</th></tr>
<tr><td colspan="2" rowspan="3"> 
Figure 4-17: Downstream view of the dam associated with the Groot Sandsloot River and the Upstream monitoring point at the time of the June 2021 assessment.</td><td>**Parameter**</td><td>**June 2021**</td><td colspan="2">**RWQO of South Africa (DWA, 2011)**</td><td>**Parameter**</td><td>**June 2021**</td><td colspan="2">**Site specific spatial water quality variations (% var) from:**</td></tr>
<tr><td>**Parameter**</td><td>**Upstream spatial reference**</td></tr>
<tr><td>**pH**
EC (mS/m)
DO (mg/L)
DO (% sat)
Temp (C)</td><td>7.78
50.2
6.47
73.6
15.3</td><td>**pH**
EC (mS/m)</td><td>>6.5 - <8.4
<30 (Ideal)
30 - 50 (Acceptable)
50 - 85 (Tolerable)
>85 (Unacceptable)</td><td>**SASS5 score**
Number of taxa
ASPT score
IHAS score
MIRAI score</td><td>40
11
3.64
42
40.8 (D/E)</td><td>**SASS5**
ASPT
IHAS</td><td>NA (No upstream spatial reference)</td></tr>
<tr><td colspan="2">**Discussion**
➢ The Electrical Conductivity (EC) measured at the assessment point was within the tolerable (< 85 mS/m) range limit according to DWA (2011);
➢ The Dissolved Oxygen (DO) saturation was below the recommended 80 – 120% saturation range during the June 2021 assessment, but did however exceed the 60% sub-lethal concentration. This is likely due to absence of turbulent flows and presence of aquatic vegetation which likely increases biological oxygen demand, no significant impact on the aquatic ecology was anticipated;
➢ The pH measured in June 2021 was within the recommended ideal range (DWA 2011);
➢ Temperature was considered largely natural in relation to the diurnal and seasonal cycles; and
➢ Overall, no significant impacts on the water quality were observed at the monitoring point. Impacts on the water quality at the monitoring point likely include domestic use of the river and dam including use by cattle.</td><td colspan="4">**Discussion**
➢ The aquatic macro-invertebrate community diversity and sensitivity was classified as a Category D/E (largely to seriously modified) condition according to the MIRAI Ecostatus tool;
➢ Macro-invertebrates not suitably adapted, or which have a requirement for improved flows, as part of their biology, will likely not be present at this site. This has the potential to lower the overall abundance and diversity of the macro-invertebrate community present at the site; and
➢ The IHAS score was assessed to be poor during the June 2021 assessment, with limited biotope diversity present at the site with no stones habitat and sampling limited to mostly marginal and aquatic vegetation as well as gravel, sand and mud (GSM).</td></tr>
<tr><td colspan="6">**Visual assessment and site description**</td></tr>
<tr><td>**Algal proliferation**</td><td colspan="5">Limited algal proliferation was observed.</td></tr>
<tr><td>**Depth profiles**</td><td colspan="5">Mostly dominated by deeper pools (average depth 1-1.5 meter).</td></tr>
<tr><td>**Flow condition**</td><td colspan="5">Limited flows, mostly ponding water.</td></tr>
<tr><td>**Riparian zone characteristics**</td><td colspan="5">Riparian area dominated by grasses and short sedges.</td></tr>
<tr><td>**Water clarity and odour**</td><td colspan="5">Slightly discoloured at time of assessment and no odour present.</td></tr>
</table>

Table 4-11: Results of the assessment site located downstream of the Groot Sandsloot River.

Figure 4-18: Downstream view of the Groot Sandsloot River and the Downstream monitoring point at the time of the June 2021 assessment.

Parameter	June 2021	% var. from Upstream	RWQO of South Africa (DWA, 2011)		Parameter	June 2021	Site specific spatial water quality variations (% var) from:	
							Parameter	Upstream spatial reference
pH	7.98	+2.6	**pH**	>6.5 - <8.4	**SASS5 score**	18		
EC (mS/m)	118.0	**+135.1**	**EC (mS/m)**	30 (Ideal)	**Number of taxa**	5	**SASS5**	**-55.0**
DO (mg/L)	4.48	**-30.8**		30 - 50 (Acceptable)	**ASPT score**	3.6	**ASPT**	-1.1
DO (% sat)	55.0	**-25.3**		50 -85 (Tolerable)	**IHAS score**	38	**IHAS**	-9.5
Temp (℃)	18.4	+20.3		>85 (Unacceptable)	**MIRAI score**	39.0 (D/E)		

Discussion

- The EC measured at the assessment point was within the unacceptable (> 85 mS/m) range limit according to DWA (2011). The increase in EC was likely due to the lack of instream connectivity and low flows at the assessment point which is compounded by the increase in evapoconcentration at the time of the assessment;
- The DO saturation was below the recommended 80 – 120% saturation range and below 60% sub-lethal limit during the June 2021 assessment. This is likely due to absence of turbulent flows and presence of significant algal proliferation observed at the assessment point;
- The pH measured in June 2021 was within the recommended ideal range (DWA 2011);
- Temperature was considered largely natural in relation to the diurnal and seasonal cycles; and
- Overall, slight impacts on the water quality were observed at the monitoring point (elevated EC and low DO). Impacts on the water quality at the monitoring point likely include flow modification, domestic use of the river and dam river including use by cattle.

Discussion

- A significant decrease in the SASS5 score was measured when compared to the upstream assessment point. This is likely due to the slight decrease in habitat suitability (isolated pool) and lack of instream connectivity compounded by the observed increase in EC as well as a decrease in dissolved oxygen;
- The aquatic macro-invertebrate community diversity and sensitivity was classified as a Category D/E (largely to seriously modified) condition according to the MIRAI Ecostatus tool, indicating a deterioration in the system when compared to the upstream community diversity. In addition to impaired water quality, this is likely due to very poor habitat conditions at the assessment point;
- Macro-invertebrates not suitably adapted, or which have a requirement for improved flows, as part of their biology, will likely not be present at this site. This has the potential to lower the overall abundance and diversity of the macro-invertebrate community present at the site;
- The IHAS score was assessed to be poor during the June 2021 assessment, with limited biotope diversity present at the site with no stones habitat and sampling limited to mostly marginal and aquatic vegetation as well as gravel, sand and mud (GSM).

Visual assessment and site description	
Algal proliferation	Moderate to high algal proliferation was observed.
Depth profiles	Mostly dominated by shallow pools (average depth 0.5 – 1.0 meter).
Flow condition	Limited flows, mostly ponding water.
Riparian zone characteristics	Riparian area dominated by sedges.
Water clarity and odour	Slightly discoloured at time of assessment and no odour present.

4.5 Visual Environment

A landscape and visual assessment of the existing landscape within the study area was conducted by Create Landscape Architecture and Consulting. Various aspects were assessed in order to describe the baseline landscape's character, uniqueness, intactness, quality, rarity, vulnerability and sense of place as it is essential to understand the existing environment before assessing the impacts that may potentially lead to changes in the existing environment.

4.5.1 Climate

As mentioned in section 4.1, the site falls within the summer rainfall region of Limpopo. The rainfall period occurs from November to February. The highest rainfall occurs in January and December. The average rainfall declines from east to west. Thunderstorms are recorded fairly often. Fog is infrequent and would therefore not limit visibility of the surrounding landscape.

As a result of climate variations throughout the year, the appearance and perception of the natural landscape changes with the season. The vegetation of the study area appears more muted during the winter months with green-grey, brown and yellow as the dominant landscape colours, while various shades of light to deeper green are present during the summer months.

4.5.2 Topography

The local topography can be described as moderately undulating with various drainage lines /small water course valleys traversing the site. The site slopes west from the N11 upwards to the east, with the highest point being 1823 amsl. and the lowest point being 903 amsl. Some isolated patches of small to medium rocky outcrops are evident within the natural landscape.

4.5.3 Vegetation cover

Section 4.1 describes the vegetation cover of the study area which falls within the Central Bushveld Bioregion. Mucina and Rutherford (2006) classify tall trees as part of this vegetation type, however the assessment found the tallest trees to be less than 10m in height. The study area is instead comprised of a low to moderate height irregular canopy structure which can provide some visual screening ability to the receiving environment.

4.5.4 Landscape character

The landscape character associated with the study area can be described as rural with flat to moderately undulating topography with some natural vegetation characterised by an herbaceous layer dominated by grass species and a discontinuous, open tree layer, often represented in clumps.

The site's landcover is largely made up out of open woodland with a formal residential portion located to the north. The areas located west of the site (opposite the N11) is categorised as mining and residential.

Various formal, built houses (providing accommodation for mine labourers and associated industries) are scattered within the small rural settlements of:

- Ga-Molekana (west of the site);
- Ga-Sekhaolelo (north east of the site);
- Sekuruwe (north of the site)

The border of the Witvinger Nature Reserve is located approximately 4km from the closest border of the proposed site. The nature reserve includes a mountain sanctuary and a few

guesthouses and lodges bordering its boundary. From the desktop study most of these tourist establishments are located on the eastern slopes of this section of the Waterberg Mountains, whereas the proposed site is located west of the Witvinger Nature Reserve. The proposed infrastructure would not be visible from these points due to distance and the screening effect of the natural topography.

The town of Mokopane (although not falling within the study area) is located nearby, the proposed development will however not be visible from there.

In general, there is a high level of anthropogenic transformations and visually detrimental activities, such as illegal dumping, evident within the study area. The greatest landscape transformation would be the Mogalakwena Open Pit Mine, located approximately 3km west of the proposed development. It is expected that the proposed development will have low impact on the landscape character.

4.5.5 Visual absorption capacity (VAC) and visual intrusion

VAC is an indication of the ability of the landscape to visually conceal the proposed development. Areas with high VAC can accommodate and absorb physical changes in the landscape without transforming its visual character and quality, while a low VAC rating implies a low ability to absorb or conceal visual impacts (Oberholzer, 2005). The factors that contribute to the VAC factor includes topographical diversity, vegetation, soil contrast, visual pattern, and recovery time.

VAC is further closely related to visual intrusion, which refers to the physical characteristics and nature of the contrast created by a project on the visual aspects of the receiving environment. It is also, as with VAC, a measure of the compatibility or the conflict of a project with the existing landscape and surrounding land use.

The visual intrusion for the proposed infrastructure will be low as the existing landscape offers visual variety and discontinuity in terms of lines, form and colours associated with industrial type vertical elements as well as existing residential houses.

The VAC of the study area is high as the proposed project is located within an area already affected by visually intrusive mining activities, such as the Mogalakwena Ope n Pit Mine. Existing transmission lines (which could be structurally smaller and therefore visually less intrusive than the proposed) are located along the N11 and Bakenberg Road running parallel to the proposed transmission line corridor.

The topography offers some screening ability from certain viewpoints and for most receptors the proposed activities and structures will mostly be visible in the foreground. A low- moderate contrast in colour (various open dry soil patches located within the study area) is expected between the proposed development and the natural landscape, especially during the construction phase of the project when vegetation clearing takes place. PV panel height will be limited (less than 5m) and natural vegetation could offer some screening ability, especially if viewed from a distance. Natural vegetation will not be able to offer any screening ability for pylons associated with the overhead transmission lines.

4.5.6 Landscape Quality

Landscape quality is based on human perceptions and expectations in the context of the existing environment. A landscape's visual quality is therefore a factor of an observer's emotional response to physical landscape characteristics and therefore assigning values to visual resources is therefore a subjective process. Landscape quality increases with the presence of water, topographic ruggedness and where diverse patterns of vegetation occur. Areas that contain more natural features or harmonious man-made compositions will have a more favourable landscape quality than areas with non-harmonious human activity.

The landscape associated with the study area provides topographical variety in the form of small rocky outcrops, mounted terrain towards the south, open canopy bushveld vegetation with bare soil patches in between, and anthropogenic structures which resemble that of the proposed project.

The natural vegetation within the project area is homogenous, offering limited variety. Drainage lines are present but did not dominate the scene during the site visit but is expected to be more noticeable during the summer months (rainy season).

Some intensity or variety in colours and contrast of the soil and vegetation is present but it is not a dominant scenic element.

The adjacent scenery, such as the Waterberg Mountains which forms a backdrop south of the site, enhances the visual quality. Mining activities located in closer proximity to the proposed site detracts from the visual quality. The landscape of the site is not distinctive to the study area and also not unique to the larger region as there are numerous open parcels of land with similar landscape quality.

The overall landscape quality is low – moderate and the proposed industrial type of activity will add to discordant elements in the area, further lowering the landscape quality of the area.

4.5.7 Landscape value

The study area is likely to be most valued by tourists who visit private nature reserves and lodges on private game reserves (within the greater Waterberg region) for either recreational (hunting) or leisure purposes. The study area is also likely to be moderately valued by motorists traveling on the N11. The proposed project may therefore lower the landscape value through the direct loss of vegetation, especially during the construction phase of the project.

Permanent residents of surrounding rural residential areas and people who work at Mogalakwena Mine will have a different perception because of their more regular contact with the landscape and the ongoing industrial type changes within it. The proposed project will not affect the landscape value for these receptors.

4.5.8 Night-time lighting

The proposed study has low district brightness as it falls within a rural area which is relatively dark. Mogalakwena Mine has already significantly contributed to sky glow and artificial lighting within the study area. It is expected that the proposed infrastructure will not have a significant contribution to additional night-time lighting in the area during the operational phase of the project.

4.5.9 Sense of place

The sense of place associated with the specific site and its surrounds can be described as rural and active with a moderate level of traffic and pedestrian movement. Mining and residential activities dominate the visual scene around the proposed site.

Formal constructed houses, gravel roads and small informal haphazardly spaced businesses and trading enhances the overall rural sense. The low visual profile of the proposed development would not disturb the overall sense of place, which is already heavily influenced by the mine west of the site and the residential areas north, west and south of the site.

Figure 4-19: Typical scattered formal and informal buildings

Figure 4-20: Open pit mining activities evident opposite the proposed PV Facility

4.6 Heritage Resources

A desktop study preluded the heritage impact assessment (HIA) field assessment in order to determine an archaeological overview of the study area and its surroundings. A brief summary of this overview is provided below. Please refer to the HIA report attached in Appendix E5.

4.6.1 Early Stone Age (>200 000 – 2 million years Before Present (BP))

Early stages include simple flakes struck from cobbles, core and pebble tools; later stages include intentionally shaped hand axes, cleavers and picks; final or transitional stages have tools that are smaller than the preceding stages and include large blades (Lombard *et al.* 2012).

As far as is currently known, Limpopo province is not as well known for its Early Stone Age resources as other parts of the country. The closest occurrences of major finds from this time period are located at the Cave of Hearths (Herries 2011), which is dated to 1.1-1.4 Ma (best age estimates interpreted from contexts of direct/associated dates) and characterised by *Acheulian* assemblages.

4.6.2 Middle Stone Age (MSA) (20 000 – 300 000 BP)

Levallois or prepared core techniques (for definitions see Van Peer 1992; Boeda 1995; Pleurdeau 2005) occur in which triangular flakes with convergent dorsal scars, often with faceted striking platforms are produced; Discoidal systems (for definition see Inizan et al. 1999) and intentional blade production from volumetric cores (for definition see Pleurdeau 2005) also occur; formal tools may include unifacially and bifacially retouched points, backed artefacts, scrapers, and denticulates (for definition see Bisson 2000); evidence of hafted tools; occasionally includes marine shell beads, bone points, engraved ochre nodules, engraved OES fragments, engraved bone fragments, and grindstones (Lombard et al. 2012).

Most MSA sites in Limpopo Province are caves or rock shelters, the best-known being Cave of Hearths (Mason 1962, 1988; Sampson 1974; Sinclair 2009), Olieboomspoort (Mason 1962; Van der Ryst 2006), Bushman Rock Shelter (Plug 1981; Porraz *et al*. 2015) and Mwulu's Cave (Tobias 1949; Sampson 1974).

4.6.3 Later Stone Age (LSA) (40 000 - < 2 000 BP)

Variability between assemblages; a wide range of formal tools, particularly scrapers (microlithic and macrolithic), backed artefacts, evidence of hafted stone and bone tools, borers, bored stones, upper and lower grindstones, grooved stones, ostrich eggshell (OES) beads and other ornaments, undecorated/decorated OES fragments, flasks/flask fragments, bone tools (sometimes with decoration), fishing equipment, rock art, and ceramics in the final phase (Lombard et al. 2012).

Major LSA sites occurring in the Limpopo Province include: Balerno Main Shelter (Van Doornum 2007a), Goergap 113 KR (Van der Ryst 1998), New Belgium (Van der Ryst 1998), Schurfpoort 112 KR (Van der Ryst 1998) and Tshisiku Shelter (Van Doornum 2007b).

4.6.4 Rock Art

By the beginning of the Later Stone Age, human behaviours were undoubtedly modern (Huffman 2005). Uniquely human traits, such as rock art and purposeful burials with ornaments, became regular practice (Huffman 2005).

South Africa's rock art tradition is the engravings and paintings produced by forager or San communities (Smith & Ouzman 2004). Though considered predominantly shamanistic and symbolic, San rock art also concerns gender, landscape, and politics (Smith & Ouzman 2004).

In addition, Bantu-speaking farmers' rock art also exists that was made by groups that appeared in southern Africa about 2,000 years ago (Vogel 1995) from East and Central Africa (e.g., Ten Raa 1974; B. Smith 1995, 1997, 2002). This art has several distinct traditions, among them the northern Sotho initiation and protest rock arts (Smith and van Schalkwyk 2002, van Schalkwyk and Smith 2004), the rock engravings of Late Iron Age settlements (e.g., Maggs 1995), and the boys' initiation rock art of the southern Sotho and Zulu. Most of these traditions are informed by oral history, and some may continue to be practiced (Smith & Ouzman 2004).

Four areas known from the northern part of the country where rock art clusters are found, comprise the Limpopo River Valley, the Makabeng-Blouberg Mountains, the Soutpansberg Mountains and the Waterberg.

4.6.5 Iron Age Sequence

In the northern regions of South Africa at least three settlement phases have been distinguished for early prehistoric agropastoralist settlements during the Early Iron Age (EIA). Diagnostic pottery assemblages can be used to infer group identities and to trace movements across the landscape. The first phase of the Early Iron Age, known as Happy Rest (named after the site where the ceramics were first identified), is representative of the Western Stream of migrations, and dates to AD 400 - AD 600. The second phase of Diamant is dated to AD 600 - AD 900 and was first recognized at the eponymous site of Diamant in the western Waterberg. The third phase, characterised by herringbone-decorated pottery of the Eiland tradition, is regarded as the final expression of the Early Iron Age (EIA) and occurs over large parts of the North West Province, Northern Province, Gauteng and Mpumalanga. This phase has been dated to about AD 900 - AD 1200. These sites are usually located on low-lying spurs close to water (Coetzee 2015).

The Late Iron Age (LIA) settlements are characterised by stone-walled enclosures situated on defensive hilltops c. AD 1640 - AD 1830). This occupation phase has been linked to the arrival of ancestral Northern Sotho, Tswana and Ndebele (Nguni–speakers) in the northern regions of South Africa with associated sites dating between the sixteenth and seventeenth centuries AD. The terminal LIA is represented by late 18th/early 19th century settlements with multichrome Moloko pottery commonly attributed to the Sotho-Tswana. These settlements can in many instances be correlated with oral traditions on population movements during which African farming communities sought refuge in mountainous regions during the processes of disruption in the northern interior of South Africa, resulting from the so-called difaqane (or mfecane) (Coetzee 2015).

4.6.6 Heritage features found during the HIA

Through desktop assessments, screening exercises and extensive field assessments, the following heritage resource sites were identified. A brief explanation of the site's relevance to the proposed project is also provided. Only sites that could potentially be impacted on by the proposed project were considered for the impact assessment phase and were assessed further (refer to section 5.5). Figure 4-21 illustrates the location of these sites.

- **MGSP 1** is located approximately 123m from the nearest development footprint. As a result, this site will not be included in this Heritage Impact Assessment;
- **MGSP 2** is located approximately 478m from the nearest development footprint. As a result, this site will not be included in this Heritage Impact Assessment;
- **MGSP 6** is located approximately 522m from the nearest development footprint. As a result, this site will not be included in this Heritage Impact Assessment;

- **MGSP 7** is located approximately 164m from the nearest development footprint. As a result, this site will not be included in this Heritage Impact Assessment;
- **MGSP 10** is located approximately 227m from the nearest development footprint. As a result, this site will not be included in this Heritage Impact Assessment;
- **MGSP 28** is located approximately 107m from the southern transmission line corridor. As a result, this site will not be included in this Heritage Impact Assessment;
- **MGSP 3** (**MGSP 8 or MGSP 33), MGSP 4 (MGSP 17), MGSP 5 (MGSP 22), MGSP 9, MGSP 11, MGSP 12 and MGSP 21** are located within the proposed development footprints and will be included in this Heritage Impact Assessment;
- **MGSP 13, MGSP 14 and MGSP 23** are located within the northern transmission line corridor and will be included in this Heritage Impact Assessment; and
- **MGSP 15, MGSP 16, MGSP 18, MGSP 19, MGSP 20, MGSP 24, MGSP 25, MGSP 26, MGSP 27, MGSP 29, MGSP 30, MGSP 31** and **MGSP 32** are located within the southern transmission line corridor and will be included in this Heritage Impact Assessment.

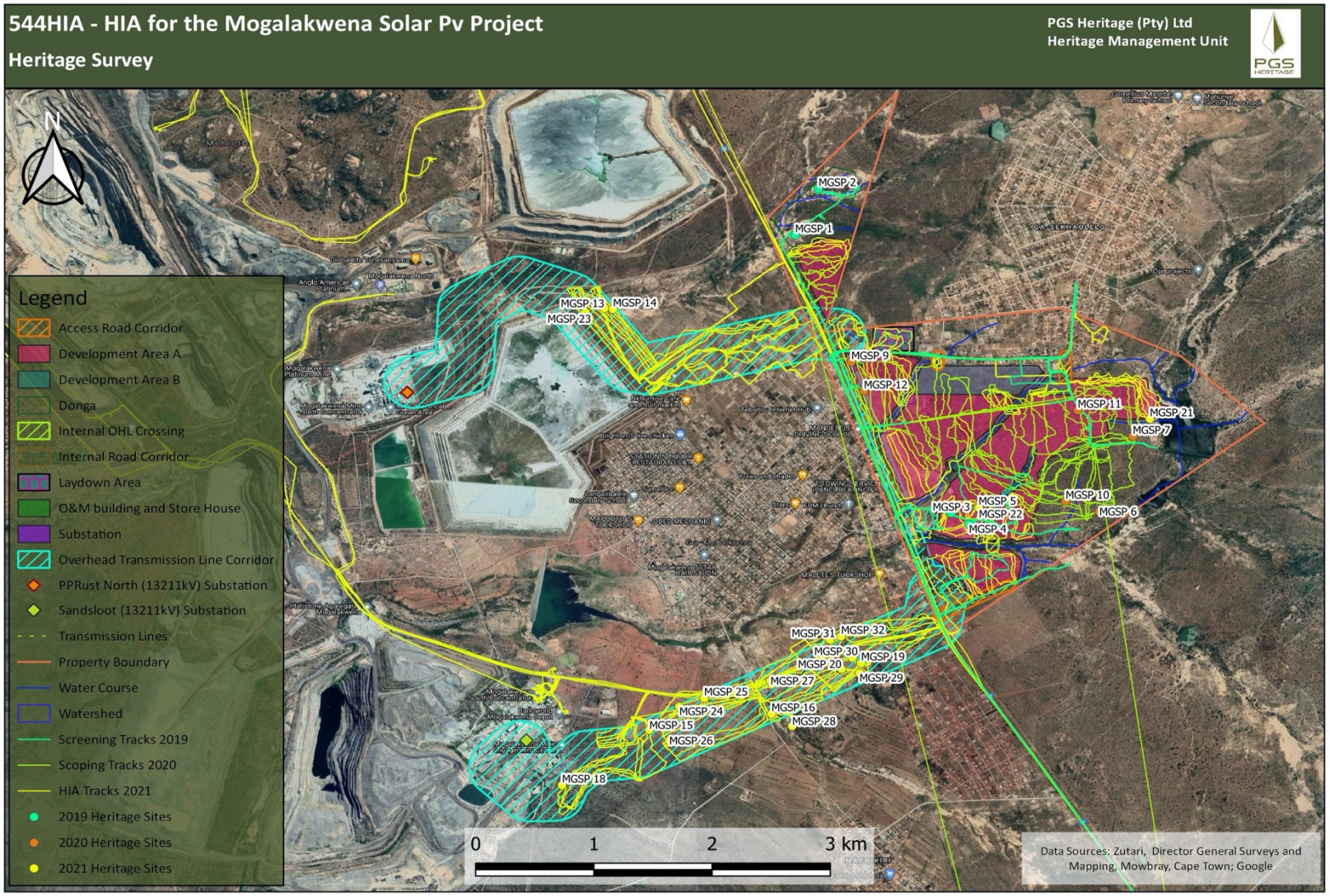


Figure 4-21: Google Earth image depicting the tracklogs that were recorded in the field. Tracks from the 2021 survey are recorded in yellow, the tracklogs 2020 survey are depicted in green, while the tracks recorded during the 2019 screening survey are depicted by the light blue line

4.7 Paleontological Resources

Banzai Environmental was appointed to conduct the Palaeontological Desktop Assessment (PDA) to assess the Mogalakwena Solar PV Project. To comply with the National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), this PDA is necessary to confirm if fossil material could potentially be present in the proposed project area and to evaluate the impact of the proposed development on the Palaeontological Heritage.

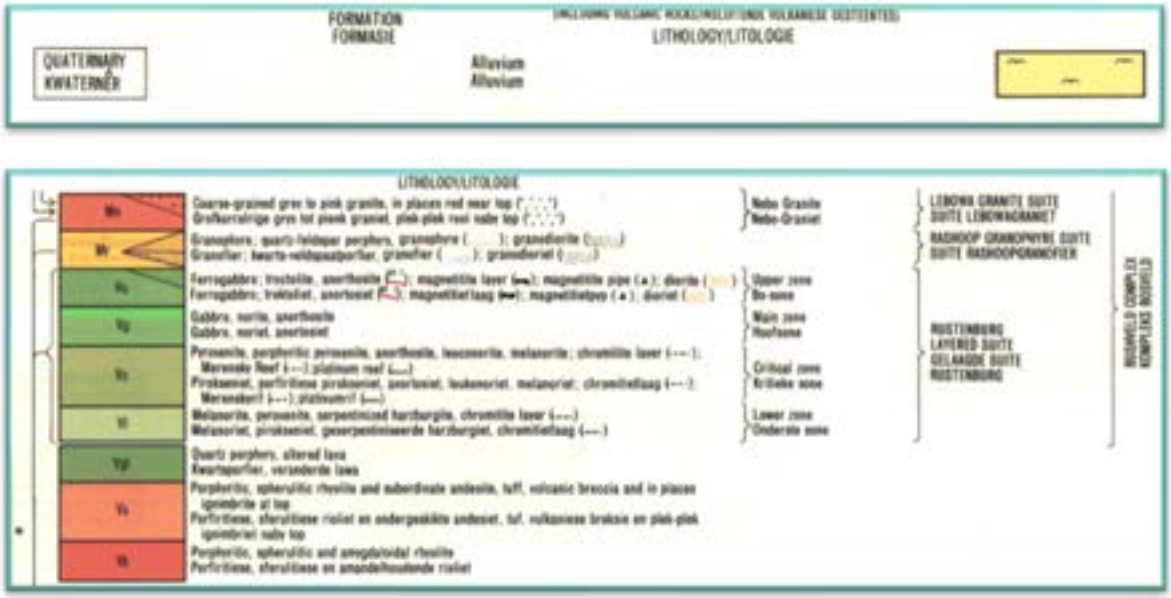
The proposed PV development is depicted on the 1: 250 000 2328 Pietersburg Geological Map (1985) while the transmission lines and corridors are shown on the 2428 Nylstroom (1978) Geological Map (Council for Geosciences, Pretoria The proposed PV development is surrounded by rocks of the Rustenburg Layered Suite and Lebowa Granite Suite of the Bushveld Complex, while the proposed PV facility is underlain by the Hout River Gneiss Suite (Archaean Granitoid Intrusions). The existing Sandsloot substation and a portion of the eastern transmission line is underlain by the Malmani Subgroup (Chuniespoort Group of the Transvaal Supergroup) (Figure 4-22). According to the PalaeoMap on the South African Heritage Resources Information System database, the Palaeontological Sensitivity of the Houtriver Gneiss Suite (Archaean Granitoid Intrusions) is zero, as they are igneous in origin and thus unfossiliferous, while the Malmani Subgroup has a very high Palaeontological Sensitivity (Almond and Pether 2008, SAHRIS website). However, as this area is surrounded by igneous rocks, possible fossil finds would have been baked.

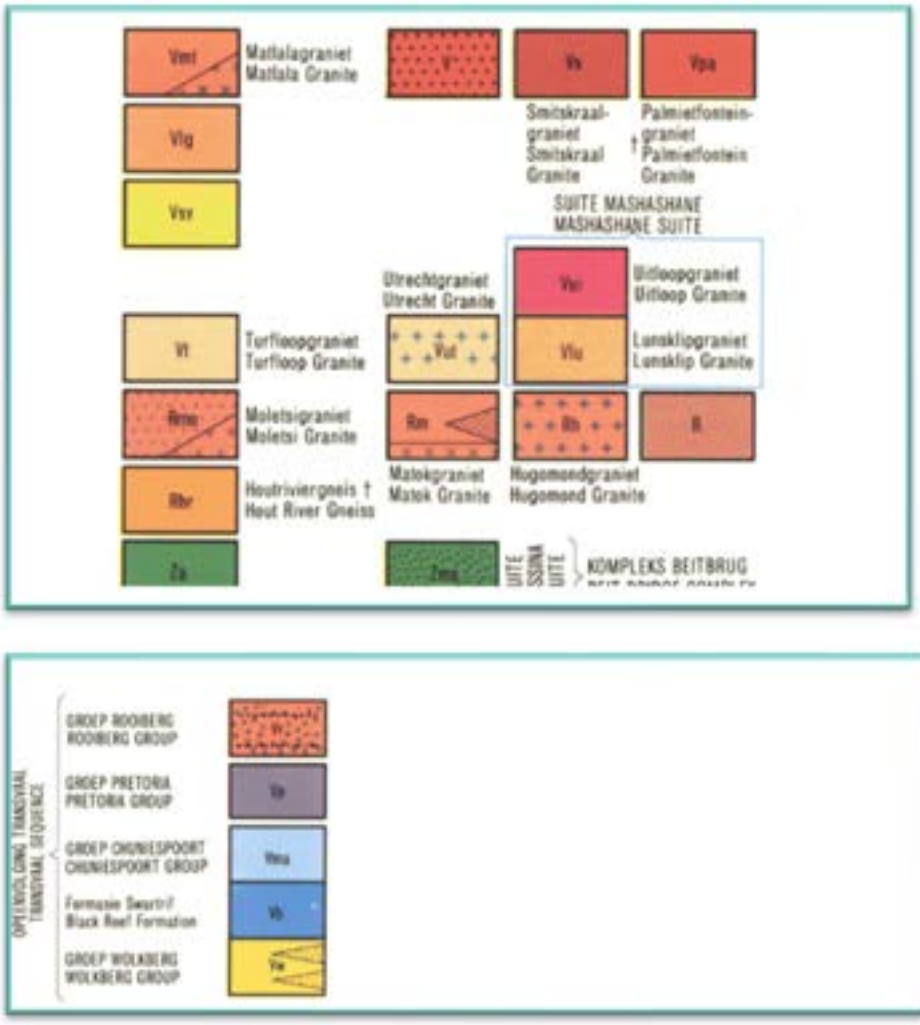
The Hout River Gneiss Suite is present in the north-eastern Kaapvaal craton and contain granitoid gneisses with various compositions. This Gneiss consists of coarse-grained metamorphic rock that is typically banded and is formed by regional high-grade metamorphism of granite. Alkali feldspar, amphiboles mica, quartz, and rarely pyroxenes forms large crystals in this gneiss (Robb et al, 2006).The transmission lines and corridors are underlain by the Malmani Subgroup (Chuniespoort Group of the Transvaal Supergroup). The Malmani Subgroup comprise of an assortment of stromatolites (microbial laminites), ranging from supratidal mats to intertidal columns and large subtidal domes. Southwest of the proposed development is a small area of Quaternary alluvium.

South Africa produces more than half of the world's annual production of chromium, platinum, valadium and refractory minerals. These minerals are a result from an extraordinary body of igneous rocks, namely the Bushveld Complex. The Bushveld Complex consists of three different types of igneous rocks. The oldest is a series of volcanic rocks, followed by basaltic magma that did not reach the surface but instead formed an enormous underground chamber of approximately 400 x 300 km across the Limpopo, North West and Mpumulanga provinces reaching a maximum thickness of approximately 8 km. Lastly magma intruded above the basaltic body and crystallized as granite. The three components are known as the Rooiberg Group, Rustenburg Layered Suite and Lebowa Granite Suite, which together make up the Bushveld Complex.

The Rustenburg Layered Suite is Vaalian in age (2,100 – 1,920 Million years old) and consists of an igneous intrusion with anorthosite, hybrid gabbro, gabbro, diabase, epidiorite, pyroxenite, and norite rocks

Figure 4-22: Extract of the 1: 250 000 2428 Nylstroom (1978) Geological Map and 2328 Pietersburg Geological Map (1985) (Council for Geosciences, Pretoria). The proposed PV development is largely underlain by Archaean granitoid Intrusions while the Sandsloot existing substation and a portion of the transmission line is underlain by the Malmani Subgroup (Chuniespoort Group of the Transvaal Supergroup).





Q (yellow); Quaternary Superficial deposits; alluvium

Mn (red-orange)-Nebo Granite, Lebowa Granite Suite, Bushveld Complex; coarse grained grey to pink granite, in places red near the top

Vg (bright green)- Rustenburg Layered Suite, Bushveld complex; Gabbo, norite anorthosite

Vl, (dull green) -Melanorite, pyrxenite serpentinized harzburgite, chromitite layer

Rhr-(orange)- Hout River Gneiss

Vma, Malmani Subgroup, Chuniespoort Group, Transvaal Supergroup-dolomite, chert, limestone, chert breccia with interbedded shale, sandstone amd quartzite

A palaeosensitivity rating must be done for all projects according to the SAHRIS rating criteria. Figure 4-23 is a representation of sensitivities affected by the proposed project. Table 4-12 indicates the required action as per SAHRIS requirements.

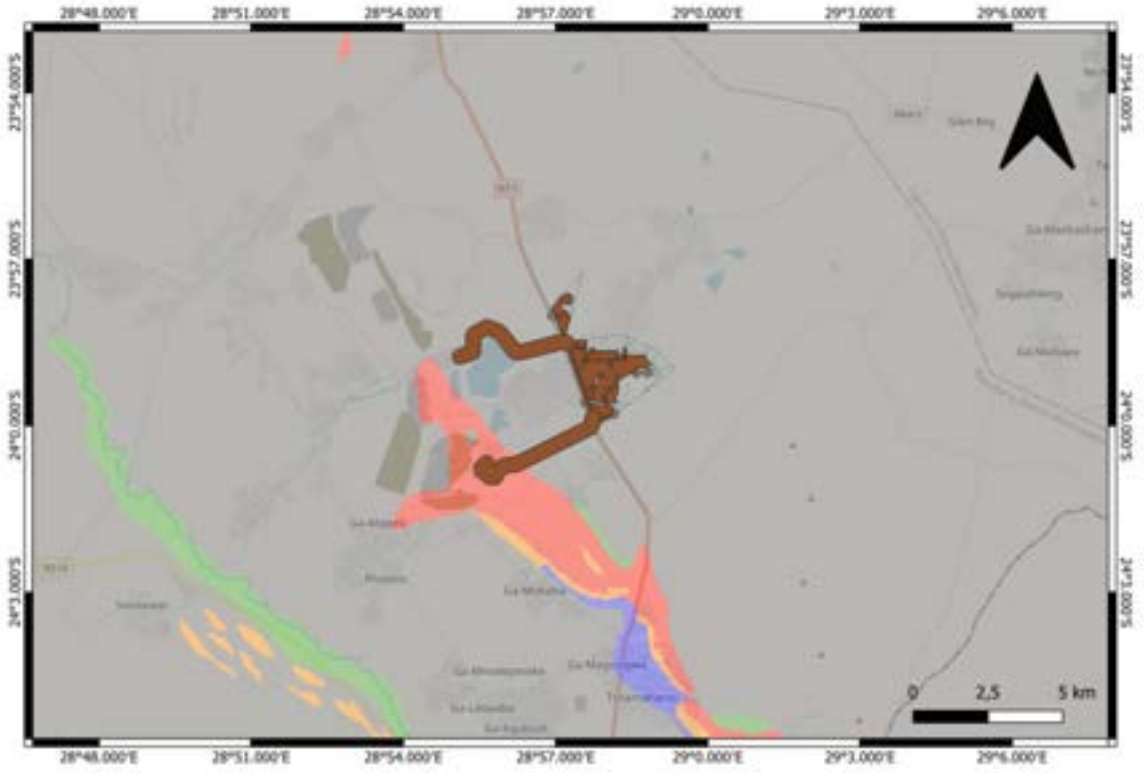


Figure 4-23: Extract of the 1 in 250 000 SAHRIS PalaeoMap map (Council of Geosciences) indicating the proposed development in brown

Table 4-12: SAHRIS Palaeosensitivity ratings table. The relevant sensitivities are highlighted

Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study; a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, sahra will continue to populate the map.

According to the SAHRIS Palaeo Sensitivity map (Figure 4-23), there is a zero chance of finding fossils in the in the grey area, while there is a high chance of finding fossils in the red area. However, the igneous rocks of the Bushveld Complex would have baked fossils in this development footprint.

4.8 Social and Socio-economic Environment

When viewing the environment from a socio-economic perspective it is important to understand what the social environment is. Different definitions for social environment exist, but a clear and comprehensive definition that is widely accepted remains elusive. Barnett & Casper (2001) offers the following definition of human social environment:

"Human social environments encompass the immediate physical surroundings, social relationships, and cultural milieus within which defined groups of people function and interact. Components of the social environment include built infrastructure; industrial and occupational structure; labour markets; social and economic processes; wealth; social, human, and health services; power relations; government; race relations; social inequality; cultural practices; the arts; religious institutions and practices; and beliefs about place and community. The social environment subsumes many aspects of the physical environment, given that contemporary landscapes, water resources, and other natural resources have been at least partially configured by human social processes. Embedded within contemporary social environments are historical social and power relations that have become institutionalized over time. Social environments can be experienced at multiple scales, often simultaneously, including households, kin networks, neighbourhoods, towns and cities, and regions. Social environments are dynamic and change over time as the result of both internal and external forces. There are relationships of dependency among the social environments of different local areas, because these areas are connected through larger regional, national, and international social and economic processes and power relations."

Environment-behaviour relationships are interrelationships (Bell, Fisher, Baum & Greene, 1996). The environment influences and constrains the behaviour of people, but behaviour also leads to changes in the environment. The impacts of a project on people can only be truly understood if their environmental context is understood. The baseline description of the social environment will include a description of the area within a provincial, district and local context that will focus on the identity and history of the area as well as a description of the population of the area based on a number of demographic, social and economic variables.

4.8.1 Description of the area

The proposed project will be located in Wards 18 and 19 of the Mogalakwena Local Municipality that falls under the Waterberg District Municipality in the Limpopo Province. For the baseline description of the area, data from Census 2011, Community Survey 2016, municipal IDP's and websites were used.

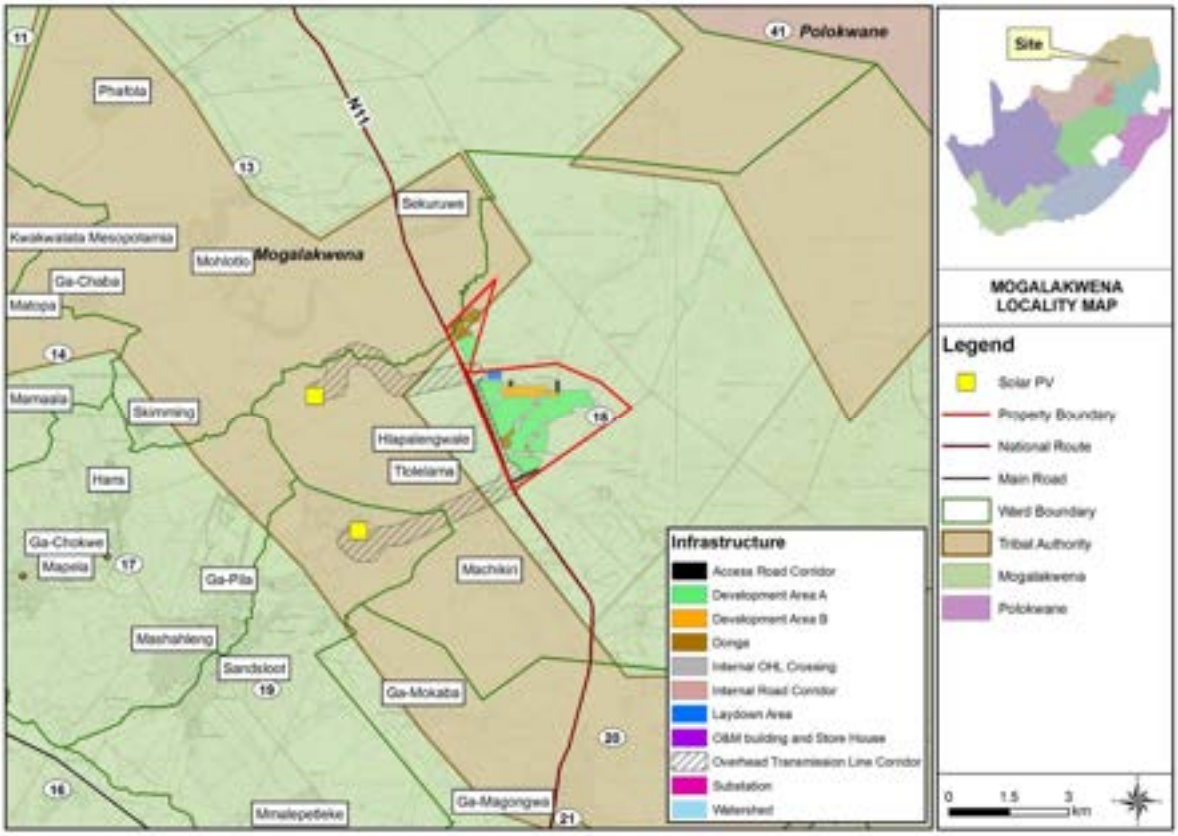


Figure 4-24: Location of the proposed project in municipal context

The **Limpopo Province** is South Africa's most northern province and covers an area of 125 754 km^2 (www.municipalities.co.za). It shares an international border with Mozambique, Zimbabwe and Botswana. It also borders the Gauteng, Mpumalanga and North West Provinces. The capital of the province is Polokwane. Other major cities and towns include Bela-Bela, Lephalale, Makhado, Musina, Thabazimbi and Tzaneen.

Mining is the main driver of the economy and mineral deposits include platinum-group metals, iron ore, chromium, high and middle-grade coking coal, diamonds, antimony, phosphate, and copper. Mineral reserves include gold, emeralds, scheelite, magnetite, vermiculite, silicon and mica.

Crops grown in Limpopo include sunflowers, cotton, maize, peanuts, bananas, litchis, pineapples, mangoes, pawpaws, a variety of nuts, as well as tea and coffee. The Bushveld is known for cattle, where controlled hunting is often combined with ranching.

The Limpopo Province is linked to the Maputo Development Corridor through the Phalaborwa Spatial Development Initiative, which is a network of road and rail corridors connecting to the major seaports with the vision to open up the province for trade and investment. This is complimented by the presence of airports in major centres of the province (Zutari, 2020).

Limpopo is divided into five districts, namely Capricorn, Mopani, Sekhukune, Vhembe and Waterberg.

The **Waterberg District Municipality** is located in the western part of the Limpopo Province (www.municipalities.co.za) and covers an area of 44 913 km^2. It shares a border with the North West and Gauteng Provinces. It is the biggest district in the province and shares five border control points with Botswana. Main towns in the area are Amandelbult Mine Town, Bela-Bela, Lephalale, Modimolle, Mokopane, Mookgophong, Pienaarsrivier, Thabazimbi and Vaalwater. The main economic sectors are mining, agriculture and tourism. The district consists of five local municipalities, namely Bela-Bela, Lephalale, Modimolle-Mookgophong, Mogalakwena and Thabazimbi.

The proposed project falls within the Mogalakwena Local Municipality (LM) which covers an area of 6 156 km^2 (www.municipalities.co.za). It was established on 5 December 2000 when the Greater Potgietersrus, Bakenberg and Koedoesrand/Rebone local authorities were amalgamated to form the new municipality.

The municipality consists largely of a tribal/traditional settlement type and is characterised by high levels of unemployment and poverty. The legitimacy of community leadership structures and traditional authority is often contested as these are not gazetted by the Government, and there is conflict between grassroots community interest groups in terms of benefit sharing, which is often driven by personal interest (Zutari, 2020). Community representative structures are fluid, and the area is characterised by unplanned and opportunistic urban expansion. Informal settlements are expanding in both urban and rural areas, and four of the six settlements identified are adjacent to the Mogalakwena Platinum mine, namely: Ga-Machikiri, Ga-Puka (Rooibokfontein), Ga-Sekhaolelo (Armoede) and Mapela next to Skimming.

The Mogalakwena LM is regarded as an unstable municipality and has collapsed in 2014 (Zutari, 2020). The current management team has the unenviable task to not only repair the functions of the municipality, but also its reputation as the municipality has been pulled into the VBS Mutual Bank scandal by allegations against it. The municipality is burdened with routine and competing political intrusions that has resulted in an entrenched spiral of institutional damage, rising securitisation, protest and violence, each of which reinforces the other.

Platinum mining is considered key to the economic development in the area, and for communities surrounding the mine, it is one of the few economic opportunities available. As a result, there is a significant expectation for employment and procurement opportunities at the mine (Zutari, 2020).

4.8.2 Description of the population

The baseline description will focus on the Limpopo Province, Waterberg District Municipality, Mogalakwena Local Municipality and Wards 13, 14, 17, 18, 19 and 20 of the Mogalakwena Local Municipality.

The data used for the socio-economic description was sourced from Census 2011. Census 2011 was a de facto census (a census in which people are enumerated according to where they stay on census night) where the reference night was 9-10 October 2011. The results should be viewed as indicative of the population characteristics in the area and should not be interpreted as absolute.

4.8.2.1 Population and household sizes

According to the Community Survey 2016, the population of South Africa is approximately 55,7 million and has shown an increase of about 7.5% since 2011. The household density for the country is estimated on approximately 3.29 people per household, indicating an average household size of 3-4 people (leaning towards 3) for most households, which is down from the 2011 average household size of 3.58 people per household. Smaller household sizes are in general associated with higher levels of urbanisation.

The greatest increase in population since 2011 has been on district level (

Table 4-13), slightly higher than the national average. On a local level the growth in population was below the national average. Population density refers to the number of people per square kilometre and the population density on a national level has increased from 42.45 people per km^2 in 2011 to 45.63 people per km^2 in 2016. In the study area the population density has increased since 2011.

Table 4-13: Population density and growth estimates (sources: Census 2011, Community Survey 2016)

Area	Size in km^2	Population 2011	Population 2016	Population density 2011	Population density 2016	Growth in Population (%)
Limpopo Province	125,754	5,404,868	5,799,090	42.98	46.11	7.29
Waterberg DM	44,913	679,336	745,758	15.13	16.60	9.78
Mogalakwena LM	6,156	307,682	328,905	49.98	53.43	6.90

The number of households in the study area has increased on all levels (Table 4-14). On provincial and district level the proportionate increases in households were greater than the increases in population, but not on local level. The average household size has shown a decrease on provincial and district level, which means there are more households, but with less members. On local level the average household size has increased slightly.

Table 4-14: Household sizes and growth estimates (sources: Census 2011, Community Survey 2016)

Area	Households 2011	Households 2016	Average household size 2011	Average household size 2016	Growth in households (%)
Limpopo Province	1,418,102	1,601,083	3.81	3.62	12.90
Waterberg DM	179,866	211,471	3.78	3.53	17.57
Mogalakwena LM	79,395	83,604	3.88	3.93	5.30

The total dependency ratio on local level is much higher on local than on district or provincial level (Table 4-15) and varies by ward. The same trend applies to the youth, aged and employment dependency ratios. Employed dependency ratio refers to the proportion of people dependent on the people who are employed, and not only those of working age. The employed dependency ratio for the Mogalakwena LM and wards under investigation is higher than on provincial and district. This suggests high levels of poverty in this area.

Table 4-15: Dependency ratios (source: Census 2011)

Area	Total dependency	Youth dependency	Aged dependency	Employed dependency
Limpopo Province	67.26	56.79	10.47	83.61
Waterberg DM	55.50	46.45	9.05	75.30
Mogalakwena LM	71.48	58.74	12.74	84.73
Ward 13	86.03	71.38	14.66	90.79
Ward 14	89.73	67.91	21.82	92.67
Ward 17	81.48	65.64	15.84	93.09
Ward 18	72.99	60.08	12.90	86.89
Ward 19	76.16	63.37	12.79	91.57
Ward 20	68.23	57.57	10.67	88.79

Poverty is a complex issue that manifests itself in economic, social and political ways and to define poverty by a unidimensional measure such as income or expenditure would be an oversimplification of the matter. Poor people themselves describe their experience of poverty as multidimensional. The South African Multidimensional Poverty Index (SAMPI) (Statistics South Africa, 2014) assess poverty on the dimensions of health, education, standard of living and economic activity using the indicators child mortality, years of schooling, school attendance, fuel for heating, lighting and cooking, water access, sanitation, dwelling type, asset ownership and unemployment.

The poverty headcount refers to the proportion of households that can be defined as multi-dimensionally poor by using the SAMPI's poverty cut-offs (Statistics South Africa, 2014). The

poverty headcount has increased on all levels since 2011 (Table 4), indicating an increase in the number of multi-dimensionally poor households.

The intensity of poverty experienced refers to the average proportion of indicators in which poor households are deprived (Statistics South Africa, 2014). The intensity of poverty has increased slightly on all levels. The intensity of poverty and the poverty headcount is used to calculate the SAMPI score. A higher score indicates a very poor community that is deprived on many indicators. The SAMPI score has increased on all levels, indicating that households might be getting poorer, especially in the Mogalakwena LM area.

Area	Poverty headcount 2011 (%)	Poverty intensity 2011 (%)	SAMPI 2011	Poverty headcount 2016 (%)	Poverty intensity 2016 (%)	SAMPI 2016
Limpopo Province	10.1	41.6	0.042	11.5	42.3	0.049
Waterberg DM	6.5	41.6	0.027	9	42.7	0.038
Mogalakwena LM	7.0	41.2	0.029	11.2	41.3	0.046

4.8.2.2 Population composition, age, genger and home language

On a ward level more than 99% of the population belong to the Black population group, a much greater proportion than on local, district or provincial level.

The average age on local level is lower than on district level, but higher than on provincial level (Table 4-16). On a ward level the average age is lower than on local level, except in Ward 14 where the average age is higher than on district level.

Table 4-16: Average age (source: Census 2011)

Area	Average Age (in years)
Limpopo Province	26.47
Waterberg DM	27.79
Mogalakwena LM	27.08
Ward 13	25.99
Ward 14	28.35
Ward 17	26.92
Ward 18	26.73
Ward 19	26.11
Ward 20	26.16

More than a third of the population on ward level is aged 14 years or younger. Ward 14 has the highest proportion of people aged 65 years or older. Such a young population holds the potential for a great future demand in terms of employment and other means of making a livelihood, as well as increased pressure on infrastructure.

The sex distribution is more or less equal on district level but is biased towards females on all other levels. This trend is often observed in rural areas where males tend to migrate to urban areas to look for employment or other means of making a livelihood.

Sepedi is the home language of more than 70% of the population in the Mogalakwena LM. The language profiles on a ward level look slightly different from one another with about a fifth of the population in Ward 17 indicating that they have Xitsonga as home language. In Ward 20 there is an equal proportion of people with Sepedi and Xitsonga as home language. Wards 19 and 20 have the highest proportions of people with IsiNdebele as home language. Home language can indicate the degree of cultural diversity in an area.

4.8.2.3 Education

Wards 18 and 19 have the highest proportion of people aged 20 years or older have completed an education higher than Grade 12 (Figure 4-25), while almost 30% of people aged 20 years or older in Ward 17 have received no schooling.

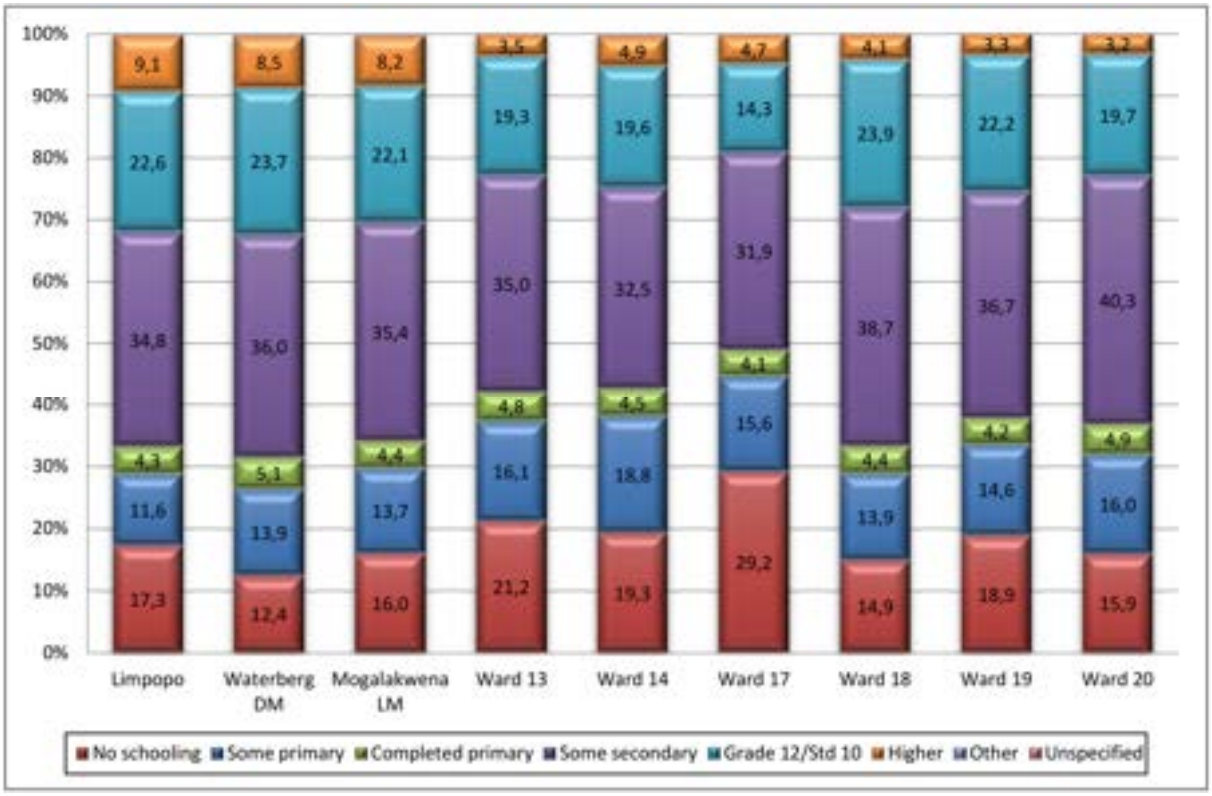


Figure 4-25: Education profiles (those aged 20 years or older, shown in percentage, source: Census 2011)

4.8.2.4 Employment, livelihoods and economic activities

Ward 18 has the highest proportion of people aged between 15 – 65 years that are employed (Figure 4-26), with more than 70% of this group being employed in the formal sector (Figure 4-27). The level of employment on ward level is much lower than on local, district or provincial level. Ward 20 has the highest level of people employed in the informal sector.

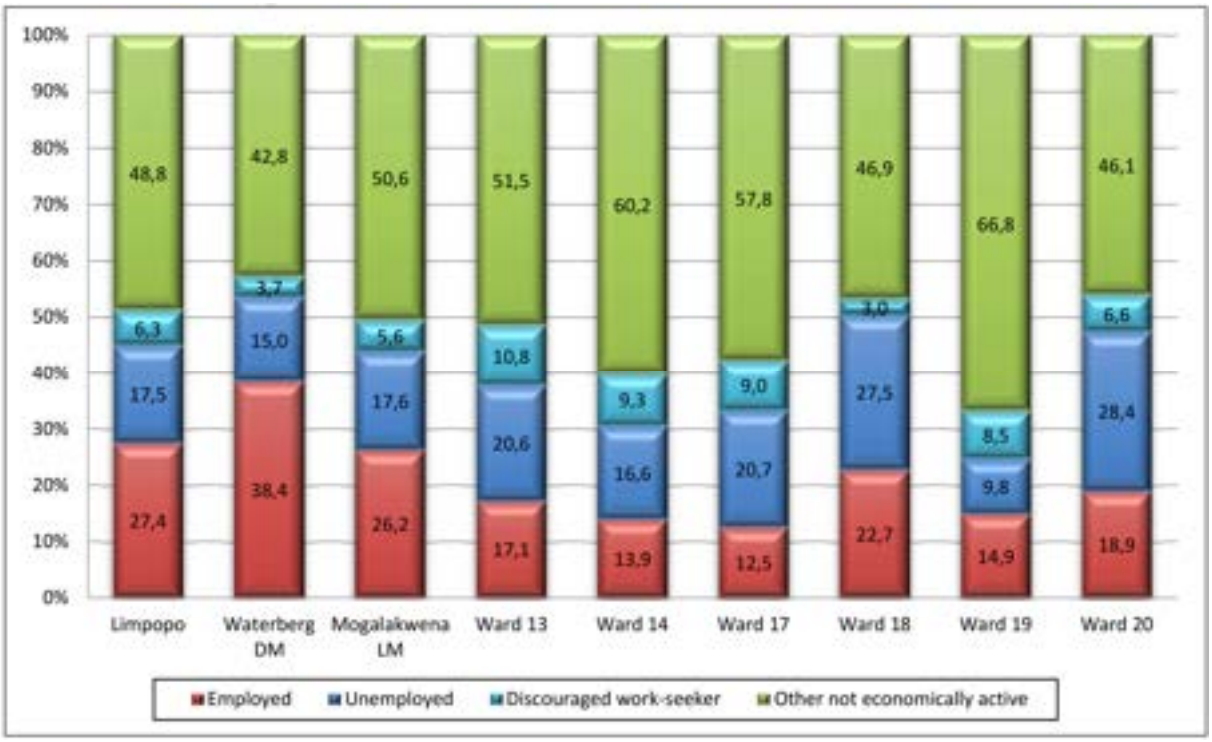


Figure 4-26: Labour status (those aged between 15 - 65 years, shown in percentage, source: Census 2011)

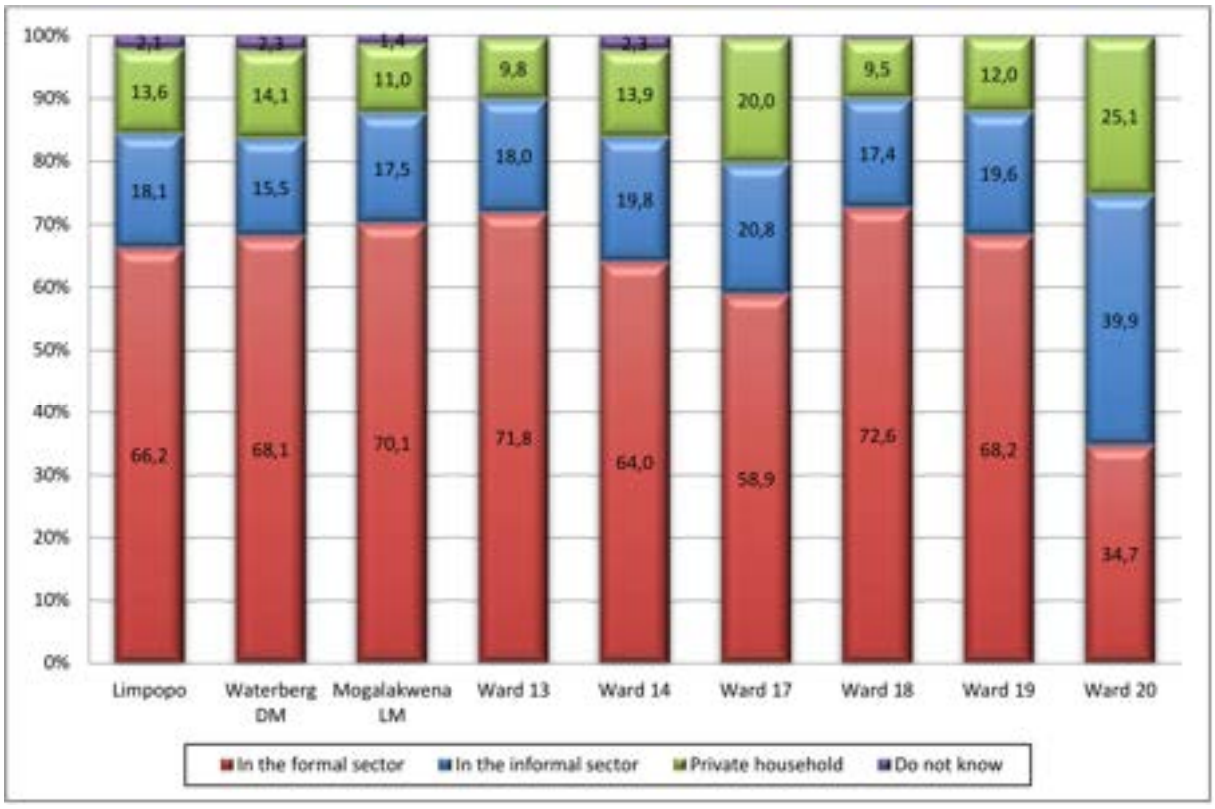


Figure 4-27: Employment sector (those aged between 15 - 65 years, shown in percentage, source: Census 2011)

The proportion of people with no annual household income is higher on local and ward level than on district and provincial level. More than 60% of the households on a ward level had an

annual household income of below R19 601 in 2011, except in Wards 18 and 20, where the proportion was more than 50%.

4.8.2.5 Housing

On a ward level almost all households live in areas under traditional authority, except in Wards 13 and 18 (Table 4-17). In Ward 18 just over a third of households live in an urban area classified as formal residential.

Table 4-17: Geotypes (source: Census 2011, households)

Area	Urban	Tribal/Traditional	Farm
Limpopo Province	20.1	73.4	6.6
Waterberg DM	50.6	35.7	13.7
Mogalakwena LM	29.2	67.9	2.9
Ward 13	0.0	97.2	2.8
Ward 14	0.0	100.0	0.0
Ward 17	0.0	100.0	0.0
Ward 18	36.9	60.0	3.1
Ward 19	0.0	100.0	0.0
Ward 20	0.0	100.0	0.0

More than 85% of households on ward level live in houses or brick structures on separate stands or yards (Figure 4-28), with informal dwellings present in all wards to a greater or lesser extent.

Most households occupy their dwellings either rent-free or have paid it off in full. Wards 18 and 20 have the highest incidence of households renting their dwellings.

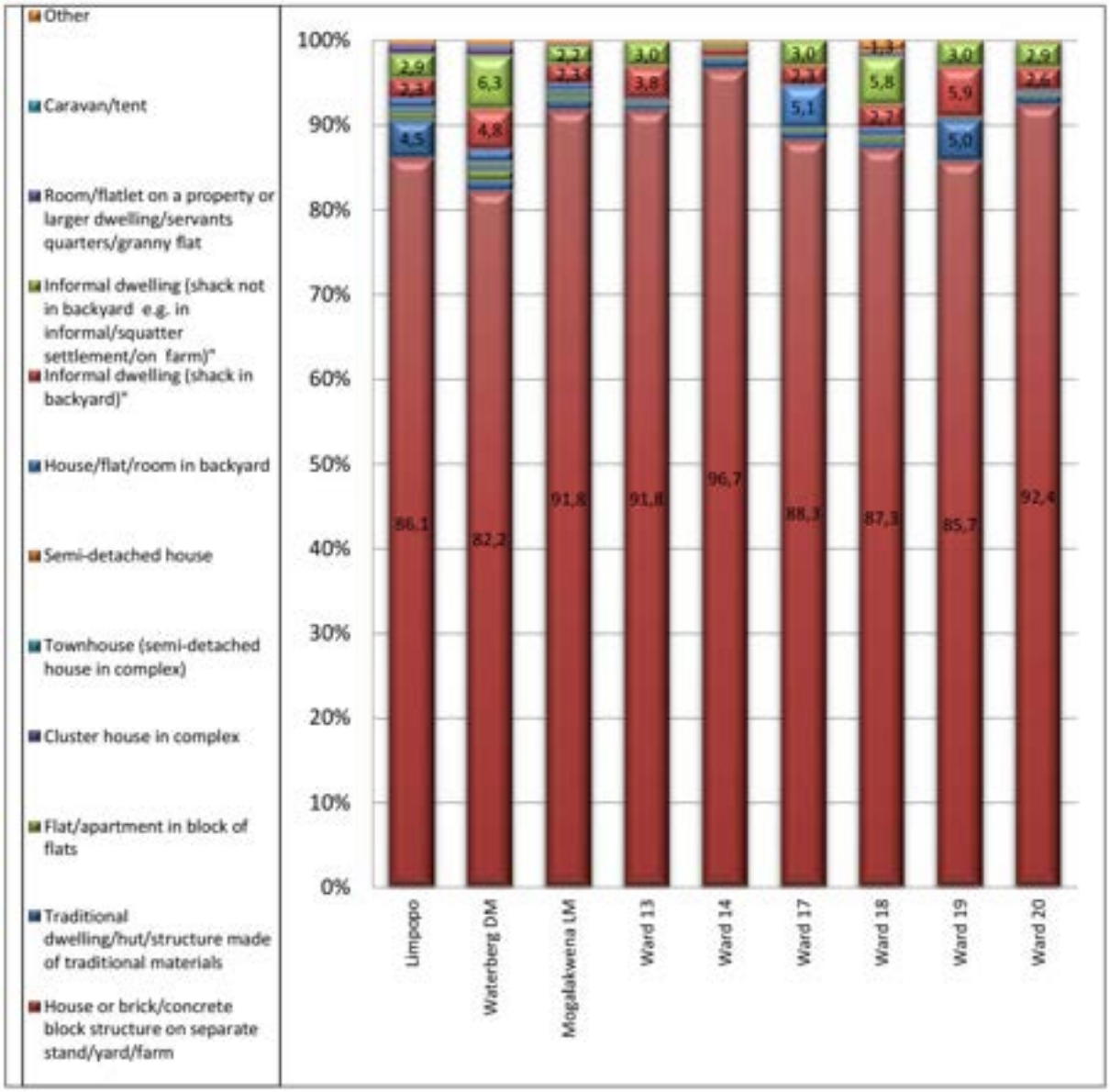


Figure 4-28: Dwelling types (shown in percentage, source: Census 2011)

4.8.2.6 Access to basic services

Access to basic services such as water, sanitation and electricity relate to standard of living according to SAMPI (Statistics South Africa, 2014). Households that use paraffin, candles or nothing for lighting; or fuels such as paraffin, wood, coal, dung or nothing for cooking or heating; have no piped water in the dwelling or on the stand and do not have flush toilets can be described as deprived in terms of these basic services.

On a municipal level about two thirds of households get their water from a regional or local water scheme, but on ward level the proportions differ. Wards 13 and 18 have the highest proportion of households with access to water from a regional or local water scheme, while Wards 14 and 19 have the largest proportion of households whose main water source is boreholes. Wards 17 and 20 has the greatest proportion of households that get their water from a water vendor.

The incidence of households with access to piped water inside their dwellings on a ward level is relatively low (Figure 4-29), with the highest incidence in Wards 13 and 17. Less than half

of households on ward level have access to piped water either inside their dwelling or yard, except in Ward 13 where the incidence is just over 60%.

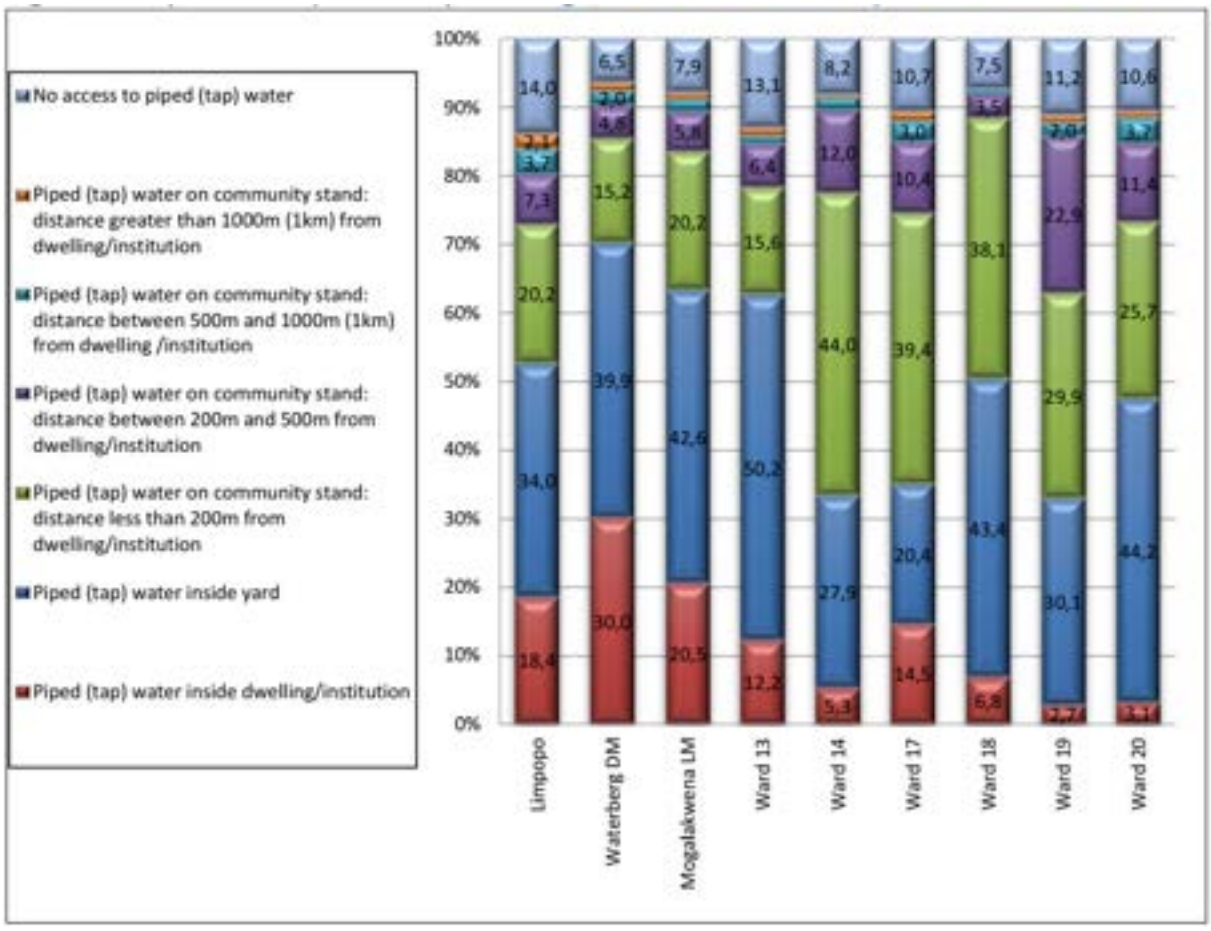


Figure 4-29: Piped water (shown in percentage, source: Census 2011)

Access to electricity for lighting purposes give an indication of whether a household has access to electricity, as poor households sometimes only use electricity for lighting, but use other sources of energy for heat and cooking. The incidence of households with access to electricity on ward level is slightly higher than on local level (Figure 4-30), except in Ward 18. Wards 13 and 18 has the greatest proportion of households that use candles as energy source for lighting.

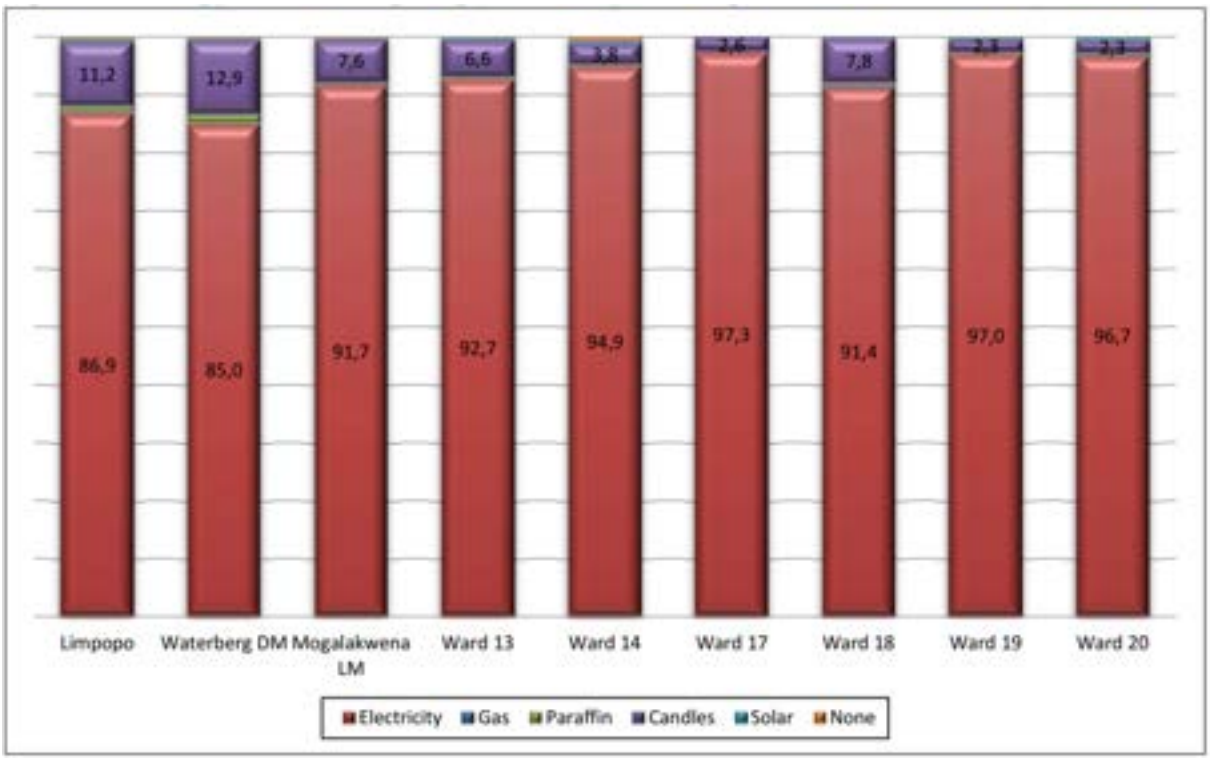


Figure 4-30: Energy source for lighting (shown in percentage, source: Census 2011)

On a ward level the majority of households have access to a pit toilet with or without ventilation (Figure 4-31). Ward 18 has the greatest proportion of households using a bucket toilet.

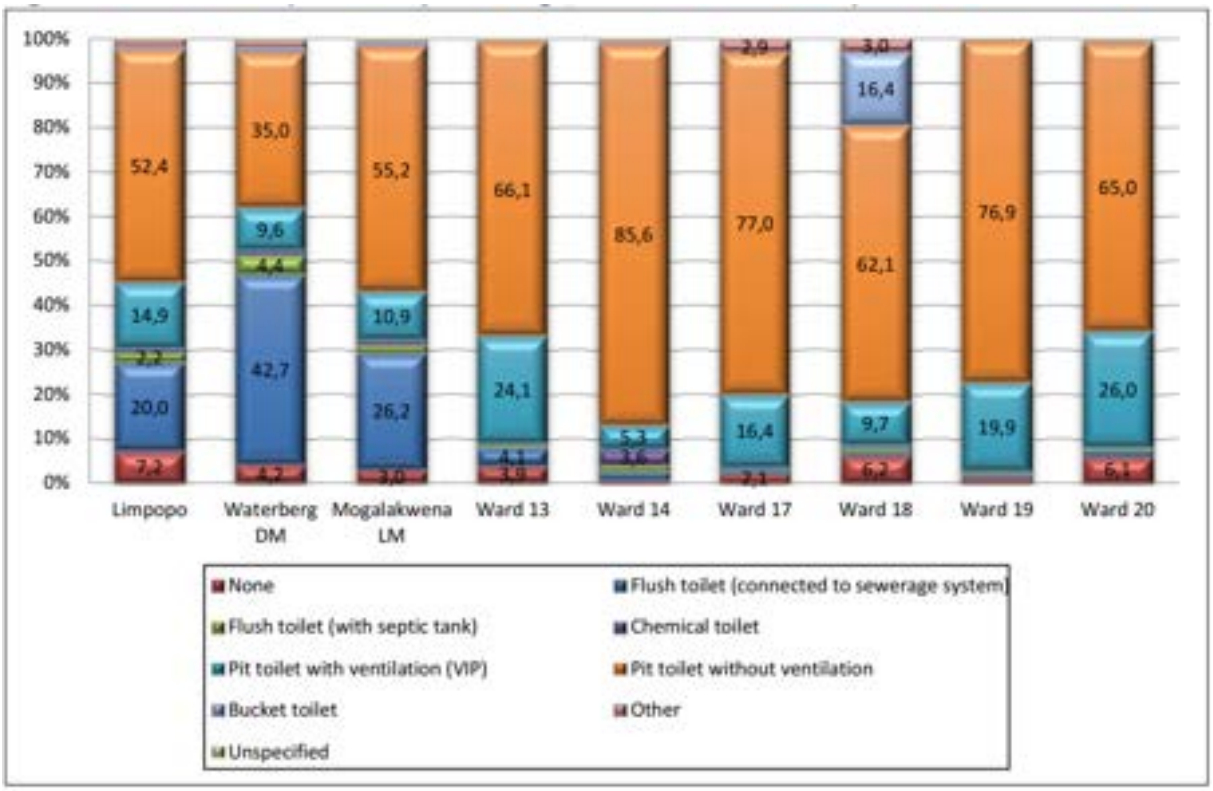


Figure 4-31: Sanitation (shown in percentage, source: Census 2011)

4.8.2.7 Community relations

There are 178 rural settlements (villages) spread across the Mogalakwena LM (Zutari, 2020). There are three semi-urban settlements, Ga-Pila – Sterkwater, Ga-Puka – Rooibokfontein, and Ga-Sekhoalelo – Armoede, which were all proclaimed as a result of relocation due to mining expansion in the Mapela (Bakenberg) Traditional Authority (TA) area. There are four TA areas in the municipality and the Mogalakwena mine is mainly located on land owned by the Mapela (Bakenberg) TA and the Mokopane TA, situated immediately adjacent to the operation. Both these traditional authorities enjoy legal recognition. Traditional authorities play an important role in provincial politics.

There are 42 villages within a radius of about 50 km around the project area, of which six are under the authority of the Mokopane TA and the remainder under the authority of the Mapela TA. When the Mogalakwena mine became operational in 1993, a number of communities were relocated to make way for mining activities. These communities are Motlhotlo (Ga Sekhaolelo), relocated to the farm Armoede (where the proposed project's preferred site alternative lies), Ga-Pila Village, which was relocated to Sterkwater Farm, and Motlhotlo (Ga-Puka) under the Mapela TA, relocated to Rooibokfontein Farm. Some economic displacement took place in Sekuruwe, Ga Molekane and Ga Chaba.

It must further be noted that, for the purposes of potential mining expansion, some exploration drilling is underway on three farms, namely Tweefontein 238 KR (Portion 1), Knapdaar 234 KR, and Rietfontein 240 KR. Six villages from Mokopane and two villages from Mapela are affected. Although traditional leadership and structures are still influential at community level, their presence and role are not accepted by all community members, and division within these structures are evident (Zutari, 2020).

The local villages of Motlhotlo Ga Puka and Motlhotlo Ga-Sekhaolelo are located on the farm Armoede, adjacent to where the land parcels earmarked for the proposed project are located, to the east. The village of Ga Molekana is located adjacent to the site on the southwestern side. There are some underlying issues that have impacted the villages after being relocated (Zutari, 2020). These issues included the lease agreement in respect of the farm Overseyl; the Broad-Based Black Economic Empowerment (B-BBEE) shareholding of the community in the lease agreement; the service level agreement between the Mine and the Mogalakwena LM; and structural defects in the houses. Not all the villagers relocated from their ancestral homes. Some community members have issues with the Mogalakwena mine in terms of cultural heritage issues.

4.9 Environmental noise

The noise assessment was conducted for the proposed solar PV plan which is 30km north of Mokopane, south of the residential area of Ga-Sekhaolelo and east of Ga-Molekana. The area generally has low ambient noise levels typical of rural environments. However, the area is directly to the east of the N11, which is a noisy national road. The investigation's purpose was to estimate any potential noise impact of the proposed plant on the existing ambient noise climate in the surrounding area. This was achieved by measuring the existing ambient noise levels around the site, as well as utilizing the manufacturer's noise specifications of the plant in question.

Three positions at the proposed corners of the site, which is more or less triangular, were chosen as representative positions to assess how the plant might affect third parties. All measurements were carried out in accordance with the relevant SANS Codes of practice, and as required by the regulations of the Department of Forestry Fisheries, and the Environment (DFFE).

The existing ambient noise levels were measured over sampling periods of ten minutes for representative time periods during a typical weekday, at three measurement positions at the

proposed site's corners. It is noted that existing ambient noise is due primarily to traffic on the N11.

At all measurement positions, notes were made on the nature of the contributions to the ambient noise and identifiable noise events where applicable. Measurements were made of the equivalent continuous A-weighted sound pressure level, $L_{Aeq,I}$ using the 'I' (Impulse) dynamic response characteristic as recommended in SANS 10103:2008 (ref. 1), and specified in the National Noise Regulations (ref. 7). In addition, the **L_{90}** was recorded[20], representing the background noise.

The expected response from the local community to the noise impact, i.e. any increase of predicted operational noise over the original ambient noise, is primarily based on the relevant SANS document, and expressed in terms of the effects of impact, on a scale of 'NONE' to 'VERY HIGH'. This noise impact report (Appendix E) is an overall assessment designed to predict the collective response of a noise-exposed population and therefore the impact the operation is likely to have on them, and is based on measured and/or predicted equivalent continuous noise levels according to the relevant SANS code of practice.

Noise measurements were carried out at the three corners of the site which is roughly triangular as described below. These locations were chosen for the following reasons:

1. Represent the two main noise climate areas of site, the rural interior and the noisy boundary along the N11 road
2. Useful for comparison purposes after development of the project.
3. Most likely to continue to exist after development of the project.
4. Easily identifiable and with easy access in case of need for future measurements.

Note 1: SANS 10103:2008 defines: Day-time: 06:00-22:00, Night-time: 22:00-06:00

Note 2: As the proposed plant is planned to operate during daytime and night-time periods, assessments have been made for both periods.

Note 3: All noise levels in this report are A-weighted noise levels expressed in dB(A) re 20 microPascals, and measured according to SANS 10103:2008 (Ref. 1)

Note 4: In the Comments column of the noise tables, C - Car, Minibus or LDV, HGV – Heavy Goods Vehicle or Bus, A/c-Commercial aircraft, La/c-light aircraft, c–noise level calculated from traffic count, for the measurement period (usually 10 Minutes)

4.9.1 Measurement Position (MP) 1

Noise measurements were taken at position 1 (MP1) at the southern corner of the proposed site on the road reserve boundary of the N11, 20m from the road centreline.

- GPS coordinates: S23° 59′55.74′′, E28°57′42.37′′. Height - 1176m.

Table 4-18: Ambient noise measurements at MP1

Date	Time	T °C	RH %	Wind m/s	$L_{Aeq,I}$	L_{90}	Comments
Wed 9/06/21	08:52-09:02	17.1	33	<0.5	65.9	41	C=37, HGV=4
Wed 9/06/21	09:04-09:14	17.1	33	<0.5	66.7	44	C=48, HGV=2
Wed 9/06/21	09:16-09:26	17.1	33	<0.5	65.4	40	C=40, HGV=5
Wed 9/06/21	11:40-11:52	20.8	20	<0.5	64.3	38	C=35, HGV=4
Wed 9/06/21	11:52-12:02	20.8	20	<0.5	61.8	39	C=21, HGV=0
Wed 9/06/21	12:04-12:14	21.1	19	<0.5	64.2	40	C=37, HGV=8

[20] The L_{90} is the sound level exceeded for 90% of the time, and usually taken as the background noise without intruding events such as traffic noise.

Wed 9/06/21	12:15-12:25	21.1	19	<0.5	63.0	40	C=31, HGV=5
Wed 9/06/21	12:28-12:38	21.1	19	<0.5	62.6	41	C=44, HGV=2
Tues 8/06/21	14:20-14:30	19.5	25	<0.5	65.9	45	C=58, HGV=6
Tues 8/06/21	14:32-14:42	19.5	25	<0.5	65.3	43	C=62, HGV=8
Tues 8/06/21	14:48-14:58	19.5	25	<0.5	64.8	43	C=45, HGV=2
Tues 8/06/21	15:00-15:10	19.5	25	<0.5	67.6	44	C=71, HGV=2
Wed 9/06/21	16:31-16:41	18.6	27	Still	65.7	41	C=62, HGV=1
Wed 9/06/21	16:43-16:53	18.6	27	Still	67.5	46	C=68, HGV=4
Tues 8/06/21	16:42-16:52	17.2	33	3.4	67.4	46	C=27, HGV=2
Tues 8/06/21	16:54-17:04	17.2	33	3.4	64.8	45	C=21, HGV=5

These values are typical of a trafficked road and represent the noise on the western boundary of the site. The LAeq,I value during the day is very consistently between 62-68 dB(A). The L90 (the sound level exceeded for 90% of the time, and usually taken as the background noise without intruding events such as traffic noise, is also very repeatable and bounded between 38 and 46 dB(A) during the day.

4.9.2 Measurement Position 2

Noise measurements were taken at position 2 (MP2) at the northern corner of the site on the road reserve boundary of the N11, 17m from the road centreline.

- GPS coordinates: S23° 58′25.12′′, E28°57′8.49′′. Height - 1178m

Table 4-19: Ambient noise measurements at MP2

Date	Time	T °C	RH %	Wind m/s	$L_{Aeq,I}$	L_{90}	Comments
Wed 9/06/21	09:55-10:04	18.7	33	Still	65.5	40	C=27, HGV=2
Wed 9/06/21	10:07-10:17	18.7	33	Still	65.3	39	C=17, HGV=1
Wed 9/06/21	10:19-10:29	18.7	33	Still	62.5	34	C=14, HGV=2
Wed 9/06/21	12:53-13:04	20.9	17	<0.5	67.7	33	C=24, HGV=7
Tues 8/06/21	13:00-13:10	21.1	29	<0.5	62.6	35	C=25, HGV=0
Tues 8/06/21	13:14-13:24	21.1	29	<0.5	67.3	42	C=28, HGV=2
Tues 8/06/21	13:26-13:36	21.1	29	<0.5	68.4	38	C=40, HGV=6
Wed 9/06/21	13:05-13:16	20.9	17	<0.5	67.5	35	C=20, HGV=12
Wed 9/06/21	13:18-13:28	20.9	17	Still	65.0	35	C=14, HGV=4
Wed 9/06/21	13:30-13:40	20.9	17	Still	65.3	37	C=25, HGV=5
Wed 9/06/21	15:57-16:07	19.7	26	Still	66.2	42	C=32, HGV=2
Wed 9/06/21	16:09-16:19	19.4	27	Still	65.4	42	C=36, HGV=2
Tues 8/06/21	16:10-16:20	17.8	31	<0.5	66.4	46	C=64, HGV=0
Tues 8/06/21	16:22-16:32	17.8	31	<0.5	66.2	40	C=52, HGV=3

These values are typical of a trafficked road and represent the noise on the western boundary of the site. The $L_{Aeq,I}$ value during the day is very consistently between 62-68 dB(A). The L_{90} (the sound level exceeded for 90% of the time, and usually taken as the background noise without intruding events such as traffic noise), is also very repeatable and bounded between 35 and 46 dB(A) during the day.

4.9.3 Measurement Position 3

Noise measurements were taken at position 3 (MP3) at the eastern corner of the site, near the floor slab of a demolished building.

- GPS coordinates: S23° 58′42.26′′, E28°58′21.15′′. Height - 1229m

Table 4-20: Ambient noise measurements at MP2

Date	Time	T °C	RH %	Wind m/s	$L_{Aeq,I}$	L_{90}
Wed 9/06/21	10:44-10:54	18.4	25	<1.0	43.6	35
Wed 9/06/21	10:56-11:06	18.4	25	<1.0	44.4	35
Wed 9/06/21	11:07-11:19	18.4	25	<0.5	44.6	33
Wed 9/06/21	14:10-14:21	19.0	20	Still	42.3	34
Wed 9/06/21	14:56-15:06	19.2	21	Still	44.4	34
Wed 9/06/21	15:08-15:19	18.5	24	Still	42.7	35
Wed 9/06/21	15:21-15:33	18.0	25	Still	48.1	32
Wed 9/06/21	15:35-15:45	18.0	25	Still	47.3	35
Tues 8/06/21	15:21-15:31	19.0	25	<0.5	46.5	35
Tues 8/06/21	15:33-15:43	19.0	25	<0.5	44.6	35
Tues 8/06/21	15:45-15:55	19.0	25	<0.5	42.8	34

These values are typical of a rural area, the $L_{Aeq,I}$ value during the day is variable between 42-48 dB(A), primarily due to natural sounds of the bush and occasional domestic noise. The L_{90}, is very repeatable and bounded between 32 and 35 dB(A) during the day.

4.10 Traffic

To determine the potential impact that the proposed project may have on the traffic within the study- and surrounding area, it is important to first understand the existing road network.

The N11 connects the site to the wider regional road network including R567, R518, R101 and N1. The N11 intersects with the R567 about 30km north of the site and runs in a southeast direction past the site toward Mokopane. The R518 joins the N11 about 15m south of the site, traverses through Mokopane as part of the N11 then deviates in a southeast direction to terminate in Zebediela. The N11 links with the N1 in Mokopane. The N1 is a national road that runs north-south from Beitbridge Border through Polokwane, Mokopane, Pretoria, Johannesburg, Bloemfontein and ends in Cape Town. The R101 mostly runs parallel to the N1 from Polokwane to Johannesburg. The wider and primary road networks are shown in Figure 4-32.

Figure 4-32: Wider road network

The primary road network that is likely to be affected by the development traffic is discussed below. The discussion is based site visits that were carried out on Thursday 17 September 2020, between 7h30 and 9h00, and Thursday 3 June 2021 between 9h30 to 12h00, to assess the existing road network layout, available public and non-motorised transport modes and activity, traffic safety aspects, traffic flow and surrounding land use.

4.10.1 N11

The N11 is classified as a Class 1 Road. The N11 runs from the Botswana border at Groblersbrug, through Mokopane, Middelburg, Ermelo and Newcastle terminating at the N3 just after Ladysmith. In Mokopane and the primary study area, the route carries a substantial number of heavy vehicles which causes problems in Mokopane (Waterberg District Municipality, 2011). N11 is a single carriageway road with one lane in each direction and extends to include turning lanes at intersections in the vicinity of the site. The speed limit in the vicinity of the site is 120km/hr, however, it ranges from 60km/hr to 120km/hr from Mokopane.

In the context of the development site, the N11 has more of an access function than mobility due to several informal accesses to the Ga-Molekana community and other accesses to individual residential properties.

4.10.2 Bakenberg Road (D4380)

Bakenberg Road is a Class 2 district road which starts at its intersection with the N11 near the southern boundary of the site, then proceeds to serve the Mogalakwena Platinum Mine and several communities north west of Ga-Molekana and terminates in Leyden. Bakenberg Road is a single carriageway with one lane in each direction and has no shoulders near the site. Bakenberg Road has an 80km/hr speed limit in the vicinity of the site.

4.10.3 Ga-Molekana access road

Ga-Molekana Access Road is the formal access to Ga-Molekana located just over 2km from the Bakenberg Road/ N11 intersection. It functions as a Class 4 collector/ distributor road. It is a single carriageway with one lane in each direction.

4.10.4 Ga-Sekhaolelo access road

Ga-Sekhaolelo Access Road is the formal access to Ga-Sekhaolelo located just over 380m from the Ga-Molekana Access Road / N11 intersection. It functions as a Class 3 road. It is a single carriageway with one lane in each direction.

4.10.5 Traffic conditions

During the site visit, it was observed that Mokopane CBD experiences congestion during the morning peak. Delays were mostly observed at priority-controlled intersections.

There is a vehicle mix of passenger cars, taxis, pedestrians, cyclists, and a notable number of heavy vehicles (trucks). Several mining activities in the Mokopane area contribute to the high number of heavy vehicles on the road network. Consequently, road conditions in the Mogalakwena District are generally in fair to poor condition, according to the (Waterberg District Municipality 2019/2020 IDP, 2019).

Low traffic volumes were observed along the N11 near the site, with a notable number of heavy vehicles accessing the Mogalakwena Platinum Mine off N11 onto Bakenberg Road.

It is important to note that the site visit was conducted on 17 September 2020, during Level 2 country lockdown due to COVID19, which had impacted on transport demand and traffic movements. As such, general traffic flow patterns may differ compared to normal circumstances. However, the Mining Sector has been operative throughout the pandemic, therefore the traffic flow patterns of especially heavy vehicles have been relatively constant.

Another site visit was conducted on 3 June 2021, during an adjusted level 2 lockdown. The traffic conditions observed revealed most of the heavy vehicle traffic turning into Bakenberg Road towards Mogalakwena Platinum Mine. Few light vehicles were using the N11. It should be noted that the site visit was conducted during off peak hours.

4.10.6 Public transport

The N11 is part of a major public transport corridor in Mogalakwena. The Public Transport routes along N11 (passing through the site) include the following:

- From Nallie (D3505) to George Masibe Hospital / Bakenberg (D4380) to Mokopane (R518/N11);
- From Magabane (D3556/D3550) to Bakenberg (D4380) to Mokopane (R518/N11);
- From Cleremond (D3540/ D3537) to Bakenberg (D4380) to Mokopane (R518/N11);
- From Segole (D3561) to Mokopane (N11);
- From Steiloop/ Uitzech/ Ga - Molekane N11 to Mokopane;

- From Tshamahansi (N11) to Mokopane;
- From Mahwelereng (Dudu Madisha Drive) to Mokopane;
- From Moshate / Sekgakgapeng (N11).

Minibus taxi was the only public transport mode observed in the vicinity of the site during the site visit. There are formal public transport lay-bys on both sides of the N11 at the intersections of N11/ Ga-Molekana Access Road and N11/ Ga-Sekhaolelo Access Road. However, minibus taxis were also observed dropping off and picking up passengers on the road verges.

4.10.7 Non-motorised transport (NMT)

Few pedestrians and very few cyclists were observed near the site. Most of the pedestrians were public transport users, walking to and from the public transport facilities. However, a significant number of pedestrians from communities on the peripheral of Mokopane CBD were observed walking toward the CBD along the N11 during the morning peak. No roads near the site have pedestrian sidewalks, including the N11.

4.10.8 Development access

There is no existing access to the proposed project site. Access to site, as well as the transmission line corridors linking the solar facility to the mine will be required during construction and, subsequently, operation.

5 IMPACT ASSESSMENT

This chapter contains detailed assessments of potential social and environmental impacts (positive and negative) associated with the proposed project and associated infrastructure that were identified during the Scoping Phase and thoroughly assessed during the EIA phase, with inputs from Specialist Assessments. The Methodology that was used, is described in the Plan of Study for EIA in Appendix G. Issues raised by I&APs during the Public Participation Process were considered, investigated and assessed during the EIA Phase. Any additional issues raised during the next round of Public Participation will also be considered and captured in the final EIR. Contributors to this chapter are listed in ***Error! Reference source not found.****.*

5.1 Impacts on the Terrestrial Environment

The sections below provide the significance of perceived impacts arising from the proposed development within the focus area.

An impact discussion and assessment of all potential planning & construction, and operational and maintenance phase impacts are provided in this section. The section is divided into a floral and a faunal section. The specialist reports can be found in Appendix E1.

5.1.1 Impacts on the floral environment

The impact assessment was undertaken on all aspects of floral ecology deemed likely to be affected by the proposed infrastructure development. The proposed development will result in the extensive clearance of vegetation (especially where PV infrastructure is planned), which will lead to a loss of floral habitat and diversity within the focus area. Although, the proposed development will lead to a loss of floral species in the footprint area, it is not likely to impact floral communities at a larger local and regional (provincial) level.

5.1.1.1 Impact on floral habitat and diversity

The proposed development will also result in extensive loss of floral habitat, particularly floral communities associated with the Bushveld Habitat (i.e., floral habitat of intermediate sensitivity (the Mixed Bushveld, approximately 20 ha) and floral habitat of moderately low sensitivity (the *Dichrostachys* and Degraded Bushveld Subunits, approximately 335 ha and 275 ha respectively) within the focus area. Furthermore, a significant loss of the associated Mixed Bushveld floral community (which is of intermediate sensitivity) is not anticipated. The development of the proposed development within the *Dichrostachys* and Degraded Bushveld subunits will result in the extensive loss of the associated floral habitat (approximately 610 ha). However, these Habitat subunits are largely encroached (as in the case of the *Dichrostachys* Bushveld) or degraded (as in the case of the Degraded Bushveld) in nature and are of a moderately low sensitivity from a floral perspective. As such a significant loss of these associated encroached and degraded floral communities is not anticipated. Although, the proposed development will lead to a loss of floral species in the Bushveld Habitat Unit, it is not likely to impact floral communities at a larger local and regional (provincial) level.

The development of the proposed infrastructure development within the Freshwater Habitat Unit is deemed likely to impact on the floral habitat and diversity that is located within this habitat unit. Both the Seep Wetland (intermediate sensitivity) and the Riverine Habitat (moderately high sensitivity) Subunits provide unique habitat within the focus area and serve as dispersal and connective corridors within the focus area and the surrounding areas. The indiscriminate placement of the proposed infrastructure within the Seep Wetland and Riverine Habitat will result in broader-scale impacts on floral communities if flow pattern of these

systems is altered, or if edge effect management such as AIP control is not effectively implemented. It is thus recommended that the proposed infrastructure development i) be placed outside of the Seep Wetland Habitat subunit, and ii) where Riverine Habitat will be traversed (e.g., within the southern OHL Transmission Corridor and the Internal OHL crossings), appropriate measures should be taken to minimise the impacts on the habitat subunit. Bridges and culverts should be used so to ensure that the (seasonal) flow of water through the nearby drainage lines are not negatively impacted. If mitigation measures are not implemented then a significant loss of floral communities associated with the Freshwater Habitat Unit is anticipated and further, given the connective properties of the Habitat Unit within the greater landscape, the proposed development may impact floral communities at a larger local level.

The development of the proposed PV infrastructure development is likely to transverse a sensitive habitat unit, namely the Rocky Habitat Unit. This habitat unit provides unique habitat both within the focus area and the greater surrounding areas. Development thereof will greatly impact on the species diversity and the associated habitat provided within such habitat. However, impacts to the Rocky Habitat can be greatly minimised by means of effective infrastructure layout plans. It is advised that infrastructure placement within the proposed southern OHL Transmission Corridor be designed to avoid the Rocky Habitat as far as is possible. Layouts can be designed to effectively exclude the Rocky Habitat by placing infrastructure closer to the existing roads thereby minimising the impacts on the associated Habitat. If mitigation measures are effectively implemented, then a significant loss of floral communities associated with the Rocky Habitat Unit is not anticipated for the proposed development and further, the proposed development is unlikely to impact floral communities at a larger local and regional (provincial) level.

The Donga Habitat (of moderately low sensitivity) which although scarcely vegetated will be impacted negatively by the proposed infrastructure development. Despite this, the proposed development within this habitat unit is not deemed significantly likely to impact on the floral habitat and diversity that is located within this habitat unit, nor is it likely to impact floral communities at a larger local and regional (provincial) level.

The proposed development within the Transformed Habitat Unit (of low sensitivity) is not deemed likely to impact on the floral habitat and diversity that is located within this habitat unit, nor is it likely to impact floral communities at a larger local and regional (provincial) level.

Project phase	**Construction**			
Impact	Loss of floral SCC within the development footprint			
Description of impact	Loss of floral SCC within the development footprint areas in the study area as a result of failure to relocate SCC that will be impacted by the proposed development.			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**Refer to mitigation measures listed in Section 6**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur

Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	

Project phase	**Construction**			
Impact	Failure to apply for permits for the removal / relocation of SCC.			
Description of impact	All SCCs must be located and subsequently removed and relocated with the appropriate permits			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Refer to mitigation measures listed in Section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Long term	Impact will last between 10 and 15 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Negligible - negative**	

Project phase	**Construction**			
Impact	Soil contamination			
Description of impact	Contaminated soils lead to a loss of viable growing conditions for plants and results in a decrease of floral habitat, diversity and SCC - rehabilitation efforts will thus be increased as a result.			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Refer to mitigation measures listed in Section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	

Duration	Long term	Impact will last between 10 and 15 years	Medium term	Impact will last between 5 and 10 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	

Project phase	**Construction**			
Impact	Loss of floral habitat, diversity, and the possible loss of SCC			
Description of impact	Loss of floral habitat, diversity, and the possible loss of SCC due to the extent of the project footprint and requirement to remove all vegetation for construction			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to mitigation measures listed in Section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Long term	Impact will last between 10 and 15 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Major - negative**		**Moderate - negative**	

Project phase	Construction			
Impact	Loss of favourable floral habitat outside of the development footprint			
Description of impact	Loss of favourable floral habitat outside of the development footprint, including a decrease in species diversity and potential loss of floral SCC as a result of uncontrolled bush encroachment and/or AIP proliferation.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6 of this report			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Long term	Impact will last between 10 and 15 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	Minor - negative		Negligible - negative	

Project phase	Construction			
Impact	Loss of intact floral habitat, diversity and SCC			
Description of impact	Loss of intact floral habitat, diversity, SCC as AIPs outcompete the indigenous plant species in these disturbed areas			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6 of this report			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur

Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Minor - negative**	

Project phase	**Construction**			
Impact	Loss of floral habitat, diversity and SCC within the direct footprint of the proposed development.			
Description of impact	Loss of floral habitat, diversity and SCC within the direct footprint of the proposed development. Loss of surrounding floral diversity and SCC through displacement of indigenous flora by bush encroachment and/or AIP species proliferation - especially in response to disturbance in natural areas.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6 of this report			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Long term	Impact will last between 10 and 15 years	Medium term	Impact will last between 5 and 10 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	

5.1.1.2 Impacts on floral SCC

Placement of the development infrastructure is likely to have an unfavourable impact on protected floral species (as per the LEMA, the NFA and the TOPS List) such as *Huernia* cf. *zebrina* subsp. *magnifolia* (within the *Dichrostachys* and Mixed Bushveld Subunits and the Donga Habitat), *Sclerocarya birrea* subsp. *caffra* (within the Bushveld Habitat, Rocky Habitat and Transformed Habitat Units), *Combretum imberbe* (within the *Dichrostachys* Bushveld Subunit), *Elaeodendron transvaalense* (within the *Dichrostachys* and Mixed Bushveld

Subunits, Riverine Habitat Subunit, Rocky Habitat and the Donga Habitat), *Boscia albitrunca* (within the *Dichrostachys* and Mixed Bushveld Subunits) and *Harpagophytum zeyheri* subsp. *zeyheri* (within the *Dichrostachys* and Mixed Bushveld Subunits).

The focus area is associated with a moderate diversity of SCC according to the LEMA, the NFA, and the TOPS List and a high abundance of individuals of these protected species was observed. The loss of SCC, all SCC as listed above, observed within areas where vegetation clearance will occur is deemed definite. Impacts on SCC from the proposed development can be reduced if vegetation clearing is kept only to areas where infrastructure will be erected and vegetation in between these structures be maintained.

Should the proposed PV Plant be authorised, all floral SCC, as per the LEMA, the NFA, and the TOPS List, that were marked during the field investigation should be relocated to suitable habitat outside the direct footprint (as far as is feasible). Good record-keeping will be necessary to record this process and to document all successes and failures associated with the relocation. Where feasible, rescue and relocation should be done by a suitably qualified specialist and either relocated to suitable habitat outside of the development footprint or moved to registered nurseries such as the Agricultural Research Council (ARC) or the South African National Biodiversity Institute (SANBI). Any other floral SCC encountered during the construction phase of the proposed development should also be relocated by a suitably qualified specialist and, where required, the necessary permits should be applied for.

Project phase	**Operation**			
Impact	Loss of SCC individuals as a result of a lack of monitoring of the relocated SCC individuals.			
Description of impact	Loss of SCC individuals as a result of a lack of monitoring of the relocated SCC individuals.			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Refer to section 6 of this report.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Long term	Impact will last between 10 and 15 years	Medium term	Impact will last between 5 and 10 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Minor - negative**	

Project phase	**Operation**
Impact	Ongoing or permeant loss of floral habitat, diversity and potential SCC

Description of impact	Ongoing or permanent loss of floral habitat, diversity and potential SCC			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6 of this report.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Very limited	Limited to specific isolated parts of the site
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Negligible - negative**	

Project phase	**Operation**			
Impact	Loss of floral habitat, medicinal flora, and SCC, as well as overall species diversity within the local area.			
Description of impact	Loss of faunal and floral habitat, medicinal flora, and SCC, as well as overall species diversity within the local area.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Short term	impact will last between 1 and 5 years
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a

				possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Negligible - negative**	

Project phase	**Operation**			
Impact	Ongoing loss of floral habitat, diversity and SCC			
Description of impact	Ongoing loss of floral habitat, diversity and SCC as AIPs proliferate within disturbance areas, and a higher likelihood of edge effect impacts on adjacent and nearby natural vegetation of increased sensitivity.			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Negligible - negative**	

5.1.1.3 Cumulative impacts related to floral environment

Within the surrounding areas, the current greatest threat to the floral ecology that are likely to contribute to cumulative impacts include i) the continued expansion of the surrounding settlements that could impact on the remaining extent of the vegetation type (seeing as it is indeed poorly protected), ii) increased grazing pressure within nearby natural areas thus leading to an increase in bush encroachment and its associated impacts, and iii) the continued

proliferation of AIP species, resulting in the overall loss of native floral communities within the local area.

5.1.2 Impacts on the faunal environment

The perceived impact significance of the proposed infrastructure development (prior to mitigation) on faunal habitat, diversity and SCC ranges from moderate to minor, and following mitigation, is anticipated to range from moderate to negligible. Disturbances to the environment, such as unmanaged AIP and erosion proliferation have potential to cause greater impacts to fauna than other potential triggers, due to being potentially long-term in duration, increased in scale and highly intense. However, mitigation does exist for these and all other associated triggers from development, such as increased personnel, widescale vegetation clearing and other activities that will impact fauna during the construction and operational phases. Should all mitigatory measures stipulated in section 6 be sufficiently implemented, significance of development risks and impacts can be considerably reduced.

5.1.2.1 Impact on faunal habitat and diversity

Development must, as per the plans, be kept out of of the Freshwater habitat (seep wetland and riverine habitat subunits and edge effects suitably managed. Otherwise notable impacts to faunal habitat, diversity, and potential SCC are anticipated. These habitats function as important migratory corridors and provide freshwater, that are resources which are not readily replaced in the surrounding landscape. Impeding movement corridors will inevitably lead to increased population fragmentation and pressure for fauna. Mitigatory measures are, however, available that will notably reduce impact significance, such as the minimization of development and associated risks within the Freshwater habitat unit as far as possible.

Despite the decrease in sensitivity of the remaining habitat units in the focus area, notable impacts to common fauna that currently rely on the focus are, are anticipated, considering the characteristics and long operational lifespan of the proposed solar development. To make way for grid-patterned solar panels, faunal habitat will inevitably and permanently be removed from the focus area, with little possibility of habitat regrowth and faunal re-colonization during the operational phase. Although faunal habitat in the focus area will be lost as a result of the proposed activities, these resources are found elsewhere and are therefore replaceable in surrounding landscapes. It is therefore important to consider, that despite the limited importance of most habitat units in the focus area, there remains the opportunity to further reduce environmental impact risks by implementing the recommended mitigation measures listed in section 6. Through implementing mitigation measures not only will the overall impact significance decrease, the effort, time and financial input costs for rehabilitation and AIP control will be reduced.

Disturbances, associated with the construction and operational phases that could significantly impact fauna in on a local scale, are uncontrolled edge effects including AIP and erosion proliferation. If left unmanaged, these edge effects may potentially spread to areas outside of the focus area, and as a result may alter favourable faunal habitat on an increased spatial scale, jeopardizing conservation potential of landscapes surrounding the focus area. However, mitigation for edge effects and disturbance of sensitive habitats does exist (refer to section 5.4) that will notably reduce significance of edge effect impacts to minor, due to decreased spatial scale and duration of impacts.

Other possible risks to fauna that are associated with the construction and operational phases, such as increased fire risk, persecution of wildlife and vehicle collisions were also considered in the impact assessment. Due to the considerable increase of personnel in the construction phase, there is increased risk of wildlife persecution and vehicle collisions during development. However, considering the moderate faunal diversity in the focus area, and that most fauna on site are common, impact significance is considered to be minor (even without mitigation) and can be mitigated against. Risk and significance of impacts to wildlife from increased personnel

in the operational phase are considered minor (without mitigation) to negligible (with mitigation). This is considering the relatively low staff numbers, of 50 (Zutari, 2021b) that are anticipated for this phase and the effectiveness of mitigation. To ensure that impacts to fauna from these triggers remain low, mitigatory measures, stipulated in section 5.4. should be adhered to.

Project phase	**Construction**			
Impact	Loss of faunal habitat and diversity, including SCC			
Description of impact	Loss of faunal habitat and diversity, including SCC			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Medium term	Impact will last between 5 and 10 years
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	

Project phase	**Construction**			
Impact	Degradation of favourable faunal habitat outside the development footprint			
Description of impact	Degradation of favourable faunal habitat outside the development footprint, impacting faunal diversity at a local scale			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Long term	Impact will last between 10 and 15 years	Medium term	Impact will last between 5 and 10 years
Extent	Local	Extending across the site and to nearby settlements	Very limited	Limited to specific isolated parts of the site
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur

Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	

Project phase	**Construction**			
Impact	Unnecessary disturbance to faunal habitat outside of the development footprint			
Description of impact	Unnecessary disturbance to faunal habitat outside of the development footprint			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Long term	Impact will last between 10 and 15 years	Medium term	Impact will last between 5 and 10 years
Extent	Local	Extending across the site and to nearby settlements	Very limited	Limited to specific isolated parts of the site
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Negligible - negative**	

Project phase	**Construction**		
Impact	Overall loss or alteration of faunal habitat and decline in overall faunal abundance and diversity on site		
Description of impact	Overall loss or alteration of faunal habitat and decline in overall faunal abundance and diversity on site from increased personnel in the area		
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts	
Potential mitigation	Refer to section 6		
Assessment	**Without mitigation**		**With mitigation**

Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Immediate	Impact will self-remedy immediately
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	

Project phase	**Construction**			
Impact	Loss or alteration of faunal habitat in the focus area			
Description of impact	Loss or alteration of faunal habitat in the focus area, resulting in the general decline of faunal diversity in the focus area			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere

Significance	Moderate - negative	Moderate - negative

Project phase	Operation			
Impact	Increased risk of fatalities to fauna and degradation of faunal habitat			
Description of impact	Increased risk of fatalities to fauna and degradation of faunal habitat			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	Minor - negative		Negligible - negative	

5.1.2.2 Impacts on faunal SCC

Due to distribution overlap, food and habitat availability within or in the vicinity of the focus area, there is a reasonable possibility that nine SCC may utilise the site while aestivating, travelling or foraging. These SCC are: *Felis lybica* (African Wild cat), *Panthera pardus* (Leopard, VU), *Parahyaena brunnea* (Brown Hyena, NT), *Dasymys robertsii* (Robert's Shaggy Rat, NYBA), *Python natalensis* (Southern African Python, VU), *Homoroselaps dorsalis* (Striped Harlequin Snake, R), *Pyxicephalus adspersus* (Giant African Bullfrog, NT), *Opistophthalmus glabrifrons* (Rough Burrower, P) and the confirmed *Ceratogyrus darlingi* (Horned Baboon Spider, VU&P). Brown hyena may occur throughout the focus area, but is unlikely to utilise any of the habitats for breeding, whilst the shaggy rat and bullfrog have an increased POC in the Freshwater habitat and as such, these areas should be avoided by development as far as possible. The arachnid SCC, *Ceratogyrus darlingi* (Horned Baboon Spider, VU&P) is confirmed to occur on site and it is certain that development will have a significant impact on the species due to its sedentary habits and poor dispersal ability. Due to decreased dispersal ability, herpetofauna and arachnid SCC face increased fatality risks during habitat clearing activities.

As such, it is strongly advised that rescue and relocation plan is designed and implemented prior to development for the Horned Baboon spider during development. Even with mitigatory measures implemented, it is inevitable that development and increased human presence in the focus area will destroy habitat suitable breeding and foraging habitat for the abovementioned SCC, resulting in decline of Horned Baboon Spiders and other SCC in the focus area. However, It is unlikely that impacts to most SCC that may occur in the focus area will be significant, considering the reduced POC of seven out of eight SCC on site, and due to the ability of these SCC to occur elsewhere. SCC populations may however be unnecessarily placed under further pressure, if no mitigatory measures regarding SCC as listed in section 6 are undertaken.

Project phase	**Construction**			
Impact	Loss, or displacement of potentially occurring faunal SCC in the focus area			
Description of impact	Loss, or displacement of potentially occurring faunal SCC in the focus area			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Long term	Impact will last between 10 and 15 years
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	

Project phase	**Operation**			
Impact	Permanent or long-term loss of faunal habitat, diversity and SCC in the area			
Description of impact	Permanent or long-term loss of faunal habitat, diversity and SCC in the area, due to uncurbed disturbance to soils and vegetation			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings

Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	

5.1.2.3 Cumulative impacts related to faunal environment

The local area has already been subjected to extensive impacts as a result of historic and current livestock farming and agriculture, informal housing and existing mining activities, with most of the proposed activities occurring along existing infrastructure and in already degraded habitat limited extent. The development will nonetheless lead to common faunal species being displaced from the proposed footprint areas into adjacent habitats. This may lead to increased competition for space and food resources, however, given the moderate abundance and replaceability of faunal diversity in the footprint areas, this impact is not expected to be significant. Edge effects and AIP proliferation are more concerning over the long-term. AIP proliferation will ultimately lead to loss of viable habitat, on a potentially increased scale, in the surrounding areas, displacing faunal species further as indigenous floral species (faunal habitat and food resources) are displaced and lost. An additional cumulative impact that could increase substantially over the life of the development, if not mitigated, is littering and dumping of other waste material in sensitive areas or outside designated areas, which will negatively impact faunal habitat on an increased scale over time.

5.2 Impacts on Avifauna

The sections below provide the significance of perceived impacts arising from the proposed developments within the focus area. The perceived impact significance of the proposed development (prior to mitigation) on avifaunal habitat, diversity and SCC range from moderate to minor (negative). The potential for local or regional impacts are likely if recommended mitigation measures as stipulated in Section 6 are not adhered to. If effective mitigation takes place at all stages of the proposed project, most of the impacts may be reduced to lower significance ratings.

Construction phase impacts resulting in the destruction of habitat and operational phase impacts resulting from possible avifaunal collisions are expected to be the highest in their severity with impact that are anticipated to be moderate (negative) without mitigation. Impact mitigation is however expected to reduce the severity of these impacts to lower significance levels. Impacts to SCC will be moderate to minor (negative) if mitigations measures are ignored during the construction and operational phases. Mitigation, if implemented correctly, will reduce the impact significance to lower levels for SCC.

5.2.1 Impacts on avifaunal diversity and habitat

The eastern portions of the focus area where much of the PV facility and infrastructure is proposed has avoided any form of large-scale landscape transformation (e.g. extensive agriculture or mining activities or earth works) ensuring that a modest assemblage of avifauna, with a reduced abundance of large raptors, has been conserved. Very little clearing of vegetation is anticipated for the construction of the Powerline and thus little alteration in the local habitat or impacts on SCC habitat are anticipated. However, these proposed infrastructures increase the potential for avifauna (particularly larger birds) to collide with the pylons or be electrocuted on them while perching which may reduce their abundances. The major impact will result from the proposed PV facility and the associated infrastructure which will result in the alteration of intact portions of Bushveld Habitat. Impacts from edge effects may occur should proper rehabilitation of the site not be completed which may alter the local environment to a small extent, however these impacts are not anticipated to be high. An increase in vehicle movement during maintenance will increase the likelihood of collisions with avifauna, yet the vehicles are unlikely to be moving fast enough to be a significant risk to avifauna should a strict speed limit be kept. Avifaunal diversity within the focus area is considered intermediate, and should the proposed PV facility be established it is likely that a reduction in species diversity will occur within the focus area. The impact significance of the loss of avifaunal species diversity based on the proposed layout plans for the construction and operational phases is expected to be between moderate and minor prior to the implementation of mitigation measures and minor should mitigation be implemented thoroughly.

Project phase	**Construction**			
Impact	Loss of avian habitat outside of the development footprint			
Description of impact	Loss of avian habitat outside of the development footprint, including a decrease in species diversity and potential loss of avian SCC as a result of uncontrolled bush encroachment and/or AIP proliferation.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Short term	impact will last between 1 and 5 years
Extent	Municipal area	Impacts felt at a municipal level	Limited	Limited to the site and its immediate surroundings
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Negligible - negative**	

Project phase	**Construction**

Impact	Loss of intact avifaunal habitat and diversity within the proposed development footprint.			
Description of impact	Loss of intact avifaunal habitat and diversity within the proposed development footprint.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Short term	impact will last between 1 and 5 years
Extent	Municipal area	Impacts felt at a municipal level	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	

Project phase	**Construction**			
Impact	Loss of favourable avian habitat and consequently a further loss of diversity			
Description of impact	Loss of favourable avian habitat and consequently a further loss of diversity through changes in the current pattern, flow, and timing of water in the landscape as well as the chemical constituency of the local water resources			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Short term	impact will last between 1 and 5 years
Extent	Municipal area	Impacts felt at a municipal level	Local	Extending across the site and to nearby settlements
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment

Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Minor - negative**	

Project phase	**Operation**			
Impact	Ongoing loss of avian habitat, diversity and SCC			
Description of impact	Ongoing loss of avian habitat, diversity and SCC as AIPs proliferate within disturbance areas and adjacent locations, and a higher likelihood of edge effect as a result of the proposed development			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	Long term	Impact will last between 10 and 15 years
Extent	Municipal area	Impacts felt at a municipal level	Local	Extending across the site and to nearby settlements
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Minor - negative**	

Project phase	**Operation**			
Impact	Ongoing or permanent loss of avian habitat and diversity			
Description of impact	Ongoing or permanent loss of avian habitat and diversity			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	Long term	Impact will last between 10 and 15 years
Extent	Municipal area	Impacts felt at a municipal level	Local	Extending across the site and to nearby settlements

Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Minor - negative**	

5.2.2 Impact on avifaunal SCC

Twenty two avifaunal SCC have distribution ranges which overlay the focus area and may utilize it for foraging on an intermittent basis. These species include; *Necrosyrtes monachus* (Hooded Vulture), *Gyps africanus* (White-backed Vulture), *Polemaetus bellicosus* (Martial Eagle), *Aquila rapax* (Tawny Eagle), *Gyps coprotheres* (Cape Vulture), *Torgos tracheliotos* (Lappet-faced Vulture), *Mycteria ibis* (Yellow-billed Stork), *Neotis denhami* (Denham's Bustard), *Aquila verreauxii* (Verreauxs' Eagle), *Nettapus auratus* (Pygmy Goose), *Gorsachius leuconotus* (White-backed Night Heron), *Eupodotis senegalensis* (White-bellied Korhaan), *Sagittarius serpentarius* (Secretarybird), *Cocinia nigra* (Black Stock), *Oxyura maccoa* (Maccoa Duck), *Anthropoides paradiseus* (Blue Crane), *Alcedo semitorquata* (Half-collared Kingfisher), *Certhilauda chuana* (Short-clawed Lark), *Coracias garrulus* (European Roller), *Falco biarmicus* (Lanner Falcon), *Ciconia abdimii* (Abdim's Stork) and *Leptoptilos crumeniferus* (Marabou Stork). Of these species only two, *Certhilauda chuana* (Short-clawed Lark) and *Coracias garrulus* (European Roller) are anticipated to have a medium potential of occurring within the focus area for sustained periods, and as such will lose habitat should the proposed PV facility be installed. The area however, is not considered to be a regionally important breeding, roosting or foraging habitat for any of the abovementioned species and thus no impacts on their respective populations breeding productivity are likely to occur.

Based on the habitats observed during the field investigation, two species have suitable habitat on-site. *Coracias garrulus* (European Roller) is a non-breeding migrant which ranges throughout much of the country. Habitat is marginal for this species as a result of the high human abundance and activity and encroached habitat within the focus area. *Certhilauda chuana* (Short-clawed Lark) prefers more open habitat as observed within the Degraded Bushveld habitat, yet the species distribution range occurs more north east and as such habitat is considered marginal.

Local migrations from the development footprint and its direct surroundings will likely occur during the construction, operational and maintenance phase which will lead to higher competition for resources in adjacent habitats and a reduced species richness within the focus area. Even with the proposed mitigation measures it is unlikely that diversity levels will return to baseline levels.

The impact associated with the loss of habitat for the above-mentioned SCC is of minor significance during the construction and operational phases, prior to the implementation of mitigation measures. With the implementation of mitigation measures, the impact significance

of the loss of important species will reduce, however, not enough to reduce the impact significance levels, as mitigation measures will ensure better protection for these species.

Project phase	**Construction**			
Impact	Loss of avian SCC habitat within the development footprint.			
Description of impact	Loss of avian SCC habitat within the development footprint.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Short term	impact will last between 1 and 5 years
Extent	Municipal area	Impacts felt at a municipal level	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Minor - negative**	

Project phase	**Operation**			
Impact	Loss of SCC habitat			
Description of impact	Loss of SCC habitat due to the operations of the PV solar plant			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Long term	Impact will last between 10 and 15 years	Long term	Impact will last between 10 and 15 years
Extent	Municipal area	Impacts felt at a municipal level	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment

Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Minor - negative**	

Project phase	**Operation**			
Impact	Loss of avian SCC			
Description of impact	Loss of avian SCC, as a result of collisions with powerlines and PV infrastructure			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	Long term	Impact will last between 10 and 15 years
Extent	Municipal area	Impacts felt at a municipal level	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	

5.2.3 Cumulative impacts related to avifaunal environment

Based on the number of avifaunal SCC whose distribution overlay the focus area the area appears to be important in terms of its avifaunal assemblage, however, habitat characteristics and human disturbances reduce the suitability of habitat for most of these species. Many of these species are, however wide ranging and it is likely that they will use this area between Witvinger Nature Reserve and the Waterberg IBA as a corridor and as such bird flappers are required to increase the visibility of the OHPL. Only two species have a medium POC within the focus area and habitat is considered marginal. Thus, it is unlikely that the location plays an important role in supporting SCC populations. As areas within the focus area and its surrounding landscape have been exposed to anthropogenic impacts areas suitable for SCC inhabitation are limited. In most cases the anticipated SCC are not known to have any

important foraging, roosting or breeding locations within the focus area and thus regional impacts are not anticipated. Both mitigated and unmitigated impacts are anticipated to be minor on SCC due to the reduced habitat suitability and small SCC assemblage anticipated to inhabit the focus area.

Based on the general landscape and habitat within the focus area the site has the potential to host an intermediate assemblage on avifauna and several potential SCC. Two SCC have possible habitat within the focus area and, as such uncontrolled development should be restricted as it may result in the loss of habitat for these species. The proposed activities will lead to the loss of avifaunal habitat and to a reduction in the abundance of common avifauna and local reductions in SCC presence. The activities will lead to the displacement of avifaunal species currently inhabiting these areas, pushing them out into the surrounding vegetated areas leading to increased competition for territories and breeding sites. Moreover, there is likely to be a knock-on dispersal affect, leading to increased resource competition and possible increased mortality rates, resulting in a decreased species abundance and possible further loss of species diversity. Lastly, ineffective control and monitoring of edge effects will result in the spread of AIP species to areas outside of the focus area, which will further alter avifaunal habitat and subsequently abundance within the habitats surrounding the focus areas.

5.3 Impacts on the Aquatic Environment

Identified impacts are described in terms of the nature of the impact, receptor sensitivity and the significance of the predicted environmental change (before and after mitigation). The assessment of the identified impacts is based on determining the following aspect: impact intensity, duration, extent, consequence, probability and impact reversibility. The impact rating system considers the confidence level that can be placed on the successful implementation of mitigation.

There are four key ecological impacts on freshwater ecosystems that are anticipated:

- Changes to the freshwater ecosystems leading to the loss of habitat;
- Modification of hydrological function and water quality of the freshwater ecosystems;
- Changes to the freshwater geomorphological processes and sedimentation; and
- Impacts on the freshwater ecosystems leading to the loss of biota.

Various activities and development aspects may lead to these impacts, however, these impacts can be adequately minimized or avoided provided the mitigation measures provided in Section 6 of this report are implemented and adhered to.

5.3.1 Construction phase impacts

Project phase	**Construction**			
Impact	Removal of vegetation within the development footprint and associated disturbances to soil			
Description of impact	Removal of vegetation within the development footprint and associated disturbances to soil resulting in loss of freshwater habitat.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Brief	Impact will not last longer than 1 year

Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Negligible - negative**	

Project phase	**Construction**			
Impact	Modification of hydrological function			
Description of impact	Modification of hydrological function and water quality of the freshwater ecosystems			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Negligible - negative**	

Project phase	Construction			
Impact	Changes to the freshwater geomorphological processes and sedimentation			
Description of impact	Changes to the freshwater geomorphological processes and sedimentation			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Brief	Impact will not last longer than 1 year
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	Moderate - negative		Negligible - negative	

Project phase	Construction			
Impact	Loss of biota			
Description of impact	Impacts on the freshwater ecosystems leading to the loss of biota			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Brief	Impact will not last longer than 1 year
Extent	Local	Extending across the site and to nearby settlements	Very limited	Limited to specific isolated parts of the site
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered

Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Negligible - negative**	

5.3.2 Operational phase

Project phase	**Operation**			
Impact	Loss of freshwater habitat			
Description of impact	Removal of vegetation within the development footprint and associated disturbances to soil resulting in loss of freshwater habita			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Immediate	Impact will self-remedy immediately
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere	Highly unlikely / none	Expected never to happen
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	

Project phase	Operation			
Impact	Modification of hydrological function and water quality			
Description of impact	Modification of hydrological function and water quality of the freshwater ecosystems			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere	Highly unlikely / none	Expected never to happen
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	

Project phase	Operation			
Impact	Changes to the freshwater geomorphological processes and sedimentation			
Description of impact	Changes to the freshwater geomorphological processes and sedimentation			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has	Highly unlikely / none	Expected never to happen

		rarely been known to result elsewhere		
Confidence	Medium	Determination is based on common sense and general knowledge	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	

Project phase	**Operation**			
Impact	Loss of biota			
Description of impact	Impacts on the freshwater ecosystems leading to the loss of biota			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Immediate	Impact will self-remedy immediately
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Highly unlikely / none	Expected never to happen
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	

5.3.3 Cumulative impacts related to aquatic environment

Cumulative impacts are activities and their associated impacts on the past, present and foreseeable future, both spatially and temporally, considered together with the impacts identified above. Freshwater ecosystems within the region are under continued threat due to growing mining intensification in the surrounding landscape along with the impacts of population growth.

Direct and indirect impacts identified on freshwater ecosystems include an increase mining activities, expansion of communal areas (linked to increased livestock grazing) which have resulted in proliferation of alien and invasive species in the area due to regular disturbance of soil and removal of indigenous vegetation. Anticipated cumulative impacts associated with the project include increase in runoff which will result in changes if pattern of flows and timing of water in the landscape especially during rainfall events. As such, it is recommended that stormwater generated within the proposed Mogalakwena PV facility and associated infrastructure (substations) must be suitably managed according to a site-specific stormwater management plan. No water may be directly released from the proposed PV facility into the surrounding freshwater ecosystems but must rather be suitably managed and released diffusely into the landscape. As far as possible engineering techniques should be used to achieve this.

5.4 Visual Impacts

A landscape and visual assessment was conducted to identify the potential impacts that the proposed project may have on the existing visual environment. These identified impacts are discussed in this section, starting with the description of the visual receptors and visual exposure and visibility to illustrate “for whom” and “where” the impacts might occur. The specialist report can be found in Appendix E4.

5.4.1 Receptors

Receptors for visual impacts are potential viewers of the proposed development. The perception of viewers is difficult to determine as there are many variables to consider such as:

- Familiarity with the actual scene;
- The location and context of the viewpoint;
- Circumstances that bring them into contact with that view (occupation or activity of the receptor) and;
- Nature and importance of the view (full or glimpsed, near or distant).

Table 5-1: Receptor sensitivity rating

Receptor sensitivity	Explanation
High	Views to and from nature reserves, coastal areas and scenic routes or trails
Moderate	Views to and from residential areas, agricultural areas, sporting / recreational areas or places of work
Low	Views to and from industrial, mining, or degraded areas.

Other variables include cultural background, state of mind and how often the proposed project is viewed within a set period, it is therefore necessary to generalize the viewer sensitivity to some degree. Potential visual receptors that may be affected by the proposed project is outlined in Table 5-2 below:

Table 5-2: Visual receptors identified for the study area

Visual receptors	Description
Residents from nearby villages such as Ga Molekana, Ga Sekhaolelo, Sekuruwe residing permanently in the study area	Low – Moderate
Motorists traveling on the N11.	Low – Moderate
Tourists visiting nearby private game lodges and guest houses for leisure purposes such birding, hiking, and hunting.	Moderate- High

Visual receptors	Description
Workers from Mogalakwena Mine and associated industries	Low

5.4.2 Visual exposure and visibility

Visual exposure refers to the geographic area from which the proposed project will be visible and is defined by the degree of visibility of a proposed project from various receptor sites. The visual exposure of the proposed project is based on the distance from the proposed source of impact and usually fades out beyond 7km. The visibility of an object decreases exponentially over distance and accordingly visual impact will diminish as the viewer moves away from the object being viewed. It is also important to note that the actual zone of visual influence of the proposed project may be smaller than indicated because of screening by existing vegetation and infrastructure.

Visibility is determined by the distance between the proposed project components and the visual receptor. The visibility or viewshed/ZTV of the project is the area from which the project will be visible and includes all the major observation sites from where the proposed project will be visible. The viewshed is theoretical as it assumes direct line of sight between any point within the viewshed and the object being viewed.

A GIS has been used to generate the viewshed analyses for the proposed project and related infrastructure. The system has 3D topographical modelling capabilities, including a line-of-sight analysis. For this project, the viewshed analysis was generated by means of contours using the proposed project and height of the associated infrastructure. The visibility of a development and its influence on visual impact is rated using the criteria listed in Table 5-3 below.

Table 5-3: Visibility classes

Class	Description
Highly visible	Clearly noticeable within the observer's view frame 0-5km
Moderately visible	Recognisable feature within the observer's view frame 5-7km
Marginally visible	Not particularly noticeable within the observer's view frame 7-10km
Hardly visible	Practically not visible unless pointed out to observer beyond 10km

5.4.2.1 PV Panels

The PV panels are expected to appear as a linear dark element in the landscape. In addition to weather conditions the obviousness of this dark line will depend on the extend of the screening vegetation as well as the distance between the viewer and the edge of the array. At a distance of 7 km the dark line will start to blend into the background.

The proposed development will be highly visible within a distance of 1km from the areas west of the proposed development. This mainly includes receptors from the N11 and residents from Ga Molekana. According to the viewshed analysis views from the south will be moderately – highly visible within a range of 5km from the proposed site. From the site visit it was concluded that it will be significantly less as a result of the screening properties from natural vegetation and adjacent buildings. Views from the north is largely limited due to the natural topography. Visibility from the east is low as a result of the screening properties of local topography. This was confirmed during the site visit as views from the Ga Sekhaolelo access road was mostly obscured, except for an elevated section where longer views towards the site were possible.

5.4.2.2 Overhead transmission lines

The proposed transmission lines will run parallel to the N11 and will cross this road twice to connect to the existing substations as indicated in Figure 5-1. Transmission lines will be most noticeable to motorists where the line crosses the N11. Due to its height, the transmission lines will be highly - moderately visible over a larger area. Views of residents from Ga Molekana and motorists traveling on Bakenberg Road will be mostly affected.

5.4.2.3 Access roads

Access road construction is likely to only have an impact on the area immediately surrounding it, especially when the disturbance of natural vegetation has been minimised, it will not be obvious 100m past the road edge.

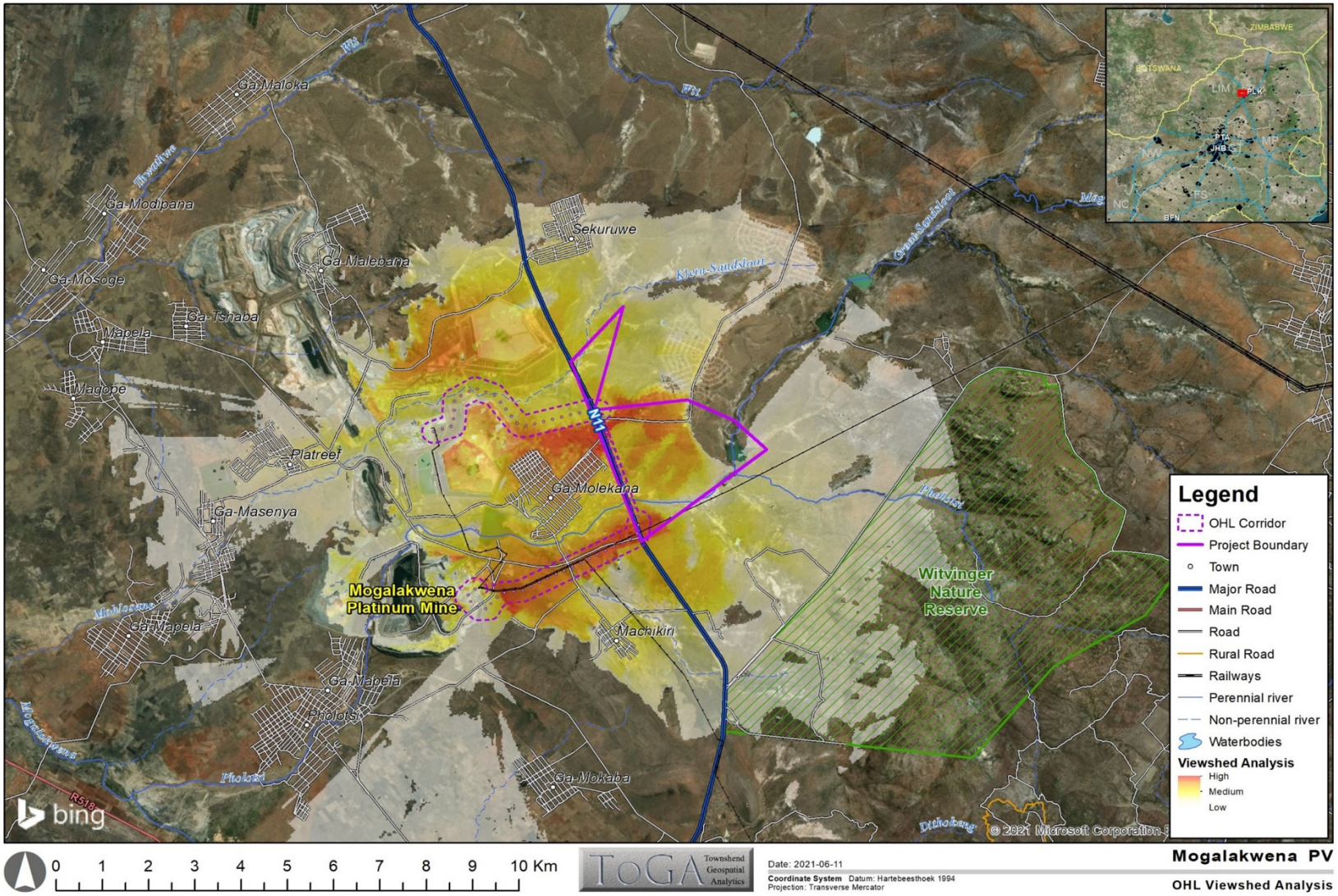


Figure 5-1: Viewshed analysis for the overhead transmission lines

5.4.3 Impact on landscape character and sense of place

The study area appears to be highly modified and impacted by various large-scale industrial type influences with no protected or significantly sensitive landscapes within the study area. Overhead transmission lines (in the context of existing transmission lines) are unlikely to have significant impact on the landscape character and sense of place.

Project phase	**Construction**			
Impact	Impact on landscape character and sense of place			
Description of impact	Change in the landscape character and sense of place of the study area through the introduction of industrial type infrastructure			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	Make use of existing access roads and dirt tracks so that it minimizes modification of the existing topography.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will last between 1 and 5 years	Short term	Impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	
Cumulative impacts	The proposed development will extend the cumulative effect of industrial development within the landscape to the point that it could potentially negatively affect permanent residents from nearby settlements and tourists visiting the larger Waterberg region which travels through the study area.			

Project phase	**Operation**	
Impact	Impact on landscape character and sense of place	
Description of impact	Change in the landscape character and sense of place of the study area through the introduction of industrial type infrastructure	
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts
Potential mitigation	Where surfaces on buildings are painted darker colours such as khaki brown, grey brown or olive green should be specified. Steel roof sheets must be a dark colour such as khaki brown, grey brown or olive green, bright and light colours like red, blue, and orange must be avoided.	

Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Cumulative impacts	The proposed development will extend the cumulative effect of industrial development within the landscape to the point that it could potentially negatively affect permanent residents from nearby settlements and tourists visiting the larger Waterberg region which travels through the study area.			

Project phase	Decommissioning			
Impact	Impact on landscape character and sense of place			
Description of impact	Change in the landscape character and sense of place of the study area through the introduction of industrial type infrastructure			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	Implement rehabilitation and landscaping measures as per EMPr requirements once all materials, wastes and equipment have been removed from site.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Likely	The impact may occur	Likely	The impact may occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact

Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	

5.4.4 Impact on visual intrusion and VAC

The expected level of visual intrusion throughout construction, operation and decommissioning will be minimal, as the project is situated within an existing mining context which are highly modified by various anthropogenic and related infrastructure. There are already complex rectilinear, geometric lines and forms and artificial textures and colours visible within the study area. Visual intrusion is expected to be slightly higher for residents which reside directly next to the proposed structures.

The area has a moderate – high VAC due to its ability to absorb or conceal most visual impacts, for instance, the clearing of vegetation during construction which will result in a low degree of contrast in colour (especially during winter) due to bare ground and a yellow brown grass dominating the surrounding surface area. Therefore, making it difficult to distinguish the construction footprint from its surroundings when viewed from a distance. The visual contrast will however be higher for views within close proximity to the site as newly disturbed soils could take a few seasons before revegetation would begin to disguise past activity. Even though vegetation (due to its limited height and dispersed pattern) will not be able to assist with the VAC, transmission line pylons will however mostly or partially be viewed against a mountainous (darker) backdrop making the structure blend in more with its surrounds. Additional proposed powerlines will be barely noticed as it will run parallel with the N11, within the same corridor of existing transmission lines.

Project phase	**Construction**			
Impact	Impact on visual intrusion and VAC			
Description of impact	The level of compatibility and the ability of the landscape to visually absorb the proposed infrastructure, including contrasts in form, line , colour and texture resulting from vegetation clearing.			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	Refer to Section 6 of this report			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge

Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	

Project phase	**Operation**			
Impact	Impact on visual intrusion and VAC			
Description of impact	The level of compatibility and the ability of the landscape to visually absorb the proposed infrastructure, including contrasts in form, line , colour and texture resulting from vegetation clearing.			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	Refer to Section 6 of this report			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	

Project phase	**Decommissioning**	
Impact	Impact on visual intrusion and VAC	
Description of impact	The level of compatibility and the ability of the landscape to visually absorb the proposed infrastructure, including contrasts in form, line , colour and texture resulting from vegetation clearing.	
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts
Potential mitigation	Refer to Section 6 of this report	
Assessment	**Without mitigation**	**With mitigation**

Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	

5.4.5 Impacts on visual exposure and visibility

This impact relates directly to the perception of visual receptors towards the proposed project and the foreshortening of views. High – Moderately sensitive receptors have been determined to primarily comprise tourists visiting nearby private game lodges and guest houses for leisure purposes such as birding, hiking, and hunting. From the desktop study, various dirt tracks cover the north western slopes of the Witvinger Nature Reserve (no lodges and accommodation), and it is therefore assumed that active recreational activities will take place, which will most likely not be as sensitive to surrounding views. When viewed from elevated locations more of the facility would be visible, and the regular geometry of the panel arrays would be more apparent, and in some cases, would result in a larger visual contrast.

Moderate – Low sensitivity receptors include motorists on the N11 and resident residing permanently in the study area. Subject to the exact location of the PV panels within the site, the impact of motorists traveling on the N11 is likely to be limited to immediate adjacent sections of the road and visibility could be slightly higher during the construction phase of the project when the site is cleared, and visual screening mitigation measures have not been applied. Windblown dust (especially during the construction phase of the project) could obscure views of nearby landscape features and degrade general visibility for local residents.

Visual exposure will take place directly as a result of the construction of the proposed infrastructure and indirectly through fugitive dust generated by construction and operation of related activities, such as earthwork activities and construction vehicles driving on dirt roads which will alter the visual environment.

Glint and glare[21] will also have an impact (certain times of the year and certain times of the day) for receptors viewing the proposed infrastructure from the north such as motorists on the N11and people residing nearby. Compared to other technologies, PV panels have reduced the potential for glint and glare, however, the panels and other components do reflect light that may result in glinting that would vary depending on panel orientation, sun angle, viewing angle,

[21] Reflective surfaces visible to moving observers as spots of intensely bright light on the reflective surface or as flashes of bright light.

viewer distance, and other visibility factors. Even though it is expected that glint and glare are more likely to occur during the early morning and late afternoon when the angle of incidence of light on PV arrays is acute, this impact will have to be further investigated once the exact location of PV panels have been confirmed. The duration of this impact is shorter for motorists but could be longer for residents.

Project phase	**Construction**			
Impact	Visual Exposure and Visibilty Impacts			
Description of impact	The visibility and presence of the cleared PV facility and associated infrastructure. (Glint and glare and industrialisation of views)			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to Section 6 of this report			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	**Minor - negative**		**Negligible - negative**	

Project phase	**Operation**			
Impact	Visual Exposure and Visibilty Impacts			
Description of impact	The visibility and presence of the cleared PV facility and associated infrastructure. (Glint and glare and industrialisation of views)			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to Section 6 of this report			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered

Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	

Project phase	**Decommissioning**			
Impact	Visual Exposure and Visibilty Impacts			
Description of impact	The visibility and presence of the cleared PV facility and associated infrastructure. (Glint and glare and industrialisation of views)			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to Section 6 of this report			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	

5.4.6 Impacts due to night-time lighting

Lighting associated with the proposed infrastructure may be visible during both day and night, with lighting more likely to have a visual impact during night-time. Lighting may be visible for significant distances and indirect lighting impacts, such as sky glow (the scattering of light in the sky) and glare may reduce the night sky quality at locations which are a distance from the light sources. The study area in its current state contains various sources of light producing elements which significantly contribute to the effects of sky glow and light trespass which reduces the visual quality of the environment.

Project phase	Construction			
Impact	Impacts due to night time lighting			
Description of impact	The visibility of lighting associated with the proposed project			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to Section 6 of this report			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Negligible - negative		Negligible - negative	

Project phase	Operation			
Impact	Impacts due to night time lighting			
Description of impact	The visibility of lighting associated with the proposed project			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to Section 6 of this report.			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Likely	The impact may occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur

Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	

Project phase	**Decommissioning**			
Impact	Impacts due to night time lighting			
Description of impact	The visibility of lighting associated with the proposed project			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	

5.5 Impacts on Heritage Resources

PGS Heritage (Pty) Ltd (PGS) was appointed to undertake a Heritage Impact Assessment (HIA) for a Proposed Solar PV Plant project.

The unmitigated impact of the proposed development is expected to result in negative impacts of Medium to High significance in terms of the identified heritage fabric of the study area. With mitigation successfully completed, the impact of the proposed development on the identified heritage sites will result in negative impacts of Low to Medium significance. As a result, on the

condition that the recommendations made in this report are adhered to, no heritage reasons can be given for the development not to continue.

5.5.1 Impact on burial grounds and graves

All six confirmed burial ground and grave sites that are expected to be affected by the proposed project were grouped together during the impact assessment process. As all graves have high levels of emotional, religious and in some cases, historical significance, the impact without mitigation is moderately negative, with a very high intensity rating.

Project phase	**Construction**			
Impact	Impact on Burial Grounds and Graves.			
Description of impact	Destruction of /Damage to Graves and Burial Grounds.			
Mitigability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	See Section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Medium term	Impact will last between 5 and 10 years
Extent	Municipal area	Impacts felt at a municipal level	Local	Extending across the site and to nearby settlements
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Determination is based on common sense and general knowledge	Low	Judgement is based on intuition
Reversibility	Medium	The affected environmental will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	

5.5.2 Impact on possible graves and homesteads not yet identified or unmarked

The possible existence of graves and homesteads that may have been overlooked during the field assessments is a possible risk and has therefore been included in the impact assessment.

Project phase	**Construction and Operation**
Impact	Impact on Possible Graves and Homesteads with the Risk for Unmarked Graves

Description of impact	Destruction of / Damage to Graves			
Mitigability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	See Section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Medium term	Impact will last between 5 and 10 years
Extent	Municipal area	Impacts felt at a municipal level	Local	Extending across the site and to nearby settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur.	Unlikely	Has not happened yet but could happen once in the lifetime of the project.
Confidence	Medium	Determination is based on common sense and general knowledge	Low	Judgement is based on intuition
Reversibility	High	The affected environmental will be able to recover from the impact	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Negligible - negative**	

5.5.3 Impact on Stone Age and Iron Age sites

In this section, the potential impact of the proposed development on Stone Age and Iron Age sites have been assessed.

Project phase	**Construction**			
Impact	Impact on Stone Age and Iron Age sites.			
Description of impact	Destruction of /Damage to Stone Age and Iron Age sites.			
Mitigability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	See Section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Medium term	Impact will last between 5 and 10 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings

Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Negligible - negative**	

5.6 Impacts on palaeontological resources

Impacts on Palaeontological Heritage are only likely to happen within the construction phase. No impacts are expected to occur during the operation phase or decommissioning phase.

Project phase	**Construction**			
Impact	Loss of fossil heritage			
Description of impact	Construction could possibly damage and destroy fossil heritage			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Highly unlikely / none	Expected never to happen	Highly unlikely / none	Expected never to happen
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere

Significance	Negligible - negative	Negligible - positive

5.7 Impacts on the Social Environment

A social impact assessment was conducted to identify the potential impacts that the proposed project may have on the existing social environment. These identified impacts are discussed in this section, for all phases of the project. The specialist report can be found in Appendix E7.

5.7.1 Community-based impacts

Relationships between some of the communities around the mine are strained, and in the past, there have been incidents of violence and volatility. The expectations of the community need to be managed carefully as this impact can pose significant risk to the mine on different levels. Potential types of costs of conflict between mines and communities are explained in the table below:

Table 5-4: Types of cost to the company as a result of community conflict

Types of cost to company	
Security	• Payments to state forces or company security contractors. • Increased operational cost of security: fences, patrols, escorts, transport, alarm systems, reduced mobility. • Increased security training and management: staff time, lost production, costs of programs.
Project modification	• Design modification costs: application, redesign, legal. • Additional works.
Risk management	• Insurance: higher premiums and coverage, risk rating, withdrawal of coverage. • Legal and conflict expertise: specialist training for staff, additional staff.
Material damage	• Damage or destruction of private property or infrastructure. • Damage or destruction to public property or infrastructure.
Lost productivity	• Operations discontinued: voluntary closure or enforced through injunction. • Temporary shutdown of operations. • Lost opportunity for future expansion and/or for new projects. • Disruption to production: temporary or indefinite delays, absenteeism. • Delays in deliveries/supplies. • Greater regulatory burden/scrutiny.
Capital	• Loss of value of property: full write-off, other depreciation, sale at a loss, theft. • Inability to repay debt or default on debt. • Difficulty raising new capital.

	• Share price instability/loss in value (within relevant time period).
Personnel	• Staff time spent on risk and conflict management. • Costs of remediation: meetings, negotiations, mediators. • Hostage-taking: ransom payments, rescue operations, compensation. • Arrests of staff. • Injuries to staff and fatalities. • Low morale and stress-related effects. • Retention: higher salaries, compensation packages, bonuses. • Recruitment: advertising positions, screening, interviewing, induction training.
Reputation	• Higher expenditure on public relations: consultants, dissemination of information. • Competitive loss/disadvantage: impact on brand, investor confidence.
Redress	• Compensation (out of court payments). • Fines. • Increased social and environmental obligations: health care, education and training, provision of other services, clean-up and remediation costs. • Costs of administrative proceedings or litigation: costs of proceedings themselves, judgment/settlement costs.

It is clear that community-company conflict can potentially cost the mine and the IPP a lot of money, time and effort. Addressing this impact will not be an easy or quick process, and it is recommended that the process should start as soon as possible.

Community-based impacts are therefore described below.

5.7.1.1 Community expectations of benefits

Many communities around the mine expect that they should benefit from the mine and its associated projects. They feel that not only those closest to the proposed project should benefit, but rather the wider community. To date the perception of many of the communities is that the mine did not deliver on promises made in the past, and this make them doubtful about potential benefits to the communities resulting from the project. There is an expectation that the communities will receive electricity from the project, but due to legalities surrounding power supply, this would not be feasible for the proponent. Some groups within the surrounding communities are expecting to partner with the mine on the power purchase agreement and feel strongly that these should not be awarded to companies or politically connected people from outside the area.

Project phase	**Construction**	
Impact	Community expectations of benefits	
Description of impact	Communities expect that they should benefit from the mine and its associated project	
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts

Potential mitigation	Communication strategy, open and honest communication, establish working group with representatives from various communities or interest groups			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Municipal area	Impacts felt at a municipal level	Municipal area	Impacts felt at a municipal level
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Major - negative**		**Moderate - positive**	
Cumulative impacts	The communities already have significant expectations of the mine, and any perceived improvements will add to the expectations that the communities have.			

Project phase	**Operation**			
Impact	Community expectations of benefits			
Description of impact	Communities expect that they should benefit from the mine and its associated project			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Communication strategy, open and honest communication, establish working group with representatives from various communities or interest groups			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Municipal area	Impacts felt at a municipal level	Municipal area	Impacts felt at a municipal level
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention

Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Major - negative**		**Moderate - positive**	
Cumulative impacts	The communities already have significant expectations of the mine, and any perceived improvements will add to the expectations that the communities have.			

Project phase	**Operation**			
Impact	Environmental impacts with social dimensions			
Description of impact	Impacts such as dust, noise, light and visual can impact on the quality of life and sense of place of community members			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Mitigation measures of relevant specialist studies, community liaison forum			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Likely	The impact may occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	**Minor - negative**		**Minor - negative**	
Cumulative impacts	This will be in addition to existing impacts created by the other activities of the mine.			

5.7.1.2 Community resistance to the proposed project

At the time of the writing of this report there were groups that were strongly opposed to the project, mainly due to the poor social license to operate from the mine. They are of the opinion that the mine did not follow the correct social protocols to introduce the project to the communities, by announcing the project instead of consulting with community leaders on the project first. Irrespective of the fact that the project will be constructed and managed by an IPP, the communities still view it as a mining project.

Project phase	**Construction**	
Impact	Community resistance to proposed project	
Description of impact	Some groups are strongly opposed to project, mainly due to poor social license to operate from mine	
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts
Potential mitigation	Engage with communities, determine social protocols, strategy for regaining social license to operate, policy on dealing with community conflict	
Assessment	**Without mitigation**	**With mitigation**
Nature	Negative	Positive

Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Minor - positive**	
Cumulative impacts	The mine has been struggling with obtaining a social license to operate, and any project associated with the mine will therefore be subjected to mistrust from some of the affected communities.			

5.7.1.3 Community relations

The relationship between the mine and the community is tense, and this can be attributed to mistrust from the community and the perception that the mine is not delivering on the benefits that they have committed to in the past. The community also do not feel respected by the mine as a result of the way the mine is embarking on the project. This may have a negative impact on the way in which the community perceive the IPP that would be implementing the project. Although the mine does not have a legal obligation to consult with the community before announcing the project, the community feels that they are just being informed, instead of being consulted with, which goes against the collaborative approach the community is expecting. The strained community relations may be transferred to the IPP if appropriate action is not taken.

Project phase	**Construction**			
Impact	Community relations			
Description of impact	The relationship between the mine and the community is tense due to mistrust and perception that mine is not delivering on benefits committed to in the past			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Community relations strategy, grievance mechanism			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Municipal area	Impacts felt at a municipal level	Municipal area	Impacts felt at a municipal level

Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Major - negative**		**Moderate - positive**	
Comment on significance	It will take significant input from the mine to mitigate this impact.			
Cumulative impacts	Due to historic mistrust any new development is viewed with some scepticism from a community perspective.			

Project phase	**Operation**			
Impact	Community relations			
Description of impact	The relationship between the mine and the community is tense due to mistrust and perception that mine is not delivering on benefits committed to in the past			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Community relations strategy, grievance mechanism			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Municipal area	Impacts felt at a municipal level	Municipal area	Impacts felt at a municipal level
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Major - negative**		**Moderate - positive**	
Comment on significance	It will take significant and ongoing input from the mine to mitigate this impact.			

Cumulative impacts	Due to historic mistrust any new development is viewed with some skepticism from a community perspective

Project phase	**Decommissioning**			
Impact	Community relations			
Description of impact	The relationship between the mine and the community is tense due to mistrust and perception that mine is not delivering on benefits committed to in the past			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Community relations strategy, grievance mechanism			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Municipal area	Impacts felt at a municipal level	Municipal area	Impacts felt at a municipal level
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Major - negative**		**Moderate - positive**	
Comment on significance	The management if this impact requires significant and ongoing commitment from the proponent.			
Cumulative impacts	Community relations is an ongoing impact that should be managed for the life of the mine.			

5.7.1.4 Uncertainty

Some community members expressed uncertainty about how the project will affect their lives. If this is not addressed, it could result in unrest in the community when people start to make their own assumptions regarding the potential impacts.

Project phase	**Construction**			
Impact	Uncertainty			
Description of impact	Some community members are uncertain about how project will affect their lives			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Communication strategy			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	

Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - positive**	
Comment on significance	It will take significant input from the mine to implement the mitigation measures successfully			
Cumulative impacts	Due to trust issues in the past community members are reluctant to believe that the mine has their best interest at heart			

5.7.1.5 Relocation

Depending on the layout of the PV facility, it may be necessary to relocate a few households. This process falls outside the scope of the SIA but needs to be done with care to avoid it causing further community impacts.

Project phase	**Construction**			
Impact	Relocation			
Description of impact	Some households may need to be relocated			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Relocation action plan, livelihood restoration plan			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Low	The affected environment will not be able to recover	Low	The affected environment will not be able to recover

		from the impact - permanently modified		from the impact - permanently modified
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	If this impact is not mitigated properly it can cause human rights infringements with dire consequences for the mine			
Cumulative impacts	There is a history of negative impacts associated with relocation in the communities within the social area of influence. This influence all future relocations.			

5.7.1.6 Loss of livelihoods

Some community members are concerned that the project will lead to a loss in livelihoods, as they use the land where the site is proposed for grazing of cattle and agricultural activities. In the past, mining activities and relocation of people have resulted in the loss of agricultural land and grazing areas, which impacted on the livelihoods of people. Some people are concerned that the project will contribute to this. It must be noted though that the land currently belongs to the mine and not to the community. Relocation of indigenous plants and access of the community to these plants form part of this impact.

Project phase	**Construction**			
Impact	Loss of livelihoods			
Description of impact	Concerns that project may lead to loss of livelihoods as some use site for grazing and agricultural activities			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Compensate affected people for loss of livelihood, indigenous plant nursery			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Likely	The impact may occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	The significance of the unmitigated impact is greater than minor			
Cumulative impacts	Communities living adjacent to mines already complain about the impacts on their livelihoods due to environmental impacts. If livelihood strategies are impacted by the proposed project, it would add an extra layer of impacts to existing livelihood impacts.			

Project phase	Decommissioning			
Impact	Loss of livelihoods			
Description of impact	Those employed at the facility will become unemployed			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Implement measures in accordance with Labour Relations Act			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	Major - negative		Moderate - negative	
Comment on significance	This impact should be managed throughout the project lifecycle			
Cumulative impacts	Some livelihoods will be lost with decommissioning, and some new livelihoods could be established. Livelihoods enhancement strategies should form part of the mine closure and decommissioning process.			

5.7.2 Economic impacts

The communities have great expectation in terms of the socio-economic benefits that the project will have for them. If managed properly, the impacts can be very positive, but if the proponent does not keep to its commitments, the lack of benefits, whether perceived or real, will result in negative impacts. Potential economic impacts are discussed below.

5.7.2.1 Job creation

it is anticipated that during the construction phase there will be employment for approximately 1 500 people, and approximately 50 people during the operational phase. Of these jobs it is anticipated that about 10% will be skilled, 50% semi-skilled, and 40% unskilled. Although most of the jobs will be temporary in the nature, it will provide an opportunity for developing new skills, gaining experience and a temporary livelihood. The communities expect that most of these people will be sourced from the community and that the mine will invest in developing the necessary skills in the community to enable the community to qualify for a larger proportion of the available positions. This is a challenging position for the mine as the facility will be

developed by an external provider, and it must be considered that the community is likely to view the provider as part of, or a representative of the mine.

Project phase	**Construction**			
Impact	Job creation			
Description of impact	Jobs for approximately 1 500 people will be created during the construction phase			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Use local labour as far as possible, recruitment policy, skills development plan			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Regional	Impacts felt at a regional / provincial level	Regional	Impacts felt at a regional / provincial level
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	**Moderate - positive**		**Moderate - positive**	
Comment on significance	The significance of the mitigated impact is greater than moderate			
Cumulative impacts	The mine already contributes significantly to employment opportunities in the area, and the proposed project will increase this positive impact.			

Project phase	**Operation**			
Impact	Job creation			
Description of impact	Jobs for apparently 50 people will be created during the operation phase			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Use local labour as far as possible, recruitment policy, skills development plan			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
Duration	Long term	Impact will last between 10 and 15 years	Long term	Impact will last between 10 and 15 years
Extent	Regional	Impacts felt at a regional / provincial level	Regional	Impacts felt at a regional / provincial level
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered

Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	**Moderate - positive**		**Moderate - positive**	
Comment on significance	The significance of the mitigated impact is greater than moderate			
Cumulative impacts	The jobs created will be in addition to existing jobs created by the mine			

5.7.2.2 Economic opportunity

The construction and operation of the facility will result in economic opportunities for entrepreneurs. The communities are concerned that most of these opportunities will go to entrepreneurs and businesses from outside the community. Examples of potential opportunities are the provision of building sand, catering services, transport, accommodation, etc. Another concern is that women will be marginalised and will not benefit from the proposed project.

Project phase	**Construction**			
Impact	Economic opportunities			
Description of impact	Economic opportunities associated with project for entrepreneurs			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Procure locally as far as possible, local procurement policy			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Regional	Impacts felt at a regional / provincial level	Regional	Impacts felt at a regional / provincial level
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere

Significance	Moderate - positive	Moderate - positive
Comment on significance	The significance of the mitigated impact is greater than moderate	
Cumulative impacts	The mine already contributes significantly to entrepreneural opportunities in the area, and the proposed project will increase this positive impact.	

Project phase	Operation			
Impact	Economic opportunities			
Description of impact	Economic opportunities associated with project for entrepreneurs			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Procure locally as far as possible, local procurement policy			
Assessment	Without mitigation		With mitigation	
Nature	Positive		Positive	
Duration	Long term	Impact will last between 10 and 15 years	Long term	Impact will last between 10 and 15 years
Extent	Regional	Impacts felt at a regional / provincial level	Regional	Impacts felt at a regional / provincial level
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	Moderate - positive		Moderate - positive	
Comment on significance	The significance of the mitigated impact is greater than moderate			
Cumulative impacts	Economic opportunities will be in addition to existing opportunities for entrepreneurs			

5.7.2.3 Community shareholding

The land where the facility will be developed currently belongs to the mine but will be transferred to the community and then leased back to the mine. There is not yet a formal agreement in place, but it has been agreed in principle. It is further planned that the community will hold shares in the project, which will generate an income for the communities and contribute to the socio-economic upliftment of the area. There are concerns from community members that only certain communities in the area will benefit, and the feeling from some stakeholders is that the communities in the wider area should also benefit from the shareholding. Another concern raised by the communities is that they were not consulted regarding the potential shareholding, which raises the perception that shareholding is done to them, rather than with them. Although shareholding holds benefit to the community, the way that it is done, and the process is being managed, will to a great extent determine the success of the initiative.

Project phase	Construction			
Impact	Community shareholding			
Description of impact	It is planned that the community will hold shares in the project and lease land to mine			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Establish community trust in collaboration with communities			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	**Minor - positive**		**Moderate - positive**	
Comment on significance	The significance of the mitigated impact is greater than moderate			
Cumulative impacts	Through the social and labour plan there are already a positive impact in the community, and the proposed project will increase the positive impact.			

Project phase	**Operation**			
Impact	Community shareholding			
Description of impact	Implementation and management of community shareholding			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Manage community trust in collaboration with communities			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur

Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	**Minor - positive**		**Moderate - positive**	
Comment on significance	The significance of the mitigated impact is greater than moderate			
Cumulative impacts	This will be in addition to existing opportunities created through the social and labour plan			

5.7.3 Impacts on infrastructure

Impacts on infrastructure are most likely to take place during the construction phase of the project and are discussed below.

5.7.3.1 Traffic safety impacts

The N11 that will separate the mine from the PV facility is a busy road that connects the site to a wider regional road network. It is also part of a major public transport corridor in Mogalakwena that consists mostly of minibus taxis. According to residents there are many accidents on the road. During the construction phase there will be an increase in construction vehicles on the road. Although a traffic impact assessment is being conducted for the project, from a social perspective the concern is regarding community safety, given the anticipated increase in traffic.

Project phase	Construction			
Impact	Traffic safety impacts			
Description of impact	Increase in traffic creates concerns regarding community safety			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Traffic management plan			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge

Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	The signicance of the mitigated impact is more positive than minor negative			
Cumulative impacts	There are existing traffic impacts associated with the mine, and the proposed project will increase the traffic impacts.			

5.7.3.2 Pressure on physical infrastructure

An increase in workers in the area will put pressure on physical infrastructure such as housing and access to basic services such as water and electricity. The extent of the pressure will be determined by the proportion of contractors that will come from outside the area. No housing will be allowed on the site, and contractors will be expected to make us of existing housing in the area.

Project phase	Construction			
Impact	Pressure on physical infrastructure			
Description of impact	Potential shortage of housing and access to basic services such as water and electricity. Potential presence of construction camp			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Plan contractor housing in advance, construction camp according to international best practice			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Municipal area	Impacts felt at a municipal level	Municipal area	Impacts felt at a municipal level
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	The significance of the unmitigated impact is greater than minor			

Cumulative impacts	There will be an increased demand for housing in close proximity to the construction site

5.7.4 Environmental impacts with social dimensions

Although environmental impacts such as dust, noise, light and visual are addressed in other specialist reports, these impacts have a social dimension and can impact on the quality of life and sense of place of affected community members, even if the impact is within its legal parameters.

Project phase	Construction			
Impact	Environmental impacts with social dimensions			
Description of impact	Impacts such as dust, noise, light and visual can impact on the quality of life and sense of place of community members			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Mitigation measures of relevant specialist studies, community liaison forum			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Likely	The impact may occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance				
Cumulative impacts	These impacts already exist, and will increase with the proposed project, especially for the duration of the construction period.			

Project phase	**Operation**			
Impact	Environmental impacts with social dimensions			
Description of impact	Impacts such as dust, noise, light and visual can impact on the quality of life and sense of place of community members			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Mitigation measures of relevant specialist studies, community liaison forum			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements

Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Likely	The impact may occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance				
Cumulative impacts	This will be in addition to existing impacts created by the other activities of the mine.			

5.8 Impacts on noise

The noise emission values used in this assessment are those supplied in a typical manufacturer's specifications of inverter and transformer equipment expected to be employed on this project. The worst-case noise emission for any piece of equipment in these specifications has therefore been taken as 65 dB(A) at 1m from this plant. The noise levels of other units are quoted as a lower 60 dB(A). This is typical of this type of plant, the noise being generated primarily from inbuilt cooling fans for the units, whose processes generate a certain amount of heat.

A worst case scenario is considered, i.e. that the primary noise sources are positioned closest to the assessment point under consideration, that there is direct line of sight to such equipment, that there is a continuous cycle of noise from such equipment, and that the emitted noise is the maximum level expected over a representative period from that equipment.

5.8.1 Predicted impact of general site operational noise

The noisiest of the inverter/transformer units generates a maximum of 65 dB(A) measured at 1m according to the manufacturer's specifications. The nearest such a unit will be placed to the boundary of the site, and therefore the nearest affected third party is approximately 50m, at which distance the calculated noise level is 31 dB(A). This value is 14 dB lower than the noise level limit for daytime noise and also 4 dB lower than the noise level limit for night-time noise. The investigation shows that the proposed plant will have a very minor impact on the noise climate of the surrounding environment. In the worst case, as described above, with no mitigating measures, both the daytime and night-time noise impact will be NONE at the boundary of the plant site, so no third parties are likely to be affected.

Project phase	**Operation**		
Impact	Operational noise		
Description of impact	Noise generated due to operations of the PV plant		
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts	
Potential mitigation	Refer to section 6		
Assessment	**Without mitigation**		**With mitigation**

Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	

5.8.2 Predicted impact of construction noise

It can be expected that construction noise on the site is likely to occur over the full three years of the projects construction, as groundworks and supports will cover the full 3 square kilometers of the site. Typical construction noise for such a project is assumed to be limited by the Health and Safety act, which stipulates a maximum noise level of 85 dB(A) at 1m from any individual noisy operation. This translates to 51dB(A) at 50m, which is the nearest the construction operation should come to the residential area of Ga-Sekhaolelo. This value is 6 dB higher than the noise level limit for daytime noise (45 dB(A)), which is a noise impact of MODERATE during daytime. It is assumed that construction will only be carried out in hours which are defined as 'daytime' in the relevant SANS Recommendation. Therefore an impact has not been assessed for night-time noise.

Project phase	**Construction and Decommissioning**			
Impact	Construction related noise impacts			
Description of impact	Construction related noise impacts			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Refer to section 6			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Medium term	Impact will last between 5 and 10 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered

Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Minor - negative**	

5.9 Impacts on traffic

The traffic impact of the proposed development on the adjacent road network focuses on determining the vehicular trips generated and investigating traffic engineering issues and concerns on road capacity, road safety, public transportation, and non-motorised transport (NMT) within the study area. Identified impacts are described for both the construction phase and the operational phase.

5.9.1 Construction phase

Project phase	**Construction**			
Impact	Increased traffic volumes resulting in a reduction in road capacity			
Description of impact	The solar farm additional traffic volumes added to the road network are expected to result in a reduction in road capacity and therefore cause delays or deterioration of operation service levels on the affected road network.			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impact.		
Potential mitigation	▪ Manage daily delivery volumes and times, less vehicles during AM and PM peak hours. ▪ A detailed construction traffic management plan is recommended to ensure adequate right of way is secured for normal traffic and allow safe vehicle operations entering and exiting the development site and the transmission line corridors.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Regional	Impacts felt at a regional / provincial level	Regional	Impacts felt at a regional / provincial level
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a

				possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	

Project phase	**Construction**			
Impact	Increased public transport and NMT demand.			
Description of impact	The construction phase is expected to generate a significant number of public transport and NMT users which will require additional public transport services and increase pedestrian activity in the vicinity of the site.			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impact		
Potential mitigation	▪ In addition to providing a staff bus service, a bus facility for ranking and holding buses is recommended on site. ▪ Provide crossing facilities at developments access points along pedestrian desire lines. ▪ Provide temporary safe walkways along N11 pedestrian desire lines and Ga-Sekhaolelo Access Roads in the vicinity of the site. ▪ Regular pedestrian and cycling activity awareness for staff working on site during all construction, as part of regular Health and Safety briefings.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Minor - negative**	

Project phase	Construction			
Impact	Increase road safety risk			
Description of impact	Generally, heavy vehicles/ abnormal vehicles can lead to an increase in the speed differential of the vehicles on road network. The heavy vehicles are generally slower and require larger gaps and follow-up headways. There is generally low tolerance of heavy vehicles by drivers of lighter vehicles. This is evident in the aggressiveness of lane changing and overtaking by vehicles following heavy vehicles. This in turn leads to problems with road safety as a result of additional heavy vehicles on the road network.			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	▪ Ensure heavy vehicles and abnormal load vehicles comply with limitations on vehicle dimensions and axle, vehicle masses and safety standards set out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000 for vehicle using a public road. ▪ Construction traffic / vehicles must adhere to designated routes or access roads. ▪ Drivers of heavy vehicles be required to attend a specialised road safety and driving course that sensitises them to the impact that they have on driving conditions for other road users			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Regional	Impacts felt at a regional / provincial level	Regional	Impacts felt at a regional / provincial level
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Likely	The impact may occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	

5.9.2 Operational phase

Project phase	Operation	
Impact	Increase in traffic volumes resulting in reduced road capacity	
Description of impact	The expected additional traffic volumes added to the road network could result in an increase in average vehicle delays or deterioration of operation service levels on the affected road network.	
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts

Potential mitigation	No mitigation			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Highly unlikely / none	Expected never to happen	Highly unlikely / none	Expected never to happen
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	

Project phase	**Construction**			
Impact	Increased public transport and NMT demand and activity.			
Description of impact	The operation phase is expected to generate a very low public transport and NMT demand which will be accommodate by the existing public transport services and facilities.			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	No mitigation			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Highly unlikely / none	Expected never to happen	Highly unlikely / none	Expected never to happen
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be	High	The affected environmental will be

		able to recover from the impact		able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	

6 SPECIALIST IMPACT MITIGATION

As part of the impact assessment conducted by the EAP and the appointed specialists, certain mitigation measures are proposed as an effort to minimise negative impacts while optimising positive impacts. Mitigation measures as recommended by the specialists are discussed according to individual specialities. All feasible mitigation measures have also been captured in the EMPr in Appendix I.

6.1 Terrestrial impacts mitigation measures

The below mitigation measures highlight the key, general integrated mitigation measures that are applicable to the proposed development in order to suitably manage and mitigate the ecological impacts that are associated with all phases of the proposed development. Provided that all management and mitigation measures are implemented, as stipulated in this report, the overall risk to floral and faunal diversity, habitat and SCC can be mitigated and minimised.

6.1.1 Pre-construction and construction phase

- Minimise loss of indigenous vegetation where possible through adequate planning and, where necessary, by incorporating the sensitivity of the biodiversity report as well as any other specialist studies;
- The construction footprint must be kept as small as possible in order to minimise impact on the surrounding environment (edge effect management);
- Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved development footprint.
- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal;
- No collection of indigenous floral species must be allowed by construction personnel, especially with regards to floral SCC (if encountered);
- Care should be taken during the construction and operation of the proposed development to limit edge effects to surrounding natural habitat. This can be achieved by:
- Demarcating all footprint areas during construction activities;
- No construction rubble or cleared alien invasive species are to be disposed of outside of demarcated areas, and should be taken to a registered waste disposal facility;
- All soils compacted as a result of construction activities should be ripped and profiled and reseeded;
- Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas. Specific mention in this regard is made to Category 1b and 2 species identified within the development footprint areas (refer to section 2.7.3 of this report); and
- No dumping of litter, rubble or cleared vegetation on site should be allowed. Infrastructure and rubble removed as a result of the construction activities should be disposed of at an appropriate registered dump site away from the development footprint. No temporary dump sites should be allowed in areas with natural vegetation. Waste disposal containers and bins should be provided during the construction phase for all construction rubble and general waste. Vegetation cuttings must be carefully collected and disposed of at a separate waste facility.

- If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line. Spill kits should be kept on-site within workshops. In the event of a breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be practised, preventing the ingress of hydrocarbons into the topsoil; and
- Upon completion of construction activities, it must be ensured that no bare areas remain, and that indigenous species be used to revegetate the disturbed area.
- Prior to the commencement of construction activities, an AIP Management/Control Plan should be compiled for implementation:
- Removal of AIPs should preferably commence during the pre-construction phase and continue throughout the construction and operational phases. AIPs should be cleared within the focus area before any vegetation clearing activities commence, thereby ensuring that no AIP propagules are spread with construction rubble, or soils contaminated with AIP seeds during the construction phase;
- An AIP Management/Control Plan should be implemented by a qualified professional. No use of uncertified chemicals may be used for chemical control of AIPs. Only trained personnel are to use chemical and mechanical control methods of AIPs. Chemical control may not be used within the Freshwater Habitat.
- Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b and 2 AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2014) (section 2.7.3 of this report);
- Ongoing alien and invasive plant monitoring and clearing/control should take place throughout the construction and operational phase of the development, and a 30 m buffer surrounding the focus area should be regularly checked for AIP proliferation and to prevent spread into surrounding natural areas; and
- Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility which complies with legal standards.
- For the removal, destruction, or relocation of protected flora in terms of the LEMA (Schedules 11 and 12), a license is required from the LEDET. For the removal of nationally protected tree species, as per the NFA, permits will be required form the DFFE. Good record-keeping will be necessary to record this process and to document all successes and failures associated with the relocation.
- No collection of floral SCC must be allowed by construction personnel; and
- Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC outside of the proposed development footprint area.
- No illicit fires must be allowed during the construction of the proposed development.
- A rehabilitation plan for natural vegetation should be drawn up. This rehabilitation plan should consider all phases of the project indicating rehabilitation actions to be undertaken during and once construction has been completed, ongoing rehabilitation during the operational phase of the project as well as rehabilitation actions to be undertaken after operations have ceased;
- Any natural areas beyond the direct footprint, which have been affected by the construction or operational activities, must be rehabilitated using indigenous species;
- Floral monitoring should be done annually during operational activities. Please also refer to the monitoring guidelines in section 4.5;

- Rehabilitation must be implemented concurrently as per the rehabilitation plan, and disturbed areas must be rehabilitated as soon as such areas become available. This will not only reduce the total disturbance footprint but will also reduce the overall rehabilitation effort and costs associated with it; and
- All soils compacted because of construction activities falling outside of the project area should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas.

6.1.2 Operational and maintenance phase

- No additional habitat is to be disturbed during the operational phase of the development;
- No vehicles are allowed to indiscriminately drive through sensitive habitat and natural areas;
- No dumping of litter must be allowed on-site; and
- No dumping of litter or garden refuse must be allowed on-site. As such it is advised that vegetation cuttings from landscaped areas be carefully collected and disposed of at a separate waste facility.
- Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b and 2 AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2014);
- Ongoing alien and invasive plant monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas; and
- Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility, which complies with legal standards.
- Monitoring of rescued and relocated floral SCC should continue during the operational and maintenance phase until it is evident that the species have successfully established;
- As far as possible, no collection of floral SCC/protected or medicinal floral species within the focus area or adjacent natural habitat must be allowed during the operational and maintenance phase of the proposed development; and
- Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC/protected species or suitable habitat for such species outside of the proposed development footprint.

6.2 Avifaunal impacts mitigation measures

The below highlights the key integrated mitigation measures that are applicable to the proposed focus area in order to suitably manage and mitigate the ecological impacts that are associated with the proposed development. Provided that all the management and mitigation measures as stipulated in this report are implemented the overall risk associated with the activities may be minimised, although impacts are still considered unavoidable.

6.2.1 Planning phase

- At all times, ensure that sound environmental management is in place during the planning phase;
- During the site-pegging phase of surface infrastructure, any avifaunal SCC that will be affected by surface infrastructure must be noted and recorded. Should the species (likely its nest) need to be removed the relevant permits must be applied for from the Limpopo Department of Economic Development, Environment and Tourism (LDEDET) or from the Department of Forestry, Fisheries and the Environment (DFFE) prior to construction;
- Minimise loss of indigenous vegetation where possible through refining the final development footprint, optimising the design within focus area while avoiding sensitive Freshwater Habitat where possible;
- If avian SCC nests are located, a qualified avifaunal specialist should be consulted to determine the best management options. If nests are known to have nestlings or eggs within, these should be allowed to fledge prior to the nest removal;
- Design of infrastructure should be environmentally sound and all construction equipment to be utilised must be a good working condition, and all possible precautions taken to prevent potential avifaunal collisions or electrocutions, and mechanical spills and/or leaks;
- Prior to the commencement of proposed activities on site an alien vegetation management plan should be compiled for implementation throughout all development phases.

6.2.2 Construction phase

- The development footprint should be demarcated, and it should be ensured that no development related activities take place outside of the demarcated footprint. This final footprint area should be reviewed by an avifaunal specialist to ensure no detrimental impacts to avifaunal assemblages occur;
- Any structures which may act as perching sites for birds should be installed with anti-perching spikes;
- Should any lights be installed they should face downwards to reduce the abundance of insects attracted to the night lights, this prey source may attract birds to the focus area and may increase avian collisions or electrocutions;
- Avifaunal habitat beyond the demarcated area should not be cleared or altered;
- Avifaunal monitoring within the proposed PV facilities and along the proposed power line should be undertaken and reported monthly to monitor or record avifauna and collect any birds which have collided with or been electrocuted by the proposed infrastructure, these must be reported by the ECO to the department and further mitigation measures should be investigated in how to minimise the mortalities;
- Anti-collision devices should be installed along the entire length of the powerline. These must be Eskom approved anti-collision devices that are durable as the area is prone to strong winds. Anti-collision devices must be installed as soon as the wires are strung. The devices must be installed 5m apart and alternate between a light and dark colour in order to increase the visibility of the earth wires;
- Construction equipment should be restricted to travelling only on designated roadways to limit the ecological footprint of the development activities;

- No dumping of litter, rubble or cleared vegetation on site should be allowed. As such it is advised vegetation cuttings (especially AIP) to be carefully collected and disposed of at a separate waste facility;
- If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line and avifaunal recolonization. In the event of a breakdown, maintenance of vehicles must take place with care, and the collection of spillages should be practised preventing the ingress of hydrocarbons into the topsoil;
- No hunting/trapping or collecting of avifaunal species is allowed;
- No collection of avifaunal SCC within the focus area may be allowed by construction personnel;
- Edge effect control needs to be implemented to prevent further degradation and potential loss of avifaunal SCC habitat outside of the proposed development footprint;
- Should any other avifaunal species protected under the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) or the Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003) be encountered, construction should be halted and authorisation to relocate such species must be obtained from LDEDET or DFFE;
- Edge effect control needs to be implemented to ensure no further degradation and potential loss of avifaunal SCC outside of the proposed project footprint area;
- A suitable rescue and relocation plan should be developed and overseen by a suitably qualified specialist should SCC be identified within the focus area in order to ensure that species loss during construction activities is kept to a minimum;
- No illicit fires must be allowed during the construction phase of the proposed development;
- A rehabilitation plan should be compiled by a suitable specialist. This rehabilitation plan should consider all development phases of the project indicating rehabilitation actions to be undertaken during, and once construction has been completed as well as ongoing rehabilitation during the operational phase of the project to ensure habitat for avifauna is restored; and
- Any natural areas beyond the development footprint, that have been affected by the construction activities, must be rehabilitated using indigenous plant species.

6.2.3 Operational phase

- All vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the development activities;
- Bird nests on Powerlines or the PV infrastructure are potential fire hazards and should be removed from structures regularly;
- Continuous monitoring (monthly) should be undertaken and a record of potential bird strikes or collisions should be kept and reported to the to or by the ECO. Mitigation measures should be updated annually depending on monitoring results;
- Ongoing alien and invasive plant monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas which may alter the suitability of the habitat to avifaunal species;
- Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility, which comply with legal standards;

- No collection of avifaunal SCC within the focus area may be allowed by operational phase personnel unless as part of mortality monitoring activities;
- Where bare soils are left exposed as a result of construction activities, they should be immediately rehabilitated. Rehabilitated efforts should continue to be monitored throughout the operational phase, until natural processes will allow the ecological functioning and biodiversity of the area to be re-instated.

6.3 Aquatic impacts mitigation measures

Following the mitigation hierarchy as advocated by the Department of Environmental Affairs (DEA) *et al* (2013), i.e. the impacts would first be avoided, minimised if avoidance is not feasible.

It is therefore highly recommended that:

- The areas of the of the proposed footprint as shown in the layout which encroach the delineated freshwater ecosystems be shifted outside of the freshwater ecosystems and associated 32 m Zone of Regulation (ZoR) in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998);
- it is strongly recommended that the 1:100-year floodline be modelled for the EDL's and the identified rivers and where the floodline delineation is greater than the riparian delineation, the floodline be used as a zone of regulation. In addition, the dam full supply level for the Groot-Sandsloot River must be avoided. This is important both for the ecological functioning of the freshwater systems as well as protection of the proposed PV infrastructure; and
- The construction activities nearest to the freshwater ecosystems must be undertaken during the drier winter months when surface flow is absent to very low within the freshwater ecosystems, this will ensure that impacts to the hydrological and geomorphological regime, and surface water quality of the are potentially reduced to low.

Additional "good practice" mitigation measures applicable to a project of this nature are provided in Appendix D of the freshwater specialist report in Appendix E2.

6.4 Visual impacts mitigation measures

Mitigation measures for landscape and visual impacts are discussed per project phase as mitigation for impacts as discussed in Section 5.4.

6.4.1 Design and planning phase

The following mitigation measures must be considered during the Design and Planning Phase:

- To reduce visual intrusion, fences must be of a robust mesh type. Shiny galvanized or white coloured fencing must be avoided for permanent security fencing around infrastructure areas. Where practically feasible, the security fence must be offset between any road or residential houses and a green buffer zone must be kept in place to shield receptors from the security fencing;
- Low level lighting or limit mounting heights of lighting fixtures by utilising footlight or bollard level lights. The use of high light masts and high pole top security lighting should be avoided along the security fence of infrastructure areas. Any high-level masts should be covered to reduce glow and light spillage;

- Use minimum lumen or wattage in light fixtures, where possible and practical;
- Up lighting of structures must be avoided where possible, with lighting installed downward angles that provide precisely directed illumination beyond the immediate surroundings of the infrastructure, thereby minimising the light spill and trespass;
- All buildings must have “full cut off” light fixtures that direct light only below the horizontal;
- Use low pressure sodium lamps, yellow Light Emitting Diode (LED) lighting, or equivalent to reduce sky glow. (Bluish white lighting is more likely to cause glare);
- Make use of motion detectors on security lighting at office and Operations and Maintenance Building;
- Where surfaces on buildings are painted darker colours such as khaki brown, grey brown or olive green should be specified;
- Steel roof sheets must be a dark colour such as khaki brown, grey brown or olive green, bright and light colours like red, blue, and orange must be avoided; and
- Make use of existing access roads and dirt tracks so that it minimizes modification of the existing topography.

6.4.2 Construction and decommissioning phase

The following mitigation measures must be considered during the Construction and Decommissioning Phase:

- Material stockpiles must not be higher than 3m;
- Construction signage should not be obtrusive and should not be seen against the skyline;
- Fences around construction camps should be black and of a robust mesh like material;
- Only the bigger tree species and/or individuals potentially causing problems with the transmission line/s should be removed. i.e., it is not necessary to clear/ fell the access route beneath the transmission line or the servitude;
- Vegetation clearance along the construction footprint of the servitude must be minimized by fencing off the work area and restricting vehicular access outside this area;
- A vegetation buffer (of approximately 10m) must be maintained between the proposed laydown area and the Ga Sekhaolelo access road;
- After the construction phase, the areas disturbed that are not earmarked for operational purposes (part of infrastructure footprint) must be suitably rehabilitated;
- Trees and shrubs must be planted in clumps, (mimicking natural vegetation openings) and not in rows or other geometric shapes;
- Construction activities should be restricted to daylight hours as far as possible, to limit the need to bright floodlighting and the potential for sky glow;
- The Contractor shall not deface, paint, damage or mark any natural feature (e.g., rocks, etc.) situated on or around the site for survey or any other purposes unless agreed beforehand.

6.4.3 Operational phase

The following mitigation measures must be considered during the Operational Phase:

- Set the development back as far as practically possible from the main road and plant a buffer strip of indigenous low growing shrubs between the N11 and the proposed development to minimise the effects of glint and glare;
- If feasible, the development must be kept off the higher sections of the site where it would potentially be more visible;
- Maintaining as much of the natural vegetation on the ground within the development footprint as practically feasible;
- To ensure glint and glare do not have significant effects on motorists driving on the N11, nearby residences and commercial areas a glint and glare assessment, mitigation, and monitoring plan should be prepared that accurately assesses and quantifies potential glint and glare effects and determines the potential health, safety, and visual impacts associated with glint and glare. This can be conducted once the detailed layout and technical specifications have been confirmed.

6.5 Heritage impacts mitigation measures

Mitigation measures are required for the following sites of heritage value which were identified during the HIA:

- Graves and Burial Grounds: MGSP 3, MGSP 26, MGSP 27, MGSP 29, MGSP 30 and MGSP 32
- Possible Graves: MGSP 23, MGSP 24, MGSP 25 and MGSP 31
- Homesteads with the Risk for Unmarked Graves: MGSP 9 and MGSP 20
- Stone Age Sites: MGSP 4 (MGSP 17)
- Iron Age Sites: MGSP 19

6.5.1 Mitigation for graves and burial sites

As cemeteries and graves have Medium to High Heritage Significance, the best option is to change the development footprint to allow for the *in situ* preservation of these sites. This can only be achieved is a buffer area of at least 100m between the proposed development footprints and the sites can be established. However, should it not be possible to preserve these sites *in situ,* the required mitigation measures are outlined below.

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.
- The process must be done by a reputable company well versed in the mitigation of graves.

6.5.2 Mitigation for possible graves and homesteads, including unmarked graves

This section relates to sites MGSP 9, MGSP 20, MGSP 23, MGSP 24, MGSP 25 and MGSP 31 as identified during the HIA.

The following initial mitigation measure is required:

- A social consultation process to assess whether any local residents or the wider public is aware of the presence of graves at these sites.

Depending on the outcome of the social consultation process, three different outcomes would be the result, namely:

- Outcome 1: The social consultation absolutely confirms that no graves are located here.
- Outcome 2: The social consultation absolutely confirms that graves are located here.
- Outcome 3: The social consultation does not yield any confident results.

The following mitigation measures would be required for sites falling under Outcome 1:

- No further grave-related mitigation would be required.

The following mitigation measures would be required for sites falling under Outcome 2:

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.
- The process must be done by a reputable company well versed in the mitigation of graves.

The following mitigation measures would be required for sites falling under Outcome 3:

- Test excavations to physically confirm the presence or absence graves.
- If no evidence for graves is found, the site will fall within Outcome 1 as outlined above. This means that no further mitigation measures would be required.
- If evidence for graves is found, the site will fall within Outcome 2 as outlined above. This means that a full grave relocation process must be implemented.

Additionally, the following mitigation measures must be undertaken for all these sites:

- All structures and site layouts from each site must be recorded using standard survey methods. The end result would be site layout plans for all these sites.
- A mitigation report must be compiled for these sites within which all the mitigation measures and its findings will be outlined. The recorded drawings from the previous item must also be included in this mitigation report.
- The completed mitigation report must be submitted to the relevant heritage authorities.

6.5.3 Mitigation for Stone Age and Iron Age sites

The sites relevant to this section are MGSP 4 (MGSP 17) and MGSP 19 as identified during the HIA.

The following mitigation measure is required for the six sites:

- The sites must be assessed in the field by a suitably qualified Stone Age specialist (for site MGSP 4) and Iron Age specialist (for site MGSP 19).
- The recommendations made by the respective specialist for each site must be adhered to. Such recommendations may include archaeological excavation.

6.6 Social impacts mitigation measures

Mitigation measures for social impacts are discussed per impact group as discussed in Section 5.7.

6.6.1 Community-based impacts

The proponent must put a communication strategy in place to communicate in an open and honest way what benefits the community can expect, who will qualify and how benefits will be distributed. The possibility of potential benefits realising must be made explicit and the community must be informed in no uncertain terms what would be possible and what not. The strategy must actively manage expectations. The communication strategy must be used for the life of the project. To reach a wide audience, it is recommended that different media must be used, including social media, printed media, meetings, and a stakeholder liaison person. The proponent needs to ensure that it is able to deliver on its commitments. The proponent must consult with the communities to determine the scope of the benefits, who should benefit, and how the benefits are distributed. A working group / committee with representatives from the various communities or interest groups can be established to assist with this.

It will be beneficial for all relationships if the mine can engage in a strategy to regain its social licence to operate in the community. This will not be an easy process and will take time as the community will not trust their efforts and the mine will have to prove their commitment to good relationships and delivering on promises over time. The mine needs to engage with the community regarding benefits that the community expected in the past but did not receive – whether real or perceived. The community will expect an apology from the mine, and that the mine will make good on their past promises. The proponent must also determine what the appropriate social protocols are to engage with the community.

The proponent must also develop a grievance mechanism to address and keep record of community grievances. It must include a grievance register. Given the nature of the relationship it is important to have documented evidence of community/proponent interactions. This will assist the proponent to track the issues, and the community to see what actions the proponent has taken. The community must assist with developing the grievance mechanism. The trust issues between the mine and the community means that all parties will need to work hard at re-building the relationship.

The proponent furthermore needs to include planning and budgeting for conflict situations in their emergency response procedure. There must be a policy on dealing with community conflict, and it must be shared with the community. The proponent should conduct a root cause analysis or use other appropriate systems to identify potential sources and impact of conflict.

A resettlement action plan must be compiled to inform any potential relocation. This plan must be compiled according to international best practice.

The proponent needs to interact with the relevant community groups to determine how the affected individuals can be compensated for the loss of their livelihoods, either financially or in kind by providing a suitable alternative site for these activities.

6.6.2 Economic impacts

Local labour must be used as far as possible for the project. This will minimise the potential negative social impacts on the communities and optimise the positive impacts. The proponent needs to liaise with the Local Economic Development section of the Mogalakwena LM, local leaders and NGOs regarding their recruitment policy to ensure it is in line with the local practices and tap into existing knowledge. The recruitment policy must set reasonable targets for the employment of local people and women. The proponent and stakeholders should identify these targets before recruitment commences. The definition of 'local' must be clarified with the affected stakeholders. The proponent must provide the local municipality and local leadership structures with a list of skills required before the construction period commences, and they must distribute this list to all stakeholders to allow them to prepare for opportunities. All labour opportunities must be accessed through a labour desk in a location that is accessible for the communities, no recruitment must be allowed on site.

The proponent should consider implementing a skills development plan that focuses on the skills that will be needed, in order to increase the availability of required skills in the local community.

The specialised equipment needed for the project will not be available locally, but as far as possible everything else must be procured locally. The proponent must develop a policy about local procurement. Workers from outside the area must be provided with a list of local service providers for their accommodation and other social needs. People that could provide services should be offered an opportunity to put their names on a list at the municipality or community structures to ensure that the proponent is aware of the available resources. The proponent should engage with local entrepreneurs through the local business association and provide them with relevant economic opportunities. If there is no local business association, the proponent can facilitate the establishment of such an association.

Benefits to the local communities must be real and tangible. The shareholding benefits and structure should be finalised with the input of the community in order to be successful. The proponent should consider establishing a community trust that is administered by a board that consist of a range of representatives, including representatives from the local communities. Representatives from the local communities should also include people that are not part of the traditional leadership structures as well as representatives from groups that are often marginalised, such as women, youth and the elderly. The structure and operational objectives of the trust should be determined at the time of establishment. It is envisaged that the development objectives/ projects identified and supported by the trust will be identified in collaboration with the local municipality, community representatives and NPOs in the area. Projects should align with key needs that were identified in the area.

It is recommended that a written Memorandum of Understanding (MoU) is drafted to formalise the arrangements for the transfer of the Armoede site from Anglo to the community once negotiations on this process are concluded.

6.6.3 Impacts on infrastructure

The IPP, together with the mine, must develop a Traffic Management Plan to address the flow of traffic and road safety. Aspects such as speeding, driving while tired, transport of passengers, driving on un-tarred roads and general road safety must be included in the plan and in the induction of workers.

Although independent contractors will be used, it should not be left up to them to find accommodation for their workers. The proponent needs to coordinate with the local

municipality and local community structures to ensure that the available infrastructure can cope with the demand.

6.6.4 Environmental impacts with social dimensions

Noisy activities should be limited at night, and from a social perspective the criteria would be that the activities should not bother community members who reside in close proximity to the facility. It is important to create a community liaison forum (CLF) that communicates the mitigation and monitoring measures to the affected parties. This forum can also act as a platform to discuss environmental issues. The CLF can meet twice a year to discuss all the concerns about the project and to share new project information. It can be an important aspect assisting the proponent with obtaining a social licence to operate. The public perception would be negative or positive depending on the successful implementation of the rehabilitation after construction.

6.7 Noise impacts mitigation measures

- Maintenance of equipment and operational procedures: Proper design and maintenance of silencers on diesel-powered construction equipment, systematic maintenance of all forms of equipment, training of personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events.
- Equipment noise audits: Standardised noise measurements should be carried out on individual equipment at the delivery to site to construct a reference data-base and regular checks carried out to ensure that equipment is not deteriorating and to detect increases which could lead to an increase in the noise impact over time and increased complaints.
- Environmental noise monitoring: Should be carried out regularly to detect deviations from predicted noise levels and enable corrective measures to be taken where warranted.

To mitigate fixed plant noise, the following remedial measures should be put in place:

- Reduce noise at source damping acoustic treatment, etc.
- Isolate source by enclosure in acoustic building, room, etc.
- Carefully select fixed plant site for remoteness from sensitive areas
- Raise barriers or berms around noisy equipment

6.8 Traffic impacts mitigation measures

- Manage daily delivery volumes and times, less vehicles during AM and PM peak hours.
- A detailed construction traffic management plan is recommended to ensure adequate right of way is secured for normal traffic and allow safe vehicle operations entering and exiting the development site and the transmission line corridors.
- In addition to providing a staff bus service, a bus facility for ranking and holding buses is recommended on site.
- Provide crossing facilities at pedestrian access points.
- Provide temporary safe walkways along the N11 pedestrian desire lines and the Ga-Sekhaolelo Access Roads in the vicinity of the site.
- Regular pedestrian and cycling activity awareness for staff working on site during all construction, as part of regular Health and Safety briefings.

- Ensure heavy vehicles and abnormal load vehicles comply with limitations on vehicle dimensions and axle and vehicle masses and safety standards set out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000 for vehicle using a public road.
- Discourage routing of heavy vehicle traffic through populated area.
- Avoid transporting abnormal load during peak periods.
- Heavy vehicle drivers should attend a specialised road safety and driving course that sensitises them to the impact that they have on driving conditions for other road users

7 PUBLIC PARTICIPATION

In terms of Section 41 of the EIA Regulations (2014) a call for open consultation with all I&APs at defined stages of the EIA process are required. This entails participatory consultation with members of the public by providing an opportunity to comment on the proposed project. The PPP has thus incorporated the legislated requirements.

Consultation with the public forms an integral component of this investigation and enables I&APs (e.g. directly affected landowners, communities, national-, provincial- and local authorities, environmental groups, civic associations) to identify their issues and concerns relating to the proposed activities. The PPP is structured to provide I&APs with an opportunity to gain more knowledge about the proposed project, to provide input through the review of documents/reports, and to voice any issues of concern at various stages throughout the EIA process.

The objectives of the PPP are to provide information to the public, identify key issues and concerns at an early stage, respond to the issues and concerns raised, provide a review opportunity, and to document the process properly. The PPP will be managed to meet these objectives throughout the EIA. The PPP undertaken to date is summarised in Table 7-1.

7.1 Public Participation Process to Date

The 30-day comment period ran from Monday, 9 November 2020 and 10 December 2020. However, during the course of planned public participation meetings with interested and affected parties around Mogalakwena Mine, strikes broke out at the mine on 5 November 2020. The security situation deteriorated in the weeks thereafter, and shots were fired in the community on 19 November 2020. The Mogalakwena Mine security team assessed the situation to be too risky for public participation meetings that were planned in the community around the mine. The risk to safety of members of the Zutari team, mine employees and the broader community was considered to be too high. Therefore, alternative plans had to be made to transport community groups to neutral venues in Mokopane compliant with COVID-19 protocols. Resultantly, meetings with interested and affected parties were held from 7 to 10 December 2020, once the security situation had calmed down sufficiently.

Therefore, Zutari requested, in terms of Regulation 3(7) of the EIA Regulations (GN R 982 of 2014), that these security risks be considered to be “exceptional circumstances” that delayed public participation from occurring, and that the time frame of 44 days for submission of the Scoping Report be extended by 21 calendar days to a total of 65 calendar days. Considering the period of 15 December to 5 January that must be excluded from timeframes in terms of Regulation 3(2) of GN R 982 of 2014, this extended the end of the public participation period to 27 January 2021. I&APs were notified of this extension on 15 December 2020. LEDET approved the extension of the comment period (Appendix C) and advised that the Scoping Report must be submitted by 26 February 2021.

Table 7-1: Summary of Public Participation to date

Task	Details	Date
I&AP notification (relevant authorities and I&APs)		
I&AP identification	An I&AP database was developed for the project by establishing the jurisdiction of organisations, individuals and businesses in proximity to the project site or within an interest in the proposed development. The database of I&APs includes the landowner, the adjacent landowners, traditional authorities, relevant district and local municipal officials,	October 2020

Task	Details	Date
	relevant national and provincial government officials, and organisations. This database is being augmented via chain referral during the EIA process and will be continually updated as new I&APs are identified throughout the project lifecycle.	
Site notices	Site notices with a size of 600 mm x 420 mm were erected to inform the general public of the proposed project and the PPP around the site. Photos of these notices were provided in Appendix D3 of the Scoping Report.	12 November 2020
BID distribution	Emails were sent to identified I&APs, notifying them of the availability of the Background Information Document (BID) for the proposed project for perusal and comment. Authorities and I&APs were provided 30 days within which to register and submit initial comments on the proposed project. BIDs and invitations to comment were also distributed to community leaders, tribal authorities and other community structures during public meetings.	9 November to 10 December 2020
Newspaper advertisements	Two advertisements were placed in the Bosveld Review and Polokwane Observer during the comment period as notification of the availability of the DSR. Proofs of the advertisements were included in Appendix D4 of the Scopng Report.	5 to 11 November 2020
Addressing comments received	All comments received to date have been included into the Comments and Response Report in Appendix D6, together with responses to these comments.	9 November 2020 to May 2021
Notification of and Comment on Draft Scoping Report		
I&APs and authorities	Due to current Covid-19 related lockdown restrictions, no physical copies of the Draft Scoping Report were provided for comment. Instead, the Draft Scoping Report was provided digitally via Google Drive to I&APs who requested it.	Comment period for the Draft Scoping Report: 9 November – 27 January 2021
Public Meetings	Numerous community structures were invited to attend public meetings in the study area. Strict protocols were observed to prevent the transmission of Covid-19. The following meetings took place in and around Mokopane: ▶ Mapela Local Authority; Kgoro Moshate/ Mapela; 7 December 2020 at 15:30; attended by 62 people. ▶ Action Aid, Bohwa Communal Property Trust, MACUA and SANCO; Oasis Conference Centre; Mokopane; 7 December 2020 at 09:00; attended by 32 people. ▶ Mogalakwena Municipality; 7 December 2020 at 7:30; meeting cancelled due to turmoil in the council at the time. The mayor was in the process of being recalled. Only an attendance register was filled in, but the meeting did not go ahead. Despite attempts at ensuring another meeting in the same week as other meetings in Kompane (7-10 December 2020), the municipality was not available for another meeting. ▶ MTC & 36 Village Representatives; Oasis Conference Centre, Mokopane; 7 December 2020 at 14:00; attended by 16 people. ▶ Community Based Structure and Vulnerable Groups; Oasis Conference Centre, Mokopane; 8 December 2020 at 12:00; attended by 33 people. ▶ Resettlement Committee; Oasis Conference Centre, Mokopane; 8 December 2020 at 09:00; objections were raised to writing names on attendance registers, *"because the mine will say the communities agreed to their plans"*. A lengthy discussion about the attendance register followed, delaying the start of the meeting for more than an hour. Attendees refused to fill in their names on the attendance registers and most of them did not want to mention their names when asking questions. ▶ Armoede Traditional Council; Oasis Conference Centre, Mokopane; 9 December 2020 at 11:00; attended by ten people. ▶ Mapela Task Team Executive; Oasis Conference Centre, Mokopane; 10 December 2020 at 9:00; attended by seven people. ▶ Interfaith Groups; Oasis Conference Centre, Mokopane; 10 December 2020 at 11:50; attended by 62 people. ▶ Rescheduled Meeting with the Municipality; Oasis Conference Centre, Mokopane; 10 December 2020; three representatives from the municipality attended and were briefed about the process. ▶ Mapela Task Team; Oasis Conference Centre, Mokopane; planned for 10 December 2020 at 13:00, but was cancelled shortly before the meeting was about to start.	7, 8, 9 and 10 December 2020

Task	Details	Date
Key authority meetings	Consultations were held with the Department of Mineral Resources and Energy as outlined below: ▶ Minister of Mineral Resources and Energy, Mr Mantashe – 18 October 2019 o This meeting was held with the Minister on the Innovative use of solar energy to generate hydrogen ▶ Deputy Director General (Energy), Mr Mbele, 30 January 2020	October 2019 and January 2020

7.2 Authority Consultations

Zutari submitted the Scoping Report to LEDET on 25 February 2021. LEDET accepted the Scoping Report and Plan of Study for EIA on 12 April 2021. The letter of acceptance contains items as indicated in Table 7-2 which need to be addressed during the EIA phase. Zutari's responses to these requirements are also indicated in the table.

Table 7-2: Issues to be addressed in EIR as stipulated in LEDETs letter of acceptance of the scoping report

No.	Project aspect	Description
1	All reports provided for consultation must be final reports.	Noted. All reports provided for consultation will be labelled as final.
2	State whether there is an agreement in place with the Ga-Sekhaolelo community in terms of transferring the land from the applicant to the community with the intention of a leasing the land from the community; Is there any written comms between Anglo and the community.	The only existing agreement in relation to the transfer of the R/E of the farm Armoede is in terms of the relocation agreement and the Surface Lease Agreement. However, there is currently no formal agreement entered between the Armoede / Ga-Sekhaolelo Community and Anglo that once the land is transferred to the community Anglo will lease from them. However, Anglo and the Armoede community/council have been engaging and have agreed in principle that once the land is transferred, Anglo will lease from the Community/Trust. These engagements are still ongoing in formalizing the surface lease once transfer has taken place.
3	Correct the Plan of Study for EIA to include a Visual Impact Assessment and remove the reference to a Visual Impact Statement.	The Environmental Impact Report includes a Visual Impact Assessment.
4	The layout for the preferred site and the two alternative sites must be submitted with the EIR to be circulated for consultation.	Conceptual layouts for the PV plant and transmission lines have been provided in Section 3.7. Since the Armoede site was confirmed to be the preferred site in the Scoping Report, the layouts for the alternative sites on the farms Groenfontein and Gillimberg are conceptual in nature, whilst the design for the Armoede site is more detailed.

No.	Project aspect	Description
5	Consultation specifically regarding the impact on grave(s) must be undertaken.	Consultations for the Environmental Impact Report to be undertaken in June and July 2021 will include confirmation of the location of grave sites.
6	A detailed motivation why Groenfontein site should not be authorised must be provided.	A motivarion why the Groenfontein is not the preferred site is included in the section on alternatives in section 3.7.2.1.

In terms of Sections 24 O (2) and (3) of the NEMA, the following additional state departments and/or parastatal bodies were included in the PPP and invited to comment on the proposed project:

Parastatal organisations

- Provincial Heritage Resources Agency of Limpopo
- Eskom Distribution;
- Limpopo Roads Agency
- South African National Roads Agency (SANRAL);
- Civil Aviation Authority;
- South African Heritage Resources Agency; and
- National Energy Regulator of South Africa (NERSA).

Local authorities

- Waterberg District Municipality; and
- Mokopane Local Municipality.

National departments

- Department of Water and Sanitation (DWS);
- Department of Forestry, Fisheries and the Environment (DFFE);
- Department of Transport (DoT);
- Department of Mineral Resources and Energy (DMRE); and
- Other national/provincial departments where deemed necessary.

As with all other I&APs, state departments and parastatal bodies were provided with 30 days to comment on the Draft Scoping Report. However, after the extension of the PPP period, all I&APs were notified that additional comments could be submitted. All comments received were included in the CRR (Appendix D12 of the Scoping Report).

7.3 Public Participation Process to follow

This EIR will be made available for public review during the next round of PPP. The PPP period is planned to run from **23 June 2021 to 23 July 2021**. During this period, a week of public participation meetings with interested and affected parties will be held in nd around Mokopane in the week 12 to 16 July 2021. I&Aps from communities around the mine will be provided with transport to meetings held in Mokopane. Owing to restrictions related to Covid-19 on the numbers of people who may gather in public, indoors meetings will be restricted to 50 people, and outdoors meeting of up to 100 people will be held in tents with open sides.

All comments from I&APs and organs of state are to be submitted, in writing, to Zutari on or before 23 July 2021, after which the CRR will be updated to include all comments received.

Once the PPP for the EIR has been completed, all reports, documents, letters and other correspondence will be submitted to LEDET for decision-making as per the EIA process described in Chapter 1.1

8 CONCLUSIONS AND RECOMMENDATIONS

This section briefly concludes the report and touches on a few key aspects of the EIR.

As with any development, environmental, social and heritage resource aspects are potentially negatively impacted upon while the socio-economical aspects, if correctly managed, have the potential to empower, uplift and benefit the affected community.

It is the EIA process's objective to compare these negative impacts to the benefit of approving the proposed project, taking into account the alternative source of electricity which will be required should the PV Power Plant not be approved.

The key intended outcomes of the project are:

- **Improved financial viability for the Mogalakwena Mine**. This means that, over the life of the project, the project will create a net saving in energy costs for the mine;
- **Energy cost predictability for the Mogalakwena Mine**. This means that the mine is able to make reasonable long-term predictions as to the cost of energy from the project;
- **Community Involvement.** This implies the inclusion of local communities living around the mine to enable them to benefit from the project's implementation in tangible ways, as part of a more general drive to create employment and improve the communities' economic sustainability;
- **Reduced Carbon Footprint:** Anglo, and specifically Mogalakwena Mine, would like to reduce its carbon footprint, by reducing the quantity of non-renewable forms of energy purchased.
- **Energy Security:** This implies an ability to maintain mine operations in the event of an interruption of power from the grid.
- **Mining Charter Compliance:** Anglo would like to contribute to the achievement (and, if possible, out-performance) of the Mining Charter requirements.

Bearing in mind these objectives, it is also important to consider that there are other outcomes that the proposed project cannot deliver. These are:

- **Energy Security:** an ability to maintain mine operations in the event of an interruption of power from the grid. Solar plants cannot store energy or dispatch energy on demand, and battery storage was not found to be viable. However, the proposed project does diversify electricity supply, and thus contributes to Anglo's understanding of the nature of energy supply contracts.
- **Energy for the Community:** Many of the local communities are already electrified, but a natural desire for the project would be to provide energy directly to the local communities, as a clear, tangible benefit. However, any such supply of energy has significant regulatory impacts (the need to be a Regional Electricity Distributor, amongst others), and may have limited benefit, given that the solar plant only generates energy during the daytime. Any communities that require electrification are likely to be better served through a dedicated off-grid electrification project, similar to that undertaken for the Zenzele Trust.

- **Prevention of incursion:** The limited site options available mean that the project cannot be sited to limit local communities' incursion onto mine land, except by chance.
- **Employment creation:** It is expected that a maximum of 30 permanent full-time jobs will be created for the local community during the operational phase. Therefore, expectations of large-scale job creation are unrealistic.

The need for renewable energy is well documented and reasons for the desirability of solar energy include:

- Utilising the most abundant natural resource available to South Africa;
- Meeting nationally appropriate emission targets in line with global climate change commitments under the Paris Accord;
- Enhancing energy security by diversifying generation; and
- Creating a more sustainable economy.

8.1 Preferred alternatives

The EIA process has determined the following proposed alternatives as preferred options.

8.1.1 Site alternatives

The Armoed site was determined to be the preferred site from an environmental, heritage, social and technical perspective. The cost associated with the shorter distance of transmission of power from the PV Power Plant to the mine will result in large cost savings to the Proponent.

8.1.2 Transmission line alternatives

The project is not yet at the detailed design phase, largely due to ongoing discussions between Anglo and Eskom as well as the fact that an IPP has not yet been announced. The use of either 3 x 66kV or 1 x 132kV OHLs in each of the northern and southern transmission corridors is expected and as such, the EIA aims to authorise a 500m wide corridor from the proposed solar PV plant to the two respective substations for both the proposed northern OHL transmission corridor and the southern OHL transmission corridor. Sensitivities identified during the EIA must be considered and, as far as possible, avoided when planning the OHL layout and pylon positions.

8.1.3 Technology alternatives

8.1.3.1 PV module:

The preferred alternatives are either monocrystalline or polycrystalline silicon modules. The choice of alternative is dependent on their technical factors, since neither of these technologies has any direct environmental advantage over the other. The appointed IPP is to decide which of these two PV modules is to be used during the detailed design phase.

8.1.3.2 Mounting method:

Single-axis tracking is preferred, since it produces an energy output approximately 20% higher than the fixed angle system, requires fewer panels than a fixed system (thus reducing its footprint) and it produces more energy in the early mornings when the peak tariff is used, but is not as complex and costly as a dual axis system. It has a further advantage that its visual

impacts are lower than dual axis tracking system, which has twice the height of a single axis tracking system.

8.1.4 Inverter alternative

Neither String Inverters nor Central Inverters have any obvious direct advantages in terms of environmental impacts. In this case, too, the choice of alternative is dependent on their technical factors and the appointed IPP is to decide which of these inverters is to be used during the detailed design phase. Neither options is a better or worse environmental option.

8.1.5 Access roads

The development site currently does not have access from the surrounding road network. Due to two proposed interchanges near the site at the existing N11/ Bakenberg Road intersection and off N11/ Ga-Sekhaolelo Access Road intersection, direct access from the N11 to the development site could not be obtained. Therefore, the following access points to the development site have been proposed for both the construction and operation phases and are considered the preferred alternatives which have been thoroughly investigated as part of the EIA phase of the project. These access points provide the least interference to the surrounding community.

- **Access A** is proposed along the Ga-Sekhaolelo Access Road at an existing T-junction which would then become a four-legged intersection. The existing road will provide access to the northern triangular section of the site and the new access road will serve the larger southern portion of the site.
- **Access B** is also proposed along the Ga-Sekhaolelo Access Road. The access will form a T- junction where the Ga-Sekhaolelo Access Road has a 90-degree bend. This section of the road will have to be realigned to accommodate the proposed T-junction.
- Further discussions will be had with SANRAL to ascertain the possibility of **Access C** as the fourth leg at the future southern interchange (N11/ Bakenberg Road Interchange).

8.1.5.1 Northern transmission corridor

- **Access 1** would be a temporary construction access off the N11. The access avoids the community and there is space to widen the road and allow heavy vehicle traffic to pass through, making it ideal for the construction phase of the project. SANRAL's approval to use this access will be required.
- **Access 2** would be off the N11 into an already existing dirt access road that serves the northern part of the Ga-Molekana community. The access is recommended for the operation phase to provide access for limited maintenance vehicles.

8.1.5.2 Southern transmission corridor

- Access to the southern substation transmission line, during both the construction and operation phases, is recommended off an existing class 4 road which intersects with Bakenberg Road 1.7 km from the N11.

8.2 Summary of potential impacts

Impacts identified during the EIA have been summarised below based on their negative or positive outcomes. Note that certain impacts may initially be negative in nature but, by implementing the recommended mitigation measures, have the potential of resulting in positive impacts.

8.2.1 Summary of negative impacts

8.2.1.1 Impacts on terrestrial and avifaunal environments

- Loss of floral, faunal and avifaunal SCC within the development footprint
- Loss of floral, faunal and avifaunal habitat within the development footprint
- Loss of floral, faunal and avifaunal diversity within the development footprint
- Loss of favourable floral and faunal habitat outside of the development footprint
- Soil contamination
- Loss of floral and faunal SCC individuals due to improper relocation management and monitoring
- Ongoing or permanent loss of floral, faunal and avifaunal habitat and diversity during the operational phase
- Loss of floral habitat, medicinal flora, and SCC, as well as overall species diversity within the local area

8.2.1.2 Impacts on the aquatic environment

- Removal of vegetation within the development footprint and associated disturbances to soil
- Modification of hydrological function and water quality
- Changes to the freshwater geomorphological processes and sedimentation
- Loss of aquatic biota
- Loss of freshwater habitat

8.2.1.3 Impacts on the landscape and visual environment

- Impacts on landscape character and sense of place
- Impact on visual intrusion and VAC
- Impact on visual exposure and visibility
- Impacts due to nigh-time lighting

8.2.1.4 Heritage and Palaeontological impacts

- Impacts on burial grounds and graves
- Impact on possible graves and homesteads not yet identified or unmarked
- Impact on stone age and Iron Age sites
- Loss of fossil heritage

8.2.1.5 Social impacts

- Environmental impacts with social dimensions such as dust, noise and visual impacts
- Relocation

- Loss of livelihoods
- Community safety impacts due to increased traffic
- Increased pressure on physical infrastructure

8.2.1.6 Traffic impacts

- Increased traffic volumes resulting in a reduction in road capacity
- Increased public transport demand and activity
- Increase in road safety risks

8.2.2 Summary of positive impacts

Positive impacts are mainly related to the social and socio-economic benefits that are expected to be brought to the community. These are related to the following impacts:

- Community expectations of benefits
- Community resistance to the proposed project
- Community relations, perceptions and uncertainty about how the project will affect their lives
- Job creation and economic opportunities
- Community shareholding

8.3 EAP Recommendations

8.3.1 Biodiversity recommendations

No SANBI RDL species were observed during the field assessment. However, protected species as per the LEMA, namely *Huernia* cf. *zebrina* subsp. *magnifolia,* the NFA, namely *Sclerocarya birrea* subsp*. caffra, Combretum imberbe*, *Elaeodendron,* and *Boscia albitrunca,* and the TOPS List, namely *Harpagophytum zeyheri* subsp*. zeyheri,* were identified within the focus area. It is recommended that a summer season walkdown be undertaken and all potentially occurring protected floral species within the final development footprint be marked by means of GPS. Permits from LEDET and DFFE should be obtained to remove, cut, or destroy the above-mentioned protected species before any vegetation clearing may take place.

No threatened ecosystem or CBA habitat will be directly impacted by the proposed development. However, a CBA1 is located immediately east of the focus area and is thus susceptible to edge effects. Effective mitigation measures must be implemented to reduce the potential impacts from associated edge effects on the CBA habitat. The proposed development will directly impact ESA habitat, particularly ESA1 habitat and to a lesser extent ESA2 habitat. ESAs are important features in the greater landscape and provide unique conditions for flora and important ecological functionality within the ecosystem. Due to their ecological importance, it is recommended that impacts to ESAs be minimised as far as possible and kept to approved areas only.

The proposed infrastructure area will impact on two habitat units of increased sensitivity, i.e., the Rocky Habitat and the Freshwater Habitat (including both subunits). The following recommendations are thus proposed:

- Freshwater Habitat: it is proposed that the proposed infrastructure development i) be placed outside of the Seep Wetland Habitat subunit, and ii) where Riverine Habitat will be traversed (e.g., within the southern OHL Transmission Corridor and the Internal

OHL crossings), appropriate measures should be taken to minimise the impacts on the habitat subunit. Bridges and culverts should be used so to ensure that the (seasonal) flow of water through the nearby drainage lines are not negatively impacted.

- Rocky Habitat: It is advised that infrastructure placement within the Development area 1 and the proposed southern OHL Transmission Corridor be designed to avoid the Rocky Habitat as far as is possible. Layouts can be designed to effectively exclude the Rocky Habitat by placing infrastructure i) out of the Rocky Habitat within Development Area 1 and ii) closer to the existing roads thereby minimising the impacts on the associated Habitat.

Following the biodiversity assessment within the focus area, the impacts associated with the proposed development activities were determined. The impacts arising from the proposed development are predominantly major to minor prior to the implementation of mitigation measures. With mitigation measures fully implemented, it is the opinion of the specialist that all impacts can be effectively reduced to minor to negligible levels.

Based on the findings of the avifaunal assessment it is the opinion of the ecologists that from an avifaunal ecological perspective, the proposed components of the proposed development can be considered acceptable. The major impact anticipated to occur are the alteration of large areas of natural habitat reducing avian abundance and diversity within the focus area. Further impacts that may result from the proposed project are collisions and electrocutions resulting from the proposed PV facilities and OHLs. It is anticipated that should the proposed mitigation measures be implemented the risk of collisions and electrocutions can be drastically reduced. Although several SCC have distribution ranges which overlay the focus are, only two have marginal habitat within the focus area and no known important foraging, nesting or roosting sites are located here and impacts to the priority species are not anticipated to be regionally significant. However, all essential mitigation measures and recommendations presented in this report should be adhered to as to ensure the ecology within the proposed construction areas as well as surrounding zone of influence is protected or adequately rehabilitated in order to minimise the deviations from the Present Ecological State as much as possible.

In terms of the aquatic environment, provided that site-specific mitigation measures are implemented during all phases of the project, with specific mention of only undertaking the construction activities in the dry season when no surface water is present and realigning the small portion of the proposed solar PV footprint areas to avoid the seep wetland, thereby reducing likelihood of any direct impacts, the risk significance can be considered a 'Low' risk significance. For the Mohlosane River, Groot-Sandsloot River and the EDLs, the overall risk significance was assessed of 'Low-risk' significance. This was due to the current layout which was optimised significantly to avoid traversing or encroaching into these freshwater ecosystems. The following is recommended:

- If the proposed PV Plant is authorised, permits will need to be applied for from the relevant authorities for the removal / relocation of all floral SCC that were marked during the field investigation. Good record-keeping will be necessary to record this process and to document all successes and failures associated with the relocation of any SCC.
- Infrastructure layout plans should be designed to minimise impacts to the Freshwater Habitat. It is advised that the Seep Wetland Subunit be excluded from the PV development area. Where Riverine Habitat will be traversed (e.g., within the southern OHL Transmission Corridor and the Internal OHL crossings), appropriate measures should be taken to minimise the impacts on the habitat subunit. Bridges and culverts should be used so to ensure that the (seasonal) flow of water through the nearby drainage lines are not negatively impacted.

Due to the area already being exposed to disturbances and edge effect impacts from informal housing and subsistence farming practices, this habitat unit is susceptible to AIP proliferation.

Care must be taken to limit edge effects on the surrounding natural areas. Furthermore, it is recommended that an AIP species management plan be developed to manage AIP proliferation within the Freshwater Habitat Unit.

8.3.2 Agricultural recommendations

The proposed site has medium sensitivity for impacts on agricultural resources as a result of it having land capability values of 6 to 8.

The only possible agricultural impact is loss of agricultural potential by occupation of the land by the energy facility. The significance of this impact, in terms of its effect on agricultural production, is assessed as negligible. This is because the site is not currently used for agricultural production and due to its location in an area of expanding urban development and mining activity, is not likely to ever be used for agricultural production, even in the absence of the proposed development.

The conclusion of the agricultural potential assessment is therefore that the proposed development will not have an unacceptable negative impact on the agricultural production capability of the site. The proposed development is therefore acceptable.

8.3.3 Landscape and visual recommendations

The overall landscape quality is considered to have low - moderate scenic quality with visually detracting features such as existing mining activities and related infrastructure. The sense of place is not unique to the study area as it extends to the larger Waterberg region.

The study area has medium lighting brightness, mostly related to existing mining and security infrastructure. Considering the existing lighting context, the impact from the proposed PV Facility is expected to be negligible during night-time hours and it is therefore not expected to significantly contribute to the effects of sky glow and additional artificial lighting in the study area.

Other potential risks to the landscape and visual environment due to the proposed project have been identified, these include the impact on visual character and sense of place, impact on visual intrusion and VAC and the impact on visibility and visual exposure. Based on the impact assessment, it was found that the various landscape and visual impacts would generally range from minor – negligible. During decommissioning, the significance of immediate visual impacts would mostly be similar to those encountered during construction, but likely of shorter duration. The solar PV Facility may however vary substantially in its appearance, depending on viewer location and other visibility factors.

Theoretically the predicted visual impact [based on the Guideline for Involving Visual and Aesthetic Specialists on EIA processes (Oberholzer, 2005)] is expected to be high, after assessing the nature of the development and the sensitivity of the existing landscape and visual environment it can be regarded as minor - negligible based on the following:

- The presence of existing industrial type (mining) infrastructure in the study area;
- The limited height of the proposed infrastructure (PV projects generally have lower visual impacts than the other technologies because of the low profile of the collector arrays and the lower reflectivity of the PV panels compared to the highly reflective mirrors used by the other technologies);
- Most sensitive receptors (tourists visiting the larger Waterberg region, travelling along the N11) will be in transit and views will be brief;
- The slightly undulating topography and existing houses allows some local screening from the proposed development; and

- Existing soil disturbance and bare patches of open ground will result in a low degree of contrast in colour, making it difficult to distinguish the proposed PV Facility from its surrounds when viewed from a distance.

The proposed development will extend the cumulative effect of industrial development within the landscape; however, it appears that this will not increase to the extent that this will cause significant additional impact on the existing landscape and most of the identified receptors.

Should it be considered appropriate to construct the proposed PV Facility as described in this report, mitigation measures will have to be implemented to minimise the landscape and visual impacts (especially potential glint and glare when viewing the site from the north). Specific focus should be placed on the planting of screening vegetation. Other considerations include material selection (for ancillary infrastructure) effective management of lighting and dust generation as well as the implementation of good housekeeping measures during construction. From a visual perspective the proposed project is not considered fatally flawed and listed impacts (in section 6) have the potential to be reduced through mitigation

8.3.4 Heritage resources recommendations

The unmitigated impact of the proposed development is expected to result in negative impacts of Medium to High significance in terms of the identified heritage fabric of the study area. With mitigation successfully implemented, the impact of the proposed development on the identified heritage sites will result in negative impacts of Low to Medium significance. As a result, on the condition that the mitigation measures as listed in section 6 of this report and in the HIA, no heritage reasons can be given for the development not to continue.

The following general recommendation must be implemented:

- An archaeological watching brief is required during construction activities.

8.3.5 Palaeontological resources recommendations

The construction and operation of the proposed Mogalakwena Solar PV Project is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. Thus, the construction and operation of the facility may be authorised as the whole extent of the development footprint is not considered sensitive in terms of palaeontological resources.

8.3.6 Recommended conditions to be included in EA

- The approved EMPr for the project must be implemented and adhered to by the Proponent and its appointed IPP.
- The 500m corridor (250m either side of the proposed centreline as per the coordinates provided in Table 3-1 and Table 3-2) for both the northern and southern transmission corridors should be authorised with the condition that the sensitivities as assessed during this EIA phase be considered and, as far as possible, avoided during the final design and pylon placement of the OHL in both corridors. Refer to section 3.7 for details.
- The preferred alternatives as detailed in thie EIR and authorised in the EA must be adhered to.
- Permits must be applied for for the removal / relocation of all SCC that were marked during the field investigation. A search and rescue of all SCC must be conducted prior to the construction commencement. Good record-keeping will be necessary to record this process and to document all successes and failures associated with the relocation

of any SCC. It is strongly advised that rescue and relocation plan is designed and implemented prior to development for the Horned Baboon spider during development.

- Infrastructure layout plans should be designed to minimise impacts to the Freshwater Habitat. It is advised that the Seep Wetland Subunit be excluded from the PV development area. Where Riverine Habitat will be traversed (e.g., within the southern OHL Transmission Corridor and the Internal OHL crossings), appropriate measures should be taken to minimise the impacts on the habitat subunit.
- Bridges and culverts should be used so to ensure that the (seasonal) flow of water through the nearby drainage lines are not negatively impacted.
- It is advised that infrastructure placement within the proposed southern OHL Transmission Corridor be designed to avoid the Rocky Habitat as far as is possible. Layouts can be designed to effectively exclude the Rocky Habitat by placing infrastructure closer to the existing roads thereby minimising the impacts on the associated Habitat.

8.4 EAP Statement

The proposed Solar PV Plant is expected to cause various positive and negative impacts on the affected and surrounding environment. Taking these impact assessments into consideration together with the mitigatability of these impacts, the EAP is of the opinion that these impacts can be efficiently addressed to prevent any undue or highly negative impacts from occurring. It is, however, imperative that any appointments made by Anglo shall include all documents relevant to the EA (if approved) in the tender requirements.

As such, the EAP is of the opinion that the proposed photovoltaic energy facility for Anglo American Platinum in Limpopo be authorised, subject to the recommended conditions and any additional conditions deemed appropriate by LEDET.

9 REFERENCES

Burgess, M.D., Nicoll, M.A.C., Jones, C.G., Norris, K. (2011). Multiple environmental gradients affect spatial variation in the productivity of a bird population. Journal of Animal Ecology 80:688-695.

de Bruyn, C. 2021. Heritage Impact Assessment for the Proposed Solar PV Plant for the Mogalakwena Mine, Situated near Mokopane, Limpopo Province. PGS Heritage Pty (Ltd)

Department of Water Affairs and Forestry (DWAF). 2005. Final draft: A practical field procedure for identification and delineation of wetlands and Riparian areas.

Department of Water Affairs and Forestry (DWAF). 2008. Updated Manual for the Identification and Delineation of Wetlands and Riparian Areas, prepared by M. Rountree, A. L. Batchelor, J. MacKenzie and D. Hoare. Report no. X. Stream Flow Reduction Activities, Department of Water Affairs and Forestry, Pretoria, South Africa.

Department of Water and Sanitation (DWS). 2014. A Desktop Assessment of the Present Ecological State, Ecological Importance and Ecological Sensitivity per Sub Quaternary Reaches for Secondary Catchments in South Africa. Secondary: C2 Compiled by RQIS-RDM: Online available: **https://www.dwa.gov.za/iwqs/rhp/eco/peseismodel.aspx**

JH Consulting. 2021. Environmental Noise Report for the Proposed PV Power Plant, Mogalakwena Mine.

Lanz, J. 2021. Site Sensitivity Verification and Agricultural Compliance Statement for Proposed PV Facility at Mogalakwena Mine in Limpopo.

Mtizi, C. 2021. Traffic Impact Assessment, Proposed Mogalakwena Solar Farm. Zutari (Pty) Ltd.

Mucina, L. & Rutherford, M.C. (Eds). 2012. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria, RSA

Oberholzer, B. (2005), Guideline for involving visual and aesthetic specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 F. Republic of South Africa, Provincial government of the Western Cape, Department of Environmental Affairs and Development Planning, Cape Town.

O'Connor, T. G., Puttick, J. R., and Hoffman, T. M. 2014. Bush encroachment in southern Africa: changes and causes. African Journal of Range and Forage Science. 31:2, 67-88, DOI: 10.2989/10220119.2014.939996

Ollis, D.J., Snaddon, C.D., Job, N.M. & Mbona, N. 2013. Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. SANBI Biodiversity Series 22. South African Biodiversity Institute, Pretoria.

SANBI. 2018. The Vegetation Map of South Africa, Lesotho and Swaziland, Mucina, L., Rutherford, M.C. and Powrie, L.W. (Editors), Online, http://bgis.sanbi.org/Projects/Detail/186, Version 2018.

SANBI. 2018a. Terrestrial ecosystem threat status and protection level layer 2018.

SANBI. 2018b. Terrestrial ecosystem threat status and protection level - remaining extent 2018.

SANBI. 2020. Draft Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Flora (3c) & Terrestrial Fauna (3d) Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 1.0.

SANBI BGIS. 2019. The South African National Biodiversity Institute - Biodiversity GIS (BGIS) [online]. URL: http://bgis.sanbi.org as retrieved in 2020.

San-Marie Aucamp. 2021. Social Impact Assessment, Mogalakwena PV Facility. Equispectives Research & Consulting Services.

Scientific Terrestrial Services. 2021. Freshwater Ecosystem Assessment as Part Of The Environmental Authorisation Process For The Proposed Solar Photovoltaic (PV) Associated With The Anglo-Mogalakwena Mine Near Mokopane, Limpopo Province.

Scientific Terrestrial Services. 2021. Terrestrial Biodiversity Assessment as Part Of The Environmental Authorisation Process For The Proposed Solar Photovoltaic (PV) Associated With The Anglo-Mogalakwena Mine Near Mokopane, Limpopo Province.

Scientific Terrestrial Services. 2021. Terrestrial Biodiversity Assessment as Part Of The Environmental Authorisation Process For The Proposed Solar Photovoltaic (PV) Associated With The Anglo-Mogalakwena Mine Near Mokopane, Limpopo Province: Part B: Floral Assessment.

Scientific Terrestrial Services. 2021. Terrestrial Biodiversity Assessment as Part Of The Environmental Authorisation Process For The Proposed Solar Photovoltaic (PV) Associated With The Anglo-Mogalakwena Mine Near Mokopane, Limpopo Province: Part C: Faunal Assessment.

Smith, S.H., Steenhof, K., McClure, C.J.W., Heath, J.A. (2017). Earlier nesting by generalist predatory bird is associated with human responses to climate change. Journal of Animal Ecology 86:98-107.

Skowno, A.L. & Bond, W.J. (2003). Bird community composition in an actively managed savanna reserve, important of vegetation structure and vegetation composition. Biodiversity and Conservation 12:2279-2294.

Weideman, E. 2021. Landscape and Visual Impact Assessment, Mogalakwena Mine Solar Power Project. Create Landscape Architecture and Consulting.

Wichmann, M.C., Dean, W.R.J, Jeltsch, F., Wichmann, M.C, Predicting, F.J. (2009). Predicting the breeding Success of large raptors in arid southern Africa: a first assessment 6525:589-594.

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In diversity there is beauty
and there is strength.

MAYA ANGELOU

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