EIMS | ENVIRONMENTAL IMPACT MANAGEMENT SERVICES

T 011 789 7170 E info@eims.co.za W www.eims.co.za

BASIC ASSESSMENT REPORT

PROPOSED ACWA POWER SOLAR RESERVE REDSTONE SOLAR PHOTOVOLTAIC POWER PLANT ON THE REMAINING EXTENT OF THE FARM NO. 469, HAY REGISTRATION DIVISION, TSANTSABANE LOCAL MUNICIPALITY, ZF MGCWU DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE

DFFE PRE-APPLICATION REFERENCE: 2026-05-0023

DOCUMENT DETAILS

EIMS REFERENCE: 1761

DOCUMENT TITLE: PROPOSED ACWA POWER SOLAR RESERVE REDSTONE SOLAR PHOTOVOLTAIC POWER PLANT ON THE REMAINING EXTENT OF THE FARM NO. 469, NORTHERN CAPE PROVINCE

DOCUMENT CONTROL

	NAME	SIGNATURE	DATE
COMPILED:	Andre van Rooyen		2026/07/10
CHECKED:	Liam Whitlow		2026/07/14
AUTHORIZED:	Liam Whitlow		2026/07/14

REVISION AND AMENDMENTS

REVISION DATE:	REV #	DESCRIPTION
2026/07/14	ORIGINAL DOCUMENT	BAR for Public Review

Table of Contents

List of Figures

List of Tables

Appendices

ACRONYMS AND ABBREVIATIONS

AC	Alternating Current
ARC-ISCW	Agricultural Research Council – Institute for Soil, Climate and Water
ASAPA	Association of Southern African Professional Archaeologists
BA	Basic Assessment
BESS	Battery Energy Storage System
CARA	Conservation of Agricultural Resources Act
CER	Centre for Environmental Rights
CI	Cumulative Impact
CMA	Catchment Management Agency
CMS	Catchment Management Strategy
CRM	Cultural Resource Management
CR	Critically Endangered
CSA	Conservation South Africa
SP	Concentrated Solar Power
DC	Direct Current
DWS	Department of Water and Sanitation
ECA	Environment Conservation Act
ECO	Environmental Control Officer
EIS	Ecological Importance and Sensitivity
ELWU	Existing Lawful Water Use
EMF	Environmental Management Framework
EN	Endangered
ESA	Ecological Support Area / Earlier Stone Age *(context dependent; both appear in the report)*
EWT	Endangered Wildlife Trust
FEPA	Freshwater Ecosystem Priority Area
FPA	Fire Protection Association
FS	Final Significance
GA	General Authorisation
GHG	Greenhouse Gas
GIS	Geographic Information System
GN / GNR	Government Notice / Government Notice Regulation
GPS	Global Positioning System
GWC	Griqualand West Centre of Endemism
HGM	Hydrogeomorphic

HIA	Heritage Impact Assessment
IAP / IAPs	Invasive Alien Plant(s)
IDP	Integrated Development Plan
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature
JET	Just Energy Transition
LC	Least Concern
LED	Local Economic Development
LM	Local Municipality
LR	Irreplaceable Loss of Resources
LSA	Later Stone Age
LUS	Land Use Scheme
MEC	Member of the Executive Council
MPRDA	Mineral and Petroleum Resources Development Act
MSA	Middle Stone Age
NAAQS	National Ambient Air Quality Standards
NBA	National Biodiversity Assessment
NCHRA	Northern Cape Heritage Resources Authority
NCNCA	Northern Cape Nature Conservation Act
NCRs	National Noise Control Regulations
NDC	Nationally Determined Contribution
NEMBA	National Environmental Management: Biodiversity Act
NEMPAA	National Environmental Management: Protected Areas Act
NEMWA	National Environmental Management: Waste Act
NFA	National Forests Act
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act
NPAES	National Protected Area Expansion Strategy
NT	Near Threatened
NTCSA	National Transmission Company South Africa
NWA	National Water Act
PAOI	Project Area of Influence
PES	Present Ecological State
PF	Prioritisation Factor
PPR	Public Participation Report
PSDF	Provincial Spatial Development Framework

PV	Photovoltaic
REC	Recommended Ecological Category
RFI	Radio Frequency Interference
RMO	Recommended Management Objective
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SANS	South African National Standard
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SKA	Square Kilometre Array
SPLUMA	Spatial Planning and Land Use Management Act
SSVR	Site Sensitivity Verification Report
SWSA	Strategic Water Source Area
TOPS	Threatened or Protected Species
UVB	Unchannelled Valley-Bottom
VU	Vulnerable
WEF	Wind Energy Facility
WESSA	Wildlife and Environment Society of South Africa
WMA	Water Management Area
WRC	Water Research Commission
WULA	Water Use Licence Application

EXECUTIVE SUMMARY

1.1 INTRODUCTION AND OVERVIEW

ACWA Power Solar Reserve Redstone Solar Thermal Power Plant RF (Pty) Ltd (the Applicant) proposes the development of the Redstone Solar Photovoltaic (PV) Power Project (Redstone PV) on the Remaining Extent of Farm 469, approximately 25 km east of Postmasburg within the Tsantsabane Local Municipality, Northern Cape Province. The proposed development is intended to support the existing Redstone Concentrated Solar Power (CSP) facility by supplying renewable energy for auxiliary electricity requirements.

Environmental Impact Management Services (Pty) Ltd (EIMS) was appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the Basic Assessment (BA) process and compile this Basic Assessment Report (BAR) in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended.

The purpose of the BAR is to describe the proposed development, identify and assess potential impacts, evaluate alternatives, present specialist findings, document the public participation process, and provide recommendations to assist the competent authority in making an informed decision regarding the proposed development.

1.2 REGULATORY FRAMEWORK AND PROCESS

The proposed development triggers listed activities in terms of the NEMA EIA Regulations and therefore requires Environmental Authorisation prior to commencement. A Basic Assessment process was undertaken in accordance with the requirements of NEMA and Appendix 1 of the EIA Regulations, 2014, as amended.

The assessment process included:

- Submission of an application for Environmental Authorisation;
- Generation and review of the DFFE Environmental Screening Tool Report;
- Compilation of a Site Sensitivity Verification Report (SSVR);
- Public participation in accordance with the NEMA EIA Regulations;
- Specialist investigations relating to terrestrial biodiversity, wetlands, visual and landscape impacts, heritage resources, palaeontology, soils and agricultural potential, and socio-economic considerations;
- Assessment of project alternatives; and
- Compilation of the BAR and Environmental Management Programme (EMPr).

The findings of the specialist studies and impact assessment have informed the preferred project layout and mitigation measures proposed for implementation.

1.3 PROJECT OVERVIEW

The proposed Redstone PV Project will consist of a solar photovoltaic facility with a generation capacity of approximately 19.5 MW (DC), an energy storage system of up to 30 MWh, associated electrical infrastructure, and supporting infrastructure required to supply auxiliary power to the operational Redstone CSP facility. The proposed PV development will occupy approximately 19.5 ha and will be located within the broader Redstone CSP project area. Existing access roads, security systems and support infrastructure associated with the CSP facility will be utilised where feasible. The project is intended purely for internal consumption and no electricity export to the national grid is proposed.

The proposed development is aligned with national, provincial and municipal renewable energy objectives and supports South Africa's transition towards a lower-carbon energy sector. The project will provide a dedicated

renewable electricity source for the auxiliary load requirements of the existing Redstone CSP facility, thereby improving operational efficiency and reducing reliance on external electricity supply.

The project supports the objectives of the Integrated Resource Plan (IRP), the Just Energy Transition framework, the Northern Cape Provincial Spatial Development Framework, and relevant municipal planning frameworks. The proposed development further contributes to economic diversification within the region, supports investment in renewable energy infrastructure, and reinforces the Northern Cape's role as a renewable energy hub.

1.4 RECEIVING ENVIRONMENT

The project area occurs within a semi-arid landscape characterised by open plains, low-intensity livestock grazing, renewable energy infrastructure and mining-related activities. The site is located adjacent to the operational Redstone CSP facility and forms part of an established renewable energy development landscape.

Specialist investigations identified the following environmental characteristics:

- The site is located within the Olifantshoek Plains Thornveld vegetation type.
- One unchannelled valley-bottom wetland occurs within the broader area of influence and requires protection through the implementation of wetland buffers and mitigation measures.
- Agricultural potential is low due to prevailing climatic conditions and limited grazing capacity.
- The visual landscape has already been substantially influenced by existing renewable energy infrastructure, including the Redstone CSP, Jasper Solar PV and Lesedi Solar facilities.
- The surrounding area supports extensive livestock grazing and renewable energy development as the dominant land uses.
- No environmental fatal flaws were identified from a biodiversity, wetland, soil, heritage, palaeontological, visual or socio-economic perspective.

1.5 PUBLIC PARTICIPATION

A Public Participation Process (PPP) was undertaken in accordance with the requirements of the National Environmental Management Act (NEMA) and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended. The process was designed to be transparent, inclusive and accessible, providing Interested and Affected Parties (I&APs), landowners, government authorities, non-governmental organisations, community stakeholders and other interested parties with a meaningful opportunity to participate in the Basic Assessment process.

The stakeholder engagement process included the identification and registration of I&APs, consultation with relevant organs of state, direct notification of stakeholders via email, SMS, post and other available communication channels, placement of bilingual site notices, publication of newspaper advertisements, and the provision of project information for public review and comment. The Basic Assessment Report was made available for review through accessible platforms, including electronic distribution and publicly accessible hard-copy locations.

Relevant national, provincial, district and local authorities were notified of the application, together with landowners, conservation organisations, specialist interest groups and other stakeholders. Key authorities consulted included, amongst others, the Department of Forestry, Fisheries and the Environment (DFFE), Department of Water and Sanitation (DWS), South African Heritage Resources Agency (SAHRA), South African National Biodiversity Institute (SANBI), SANRAL, Tsantsabane Local Municipality and the ZF Mgcawu District Municipality.

Stakeholders were invited to register as I&APs and submit comments, concerns, objections and recommendations. Comments received during the process included requests for ongoing project updates, enquiries regarding potential benefits to the non-profit sector, and confirmation from certain infrastructure authorities that the proposed development would not affect existing services. All comments and responses have been documented and incorporated into the assessment process. To date, no substantive comment has yet been received, the correspondence received consisted of I&AP registration requests, a request to be kept informed regarding potential benefits to the NPO sector, confirmations from Transnet Pipelines and NTCSA that they are not affected by the proposed project, and a query from SANRAL Western Region regarding the anticipated availability of the Basic Assessment Report.

The public participation process contributed to the identification of issues, refinement of the assessment, and development of mitigation measures. No stakeholder issues were identified that would constitute a fatal flaw to the proposed development. The stakeholder engagement process therefore informed decision-making and supported the overall environmental assessment in a manner consistent with legislative requirements and best-practice principles.

1.6 IMPACT ASSESSMENT AND MITIGATION

The EAP and specialist studies identified a range of potential environmental and socio-economic impacts associated with the construction, operation and decommissioning phases of the project. The key negative impacts relate to terrestrial biodiversity, wetlands, loss of agricultural land, heritage resources, palaeontological resources, visual impacts and sense of place.

Following implementation of recommended mitigation measures, the majority of negative impacts were assessed as having low to medium-low negative significance. Key mitigation measures include:

- Demarcation and protection of environmentally sensitive areas;
- Maintenance of wetland buffers;
- Search and rescue of protected plant species where required;
- Erosion and stormwater management measures;
- Control of alien invasive species;
- Implementation of heritage chance-find procedures;
- Responsible waste management;
- Rehabilitation of disturbed areas; and
- Ongoing environmental monitoring and compliance auditing.

Positive impacts identified include contributions to GDP, government revenue, employment creation, skills development and support for renewable energy generation. These impacts were assessed as medium-to-high positive and are expected to provide socio-economic benefits during the project lifecycle.

1.7 ENVIRONMENTAL IMPACT STATEMENT

The findings of the Basic Assessment process and associated specialist studies indicate that there are no environmental fatal flaws that would preclude the proposed Redstone PV Project from proceeding. The identified negative impacts are generally of low to medium-low significance following the implementation of recommended mitigation and management measures.

The proposed development will provide renewable auxiliary power to the existing Redstone CSP facility, support national renewable energy objectives, improve operational efficiency and contribute to regional economic development. The project is located within an existing renewable energy development area and has been designed to minimise environmental disturbance through the use of existing infrastructure and avoidance of sensitive features where practicable.

It is therefore the opinion of the EAP that the proposed Redstone PV Project is environmentally acceptable and should be authorised, subject to the implementation of the EMPr, specialist recommendations and any conditions of Environmental Authorisation issued by the competent authority.

2 INTRODUCTION

ACWA Power Solar Reserve Redstone Solar Thermal Power Plant RF (Pty) Ltd (the Applicant) has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the independent Environmental Assessment Practitioner (EAP) to undertake the Basic Assessment (BA) process and compile the Basic Assessment Report (BAR) for the ACWA Power Solar Reserve Redstone Solar Photovoltaic (PV) Power Project (Redstone PV).

The Redstone PV is proposed as an auxiliary photovoltaic facility to support the existing ACWA Power Solar Reserve Redstone Solar Thermal Power Plant (CSP) by supplying renewable energy for its auxiliary load requirements. The proposed PV facility forms part of the broader Redstone CSP Power Project and will be located within the same approved project area. The integration of the Redstone PV is intended to enhance operational efficiency and reduce reliance on external electricity sources through the generation of on-site renewable energy.

This report has been prepared in accordance with the requirements of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended. A Basic Assessment process is required due to the triggering of listed activities associated with the development of renewable energy infrastructure and associated supporting infrastructure.

The purpose of this BAR is to:

- Provide a detailed description of the proposed Redstone PV and associated infrastructure;
- Describe the receiving biophysical and socio-economic environment;
- Identify and assess potential environmental and socio-economic impacts associated with the proposed development;
- Evaluate feasible and reasonable alternatives;
- Present the findings of specialist studies;
- Document the public participation process undertaken; and
- Recommend appropriate mitigation measures to avoid, minimise, or manage identified impacts.

EIMS, as the independent EAP, confirms that the assessment has been undertaken in an objective manner, taking into account all relevant environmental, social, and economic considerations. The findings of this BA process are intended to support the competent authority in making an informed decision regarding the granting of Environmental Authorisation (EA) for the proposed Redstone PV.

2.1 REPORT STRUCTURE

This report has been compiled in accordance with the NEMA EIA Regulations, 2014, as amended. A summary of the report structure, and the specific sections that correspond to the applicable regulations, is provided in Table 1 below.

Table 1: Report structure

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
Appendix 1- 3(1)(a)	Details of – i. The Environmental Assessment Practitioner (EAP) who prepared the report; and ii. The expertise of the EAP, including a curriculum vitae;	2.2
Appendix 1- 3(1)(b)	The location of the activity. Including – i. The 21-digit Surveyor General code of each cadastral land parcel; ii. Where available, the physical address and farm name; iii. Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	3
Appendix 1- 3(1)l	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is – i. A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or ii. On a land where the property has not been defined, the coordinates within which the activity is to be undertaken;	3
Appendix 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;	4
Appendix 1- 3(1)l	A description of the policy and legislative context within which the development is proposed including- **(1)** an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and	5

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
	(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments	
Appendix 1- 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 location;	5
Appendix 1- 3(1)(g)	A motivation for the preferred site, activity and technology alternative	7, 4 and 10
Appendix 1- 3(1)(h)	A full description of the process followed to reach the proposed preferred alternative within the site, including: – i. Details of the development footprint alternatives considered; ii. Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; iii. A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; iv. The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; v. The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts – a. Can be reversed; b. May cause irreplaceable loss or resources; and c. Can be avoided, managed or mitigated; vi. The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; 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; viii. The possible mitigation measures that could be applied and level of residual risk;	7, 8, 9 and 10

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
	ix. The outcome of the site selection matrix; x. If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and; xi. A concluding statement indicating the preferred alternatives, including preferred location of the activity.	
Appendix 1- 3(1)(i)	A full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location 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;	7, 8, 9 and 10
Appendix 1- 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;	7, 8, 9 and 10
Appendix 1- 3(1)(k)	Where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;;	11
Appendix 1- 3(1)(l)	An environmental impact statement which contains – i. A summary of the key findings of the environmental impact assessment;	11.4

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
	ii. A map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicting any areas that should be avoided, including buffers; and iii. A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
Appendix 1- 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;	11.5
Appendix 1- 3(1)(n)	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;	11.5
Appendix 1- 3(1)(o)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	12
Appendix 1- 3(1)(p)	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;	11.4
Appendix 1- 3(1)(q)	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 The project includes operational aspects.
Appendix 1- 3(1)I	An undertaking under oath or affirmation by the EAP in relation to – iv. The correctness of the information provided in the reports; v. The inclusion of comments and inputs from stakeholders and interested and affected parties; vi. The inclusion of inputs and recommendations from the specialist reports where relevant; and vii. 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;	13

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
Appendix 1- 3(1)(t)	Any specific information that may be required by the competent authority; and	None
Appendix 1- 3(1)(u)	Any other matters required in terms of section 24(4)(a) and (b) of the Act.	None

2.2 DETAILS OF THE EAP

EIMS has been appointed by the applicant as the independent Environmental Assessment Practitioner (EAP) to prepare and submit the EA application, Basic Assessment Report, and undertaking a Public Participation Process (PPP). The contact details of the EIMS consultant and EAP who compiled this Report are as follows:

Table 2: EAP Details

Name of Practitioner	Mr Liam Whitlow (EAP/ reviewer)	Mr Andre van Rooyen (Candidate EAP/compiler)
Tel No.:	+27 11 789 7170	+27 11 789 7170
Fax No.:	+27 86 571 9047	+27 86 571 9047
E-mail:	acwapv@eims.co.za	

In terms of Regulation 13 of the EIA Regulations, 2014, as amended, an independent EAP, must be appointed by the applicant to manage the application. EIMS is compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations, as well as Section 1 of the NEMA. This includes, inter alia, the requirement that EIMS is:

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

EIMS is a private and independent environmental management-consulting firm that was founded in 1993. EIMS has in excess of 30 years' experience in conducting EIA's. Please refer to the EIMS website (www.eims.co.za) for further details of expertise and experience.

2.3 EXPERIENCE OF THE COMPILER (CANDIDATE EAP)

Andre van Rooyen is a current Environmental Assessment Practitioner with three years of working experience. He is a registered Candidate Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP) (Reg. No. 164675). He is also a Registered Candidate Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioners Association of South Africa (EAPASA) (Reg. No. 2023/6845).

Andre has a background in Environmental Sciences, supported by relevant academic qualifications and practical work experience. He has been involved in a range of environmental assessment projects, including environmental screening, auditing, compliance evaluations, and Section 24G applications, for which he has compiled and submitted Environmental Assessment Reports and associated Environmental Management Programmes (EMPrs). These include projects for a concrete batching plant and a chrome beneficiation plant.

In addition, Andre has experience in undertaking Water Use Authorisation applications through both General Authorisation and full Water Use Licence Application processes. This includes compiling supporting documentation such as Integrated Waste and Water Management Plans. The Curriculum Vitae of the compiler responsible for the compilation of this Report is included in APPENDIX A.

2.4 EXPERIENCE OF THE REVIEWER (EAP)

Liam Whitlow is an Environmental Assessment Practitioner with over 24 years of experience in the environmental management field. He holds a BSc Honours degree in Environmental Management and is a Registered Professional Natural Scientist with the South African Council for Natural Scientific Professions

(SACNASP) (Reg. No. 400148/08). He is also a Registered Environmental Assessment Practitioner (EAPASA) (Reg. No. 2019/222).

Liam has extensive experience in environmental impact assessments (EIAs), having managed and contributed to complex projects across the mining, infrastructure, and energy sectors. His expertise includes environmental authorisation processes, environmental audits, due diligence assessments, and environmental monitoring programmes. He has been involved in a wide range of environmental applications, including EIAs, Basic Assessments, and Section 24G rectification processes.

In addition, Liam has experience in water use licensing, ISO 14001 environmental management systems, and the compilation and review of Environmental Management Programmes (EMPrs) and other environmental management plans. A detailed for CV Liam Whitlow is presented in APPENDIX A.

3 DESCRIPTION OF THE PROJECT AREA

Table 3 indicates the details of the project area for the proposed project including details on the project location as well as the distance from the proposed project area to the nearest towns.

Table 3: Locality details

Application Area (ha)	~19.5 ha
Cadastral description	Remaining Extent of Farm No. 469, Hay Registration Division C03100000000046900000
Magisterial District	Hay Magisterial District
District Municipality	ZF Mgcawu District Municipality
Local Municipalities	Tsantsabane Local Municipality

The locality of the proposed project is shown in Figure 1.

The proposed Redstone PV site falls within areas identified by spatial planning instruments, including the Siyanda District Municipality Environmental Management Framework (EMF) and the Strategic Transmission Corridor (Northern Corridor), which supports the development of large-scale energy infrastructure within the region.

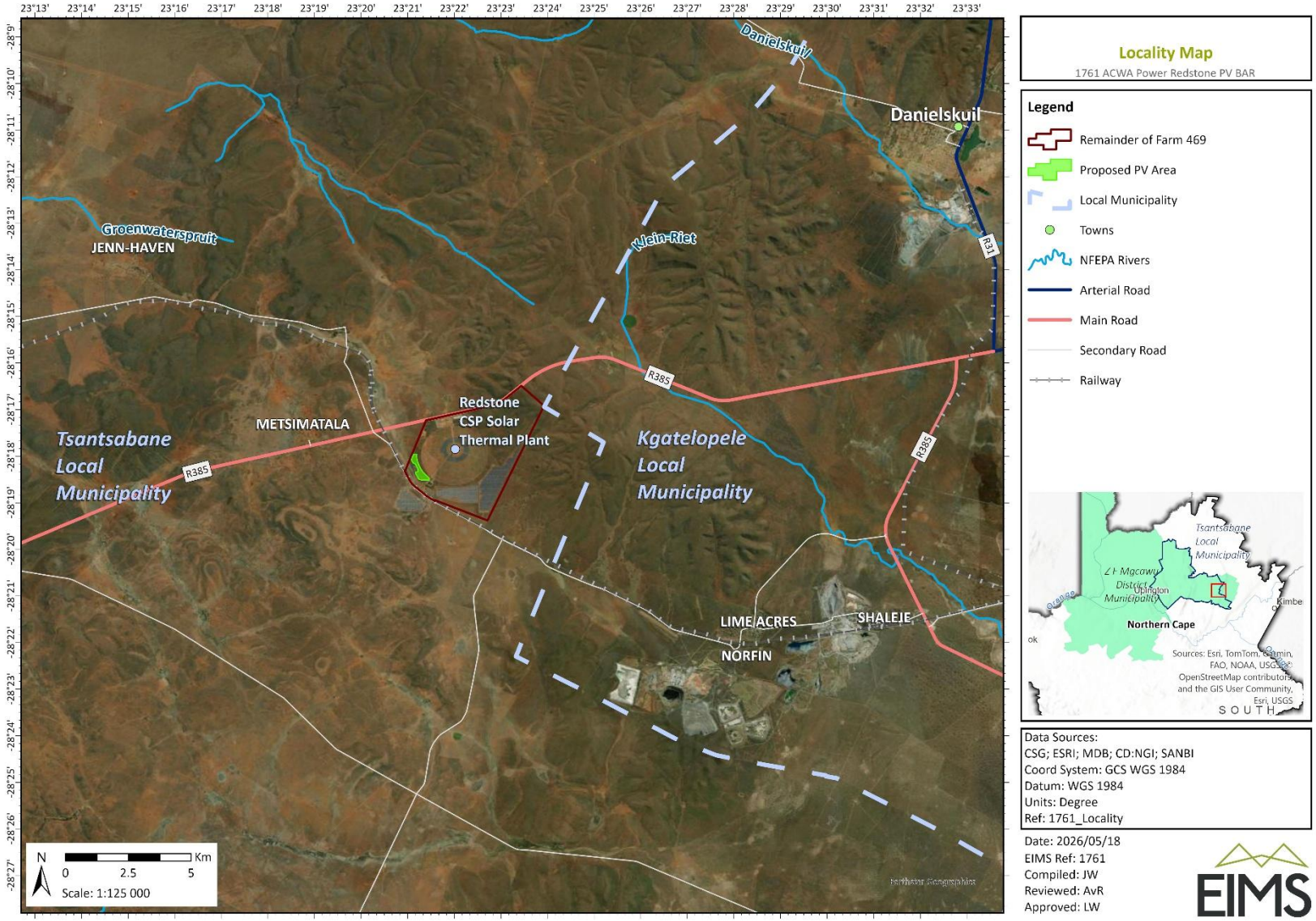

Figure 1: Locality map.

4 DESCRIPTION AND SCOPE OF THE PROPOSED ACTIVITY

4.1 PROJECT DESCRIPTION

This section provides an overview of the proposed Redstone PV, including a description of the development components, project phases, and associated activities. The intention is to clearly describe the nature and extent of the proposed development to ensure a comprehensive understanding of the project.

4.1.1 PROJECT OVERVIEW

The ACWA Power Solar Reserve Redstone Solar Photovoltaic (PV) Power Project (Redstone PV) is proposed as an auxiliary renewable energy facility to support the existing ACWA Power Solar Reserve Redstone Solar Thermal Power Plant (CSP). The purpose of the Redstone PV is to provide electricity for the auxiliary load requirements associated with the operation of the CSP facility.

The Redstone PV will form part of the broader Redstone CSP Power Project and will be developed within the same project area. The facility will have a generation capacity of up to approximately 19.5 MW (DC), with a design capacity of approximately 15 MW (AC), and will include energy storage of up to 30 MWh.

The Redstone PV is designed to generate renewable energy for self-consumption by the CSP facility, thereby reducing reliance on external power sources and improving operational efficiency.

4.1.2 PROJECT TIMELINE

This section outlines the anticipated lifecycle of the Redstone PV, including the key project phases from planning through to decommissioning. The overall timeline is aligned with typical renewable energy project development processes and is integrated with the lifecycle of the associated CSP facility.

4.1.2.1 **PLANNING AND AUTHORISATION PHASE**

The planning and authorisation phase includes the completion of all required regulatory processes, including the Basic Assessment process and the obtaining of an Environmental Authorisation (EA), as well as any other relevant approvals and permits required prior to construction.

This phase also includes detailed engineering design, procurement planning, and finalisation of project specifications.

4.1.2.2 **CONSTRUCTION PHASE**

The construction phase will involve all site establishment and infrastructure installation activities required to develop the Redstone PV. This includes vegetation clearing (where required), site preparation, installation of PV panels, electrical infrastructure, and associated support infrastructure.

The construction period is anticipated to be relatively short, approximately 2 to 6 months, due to the modular nature of photovoltaic infrastructure and the utilisation of existing CSP-related infrastructure where feasible.

4.1.2.3 **OPERATIONAL PHASE**

The operational phase will involve the ongoing generation of electricity from the Redstone PV and the provision of auxiliary power to the CSP facility. This phase includes routine operation, maintenance of PV panels and associated infrastructure, and monitoring of system performance.

The operational lifespan of the Redstone PV is expected to align with that of the Redstone CSP Power Project, typically approximately 25 years, subject to ongoing maintenance, technological upgrades, and potential refurbishment.

4.1.2.4 **DECOMMISSIONING AND REHABILITATION PHASE**

At the end of the operational life, the Redstone PV will be decommissioned, which includes the dismantling and removal of all infrastructure, recycling or disposal of materials where applicable, and the rehabilitation of disturbed areas.

Rehabilitation activities will aim to restore the site to a condition that is as close as reasonably possible to its pre-development state, or alternatively to a stable and functional post-use land condition, in accordance with the requirements of the Environmental Management Programme (EMPr).

4.1.3 PROJECT COMPONENTS

This section describes the key structural and functional components of the Redstone PV and the infrastructure required for its construction and operation. The Redstone PV will comprise several key components, which are described below.

4.1.3.1 **PHOTOVOLTAIC (PV) PANEL FIELD**

The PV panel field forms the primary energy generation component of the development and will consist of arrays of photovoltaic panels mounted on support structures.

The PV facility will consist of arrays of photovoltaic panels mounted approximately 3–5 m above ground level, oriented north to optimise solar energy capture. The panels may be fixed or tracking systems, depending on final engineering design. The panels will be arranged in rows (arrays) across the development footprint, covering an area of approximately 19.5 hectares including the auxiliary BESS system.

4.1.3.2 **ELECTRICAL INFRASTRUCTURE**

The electrical infrastructure is required to convert generated electricity into a usable form and transmit it within the internal network. The PV system will generate direct current (DC) electricity, which will be converted to alternating current (AC) using inverter units. The electrical components will include:

- Inverter units distributed across the PV field;
- Transformers to step up voltage levels (up to approximately 33 kV); and
- Underground and/or surface cabling connecting the PV system to the CSP facility.

Electricity generated by the Redstone PV will be transmitted to the CSP facility for auxiliary use.

4.1.3.3 **ENERGY STORAGE SYSTEM**

The energy storage system is a critical component of the Redstone PV, enabling improved stability and operational flexibility. The Redstone PV will include a battery energy storage system of up to approximately 30 MWh with a footprint of approximately 0.7 ha, which will:

- Stabilise energy supply;
- Support peak demand requirements; and
- Improve reliability of the auxiliary power system.

Battery storage units will be housed within containerised or enclosed structures.

4.1.3.4 **SUBSTATION AND GRID INTEGRATION**

This component facilitates the integration of the Redstone PV facility into the existing electrical infrastructure associated with the CSP facility. A mini-substation of up to approximately 11 kV may be constructed to enable connection of the Redstone PV facility to the internal CSP electrical network. The mini-substation will comprise medium-voltage (MV) switchgear rated at 36 kV and oil-filled transformers utilising uninhibited transformer oil with low sulphur content in accordance with IEC 60296. The transformers will be ONAN-cooled and designed to achieve a noise level not exceeding 65 dB(A) measured at 1 m. Power generated by the facility will be transferred through internal cabling routes to the CSP power block.

4.1.4 AUXILIARY INFRASTRUCTURE AND SERVICES

In addition to the primary generation components, the Redstone PV will require various supporting infrastructure and services to enable construction and operation. Where possible, the Redstone PV will utilise existing infrastructure associated with the CSP facility, including:

- Access roads and internal circulation routes;
- Security infrastructure and controlled access;
- Water supply for cleaning and operational use;
- Waste management systems;
- Stormwater management infrastructure;
- Administrative and operational facilities; and
- Fire protection systems.

4.1.5 ASSOCIATED ACTIVITIES AND INFRASTRUCTURE

In addition to the primary generation components described above, the Redstone PV requires a range of supporting activities and infrastructure to enable its construction, operation, and maintenance. These associated components are largely integrated with, or supported by, the existing infrastructure of the Redstone CSP facility, thereby reducing the need for extensive new infrastructure development. The key associated activities and infrastructure are described below.

4.1.5.1 **ACCESS AND TRANSPORTATION**

Access to the Redstone PV will be achieved via existing access roads associated with the CSP facility. Internal circulation within the PV site will be facilitated by gravel access tracks between panel arrays for construction and maintenance purposes. Limited upgrades to existing access infrastructure may be required to accommodate construction traffic and equipment.

4.1.5.2 **POWER AND ELECTRICAL INTEGRATION**

The electricity generated by the Redstone PV will be used to supply the auxiliary load requirements of the CSP facility. Internal electrical integration will be achieved through on-site cabling and connection to the CSP electrical network. No export of electricity to the national grid is proposed as part of the Redstone PV, as the facility is designed for internal consumption.

4.1.5.3 **WATER SUPPLY AND USE**

Water will be required on a limited basis during both the construction and operational phases of the proposed 19 MWp Solar PV and 30 MWh Battery Energy Storage System (BESS) project. During construction, water will be used primarily for dust suppression, earthworks, equipment cleaning, concrete works and other general site activities. Total construction-phase water consumption is conservatively estimated at approximately 15,800 m^3, with an average demand of approximately 40 m^3/day and peak demand of up to 60 m^3/day.

During operation, water will be required mainly for periodic PV module cleaning, staff facilities, general housekeeping and routine maintenance activities. Annual water consumption is conservatively estimated at approximately 2,000 m^3 per annum. The BESS is not expected to require significant process water during normal operation.

Water requirements for both construction and operation will be supplied through the existing water supply systems associated with the CSP facility, including the municipal water supply where applicable. Water use will be managed and optimised to minimise consumption and avoid unnecessary losses. No new PV substation will be constructed as part of the project, as the facility will utilise the existing substation and associated electrical infrastructure. Consequently, no additional land area will be required for a new substation. The above water

consumption figures are preliminary and conservative estimates for EIA purposes and may be refined during the detailed design stage.

4.1.5.4 WASTE MANAGEMENT

Construction and operational activities will generate both general and limited hazardous waste streams, including packaging materials, discarded solar panels, scrap materials, and small quantities of hazardous substances such as oils and chemicals. All waste will be managed in accordance with applicable legislation and best practice, including waste minimisation, recycling where feasible, and disposal at appropriately licensed facilities.

4.1.5.5 STORMWATER MANAGEMENT

Stormwater management infrastructure will be implemented to control runoff, prevent erosion, and avoid the contamination of surrounding environments. Design measures will include appropriate drainage design, erosion control measures, and maintenance of natural drainage patterns where possible. The facility will be required to prepare a specific stormwater management plan (SWMP) as part of the detailed design phase.

4.1.5.6 SECURITY

Security infrastructure will be implemented to control access to the site and protect equipment. This will include perimeter fencing, controlled access points, and security monitoring systems consistent with those implemented at the CSP facility.

4.1.5.7 HUMAN RESOURCES AND LABOUR

The construction phase will require a temporary workforce, while the operational phase will require a smaller permanent workforce for maintenance and monitoring activities. Where possible, employment opportunities will be sourced locally in line with applicable procurement and labour policies.

It is anticipated that the number of permanent opportunities made available will be limited, estimated to approximately 2 new permanent positions. A more significant number of temporary jobs are anticipated to be created during the construction phase, this is estimated to be between 80 and 120 temporary construction phase jobs. The nature of the PV plant and its integration to the existing CSP facility operations results in an existing labour force with minimal new positions available during the operational phase of the project.

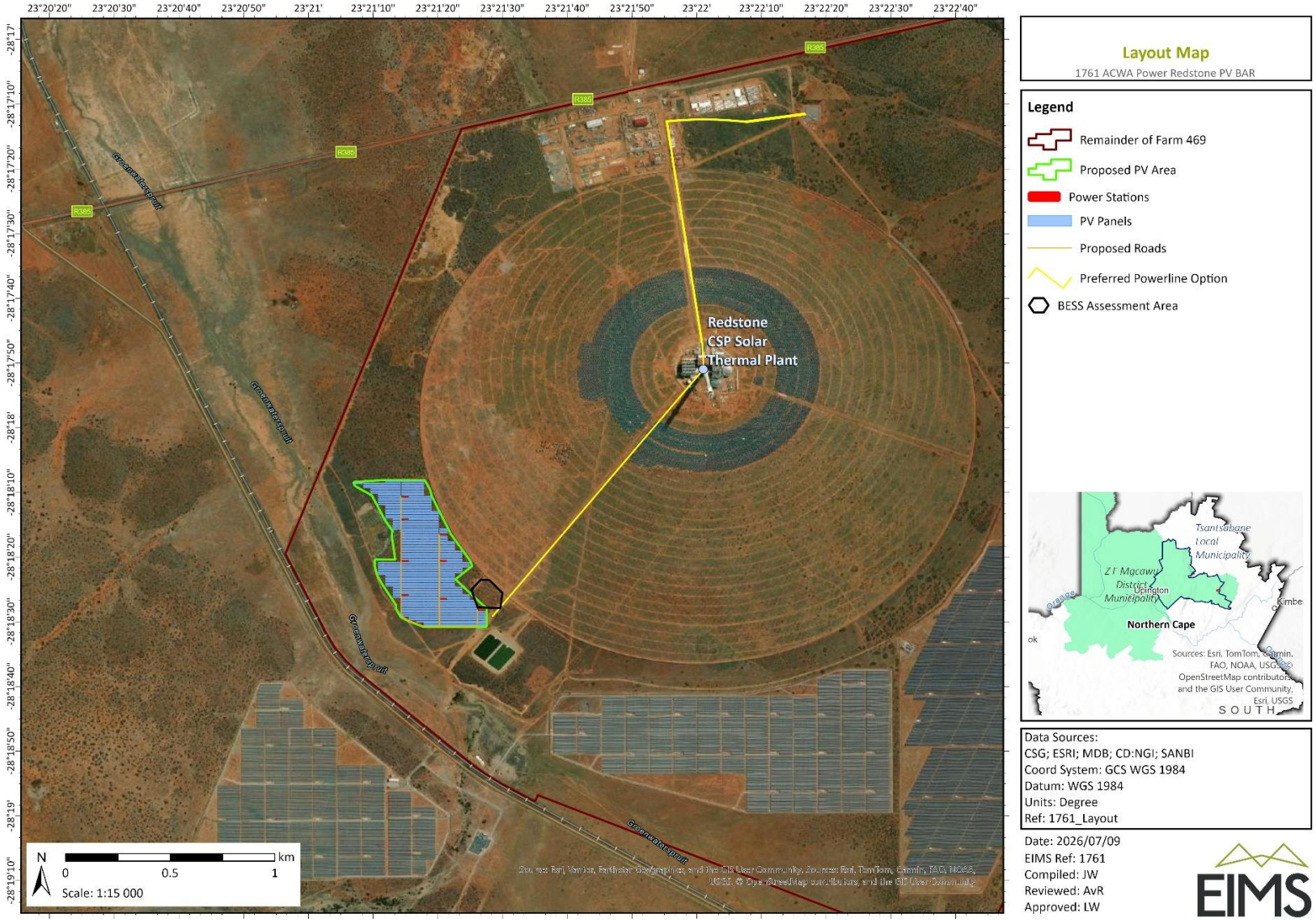

Figure 2: Planned site layout

5 POLICY AND LEGISLATIVE CONTEXT

This section provides an overview of the governing legislation identified which relates to the proposed project.

5.1 NATIONAL LEGISLATION

5.1.1 CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA

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

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

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

***i.** prevent pollution and ecological degradation;*

***ii.** promote conservation; and*

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

The EIA and associated impact mitigation actions are conducted to fulfil the requirement of the Bill of Rights.

MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT (MPRDA)

The aim of the MPRDA is to *"make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources"*. The MPRDA outlines the procedural requirements that need to be met to acquire mining rights in South Africa. The MPRDA also requires adherence with related legislation, chief amongst them is the National Environmental Management Act (Act No. 107 of 1998, NEMA) and the National Water Act (Act No. 36 of 1998, NWA).

Section 53 of the MPRDA regulates the use of land in circumstances where the intended land use may conflict with, or impede, the objectives of the Act. In terms of this section, any person who intends to use the surface of land in a manner that could negatively affect the prospecting, mining, exploration, or production of mineral and petroleum resources may be required to obtain the written consent of the Minister responsible for Mineral Resources before undertaking such activities.

The purpose of Section 53 is to ensure that developments or alternative land uses do not unnecessarily sterilise mineral resources or prevent the future exploitation of economically viable mineral deposits. As South Africa's mineral resources are held in custodianship by the State for the benefit of the nation, the provision seeks to balance competing land-use interests while safeguarding access to mineral resources.

In practice, Section 53 approval is commonly required for large-scale infrastructure, renewable energy, industrial, and property development projects situated on land with known or potential mineral resources. The Department of Mineral and Petroleum Resources assesses whether the proposed land use could conflict with current or future mining activities before granting consent.

For environmental and planning processes, compliance with Section 53 is an important consideration where proposed developments may overlap with areas of mineral potential, helping to minimise land-use conflicts and ensure the sustainable development of South Africa's mineral resources.

It is anticipated that an application in terms of section 53 of the MPRDA will be required for the proposed Redstone PV.

5.1.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA)

The main aim of the National Environmental Management Act, 1998 (Act 107 of 1998 – NEMA) is to provide for co-operative governance by establishing decision-making principles on matters affecting the environment. In terms of the NEMA EIA Regulations, the applicant is required to appoint an EAP to undertake the EIA process,

as well as conduct the public participation process towards an application for EA. In South Africa, EIA's became a legal requirement in 1997 with the promulgation of regulations under the Environment Conservation Act (ECA). Subsequently, NEMA was passed in 1998. Section 24(2) of NEMA empowers the Minister and any MEC, with the concurrence of the Minister, to identify activities which must be considered, investigated, assessed and reported on to the competent authority responsible for granting the relevant EA. On 21 April 2006, the Minister of Environmental Affairs and Tourism (now Department of Forestry, Fisheries and the Environment – DFFE) promulgated regulations in terms of Chapter 5 of the NEMA. These regulations, in terms of the NEMA, were amended a number of times between 2010 and 2022. The NEMA EIA Regulations, 2014, as amended, are applicable to this project. Exploration and Production activities officially became governable under the NEMA EIA Regulations in December 2014 with the competent authority identified as the DMRE.

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

NEMA sets out the general objectives of IEM in South Africa, including to (section 23(2)), of which the following two are of relevance for this report:

- Identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities. This is to be done with a view to minimising negative impacts, maximising benefits and promoting compliance with the principles of environmental management set out in section 2 (of NEMA).
- Ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them.

5.1.2.1 **LISTED ACTIVITIES**

In accordance with the provisions of Sections 24(5) and Section 44 of the NEMA the Minister has published Regulations (GN R. 982) pertaining to the required process for conducting EIA's in order to apply for, and be considered for, the issuing of an EA. These EIA Regulations provide a detailed description of the process to be followed when applying for EA for any listed activity.

In terms of these regulations a Basic Assessment process is required for the proposed project. The Table 4 below identifies the listed activities the proposed project triggers and consequently requires authorisation prior to commencement.

Table 4: NEMA listed activities to be authorised

Activity	Activity Description	Applicability
GN.R 983 **Activity 1**	The development of facilities or infrastructure for the generation of electricity from a renewable resource where- (i) the electricity output is more than 10 megawatts but less than 20 megawatts; or (ii) the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare; excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs-	Construction of a Photovoltaic plant to generate 19.5 Megawatt to supply in the auxiliary load requirements of the Redstone CSP Power Project to avoid the usage of an external power source.

Activity	Activity Description	Applicability
	(a) within an urban area; or (b) on existing infrastructure.	
GN.R 983 **Activity 12**	**The development of-** (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or **(ii) infrastructure or structures with a physical footprint of 100 square metres or more;** where such development occurs- (a) within a watercourse; (b) in front of a development setback; or **(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;-** excluding- (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of the development and where indigenous vegetation will not be cleared.	The proposed location of the PV facility is located within the 32m of a delineated wetland.
GN.R 983 **Activity 27**	**The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation**, except where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Redstone PV Project footprint of the PV is approximately 19.5ha. Roads between panels are excluded as these are linear activities Powerline route is excluded as the preferred route makes use of the disturbed footprint of the Redstone CSP.

The DFFE have published a number of guidelines and protocols which have been considered in the compilation of this report and include but not limited to:

- Public Participation Guideline in terms of NEMA EIA Regulations (2017).
- Need and desirability Guideline in terms of NEMA (2012).
- National guideline on minimum information requirements for preparing Environmental Impact Assessments for mining act activities that require environmental authorisation (2018).
- 2004 Information Series covering various aspects of the EIA process.
- Procedures for assessment and minimum criteria for specialist studies.

5.1.2.2 SCREENING TOOL

A Screening Tool Report was generated from the DFFE Screening tool as per the requirements of Regulation 16 (1)(b)(v) of the EIA Regulations 2014, as amended, and was included in the Application for EA. The screening Tool provided a list of specialist studies for consideration and inclusion in the process. The Screening Tool identified environmental sensitivities are presented in Table 5.

Table 5: Screening Tool environmental sensitivities.

Theme	Sensitivity			
	Very High	High	Medium	Low
Agriculture Theme			X	
Animal Species Theme			X	
Aquatic biodiversity theme	X			
Archaeological and Cultural Heritage Theme				X
Avian Theme				X
Civil Aviation (Solar PV) Theme				X
Defence Theme				X
Palaeontology Theme			X	
Plant Species Theme				X
RFI Theme				X
Terrestrial Biodiversity Theme	X			

In this regard, as Site Sensitivity Verification Report (SSVR) has been compiled to consider the recommendations of the DFFE Screening Tool Report and to provide a rationale for the selection of specialist studies included in the assessment report. Please refer to Table 6 for a summary of the verification process. Please refer to APPENDIX B for the SSVR.

Table 6: SSVR findings and motivation.

Screening Tool Specialist Study Required:	Level of Sensitivity:	Suggested Sensitivity:	Required level of Assessment	Motivation
Agricultural Impact Assessment	Medium	Low	Compliance Statement	An amendment letter as an appendix to the existing study will be undertaken stating the continued applicability of the report and to update any sections which should not align with the DFFE screening tool protocol.
Landscape/Visual Impact Assessment	N/A		Compliance Statement	A compliance statement will be undertaken with the original assessment being appended in order to ensure continued adequacy.
Archaeological and Cultural Heritage Impact Assessment	Vey High	Low	Full Study	A Heritage Impact Assessment will be undertaken in compliance with the Minimum Standards for Heritage Specialist Studies in terms of Section 38 of the National Heritage Resources Act (No. 25 of 1999).
Palaeontology Impact Assessment	Medium	Low	Compliance Statement	According to the SAHRIS paleo sensitivity map, the site falls with the Medium to Low and Insignificant/Zero paleo sensitivity. In addition, no fossiliferous outcrops were noted within the site. Considering that for the Insignificant/Zero paleo sensitivity, no palaeontological studies are required while for Low-Medium paleo sensitivity, a desktop palaeontological study will be conducted by a qualified palaeontologist.
Terrestrial Biodiversity Impact Assessment	Very High	Medium	Full Study	The DFFE Screening Tool found that the Relative Terrestrial Biodiversity Sensitivity Theme is Very High-Sensitive. Although there have been disturbances on site, the vegetation is indigenous with some invasive species present. Therefore, a Terrestrial Biodiversity Impact Assessment must be undertaken in line with the Protocol for The Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN 320, 2020 as amended) to confirm presence of Flora or Fauna, Avifauna, SCC, or protected species within the development site, verify site terrestrial biodiversity sensitivity and provide necessary mitigation measures.
Aquatic Biodiversity Impact Assessment	Very High	Very High	Full Study	Based on the DFFE Screening Tool, the site overlaps very-high sensitivity Freshwater Ecosystem Priority Areas

Screening Tool Specialist Study Required:	Level of Sensitivity:	Suggested Sensitivity:	Required level of Assessment	Motivation
				(FEPA). Subsequently, an Aquatic Biodiversity Impact Assessment be undertaken in line with the Protocol for The Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity (GN 320, 2020 as amended) to amongst others, provide a description of the aquatic biodiversity and ecosystems on the site, the threat status of the ecosystem and species as identified by the screening tool, an indication of the national and provincial priority status of the aquatic ecosystem, a description of the ecological importance and sensitivity of the aquatic ecosystem and a detailed assessment of the potential impacts of the proposed development and buffer requirements.
Civil Aviation Assessment	Low	Low	Other	Comment from the CAA will be requested in regard to the previous approval of the project to establish applicability.
Defence Assessment	Low	Low	None	No specific study nor protocol in place,. The Low sensitivity for the Defence theme therefore will not require any assessment.
RFI Assessment	Low	Low	Other	The proposed PV facility will be in keeping with the infrastructure surrounding the site including several solar PV facilities and the Redstone CSP. The Square Kilometre Array will be consulted as a key I&AP alongside any other relevant stakeholders in the area.
Geotechnical Assessment	N/A		Other	
Socio-Economic Assessment	N/A		None	An amendment letter as an appendix to the existing study will be undertaken stating the continued applicability of the report.
Plant Species Assessment	Low	Medium	Full Study	The DFFE Screening Tool found that the Relative Terrestrial Biodiversity Sensitivity Theme is Very High-Sensitive. Although there have been disturbances on site, the vegetation is indigenous with some invasive species present. Therefore, a Terrestrial Biodiversity Impact Assessment must be undertaken

Screening Tool Specialist Study Required:	Level of Sensitivity:	Suggested Sensitivity:	Required level of Assessment	Motivation
				in line with the Protocol for The Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN 320, 2020 as amended) to confirm presence of Flora or Fauna, Avifauna, SCC, or protected species within the development site, verify site terrestrial biodiversity sensitivity and provide necessary mitigation measures.
Animal Species Assessment	Medium	Medium	Full Study	The DFFE Screening Tool found that the Relative Terrestrial Biodiversity Sensitivity Theme is Very High-Sensitive. Although there have been disturbances on site, the vegetation is indigenous with some invasive species present. Therefore, a Terrestrial Biodiversity Impact Assessment must be undertaken in line with the Protocol for The Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN 320, 2020 as amended) to confirm presence of Flora or Fauna, Avifauna, SCC, or protected species within the development site, verify site terrestrial biodiversity sensitivity and provide necessary mitigation measures.

5.1.3 NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT

The National Environmental Management Protected Areas Act (Act No. 57 of 2003 – NEMPAA) is intended to *"provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes"* and creating a *"national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity".*

The NEMPAA defines various kinds of protected areas, namely: *"special nature reserves, national parks, nature reserves (including wilderness areas) and protected environments; world heritage sites; marine protected areas; specially protected forest areas, forest nature reserves and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act 84 of 1998); and mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act 63 of 1970)".*

No protected areas are present within the project area of influence.

5.1.4 NATIONAL ENVIRONMENTAL MANAGEMENT AIR QUALITY ACT (NEMAQA)

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

- To protect the environment by providing reasonable measures for –
    i. the protection and enhancement of the quality of air in the republic;
    ii. the prevention of air pollution and ecological degradation; and

iii. securing ecologically sustainable development while promoting justifiable economic and social development; and

- Generally, to give effect to Section 24(b) of the constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and well-being of people.

The NEMAQA mandates the Minister of Environment to publish a list of activities which result in atmospheric emissions and consequently cause significant detrimental effects on the environment, human health and social welfare. All scheduled processes as previously stipulated under the Air Pollution Prevention Act (APPA) are included as listed activities with additional activities being added to the list. The updated Listed Activities and Minimum National Emission Standards were published on the 22nd of November 2013 (Government Gazette No. 37054).

National Ambient Air Quality Standards (NAAQS) were determined based on international best practice for particulate matter less than 10 and 2.5 µm in aerodynamic diameter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), carbon monoxide (CO), lead (Pb) and benzene. The NAAQS were published in the Government Gazette (no. 32816) on 24 December 2009 for PM_{10} and other pollutants (South Africa, 2009). The $PM_{2.5}$ NAAQS were published in 2012 (South Africa, 2012).

The NEMAQA also provides for the monitoring and reporting of GHG emissions. The National Greenhouse Gas Emission Reporting Regulations (South Africa, 2017) were published in terms of Section 53 (aA), (o) and (p) of NEM: AQA on 3 April 2017 and amended on 11 September 2020 (South Africa, 2020). The purpose of these Regulations is to implement a single national reporting system for the transparent reporting of GHG emissions.

The National Pollution Prevention Plans Regulations were published in March 2014 (Government Gazette 37421) and tie in with the National Greenhouse Gas (GHG) Emission Reporting Regulations which took effect on 3 April 2017. In summary, the Regulations aim to prescribe the requirements that pollution prevention plans of greenhouse gases declared as priority air pollutants, need to comply with in terms of the NEMAQA. The Regulations specify who needs to comply, and by when, as well as prescribing the content requirements.

The National Dust Control Regulations are promulgated under the NEMAQA and the purpose of these Regulations is to prescribe general measures for the control of dust in all areas. Dustfall is assessed for nuisance impact and not for inhalation health impact. The National Dust Control Regulations (Department of Environmental Affairs, 2013) prescribes measures for the control of dust in residential and non-residential areas. Acceptable dustfall rates are measured (using American Standard Testing Methodology (ASTM) D1739:1970 or equivalent) at and beyond the boundary of the premises where dust originates. In addition to the dustfall limits, the National Dust Control Regulations prescribe monitoring procedures and reporting requirements. Dust that may be created from the project (including but not limited to the construction phase) will be managed in accordance with these Regulations.

According to the NEMAQA, air quality management control and enforcement is in the hands of local government with District and Metropolitan Municipalities as the licensing authorities. Provincial government is primarily responsible for ambient monitoring and ensuring municipalities fulfil their legal obligations, with national government primarily as policy maker and co-ordinator. Each sphere of government must appoint an Air Quality Officer responsible for co-ordinating matters pertaining to air quality management. Given that air quality management under the old Act was the sole responsibility of national government, local authorities have in the past only been responsible for smoke and vehicle tailpipe emission control.

The project will not trigger any activities listed under the NEMAQA.

5.1.5 NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT (NEMBA)

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

The National List of Ecosystems that are Threatened and Need of Protection (GN 1002 of 2011) are promulgated under the NEMBA and these Regulations provide for listing of threatened or protected ecosystems in one of the following categories:

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

Further regulations published under the NEMBA are the threatened or protected Species Regulations (GN R 152 OF 2007) which aims to:

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

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

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

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

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

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

The Alien and Invasive Species Lists are promulgated under the NEMBA with the aim of protecting the quality and quantity of arable land in South Africa. Loss of arable land should be avoided and declared Weeds and Invaders in South Africa are categorised according to one of the following categories, and require control or removal:

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

In giving effect to the above, the Alien and Invasive Species Regulations (GNR 1020 of 2020) provide for amongst others, the prevention of the spread or allowing the spread of, any specimen of a listed invasive species.

It will be required to undertake a pre-construction search and rescue operation before the onset of construction to allow for the removal of plants. This may require permitting in terms of NEMBA.

5.1.6 THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT (NEMWA)

On 2 June 2014, the NEMWA came into force. The objectives of this Act are:

a) to protect health, well-being and the environment by providing reasonable measures for-

   i. minimising the consumption of natural resources;

   ii. avoiding and minimising the generation of waste;

   iii. reducing, re-using, recycling and recovering waste;

   iv. treating and safely disposing of waste as a last resort;

   v. preventing pollution and ecological degradation;

   vi. securing ecologically sustainable development while promoting justifiable economic and social development;

   vii. promoting and ensuring the effective delivery of waste services;

   viii. remediating land where contamination presents, or may present, a significant risk of harm to health or the environment; and

   ix. achieving integrated waste management reporting and planning;

b) to ensure that people are aware of the impact of waste on their health, well-being and the environment;

c) to provide for compliance with the measures set out in paragraph (a); and

d) generally, to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being.

Section 16 of the NEMWA states:

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

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

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

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

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

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

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

The NEMWA provides for specific waste management measures to be implemented, as well as providing for the licensing and control of waste management activities.

5.1.6.1 **WASTE MANAGEMENT ACTIVITIES**

GNR 921 provides a list of waste management activities that have, or are likely to have, a detrimental effect on the environment, and consequently require a Waste Management Licence. It is not anticipated that the project will trigger any waste activities in terms of GNR 921.

5.1.6.2 **WASTE CLASSIFICATION AND MANAGEMENT REGULATIONS**

The Waste Classification and Management Regulations (GNR 634) are published under the NEMWA. The purpose of these Regulations is to –

- Regulate the classification and management of waste in a manner which supports and implements the provisions of the Act;
- Establish a mechanism and procedure for the listing of waste management activities that do not require a Waste Management Licence;
- Prescribe requirements for the disposal of waste to landfill;
- Prescribe requirements and timeframes for the management of certain wastes; and
- Prescribe general duties of waste generators, transporters and managers.

Waste classification, as presented in Chapter 4 of these regulations, entails the following:

- Wastes listed in Annexure 1 of these Regulations do not require classification in terms of SANS 10234;
- Subject to sub regulation (1), all waste generators must ensure that the waste they generate is classified in accordance with SANS 10234 within one hundred and eighty (180) days of generation;
- Waste must be kept separate for the purposes of classification in terms of sub regulation (2), and must not be mixed prior to classification;
- Waste-must be re-classified in terms of sub regulation (2) every five (5) years, or within 30 days of modification to the process or activity that generated the waste, changes in raw materials or other inputs, or any other variation of relevant factors;
- Waste that has been subjected to any form of treatment must be re-classified in terms of sub regulation (2), including any waste from the treatment process; and
- If the Minister reasonably believes that a waste has not been classified correctly in terms of sub regulation (2), he or she may require the waste generator to have the classification peer reviewed to confirm the classification.

Furthermore, Chapter 8 of the Regulations stipulates that unless otherwise directed by the Minister to ensure a better environmental outcome, or in response to an emergency so as to protect human health, property or the environment –

- Waste generators must ensure that their waste is assessed in accordance with the Norms and Standards for Assessment of Waste for Landfill Disposal set in terms of section 7(1) of the Act prior to the disposal of the waste to landfill;
- Waste generators must ensure that the disposal of their waste to landfill is done in accordance with the Norms and Standards for Disposal of Waste to Landfill set in terms of section 7(1) of the Act; and
- Waste managers disposing of waste to landfill must only do so in accordance with the Norms and Standards for Disposal of Waste to Landfill set in terms of section 7 (1) of the Act.

5.1.6.3 NEMWA NATIONAL NORMS AND STANDARDS FOR THE ASSESSMENT OF WASTE FOR LANDFILL DISPOSAL, 2013 (GN R. 635)

These Norms and Standards prescribe the requirements for the assessment of waste prior to storage or disposal to landfill. The aim of the waste assessment tests is to characterise the material to be deposited or stored in terms of the above-mentioned waste assessment guidelines set by the DFFE. The waste generated at the proposed project which is not listed under Annexure 1 of the Waste Classification and Management Regulations, must be assessed in accordance to these Norms and Standards to determine the waste type. In terms of Regulation 12(1) of GN R 634 with regards to the classification of waste, the potential level of risk associated with disposal or downstream use of waste must be determined by following the prescribed and appropriate analysis protocol as detailed in these Norms and Standards. The assessment of the waste should:

- Identify the chemical substances present in the waste;

- Sampling and analysis to determine the total concentration (TC) and leachable concentration (LC) of the elements and chemical substances that have been identified within the waste according to section 6 of this regulation;
- Based on the TC and LC limits of the identified elements and chemical substances in the analysed waste exceeding the corresponding TC and LC thresholds respectively, the waste type will be determined (Type 0 Waste to Type 4 Waste); and
- The waste type will then be used determine to which landfill class site the waste must be disposed and / or the suitable containment barrier design for storage.

A waste classification for discarded panels should be undertaken to determine the appropriate waste facility for disposal of waste panels.

5.1.6.4 NEMWA NATIONAL NORMS AND STANDARDS FOR THE DISPOSAL OF WASTE TO LANDFILL, 2013 (GN R. 636)

Once the waste has been assessed and waste type determined, these Norms and Standards can be used to determine the minimum requirements for the landfill and containment barrier design. This will distinguish between Class A, Class B, Class C, or Class D landfills and the associated containment barrier requirements. Although these Norms and Standards prescribe the containment barrier or liner design for each determined waste type, the recent amendments in chapter 3 of the regulations to the planning and management of residue stockpiles and residue deposits, a competent person must recommend the pollution control measures suitable for a specific residue stockpile or residue deposit on the basis of a risk analysis as contemplated in regulations 4 and 5 of the regulations. The recommendation should be founded on a risk analysis based on the characteristics and classification in regulation 4 and 5 of these Regulations, towards determining the appropriate mitigation and management measures.

Waste panels will be generated on site which will require disposal.

5.1.7 THE NATIONAL WATER ACT (NWA)

The purpose of the NWA is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors:

a) meeting the basic human needs of present and future generations;

b) promoting equitable access to water;

c) redressing the results of past racial and gender discrimination;

d) promoting the efficient, sustainable and beneficial use of water in the public interest;

e) facilitating social and economic development;

f) providing for growing demand for water use;

g) protecting aquatic and associated ecosystems and their biological diversity;

h) reducing and preventing pollution and degradation of water resources;

i) meeting international obligations;

j) promoting dam safety;

k) managing floods and droughts,

and for achieving this purpose, to establish suitable institutions and to ensure that they have appropriate community, racial and gender representation.

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

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

The above water use processes are described in Figure 3.

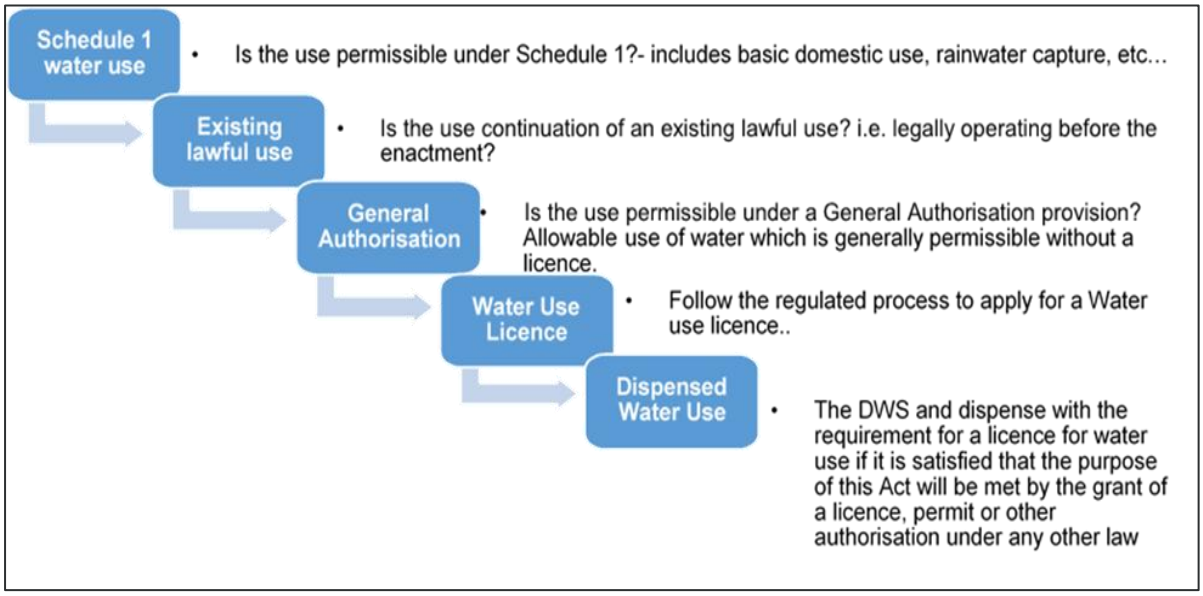

Figure 3: Authorisation processes for new water uses.

The NWA defines 11 water uses in Section 21 of the Act. A water use may only be undertaken if authorised by the DWS. The water uses for which an authorisation or licence can be issued include:

a) Taking water from a water resource;

b) Storing water;

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

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

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

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

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

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

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

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

k) Using water for recreational purposes.

A watercourse is defined in terms of the Act as follows:

a) a river or spring;

b) a natural channel in which water flows regularly or intermittently;

c) a wetland, lake or dam into which, or from which, water flows; and

d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks;

The regulated area of a watercourse for section 21(c) or (i) of the Act water uses, is similarly defined in terms of the Act as follows:

a) The outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;

b) In the absence of a determined 1 in 100-year flood line or riparian area the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); or

c) A 500 m radius from the delineated boundary (extent) of any wetland or pan.

As part of this EA process, the relevant water uses will be identified and applied for. The water uses applicable to this project are presented in Table 7 below and shall be discussed and agreed upon with the DWS during the WULA process.

Table 7: Likely NWA Section 21 water uses triggered by this project.

Section 21 water use	Description	Applicability
c & i	Impeding or diverting the flow of water in a watercourse and/or altering the bed, banks, course or characteristics of a watercourse.	The proposed PV footprint is located within the 500m regulated area of a wetland and it is anticipated that a general authorization will be required. **A separate General Authorisation will be applied for by the applicant**

The required water use licencing application will run concurrently with this EIA process and in consultation with the DWS, additional water uses may be identified.

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

The proposed Redstone PV is located within the Lower Orange Water Management Area (WMA), as defined in terms of the National Water Act (Act No. 36 of 1998). The Lower Orange WMA is a predominantly arid region characterised by limited surface water resources, with water availability largely dependent on the Orange River system and associated infrastructure. Key challenges within the WMA include water scarcity, high variability in rainfall, pressure on water resources from agricultural, mining, and energy developments, and the need to maintain ecological flows and protect aquatic ecosystems such as wetlands and ephemeral watercourses.

The primary objectives for water resource management within the Lower Orange WMA include ensuring the sustainable and equitable use of water resources, protecting the ecological integrity of watercourses, maintaining water quality, and supporting socio-economic development through efficient water allocation. In

this context, developments within the WMA are required to implement appropriate water conservation, stormwater management, and pollution prevention measures to minimise impacts on water resources.

5.1.8 NATIONAL HERITAGE RESOURCES ACT (NHRA)

The National Heritage Resources Act (Act 25 of 1999 – NHRA) stipulates that cultural heritage resources may not be disturbed without authorisation from the relevant heritage authority. Section 34(1) of the NHRA states that, "*no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority…*" The NHRA is utilised as the basis for the identification, evaluation and management of heritage resources and in the case of Cultural Resource Management (CRM) those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through the NEMA, MPRDA and the Development Facilitation Act (FDA) legislation. In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorisations are granted for a development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impact Processes required by the NEMA and MPRDA.

The NEMA 23(2)(b) gives effect to the NHRA and states that an integrated environmental management plan should, "*…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*". A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be taken into account of in the EIA Regulations under the NEMA relates to the Specialist Report requirements (Appendix 6 of EIA Regulations 2014, as amended) which apply to Heritage Impact Assessments.

The MPRDA also gives effect to the NHRA as this Act defines 'environment' as it is in the NEMA and, therefore, acknowledges cultural resources as part of the environment. Section 39(3)(b) of this Act specifically refers to the evaluation, assessment and identification of impacts on all heritage resources as identified in Section 3(2) of the NHRA that are to be impacted on by activities governed by the MPRDA. Section 40 of the MPRDA requires the consultation with any State Department administering any law that has relevance on such an application through Section 39 of the MPRDA. This implies the evaluation of Heritage Assessment Reports in Environmental Management Plans or Programmes by the relevant heritage authorities.

In accordance with the legislative requirements and EIA rating criteria, the regulations of the South African Heritage Resources Agency (SAHRA) and Association of Southern African Professional Archaeologists (ASAPA) have also been incorporated to ensure that a comprehensive and legally compatible Heritage Report is compiled.

A heritage specialist assessment was undertaken for the project based on previously identified heritage resources in the proximity of the site. Appropriate mitigation and management measures will be included and SAHRIS application was submitted for comment.

5.1.9 ENVIRONMENT CONSERVATION ACT (ECA)

The ECA (Act 73 of 1989) was, prior to the promulgation of the NEMA, the backbone of environmental legislation in South Africa. To date the majority of the ECA has been repealed by various other Acts, however Section 25 of the Act and the Noise Regulations (GN R. 154 of 1992) promulgated under this section are still in effect. These Regulations serve to control noise and general prohibitions relating to noise impact and nuisance.

In terms of section 25 of the ECA, the National Noise Control Regulations (GN R. 154 – NCRs) published in Government Gazette No. 13717 dated 10 January 1992, were promulgated. The NCRs were revised under GN R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations. Provincial noise control regulations have been promulgated in Gauteng, Free State and Western Cape Provinces.

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

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

Section 5 of the NCRs in essence prohibits the creation of a noise nuisance. A noise nuisance is defined as "*any sound which disturbs or impairs or may disturb or impair the convenience or peace of any person".* The South African National Standard 10103 also applies to the measurement and consideration of environmental noise and should be considered in conjunction with these Regulations.

There are a few South African National Standards (SANS) relevant to noise from mines, industry and roads. They are:

- South African National Standard (SANS) 10103:2008 – 'The measurement and rating of environmental noise with respect to annoyance and to speech communication';
- SANS 10210:2004 – 'Calculating and predicting road traffic noise';
- SANS 10328:2008 – 'Methods for environmental noise impact assessments';
- SANS 10357:2004 – 'The calculation of sound propagation by the Concave method';
- SANS 10181:2003 – 'The Measurement of Noise Emitted by Road Vehicles when Stationary'; and
- SANS 10205:2003 – 'The Measurement of Noise Emitted by Motor Vehicles in Motion'.

The relevant standards use the equivalent continuous rating level as a basis for determining what is acceptable. The levels may take single event noise into account, but single event noise by itself does not determine whether noise levels are acceptable for land use purposes. With regards to SANS 10103:2008, the recommendations are likely to inform decisions by authorities, but non-compliance with the standard will not necessarily render an activity unlawful per se.

A specialist noise assessment was not considered necessary due to the nature of the proposed PV development, the absence of significant operational noise sources, the location within an existing industrial energy facility, and the distance to sensitive receptors. Construction noise impacts are temporary and can be effectively managed through standard EMPr measures.

5.1.10 THE CONSERVATION OF AGRICULTURAL RESOURCES ACT (CARA)

The law on Conservation of Agricultural Resources (Act 43 of 1983) aims to provide for the conservation of the natural agricultural resources of the Republic by the maintenance of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the vegetation and the combating of weeds and invader plants. In order to achieve the objectives of this Act, control measures related to the following may be prescribed to land users to whom they apply:

- The cultivation of virgin soil;
- The utilisation and protection of land which is cultivated;
- The irrigation of land;
- The prevention or control of waterlogging or salination of land;
- The utilisation and protection of vleis, marshes, water sponges, water courses and water sources;
- The regulating of the flow pattern of run-off water;
- The utilisation and protection of the vegetation;
- The grazing capacity of veld, expressed as an area of veld per large stock unit;

- The maximum number and the kind of animals which may be kept on veld; The prevention and control of veld fires;
- The utilisation and protection of veld which has burned;
- The control of weeds and invader plants;
- The restoration or reclamation of eroded land or land which is otherwise disturbed or denuded;
- The protection of water sources against pollution on account of farming practices;
- The construction, maintenance, alteration or removal of soil conservation works or other structures on land; and
- Any other matter which the Minister may deem necessary or expedient in order that the objects of this Act may be achieved.

Further, different control measures may be prescribed in respect of different classes of land users or different areas or in such other respects as the Minister may determine. Impacts on the soil, biodiversity and water resources have been identified with regards to the proposed Project, and mitigation and management measures recommended.

5.1.11 THE NATIONAL FORESTS ACT (NFA)

According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that "*no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister*."

Protected trees, if any, on the site will require a permit in terms of the Forest Act for the removal of protected species from the footprint of the PV.

5.1.12 THE SPATIAL PLANNING AND LAND USE MANAGEMENT ACT (SPLUMA)

The Spatial Planning and Land Use Management Act (Act 16 of 2013 – SPLUMA) is set to aid effective and efficient planning and land use management, as well as to promote optimal exploitation of minerals and mineral resources. The SPLUMA was developed to legislate for a single, integrated planning system for the entire country. Therefore, the Act provides a framework for a planning system for the country and introduces provisions to cater for development principles; norms and standards; inter-governmental support; Spatial Development Frameworks (SDFs) across national, provincial, regional and municipal areas; Land Use Schemes (LUS); and municipal planning tribunals.

5.1.13 NATIONAL VELD AND FOREST FIRE ACT

The National Veld and Forest Fire Act 101 of 1998 is a key piece of legislation in South Africa aimed at reforming the legal framework surrounding veld and forest fires. Its primary purpose is to prevent and manage wildfires through coordinated efforts, particularly in rural and fire-prone areas. The Act encourages the formation of Fire Protection Associations (FPAs), which are legally recognized bodies that facilitate local collaboration among landowners, municipalities, and other stakeholders to predict, prevent, and suppress veldfires. These associations play a vital role in fire management by offering training, support, and technical expertise to their members.

For private developers and landowners, the Act imposes several important obligations. They are legally required to take reasonable precautions to prevent fires from starting or spreading from their property. This includes maintaining firebreaks, ensuring that controlled burns are conducted safely and in accordance with regulations, and joining or cooperating with local FPAs. Failure to meet these responsibilities can result in legal liability, especially if negligence leads to damage or loss caused by a fire. In such cases, landowners may face civil claims for damages, making it essential for them to understand and comply with the Act's provisions.

In essence, the Act not only promotes proactive fire management but also establishes a framework for accountability. Private developers and landowners must be vigilant and informed, as their actions, or lack thereof, can have significant legal and financial consequences. By participating in FPAs and adhering to fire safety regulations, they contribute to a safer and more resilient environment for their communities and the broader ecosystem

5.2 NATIONAL POLICY AND PLANNING CONTEXT

5.2.1 INTEGRATED RESOURCE PLAN (IRP 2019)

The Integrated Resource Plan (IRP), as updated in the Government Gazette of 28 October 2025, remains South Africa's primary electricity planning instrument, providing a long-term framework for the development of the national power system. The updated IRP builds on previous iterations by incorporating recent legislative developments, including the Climate Change Act (2024), and places increased emphasis on decarbonisation, system flexibility, and diversified generation capacity. The revised IRP reflects a "balanced plan" approach, integrating multiple generation technologies including renewable energy (solar PV, wind, gas, nuclear, and energy storage) to ensure system reliability while meeting climate commitments.

A key focus of the updated IRP is the expanded role of renewable energy technologies, particularly solar PV, which is recognised as a critical component of the future energy mix due to its cost-effectiveness, scalability, and contribution to emissions reductions. The IRP also explicitly acknowledges the growing role of private and embedded generation, with "committed private generating capacity" forming a defined component of the national electricity supply outlook. Importantly, the revised IRP aligns energy planning with South Africa's Nationally Determined Contribution (NDC) targets, noting the need for a sustained reduction in greenhouse gas emissions and a transition to lower-carbon energy sources.

In this context, the proposed PV project is considered consistent with the objectives of the updated IRP, notwithstanding that it will not export electricity directly to the Eskom grid. The IRP recognises that:

- Electricity generation capacity is no longer exclusively centralised within the national grid, but includes private, embedded and hybrid generation systems;
- Renewable energy deployment contributes to national policy objectives irrespective of off-take arrangements; and
- Improved operational efficiency and reduced emissions within existing generation facilities (such as CSP plants) are aligned with system-wide optimisation goals.

The PV project, as an augmentation to an existing CSP facility, contributes to these objectives by increasing renewable energy capacity, enhancing system efficiency, and reducing reliance on carbon-intensive auxiliary energy sources.

5.2.2 JUST ENERGY TRANSITION (JET)

South Africa's Just Energy Transition (JET) framework remains a central pillar of national policy, aiming to transition the economy towards a low-carbon and climate-resilient development pathway while ensuring social equity and economic inclusion.

The updated IRP explicitly situates energy planning within the broader transition context, including:

- Socio-economic impact planning associated with coal plant decommissioning;
- Alignment with climate policy instruments such as the Climate Change Act (2024); and
- The need to balance decarbonisation with energy security and affordability.

Renewable energy projects, including solar PV developments, are integral to achieving the goals of the Just Energy Transition. These projects contribute to:

- Decarbonisation of the energy sector, in line with national and international climate commitments;

- Diversification of the energy mix, improving resilience and reducing dependence on ageing coal-fired infrastructure;
- Stimulation of local and regional economic development, particularly in provinces such as the Northern Cape with high renewable energy potential; and
- The gradual restructuring of the energy sector towards a more decentralised and flexible system.

Although the proposed PV project will not supply electricity to the Eskom grid, it remains aligned with JET objectives by contributing to the decarbonisation and efficiency of an existing energy facility. The integration of PV capacity within the CSP plant reduces overall environmental impact per unit of electricity generated and supports a phased and integrated transition rather than a disruptive shift in land use or energy systems.

5.3 PROVINCIAL POLICY AND PLANNING CONTEXT

5.3.1 NORTHERN CAPE PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK (PSDF)

The Northern Cape Provincial Spatial Development Framework (PSDF) provides the overarching spatial vision for land use planning and development within the province. The PSDF identifies renewable energy development as a key economic driver, particularly given the province's exceptional solar irradiance levels.

The PSDF promotes the Northern Cape as a strategic renewable energy hub, encouraging the establishment of solar and wind energy projects in suitable areas, especially within the arid western interior and central plateau regions. These areas are recognised for their low population density, high solar resource availability, and relative absence of large-scale competing land uses.

The proposed PV project aligns strongly with the objectives of the PSDF in that:

- It is located within a region designated as highly suitable for renewable energy development;
- It contributes to the diversification of the provincial economy through renewable energy investment; and
- It supports the broader spatial vision of establishing the Northern Cape as a leader in clean energy production.

However, the PSDF also emphasises the need to:

- Avoid or minimise impacts on environmentally sensitive areas;
- Protect biodiversity and ecological processes; and
- Promote sustainable land use practices.

In this context, although no listed ecosystems were identified within the study area, the presence of locally sensitive habitats such as drainage lines and floodplains requires careful planning and mitigation to ensure alignment with provincial environmental priorities.

5.4 MUNICIPAL POLICY AND PLANNING CONTEXT

5.4.1 TSANTSABANE LOCAL MUNICIPALITY INTEGRATED DEVELOPMENT PLAN (IDP)

The Tsantsabane Local Municipality Integrated Development Plan (IDP) serves as the municipality's principal strategic planning instrument and provides the framework for socio-economic development, infrastructure investment, environmental management, and service delivery within the municipal area. The IDP aligns local development priorities with national and provincial planning frameworks, including the National Development Plan (NDP), Spatial Planning and Land Use Management Act (SPLUMA), Northern Cape Provincial Spatial Development Framework (PSDF), and the ZF Mgcawu District Municipality planning framework.

The IDP identifies economic growth, infrastructure development, job creation, improved service delivery, and sustainable environmental management as key development objectives. Particular emphasis is placed on

supporting economic sectors that contribute significantly to the local economy, including mining, agriculture, logistics, and renewable energy development. The municipality recognises renewable energy projects as important contributors to economic diversification, investment attraction, skills development, and employment creation within the region.

The proposed Redstone PV Project aligns with the objectives of the Tsantsabane IDP as it:

- Supports renewable energy generation and South Africa's transition towards a lower-carbon economy;
- Contributes to regional economic development through investment and employment opportunities;
- Makes use of existing approved energy infrastructure associated with the Redstone CSP facility;
- Supports local economic diversification within a municipality historically dependent on mining activities; and
- Contributes towards sustainable development objectives and improved energy security.

The project is therefore considered consistent with the strategic development objectives and priorities identified within the Tsantsabane Local Municipality IDP.

5.4.2 TSANTSABANE LOCAL MUNICIPALITY SPATIAL DEVELOPMENT FRAMEWORK (SDF)

The Tsantsabane Spatial Development Framework (SDF) provides long-term spatial planning guidance for the municipality and seeks to promote sustainable land use, economic development, environmental protection, and efficient infrastructure investment. The SDF identifies the municipality as a strategic economic node within the Northern Cape due to the presence of significant mining operations, transport infrastructure, and increasing renewable energy investment.

The SDF promotes the concentration of compatible land uses within already transformed development corridors while encouraging the protection of environmentally sensitive areas and ecological infrastructure. Renewable energy development is recognised as a compatible land use within appropriately located areas, particularly where projects are situated within existing industrial, mining, or energy development landscapes.

The proposed Redstone PV Project is located within the already authorised and operational Redstone CSP development area and therefore does not introduce a new land-use node into an undisturbed environment. The project represents an expansion of existing renewable-energy infrastructure and utilises existing access roads, services, and electrical infrastructure. Consequently, the development supports the SDF objectives of:

- Optimising existing infrastructure investment;
- Promoting sustainable economic development;
- Limiting unnecessary spatial expansion into undeveloped areas;
- Supporting energy security; and
- Encouraging investment within established development corridors.

The proposed development is therefore considered consistent with the principles and spatial objectives of the Tsantsabane SDF.

5.4.3 ZF MGCAWU DISTRICT MUNICIPALITY PLANNING FRAMEWORK

The ZF Mgcawu District Municipality IDP and Spatial Development Framework identify the district as a strategic economic region characterised by mining, agriculture, logistics, tourism, and renewable energy development. The district planning framework seeks to promote economic growth, infrastructure expansion, climate resilience, environmental sustainability, and investment attraction whilst supporting inclusive socio-economic development.

The district recognises the Northern Cape as a nationally significant renewable energy hub due to its exceptional solar resource and favourable development conditions. District planning policies specifically encourage

investment in renewable energy projects that support economic diversification, create employment opportunities, strengthen municipal revenue bases, and contribute towards national energy objectives.

The proposed Redstone PV Project aligns with the District Municipality's objectives by:

- Increasing renewable energy generation capacity within the district;
- Supporting the operational efficiency of the existing Redstone CSP facility;
- Contributing to economic investment and employment creation;
- Promoting the transition towards cleaner energy sources; and
- Supporting national and provincial renewable energy development initiatives.

The project is therefore considered compatible with the strategic vision and spatial planning objectives of the ZF Mgcawu District Municipality.

5.4.4 ENVIRONMENTAL MANAGEMENT FRAMEWORK (EMF)

The Siyanda District Municipality (now the ZF Mgcawu District Municipality the) Environmental Management Framework (EMF), together with provincial environmental planning instruments, provides guidance on environmentally sensitive areas, sustainable development opportunities, and environmental constraints within the district. The EMF seeks to balance economic development with the protection of ecological infrastructure, biodiversity resources, water resources, and areas of environmental sensitivity.

The project area is situated within an existing renewable energy development landscape associated with the operational Redstone CSP facility. Specialist investigations undertaken as part of the Basic Assessment process identified no environmental fatal flaws within the proposed development footprint. Sensitive environmental features identified within the broader project area, including the delineated wetland system and associated buffer areas, have been incorporated into project planning and impact assessment processes. Appropriate avoidance, mitigation, management, and rehabilitation measures have been recommended to minimise potential environmental impacts.

The proposed Redstone PV Project is therefore considered consistent with the objectives of the EMF in that it:

- Promotes sustainable renewable energy development;
- Avoids direct impacts on identified sensitive environmental features where practicable;
- Incorporates specialist recommendations into project design;
- Applies the mitigation hierarchy through avoidance, minimisation, rehabilitation, and management measures; and
- Supports environmentally responsible economic development within the district.

Overall, the proposed development is considered to be aligned with the relevant municipal planning frameworks and environmental management objectives applicable to the Tsantsabane Local Municipality and the ZF Mgcawu District Municipality.

6 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITY

The needs and desirability analysis component of the “Guideline on need and desirability in terms of the EIA Regulations (Notice 819 of 2014)” includes, but is not limited to, describing the linkages and dependencies between human well-being, livelihoods and ecosystem services applicable to the area in question, and how the proposed development’s ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.). Table 8 presents the needs and desirability analysis undertaken.

Table 8: Needs and desirability analysis for the proposed project

Ref No.	Question	Response
1	Securing ecological sustainable development and use of natural resources	
1.1	How were the ecological integrity considerations taken into account in terms of: Threatened Ecosystems, Sensitive and vulnerable ecosystems, Critical Biodiversity Areas, Ecological Support Systems, Conservation Targets, Ecological drivers of the ecosystem, Environmental Management Framework, Spatial Development Framework (SDF) and global and international responsibilities.	Ecological integrity considerations were incorporated through the DFFE Screening Tool, the Site Sensitivity Verification Report, specialist inputs, and the assessment of wetland, biodiversity, heritage, visual and socio-economic sensitivities. The project area is located within an existing renewable energy development landscape associated with the Redstone CSP facility and does not occur within a formally protected area. Sensitive features, including delineated wetland areas and associated regulated/buffer areas, were considered in the layout refinement and impact assessment. The project is also considered in relation to the municipal SDF, EMF and renewable energy planning context, as described in Sections 5, 7, 9 and 10.
1.2	How will this project disturb or enhance ecosystems and / or result in the loss or protection of biological diversity? What measures were explored to avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	The project may result in localised disturbance to vegetation, soils and fauna habitat within the development footprint. These impacts have been reduced through the selection of a compact footprint, use of the existing CSP development area and associated infrastructure where feasible, avoidance of sensitive wetland areas as far as practicable, and inclusion of mitigation measures in the EMPr. Measures include demarcation of no-go areas, control of alien invasive species, search-and-rescue where required, stormwater and erosion control, rehabilitation of disturbed areas and environmental monitoring during construction and operation.
1.3	How will this development pollute and / or degrade the biophysical environment? What measures were explored to either avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	Potential pollution and degradation risks include dust generation, erosion, stormwater contamination, hydrocarbon spills, waste generation, vegetation disturbance and noise during construction. These risks are expected to be limited and manageable due to the relatively small scale of the project and its location within an existing energy development area. Mitigation includes dust suppression, spill prevention and response procedures, responsible waste handling, stormwater management, erosion control, use of existing access where possible, and rehabilitation of disturbed areas.
1.4	What waste will be generated by this development? What measures were explored to avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and / or recycle the waste?	Waste will include general construction waste, packaging, scrap metal, cable offcuts, domestic waste, limited hazardous waste such as oils, lubricants and contaminated materials, and possible PV or battery-related waste during maintenance or decommissioning. Waste avoidance and minimisation will be achieved through procurement planning, reuse and recycling where feasible,

Ref No.	Question	Response
	What measures have been explored to safely treat and/or dispose of unavoidable waste?	segregation of waste streams, safe storage of hazardous waste, and disposal only at appropriately licensed facilities. End-of-life PV panels and battery components must be recycled or disposed of in accordance with applicable waste legislation and classification requirements. For other waste types, the existing waste facilities and services at the Redstone CSP will be utilised.
1.5	How will this project disturb or enhance landscapes and / or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	The project will add PV infrastructure to an area already characterised by renewable energy development. Visual and landscape impacts are therefore expected to be limited in the context of the existing CSP facility. Heritage sensitivity was assessed through the heritage assessment and SAHRIS process. No heritage resources were identified during the site investigation; however, a chance-finds procedure will be mandatory during construction. Mitigation will include implementing the chance-finds procedure, controlling construction disturbance, and limiting activities to the approved development footprint.
1.6	How will this project use and / or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	The project will make limited use of non-renewable resources, mainly construction materials, fuel, lubricants and manufactured components such as PV panels, cabling, support structures and batteries. The development itself supports reduced reliance on externally supplied electricity and contributes to renewable energy use. Responsible resource use will be promoted through efficient design, use of existing infrastructure, local sourcing where feasible, minimisation of unnecessary earthworks, waste reduction, recycling and appropriate decommissioning and rehabilitation measures.
1.7	How will this project use and / or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and / or impacts on the ecosystem jeopardise the integrity of the resource and / or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?	The project will use solar energy, a renewable resource, to supply auxiliary power to the Redstone CSP facility. Limited water will be required mainly for dust suppression and periodic panel cleaning. The project is not expected to jeopardise the integrity of renewable resources or ecosystems provided that the mitigation measures in the EMPr are implemented. Positive impacts include reduced reliance on external electricity sources and improved operational efficiency of the existing CSP facility.
1.7.1	Does the proposed project exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)?	The project reduces resource dependency by generating renewable auxiliary power on-site and reducing reliance on externally supplied electricity. The project represents a form of dematerialised growth because it improves the efficiency of an existing energy facility without requiring a new standalone energy development node.

Ref No.	Question	Response
1.7.2	Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used?	The use of solar energy is considered an appropriate and justifiable use of the natural solar resource in the Northern Cape, where solar irradiation is high and renewable energy development is supported by national, provincial and municipal planning instruments. The use is consistent with intra- and intergenerational equity as it contributes to lower-carbon energy generation while retaining mitigation obligations to protect local environmental resources.
1.7.3	Do the proposed location, type and scale of development promote a reduced dependency on resources?	Yes. The proposed location, type and scale promote reduced resource dependency by using an existing renewable energy development area, existing access and support infrastructure where feasible, and a compact PV footprint. The project will supply auxiliary power to the CSP facility and therefore reduce dependence on external electricity supply for operational requirements.
1.8	How were a risk-averse and cautious approach applied in terms of ecological impacts:	A risk-averse and cautious approach was applied by identifying environmental sensitivities early in the process, verifying the Screening Tool results, commissioning specialist input where required, considering alternatives, refining the layout to reduce interaction with sensitive areas, and incorporating mitigation and monitoring measures into the assessment and EMPr.
1.8.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	The main limits of knowledge relate to final detailed engineering design, final construction methodology, exact construction timing, micro-siting of some infrastructure, and the inherent limitations of desktop screening and field surveys undertaken at a point in time. Specialist assessments were used to reduce uncertainty, and any remaining assumptions and limitations are addressed through precautionary mitigation, monitoring and adaptive management. Where applicable, the management measures prescribed in the EMPr will ensure that the above gaps are managed sustainably and responsibly.
1.8.2	What is the level of risk associated with the limits of current knowledge?	The level of risk associated with the limits of current knowledge is considered low to moderate, provided the recommended mitigation, monitoring and EMPr requirements are implemented. The project is relatively small in scale, located within an existing energy development context and has been informed by specialist assessment and layout refinement.
1.8.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	The precautionary approach was applied by treating identified wetlands, biodiversity sensitivities and heritage resources as constraints, even where impacts are expected to be manageable. The layout, construction controls, buffer

Ref No.	Question	Response
		considerations, stormwater management, alien plant control, rehabilitation and monitoring requirements collectively reduce the likelihood and severity of residual ecological impacts.
1.9	How will the ecological impacts resulting from this development impact on people's environmental right in terms following?	The project is not expected to significantly compromise people's environmental rights, provided mitigation measures are implemented. Potential ecological impacts are localised and manageable, while the project contributes to renewable energy use, reduced external power dependence and improved operational efficiency of the existing CSP facility. The impact assessment with mitigation measures is provided in section 10.
1.9.1	Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Negative impacts may include temporary nuisance impacts such as dust, noise, construction traffic, visual disturbance, and limited changes to open landscape character. These impacts will be avoided or reduced through use of existing access routes, limiting the construction footprint, dust and noise control, traffic management, spill prevention, rehabilitation, and compliance monitoring. The impact assessment with mitigation measures is provided in section 10.
1.9.2	Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	Positive impacts include improved renewable energy self-supply for the CSP facility, reduced external power reliance, limited local employment and procurement opportunities, and contribution to a lower-carbon energy system. These benefits can be enhanced through local employment, skills transfer, local procurement where feasible, efficient operational management and continued compliance with environmental management requirements. The impact assessment with mitigation measures is provided in section 10.
1.10	Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	The surrounding area is characterised by mining, renewable energy, agricultural (grazing) and low-density rural land uses. Livelihoods and wellbeing are linked to employment, access to services, land-based economic activity, ecological infrastructure and the maintenance of water and biodiversity resources. The project's ecological impacts are expected to be localised and manageable, and therefore significant adverse socio-economic impacts on livelihoods are not anticipated. Positive socio-economic effects include local employment, procurement and support for the existing energy facility.
1.11	Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area?	The development is expected to have a limited negative impact on ecological integrity due to its scale, location within an existing energy development landscape, and the proposed mitigation measures. The project supports broader

Ref No.	Question	Response
		sustainability objectives by enabling renewable auxiliary power generation, while ecological risks are managed through avoidance, minimisation, rehabilitation and monitoring.
1.12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	The preferred option is considered the best practicable environmental option from an ecological perspective because it uses an existing energy development area, reduces the need for new standalone infrastructure, avoids sensitive areas as far as practicable, and has been refined to reduce interaction with the wetland system. Routing and design alternatives for the powerline were considered further in Section 7.
1.13	Describe the positive and negative cumulative ecological / biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Cumulative biophysical impacts relate mainly to incremental habitat transformation, visual change, water resource pressures and construction disturbance within a broader renewable energy landscape. Due to the small scale of the PV facility and its integration with the existing CSP site, cumulative negative impacts are expected to be limited and manageable. Positive cumulative impacts include contribution to renewable energy development and reduced reliance on higher-emission electricity sources.
2	Promoting justifiable economic and social development	
2.1	What is the socio-economic context of the area, based on, amongst other considerations, the following:	
2.1.1	The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks or policies applicable to the area	The socio-economic context is described in Sections 5 and 9.3. The project area falls within the Tsantsabane Local Municipality and ZF Mgcawu District Municipality, where mining, agriculture, renewable energy and associated services are important contributors to the local economy. The area is rural in character, with relatively low population density and limited local employment opportunities. The project supports local and regional planning objectives by contributing to renewable energy investment, economic diversification and the operational efficiency of the existing Redstone CSP facility. The project aligns with the relevant municipal and district planning frameworks, including the Tsantsabane IDP, Tsantsabane SDF, ZF Mgcawu District planning framework and EMF, as discussed in Section 5.4. These frameworks support renewable energy development, economic diversification, infrastructure

Ref No.	Question	Response
		optimisation, employment creation and environmentally responsible development within suitable areas.
2.1.2	Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	The project is located within an existing renewable energy development landscape and therefore does not create a new development node or settlement pattern. It supports the spatial objective of concentrating compatible infrastructure in already transformed or authorised development areas while limiting unnecessary expansion into undisturbed areas.
2.1.3	Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and	The surrounding spatial character is rural and energy-related, with nearby mining, agricultural grazing, transport and renewable energy land uses. The Redstone PV will be located within the broader Redstone CSP project area, making it compatible with the existing and planned energy infrastructure in the area. No significant change to the broader land-use character is expected.
2.1.4	Municipal Economic Development Strategy ("LED Strategy").	The project is broadly consistent with municipal economic development objectives because it supports investment in renewable energy, improves the efficiency of an existing energy facility, and may create limited local employment and procurement opportunities during construction and operation. These benefits are aligned with local economic diversification and skills development priorities.
2.2	Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	The socio-economic impacts are expected to be mostly positive but limited in scale and temporary in nature. Positive impacts include temporary construction employment, limited operational maintenance opportunities, local procurement where feasible, improved energy security for the CSP facility and support for renewable energy investment in the region. Potential negative impacts include temporary construction-related nuisance, traffic and safety risks, which can be managed through the EMPr and construction management measures.
2.2.1	Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	Yes. The development complements local socio-economic initiatives by supporting renewable energy investment and creating opportunities for local labour, services and suppliers where feasible. Skills transfer may occur during construction and operation through contractor training, health and safety induction, environmental awareness training and maintenance-related activities.
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	The project is not intended to provide direct social infrastructure such as housing, health or cultural facilities. However, it supports community interests indirectly by contributing to local employment, procurement, skills exposure and continued operation of renewable energy infrastructure in the area. Potential nuisance and

Ref No.	Question	Response
		safety impacts will be managed through the EMPr, public participation process and site-specific construction controls.
2.4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?	The development is expected to support equitable short- and long-term benefits by contributing to renewable energy supply, limited employment and procurement opportunities, and reduced dependence on external electricity for the CSP facility. Negative impacts are expected to be localised, temporary and manageable. With implementation of the EMPr, the project is considered socially and economically sustainable in the short and long term.
2.5	In terms of location, describe how the placement of the proposed development will:	
2.5.1	Result in the creation of residential and employment opportunities in close proximity to or integrated with each other.	The location is appropriate because the project will be placed within the existing Redstone CSP development area and will use existing access, services and electrical infrastructure where feasible. This reduces the need for new off-site infrastructure and avoids creating a new isolated development footprint. The project will not create residential opportunities and is not a settlement development. It will, however, create limited temporary employment opportunities during construction and smaller operational maintenance opportunities within an existing energy development area.
2.5.2	Reduce the need for transport of people and goods.	The use of existing access roads and infrastructure associated with the CSP facility will reduce the need for additional transport of goods and materials over new routes. Labour transport needs are expected to be limited and temporary during construction, with a small workforce required during operation.
2.5.3	Result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms of public transport),	The project is not an urban densification or public transport-oriented development and will not materially affect public transport thresholds. Access will be via existing site access arrangements, and construction traffic will be managed through standard traffic and access control measures.
2.5.4	Compliment other uses in the area,	The proposed development complements existing renewable energy infrastructure and is compatible with the broader land-use character of the area, which includes energy, mining, agricultural grazing and rural land uses. The project will support the existing CSP facility rather than introduce an incompatible land use.
2.5.5	Be in line with the planning for the area.	The project is aligned with the relevant planning context, including the municipal IDP, SDF, district planning framework, EMF, provincial renewable energy

Ref No.	Question	Response
		objectives and national energy policy. These planning instruments support renewable energy development in suitable locations, subject to appropriate environmental management.
2.5.6	For urban related development, make use of underutilised land available with the urban edge.	The project is not an urban-related development and is located outside an urban edge. This criterion is therefore not directly applicable. However, the project makes use of land within an existing authorised renewable energy development area, thereby avoiding unnecessary expansion into unrelated or more sensitive areas.
2.5.7	Optimise the use of existing resources and infrastructure,	The project will optimise existing resources and infrastructure by using access roads, security arrangements, electrical infrastructure, water supply, waste management systems and operational support services associated with the Redstone CSP facility where feasible. This reduces the need for additional standalone infrastructure and limits the development footprint.
2.5.8	Opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	The project is not expected to require major bulk infrastructure expansion in a non-priority area. It is located within the existing CSP development area and will rely on existing site infrastructure where feasible. Opportunity costs associated with new bulk infrastructure are therefore expected to be limited.
2.5.9	Discourage “urban sprawl” and contribute to compaction / densification.	The project is not a settlement or urban development and will not contribute to urban sprawl. By locating the PV facility within the existing Redstone CSP development area, the project consolidates compatible energy infrastructure rather than creating a new dispersed development node.
2.5.10	Contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,	The project will not directly alter settlement patterns or provide settlement infrastructure. It will, however, support the optimum use of existing renewable energy infrastructure by adding auxiliary PV generation within the CSP development area. This represents efficient use of existing infrastructure rather than expansion into unrelated areas.
2.5.11	Encourage environmentally sustainable land development practices and processes	The project encourages environmentally sustainable land development by supporting renewable energy generation, using existing infrastructure where feasible, limiting the development footprint, avoiding sensitive areas as far as practicable, and implementing mitigation and monitoring measures through the EMPr.

Ref No.	Question	Response
2.5.12	Take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	The location is favoured by the presence of the existing Redstone CSP facility, existing energy-related infrastructure, high solar resource potential, suitable access arrangements and compatibility with the broader renewable energy development context of the Northern Cape. These locational factors support the preferred site.
2.5.13	The investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential).	The investment is expected to generate positive socio-economic returns by improving the operational efficiency of the existing CSP facility, supporting renewable energy investment, creating limited employment and procurement opportunities, and reinforcing the region's role as a renewable energy hub. The returns are considered appropriate for the project's scale and purpose.
2.5.14	Impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and	The area is already influenced by renewable energy infrastructure and rural land uses. The project will introduce additional PV infrastructure, but this is compatible with the existing energy landscape and is not expected to materially alter the sense of place. Heritage sensitivities were assessed, and a chance-finds procedure will be implemented during construction.
2.5.15	In terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	The development is not a settlement project and will not directly create a more integrated settlement. Its contribution is instead economic and infrastructural, by supporting renewable energy investment and employment opportunities within an existing development area.
2.6	How was a risk-averse and cautious approach applied in terms of socio-economic impacts:	
2.6.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	The main socio-economic information limitations relate to final construction timing, the final number of workers required, the proportion of labour and procurement that can be sourced locally, and the availability of suitably skilled local service providers at the time of construction. The socio-economic baseline is based on available municipal planning information and desktop data, supplemented by the project description and assessment findings.
2.6.2	What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	The level of socio-economic risk associated with these limits of knowledge is considered low. The project is small in scale, will be located within an existing energy development area and is not expected to result in displacement, loss of livelihoods, significant pressure on services or major changes to the social fabric. Potential risks relating to employment expectations, contractor conduct, traffic,

Ref No.	Question	Response
		safety and construction nuisance can be managed through the EMPr, procurement planning and construction management controls.
2.6.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	A risk-averse and cautious approach was applied by recognising that socio-economic benefits are likely to be limited and temporary, avoiding overstatement of employment and procurement benefits, and identifying manageable risks such as traffic, safety, nuisance and community expectations. Mitigation includes local employment and procurement where feasible, clear contractor requirements, health and safety controls, environmental awareness training, stakeholder communication and implementation of the EMPr.
2.7	How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:	
2.7.1	Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	The project is not expected to negatively affect people's environmental rights, provided the mitigation measures in the EMPr are implemented. Potential negative socio-economic impacts are expected to be temporary and construction-related, including traffic, dust and noise nuisance, health and safety risks, contractor misconduct, unrealistic employment expectations and limited pressure on local services if non-local labour is used. These impacts will be avoided or reduced through existing access routes, traffic and access control, dust and noise management, contractor induction, health and safety procedures, environmental awareness training, clear stakeholder communication, local employment where feasible and implementation of the EMPr.
2.7.2	Positive impacts. What measures were taken to enhance positive impacts?	
2.8	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	The local economy is dependent on mining, agriculture, renewable energy development and associated services. Ecosystem services such as biodiversity support, groundwater recharge, erosion control and wetland functioning contribute to the sustainability of these activities. The socio-economic benefits of the project, including employment and economic activity, are not expected to result in significant additional ecological pressure due to the small scale of the workforce and the use of an existing energy development area. Ecological impacts associated with increased human activity will be managed through the EMPr.

Ref No.	Question	Response
2.9	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	The preferred option utilises an existing authorised renewable energy development area, existing infrastructure and support services, thereby reducing environmental disturbance, capital requirements and social disruption. Alternatives were assessed and the preferred option was selected because it provides socio-economic benefits while minimising environmental and social impacts.
2.10	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	The assessment considered impacts on all stakeholders and confirmed that no communities will be displaced and no vulnerable groups will be disproportionately affected. Benefits and impacts are expected to be distributed equitably. The preferred alternative avoids unnecessary environmental degradation while supporting local economic development and renewable energy objectives.
2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	The project promotes equitable access to benefits through local employment and procurement opportunities where feasible, fair recruitment processes, stakeholder engagement and implementation of environmental management measures that protect shared environmental resources for current and future generations.
2.12	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	Environmental health and safety responsibilities have been addressed through the Basic Assessment process, specialist studies, EMPr, contractor management requirements, monitoring programmes, emergency preparedness measures, rehabilitation commitments and decommissioning obligations.
2.13	What measures were taken to:	
2.13.1	Ensure the participation of all interested and affected parties.	The public participation process was undertaken in accordance with the requirements of the NEMA EIA Regulations and was designed to be open, transparent, inclusive and accessible to all interested and affected parties (I&APs). Stakeholders were identified through a stakeholder database and were notified of the application and opportunities to participate through written notifications, advertisements, site notices and the distribution of project information, section 8 provides a summary of PPP activities undertaken and full detail is provided in APPENDIX C. Adequate review and comment periods were provided to enable stakeholders to understand the proposed development and submit comments, concerns and recommendations. All comments received were recorded, considered
2.13.2	Provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,	
2.13.3	Ensure participation by vulnerable and disadvantaged persons,	
2.13.4	Promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,	

Ref No.	Question	Response
2.13.5	Ensure openness and transparency, and access to information in terms of the process,	and responded to within the public participation process and incorporated into the environmental assessment where relevant. The process was conducted in a manner that encouraged participation by all sectors of society, including vulnerable and disadvantaged groups, women, youth, landowners, government authorities and local communities. Through the sharing of project information and environmental assessment findings, the process also contributed to environmental awareness and understanding of the project, its potential impacts and proposed mitigation measures. The participation process therefore ensured transparency, access to information, consideration of stakeholder interests and values, and meaningful opportunities for involvement in environmental decision-making.
2.13.6	Ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge,	
2.13.7	Ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein will be promoted?	
2.14	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	The project will provide employment, procurement and service opportunities that may be accessed by a range of community members and local businesses. Opportunities will be based on project requirements, qualifications and procurement procedures, and are consistent with local economic development priorities.
2.15	What measures have been taken to ensure that current and / or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	All workers will receive occupational health and safety induction, task-specific training, environmental awareness training and emergency response training. Safety procedures, incident reporting systems and legal rights, including the right to refuse unsafe work, will be implemented in accordance with applicable legislation.
2.16	Describe how the development will impact on job creation in terms of, amongst other aspects:	
2.16.1	The number of temporary versus permanent jobs that will be created.	The project is expected to create temporary employment opportunities during construction and a smaller number of permanent or long-term employment opportunities during operation and maintenance.
2.16.2	Whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area).	Many lower and semi-skilled positions can potentially be filled by local labour, while some specialised positions may require external expertise.
2.16.3	The distance from where labourers will have to travel.	Labour will be sourced locally where feasible. Some specialist personnel may travel from outside the municipal area.

Ref No.	Question	Response
2.16.4	The location of jobs opportunities versus the location of impacts.	Employment opportunities will occur within the same region where project impacts occur, allowing local communities to benefit directly from the development.
2.16.5	The opportunity costs in terms of job creation.	The project will not significantly compromise alternative employment opportunities due to its location within an existing renewable energy development area and the low agricultural potential of the affected land.
2.17	What measures were taken to ensure:	
2.17.1	That there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment.	Relevant authorities and organs of state were consulted during the BA process, and applicable legislation, planning frameworks and specialist requirements were considered.
2.17.2	That actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures.	Potential conflicts were managed through consultation with competent authorities and review of applicable planning and environmental frameworks.
2.18	What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	The project has been assessed in terms of NEMA principles, public participation requirements and specialist investigations. The development incorporates mitigation measures to protect environmental resources while supporting public-interest renewable energy objectives.
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	Yes. The proposed mitigation measures are practical, achievable and consistent with industry practice. The long-term legacy of the development is expected to be positive through support for renewable energy generation and reduced dependence on external electricity sources. Residual environmental impacts are expected to remain low to medium-low following mitigation and rehabilitation.
2.20	What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	The Applicant will be responsible for implementing the EMPr, pollution prevention measures, rehabilitation requirements, waste management obligations and corrective actions in the event of environmental incidents, in accordance with the polluter-pays principle.
2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being	The preferred alternative maximises the use of existing infrastructure and established energy corridors, limits environmental disturbance, avoids unnecessary expansion into undisturbed areas and still provides renewable energy, employment

Ref No.	Question	Response
	proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	and economic benefits. The preferred option therefore offers the best balance between environmental protection and socio-economic benefit.
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	Cumulative positive impacts include continued investment in the renewable energy sector, support for regional economic diversification, reinforcement of the Northern Cape's role as a renewable energy hub, temporary employment creation, local procurement opportunities and improved operational efficiency of the Redstone CSP facility. Potential cumulative negative impacts may include temporary construction-related traffic, nuisance impacts and increasing industrialisation of the broader renewable energy landscape. However, given the relatively small scale of the project and its integration within an existing CSP facility, cumulative negative socio-economic impacts are expected to be limited and manageable. Overall, the cumulative socio-economic impact of the project is considered positive.

7 PROJECT ALTERNATIVES

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

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

(b) type of activity to be undertaken;

(c) design or layout of the activity;

(d) technology to be used in the activity;

(e) operational aspects of the activity; and

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

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

- The role of the environmental assessment practitioner is to:
    - encourage the proponent to consider all feasible alternatives;
    - Identify reasonable alternatives;
    - provide opportunities for stakeholder input to the identification and evaluation of alternatives;
    - document the process of identification and selection of alternatives;
    - provide a comprehensive consideration of the impacts of each of the alternatives; and
    - document the process of evaluation of alternatives.
- The role of the proponent is to:
    - assist in the identification of alternatives, particularly where these may be of a technical nature;
    - disclose all information relevant to the identification and evaluation of alternatives;
    - be open to the consideration of all reasonable alternatives; and
    - be prepared for possible modifications to the project proposal before settling on a preferred option.
    - The role of the public is to:
    - assist in the identification of alternatives, particularly where local knowledge is required;
    - be open to the consideration of all reasonable alternatives; and
    - recognise that there is rarely one favoured alternative that suits all stakeholders and that alternatives will be evaluated across a broad range of criteria, including environmental, social and economic aspects.

Table 9 outlines the various alternative types that must be considered for each development. The extent of the applicability of each of these is further presented. It must be highlighted that the alternatives presented in the table are derived from both the EIA Regulations (2014) as amended as well as the Department of Environmental Affairs and Tourism's (now Department of Environmental, Fisheries and Forestry) 2004 Integrated Environmental Information Series on the Criteria for determining alternatives in EIA. Where the alternative is applicable to the project, it will be further discussed in this Report. The alternatives discussed further in this report are as follows:

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

Table 9: Project alternatives as per NEMA EIA Regulations, 2014 as amended

Alternative	Comment
No-go Option	The 'no-go' alternative is sometimes referred to as the 'no-action' alternative (Glasson et al., 1999) and at other times the 'zero-alternative'. It assumes that the activity does not go ahead, implying a continuation of the current situation or the status quo. This alternative must be discussed on all projects as it allows for an assessment of impacts should the activity not be undertaken. **This alternative is discussed in this report.**
Activity alternatives	These are sometimes referred to as project alternatives, although the term activity can be used in a broad sense to embrace policies, plans and programmes as well as projects. Consideration of such alternatives requires a change in the nature of the proposed activity. This would entail a process where a different project is proposed instead of the ACWA Redstone PV Facility. Based on project information, there is one proposed activity and no other activity alternative**. Therefore, this alternative is considered <u>not</u> feasible and will not be discussed in this report.**
Location / property alternatives	Location alternatives could be considered for the entire proposal or for a component of a proposal, for example the location of a processing plant within the property boundary. The latter is sometimes considered under site layout alternatives. A distinction should also be drawn between alternative locations that are geographically quite separate, and alternative locations that are in proximity. In the case of the latter, alternative locations in the same geographic area are often referred to as alternative sites. The proposed project had previously been authorised and the preferred location set to the Eastern Extent of the property. **<u>No</u> other location alternatives are considered to be feasible of reasonable and will not be assessed.**
Process alternatives	Various terms are used for this category, including technological alternative and equipment alternative. The purpose of considering such alternatives is to include the option of achieving the same goal by using a different method or process. An industrial process could be changed, or an alternative technology could be used. Due to the specialised nature of photovoltaic energy generation infrastructure, process alternatives are somewhat limited. However, several technological variations were considered, including different PV module types, mounting systems, tracking configurations, and electrical layouts. These alternatives will likely have very little impact and therefore are not considered to be material to the impact of the PV and are **not considered to be feasible to assess**.

Alternative	Comment
Demand alternatives	Demand alternatives arise when a demand for a certain product or service can be met by some alternative means. This is applicable to the demand for a product or service. An example of this would be where there is a need to provide housing units. Examples of alternatives can be through managing demand through various methods or providing additional housing through either single dwelling residential units or mixed-use developments. Specific to the proposed project, **alternative renewable technologies such as wind and concentrated solar power were considered at a high level but were not deemed feasible due to site-specific constraints and project objectives**
Scheduling alternatives	These are sometimes known as sequencing or phasing alternatives. In this case an activity may comprise several components, which can be scheduled in a different order or at different times and as such produce different impacts. **These alternatives are considered <u>not</u> feasible to the project as there will be no significant impact variation due to scheduling.**
Input alternatives	By their nature, input alternatives are most applicable to industrial applications that may use different raw materials or energy sources in their processes. **Supply structures to the proposed PV facility are directly linked to the existing Redstone CSP and therefore this alternative is <u>not</u> considered feasible and will not be discussed in this report.**
Routing alternatives	Consideration of alternative routes generally applies to linear developments such as power lines, transport, and pipeline routes. The PV plant will supply additional power the Redstone CSP to meet operational requirements and as such will require a power line for the transfer of power to the CSP operational areas. Two potential routes for the powerline have been identified as Option A which directs the powerline around the CSP facility and Option B which routes the powerline through the CSP. **Both options are considered reasonable and feasible and will be assessed.**
Site layout alternatives	Site layout alternatives permit consideration of different spatial configurations of an activity on a particular site. This may include particular components of a proposed development or may include the entire activity. A layout change has occurred during the design refinement for the facility (change from the previously approved layout), the original design has a much greater interaction with a nearby delineated wetland compared to the revised, newer layout. **The previous layout iteration is therefore not considered reasonable as the greater interaction chance with the delineated wetland will result in greater potential environmental impact, including a greater footprint area required for the activity and will not be assessed.**
Scale alternatives	In some cases, activities that can be broken down into smaller units can be undertaken on different scales. For example, a housing development within an overall mixed-used development could have the option of 1 000, 2 000 or 4 000 housing units. Each of these scale alternatives may have different impacts. **The proposed Redstone solar PV project is considered to be small scale and therefore it is not reasonable to consider scale alternatives since the project design is also fir for purpose.**
Design alternatives	This entails the consideration of different designs for aesthetic purposes or different construction materials to optimise local benefits, and sustainability would constitute design alternatives. Different designs are assumed to have different impacts. Generally, the design alternatives could be incorporated into the project proposal

Alternative	Comment
	and so be part of the project description and need not be evaluated as separate alternatives. Design alternatives for the Redstone PV facility would focus primarily to the power lines. The powerlines may be designed to be overhead lines or underground lines. T**herefore, design alternatives are considered feasible and will be discussed in this report**.
Operational alternatives	The Operational Alternative is where you can specify controls on the operational aspects of the project such as pressure pipes, pumps, as well as valves. In the case of the proposed stormwater infrastructure, **feasible operational alternatives were not identified and are not discussed further.**

7.1 ROUTING ALTERNATIVES

The routing of the proposed powerline (preferred to be underground powerlines through the existing CSP footprint as assessed in section 7.2) considered two primary alternatives, namely routing the line through already disturbed CSP footprint areas and routing the line through greenfield areas. Disturbed areas include existing infrastructure corridors, road reserves, agricultural lands, previously developed areas, and other transformed environments where the natural landscape has already been altered by human activities. Greenfield areas, in contrast, comprise relatively undisturbed natural environments with limited or no existing infrastructure development. The assessment of these alternatives was undertaken to identify the most environmentally, socially, and technically sustainable route option. In line with the principles of impact avoidance and minimisation, preference is generally given to routes that utilise existing disturbed corridors where feasible, thereby reducing the need for additional land transformation and limiting impacts on sensitive environmental features and biodiversity resources.

Table 10: Assessment of routing alternatives for powerlines

Route through CSP		**Route through Greenfield Areas**	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**
Reduces impacts on natural habitats, biodiversity, and ecological processes.	May require deviations around existing infrastructure, developments, or property boundaries.	Provides greater flexibility in selecting the most direct or technically optimal alignment.	Results in greater disturbance of natural vegetation and previously undisturbed habitats.
Minimises vegetation clearing and habitat fragmentation.	Potential conflicts with existing services, roads, pipelines, and utilities.	May avoid congestion within existing infrastructure and utility corridors.	Increases habitat fragmentation and ecological disturbance.
Utilises existing transformed corridors, reducing the overall environmental footprint.	Visual impacts may be concentrated where infrastructure already exists.	Potentially fewer constraints associated with existing services, infrastructure, and land uses.	Greater likelihood of affecting sensitive environmental features and protected species.
Limits impacts on sensitive environmental features such as wetlands		Can provide opportunities to optimise engineering	May require the construction of new access

Route through CSP		Route through Greenfield Areas	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**
and conservation-priority habitats.		and design requirements.	roads and associated infrastructure.
Existing access roads and infrastructure may reduce construction-related disturbance and costs.			Expands the overall infrastructure footprint into natural areas.
Supports the consolidation of infrastructure within already modified landscapes.			Typically associated with higher environmental risks, mitigation requirements, and potential regulatory constraints.

Based on the assessment, powerline through already disturbed areas is considered the preferred alternative from an environmental perspective. Although this option may present certain engineering and land-use constraints, it substantially reduces impacts on natural ecosystems, biodiversity, and sensitive environmental features when compared to a greenfield alignment. The utilisation of existing disturbed corridors is therefore consistent with the mitigation hierarchy and represents the most sustainable routing option where technically and economically feasible. The avoidance of additional clearance by utilising the already disturbed route through the existing CSP is therefore preferred. **The route around the CSP is considered to not be reasonable in this case and will not be assessed further.**

7.2 DESIGN ALTERNATIVES: OVERHEAD VERSUS UNDERGROUND POWERLINES

The proposed electrical connection can be established either as an overhead powerline or as an underground (buried) cable system. These alternatives represent different design approaches for transmitting electricity within the development area. The assessment of the alternatives considered environmental, technical, operational, visual, and economic factors. Given that the proposed powerline is situated within the already disturbed footprint of the CSP facility, the environmental impacts associated with trenching and cable installation are substantially reduced. As a result, the underground alternative offers the benefit of avoiding additional visual intrusion and reducing potential impacts on avifauna, while making use of a footprint that has already been transformed through previous development activities.

Table 11: Consideration of design alternatives

Overhead Powerline		Underground (Buried) Powerline	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**
Lower capital construction costs.	Introduces additional visual infrastructure into the landscape.	Negligible visual impact on the surrounding environment.	Higher construction costs compared to overhead infrastructure.
Simpler installation process with limited excavation requirements.	Potential collision and electrocution risk to avifauna.	No collision or electrocution risk to birds.	Requires trenching and excavation during construction.

Overhead Powerline		Underground (Buried) Powerline	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**
Easier access for inspections and routine maintenance.	More susceptible to weather-related damage and outages.	Reduced exposure to weather-related damage such as strong winds and lightning.	Fault detection and repair can be more complex and costly.
Faults are generally easier to locate and repair.	May require ongoing vegetation management and servitude maintenance.	No requirement for ongoing vegetation clearance beneath conductors.	Future maintenance and upgrades may be more difficult to undertake.
Easier to modify or upgrade if future expansion is required.	Contributes to cumulative infrastructure impacts within the development area.	Makes use of the existing disturbed CSP footprint, thereby avoiding additional impacts on surrounding natural areas.	
		Reduces the cumulative visual impact associated with above-ground infrastructure.	

The underground powerline alternative is considered the preferred design alternative for the proposed development. Although underground cabling is generally associated with higher installation costs and more complex maintenance requirements, the proposed alignment is located within the already disturbed footprint of the CSP facility, significantly reducing the environmental impacts normally associated with trenching and cable installation. The underground alternative avoids the introduction of additional above-ground infrastructure and minimises visual impacts on the receiving environment. Given the disturbed nature of the development footprint and the relatively limited extent of the electrical connection, the underground option is considered environmentally preferable and represents the most appropriate design alternative for the proposed project. **Therefore, the overhead line option will not be assessed as it is determined to not be feasible.**

7.3 NO GO ALTERNATIVE

The “No Go” or “No Action” alternative refers to the alternative of not embarking on the proposed project at all. It assumes that the activity does not go ahead, implying a continuation of the current situation or the status quo. It is important to note that the No Go alternative is the baseline against which all other alternatives and the development proposal are assessed. When considering the No Go alternative, the impacts (both positive and negative) associated with any other specific alternative, or the current project proposal would not occur and in effect the impacts of the No Go alternative are therefore inadvertently assessed by assessing the other alternatives. In addition to the direct implications of retaining the status quo, there are certain other indirect impacts, which may occur should the No Go alternative be followed. The ‘no-go’ alternative provides the means to compare the impacts of project alternatives with the scenario of a project not going ahead. In evaluating the ‘no-go’ alternative it is important to take into account the implications of foregoing the benefits of the proposed project.

The No-Go Alternative assumes that the proposed Redstone PV Facility, Battery Energy Storage System (BESS), and associated electrical connection infrastructure are not developed. Under this scenario, the existing land use and environmental characteristics of the site would remain unchanged, and the direct impacts associated with

the project would not occur. These avoided impacts would include the clearing of approximately 19.5 ha of natural vegetation required for the PV array, the loss of protected plant species within the development footprint, habitat disturbance and fragmentation, construction-related noise and dust generation, increased vehicle movement, and temporary disturbance to fauna. The installation of the BESS and electrical connection infrastructure would also not occur. However, much of the infrastructure associated with the BESS and electrical connection is proposed within or adjacent to areas already influenced by the existing Redstone CSP facility and would therefore result in relatively limited additional disturbance.

While the No-Go Alternative would avoid these project-related impacts, it would also prevent the establishment of a dedicated renewable energy source intended to supply the auxiliary electricity requirements of the existing Redstone CSP facility. As a result, the operational efficiencies associated with the integration of the PV and BESS components would not be realised. The project's contribution to reducing greenhouse gas emissions and improving the overall sustainability and energy security of the existing Redstone operation would therefore not be achieved.

From a socio-economic perspective, the No-Go Alternative would forgo the positive benefits associated with the project, including construction-related employment opportunities, skills development, expenditure within the local and regional economy, and contributions to production, GDP and government revenue identified by the socio-economic assessment. Although these benefits are moderate in significance, they would nonetheless contribute positively to the local economy and support broader renewable energy development objectives in the Northern Cape. The terrestrial biodiversity assessment concluded that the development would result in the loss of some natural vegetation and protected plant species, but that these impacts would be of medium-low to low significance following the implementation of mitigation measures and permitting requirements. Furthermore, the site occurs adjacent to the existing Redstone CSP facility where edge effects and previous disturbance have already reduced the ecological functionality of portions of the surrounding habitat. The proposed development is therefore not expected to result in significant biodiversity loss at a regional scale.

Although the No-Go Alternative would avoid the direct impacts associated with the development, it would also prevent the realisation of the project's environmental, operational and socio-economic benefits. Given the relatively low residual significance of the identified environmental impacts following mitigation, together with the positive contribution of the project to renewable energy generation and support of the existing CSP facility, the No-Go Alternative is **considered to not be reasonable**. The implementation of the PV facility, BESS and associated electrical infrastructure is therefore regarded as the preferred development alternative.

8 STAKEHOLDER ENGAGEMENT

ACWA Power Solar Reserve Redstone Solar Thermal Power Plant RF (Pty) Ltd (hereafter referred to as the applicant) has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with undertaking the required authorisation processes (including the statutory public participation), and to compile and submit the required documentation in support of application for Environmental Authorisation (EA) in accordance with the National Environmental Management Act (NEMA-Act 107 of 1998) – Listed Activities: GN R983 and GN R985.

Additional activities to be applied for may be raised and will be confirmed during the process.

8.1 OBJECTIVES OF THE PUBLIC PARTICIPATION

South Africa, being one of the countries with the most progressive constitutions, enshrined the public's right to be involved in decisions that may affect them in its Constitution. Section 57(1) of the new Constitution that provides: "*The National Assembly may (b) make rules and orders concerning its business, with due regard to representative and participatory democracy, accountability, transparency and public involvement".* This provision, along with several others gave rise to many new trends in South African legislation. In environmental legislation, the idea of public participation (or stakeholder engagement) features strongly and especially the National Environmental Management Act (Act 107 of 1998, NEMA) and the recent regulations passed under the auspices of this Act makes very strict provisions for public participation in environmental decision-making.

Public participation can be defined as..."*a process leading to a joint effort by stakeholders, technical specialists, the authorities and the proponent who work together to produce better decisions than if they had acted independently*"[1]. From this definition, it can be seen that the input of the public is regarded as very important indeed.

The Public Participation Process (PPP) is designed to provide sufficient and accessible information to Interested and Affected Parties (I&APs) in an objective manner to assist them to:

During the Environmental Authorisation:

- Verify that their issues have been recorded;
- Comment on the findings of the environmental assessments; and
- Provide relevant local information and knowledge to the environmental assessment.

The PPP is a requirement of several pieces of South African Legislation and aims to ensure that all relevant I&APs are consulted, involved and their opinions are taken into account and a record included in the reports submitted to Authorities. The process ensures that all stakeholders are provided this opportunity as part of a transparent process which allows for a robust and comprehensive environmental study. The PPP for the necessary authorisation required for the project needs to be managed sensitively and according to best practises in order to ensure and promote:

- Compliance with international best practice options;
- Compliance with national legislation;
- Establishment and management of relationships with key stakeholder groups; and
- Encouragement of involvement and participation in the environmental study and authorisation/approval process.

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

- Introduce the proposed project and process for the authorisation project;
- Explain the environmental authorisation;
- Determine and record issues, concerns, suggestions, and objections to the project;

- Provide opportunity for input and gathering of local knowledge;
- Establish and formalise lines of communication between the I&APs and the project team;
- Identify all significant issues for the project; and
- Identify possible mitigation measures or environmental management plans to minimise and/or prevent negative environmental impacts and maximise and/or promote positive environmental impacts associated with the project.

This Public Participation Report (PPR) lists all verbal and written issues raised by I&APs during the call to register period from the 21st of May 2026 to date. A breakdown of the PPP is given within the remaining sections of this PPR.

8.2 LEGAL COMPLIANCE

The PPP must comply with all environmental legislation that requires public participation as part of an application for authorisation or approval; namely, the National Environmental Management Act (NEMA, Act No. 107 of 1998).

The details of the PPP are provided below.

8.3 IDENTIFICATION OF INTERESTED AND AFFECTED PARTIES (I&APS)

An initial I&AP database has been compiled from historic projects in the area, and Windeed searches were conducted to obtain the contact details of the surrounding landowners. The I&APs referred to in the PPR include:

- Pre-identified and registered landowners and surrounding landowners;
- Pre-identified and registered key stakeholders;
- Regulatory authorities;
- Specialist interest groups; and
- All I&APs who responded to the initial notifications and requested to be registered.

Efforts to pre-identify key I&APs involved various avenues such as consultation with the proponent and known landowners within the study area, review of related previously conducted studies, and identification of key interest groups and authorities within the vicinity of the study area and municipality. Refer to APPENDIX C for the Key Stakeholder/I&AP Database.

8.3.1 LIST OF ORGANS OF STATE IDENTIFIED AND NOTIFIED

The following key I&APs, but not limited to, were notified of the proposed project and invited to participate in the public participation process:

- National Department of Agriculture Land Reform and Rural Development (DALRRD)
- National Department of Co-operative Governance and Traditional Affairs (GoGTA)
- National Department of Forestry, Fisheries and Environment (DFFE)
- National Department of Human Settlements
- National Department of Mineral and Petroleum Resources (DMPR)
- National Department of Agriculture, Land Reform and Rural Development (DALRRD)
- National Department of Science, Technology and Innovation
- National Department of Tourism
- National Department of Transport
- National Department of Water and Sanitation (DWS)

- National Energy Regulator of South Africa (NERSA)
- National House of Traditional Leaders
- Northern Cape Department of Agriculture, Environmental Affairs, Land Reform and Rural Development
- Northern Cape Department of Co-operative Governance, Human Settlement and Traditional Affairs (NC COGHSTA)
- Northern Cape Department of Economic Development and Tourism (NCDEDAT)
- Northern Cape Department of Environment and Nature Conservation (DENC)
- Northern Cape Department of Environment and nature Conservation
- Northern Cape Department of Roads and Public Works (NC DR&PW)
- Northern Cape Department of Social Development (NCDSD)
- Northern Cape Department of Water and Sanitation
- Northern Cape Economic Development, Trade and Investment Promotion Agency (NCEDA)
- Northern Cape Heritage Resources Authority (NCHRA)
- Northern Cape Protech and Agri Revolution (Pty) Ltd
- Northern Cape Tourism Authority
- South African Civil Aviation Authority (SACAA)
- South African Heritage Resources Agency (SAHRA)
- South African National Biodiversity Institute (SANBI)
- South African National Parks (SanParks)
- South African National Roads Agency Limited (SANRAL)
- Square Kilometre Array (SKA)
- Transnet South Africa SOC Limited
- Tsantsabane Local Municipality
- Z.F. Mgcawu District Municipality

8.3.2 LIST OF OTHER KEY I&APS IDENTIFIED AND NOTIFIED

Pre-identified and registered landowners and surrounding landowners.

- Agri Northern Cape
- Agri South Africa
- Agricultural Research Council
- Augrabies Falls National Park
- BirdLife South Africa
- Botanical Society
- Centre for Environmental Rights (CER)
- Conservation South Africa (CSA)
- Council for Geoscience
- Earth Life Africa
- Endangered Wildlife Trust (EWT)
- Eskom Holdings SOC Ltd
- Federation for a Sustainable Environment (FSE)
- Groundwork South Africa
- Mainstream Renewable Power Development – S.A
- National Khoisan Council
- Natural Justice
- Wildlife and Environment Society of South Africa (WESSA)
- World Wildlife Fund

8.4 NOTIFICATION OF INTERESTED AND AFFECTED PARTIES

This section provides details on the notifications that were distributed as part of the consultation process to date.

8.4.1 INITIAL NOTIFICATION OF KEY I&APS

The PPP commenced on the 21st of May 2026 with an initial call to register notification. Notification during this initial consultation was given in the manner described below.

8.4.1.1 **FAXES, REGISTERED MAIL AND EMAILS**

Notification letters (in English and Afrikaans) were distributed to pre-identified I&APS through either faxes, SMSs, registered mail, and/or emails on the 29th of May 2026.

The notification documents included the following information:

- Authorisations required;
- Sufficient detail of the proposed development to enable I&APs to assess/surmise what impact the development will have on them or the use of their land;
- The purpose of the proposed project;
- Details of the application processes associated with proposed activities;
- Details of the affected properties;
- Details of the South African environmental legislation that must be adhered to;
- Contact details of the relevant EIMS contact person.

Please refer to APPENDIX C for initial notification and proofs.

8.4.1.2 NEWSPAPER AND GAZETTE ADVERTISEMENTS

Advertisements (in English and Afrikaans) describing the proposed project and Basic Assessment (BA) process were placed in the Postmasburg Rekord Newspaper with circulation in the vicinity of the study area on the 22nd of May 2026. The newspaper adverts included the following information:

- Project name;
- Applicant name;
- Project location;
- Nature of the activity;
- Legislative requirements; and
- Relevant EIMS contact person for the project.

Please refer to APPENDIX C for proof of the advert and gazette notice placed.

8.4.1.3 SITE NOTICE PLACEMENT

Two (2) A1 Correx site notices (in English and Afrikaans) were placed at 2 locations around the proposed project study area on the 21st of May 2026. The on-site notices included the following information:

- Project name;
- Applicant name;
- Project location;
- Map of proposed project area;
- Project description;
- Legislative requirements; and
- Relevant EIMS contact person for the project.

Please refer to APPENDIX C for proof of site notice and site notice distribution.

8.4.2 NOTIFICATION OF INTERESTED AND AFFECTED PARTIES OF BASIC ASSESSMENT REPORT AVAILABILITY

Notification (in English and Afrikaans) regarding the availability of the Basic Assessment Report for public review and comment will be provided to pre-identified and registered I&APs. The notifications will be distributed through either email, fax, and/or SMS, where contact details are available.

Contact details will be provided to I&APs should they require assistance accessing the information or require copies of the reports.

A hard copy of the Basic Assessment Report will be placed at suitable venue in the vicinity of the proposed project application area for a period of 30 days. An electronic copy of the Report will be made available on the EIMS Public Participation Website.

8.5 SUMMARY OF PUBLIC PARTICIPATION OPPORTUNITIES

The table below provides a summary of the opportunities provided to I&APs for participation in the public participation process to date.

Table 12: Summary of Public Participation Opportunities

Action	Description	Publication/Place	Date
Initial Call to Register	Notification of landowners, occupiers, and other key I&APs.	Affected landowners and key I&APs were notified via email, fax, SMSs and/or post.	29 May 2026
	Placement of site notices.	Two (2) A1 Correx site notices (in English and Afrikaans) were placed at 2 locations along the proposed project study area.	21 May 2026
	Newspaper advertisement.	Advertisements (in English and Afrikaans) describing the proposed project and EA process were placed in the Postmasburg Rekord Newspaper.	22 May 2026
Availability of Basic Assessment Report for public review	Placement of hard copy Scoping Report.	One (1) hard copy of the report will be placed at a suitable location where members of the public could access the report.	TBA
	Placement of Scoping Report electronic copy.	An electronic copy of the report will be placed on the EIMS website. A data free service will be made available to anyone who has limitations with respect to data downloads.	TBA

8.6 RECORD OF ISSUES RAISED

Comments on the proposed project were solicited from pre-identified and registered I&APs and key stakeholders. To date, the following comments have been received:

- I&AP registration
- An I&AP requested to be kept updated on how the NPO sector will be benefitted.
- Transnet pipelines: not affected by the proposed project.
- NTCSA: not affected by the proposed project.
- SANRAL western region requested clarity on when the Basic Assessment Report will be ready.

All comments and/or queries received to date are included in this report and presented in APPENDIX C.

9 ENVIRONMENTAL ATTRIBUTES AND BASELINE ENVIRONMENT

This section of the BA Report provides a description of the environment that may be affected by the proposed project. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, the proposed development have been described. This information has been sourced from existing information available for the area and where applicable relevant specialist assessments.

9.1 PHYSICAL ENVIRONMENT

9.1.1 CLIMATE AND WEATHER

The climate for the predominant vegetation type (Olifantshoek Plains Thornveld) was used to draw inferences about the climate for the region. This region is characterised by a This vegetation type is located in the Northern Cape Province, specifically through the pediment areas of Korannaberg, Langeberg and Asbestos Mountains as well as some of those ridges to the west of the Langeberg. In addition, from the vicinity of Sonstraal in the north past Olifantshoek to the areas north of Niekerkshoop between Volop and Griekwastad in the south. Furthermore, from Griekwastad, this vegetation type stretches northwards to the flats west of the Lime Acres area (Mucina & Rutherford, 2006).

This region is characterised by summer and autumn rainfall with very dry winters. The mean annual precipitation is approximately 200 to 350 mm with frost frequently occurring during winter months (Mucina & Rutherford, 2006;Figure 4).

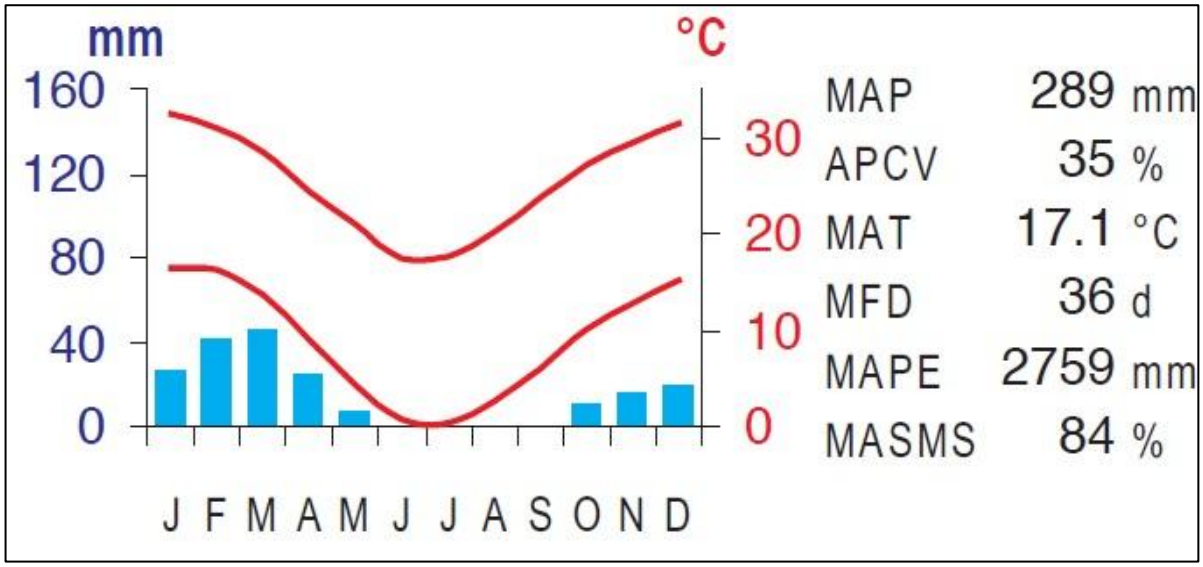

Figure 4: Climate for the project area based on the Olifants Plains Thornveld (SVk 13) (Mucina & Rutherford, 2006)

9.1.2 GEOLOGY, SOILS, AND LAND CAPABILITY

9.1.2.1 **REGIONAL GEOLOGY**

The study area is situated within the Griqualand West geological sequence, which forms part of the broader geological framework of the Northern Cape Province (Geological Survey, 1977). The regional geology is characterised by a combination of volcanic and sedimentary rock units, reflecting a complex geological history.

The western portions of the site are predominantly underlain by basaltic lava of the Ongeluk Formation, while the eastern portions comprise banded iron formations (jaspelite), crocidolite, and shale of the Danielskuil Formation (Paterson, 2011). These lithological units are typical of the Transvaal Supergroup and are widely distributed in the region.

In addition to the underlying bedrock, large portions of the study area are mantled by unconsolidated Quaternary wind-blown sand deposits, particularly across the central parts of the site (Paterson, 2011). These superficial deposits play an important role in soil development and influence surface characteristics such as infiltration capacity and erosion susceptibility. Overall, the geological conditions of the site are typical of the Northern Cape interior and provide the underlying framework for the development of soils and associated land capability within the study area.

9.1.2.2 GEOTECHNICAL INVESTIGATION

A geotechnical investigation previously undertaken for the broader Humansrus/Redstone development area indicates that the proposed PV facility is underlain predominantly by volcanic rocks of the Ongeluk Formation, consisting of lava, agglomerate, chert and jasper. The area is structurally influenced by a prominent north-northwest-trending fault and associated folding, which has resulted in variable subsurface conditions across the site.

The near-surface profile typically comprises a veneer of red-brown aeolian sand, generally up to 0.6 m thick, overlying residual clayey soils, boulder-rich residuum and highly weathered lava bedrock. The aeolian sands are generally loose and locally potentially collapsable, while the underlying residual materials consist of sandy silts, clays and weathered volcanic rock fragments. Boulder-rich residual horizons and highly fractured weathered lava occur extensively throughout the site and are commonly encountered at shallow depths.

Geotechnical investigations for the larger CSP development areas (across the whole site including the PV area) found that competent weathered lava bedrock generally occurs at shallow to moderate depths, although the depth to bedrock and boulder content are highly variable due to faulting and weathering processes. Groundwater was not encountered during the geotechnical investigations, and regional groundwater levels are generally reported to occur between 20 m and 30 m below ground level.

Overall, the geotechnical assessment concluded that the site is suitable for solar energy infrastructure development, subject to appropriate foundation design and site-specific engineering measures to account for localised collapsible sands, boulder-rich horizons and variable weathered bedrock conditions. These considerations will be considered by the engineering team responsible for the design of the PV.

9.1.2.3 SOILS AND LAND CAPABILITY

The proposed development is located approximately 25 km east of Postmasburg in the Northern Cape Province and falls within an area previously assessed by the Agricultural Research Council – Institute for Soil, Climate and Water (ARC-ISCW) as part of the environmental authorisation process for the original Humansrus/Redstone solar energy development. The previously undertaken study was determined to be applicable to the current project since the study covered the entire farm portion on which the operational CSP and the proposed PV are located. A compliance statement prepared by Paterson (2026) confirms that the soil conditions and agricultural potential described in the original specialist assessment undertaken in 2011 remain applicable to the current project area and that the original findings, impact assessment conclusions and recommended mitigation measures remain valid.

The project area is situated within the semi-arid interior of the Northern Cape and is characterised by generally flat to gently undulating terrain at an elevation of approximately 1 500 m above sea level. No permanent watercourses occur within the broader study area, although isolated seasonal drainage features may be present. The geology comprises rocks of the Griqualand West Sequence, including Ongeluk

Formation lavas as well as Danielskuil Formation jaspelite, crocidolite and shale. Large portions of the area are mantled by wind-blown Quaternary sand deposits, which have contributed to the development of the dominant soil forms in the area.

The climate represents the principal limitation to agricultural production. The area receives a mean annual rainfall of approximately 408 mm, occurring predominantly during summer months, while evaporation rates remain high throughout the year. Summer temperatures frequently exceed 40°C and may exceed 42°C, while winter frost is common. These climatic conditions severely constrain dryland agriculture and significantly limit agricultural productivity irrespective of soil characteristics.

9.1.2.3.1 SOIL CHARACTERISTICS

According to the national Land Type Survey, the study area is predominantly underlain by the land types Ae214, Ae215 and Ib237. The dominant soils are red, structureless soils of the Hutton Form, occurring as sandy loam, loamy sand and sandy clay loam textures with variable depths to underlying hard rock or calcrete. Soil depth generally ranges between approximately 300 mm and 1 200 mm, although shallower soils and exposed rock occur within portions of the area. These soils typically exhibit a high base status but are constrained by low rainfall and limited moisture availability.

The Ae215 land type, which dominates much of the central portion of the site, comprises moderately deep to deep red sandy soils over hard rock and calcrete. Ae214 consists of similar red soils but with greater variability in depth and texture, while the Ib237 land type is characterised by shallow stony and rocky soils with exposed rock and limited soil development.

Paterson (2026) further describes the soils as predominantly reddish, structureless sandy to loamy soils with bedrock occurring at depths ranging from approximately 300 mm to 1 200 mm. The specialist confirmed that these characteristics remain representative of the current development area.

9.1.2.3.2 AGRICULTURAL POTENTIAL

Although some of the mapped soil forms may exhibit moderate inherent soil potential when considered in isolation, agricultural potential across the study area is significantly constrained by climatic factors. The low and variable rainfall, high evaporation rates, prolonged dry periods, and extreme summer temperatures render the area unsuitable for intensive agriculture. Consequently, agricultural activities are largely restricted to extensive livestock grazing.

The original specialist study noted the absence of irrigation infrastructure or evidence of cultivated agriculture within the broader area, further demonstrating the limited agricultural viability of the landscape. Grazing capacity is low, estimated at approximately 15–20 ha per large stock unit, reflecting the poor agricultural carrying capacity of the region.

The National Environmental Screening Tool indicates a mixture of Medium and Low Agricultural Sensitivity within the broader area. However, the soil specialist specifically notes that this screening-level sensitivity mapping is undertaken at a coarse scale and does not accurately reflect local site conditions. Based on the findings of the soil investigation and the prevailing climatic constraints, the agricultural sensitivity of the project area is considered to be **Low** throughout the site and surrounding area.

9.1.2.3.3 SOIL AND AGRICULTURAL SENSITIVITY

The overall soil and agricultural sensitivity of the project area is regarded as **Low** due to:

- The dominance of sandy to loamy soils with variable depth to rock;
- The absence of high-potential agricultural land;
- The semi-arid climate and low annual rainfall;
- High evaporation rates and frequent drought conditions;

- The lack of irrigation infrastructure or cultivated agricultural activities;
- The suitability of the area primarily for low-intensity livestock grazing; and
- The largely disturbed nature of the existing CSP development footprint.

The proposed development is located within proximity of the existing disturbed footprint associated with the CSP facility. As a result, impacts on soils and agricultural resources will be largely confined to areas that have already undergone transformation. Any impacts are expected to be localised and of low significance provided that good construction practices are implemented.

The primary soil-related mitigation measures include minimising unnecessary disturbance of surface soils and vegetation, preventing contamination from fuels, oils and other pollutants, and ensuring that stormwater runoff is appropriately managed to prevent erosion

Based on the findings of the specialist studies and compliance statement, the soils and agricultural potential of the project area are considered to be of low sensitivity, and there are no soil or agricultural constraints that would prevent the implementation of the proposed development.

9.1.3 TOPOGRAPHY

The project area is situated on the Ghaap Plateau and is characterised by a generally flat to gently undulating topography at an elevation of approximately 1,500 m above sea level. The landscape consists of open plains with broad horizons, sparse shrubland vegetation, and occasional low rocky areas typical of the semi-arid Northern Cape. No prominent topographical features occur within the development footprint, although minor seasonal drainage features are present in the wider area.

The proposed PV facility is located within an established renewable energy landscape adjacent to the operational Redstone CSP facility. Owing to the relatively level terrain and the presence of existing energy infrastructure in the surrounding area, the site has a high capacity to accommodate the proposed development with limited topographical constraints. The generally flat terrain is also favourable for the construction and operation of photovoltaic infrastructure, reducing the need for significant earthworks or landform modification. Figure 5 presents the topography of the project area and surrounding landscape.

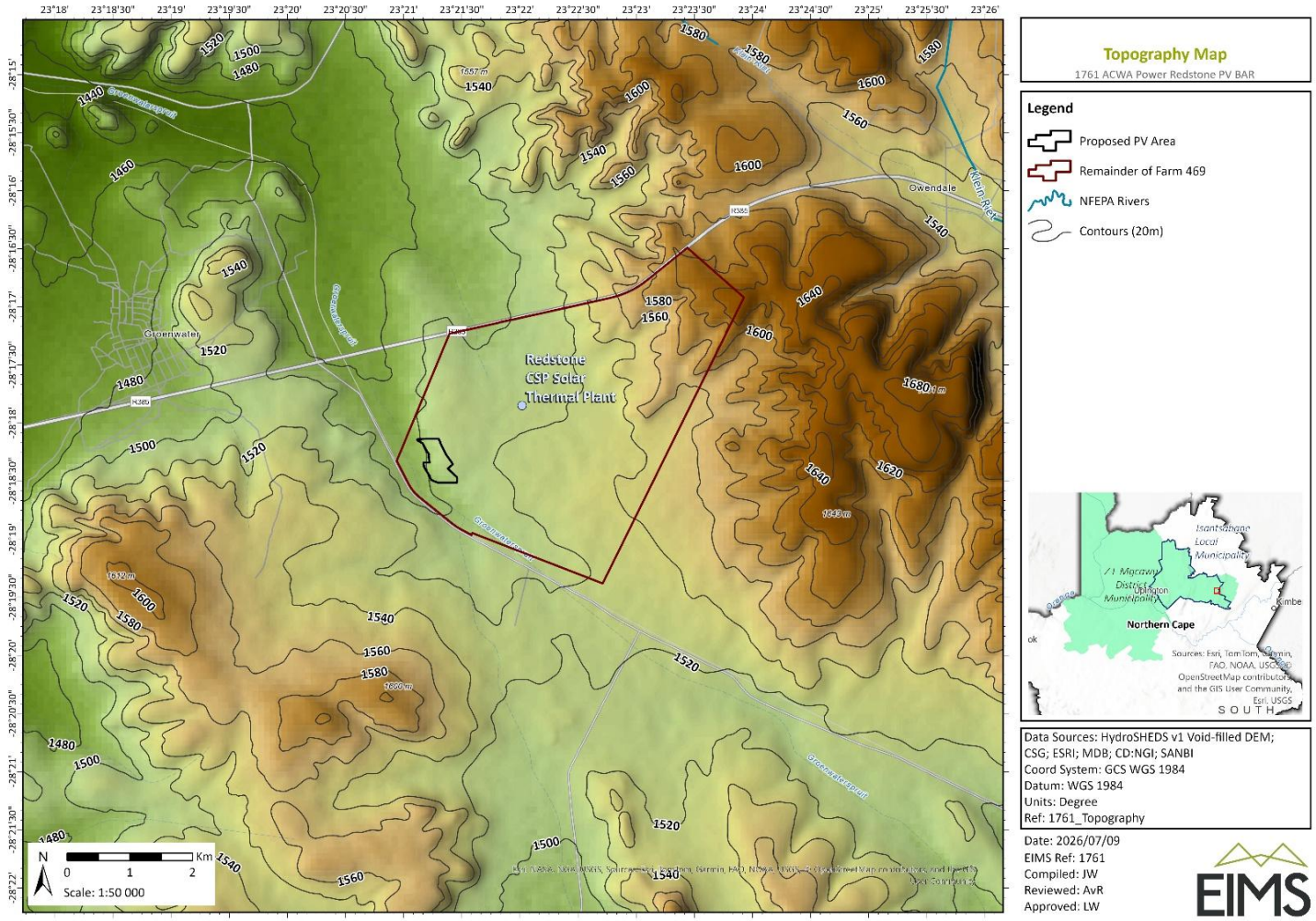

Figure 5: Topography in the project area

9.1.4 WETLANDS

9.1.4.1 HYDROLOGICAL CHARACTERISTICS

The project area of influence (PAOI) falls within the Southern Kalahari Ecoregion, within the Vaal-Orange Water Management Area (WMA). At a finer scale, within the D73A quaternary catchment. The fine scale hydrological features are presented in the following section.

9.1.4.2 TOPOGRAPHICAL RIVER LINES AND INLAND WATER AREAS

The topographical inland and river line data for the "2823" dataset indicated one non-perennial drainage feature within the PAOI (Figure 6). No inland water areas were identified within the PAOI.

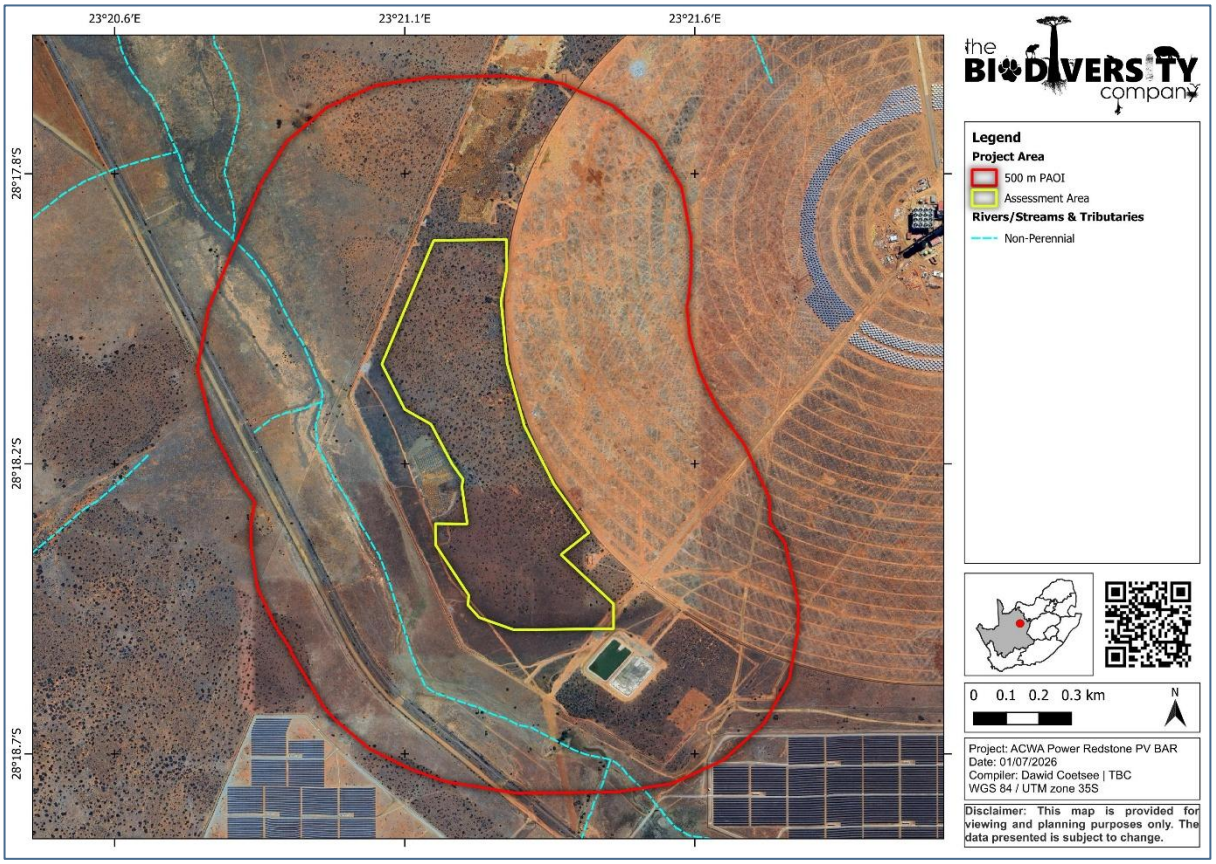

Figure 6: Topographical Inland Water Areas and River Lines that intersect the project area of influence

9.1.4.3 ECOLOGICALLY IMPORTANT LANDSCAPE FEATURES

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features is summarised in Table 13 below. Only features that were identified to be relevant to the proposed project were further discussed.

Table 13: Summary of relevance of the proposed project to ecologically important landscape features

Desktop Information Considered	Relevant/Irrelevant
Strategic Water Source Areas	Relevant – PAOI does overlap with a GWSA.

Desktop Information Considered	Relevant/Irrelevant
Provincial Conservation Plan	Irrelevant – PAOI does not overlap with CBA and ESAs.
South African Inventory of Inland Aquatic Ecosystems (SAIIAE)	Irrelevant – PAOI does not overlap with SAIIAE wetlands.
National Freshwater Priority Area	Irrelevant – PAOI does not overlap with NFEPA wetlands.

9.1.4.4 STRATEGIC WATER SOURCE AREAS

As displayed in Figure 7, the project area overlaps with the Southern Ghaap Plateau Groundwater Strategic Water Source Area.

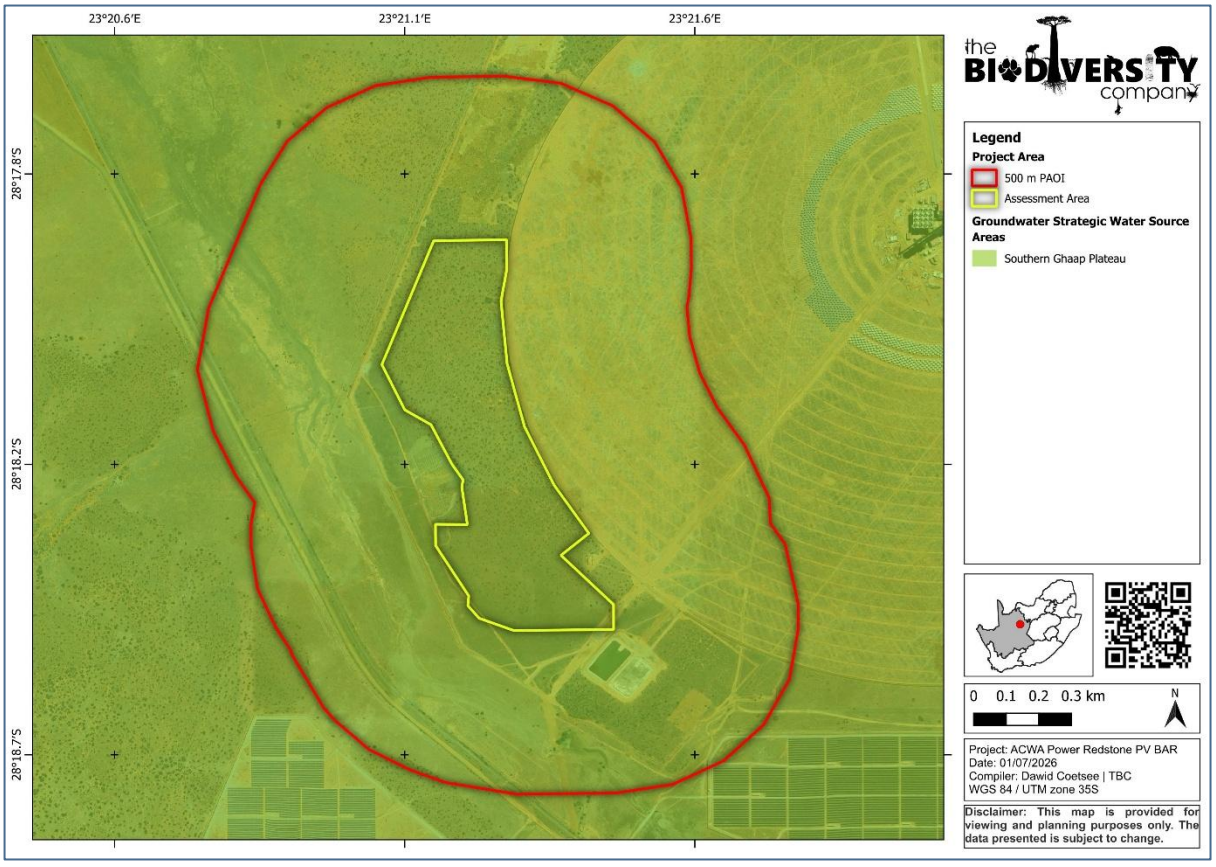

Figure 7: Groundwater Strategic Water Source Area within the project area of influence

9.1.4.5 WETLAND FIELD SURVEY

9.1.4.5.1 DELINEATION

One (1) Hydrogeomorphic (HGM) unit was identified within the encompassing 500 m PAOI. This HGM unit was classified as a unchannelled valley-bottom (UVB) (HGM 1). Along with this wetland several artificial drainage channels, in-channel dam, artificial wet area, and evaporation pond were identified and delineated within the PAOI (Figure 8).

A summary of the wetland area and percentage cover of wetlands within the PAOI is provided in Table 14. The total area of wetland identified within the PAOI is 27.72 Ha.

Table 14: Summary of wetland area within the project area of influence

HGM Units	Area (Ha)	Area (%)
HGM 1 - UVB	27.72	100

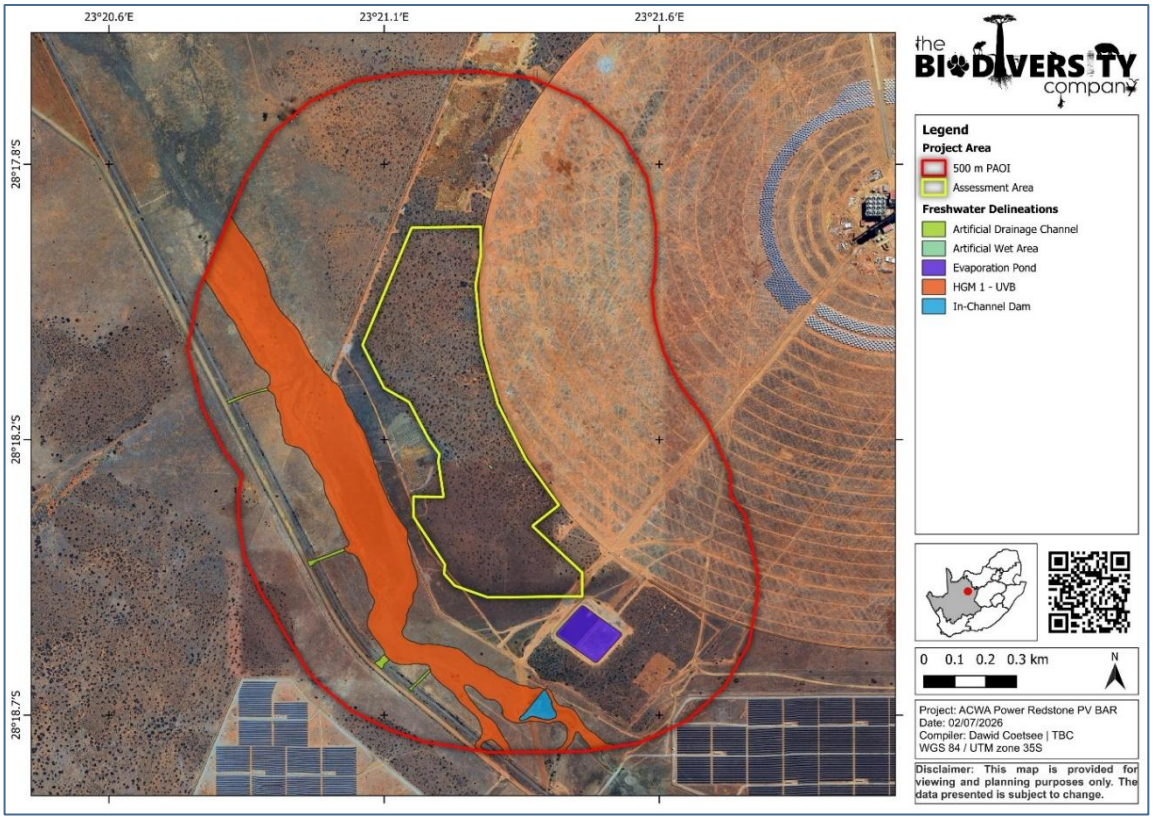

Figure 8: Delineation of wetland features within the project area of influence

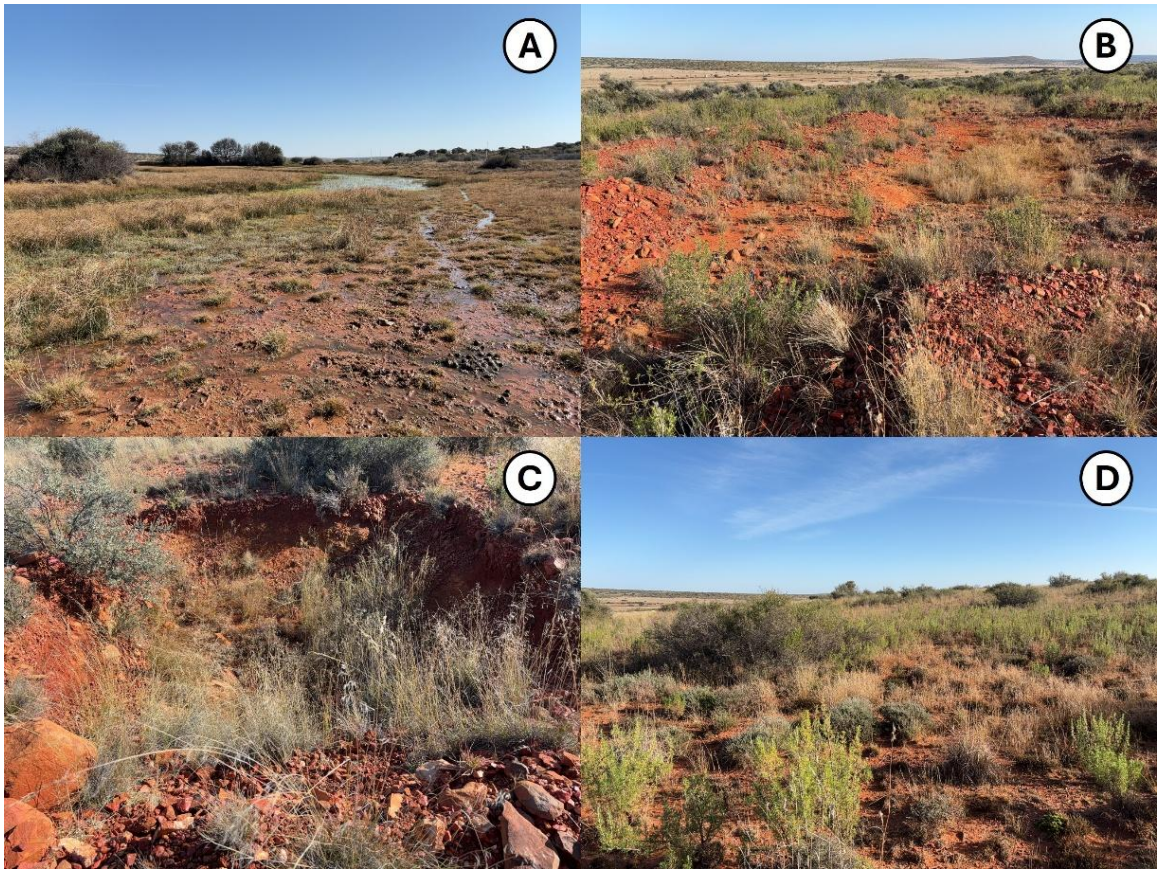

Figure 9:Representative photographs of the different identified features within the project area of influence. A) Unchannelled valley-bottom; B) Artificial wet area; C) Historical excavations; D) Terrestrial environment

9.1.4.5.2 RISK SCREENING

Table 15 provides the results of risk screening for the delineated wetlands and provides motivation for each of the determined categories.

Table 15: Risk screening results for the identified wetlands

HGM unit	Risk Status	Rationale
HGM 1	At Risk	This HGM unit was located within proximity of the proposed activities and downslope of the activities and, have therefore been determined as "At Risk". It is anticipated that indirect impacts to the wetland systems are possible.
Artificial Drainage Channels **Artificial Wet Area** **In-Channel Dam** **Evaporation Pond**	Not applicable	Artificial drainage channels, artificial wet areas, dams, and evaporations ponds are predominantly man-made or anthropogenically induced systems/areas that are dependent on one or more induced drivers (e.g., engineered flow conveyance, altered runoff regimes, seepage, damming, discharge, or land-use–driven concentration of flows) for their initiation and ongoing persistence. Their ability to provide ecological services is therefore contingent on

HGM unit	Risk Status	Rationale
		the long-term persistence and management of these drivers. As such, standard wetland risk assessment approaches are generally not directly applicable to these features, because their ecological processes, values, and sensitivities may be substantially different from those of natural wetlands and can change rapidly if the inducing drivers are modified, removed, or fail.

9.1.4.5.3 CLASSIFICATION AND DESCRIPTION

The wetland classification as per SANBI guidelines (Ollis *et al*., 2013) is presented in Table 16

Table 16: Wetland classification as per SANBI guideline (Ollis et al., 2013)

Wetland Unit	Level 1	Level 2		Level 3	Level 4		
	System	DWS Ecoregion/s	NFEPA Wet Veg Group/s	Landscape Unit	4A (HGM)	4B	4C
HGM 1	Inland	Southern Kalahari Ecoregion	Eastern Kalahari Bushveld Group 3	Valley Floor	Unchannelled valley-bottom	N/A	N/A

An unchannelled valley-bottom wetland, is a wetland located on a valley floor, characterised by the absence of a distinct river channel (Ollis *et al*., 2013). These wetlands are defined by their diffuse water flows, which are not confined within channel banks, allowing water to spread across the valley floor. The primary water inputs for unchannelled valley-bottom wetlands include diffuse surface and subsurface flows from upstream channels that lose confinement, as well as seepage from adjacent valley side-slopes. The hydrodynamics of these wetlands are dominated by horizontal, unidirectional, diffuse surface flow, although infiltration and evapotranspiration can also be significant. This setting allows unchannelled valley-bottom wetlands to function as important sites for sediment deposition, water filtration, and habitat provision, supporting a diverse range of plant and animal species. Their unique hydrological and geomorphological characteristics make them vital components of the landscape, contributing to the overall ecological health of the valley systems in which they occur. Figure 10 presents a diagram of a typical unchannelled valley-bottom wetland, showing the dominant movement of water into, through and out of the system.

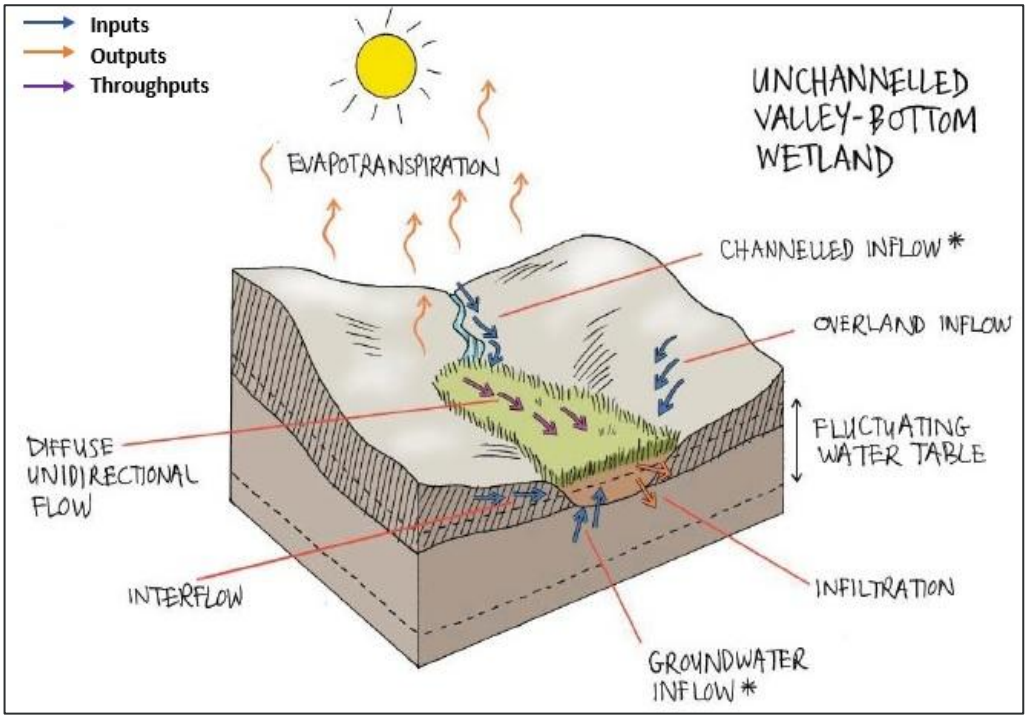

Figure 10: Amalgamated diagram of a typical unchannelled valley-bottom, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al., 2013)

9.1.4.6 **WETLAND FUNCTIONAL AND ECOLOGICAL ASSESSMENT**

9.1.4.6.1 GENERAL FUNCTIONAL DESCRIPTION

Unchannelled valley-bottom wetlands are characterised by their location in valley-bottoms without a distinct stream channel, resulting in diffuse water flow across the wetland. These wetlands are highly effective in sediment trapping due to their gentle gradients and the extensive areas that remain permanently saturated, which promote the deposition of sediments carried by runoff waters. The high levels of soil organic matter in these wetlands enhance their capacity for nitrate and toxicant removal, as the prolonged contact with runoff waters facilitates these processes. However, phosphate retention may be lower compared to other wetland types due to potential remobilization under prolonged anaerobic conditions. Unchannelled valley-bottom wetlands also contribute to streamflow regulation to some extent, although this is influenced by factors such as vegetation transpiration and soil characteristics. These wetlands play a crucial role in maintaining water quality and providing habitat for diverse species, making them vital components of the landscape (Kotze et al. 2009).

It should be noted that these characteristics are representative of ideal wetland features and may not necessarily represent the characteristics of all wetlands. The functionality of wetlands and the provision of benefits is largely dependent on wetland size and influence from abiotic drivers.

9.1.4.6.2 ECOSYSTEM SERVICES

The ecosystem services provided by the relevant HGM units on site were assessed and rated using the WET-EcoServices method (Kotze *et al*., 2009; updated Version 2, Kotze *et al*., 2020). The results of the assessment are presented in Table 17. The ecosystem services scores of the delineated wetlands classify as “Intermediate” for HGM 1. The main ecosystem services provided by these wetlands are localised in nature and include temporary water storage and attenuation, limited sediment and nutrient trapping, minor water-quality regulation, and habitat biodiversity support, although these functions are generally expressed at an “intermediate” level.

Table 17: Summary of the average ecosystem scores of the assessed wetland units

Wetland Unit					HGM 1
Ecosystem Services Supplied by Wetlands	Indirect Benefits	Regulating and supporting benefits	Flood attenuation		2.1
			Streamflow regulation		1.5
			Water Quality enhancement benefits	Sediment trapping	2.2
				Phosphate assimilation	2.0
				Nitrate assimilation	2.0
				Toxicant assimilation	1.8
				Erosion control	1.0
			Carbon storage		1.2
	Direct Benefits	Biodiversity maintenance			1.8
		Provisioning benefits	Provisioning of water for human use		0.6
			Food for Livestock		1.6
			Provisioning of harvestable resources		0.8
			Provisioning of cultivated foods		0.2
		Cultural benefits	Cultural heritage		0.2
			Tourism and recreation		0.4
			Education and research		0.5
Class					Intermediate

HGM 1 is performing several important ecological and hydrological functions. These included erosion control, through the stabilisation of soils and reduction in sediment mobilisation; flood attenuation, through the slowing and temporary spreading of flows during runoff events; biodiversity support, by providing habitat distinct from the surrounding terrestrial environment; surface water provision, particularly in the context of an arid landscape where freshwater features are limited; and ecological corridor functioning, by facilitating the movement of fauna through the landscape. Direct human-use benefits are relatively limited, with grazing representing the most apparent direct use of the wetland and buffer zone. Although the erosion control function is considered somewhat constrained by the dominance of non-woody vegetation, the corridor is nonetheless regarded as functionally important within the local landscape.

9.1.4.6.3 PRESENT ECOLOGICAL STATE

The wetlands identified within the project area have exhibited some degree of modification resulting from natural physical changes as well as anthropogenic impacts at both the local and catchment levels. Resultingly, the wetland scored an average Present Ecological State (PES) score within the "C – Moderately Modified" PES classes. The results of the wetland health and integrity assessment is provided in Table 18.

Table 18: Average Present Ecological State scores for the assessed wetlands

PES Assessment	Hydrology	Geomorphology	Water Quality	Vegetation
Ecological Category	**C**	**C**	**B**	**B**
Combined Ecological Category	**C**			

The list below refers to the present-day local impacts observed within the assessed wetland areas:

- Alterations to wetland hydrology as a result of the in-channel dam and adjacent built-up infrastructure in the surrounding catchment, together with local land transformation that has likely modified natural runoff pathways, ponding patterns, and infiltration characteristics;
- Geomorphological disturbance (road and railway culvert crossings) associated with past and ongoing land-use activities, including local surface disturbance, soil compaction, and modification of natural wetland microtopography, with consequent disruption of natural sediment movement and deposition processes;
- Limited vegetation transformation and degradation, with the wetland and its surrounds occurring within a secondary grassland setting resulting in reduced natural wetland vegetation integrity and increased dominance of disturbance-tolerant species; and
- Localised erosion and sedimentation resulting from altered hydrological response and disturbed catchment conditions, further contributing to geomorphological instability and reduced wetland ecological functioning.

9.1.4.6.4 ECOLOGICAL IMPORTANCE AND SENSITIVITY

The Ecological Importance and Sensitivity (EIS) assessment was applied to the HGM units in conjunction with the ecosystem service scores in the preceding sections, to assess the levels of sensitivity and ecological importance of the wetland. Various components pertaining to the protection status of a wetland is considered for the EIS, including Strategic Water Source Areas (SWSA), the NFEPA Wetveg protection status and the protection status of the wetland itself considering the NBA wetland dataset. The results of the assessment are shown in Table 19. The wetlands average EIS scores fall within the "C – Moderate" class. The level of service provision by the wetlands influenced the overall EIS ratings.

Table 19: Aspects considered in the Ecological Importance and Sensitivity assessment

HGM Type	NFEPA Wet Veg			NBA Wetlands			SWSA (Y/N)	CBA / ESA (Y/N)	EIS Class
	Type	Ecosystem Threat Status	Ecosystem Protection Level	Wetland Condition	Ecosystem Threat Status 2018	Ecosystem Protection Level			
HGM 1 UVB	Eastern Kalahari Bushveld Group 3	Least Threatened	Not Protected	C Moderately Modified (Site visit)	Critically Endangered	Not Protected	N	N	**C – Moderate**

9.1.4.6.5 RECOMMENDED ECOLOGICAL CATEGORY AND RECOMMENDED MANAGEMENT OBJECTIVE

The Recommended Ecological Category (REC) and Recommended Management Objective (RMO) for the wetland areas was determined from the results of the PES and EIS assessments. These assessments indicated that all wetland features within the site had, to an extent, undergone transformation as a result of historical and current impacts. Nevertheless, despite the altered ecological integrity of these systems, they are considered to provide ecological services. The appropriate REC and RMO estimated for the wetland areas is presented in Table 19.

9.1.4.7 BUFFER REQUIREMENTS

The buffer requirements for the wetlands were calculated using the Site-Based Tool: Determination of Buffer Zone Requirements for Wetland Ecosystems (Macfarlane et al., 2014). The recommended pre-mitigation and post-mitigation buffer zones for the wetlands in relation to the proposed development area were calculated to be 32 m and 30 m, respectively, as presented in Table 20. The post-mitigation buffer zone is depicted in Figure 11. Given that the surrounding landscape is already modified, and that the proposed activity is not anticipated to constitute a high-impact land use, provided that all recommended mitigation measures are diligently implemented, these buffers are considered sufficient to maintain the resilience and ecosystem services of the wetlands. Furthermore, the specialist-assigned 30 m post-mitigation buffer is consistent with the minimum recommended buffers for low-impact land uses in already modified landscapes, as set out in Annexure 16 of the Buffer Zone Guidelines for Wetlands, Rivers and Estuaries (Macfarlane and Bredin, 2017).

Table 20: Buffer requirements for the relevant wetland features

Aspect	Recommended Pre-Mitigation Buffer	Recommended Post-Mitigation Buffer
HGM 1	32 m	30 m

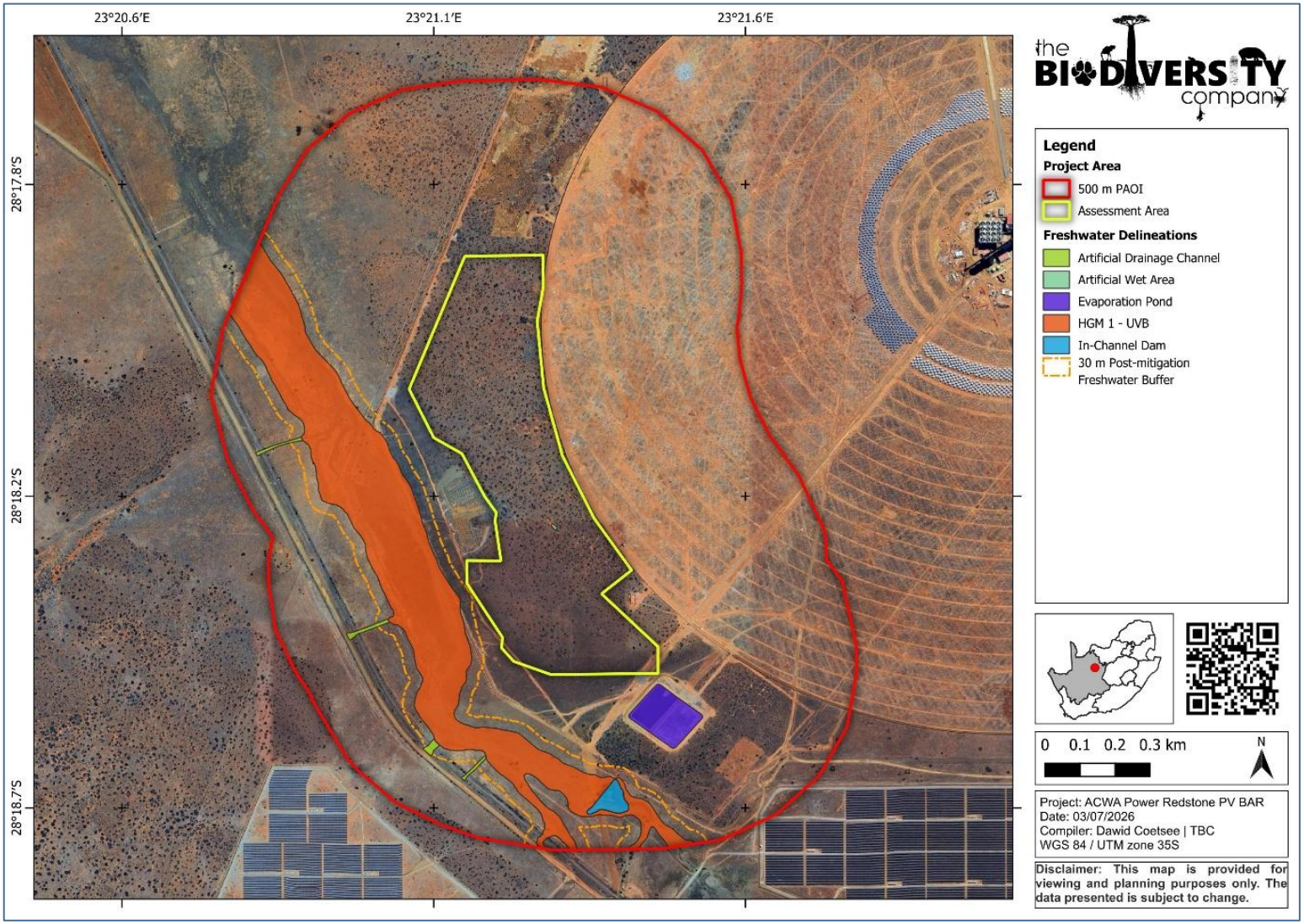

Figure 11: Recommended Buffers for the identified wetlands in relation to the proposed development

9.1.4.8 SITE SENSITIVITY VERIFICATION

The following is deduced from the National Web-based Environmental Screening Tool (Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended): Aquatic Biodiversity Theme sensitivity is "Very High" for the Assessment Area within the PAOI attributed to the presence of a FEPA Subcatchement.

The allocated sensitivities for each of the relevant themes are either disputed or validated for the assessed areas in Table 21 below. A summative explanation for each result is provided as relevant. The specialist-assigned sensitivity ratings are based on the presence or absence of wetlands, the nature of features and the PES and EIS assessment processes followed in the previous section. Furthermore, consideration is given to any observed or likely presence of sensitive fauna and flora.

Table 21: Summary of the screening tool vs specialist assigned sensitivities

Aspect	Screening Tool Theme	Environmental Screening Tool Sensitivity	Specialist Sensitivity	Tool Validated or Disputed by Specialist - Reasoning
HGM 1	Aquatic Biodiversity Theme	**Very High**	**Very High**	Validated – This area is representative of a natural wetland that provides suitable and significant habitat and functionality to support freshwater biodiversity.
30 m Buffer		**Very High**	**Medium**	Disputed – These areas are representative of the wetland area periphery and are of importance in terms of supporting intactness of the features they encompass.
Artificial Drainage Channels Artificial Wet Area In-Channel Dam Evaporation Pond		**Very High**	**Low**	Disputed – These are artificial features which were constructed by human intervention and are therefore reliant on human induced drivers for long-term persistence which if removed, altered or stopped will result in the features not being present. The features do not provide naturally supported ecological services.
Remaining Area		**Very High**	**Low**	Disputed – These areas are not representative of natural wetlands and lack typical wetland indicators.

9.1.5 LANDSCAPE QUALITY AND VISUAL

The field survey involved travelling along the R385 Provincial Road and the Lime Acres District Road in the areas adjacent to and surrounding the Project site to determine the nature and character of the landscape. The site visit was undertaken on 16 June 2026. Panoramas illustrating the landscape character from key viewing sites (see Figure 12 for their locations) within the study area are shown in Figure 13 and Figure 14.

9.1.5.1 LANDSCAPE CHARACTER AND SENSITIVITY

Most of the study area's original landscape was covered by Olifantshoek Plains Thornveld (Mucina and Rutherford 2006:522) on open plains with a shrub layer. According to Mucina and Rutherford (2006:523), this landscape type is the least threatened. The proposed Project site falls within this landscape type. At the far eastern section of the study area, east of the Redstone CSP, lies Kuruman Mountain Bushveld in relatively good condition. Refer to Figure 12 below.

However, almost half of the study area's original landscape has been transformed in recent years by solar power projects, including the Redstone CSP, the Jasper Solar PV power plant, and the Lesedi Solar power plant.

The result is a mixed natural and infrastructural landscape, characterised by open, rolling land as the backdrop to solar power installations. The CSP, however, dominates the visual environment and the sense of place of the study area. Refer also to the panoramas in Figure 13 and Figure 17.

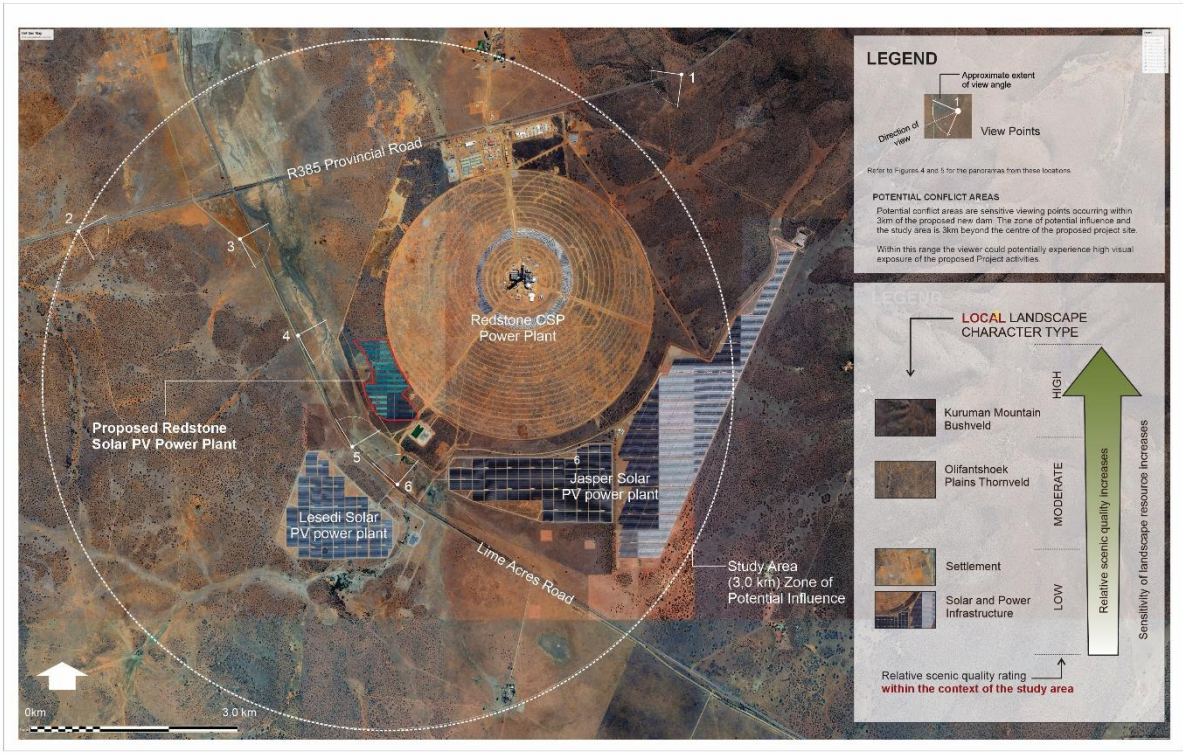

Figure 12: Location of panorama viewpoints and landscape context

Figure 13: Views 1, 2 and 3

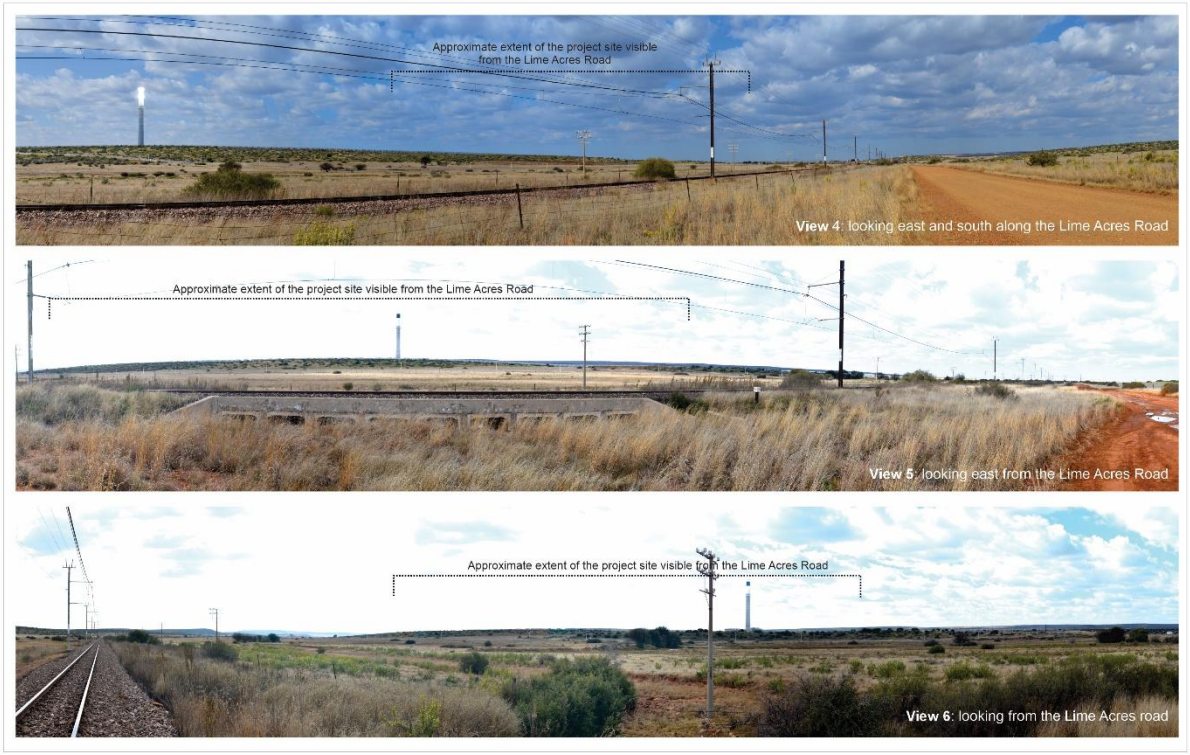

Figure 14: Views 5, 6 and 7

9.1.5.2 **SENSE OF PLACE**

The study area spans an expansive semi-arid plateau characterised by broad horizons, ancient geology, sparse shrublands, and immense skies. Historically defined by its remoteness, simplicity, and pastoral character, the landscape has been increasingly transformed by large-scale solar energy developments. Extensive photovoltaic arrays and associated infrastructure introduce a contemporary technological layer that reflects the region's strategic role in South Africa's renewable energy transition. The resulting landscape is one of dynamic contrast, where enduring natural processes and agricultural land use have transitioned to a renewable energy production landscape, with mining influences, and where cumulative solar development has become one of the defining visual characteristics of the study area.

9.1.5.3 **RECEPTOR SENSITIVITY**

Visual receptors include people living in, visiting, or travelling through or adjacent to the study area. The primary public roads that cross the study area are the R385 Provincial Road and the Lime Acres District Road. Users of these roads, along with residents and visitors to the farmsteads, as shown in Figure 15, would have varying views of the proposed solar PV park from different distances and angles. However, due to the area's topography, the proposed Project would be largely screened from the R385 and other sensitive viewing areas, except for Lime Acres Road, where it would be most visible. Refer to the viewshed in Figure 16.The main potentially sensitive receptor viewpoints are from nearby farmsteads (north and south of the Project site), the R385 and Lime Acres roads, and the residential areas associated with a settlement north-west of the study area.

Notwithstanding the above, the original natural/rural landscape has been dramatically transformed to the point that the study area is dominated by solar power infrastructure. Potentially sensitive viewers would most likely not be alarmed by the addition of the proposed Redstone Solar PV facility. It is therefore anticipated that receptor sensitivity would be low for the proposed Project.

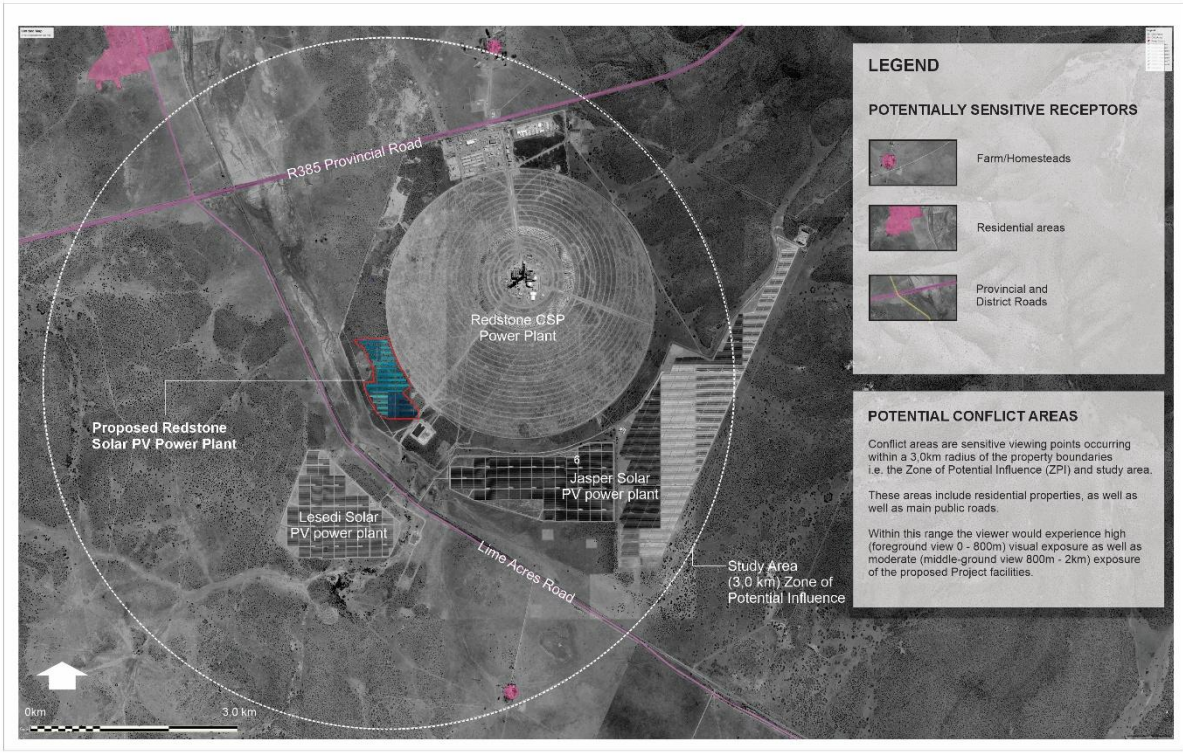

Figure 15: Receptor Sensitivity

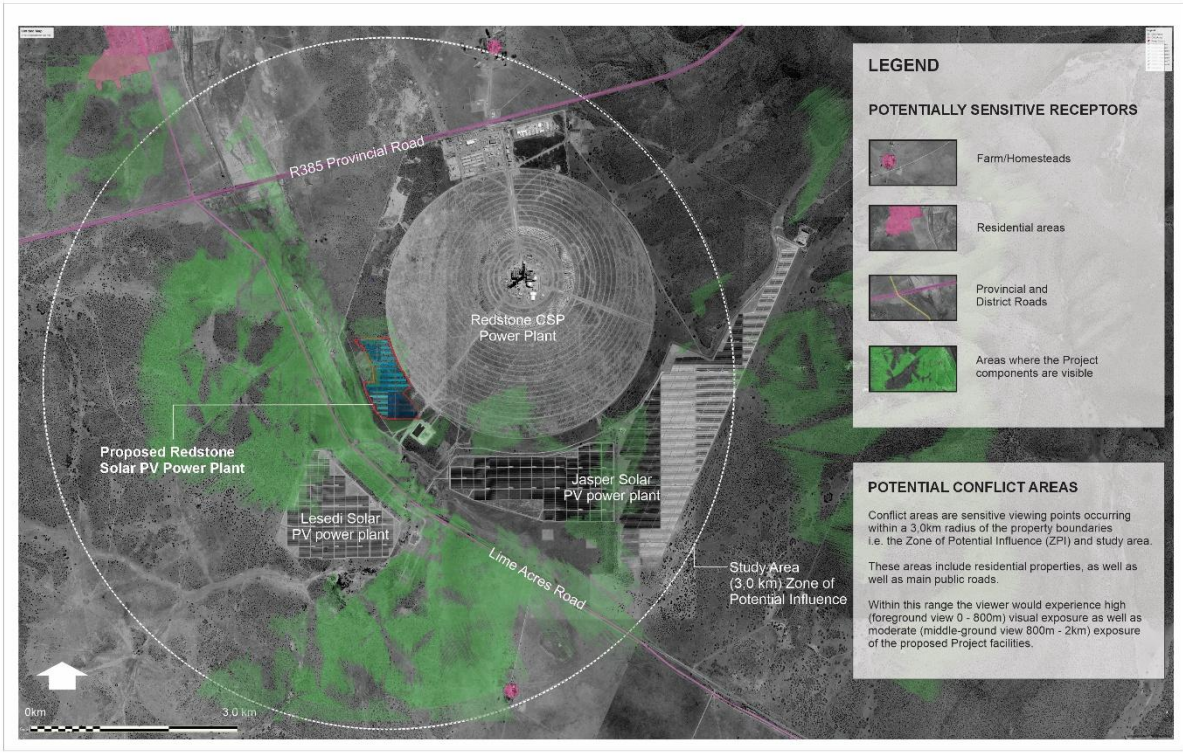

Figure 16: Viewshed Analysis

The Screening Tool did not identify landscape and visual considerations as an environmental theme for this project or assign a sensitivity rating to them.

Given the surrounding land uses and the study area's high capacity to absorb visual changes (see the viewshed in Figure 16), the landscape would largely shield, or at least partially conceal, the project's potential visual impacts. While the site's landscape will undergo a moderate transformation, this change may be perceived neutrally by sensitive viewers.

The proposed development is unlikely to have a major effect on visual, sense-of-place, or landscape qualities, as it would result in limited changes to the main features of the existing landscape. Consequently, the project poses little risk to the sensitive aspects of the surrounding environment, and any impact on the area's scenic value will be minimal.

The proposed new solar PV power plant would recede into the landscape, i.e., it would not be visually intrusive or appear out of place within the sub-region. Visibility and visual intrusion and receptor sensitivity are, therefore, low (-) to negligible (-) as the Project would:

- Have a minimal effect on the visual quality of the landscape
- Contrasts minimally with the patterns that define the structure of the landscape and
- Be mostly compatible/visually acceptable with current land use and enclosure patterns

A low to negligible change in landscape character and sense of place is predicted, as the Project would cause minimal change to potentially sensitive receptors and areas.

9.2 BIOLOGICAL ENVIRONMENT

A site survey was undertaken 21 May 2026. The assessment area comprised a 40ha area, the development footprint will only constitute approximately 19.5ha of the 40 ha area surveyed. During this site visit

information obtained from previous surveys was ratified and the different biodiversity features, habitat, vegetation and landscape units present at the site were inspected in the field. A Walk-through survey was conducted across the site and all plant and animal species observed were recorded. Active searches for reptiles and amphibians were also conducted within habitats likely to harbour or be important for such species. The presence of sensitive habitats such as wetlands or pans and unique edaphic environments such as rocky outcrops or quartz patches were noted in the field if present and recorded on a GPS and mapped onto satellite imagery of the site.

9.2.1 FLORA

Satellite images were used to identify homogenous vegetation/habitat units within the study area. These were then sampled on the ground with the aid of a GPS to navigate in order to characterise the species composition. The following quantitative data was collected:

- species composition,
- cover estimation of each species according to the Braun-Blanquet scale,
- vegetation height,
- amount of bare soil and rock cover,
- slope, aspect
- presence of biotic disturbances, e.g. grazing, animal burrows, etc.

Additional checklists of plant species were compiled by traversing a linear route and recording species as they were encountered. Searches for listed and protected plant species at the site were conducted and all listed plant species observed were recorded.

9.2.2 FAUNA

The faunal study was undertaken as a desktop / literature survey combined with a field survey. The tasks included in each are given below.

9.2.3 DESKTOP/LITERATURE SURVEY

A desktop survey was undertaken to determine the red data reptile, amphibian, mammalian and bird species occurring in the quarter degree square in which the study area falls. The likelihood of red data species occurring on-site has been determined using the i) distribution maps in reference books and ii) a comparison of the habitat described from the field survey.

9.2.4 FIELD SURVEY

The habitats on-site were assessed to compare with habitat requirements of red data species determined during the literature survey. During the site visit the presence and identification of bird and mammal species was determined using the following methods / techniques:

- Identification by visual observation.
- Identification of bird and mammal calls.
- Identification of spoor.
- Identification of faeces.
- Presence of burrows and / or nests.

9.2.5 DESCRIPTION OF THE STUDY AREA

The study area falls within the Olifantshoek Plains Thornveld, which typically is found on plains with an open tree and shrub layer, and is formed by species such as *Vachellia luederitzii, Bosica albitrunca* and *Searsia tenuinervis*. The grass layer is usually sparse with species such as *Schmidtia pappophoroides,*

Figure 17: The study are (red polygon) in relation to the Redstone CSP.

Stipagrostis uniplumis and *Aristida congesta*. The Olifantshoek Plains Thornveld is classified as Least Concern, however the eastern part of the Northern Cape is under higher land transformation pressures than indicated, in the National Biodiversity Assessment report (2025), Mucina & Rutherford (2006). The DAERL spatial analysis has indicated that the areas of highest pressures include the Postmasburg (Beeshoek) to Daniëlskuil areas. Furthermore, the Olifantshoek Plains Thornveld is part of the top 5 vegetation types, currently under the most pressure within the eastern part of the province. Olifantshoek Plains Thornveld is listed as 'Poorly Protected' in the NBA (SANBI 2025) and is devoid of any areas identified in current national or provincial protection strategies. Although it is listed as Least Concern its actual threat status is likely higher.

Figure 18: Critical Biodiversity Areas that occur within the vicinity of the study area

No Critical Biodiversity Areas are present within the proposed development area, however some CBAs occur to the north and east of the study area.

The whole area however does fall within a River FEPA. River FEPAs achieve biodiversity targets for river ecosystems and threatened/near-threatened fish species, and were identified in rivers that are currently in a good condition (A or B ecological category). Their FEPA status indicates that they should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources.

For river FEPAs the whole sub-quaternary catchment is shown in dark green, although FEPA status applies only to the actual river reach within such a sub-quaternary catchment. The shading of the whole sub quaternary catchment indicates that the surrounding land and smaller stream network need to be managed in a way that maintains the good condition (A or B ecological category) of the river reach.

The proposed development site falls with a strategic ground water area known as the Southern Ghaap Plateau SWA. SWA (Strategic Water Areas) are considered to be strategically important at the national level for water and economic security for South Africa. Ground water strategic source areas have high groundwater recharge, protecting the capture zone, the recharge area and the integrity of the aquifers is essential in maintaining ecosystem services and functionality, especially with respect to ensuring the sustainability of aquifer dependent ecosystems.

The site does not fall within an important bird area, nor does it fall within a NPAES focus area and is not directly adjacent to any protected area.

The study area falls within the Griqualand West Centre of Endemism (GWC) (described in van Wyk & Smith 2001). Centre's of endemism are extremely vulnerable; relatively small disturbances in a centre of endemism may easily pose a serious threat to its many range-restricted species (Van Wyk & Smith 2001). The GWC of plant endemism, is recognized for over 23 endemic plant species. These endemics represent 1.4% of the region's flora (Frisby, 2016), with the Postmasburg region being predominantly the core of the centre. The greater Project area is positioned directly within the core and the Southern Kalahari and Langeberge sub-centre which is the area of the highest number of endemic records. The Southern Kalahari and Langeberge sub-centre contains three restricted endemics, namely *Amphiglossa tecta, Brachiaria dura var. pilosa* and *Lithops bromfieldii*. In addition, a total of 15 GWC endemics are present in this sub- centre.

9.2.5.1 **PLANT COMMUNITY DESCRIPTION**

The vegetation within the study area is uniform across the proposed development site. The vegetation type is well represented in the surrounding region and occurs on stony/ rocky soils, situated on slightly elevated areas from nearby grassland and drainage habitat types. The physiognomy is dominated by shrubs that developed because of the rockiness of the substrate. Prominent woody species include *Senegalia mellifera, Calobota cuspidosa, Ehretia rigida, Euclea undulata, Euryops asparagoides, Gymnosporia buxifolia, Olea europaea, Searsia ciliata, Tarchonanthus camphoratus* and *Ziziphus mucronata*. The grass layer is diverse and includes species such as *Aristida congesta subsp. barbicollis, Cymbopogon pospischilii, Digitaria eriantha, Elionurus muticus, Enneapogon scoparius, Eragrostis curvula, Fingerhuthia africana, Heteropogon contortus, Sporobolus nitens, Stipagrostis ciliata, Themeda triandra* and *Trichoneura grandiglumis*. Frequently observed herb species include *Aptosimum albomarginatum , Gazania krebsiana, Geigeria species, Gnidia species,* and *Walafrida densiflora.*

The southern section of the study site contains a small patch of open grassland. This area is flat and low lying and is mostly devoid of rocks. Grass species that occur within this unit include *Aristida congesta subsp. barbicollis, Aristida stipitata, Cymbopogon pospischilii, Eragrostis lehmanniana, Eragrostis obtusa, Fingerhuthia africana, Heteropogon contortus, Microchloa caffra, Sporobolus nitens* and *Stipagrostis ciliata*. The herbaceous stratum is diverse and includes the dominant species *Arctotis arctotoides, Berkheya species, Boophane disticha, Brunsvigia radulosa , Felicia species, Gazania krebsiana, Geigeria species* and *Hermannia species.*

Figure 19: Typical example of the vegetation that occurs within the study area.

The site mostly consists of primary vegetation, however there are areas of historical disturbance, most notably some excavations. The property currently has some sheep and goats grazing.

Figure 20**:** One of the excavations present within the study area.

9.2.5.2 **POPULATIONS OF SENSITIVE AND/OR THREATENED SPECIES**

9.2.5.2.1 FLORA

Historical records of Red List plant species were consulted as well as previous floral surveys conducted by the author in and around the study site in order to determine the likelihood of any such species occurring in the study area and these were searched for in the field. Plant species observed as well as a list of threatened plant species previously recorded in the quarter degree grids in which the study area is situated which was obtained from the South African National Biodiversity Institute, are listed in Table 22 below.

Table 22: Potential and recorded Protected Plant species on site

Species	Status	Permit/applicable Legislation	Record of occurrence
Antimima lawsonii	Rare	NCNCA schedule 2	Not recorded on site
Pentzia oppositifolia	Rare	National red list	Not recorded on site
Drimia sanguinea	Near Threatened	National red list	Not recorded on site
Pelargonium dolomiticum	Least Concerned	NCNCA schedule 1	Not recorded on site
Lessertia frutescens	Least Concerned	NCNCA schedule 1	Not recorded on site but recorded in surrounding area
Pachypodium succulentum	Vulnerable	NCNCA schedule 2	Not recorded on site but recorded in surrounding area

Species	Status	Permit/applicable Legislation	Record of occurrence
Boophane disticha	Least Concerned	NCNCA schedule 2	Not recorded on site but recorded in surrounding area
Ammocharis coranica	Least Concerned	NCNCA schedule 2	Recorded on site
Olea europeae	Least Concerned	NCNCA schedule 2	Recorded on site
Aloe cf gradidentata	Least Concerned	NCNCA schedule 2	Not recorded on site but recorded in surrounding area
Aloe hereroensis	Least Concerned	NCNCA schedule 2	Not recorded on site but recorded in surrounding area
Bulbine narcissifloia	Least Concerned	NCNCA schedule 2	Recorded on site
Bulbine abyssinica	Least Concerned	NCNCA schedule 2	Recorded on site
Jamesbrittenia integerrima	Least Concerned	NCNCA schedule 2	Not recorded on site but recorded in surrounding area
Orbea cf lutea	Least Concerned	NCNCA schedule 2	Not recorded on site but recorded in surrounding area
Anacampseros filamentosa	Least Concerned	NCNCA schedule 2	Not recorded on site but recorded in surrounding area
Eulophia hereroensis	Least Concerned	NCNCA schedule 2	Not recorded on site but recorded in surrounding area
Lithops aucampiae L.Bolus subsp. aucampiae	Least Concerned	NCNCA schedule 2	Recorded on site
Euphorbia patula	Least Concerned	NCNCA schedule 2	Not recorded on site but recorded in surrounding area
Brunsvigia radulosa	Least Concerned	NCNCA schedule 2	Recorded on site
Crassula capitella	Least Concerned	NCNCA schedule 2	Not recorded on site but recorded in surrounding area
Vachellia erioloba	Least Concerned	National Forestry Act	Not recorded
Vachellia haematoxylon	Least Concerned	National Forestry Act	Not recorded
Boscia albitrunca	Least Concerned	NFA & NCNCA schedule 2	Not recorded

9.2.5.3 **FAUNA**

The proposed development site is situated adjacent to the Redstone CSP, currently the landowner is running some sheep and goats as well as a small herd of springbok within this proposed development area. There was not a lot of other faunal activity noticeable, some evidence of other antelope species such as steenbok and duiker, and commonly occurring animals such as ground squirrels and hares. Very little bird activity was observed during the site survey. Disturbances that alter the natural environment have two effects namely, it may cause the loss of certain species due to the destruction of habitat. It may also cause the influx of other species previously unable to colonise an area owing to lack of suitable habitat or because they have been excluded through competition.

It was not possible to compile a complete list of species present on the property during the field survey owing to the limited time frame of the assessment. It is therefore important to note that many species that potentially occur on-site may not have been identified thus emphasis was placed on the habitat in order to determine potential occurrence of species. The potential of occurrence is also assessed for the immediate surrounding area as to establish the possibility of ecological linking corridors for certain species. A detailed search and rescue operation is proposed as mitigation to address this limitation and is included in the recommended mitigation measures.

9.2.5.3.1 REPTILES SPECIES OF CONSERVATION CONCERN

No red data terrapin, tortoises, snakes or lizards were identified as occurring in the quarter degree square, based on the distribution maps available in the South African Red Data Book for reptiles (Bates *et. al*. 2014) and The Southern African Reptile Conservation Assessment (SARCA). The conservation status was cross checked on the IUCN website to determine most recent status listing for these species. Although none of the regionally occurring reptile species are Red-listed, two species are listed in the NCNCA as being Specially Protected in the Northern Cape. These species have the potential to occur in the greater area but were not observed within the proposed development site. They are likely to be mostly associated with the rocky outcrops and watercourses in the greater area where habitat structure, prey availability and vegetation cover is suitable.

Table 23: Potential and recorded Protected reptile species on site

Species	Common Name	Status	Permit/applicable Legislation	Record of occurrence
Karusasaurus polyzonus	Karoo Girdled Lizard	LC	NCNCA schedule 1	Not recorded on site but recorded in surrounding area
Chamaeleo dilepis	Common Flapneck Chameleon	LC	NCNCA schedule 1	Not recorded on site but recorded in surrounding area

9.2.5.3.2 AMPHIBIANS OF CONSERVATION CONCERN

Only one red data amphibian is likely to occur in the quarter degree square, based on the distribution maps available in the South African Red Data Book for amphibians (Minter *et al*., 2004) Du Preez and Carruthers (2009) and the South African Frog Atlas project, namely the Giant Bullfrog (*Pyxicephalus adspersus*). However, their prevalence in the area is low and the highly ephemeral nature of the pan means that breeding is unlikely and thus their presence is likely to be transitory at best. There are however some species that are protected in terms of the NCNCA that may occur in the area. Although the arid nature of the region

and the general lack of seasonally to permanently inundated waterbodies (only highly temporary ephemeral washes) in the region severely limits the potential occurrence of these in the area.

Table 3: Potential and recorded Protected amphibian species on site

Species	Common Name	Status	Permit/applicable Legislation	Record of occurrence
***Pyxicephalus adspersus*)**	Giant Bullfrog	NT	TOPS	Not recorded
Cacosternum boettgeri	Common Caco	LC	NCNCA schedule 2	Not recorded
Tomopterna cryptotis	Tremolo sand frog	LC	NCNCA schedule 2	Not recorded

9.2.5.3.3 BIRDS OF CONSERVATION CONCERN

A list of all red data bird species occurring in the quarter degree square, was extracted from the SABAP 1 and SABAP 2 databases and Birdlife South Africa's Important Bird Areas and from the Red Data Book of Birds (Taylor *et al* 2015) with the distribution being confirmed in Roberts – Birds of Southern Africa, 7th edition (Hockey *et al.*, 2005). The IUCN 3.1. status is also presented in the table. No avifaunal SCC were observed within the proposed development site during the survey. Species that could potentially occur either on-site or within 500m of the property boundary is provided in Table 24 below.

Table 24: Potential Protected bird species on site

Common Name	Scientific Name	Conservation Status (*Regional, Global)	Suitable Habitat requirements[1]
Blue Crane	*Anthropoides paradiseus*	Near Threatened Vulnerable	Grasslands, cultivated lands Karoo scrub and edges of vleis
Kori Bustard	*Ardeotis kori*	Near Threatened Near Threatened	Dry thornveld grassland, arid scrub requires the cover of some trees
Lanner Falcon	*Falco biarmicus*	Vulnerable Least Concerned	Lanner Falcons are generally a cliff nesting bird, but have adapted to using the disused nests of Black and Pied crows, situated either in trees or on power lines For foraging purposes, Lanner Falcons utilise a wide range of habitats, from semi desert to woodland, agricultural land and also

[1] Habitat requirements determined using the following reference material: Harrison et al., 1997a; Harrison et al., 1997b; ; Hockey et al., 2005

Common Name	Scientific Name	Conservation Status (*Regional, Global)	Suitable Habitat requirements[1]
			occurs in cities, but appear to prefer open habitats
Secretary bird	*Asagittarius serpentarius*	Vulnerable Vulnerable	This species shows a preference for open country, mainly savannah, open woodland, grassland, dwarf shrubland, mountain slopes and man-made habitats such as grazing paddocks and fallow fields
African White backed Vulture	*Gyps africanus*	Critically endangered Critically endangered	Savannah and bushveld. Nest in tall trees (*Vachellia erioloba).*
Cape Vulture	*Gyps coprotheres*	Endangered Endangered	Widespread in southern Africa where it can be found in open grasslands and woodlands, from sea level to very high mountains provided there are high cliffs to breed on. They can, however, roost on trees and pylons far away from their breeding sites.
Martial Eagle	*Polemaetus bellicosus*	Endangered, *Vulnerable*	Woodland, savannah or grassland with clumps of large trees or power pylons for nest sites
Verreaux's Eagle	*Aquila verreauxii*	Vulnerable *Least Concern*	Verreaux's Eagle is a solitary nester that builds a massive stick structure on a rocky outcrop or cliff, or more rarely in a tree or on a power pylon
Tawny Eagle	*Aquila rapax*	Endangered, Vulnerable Protected (NEMBA)	Woodland and savanna to semiarid savanna or grassland with scattered Acacia trees

Common Name	Scientific Name	Conservation Status (*Regional, Global)	Suitable Habitat requirements[1]
Black stork	*Ciconia bigra*	Vulnerable *Least Concern*	Marshes, dams rivers and estuaries breeds in mountainous regions
Ludwig's Bustard	*Neotis ludwigii*	Endangered *Endangered*	Requires semi-arid dwarf shrublands, occasionally visiting the southern Kalahari.
Lappetfaced Vulture	*Torgos tracheliotos*	Endangered *Endangered*	Savannah; semi arid regions closely associated with *Vachellia* spp, *Bosica albitrunca* and *Terminalia pruniode*s

9.2.5.3.4 MAMMALS OF CONSERVATION CONCERN

A list of all red data mammal species occurring in the quarter degree squares, was extrapolated from the Red Data Book for Mammals (EWT, 2004) and the MammalMAP, the Mammal Atlas of Africa database. Based on an evaluation of the habitat requirements for these red data species (EWT, 2004; Skinner and Chimimba, 2005), Table 25 lists the regionally occurring, free-ranging species (excluding all managed game species) that owing to historical distribution records and habitat types could occur. During the survey no SCC were encountered.

Table 25: Potential Protected mammal species on site

COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS[2]	SUITABLE HABITAT ON-SITE[3]	POTENTIAL FOR OCCURRENCE ON-SITE AND SURROUNDING AREA
South African hedgehog	*Atelerix frontalis*	Near Threatened	The South African Hedgehog is a nocturnal species that has been recorded to occur in grassland, resting curled up under matted grass, in debris under the shade of bushes or in holes under the ground	**High –** Area has sufficient grassland and bushes thus suitable habitat is present.

[2] Status based on listing in the National Red List of Mammals 2016

[3] Habitat requirements determined using the following reference material: Skinner and Smithers, 1990; EWT, 2004; Skinner and Chimimba, 2005

COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS[2]	SUITABLE HABITAT ON-SITE[3]	POTENTIAL FOR OCCURRENCE ON-SITE AND SURROUNDING AREA
Brown hyaena	*Hyaena brunnea*	Near Threatened	They occur in semidesert scrub, open scrub and open woodland savannah. As they are nocturnal, cover in which to lie in during the day is essential, such as dense shade or holes in the ground. This species has been reported in the general vicinity of the site, and it is possible that this species may currently visit the site as a vagrant when feeding.	**Low** –the substantial amount of activity make it unlikely that this animal will occur in the area
Dent's Horseshoe Bat	*Rhinolophus denti*	Near threatened	Requires substantial cover such as caves and rock crevices.	**Low** – Roosting habitat in the form of rock crevices may be available in the old mining area adjacent to the site. However suitable roosting habitat is limited for this species, it is unlikely that this species would have colonised the study site.
Black-footed Cat	*Felis nigripes*	Vulnerable	Arid and mesic savannah and scrubland, prefer rocky areas	**Moderate –** limited suitable habitat
Temminck's round pangolin	*Smutsia temminckii*	Vulnerable	Arid and mesic savannah and woodland with annual rainfall of 250-1,400 mm.	**High**– Suitable habitat within the study area.

9.2.5.4 ALIEN/INVASIVE SPECIES

The Conservation of Agricultural Resources Act (CARA) regulates and restricts the propagation, harbouring and sale of invasive alien plant and weed species listed in a set of Regulations published in terms of the Act. CARA was amended in 2001 and is administered by the National Department of Agriculture. In addition, the Northern Cape Nature Conservation Act (Act 9 of 2009), Chapter 7 states that no person may import, export, transport, possess or trade in an invasive species and that the owner of land upon which an invasive species is found, must take the necessary steps to eradicate or destroy such species. Schedule 6 of this Act lists a number of species classified as invasive.

The National Environmental Management: Biodiversity Act (NEMBA – Act no. 10 of 2004) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. All listed IAPs are divided into four categories in accordance with the Government Gazette Notice No. 40166 of July 2016 as listed below:

Table 6: Alien invasive species noted to occur within and surrounding the proposed development area

Botanical and Common Name	Category Under NEMBA
Argemone Mexicana **(Yellow Mexican Poppy)**	2
Prosopis glandulosa (Honey Mesquite)	1b
Datura ferox **(fierce thornapple)**	Ib
Xanthium spinosum **(Spiny cocklebur)**	1b
Cirsium vulgare **(Scotch thistle)**	1b
Nicotiana glauca **(tree tobacco)**	1b
Opuntia ficus indica (Sweet Prickly Pear)	1b
Argemone ochroleuca **(White Flowered Mexican Poppy)**	1b
Prosopis velutina (Velvet Mesquite)	3
Opuntia humifusa (Creeping Prickly Pear)	1b

9.2.5.5 SCREENING TOOL SENSITIVITY VERIFICATION

The DFFE Screening Tool assigned the site a Very High Terrestrial Biodiversity Sensitivity rating. The specialist terrestrial biodiversity assessment verified this sensitivity through a desktop review and field survey of the proposed development area.

The assessment confirmed that the site is located within the Olifantshoek Plains Thornveld, a vegetation type classified as Least Concern, and that no Critical Biodiversity Areas (CBAs) occur within the proposed development footprint. The vegetation is largely uniform and remains in a generally good condition, although some historical disturbances are present.

Several protected plant species were recorded within the study area, including *Lithops aucampiae*, *Brunsvigia radulosa*, *Ammocharis coranica*, *Bulbine abyssinica*, *Bulbine narcissifolia* and *Olea europaea* subsp. *cuspidata*. However, these species are not restricted to the site and suitable habitat remains well represented in the surrounding landscape. No significant concentrations of threatened plant species,

unique vegetation communities, or irreplaceable terrestrial biodiversity features were identified within the proposed development footprint.

Based on the field verification, the majority of the site was classified as having moderate terrestrial biodiversity sensitivity, reflecting the presence of intact natural vegetation and protected plant species, but not biodiversity features of exceptionally high conservation importance. The specialist assessment concluded that, with the implementation of appropriate mitigation measures and permitting requirements for protected flora, the anticipated impact on terrestrial biodiversity would be of medium-low to low significance.

Accordingly, the terrestrial biodiversity assessment found that the Screening Tool's Very High Terrestrial Biodiversity Sensitivity rating overestimates the sensitivity of the site at a local scale, and that a Moderate Terrestrial Biodiversity Sensitivity rating is more representative of the verified on-site conditions.

9.3 SOCIAL AND CULTURAL ENVIRONMENT

The proposed Redstone PV development is located on the Remaining Extent of Farm 469 within the Tsantsabane Local Municipality (LM), which forms part of the ZF Mgcawu District Municipality in the Northern Cape Province. The site is situated approximately 30 km east of Postmasburg and is located within the existing Redstone CSP development area.

9.3.1 DEMOGRAPHIC PROFILE

The surrounding area is characterised by a relatively small and dispersed rural population associated with the mining, agricultural and renewable energy sectors. The original socio-economic assessment identified a population of approximately 29 150 people within the Tsantsabane Local Municipality, residing in approximately 7 485 households. Population growth in the municipality has historically exceeded that of the district and province, largely due to economic activity associated with mining developments in the region (UrbanEcon, 2026;UrbanEcon, 2018).

Average household incomes within the municipality are lower than provincial and national averages, with a relatively high proportion of households reporting no income. These conditions reflect the socio-economic challenges experienced within the area and indicate the importance of employment and economic development opportunities.

9.3.2 EMPLOYMENT AND ECONOMIC CONTEXT

The local economy is strongly influenced by mining activities and associated industries. The Tsantsabane Local Municipality has historically recorded unemployment levels higher than provincial and national averages despite relatively high labour force participation rates. This suggests that many economically active individuals continue to seek employment opportunities within the area.

The local economy is dominated by the mining sector, followed by community services, transport, finance and trade. The economy is therefore vulnerable to fluctuations in commodity prices and mining activity, highlighting the importance of economic diversification through alternative sectors such as renewable energy development.

Renewable energy developments have become an established component of the regional economy, with several solar energy facilities already developed within the broader area. The existing Redstone CSP facility is operational and forms part of this evolving renewable energy landscape.

9.3.3 HOUSING AND BASIC SERVICES

The municipality exhibits a mixture of formal and informal housing, with the original assessment reporting lower access to formal housing and electricity than provincial averages. However, access to water and

sanitation services was found to be comparatively good, with a high proportion of households having access to water and sanitation infrastructure within their properties or yards.

Given that the proposed PV facility will be developed within an existing authorised energy development area and will utilise existing infrastructure and operational support systems associated with the Redstone CSP facility, no material demands on local housing or municipal services are anticipated.

9.3.4 CURRENT SOCIO-ECONOMIC ENVIRONMENT

The 2026 amendment assessment (UrbanEcon, 2026; APPENDIX D) undertaken in conjunction with the socio-economic impact assessment conducted as provided in APPENDIX D, confirmed that no significant changes have occurred within the receiving social environment since the earlier assessments were undertaken. The primary change in the area has been the construction and operation of the Redstone CSP facility together with other authorised renewable energy developments in the broader region. No changes were identified that would alter the socio-economic baseline or materially affect the conclusions of the previous studies.

The receiving environment is therefore considered to be one where employment creation, skills development, economic diversification and investment remain important social and economic priorities. Renewable energy developments continue to align with these priorities through their contribution to economic activity and support for South Africa's energy transition objectives.

9.3.5 SENSITIVITY OF THE SOCIAL ENVIRONMENT

The social sensitivity of the receiving environment is considered to be low to moderate. While the area experiences socio-economic challenges associated with unemployment and income disparities, the proposed PV facility is located within an existing energy development area and does not require the displacement of communities or loss of public infrastructure. The project area is already characterised by large-scale industrial and renewable energy development activities, and the proposed development is expected to complement existing land uses rather than introduce a substantially new activity into the area.

Consequently, the receiving environment is considered capable of accommodating the proposed development, with anticipated social effects largely limited to positive economic contributions through employment opportunities, skills development and expenditure within the regional economy.

9.4 CULTURAL HERITAGE

The Redstone PV plant is situated adjacent to the south of the Redstone CSP (Figure 21). It is located on a farm in which sheep husbandry is taking place (Figure 22). Although the farm is adjacent to the CSP, they are separated by gates and a fence (Figure 23).

Vegetation in the development footprint is mainly characterised by the Ghaap Plateau Vaalbosveld. Due to its proximity to Kuruman, other vegetation types in the area also consist of the Kuruman Mountain Bushveld and Thornveld. The Ghaap Plateau Vaalbosveld consists of an open shrubland with dense patchy shrubland areas with a well-developed grass layer and substantial wood species such as Acacias and Vaalbos (Mucina and Rutherford, 2006, Figure 24).

Figure 21: Redstone CSP to the north of the study area.

Figure 22: Sheep husbandry in the area.

Figure 23: Outer CSP fence separating the study area from the existing CSP.

Figure 24: Mixture of open and dense shrublands.

9.4.1 OVERVIEW OF THE STUDY AREA AND SURROUNDING LANDSCAPE

9.4.1.1 **THE STUDY AREA AND SURROUNDINGS DURING THE STONE AGE**

The archaeological literature does not contain much information on the Stone Age archaeology of this area. It is likely that this reflects a lack of research rather than the fact that Stone Age sites are not found in this area.

9.4.1.1.1 2.5 MILLION TO 250 000 YEARS AGO

The Earlier Stone Age (ESA) is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammer stones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian and comprises more refined and better-made stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates to approximately 1.5 million years ago.

The Kuruman area has a very long Stone Age record, especially in and around the Kuruman Hills. The most important nearby site is Wonderwerk Cave (70km N of the study area), a National Heritage Site between Danielskuil and Kuruman, which preserves archaeological deposits spanning the Earlier, Middle and Later Stone Ages, with evidence of human activity extending back perhaps close to 2 million years (sahra.org.za). The cave has yielded Earlier Stone Age material, Acheulean hand-axe traditions, Middle Stone Age deposits, pigment use, engraved objects, Later Stone Age artefacts, ostrich-eggshell beads and rock art

(wonderwerkcaves.com). Another great example of both an earlier Stone Age and Middle Stone Age site is the Kathu complex just east of the Sishen Mine (Beaumont 2004).

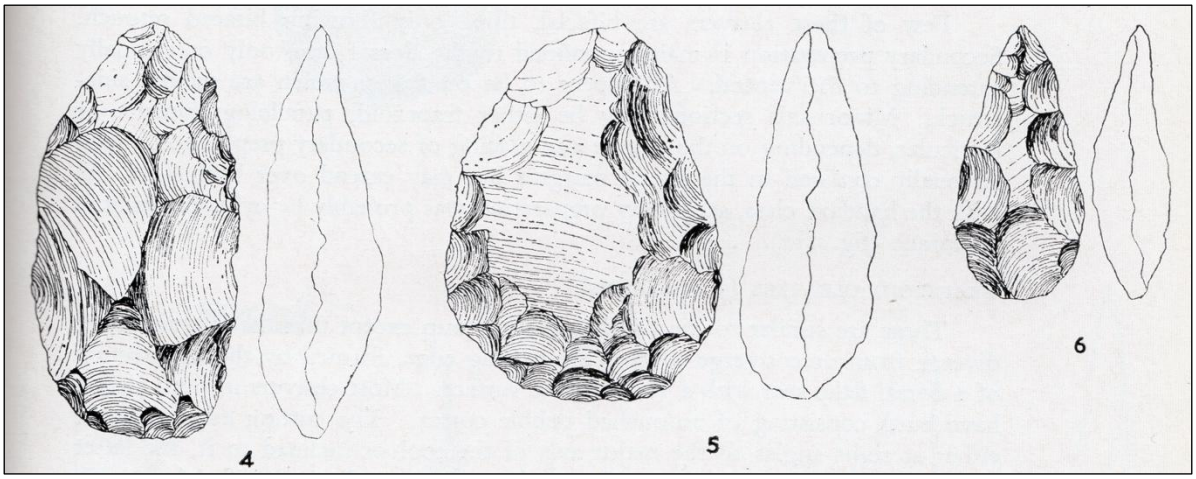

Figure 25: EExample of Early Stone Age handaxes associated with the Later Acheulian. These handaxes were identified at Blaaubank near Rooiberg. Cropped section of an illustration published in Mason (1962:199).

9.4.1.1.2 250 000 TO 40 000 YEARS AGO

The Middle Stone Age (MSA) is the second oldest phase identified in South Africa's archaeological history. This phase is associated with flakes, points and blades manufactured by means of the so-called 'prepared core' technique.

An important Middle Stone Age locality is Ga-Mohana Hill North Rock Shelter, about 82 km north-west of Kuruman, where stratified Middle and Later Stone Age deposits include knapped stone artefacts, fauna, ostrich eggshell fragments and beads, with the oldest Middle Stone Age occupation dated to around 105 000 years ago (Wilkins 2023).

9.4.1.1.3 40 000 YEARS AGO TO THE HISTORIC PAST

The Later Stone Age (LSA) is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths. A well-known feature of the Later Stone Age is rock art in the form of rock paintings and engravings. As described above, an important example of later Stone Age material is from the Ga-Mohana Hill North Rock Shelter which also contains rock art which can often be associated with the later Stone Age (Wilkins 2023). These sites highlight the reusability of the Kuruman landscape by hunter-gatherer peoples, especially around hills, shelters, pans and water sources.

9.4.1.2 THE STUDY AREA AND SURROUNDINGS DURING THE IRON AGE

9.4.1.2.1 1600S – 1800S

Evidence for Iron Age sites within the broader Kuruman–southern Kalahari region is more sparce than the Stone Age record. There are no substantial Iron Age sites near the study area. The closest Iron Age site is located 75km northwest of the study area on a ridge just above the Mashoweng River and is known as Dithakong. The site was roughly inhabited from 1600s into the historical period around the early 1800s. The site contains extensive dry-stone walling, which is a part of the Type Z settlement. Stone walling is highly associated with farmer communities and peoples of the Iron Age (https://en.wikipedia.org/wiki/Dithakong).

9.4.1.3 THE STUDY AREA AND SURROUNDINGS DURING THE HISTORICAL PERIOD

The Historical Period within the study area and surroundings commenced with the arrival of newcomers to this area. Kuruman became closely associated with the Tswana-speaking communities of the region and with the major spring known as Gasegonyane or the Eye of Kuruman, which provided a reliable water source in the semi-arid Kalahari-edge landscape (visitkuruman.co.za). The area later became an important mission centre when the London Missionary Society established a mission in the Kuruman area in 1816. The mission moved to its present site at Seodin in 1824 (visitkuruman.co.za). Robert and Mary Moffat lived and worked there for much of the 19th century, and the mission became famous for education, printing and the translation of the Bible into Setswana. The Moffat Church was completed in 1838, before the formal town of Kuruman was laid out (visitkuruman.co.za). Kuruman later developed as a colonial and settlement centre, supported by water from the Eye, agriculture, cattle farming, transport routes and mining activity in the surrounding Northern Cape landscape.

9.4.1.4 THE STUDY AREA AND SURROUNDINGS DURING THE SOUTH AFRICAN WAR

On 11 October 1899 war broke out between Britain and the two Boer republics of the Orange Free State and Transvaal (Zuid-Afrikaansche Republiek). The war-ravaged large parts of South Africa for almost three years. One of the features of this conflict was the early use of concentration camps to control the movement of the enemies of the British, as well as besieging British towns.

9.4.1.4.1 1899 - 1900

During the South African War (1899-1902) a number of battles and skirmishes were fought in the wider area, though none inside the present development area. An example of a battle which took place in the area, however, consists of the Siege of Kuruman. The siege of Kuruman took place between November 12,1899, to January 1, 1900, during the Second Anglo-Boer War. The town was besieged by a large Boer force led by General J.P. Snyman and defended by approximately 35 Cape Police officers under Captain Bates, 30 local civilians, and around 50 local tribesmen. Although the Boer force vastly outnumbered the British defence, the British defence with the help of the locals managed to hold the Boer force back for 7 weeks. However, due to the size of the Boer force, they eventually successfully besieged the town of Kuruman on the 12 November 1900, only sustaining 3 deaths and 15 injuries (www.battletoursza.com).

9.4.1.5 THE STUDY AREA AND SURROUNDINGS DURING THE TWENTIETH CENTURY

The general surroundings of the study area underwent significant changes and development during the twentieth century, including the further establishment and development of asbestos mines as well as extensive development of farms in the area.

9.4.1.5.1 LATE 1800S – 2002/2003

Asbestos Mining started predominantly around Prieska in the late 1800s and then extended to Kuruman by the early 1900s. During the first world war, blue asbestos mining in the Kuruman and Prieska areas boomed due to the highly sought after heat resistant, insulation, and industrial properties of the blue asbestos. However, due to the dangers of inhaling blue asbestos for both the miners and nearby settlements, the mining industry declined around 1975. Consequently, around 2002/2003, mining of blue asbestos completely halted (teWaterNaude 2014).

9.4.2 ARCHIVAL AND HISTORICAL MAPS

The examination of historical data and cartographic resources represents a critical tool for locating and identifying heritage resources and in determining the historical and cultural context of the study area. Relevant topographic maps and satellite imagery were assessed, by overlaying the study area on the images or map sheets, to observe the development of the area and to identify and locate historical structures,

possible BGG and/or archaeological sites protected under section 34 and 36 of the NHRA, present in, or immediately adjacent to, the area.

Historical topographic maps 1:50 000 scale 2823AD - current and historical editions (1970 and current) were available for utilisation in the background study. As can be seen on the historical maps (Figure 26), the area had been left open with a nearby railway track and some farmsteads outside the study area.

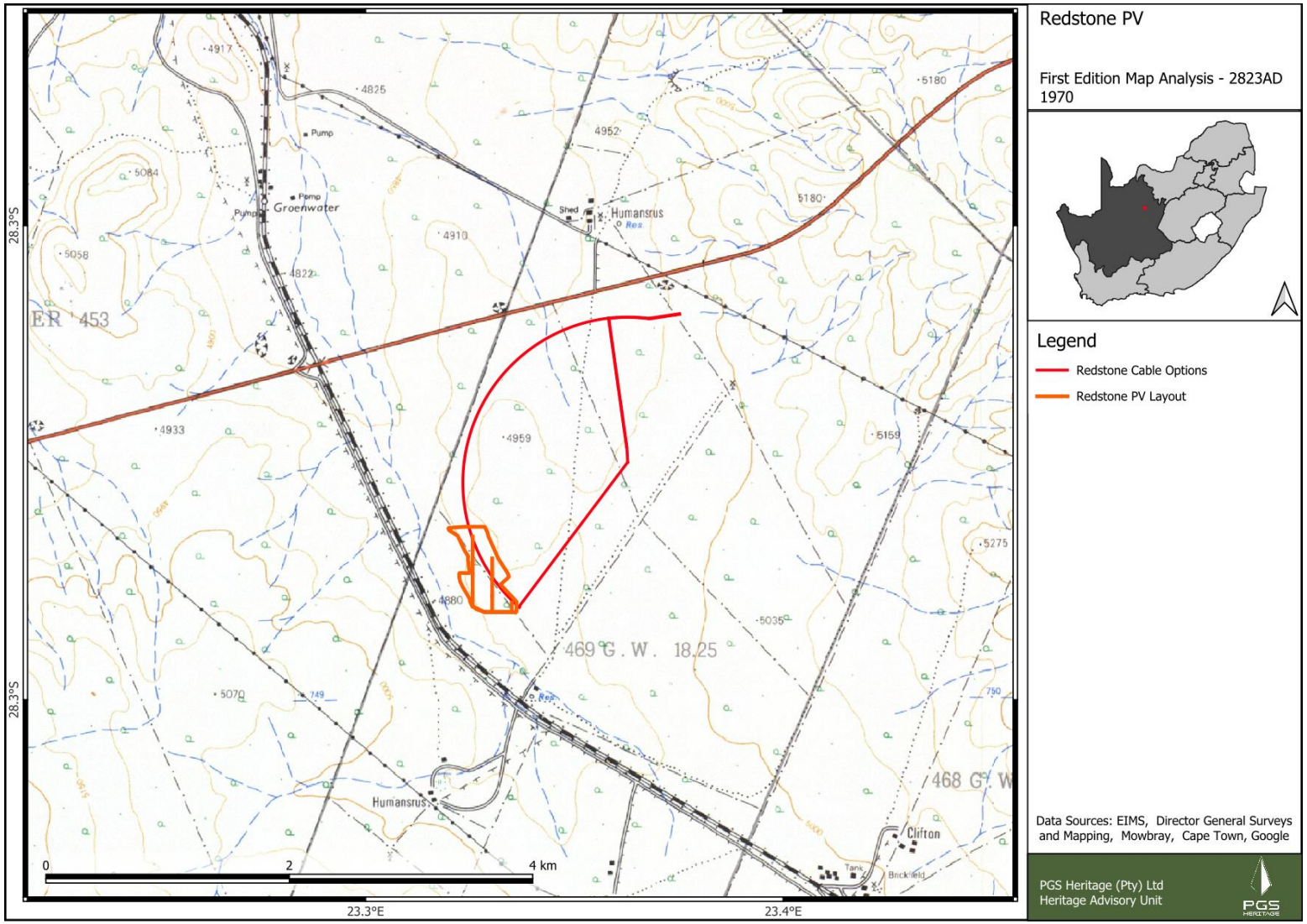

Figure 26: A First Edition historical map from 2823AD 1970.

9.4.2.1 PREVIOUS HERITAGE IMPACT ASSESSMENT REPORTS FROM THE STUDY AREA AND SURROUNDINGS

A search of the SAHRIS database revealed that several previous archaeological and heritage impact assessments had been undertaken within the surroundings of the study area. In each case, the results of each study are shown in bold. These previous studies are listed below in ascending chronological order:

- Webley, L. & Halkett, D. 2008. Phase 1 Heritage Impact Assessment: Proposed Prospecting on the Farms Adams 328 and Erin 316, Kuruman, Ga-Segonyana Municipality, Northern Cape. Archaeology Contracts Office, University of Cape Town, prepared for Zama Mining Resources (Pty) Ltd. **The study identified several heritage resources, including two ephemeral Middle Stone Age scatters, graves, possible hand-excavated wells, twentieth-century farm buildings, workers' cottages, kraals, dams, boreholes and a small MSA/LSA artefact scatter near a well.**

- Pelser, A.J. 2012. Report on an Archaeological Impact Assessment for the Proposed Housing Development on Erf 675, Kuruman, Northern Cape. Archaetnos Culture & Cultural Resource Consultants. **A number of low significance stone tools were located across the study area.**

- Van Der Walt, J. 2012. Archaeological Impact Assessment for the Proposed Prospecting Right of a Quarry on the Farm Gamohaan 438 Portion 1, Kuruman Magisterial District. Heritage Contracts and Archaeological Consulting CC, prepared for Site Plan Consulting CC / Afrimat. **No heritage sties were located during the study.**

- Wiltshire, N. 2018. Kuruman WEF for the Proposed Development of the Phase 2 Kuruman Wind Farm Facility, Kuruman, Northern Cape Province: Scoping Report. CTS Heritage. **The study identified Early, Middle and Later Stone Age sites, possible rock art, ruined farm infrastructure, old mines, graves and burial grounds, built-environment resources and some mining heritage sites.**

- Matabane, A.M. 2021. A Heritage Impact Assessment Report for the Proposed Construction of the N14/R31 Bypass Road in Kuruman, Ga-Segonyane Local Municipality, Northern Cape Province, South Africa. Reach Archaeology Consulting, prepared for Lesekha Consulting. **The study identified a historical resource which consists of the historical Kuruman Nature Reserve entrance gate.**

- Fivaz, H. & Engelbrecht, J. 2021. Phase 1 HIA Report: Proposed Subdivision, Rezoning and Development of Erf 4440, Kuruman, Ga-Segonyana Local Municipality, John Taolo Gaetsewe District Municipality, Northern Cape. Ubique Heritage Consultants, prepared for EnviroAfrica. **The study identified one isolated Middle Stone Age lithic and one unfenced Burial ground.**

9.4.2.2 HERITAGE SCREENING

A heritage screening was conducted by means of the DFFE National Web-based Environmental Screening Tool as required GN 982. According to the heritage screening report, the project area has a Low Heritage Sensitivity (Figure 27). The fieldwork is in agreement with the sensitivity suggested by the DFFE screening tool, as no heritage resources were located.

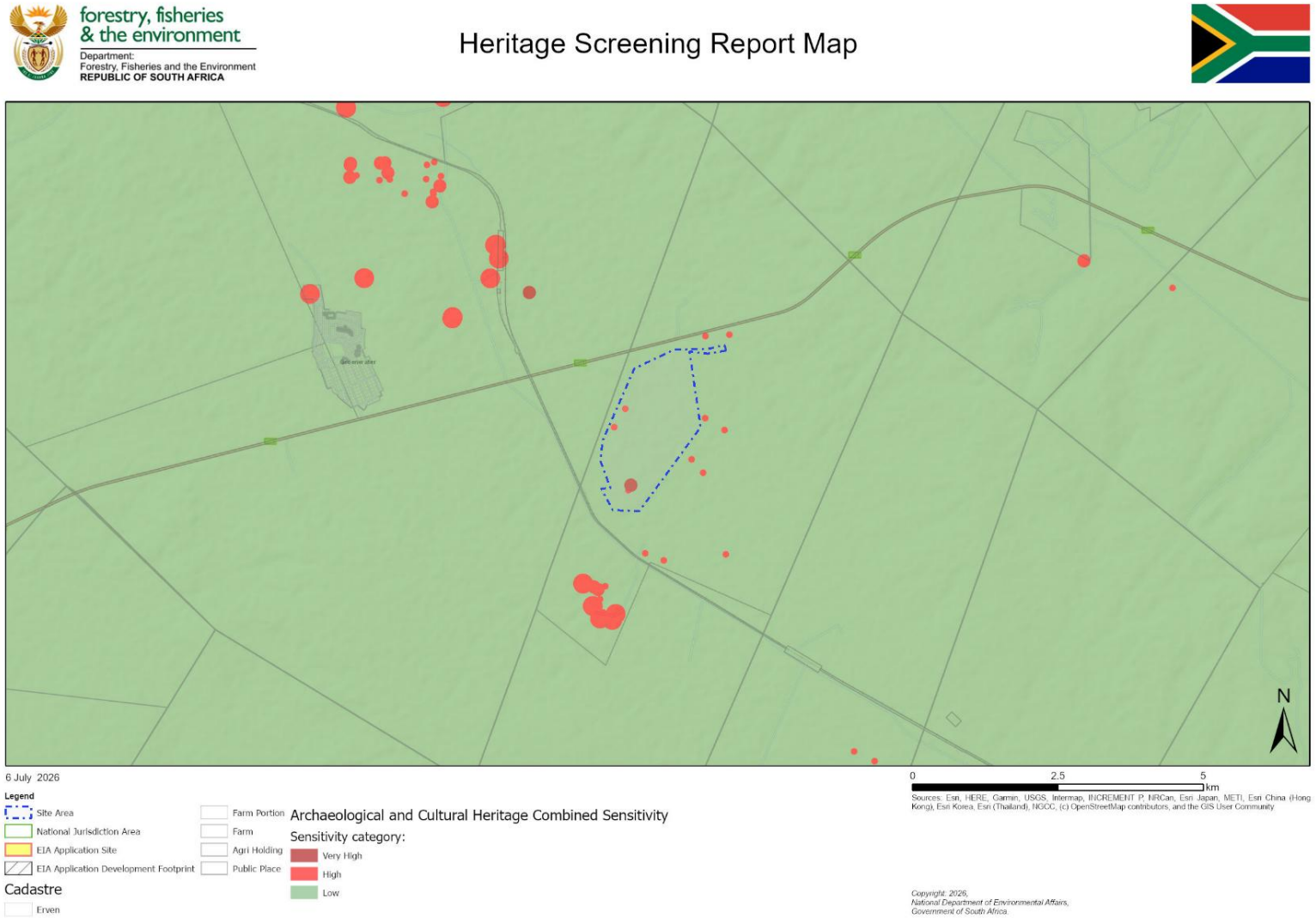

Figure 27: Screening tool map indicating a low sensitivity for Cultural Heritage.

9.4.2.3 HERITAGE SENSITIVITY

Analysis of topographical maps and satellite imagery enabled the identification of possible heritage sensitive areas. By superimposition and analysis, it was possible to rate these structures according to age and thus their level of protection under the NHRA. **Table 26** lists the possible tangible heritage sites identified in the vicinity of the study area and the relevant legislative protection.

Table 26: Tangible heritage site in the study area.

Name	Description	Legislative protection
Archaeology	Older than 100 years	NHRA sections 3 and 35
Structures	Possibly older than 60 years	NHRA sections 3 and 34
Burial grounds	Graves	NHRA sections 3 and 36

Additionally, evaluation of satellite imagery has indicated the following areas that may be sensitive from a heritage perspective. The analysis of the studies conducted in the area assisted in the development of the following landform type to heritage find matrix (Table 27).

Table 27: Landform type to heritage find matrix.

LANDFORM TYPE	HERITAGE TYPE
Crest and foot hill	LSA and MSA scatters, Late Iron Age (LIA) settlements
Crest of small hills	Small LSA sites – scatters of stone artefacts, ostrich eggshell, pottery and beads
Water holes/pans/rivers	MSA and LSA sites, LIA settlements
Farmsteads	Historical archaeological material
Ridges and drainage lines	LSA sites, LIA settlements

9.4.2.4 FIELDWORK FINDINGS[4]

The fieldwork was conducted on the 30th June 2026. Their movement on site was tracked by means of Global Positioning System (GPS) indicated as tracklogs on the map in Figure 28.

During the study, no heritage resources were identified or located in the study area.

[4] Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under Section 27 of the NHRA.

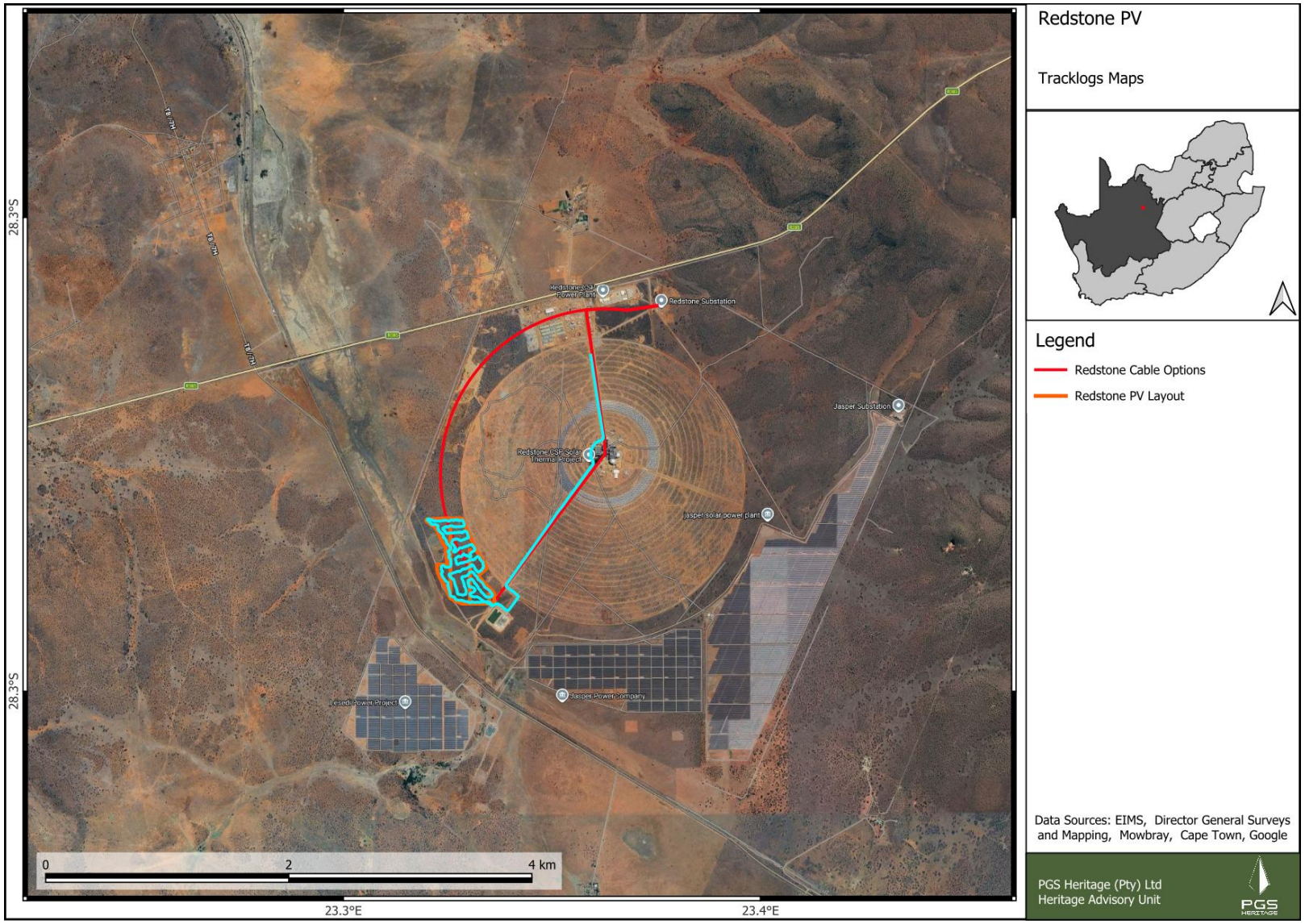

Figure 28: Fieldwork tracklogs (tracks in light blue)

9.4.3 PALAEONTOLOGY

The study site is located on the Ghaap Plateau, with an elevation of roughly 1,495–1,510 m above sea level. The immediate landscape is a flat to gently undulating sandy plain, mantled by wind-blown sediments of the Cenozoic Kalahari Group, which cover older Paleoproterozoic quartzites, shales and lavas of the Olifantshoek Supergroup beneath (Moen, 2006, cited in Mthombeni, 2019).

The site falls entirely within Olifantshoek Plains Thornveld (SVk 13), a Savanna Biome unit described by Mucina & Rutherford (2006). It's classic open thornveld: scattered stands of *Vachellia erioloba* (camel thorn) and *Vachellia haematoxylon* rise above a shrub layer of *Searsia tridactyla*, *Diospyros lycioides*, *Grewia flava* and *Tarchonanthus camphoratus*, with *Vachellia hebeclada* forming low thickets in places. The ground layer is carried by grasses such as *Digitaria eriantha*, *Eragrostis lehmanniana*, *Stipagrostis* species and *Aristida congesta* (Mucina & Rutherford, 2006). Very little of this vegetation type has been transformed, though it remains poorly conserved and increasingly exposed to grazing pressure (Mucina & Rutherford, 2006).

9.4.3.1.1 GEOLOGICAL AND PALAEONTOLOGICAL HISTORY

The proposed Redstone PV and associated BESS development, near Postmasburg, in the Northern Cape, is shown on the 1:250 000 Postmasburg 2822 Geological Map (Council for Geoscience, Pretoria). The development area is underlain by Quaternary to Tertiary sands (red to flesh-coloured, wind-blown sand and sand dune deposits), as well as by the Ongeluks Formation of the Postmasburg Group (amygdaloidal andesitic lava with interbeds of tuff, agglomerate, chert and red jasper) of the Griqualand West Sequence Figure 32). According to the SAHRIS PalaeoMap, the entire site is assigned a Moderate (green) Palaeontological Sensitivity (Figure 32; Table 28) (Almond & Pether, 2008; SAHRIS database), while the DFFE National Environmental Screening Tool identifies the development footprint as having a Medium Palaeontology Theme Sensitivity (Figure 33).

A short explanatory note accompanies the geological map sheet itself, but no detailed sheet explanation was ever published, and the map is now out of print. More recent work has refined the stratigraphic subdivision of the Precambrian rocks in the wider Kathu–Postmasburg area: Eriksson et al. (2006) revised the stratigraphy of the Transvaal Supergroup, while Moen (2006) did the same for the overlying Olifantshoek Supergroup.

A simplified regional geological map based on Cairncross & Beukes (2013) (Figure 4) shows that the development lies on the western flank of the Maremane Dome, a major north–south trending anticline within the early Proterozoic bedrock of the Ghaap Group (Transvaal Supergroup). The dome is cored by carbonate rocks of the Campbell Rand Subgroup, formerly grouped as the Ghaapplato Formation, which are in turn overlain by the Kalahari Group. These shallow-marine carbonates, roughly 2.6 to 2.5 billion years old, were deposited on the shallow, submerged shelf of the Kaapvaal Craton and form a substantial platform 1.6 to 2.5 km thick, comprising mainly dolostones and dolomitic limestones with subordinate cherts, tuffs and siliciclastic material. Repeated sea-level changes drove shifting depositional cycles within these shallow-water facies, producing stromatolitic limestones and dolostones, oolites, laminated calcilutites and cherts, with lesser shales, siltstones and tuffs (Beukes, 1980, 1986; Sumner, 2002; Eriksson et al., 2006; Sumner & Beukes, 2006). The Campbell Rand carbonate bedrock in the study area is karstified and most likely does not crop out at surface.

On the western flank of the Maremane Dome, where the Campbell Rand carbonates, Asbestos Hills banded iron formation and Koegas quartzites and iron formation occur, a major unconformity at the base of the Palaeoproterozoic Elim Group (the basal unit of the Kheis Supergroup) truncates the folded Ghaap Group succession. Dated to roughly 2.2–2.0 billion years ago, this unconformity is closely associated with the manganese and iron ores long mined in the Sishen–Postmasburg area of Griqualand West (Figure 3). These ores occur within the palaeokarst-related Manganore Formation, which overlies the Campbell Rand Subgroup carbonates, and within the Gamagara Formation at the base of the Elim Group, itself formerly included within the Olifantshoek Group (Schalkwyk, 2005; Van Niekerk, 2006; Da Silva, 2011; Cairncross & Beukes, 2013; Smith & Beukes, 2016). In the greater Kathu region, the overlying Postmasburg Group is capped by the basaltic to andesitic lavas of the Ongeluk Formation, dated to approximately 2.2 billion years, which crop out south of the Gamagara River.

Around Sishen, these older Precambrian rocks are mantled by Late Cretaceous to Late Cenozoic aeolian sands, clays, calcretes and gravels of the Kalahari Group (roughly 65 to 2.5 million years old), which reach a thickness of about 80 m north-west of the development site (Haddon, 2005). The earliest Kalahari beds, the basal gravels of the Wessels

Formation and the calcareous clays of the Budin Formation, are probably Late Cretaceous in age (Partridge et al., 2006).

The uppermost 15 m of the Kalahari sediments generally comprise clays, calcretised siltstones and pebbly horizons, with solution hollows along joint surfaces roughly 10 m below surface, and calcretised silcretes with in-situ brecciation close to the surface. Thick pedogenic calcretes of the Plio-Pleistocene Mokalanen Formation, mapped along the Ga-Mogara drainage line, underlie the Kalahari sands in this region and point to seasonally arid conditions persisting over roughly the last five million years (Truter et al., 1938; Visser, 1958). Surface limestones may reach up to 20 m in thickness, are locally conglomeratic with reworked calcrete clasts and foreign pebbles, and may be secondarily silicified. Pleistocene Kalahari sands of the Gordonia Formation mantle thick calcretes and downwasted surface gravels across the wider region, with a range of calcrete facies, gravelly, brecciated, silicified and honeycomb, together with a karstified facies associated with sand- or gravel-infilled solution hollows (Almond, 2013). Older terrace gravels recorded along the Ga-Mogara drainage line to the north and east of the study area do not underlie the development footprint. Unconsolidated, reddish-brown aeolian sands of the Quaternary Gordonia Formation in the Sishen area are considered Late Pliocene to Early Pleistocene, or younger, in age, based on Middle to Later Stone Age tools recovered from them (Dingle et al., 1983, p. 291); recalibration of the Pliocene–Pleistocene boundary from 1.8 Ma to 2.588 Ma places the Gordonia Formation almost entirely within the Pleistocene Epoch.

Within this framework, the bedrock sequence comprises the Ghaap Group at the base, shallow-water carbonates of the Campbell Rand Subgroup overlain by the banded iron formations of the Asbestos Hills Subgroup (Kuruman and Daniëlskuil Formations), and the younger Postmasburg Group above, comprising the glacially-related Makganyene Formation diamictite and the overlying Ongeluk Formation lavas (Eriksson et al., 2006; McCarthy & Rubidge, 2005). It is this uppermost Postmasburg Group, and specifically the Ongeluk Formation, that the Postmasburg 2822 map already shows directly beneath the Redstone PV footprint , a reminder that, despite its age, the older map's basic lithological call for the site remains broadly consistent with the updated regional picture.

Quaternary superficial sands and calcretes of the Kalahari Group hold the greatest potential to preserve fossil material within the study area. These are the youngest sediments in the region, deposited over approximately the last 2.6 million years, typically as unconsolidated to weakly consolidated calcrete, sand, silt and clay in thin, discontinuous patches, with pedogenic calcrete horizons up to approximately 10 m thick locally displacing or replacing near-surface bedrock. Netterberg (1978, 1980) recognised several calcrete types in South Africa, including glaebular calcrete (discrete nodules), hardpan calcrete (massive limestone) and honeycomb calcrete formed by the coalescence of glaebules; these calcretes may be locally conglomeratic, incorporating exotic pebbles and reworked calcrete clasts. Fossil assemblages within these deposits are generally of low diversity but may be locally abundant, particularly in fluvial, pan or spring-related settings, and include diatoms, ostracods, freshwater gastropods and bivalves, coprolites, ostrich eggshell fragments, mammalian bones, teeth and horn cores, tortoise and reptile remains, plant microfossils, and trace fossils such as termite and insect burrows, rhizoliths and mammalian trackways; amphibian and crocodilian remains occur where past conditions were wetter. Fossils are most commonly exposed in erosion gullies and riverbanks, and reworked Middle to Later Stone Age artefacts have occasionally been recovered in association with fossil material (Churchill et al., 2000; Partridge et al., 2006; Moen, 2007; Almond & Pether, 2008); calcretes in parts of the Northern Cape may also locally host alluvial diamonds. Quaternary deposits are of particular scientific importance as archives of palaeoclimatic fluctuation and geomorphological change (Hunter et al., 2006): climatic variability throughout the Cenozoic strongly influenced southern African landscapes (Maud, 2012), with the most pronounced changes occurring over roughly the last 1.8 million years (Barnosky, 2005), affecting river dynamics, sedimentation patterns and vegetation distribution (Tooth & McCarthy, 2004).

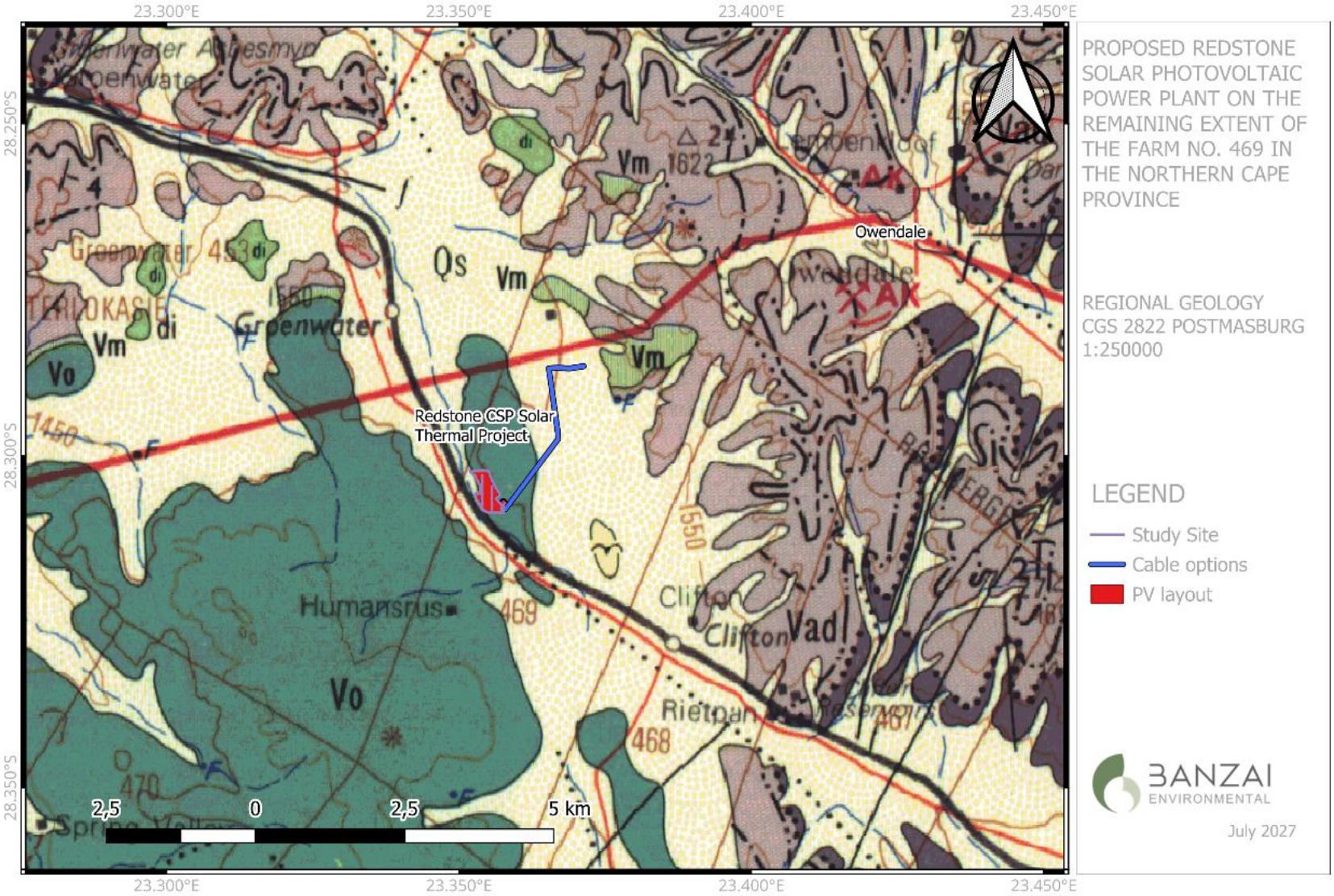

Figure 29: Extract of the 1: 250 000 Postmasburg 2822 Geological Map (Council for Geoscience, Pretoria) indicating that the study area is underlain by Quaternary to Tertiary sands (Qs) (red to flesh coloured wind-blown sand and sand dune) as well as the Ongeluks Formation (Vo) of the Postmasburg Group.

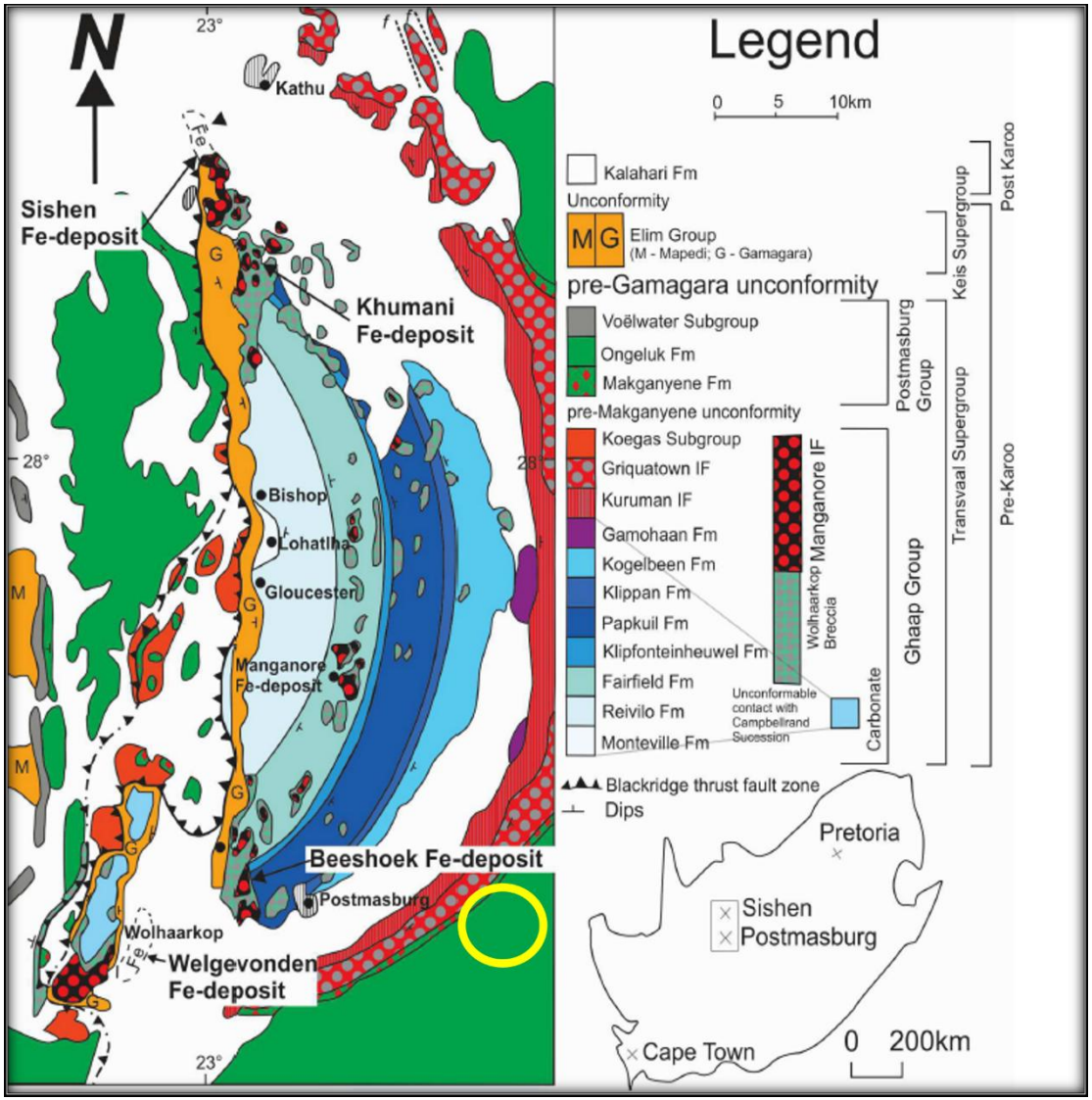

Figure 30: Updated Regional Geology of the Maremane Dome in the Northern Cape (from Smith & Beukes 2016). The approximate location of the proposed development is indicated by the yellow circle.

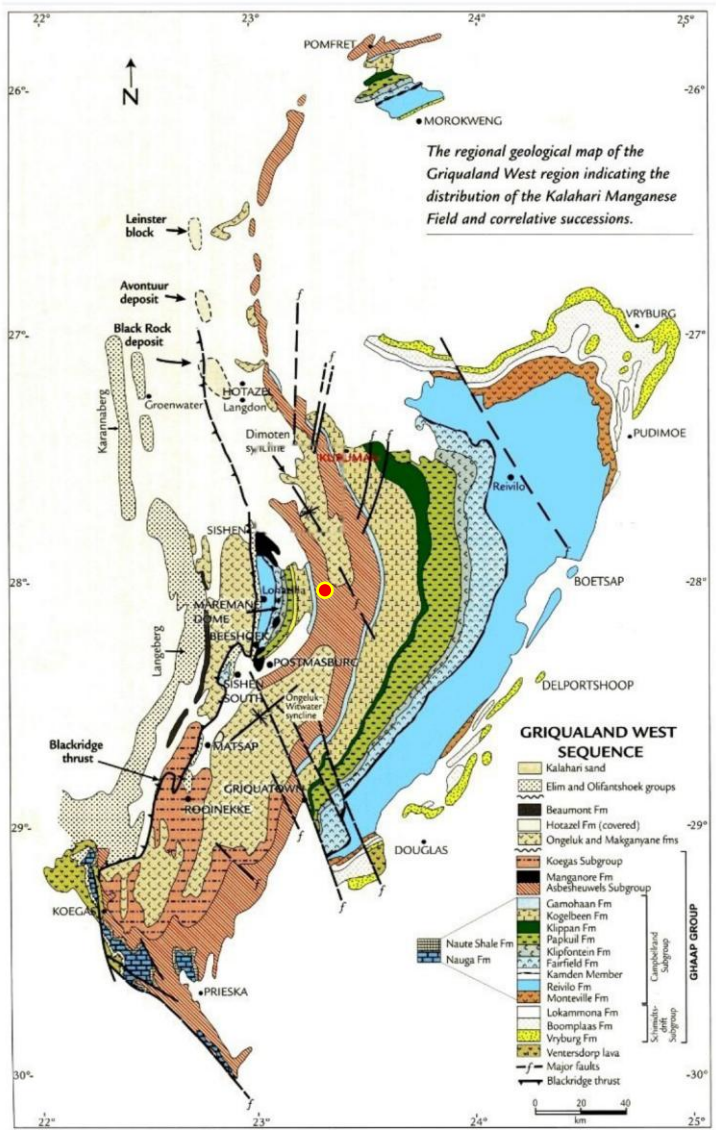

Figure 31: Schematic regional geological map of the Griqualand West region, Northern Cape, showing the Postmasburg Group (Ongeluk and Makganyene Formations) and the Ghaap Group (Campbell Rand and Asbestos Hills Subgroups) relative to Postmasburg and the Maremane Dome, in the general vicinity of the Redstone PV site (red dot with yellow outline) (after Cairncross & Beukes, 2013).

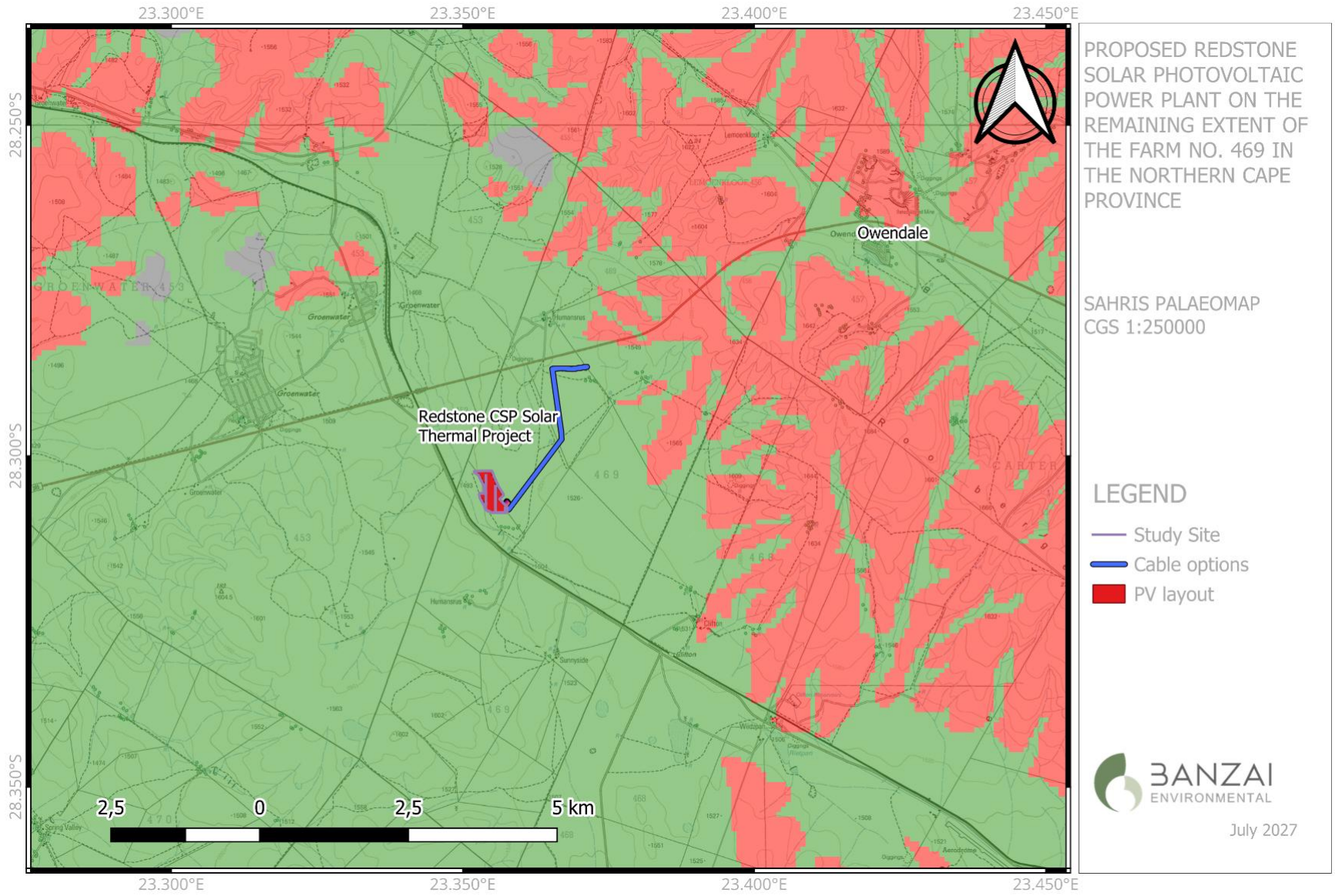

Figure 32: Extract of the SAHRIS PalaeoMap (Council for Geosciences, Pretoria) indicates that the study area is underlain by sediments with a Moderate (green) Palaeontological Sensitivity.

9.4.3.2 SAHRIS PALAEOMAP AND THE NATIONAL WEB-BASED SCREENING TOOL

Table 28: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website.

Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds are required
ORANGE/YELLOW	HIGH	A desktop study is required, and based on the outcome of the desktop study, a field assessment is likely.
GREEN	MODERATE	A 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.

The overall Palaeontological Sensitivity of the area is classified as Moderate, as indicated by the SAHRIS Palaeomap (Figure 32; Table 28).

The SAHRIS PalaeoMap (Figure 5) and the National Environmental Web-based Screening Tool (Figure 6) both classify the development area as having Moderate/Medium Palaeontological Sensitivity. Due to this Sensitivity, no field-based palaeontological investigation was conducted at the site, and therefore the site's Palaeontological Sensitivity could not be verified on site. However, desktop-based research indicates that the palaeontological sensitivity of the area is Low.

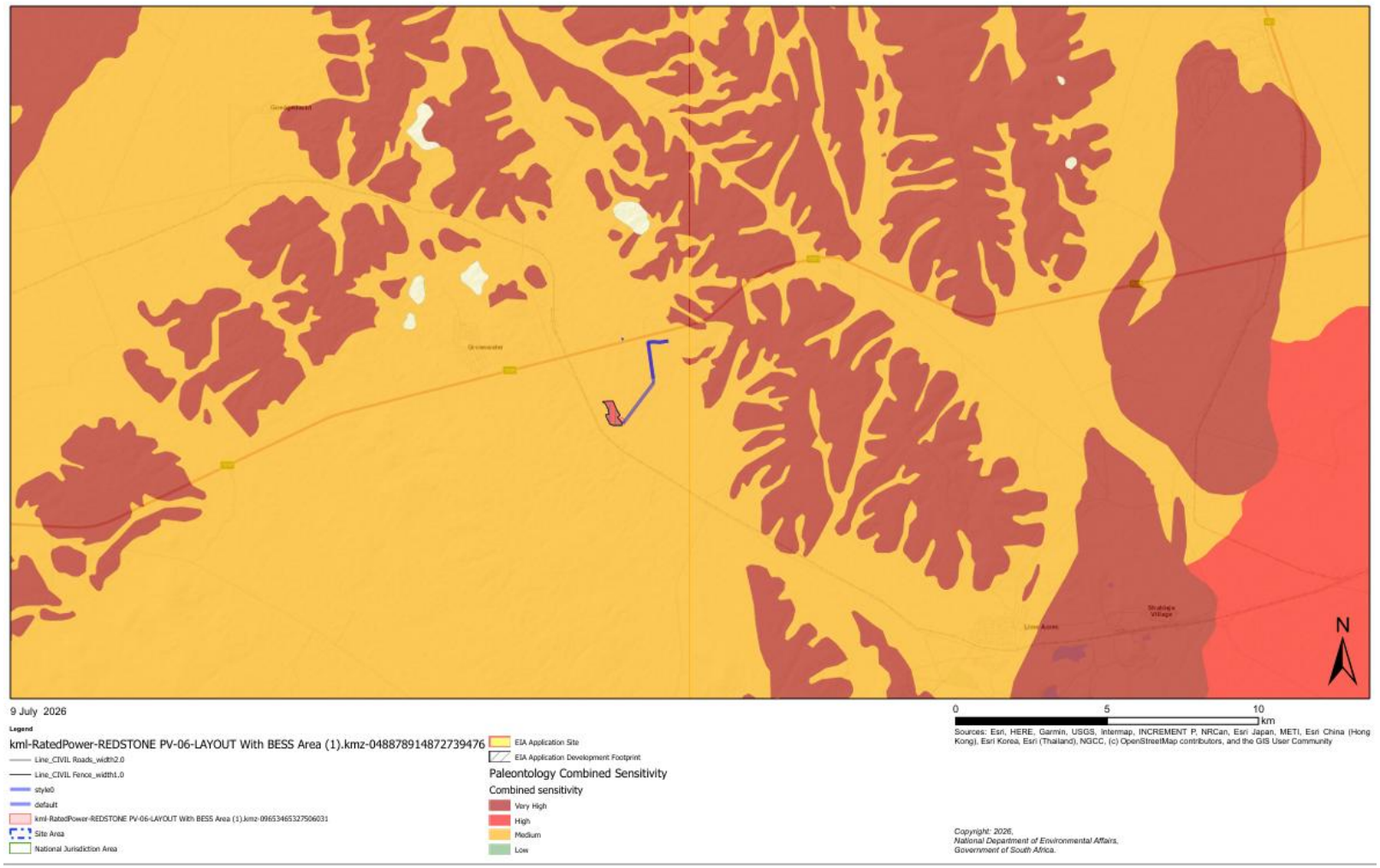

Figure 33: Palaeontological Sensitivity of the study area by the National Environmental Web-based Screening Tool indicates a Medium (orange) Sensitivity

9.4.3.3 **FINDINGS**

The development area is underlain by Quaternary to Tertiary sands (Qs) (red to flesh coloured wind-blown sand and sand dune) as well as the Ongeluk Formation (Vo) of the Postmasburg Group, Transvaal Supergroup) (Figure 2). According to the SAHRIS PalaeoMap, the entire Redstone PV site is assigned a Moderate (green) Palaeontological Sensitivity (Figure 5; Table 2) (Almond & Pether, 2008; SAHRIS database). In addition, the DFFE National Environmental Screening Tool identifies the development footprint as having a Medium (orange) Palaeontology Theme Sensitivity (Figure 6).

Implementing the impact assessment methodology, Table 3 and Table 4 provide a quantitative and qualitative assessment, respectively, of the impacts of the proposed project on the Palaeontological Resources (directly impacted).

10 ENVIRONMENTAL IMPACT ASSESSMENT

10.1 IMPACTS IDENTIFIED

This Section presents the impacts that have been identified and assessed for the BA. Potential environmental impacts were identified by the EAP, the appointed specialists (where applicable), as well as the preliminary input from the public. The impacts are included in Table 30 below.

When considering cumulative impacts, it is important to bear in mind the scale at which different impacts occur. The identification of impacts is an objective iterative process of considering the project components and activities and how these may interact with the different environmental components. An activity/ environmental component matrix is presented in Table 29 below. The matrix represents which environmental components are likely to be impacted upon by the project activities. Table 30 provides a list of the identified impacts associated with each environmental component.

Table 29: Impact identification matrix.

Phase	Activity	Environmental Component												
		Climate and Air Quality (AQ)	Geology and soils (G)	Groundwater (GW)	Surface water/ wetlands (W)	Noise (N)	Topography (T)	Visual/ Landscape (V)	Flora (FL)	Fauna (FA)	Ecosystems/ habitats (EH)	Social (S)	Cultural Heritage (C)	Economic (E)
Planning	Project planning and design footprint	+	+		+		+	+	+	+	+	+		+
	Site selection and layout optimisation		+	+	+		+	+	+	+	+	+	+	+
	Environmental constraints mapping and buffer delineation		+	+	+				+	+	+		+	
	Geotechnical investigations and surveys	+	+	+	+	+							+	
	Access road and infrastructure routing		+	+	+		+	+	+	+	+	+	+	+
	Stakeholder engagement and landowner consultation											+	+	+
Construction (incl. pre-construction and post-construction rehabilitation)	Site clearing and vegetation removal	+	+		+	+	+	+	+	+	+	+		+
	Earthworks and infrastructure development	+	+	+	+	+	+	+	+	+	+	+	+	+
	Vehicle movement and machinery use	+	+	+	+	+				+		+		+
	Wetland buffer disturbance and excavation		+	+	+		+		+	+	+			
	Fuel storage, refuelling and spill incidents		+	+	+						+			

Phase	Activity	Environmental Component												
		Climate and Air Quality (AQ)	Geology and soils (G)	Groundwater (GW)	Surface water/ wetlands (W)	Noise (N)	Topography (T)	Visual/ Landscape (V)	Flora (FL)	Fauna (FA)	Ecosystems/ habitats (EH)	Social (S)	Cultural Heritage (C)	Economic (E)
	Stormwater runoff, sedimentation and erosion		+	+	+		+		+		+			
	Access roads, laydown areas and hardstanding establishment	+	+	+	+	+	+	+	+	+	+	+		+
	Alien invasive species establishment and spread		+		+				+		+			
	Heritage and palaeontological disturbance (excavation, trenching and foundations)		+										+	
	Construction employment opportunities											+		+
	Skills development and training											+		+
	Loss of agricultural land		+					+	+		+	+		+
	Visual presence of construction activities	+				+		+				+		+
	Polluted runoff, litter and poor housekeeping		+	+	+						+			
Normal Operations	Maintenance vehicle movement	+				+						+		+
	Electricity generation and infrastructure operation	+						+				+		+
	Alien invasive vegetation proliferation		+		+				+		+			

Phase	Activity	Environmental Component												
		Climate and Air Quality (AQ)	Geology and soils (G)	Groundwater (GW)	Surface water/ wetlands (W)	Noise (N)	Topography (T)	Visual/ Landscape (V)	Flora (FL)	Fauna (FA)	Ecosystems/ habitats (EH)	Social (S)	Cultural Heritage (C)	Economic (E)
	Polluted runoff, litter and poor housekeeping		+	+	+						+			
	Altered stormwater patterns and increased water inputs to wetlands		+	+	+		+		+		+			
	Ongoing disturbance to fauna from operations and maintenance									+				
	Visual presence of PV arrays, BESS and associated infrastructure							+				+		+
	GDP, production and government revenue benefits											+		+
	Impact on sense of place							+				+		
Decommissioning, Rehabilitation and Closure	Infrastructure removal and rehabilitation	+	+	+	+	+	+	+	+	+	+	+	+	+
	Wetland rehabilitation and reinstatement activities		+	+	+		+		+	+	+			
	Demolition, excavation and removal of foundations and buried services	+	+	+	+	+	+				+		+	
	Material recycling, disposal and transport	+	+			+						+		+
	Decommissioning employment and expenditure effects											+		+

Phase	Activity	Environmental Component													
		Climate and Air Quality (AQ)	Geology and soils (G)	Groundwater (GW)	Surface water/ wetlands (W)	Noise (N)	Topography (T)	Visual/ Landscape (V)	Flora (FL)	Fauna (FA)	Ecosystems/ habitats (EH)	Social (S)	Cultural Heritage (C)	Economic (E)
	Restoration of disturbed areas and habitat recovery		+	+	+		+	+	+	+	+	+		+

Table 30: Impacts Identified and Assessed during the BA.

#	Impact	Activity/ Aspect	Phase
1	Habitat fragmentation and loss of natural vegetation	Site clearing, vegetation removal and establishment of the solar PV and BESS development footprint	Construction
2	Alien and invasive species	Vegetation disturbance, soil exposure and ongoing site maintenance within the PV and BESS footprint	Construction and Operation
3	Loss of species of conservation concern	Clearing of natural vegetation and disturbance of protected plant and fauna habitat within the PV and BESS footprint	Construction and Operation
4	Anthropogenic disturbances, including intentional and/or accidental killing of fauna	Construction activities, vehicle movement, machinery operation, fencing and routine maintenance activities	Construction and Operation
5	Soil compaction, sedimentation and disruption of freshwater ecosystems	Earthworks, trenching, access-road use, panel installation, BESS installation and maintenance vehicle movement	Construction and Operation

#	Impact	Activity/ Aspect	Phase
6	Indirect loss, disturbance and degradation of wetlands	Construction activities near wetland buffers, including clearing, excavation, vehicle movement and temporary laydown areas	Construction
7	Increased bare surfaces, runoff and potential for erosion	Vegetation clearing, earthworks, grading, access-road use and establishment of hardstanding areas for PV and BESS infrastructure	Construction
8	Degradation of wetland vegetation and the introduction and spread of alien and invasive vegetation	Vegetation clearing, disturbance of wetland buffer areas and movement of vehicles and machinery near wetland features	Construction
9	Increased sediment loads to downstream reaches	Soil disturbance, exposed surfaces, trenching, stockpiling and stormwater runoff during construction	Construction
10	Contamination of wetlands with hydrocarbons due to machinery leaks and spill incidents	Use of construction vehicles, machinery, generators, fuel storage, refuelling and BESS installation activities	Construction
11	Alteration of hydrological regime	Site preparation, grading, stormwater diversion, trenching and installation of PV, BESS and electrical infrastructure	Construction
12	Continued proliferation of alien invasive vegetation	Routine operation, vegetation management, maintenance access and ongoing disturbance within the PV and BESS facility	Operation
13	Potential wetland contamination due to polluted runoff and indiscriminate dumping of litter	Routine operation, maintenance activities, stormwater runoff from hardstanding areas, waste generation and poor housekeeping within the PV and BESS facility	Operation
14	Increased water inputs to wetland	Stormwater concentration from panel surfaces, access roads, compacted areas and drainage infrastructure associated with the PV and BESS facility	Operation

#	Impact	Activity/ Aspect	Phase
15	Degradation of wetland vegetation and proliferation of alien and invasive species	Removal of PV panels, BESS units, cabling and associated infrastructure, with soil disturbance, vehicle movement and rehabilitation activities	Decommissioning
16	Disruption of wetland soil profile, hydrological regime and increased sediment loads	Demolition, excavation, removal of foundations and buried services, vehicle movement, stockpiling and reinstatement of disturbed areas	Decommissioning
17	Loss of agricultural land due to construction of solar PV and BESS infrastructure	Site establishment, vegetation clearing, earthworks, access-road construction, laydown areas and installation of PV arrays, BESS units and electrical infrastructure	Construction
18	Physical presence of the solar PV development and BESS and impact on sensitive views, including cumulative impacts	Construction, presence, operation and eventual removal of PV arrays, BESS containers, substations, fencing, access roads and associated infrastructure	Construction, Operation and Decommissioning
19	Damage or destruction to unknown archaeological and heritage material	Ground disturbance during clearing, excavation, trenching, foundation installation, access-road construction and cable route establishment	Construction
20	GDP and production effects associated with project development	Capital expenditure, procurement of materials and services, construction employment, operational expenditure and electricity generation from the PV and BESS facility	Construction and Operation
21	Impact on national government revenue	Project investment, procurement, employment, operational revenue, electricity sales and decommissioning expenditure associated with the PV and BESS facility	Construction, Operation and Decommissioning
22	Increase in employment opportunities	Recruitment of construction workers, contractors and local service providers for site establishment, civil works, electrical works and installation activities	Construction

#	Impact	Activity/ Aspect	Phase
23	Skills development	On-site training, supervision and skills transfer during civil works, electrical installation, PV mounting, BESS installation and health and safety activities	Construction
24	Impact on sense of place	Site establishment, construction traffic, vegetation clearing, earthworks, temporary laydown areas and installation of visible PV, BESS and electrical infrastructure	Construction
25	Impact on GDP, production and metallic and non-metallic materials during decommissioning	Dismantling, removal, transport, recycling and disposal of PV panels, BESS components, steel structures, cabling, foundations and associated infrastructure	Decommissioning
26	Loss of fossil heritage	Excavation, trenching, foundation works, access-road construction and other ground-disturbing activities associated with PV and BESS infrastructure	Construction

10.2 IMPACT ASSESSMENT METHODOLOGY

The broad approach to the significance rating methodology is to determine the significance (S) of an environmental risk or impact by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relating this to the probability/ likelihood (P) of the impact occurring. The S is determined for the pre- and post-mitigation scenario. In addition, other factors, including cumulative impacts and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the S to determine the overall final significance rating (FS).

10.2.1 DETERMINATION OF SIGNIFICANCE

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

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

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

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 31 below.

Table 31: Criteria for Determining Impact Consequence

Aspect	Score	Definition
Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact
Extent	1	Activity (i.e. Highly localised, limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property or site boundary, or the area within a few hundred meters of the site)
	3	Local (i.e. beyond the site boundary within the Local administrative boundary (e.g. Local Municipality) or within consistent local geographical features, or the area within 5 km of the site)
	4	Regional (i.e. Far beyond the site boundary, beyond the Local administrative boundaries within the Regional administrative boundaries (e.g. District Municipality), or extends into different distinct geographical features, or extends between 5 and 50 km from the site).
	5	Provincial / National / International (i.e. extends into numerous distinct geographical features, or extends beyond 50 km from the site).
Duration	1	Immediate (<1 year, quickly reversible)
	2	Short term (1-5 years, less than project lifespan)
	3	Medium term (6-15 years)
	4	Long term (15-65 years, the impact will cease after the operational life span of the project)

Aspect	Score	Definition
	5	Permanent (>65 years, no mitigation measure of natural process will reduce the impact after construction/ operation/ decommissioning).
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected)
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected, or affected environmental components are already degraded)
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; moderate improvement for +ve impacts; or where change affects area of potential conservation or other value, or use of resources).
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease; high improvement for +ve impacts; or where change affects high conservation value areas or species of conservation concern)
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease, substantial improvement for +ve impacts; or disturbance to pristine areas of critical conservation value or critically endangered species)
Reversibility	1	Impact is reversible without any time and cost.
	2	Impact is reversible without incurring significant time and cost.
	3	Impact is reversible only by incurring significant time and cost.
	4	Impact is reversible only by incurring very high time and cost.
	5	Irreversible Impact.

Once the C has been determined, the significance is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/ scored as per Table 32.

It is noted that both environmental risks as well as environmental impacts should be identified and assessed. Environmental Risk can be regarded as the potential for something harmful to happen to the environment, and in many instances is not regarded as something that is expected to occur during normal operations or events (e.g. unplanned fuel or oil spills at a construction site). Probability and likelihood are key determinants or variables of environmental risk. Environmental Impact can be regarded as the actual effect or change that happens to the environment because of an activity and is typically an effect that is expected from normal operations or events (e.g. vegetation clearance from site development results in loss of species of concern). Typically, the probability of an unmitigated environmental impact is regarded as highly likely or certain (management and mitigation measures would ideally aim to reduce this likelihood where possible). In summary, environmental risk is about what could happen, while environmental impact is about what does happen.

Table 32: Probability/ Likelihood Scoring

Probabili	1	Improbable (Rare, the event may occur only in exceptional circumstances, the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <5% chance).

	2	Low probability (Unlikely, impact could occur but not realistically expected; >5% and <20% chance).
	3	Medium probability (Possible, the impact may occur; >20% and <50% chance).
	4	High probability (Likely, it is most probable that the impact will occur- > 50 and <90% chance).
	5	Definite (Almost certain, the impact is expected to, or will, occur, >90% chance).

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

$$S = C \, x \, P$$

Table 33: Determination of Significance

Consequence	5- Very High[e]	5	10	15	20	25
	4- High	4	8	12	16	20
	3- Medium	3	6	9	12	15
	2- Low	2	4	6	8	10
	1- Very low	1	2	3	4	5
		1- Improbable	2- Low	3- Medium/ Possible	4- High/ Probable	5- Highly likely/ Definite
	Probability					

The outcome of the significance assessment will result in a range of scores, ranging from 1 through to 25. These significance scores are then grouped into respective classes as described in Table 34.

Table 34: Significance Scores

S Score	Description
≤4.25	Low (i.e. where this impact is unlikely to be a significant environmental risk/ reward).
>4,25, ≤8.5	Low-Medium (i.e. where the impact could have a significant environmental risk/ reward).
>8.5, ≤13.75	High-Medium (i.e. where the impact could have a significant environmental risk/ reward).
>13.75	High (i.e. where the impact will have a significant environmental risk/ reward).

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

[e] In the event that an impact or risk has very high or catastrophic consequences, but the likelihood/ probability is low, then the resultant significance would be Low-medium. This does in certain instances detract from the relative important of this impact or risk and must consequently be flagged for further specific consideration, management, mitigation, or contingency planning.

10.2.2 IMPACT PRIORITIZATION

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

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

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

Table 35: Criteria for Determining Prioritisation

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

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 35. The impact priority is therefore determined as follows:

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

The result is a priority score which ranges from 2 to 6 and a consequent PF ranging from 1 to 1.5 (Refer to Table 36).

Table 36: Determination of Prioritisation Factor

Priority	Prioritisation Factor
2	1
3	1.125
4	1.25
5	1.375

Priority	Prioritisation Factor
6	1.5

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

Table 37: Final Environmental Significance Rating

Significance Rating	Description
<-25	**Very High (Impacts in this class are extremely significant and pose a very high environmental risk. In certain instances these may represent a fatal flaw. They are likely to have a major influence on the decision and may be difficult or impossible to mitigate. Offset's may be necessary.**
<-13.75 to -25	High negative (These impacts are significant and must be carefully considered in the decision-making process. They have a high environmental risk or impact and require extensive mitigation measures).
-8.5 to -13.75	Medium-High negative (i.e. Impacts in this class are more substantial and could have a significant environmental risk. They may influence the decision to develop in the area and require more robust mitigation measures).
<-4.25 to <-8.5	Medium- Low negative (i.e. These impacts are slightly more significant than low impacts but still do not pose a major environmental risk. They might require some mitigation measures but are generally manageable).
-1 to -4.25	Low negative (i.e. Impacts in this class are minor and unlikely to have a significant environmental risk. They do not influence the decision to develop in the area and are typically easily mitigated.
0	No impact
1 to 4.25	Low positive
>4.25 to <8.5	Medium-Low positive
8.5 to 13.75	Medium-High positive
>13.75	High positive

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

10.3 DESCRIPTION AND ASSESSMENT OF IMPACTS

This section describes each identified environmental impact in the context of the activity and associated aspect and provides reasons why specific ranking/ rating of the component attributes of the impact assessment are given.

10.3.1 GEOLOGY AND SOILS (G)

The proposed Redstone PV Solar Project will result in the permanent transformation of a portion of the site from its current natural grazing state to a renewable energy facility. From a soils and agricultural perspective, the primary impact associated with the development is the loss of land that could potentially be utilised for agricultural purposes as a result of the establishment of solar infrastructure, access roads, transmission infrastructure, and associated ancillary facilities.

The specialist assessment indicates that the significance of this impact is limited by the inherently low agricultural potential of the affected area. Although some of the soils are moderately deep and potentially suitable for cultivation from a soil perspective, agricultural productivity is severely constrained by the prevailing climatic conditions, including low annual rainfall, high evaporation rates, frequent drought conditions, and extreme summer temperatures. Consequently, the area is considered suitable primarily for extensive livestock grazing, with very low grazing carrying capacities.

The impact is localised to the development footprint and is not expected to extend beyond the project boundary. While the loss of agricultural land will persist for the operational lifespan of the facility, the development is not expected to involve extensive topsoil removal or deep excavations over large areas. Furthermore, the specialist notes that, following decommissioning, the removal of infrastructure would allow the affected areas to be rehabilitated and returned to a condition similar to the pre-development state.

Based on the specialist findings, the impact was assessed as having a Medium to low negative significance, primarily due to the long-term duration of the development footprint. However, the overall consequence is moderated by the low agricultural value of the affected land and the absence of any identified soil-related fatal flaws or highly sensitive agricultural areas within the site. Mitigation measures should focus on minimising unnecessary disturbance, preventing soil pollution and contamination, retaining natural vegetation where practicable, and implementing appropriate stormwater and erosion control measures during construction and operation.

The specialist therefore concludes that the proposed development is compatible with the existing soil and agricultural resource characteristics of the site and that no significant soil or agricultural constraints exist that would preclude the project from proceeding.

Table 38: Soila and agriculture impacts and mitigation

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Loss and disturbance of soil resources	Construction	Medium to low -	Medium to low -	Medium to low -
• Limit vegetation clearing and ground disturbance to the approved footprint only. • Use existing access roads where practicable and avoid unnecessary soil disturbance. • Strip and stockpile topsoil separately for later rehabilitation. • Rehabilitate all temporarily disturbed areas following construction.				

10.3.2 WETLANDS

The proposed development does not directly encroach into the delineated HGM 1 wetland feature; however, portions of the development footprint occur within the broader wetland zone of influence and within proximity to the recommended specialist buffer. Consequently, the primary wetland-related impacts are expected to be indirect in nature and associated with construction activities, stormwater management, erosion, sediment transport, vegetation disturbance and potential contamination pathways.

The identified wetland feature comprises an unchannelled valley-bottom wetland system that is dependent on diffuse surface flow and shallow subsurface hydrological processes. Activities which alter runoff patterns, increase the concentration of flows, disturb soils, remove vegetation cover or introduce pollutants therefore have the potential to affect wetland functioning, habitat quality and ecosystem service provision. The principal ecosystem services provided by the wetland include flood attenuation, sediment trapping, water quality enhancement, biodiversity support and ecological corridor functioning.

During the construction phase, vegetation clearing, earthworks, excavation activities, vehicle movement and the establishment of temporary work areas may increase the risk of erosion, sediment mobilisation, altered runoff pathways and accidental contamination from fuels, oils or other hazardous substances. Disturbance associated with these activities may also facilitate the establishment and spread of alien invasive plant species within the wetland buffer and adjacent habitats. If not appropriately managed, these impacts may contribute to localised degradation of wetland habitat and ecological functioning.

The operational phase is expected to present lower levels of risk than the construction phase. Potential impacts are primarily associated with altered stormwater runoff characteristics, ongoing maintenance activities, incidental pollution events and the continued spread of alien invasive species. Poorly designed or maintained drainage infrastructure may concentrate runoff and increase erosion and sedimentation within downstream portions of the wetland system. However, given the absence of direct wetland encroachment and the relatively passive nature of PV infrastructure, these impacts are expected to remain limited and manageable.

Decommissioning activities may result in impacts similar to those anticipated during construction, including temporary soil disturbance, vegetation removal, erosion risk and contamination potential. Rehabilitation of disturbed areas and restoration of natural drainage patterns following infrastructure removal will be important to ensure that residual impacts are minimised and that the ecological functioning of the wetland system is maintained.

The specialist assessment concluded that all identified impacts can be reduced to low residual significance through the implementation of the recommended mitigation measures, including avoidance of the delineated wetland and associated buffer, implementation of effective stormwater and erosion control measures, rehabilitation of disturbed areas, pollution prevention measures and ongoing alien invasive plant management. No direct loss of wetland habitat is anticipated under the assessed layout.

Table 39: Wetland impacts and mitigation

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Indirect loss, disturbance and degradation of wetlands	Construction	Medium to low -	Low-	Low-
Mitigation • Finalise the construction layout to avoid HGM 1 and its associated buffer as far as practicable. • Demarcate the wetland boundary, buffer area, and all no-go areas before construction commences, and maintain this demarcation for the duration of construction. • Restrict all construction activities, laydown areas, stockpiles, vehicle parking, and machinery movement to the approved construction footprint only. • Use existing access routes as far as practicable and prohibit the creation of informal tracks near the wetland. • No direct encroachment into the delineated wetland footprint is permitted unless specifically authorised. • Any accidental disturbance to wetland edge or buffer areas must be rehabilitated immediately using suitable indigenous vegetation and appropriate soil reinstatement measures.				
Increased bare surfaces, runoff and potential for erosion	Construction	Medium to low -	Low-	Medium to low -
Mitigation				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• Store fuels, oils, chemicals, and other hazardous substances in bunded areas outside wetland and buffer areas and away from drainage pathways. • Refuelling, servicing, and maintenance of vehicles and machinery must only take place in designated areas on impermeable or suitably contained surfaces outside wetland buffer areas. • Drip trays must be used for all stationary plant and during mobile refuelling and servicing activities. • Spill kits must be available in all active work areas, and personnel must be trained in spill prevention and spill response procedures. • Any spill must be contained immediately, and contaminated soil or absorbent material must be removed and disposed of at a licensed facility where required. • Regularly inspect and maintain machinery and vehicles to prevent leaks. • No storage, handling, or disposal of hydrocarbons, oils, chemicals, or hazardous waste may occur within the wetland or its associated buffer. • Develop and implement a Stormwater Management Plan (SWMP). • Install erosion and sediment control measures (silt fences, sediment basins, check dams, etc.). • Appropriately store excavated material to minimise impacts on water resources. • Maintain buffer zones around watercourses and wetlands. • Control dewatering discharge using sediment traps and erosion controls. • Implement the SWMP for all project-affected areas. • Implement erosion and sediment control measures. • Regularly inspect and maintain erosion control measures. • Minimise unnecessary loss of topsoil through stripping, stockpiling and reuse. • Strip topsoil correctly and prevent mixing with subsoil. • Manage and protect topsoil stockpiles from erosion and degradation. • Avoid stripping and replacement of wet topsoil. • Restrict vehicle and machinery movement to designated routes. • Rehabilitate disturbed areas as soon as practical. • Restrict vegetation clearing to approved construction footprints. • Phase construction works to minimise unnecessary disturbance and facilitate early rehabilitation. • Implement rehabilitation and revegetation of disturbed areas as soon as practical.				
Degradation of wetland vegetation and the introduction and spread of alien and invasive vegetation	Construction	Medium to low -	Low-	Medium to low -
Mitigation • Store fuels, oils, chemicals, and other hazardous substances in bunded areas outside wetland and buffer areas and away from drainage pathways. • Refuelling, servicing, and maintenance of vehicles and machinery must only take place in designated areas on impermeable or suitably contained surfaces outside wetland buffer areas. • Drip trays must be used for all stationary plant and during mobile refuelling and servicing activities. • Spill kits must be available in all active work areas, and personnel must be trained in spill prevention and spill response procedures. • Any spill must be contained immediately, and contaminated soil or absorbent material must be removed and disposed of at a licensed facility where required. • Regularly inspect and maintain machinery and vehicles to prevent leaks. • No storage, handling, or disposal of hydrocarbons, oils, chemicals, or hazardous waste may occur within the wetland or its associated buffer. • Demarcate sensitive biodiversity areas, wetlands, buffers and no-go areas. • Develop and implement a construction layout plan identifying disturbance areas, no-go areas and buffer zones. • Restrict vegetation clearing to approved construction footprints only. • Phase construction activities to minimise unnecessary disturbance and facilitate early rehabilitation.				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• Prevent the introduction of invasive species through cleaning of equipment before entering the site. • Develop and implement an Alien Invasive Species Management Plan. • Undertake progressive rehabilitation and revegetation of disturbed areas. • Restrict vehicle movement to designated access roads and routes. • Implement environmentally responsible pest control measures where required. • Maintain wetland buffer zones and prohibit stockpiling, refuelling and other disturbance within buffers. • Develop and implement an Alien Invasive Management Plan. • Rehabilitate disturbed areas and revegetate as soon as practical.				
Increased sediment loads to downstream reaches	Construction	Medium to low -	Low-	Medium to low -
Mitigation • Store fuels, oils, chemicals, and other hazardous substances in bunded areas outside wetland and buffer areas and away from drainage pathways. • Refuelling, servicing, and maintenance of vehicles and machinery must only take place in designated areas on impermeable or suitably contained surfaces outside wetland buffer areas. • Drip trays must be used for all stationary plant and during mobile refuelling and servicing activities. • Spill kits must be available in all active work areas, and personnel must be trained in spill prevention and spill response procedures. • Any spill must be contained immediately, and contaminated soil or absorbent material must be removed and disposed of at a licensed facility where required. • Regularly inspect and maintain machinery and vehicles to prevent leaks. • No storage, handling, or disposal of hydrocarbons, oils, chemicals, or hazardous waste may occur within the wetland or its associated buffer. • Develop and implement a Stormwater Management Plan (SWMP), including dirty-water control, drainage systems, attenuation structures and erosion prevention measures. • Install erosion and sediment control measures such as silt fences, sediment basins and check dams. • Store excavated material appropriately to minimise impacts on watercourses and wetlands. • Maintain wetland and watercourse buffer zones and prevent stockpiling within these areas. • Control dewatering discharge using sediment traps, energy dissipators and vegetated buffers. • Implement the Stormwater Management Plan across all project-affected areas. • Implement erosion and sediment control measures. • Regularly inspect and maintain erosion and sediment control measures. • Minimise unnecessary loss of topsoil through stripping, stockpiling and reuse. • Protect topsoil stockpiles against erosion and sediment loss. • Restrict vehicle movement to designated routes to prevent soil disturbance and erosion. • Rehabilitate disturbed areas progressively to reduce sediment generation. • Phase construction activities to minimise exposed surfaces and facilitate early rehabilitation. • Implement progressive rehabilitation and revegetation of disturbed areas.				
Contamination of wetlands with hydrocarbons due to machinery leaks and spill incidents	Construction	Medium to low -	Low-	Low-
Mitigation • Store fuels, oils, chemicals, and other hazardous substances in bunded areas outside wetland and buffer areas and away from drainage pathways. • Refuelling, servicing, and maintenance of vehicles and machinery must only take place in designated areas on impermeable or suitably contained surfaces outside wetland buffer areas. • Drip trays must be used for all stationary plant and during mobile refuelling and servicing activities. • Spill kits must be available in all active work areas, and personnel must be trained in spill prevention and spill response procedures.				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• Any spill must be contained immediately, and contaminated soil or absorbent material must be removed and disposed of at a licensed facility where required. • Regularly inspect and maintain machinery and vehicles to prevent leaks. • No storage, handling, or disposal of hydrocarbons, oils, chemicals, or hazardous waste may occur within the wetland or its associated buffer.				
Alteration of hydrological regime	Construction	Medium to low -	Low-	Medium to low -
Mitigation • Site infrastructure must be micro-sited to avoid hydrologically important areas and to minimise interception, redirection, ponding, or concentration of surface runoff toward HGM 1. • The number of drainage and low-flow crossings must be minimised as far as practicable. • Maintain natural drainage pathways and diffuse overland flow patterns as far as practicable during construction. • Clean and dirty water must be separated at all times, and no dirty water may be discharged into the wetland or adjacent drainage features. • Stormwater controls must be designed and implemented to prevent concentrated flows from reaching HGM 1. • All temporary drainage measures and discharge points must be monitored and adjusted where signs of scour, incision, pooling, or altered flow routing are observed. • Any disturbance that alters runoff routing toward the wetland must be corrected immediately.				
Continued proliferation of alien invasive vegetation	Operation	Medium to low -	Low-	Low-
Mitigation • Conduct regular monitoring for alien invasive vegetation along disturbed margins, access roads, stormwater features, wetland edges, and other disturbed parts of the operational footprint. • Maintain vegetated buffer areas around HGM 1 to reduce disturbance and limit opportunities for invasive spread. • Alien invasive plant control during operation must focus on containment and reduction of spread into wetland and buffer areas as far as reasonably practicable. • Remove or control invasive species in disturbed wetland-edge and buffer areas, with priority given to species and locations most likely to spread into the wetland. • Mechanical control should be used within or near wetland areas unless otherwise approved. • Follow-up clearing must be undertaken where regrowth occurs, and invasive species should be controlled before seed set where feasible.				
Potential wetland contamination due to polluted runoff and from indiscriminate dumping of litter	Operation	Medium to low -	Low-	Low-
Mitigation • Maintain good housekeeping standards across the facility at all time. • Prohibit the dumping of waste, spoil, litter, or discarded materials within wetland areas, buffer areas, or drainage influence zones. • Store all waste in designated areas outside wetland buffer areas and remove it regularly to an authorised disposal or recycling facility. • Inspect and maintain ablution and wastewater facilities to prevent leaks, overflow, or discharge into the surrounding environment. • Ensure stormwater controls maintain the separation of clean and dirty water, and that only clean water is released to the environment. • Monitor wetland edges and drainage features periodically for signs of pollution, waste accumulation, or declining condition, and implement remedial action where necessary.				
Increased water inputs to wetland	Operation	Medium to low -	Low-	Low-

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Mitigation • Design and maintain stormwater infrastructure so that runoff from roads, hard surfaces, and associated infrastructure is attenuated and discharged diffusely rather than as concentrated point discharges wherever practicable. • Prevent stormwater from being directed into HGM 1 via channels, culverts, ruts, or poorly designed outlets. • Retain and maintain vegetated buffer areas around the wetland to slow runoff, trap sediment, and promote infiltration. • Inspect all stormwater outlets, culverts, and drainage structures routinely and after major rainfall events for scour, erosion, sediment build-up, or flow concentration. • Repair erosion, rutting, scour, or outlet failure promptly where identified. • Avoid the creation of informal maintenance tracks or disturbed flow pathways within wetland or buffer areas.				
Degradation of wetland vegetation and proliferation of alien and invasive species	Decommissioning	Medium to low -	Low-	Medium to low -
Mitigation • Restrict decommissioning activities to the minimum practicable footprint and retain wetland buffer demarcation until all works are complete. • Use existing access routes as far as practicable and avoid unnecessary disturbance to adjacent wetland or buffer vegetation. • Strip and stockpile topsoil separately in disturbed areas and re-use it during rehabilitation. • Rehabilitate all temporary disturbed areas as soon as practicable following infrastructure removal, using suitable indigenous vegetation where feasible. • Monitor disturbed areas for alien invasive species establishment and implement follow-up control where required. • Ensure that all laydown, stockpiling, waste handling, and temporary activity areas remain outside wetland and buffer areas.				
Disruption of wetland soil profile, hydrological regime and increased sediment loads	Decommissioning	Medium to low -	Low-	Medium to low -
Mitigation • Implement erosion and stormwater controls for the duration of decommissioning and maintain them until all disturbed areas are stable and adequately rehabilitated. • Remove infrastructure in a controlled manner that minimises soil disturbance, compaction, and unnecessary exposure of bare surfaces. • Maintain diffuse drainage patterns as far as practicable and prevent the concentration of runoff toward HGM 1. • Stabilise exposed soils promptly and repair erosion features immediately where they develop. • Stockpile soil and demolition material outside wetland and buffer areas on stable ground and protect all stockpiles from erosion and rain-wash. • Inspect disturbed areas, stormwater controls, and wetland margins after rainfall events and implement corrective action where failures or sediment movement are observed.				

10.3.3 VISUAL/ LANDSCAPE (V)

The proposed Redstone PV Power Project is located within a landscape that has already been substantially transformed by existing renewable energy developments, including the Redstone CSP facility and nearby solar energy projects. As a result, the receiving environment is characterised by a mixed natural and energy infrastructure landscape with a relatively high capacity to absorb additional solar development. The visual specialist assessments concluded that the proposed development would be visually compatible with the existing

landscape character, would not appear out of place within the regional context, and would result in generally low visual sensitivity due to the prevalence of existing solar infrastructure in the area.

During the construction phase, visual impacts will be associated with site clearing, earthworks, construction vehicles and equipment, temporary stockpiles, dust generation and increased activity levels. These impacts will be temporary and localised but may be noticeable to users of the Lime Acres Road, the R385 and nearby farmsteads. Construction activities may result in a temporary change in landscape character and visual quality; however, the impact is limited to the construction period and occurs within a landscape that is already influenced by large-scale energy infrastructure. Prior to mitigation, the impact is assessed as having a medium to low negative significance. The implementation of mitigation measures, including limiting earthworks to the approved footprint, retaining existing vegetation outside areas of disturbance, minimising the exposure of disturbed soils, implementing dust suppression measures, progressively rehabilitating disturbed areas and maintaining good housekeeping practices, will reduce visual intrusion and minimise impacts on sensitive views. Following mitigation, the impact is considered to be of low negative significance, while the overall significance remains medium to low negative.

During operation, visual impacts will be associated with the long-term presence of PV arrays, substations, internal roads and associated infrastructure. Although the project will introduce additional built elements into the landscape, the specialist assessments found that the facility will be viewed within the context of an existing renewable-energy landscape and will largely be absorbed into the surrounding visual environment. The development is therefore not expected to result in a substantial change to landscape character, scenic quality or sense of place. Mitigation measures include the use of colours that complement the surrounding landscape, the avoidance of reflective materials and bright finishes, the retention of existing vegetation wherever possible, and the careful management of security and operational lighting through the use of shielded luminaires and minimisation of high-mast lighting. Notwithstanding these measures, the visual presence of the facility will remain throughout the operational life of the project. Consequently, the operational visual impact is assessed as medium to low negative before mitigation, with mitigation reducing visual contrast and improving landscape integration; however, the residual impact remains medium to low negative due to the permanent nature of the development.

During decommissioning and rehabilitation, temporary visual impacts may arise from the dismantling of infrastructure, increased vehicle activity, temporary stockpiles and areas of exposed soil. These impacts are expected to be localised and short-term. Once infrastructure is removed and rehabilitation is completed, the visual environment is expected to recover progressively. The specialist assessments indicate that the removal of project infrastructure and successful rehabilitation will ultimately restore disturbed areas and reduce visual intrusion within the landscape. Prior to mitigation, the impact is assessed as medium to low negative. The implementation of rehabilitation measures, including the replacement of topsoil, progressive rehabilitation, revegetation with indigenous species, retention of existing vegetation outside work areas, dust suppression during dismantling activities, and removal of all infrastructure and associated construction remnants, will substantially reduce the residual visual impact. Following mitigation, the impact is assessed as low negative, with a final significance of low negative.

Overall, the visual specialist studies conclude that the proposed Redstone PV Power Project will not result in significant adverse visual effects, that the receiving landscape possesses sufficient capacity to absorb the proposed development, and that the project is visually compatible with the existing landscape character and land-use patterns. No fatal visual flaws or unacceptable visual impacts were identified, provided that the recommended mitigation measures are implemented throughout the project lifecycle.

Table 40: Visual impacts

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Physical presence of Redstone PV	Construction	Low -	Low -	Low -

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Power Project and impact of sensitive views (construction) including cumulative impacts				
• Earthworks should be executed so that only the footprint and a small 'construction buffer zone' around the proposed activities are exposed, i.e. the buffer and the construction area must be below 20ha as well as staying within the approved footprint. In all other areas, the existing vegetation should be retained, especially along the periphery of the construction footprint. • All cut and fill slopes (if any) and areas affected by construction work should be progressively topsoiled and re-vegetated with indigenous species as soon as possible. • Disturbed soil must be exposed for the minimum time possible once cleared of vegetation to avoid prolonged exposure to wind and water erosion and to minimise dust generation. • Minimise the number of light fixtures to the bare minimum, including security lighting along the boundary of the property.				
Physical presence of the Redstone PV Power Project and impact of sensitive views (operation) including cumulative impacts	Operation	Low -	Low -	Low -
• Earthworks should be executed so that only the footprint and a small 'construction buffer zone' around the proposed activities are exposed, i.e. the buffer and the construction area must be below 20ha as well as staying within the approved footprint. In all other areas, the existing vegetation should be retained, especially along the periphery of the construction footprint. • All cut and fill slopes (if any) and areas affected by construction work should be progressively topsoiled and re-vegetated with indigenous species as soon as possible. • Disturbed soil must be exposed for the minimum time possible once cleared of vegetation to avoid prolonged exposure to wind and water erosion and to minimise dust generation. • Minimise the number of light fixtures to the bare minimum, including security lighting along the boundary of the property.				
Physical presence of Redstone PV Power Project and impact of sensitive views (decommissioning & rehabilitation) including cumulative impacts	Decommissioning	Low -	Low -	Low -
• Earthworks should be executed so that only the footprint and a small 'construction buffer zone' around the proposed activities are exposed, i.e. the buffer and the construction area must be below 20ha as well as staying within the approved footprint. In all other areas, the existing vegetation should be retained, especially along the periphery of the construction footprint.				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• All cut and fill slopes (if any) and areas affected by construction work should be progressively topsoiled and re-vegetated with indigenous species as soon as possible. • Disturbed soil must be exposed for the minimum time possible once cleared of vegetation to avoid prolonged exposure to wind and water erosion and to minimise dust generation. • Minimise the number of light fixtures to the bare minimum, including security lighting along the boundary of the property.				

10.3.4 TERRESTRIAL BIODIVERSITY

The proposed Redstone PV Power Project will result in the clearing of approximately 19.5 ha of predominantly natural vegetation within the assessment area, leading to habitat loss, habitat fragmentation, and the disturbance of terrestrial ecological processes. The site is situated within the Olifantshoek Plains Thornveld vegetation type, which is classified as Least Concern but is considered poorly protected and subject to increasing development pressures within the broader Postmasburg–Daniëlskuil region. Although no Critical Biodiversity Areas occur within the development footprint, the site supports natural vegetation in generally good condition and provides habitat for several protected plant species, including *Ammocharis coranica*, *Lithops aucampiae*, *Brunsvigia radulosa*, *Olea europaea* subsp. *cuspidata* and *Bulbine* species. The site also provides suitable habitat for a number of fauna species of conservation concern that may occur in the surrounding area.

Potential impacts on terrestrial biodiversity include habitat fragmentation and loss of natural vegetation, the loss of species of conservation concern, the spread of alien invasive species, anthropogenic disturbance and accidental mortality of fauna, as well as indirect impacts associated with soil disturbance and altered ecological functioning. The biodiversity assessment recognised that the proposed development is located immediately adjacent to the existing Redstone CSP facility, resulting in an area that has already been influenced by infrastructure-related edge effects and a reduction in ecological functionality relative to more intact surrounding habitats. Consequently, while additional habitat loss will occur, the severity of the impact is reduced by the existing level of landscape transformation within the immediate development area.

The key mitigation measures recommended by the specialist include limiting disturbance to the approved development footprint, conducting search-and-rescue operations for protected flora prior to vegetation clearing, translocating protected species where feasible, implementing an alien invasive species management programme, maintaining ecological movement corridors where possible, installing wildlife-friendly fencing, rehabilitating disturbed areas with indigenous vegetation, and implementing construction controls to minimise unnecessary disturbance to fauna and habitats. Dust suppression, environmental awareness training and ongoing rehabilitation and vegetation management should further reduce impacts throughout the project lifecycle.

The biodiversity assessment concluded that, although the proposed development will result in the loss of some natural habitat and species of conservation concern, these biodiversity features remain relatively well represented within the surrounding landscape and the development is not expected to significantly alter the regional biodiversity status quo. Following implementation of the recommended mitigation measures, impacts associated with habitat fragmentation, species loss and faunal disturbance are expected to reduce from medium-high or medium-low significance to predominantly medium-low or low significance. Overall, the residual impact on terrestrial biodiversity is considered medium-low to low negative, and the specialist concluded that the development can proceed provided that the recommended mitigation and management measures are implemented throughout the construction, operational and decommissioning phases of the project.

Table 41: Impacts identified and assessed in the terrestrial biodiversity study

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Habitat Fragmentation & loss of natural vegetation	Construction	Medium to high -	Medium to low -	Medium to low -
• Habitat fragmentation can be somewhat mitigated by allowing for wide, unfenced natural corridors between panel blocks to allow wildlife movement. Installing raised fences or include "mammal gates"(15–20 cm gaps at the bottom) for small animal passage. Plant low-growing, indigenous grasses and forbs beneath panels to boost pollinator populations.				
Alien and invasive species	Construction	Medium to low -	Low -	Low -
• A comprehensive and active alien and invasive species removal program must be developed and implemented, this will help to contain the spread of these unwanted plants.				
Alien and invasive species	Operation	Medium to low -	Low -	Low -
• A comprehensive and active alien and invasive species removal program will help to contain the spread of these unwanted plants.				
Loss of species of conservation concern	Construction	Medium to high -	Medium to low -	Medium to low -
• A search and rescue operation should be performed prior to clearing. Where possible floral SCC should be relocated (refuge areas can be created around infrastructure areas, which will avoid disturbing natural areas by replanting rescue plants) As it is not feasible to rescue larger trees species such as the *Olea europeae* saplings can be cultivated in these refuse areas . • Avoid clearing vegetation during peak bird-nesting or animal-breeding seasons. Activity usually peaks between October and December, directly following the first seasonal rains when vegetation flushes and food becomes most abundant. However breeding activity is highly sensitive to rainfall. If drought conditions delay the wet season, nesting peaks may also shift. • Dust suppression during construction - spray water regularly to prevent dust from coating and suffocating surrounding plants. Dust suppression requirements will vary according to season, if construction takes place during August – September when conditions are most dry and windy using standard water bowsers on unpaved surfaces near vegetation, spraying may be required 4 to 8 times per day. The frequency of dust suppression is dynamic and depends heavily on the local conditions and proximity to dust sources, constant visual monitoring will help establish requirements for dust suppression.				
Loss of species of conservation concern	Operation	Medium to high -	Medium to low -	Medium to low -
• A search and rescue operation should be performed prior to clearing. Where possible floral SCC should be relocated (refuge areas can be created around infrastructure areas, which will avoid disturbing natural areas by replanting rescue plants) As it is not feasible to rescue larger trees species such as the *Olea europeae* saplings can be cultivated in these refuse areas . • Avoid clearing vegetation during peak bird-nesting or animal-breeding seasons. Activity usually peaks between October and December, directly following the first seasonal rains when vegetation flushes and food becomes most abundant. However breeding activity is highly sensitive to rainfall. If drought conditions delay the wet season, nesting peaks may also shift.				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• Dust suppression during construction - spray water regularly to prevent dust from coating and suffocating surrounding plants. Dust suppression requirements will vary according to season, if construction takes place during August – September when conditions are most dry and windy using standard water bowsers on unpaved surfaces near vegetation, spraying may be required 4 to 8 times per day. The frequency of dust suppression is dynamic and depends heavily on the local conditions and proximity to dust sources, constant visual monitoring will help establish requirements for dust suppression.				
Anthropogenic Disturbances, Intentional and/or accidental killing of fauna	Construction	Medium to low -	Medium to low -	Medium to low -
• There is unfortunately no mitigation for the vibrations caused by machinery/vehicles, except perhaps ensuring that activities are kept to a minimum. As a standard for such developments mitigation measures include recommending acoustic shielding by enclosing noisy inverters and transformers to prevent sound from disturbing sensitive wildlife as well as anti-reflective coatings are recommended to assist to reduce the lake effect, and prevent bird collisions. However as this development is adjacent to an existing CSP development these measures would only be effective if applied to the development as a whole, which is not feasible as a CSP is reflective by design. Therefore current mitigation measures employed for the CSP facility in this regard would need to be extended into the PV development. • A search and rescue **should** be conducted prior to clearing activities, for example animals such as tortoises should be moved out of harm's way. As negative impacts on herpetofauna often stem from a lack of awareness, proactive education can effectively mitigate these occurrences. Providing targeted conservation training to the workforce highlights the ecological importance of these species and promotes safer, more sustainable workplace practices.				
Anthropogenic Disturbances, Intentional and/or accidental killing of fauna	operation	Medium to low -	Medium to low -	Medium to low -
• There is unfortunately no mitigation for the vibrations caused by machinery/vehicles, except perhaps ensuring that activities are kept to a minimum. As a standard for such developments mitigation measures include recommending acoustic shielding by enclosing noisy inverters and transformers to prevent sound from disturbing sensitive wildlife as well as anti-reflective coatings are recommended to assist to reduce the lake effect, and prevent bird collisions. However as this development is adjacent to an existing CSP development these measures would only be effective if applied to the development as a whole, which is not feasible as a CSP is reflective by design. Therefore current mitigation measures employed for the CSP facility in this regard would need to be extended into the PV development. • A search and rescue should be conducted prior to clearing activities, for example animals such as tortoises should be moved out of harm's way. As negative impacts on herpetofauna often stem from a lack of awareness, proactive education can effectively mitigate these occurrences. Providing targeted conservation training to the workforce highlights the ecological importance of these species and promotes safer, more sustainable workplace practices.				
Soil compaction, sedimentation and disruption of freshwater ecosystems	Construction	Medium to low -	Low -	Low -

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• Enforce a strict buffer zone around all mapped drainage lines (30m buffer as defined in the wetland delineation). • Design and enforce a stormwater management plan for the development. • Immediately reseed the site with deep-rooted, low-growing indigenous grasses. The roots function as a biological anchor that stabilizes the soil structure and facilitates water absorption.				
Soil compaction, sedimentation and disruption of freshwater ecosystems	Operation	Medium to low -	Low -	Low -
• Enforce a strict buffer zone around all mapped drainage lines as delineated by the wetland specialist. • Design and enforce a stormwater management plan for the development. • Immediately reseed the site with deep-rooted, low-growing indigenous grasses. The roots function as a biological anchor that stabilizes the soil structure and facilitates water absorption.				

10.3.5 SOCIAL (S)

The social impact assessment considered the potential positive and negative social impacts associated with the proposed Redstone PV Project during the construction, operational and decommissioning phases. The assessment focused on those aspects of the project that may influence the wellbeing of surrounding communities, including employment creation, skills development, sense of place, and broader socio-economic benefits. The significance of each impact was evaluated before and after the application of mitigation and enhancement measures, taking into account the existing social environment and the findings of previous assessments for the Redstone CSP and PV developments. Overall, the assessment identified predominantly positive social impacts, particularly in relation to employment opportunities and skills transfer, with limited negative impacts that can be effectively managed through the implementation of recommended mitigation measures.

Table 42: Social impacts assessed

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
GDP and Production (Construction Impact)	Construction	Medium to high +	Medium to high +	Medium to high +
Mitigation • Identify and explore opportunities to procure goods and services from local and domestic suppliers that do not jeopardise bankability of the PV Power Project • Identify and explore opportunities to procure goods and services locally to maintain the PV Power Project during the operation phase above and beyond those that would be done as part of Redstone CSP Project				
Impact on National Government Revenue	Construction	Medium to high +	Medium to high +	Medium to high +
• No mitigation required				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Increase in Employment	Construction	Medium to high +	Medium to high +	Medium to high +
Mitigation • It is recommended that the contractor employ local semi-skilled and unskilled labour from the study area. • The developer should stipulate in their contracts with contractors that local labour should be used for relevant activities e.g., bush clearing, road construction and fencing • Consult with local ward councillors who could assist in determining available local labourers that could be considered for possible employment where skills where local labourers meet the requirements of the development.				
Skills Development	Construction	Medium to high +	Medium to high +	Medium to high +
Mitigation • In order to maximise the positive impact, it is suggested that the project company provide training courses for employees where feasible to ensure that employees gain as much as possible from the work experience. • Facilitate the transfer of knowledge between experienced employees and the staff. • Perform a skills audit to determine the potential skills that could be sourced in the area.				
Impact on Sense of Place	Construction	Medium to low -	Medium to low -	Medium to low -
Mitigation • Soils should be replaced and the construction area, as well as laydown areas should be rehabilitated as soon as possible after construction. • The construction site should be kept litter free. • Overall site rehabilitation should occur as soon as the construction process allows. • The recommendations made by the Visual Impact Assessment should be adhered to.				
GDP and Production	Operation	Medium to high +	Medium to high +	Medium to high +
Mitigation • Identify and explore opportunities to procure goods and services from local and domestic suppliers that do not jeopardise bankability of the PV Power Project • Identify and explore opportunities to procure goods and services locally to maintain the PV Power Project during the operation phase above and beyond those that would be done as part of Redstone CSP Project				
Government Revenue	Operation	Medium to high +	Medium to high +	Medium to high +
• No mitigation required				
Impact on GDP, Production and Metallic	Decommissioning	Low to medium +	Low to medium +	Low to medium +

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
and Non-Metallic Materials				
Mitigation • Identify and explore opportunities to procure goods and services from local and domestic suppliers that do not jeopardise bankability of the PV Power Project • Identify and explore opportunities to procure goods and services to maintain the PV Power Project during the operation phase above and beyond those that would be done as part of Redstone CSP Project				
Impact on National Government Revenue	Decommissioning	Low to medium +	Low to medium +	Low to medium +
• No mitigation required				

10.3.6 CULTURAL HERITAGE (C)

The heritage impact assessment evaluated the potential effects of the proposed Redstone PV Facility on archaeological, historical, cultural and palaeontological heritage resources within the project area. The assessment included a desktop review, heritage screening and field survey to identify any heritage resources that may be affected by the development. No heritage resources were identified within the proposed development footprint, and the study area is considered to have a low heritage sensitivity. Nevertheless, due to the possibility of buried or previously unknown heritage resources being encountered during ground disturbance activities, the assessment considered the potential impact of chance finds during construction. The significance of identified heritage risks was assessed before and after the implementation of mitigation measures, with particular emphasis on the application of a Chance Finds Procedure to ensure that any heritage resources uncovered during construction are appropriately managed and protected. Overall, the proposed development is not expected to result in direct impacts on known heritage resources, and any residual impacts can be reduced to acceptable levels through the implementation of recommended mitigation measures.

Table 43: Heritage impacts assessed

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Damage/destruction to unknown archaeological and heritage material	Construction	Medium to low -	Low -	Low -
Mitigation measures • Develop, and implement a chance to find procedure in cases where possible heritage finds are uncovered.				

10.3.7 PALAEONTOLOGY

The palaeontological assessment evaluated the potential impacts of the proposed Redstone PV Facility and associated Battery Energy Storage System (BESS) on fossil heritage resources that may occur within the development footprint. The study area is underlain by Quaternary to Tertiary Kalahari Group sands and the Palaeoproterozoic Ongeluk Formation. While the underlying volcanic rocks of the Ongeluk Formation are not considered fossiliferous, the overlying Kalahari sediments have the potential to contain fossil remains such as mammalian bones and teeth, tortoise remains, molluscs and trace fossils preserved within calcrete and sand deposits.

Desktop investigations confirmed that the site is classified as having Moderate palaeontological sensitivity according to the SAHRIS PalaeoMap and Medium palaeontological sensitivity according to the DFFE National Environmental Screening Tool. The construction phase represents the only project phase with the potential to affect palaeontological resources through excavation and ground disturbance activities. A pre-mitigation impact significance of Medium to High was assigned to the potential loss of fossil heritage; however, with the implementation of appropriate mitigation measures, including immediate notification of SAHRA should any fossil material be uncovered during construction, the significance is reduced to Medium-Low and considered acceptable. No significant impacts are anticipated during the operational or decommissioning phases. Consequently, the proposed development is regarded as acceptable from a palaeontological perspective, and no additional palaeontological field investigations or ground-truthing studies are required prior to development.

Table 44: Paleontological impacts assessed

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Loss of fossil Heritage	Construction	Medium to high -	Medium to low -	Medium to low -
• Should fossil resources be discovered during construction, all activities should be halted and SAHRA and a paleontological specialist should be contacted immediately.				

11 CONCLUSIONS AND RECOMMENDATIONS

The BA process identified potential issues and impacts associated with the proposed project. The BA addresses those identified potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with applicable phases and activities of the project and recommends appropriate mitigation measures for potentially significant environmental impacts. The BA report provides sufficient information regarding the potential impacts and the acceptability of these impacts in order for the Competent Authority to make an informed decision regarding the proposed project. The release of a BA Report for public review and comment provides stakeholders with an opportunity to verify that the issues they have raised throughout the process to date has been captured and adequately considered. All issues raised throughout the public participation process have been captured and responded to as far as possible.

The BA report aims to achieve the following:

- Provide an overall assessment of the social and biophysical environments affected by the proposed project.
- Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed project.
- Identify and recommend appropriate mitigation measures for potentially significant environmental impacts; and
- Undertake a fully inclusive public involvement process to ensure that I&APs are afforded the opportunity to participate, and that their issues and concerns are recorded.

11.1 CONCLUSIONS FROM SPECIALIST STUDIES

The conclusions and recommendations of this BA are the result of the assessment of identified impacts by specialists where applicable, and the parallel process of public participation. The main conclusions from each of the specialist studies are presented below.

11.1.1 WETLANDS

The potential impacts associated with the proposed development are predominantly indirect and relate mainly to altered hydrology, erosion and sedimentation, vegetation disturbance, alien invasive species proliferation, and water quality deterioration from contaminated runoff or poor site management. Provided that the delineated wetland footprint and recommended buffer are avoided, and that the mitigation measures are implemented in full, no direct loss of wetland habitat is anticipated.

11.1.2 SOCIAL

To conclude, Urban-Econ assessed the proposed amendments and confirms that the time lapsed will not change the scope, nature or level of the impacts and therefore no change to the initial assessment conducted should occur. The additional impact identified will have a positive impact, whereas the sense of place impact will have a low significance if the necessary mitigations are followed. Furthermore, from a socio-economic perspective there is no reason why the proposed amendment should not be authorised.

11.1.3 SOILS AND AGRICULTURE

Regarding the soils occurring, along with their associated agricultural potential, is the opinion of the specialist that there are no fatal flaws or other impediments to the proposed development.

11.1.4 TERRESTRIAL BIODIVERSITY

The impact of this proposed development on the terrestrial biodiversity is considered to be medium-low to low and as such the development should be able to proceed as long as the mitigations measures are adhered to and that best practice measures for the operation are implemented. The planned development will not alter the biodiversity and habitat significantly from the status quo of the surrounding area.

11.1.5 VISUAL AND LANDSCAPE

The outcome of the compliance statement process confirms that:

- The study area has a potentially low (-) to negligible visual and landscape sensitivity risk.
- The report is to be submitted alongside the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations, and
- No fatal flaws, from a visual perspective, are preventing the project from moving forward.

11.1.6 HERITAGE

It is the combined considered opinion of the heritage specialists that the proposed project will have no direct impact on any identified heritage resources in the study area. However, due to the subterranean nature of heritage resources, a chance finds procedure must be implemented if any unknown heritage resources are to be uncovered. With the implementation of the recommended mitigation measures with regard to chance finds, the overall impact on heritage resources will be reduced to acceptable levels during the activities of the project.

11.1.7 PALAEONTOLOGY

The Redstone PV and BESS development is underlain by Quaternary to Tertiary sands of the Kalahari Group and by the Palaeoproterozoic Ongeluk Formation of the Postmasburg Group. The overlying Quaternary to Tertiary sands holds the greatest palaeontological potential in the study area, whereas the underlying Ongeluk Formation, being of volcanic origin and predating the evolution of shelled and skeletal life, is not considered fossiliferous. Both the SAHRIS PalaeoMap and the DFFE National Environmental Screening Tool classify the site as having a Moderate to Medium Palaeontological Sensitivity (Almond & Pether, 2008; SAHRIS database).

A Medium Palaeontological Significance has been allocated to the construction phase pre-mitigation, reducing to Low significance post-mitigation; no significant impacts are expected during the Operational or Decommissioning phases, and the No-Go Alternative would have a Neutral impact. Cumulative impacts are considered Medium pre-mitigation and Low post-mitigation, within acceptable limits. The proposed Redstone PV and BESS development may therefore be permitted, as the footprint is not considered highly sensitive in terms of palaeontological resources, and no further palaeontological heritage studies or ground truthing are required prior to development.

Given the Low Palaeontological Sensitivity of the site, no formal chance find protocol is required. Should fossil remains or trace fossils nonetheless be exposed during construction, the Environmental Control Officer (ECO)/site manager must notify SAHRA immediately (SAHRA, 111 Harrington Street, Cape Town, PO Box 4637, Cape Town 8000; Tel: 021 462 4502; www.sahra.org.za), so that a palaeontologist can undertake appropriate mitigation (recording and collection). Any fossil material collected must be permitted through SAHRA and housed in an official repository, with reporting meeting SAHRA's (2012) minimum standards.

These recommendations should be incorporated into the Environmental Management Plan for the proposed Redstone Solar PV and BESS in the Northern Cape Province.

11.2 SENSITIVITY MAP

Environmental sensitivity mapping provides a strategic overview of the environmental, cultural and social assets in a region. The sensitivity mapping technique integrates numerous datasets (base maps and shapefiles) into a single consolidated layer making use of Geographic Information System (GIS) software and analysis tools. Environmental sensitivity mapping is a rapid and objective method applied to identify areas which may be particularly sensitive to development based on environmental, cultural and social sensitivity weightings – which is refined by specialists' input within each respective specialist field based on aerial or ground-surveys. Therefore, the sensitivity mapping exercise assists in the identification of sensitive areas within and surrounding the proposed application area Figure 34 superimposes the proposed activity and its associated structures and infrastructure on the combined environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers.

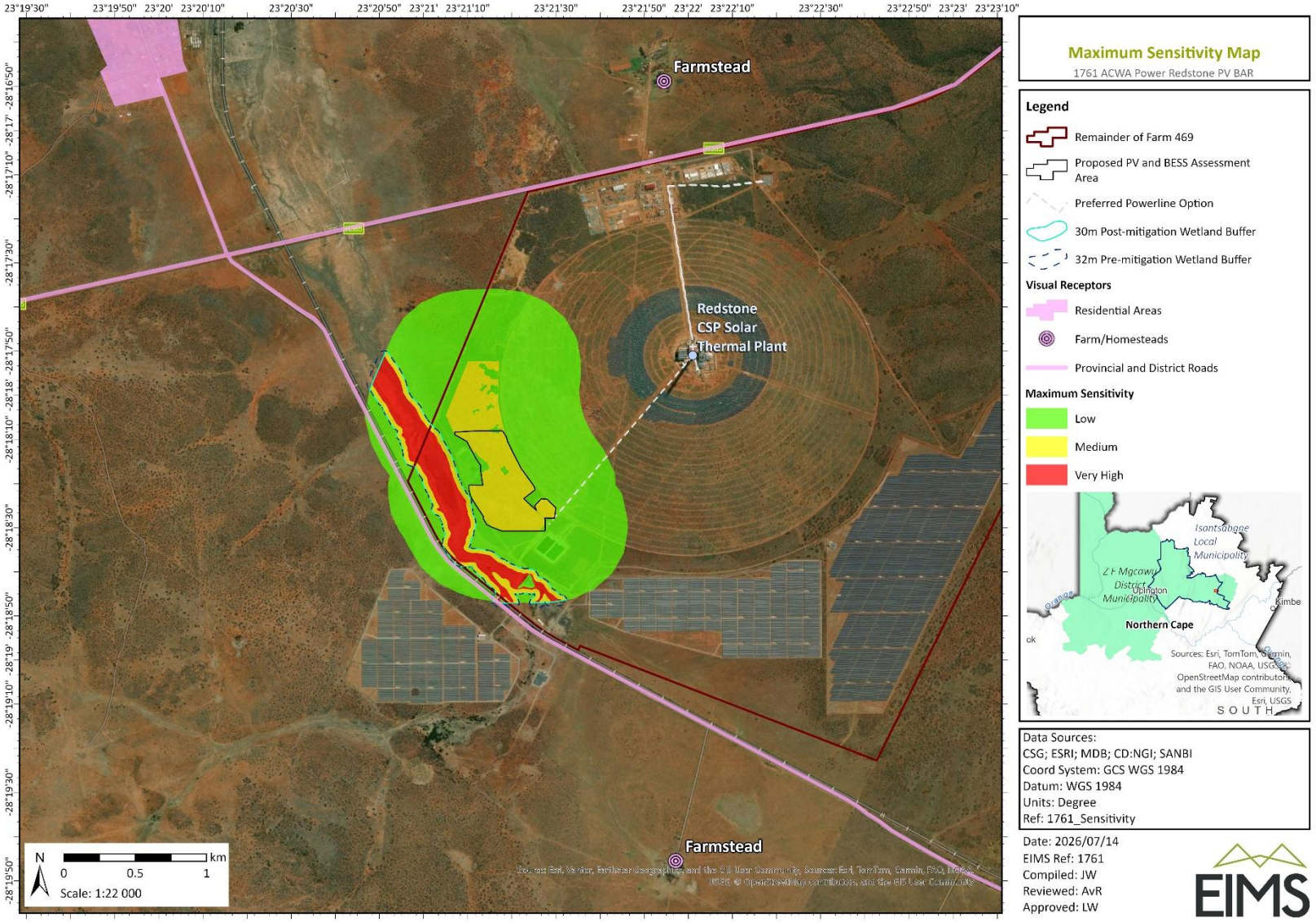

Figure 34: Composite sensitivity map.

11.3 ASSESSMENT OF ALTERNATIVES

The preferred alternatives identified in Section 7 above are discussed and comparatively assessed in this section. Each discrete alternative identified is described in respect of the potential advantages and disadvantages with a final recommendation.

Table 45 presents the identified feasible alternatives considered. The alternatives in the table below that are marked with an "✓" are considered the preferred and recommended alternatives moving forward.

Table 45: Comparative assessment of alternatives.

#	Category of Alternative	Alternative	Advantages	Disadvantages	Assessment
AA1	Activity	Proposed Redstone PV Facility✓	Supports the auxiliary electricity requirements of the existing Redstone CSP facility; contributes to renewable energy generation; improves operational efficiency; utilises existing infrastructure and services.	Localised impacts on vegetation, biodiversity, soils, wetlands, heritage resources and landscape character.	Preferred activity alternative. Impacts can be mitigated to acceptable levels and the project contributes positively to renewable energy objectives.
AA2	Activity	No-Go Alternative	Avoids all project-related environmental impacts and disturbance.	No renewable energy benefits; no improvement to CSP operational efficiency; loss of employment, procurement and economic benefits.	Not preferred as it would prevent the environmental and socio-economic benefits associated with the project.
AL1	Location	Preferred PV Site within Existing Redstone CSP Development Area✓	Located within an existing authorised energy development area; optimises use of existing infrastructure; limits expansion into undisturbed areas; reduces environmental disturbance.	Some localised environmental sensitivities remain present and require mitigation.	Preferred location. No other reasonable or feasible property alternatives were identified.
AR1	Routing	Route Through Existing CSP Footprint ✓	Reduces impacts on natural habitat and biodiversity; minimises vegetation clearing and habitat fragmentation; utilises existing disturbed corridors; limits impacts on	May require routing around existing infrastructure and utilities; maintenance and servitude	Preferred routing alternative and considered the Best Practicable Environmental Option. Selected because it minimises ecological disturbance and

#	Category of Alternative	Alternative	Advantages	Disadvantages	Assessment
			sensitive environmental features; makes use of existing access infrastructure.	constraints may occur.	additional land transformation.
AR2		Route Around CSP Through Greenfield Areas	Greater routing flexibility and potentially fewer existing infrastructure constraints.	Increased vegetation clearing, habitat fragmentation, ecological disturbance, access road requirements and cumulative environmental impacts.	Not preferred. Determined to be unreasonable due to higher environmental impacts and was not assessed further.
AD1	Design	Underground Powerline ✓	Negligible visual impact; no bird collision or electrocution risk; reduced weather-related damage; makes use of the existing disturbed CSP footprint; reduces cumulative visual impacts.	Higher installation costs; requires trenching during construction; maintenance and fault identification may be more complex.	Preferred design alternative. Considered environmentally preferable due to reduced visual and biodiversity impacts.
AD2		Overhead Powerline	Lower capital cost; easier installation, inspection, repair and future upgrades.	Visual intrusion; potential bird collision and electrocution risks; greater cumulative infrastructure impacts; exposure to weather-related damage.	Not preferred and not assessed further due to greater visual and biodiversity impacts relative to the underground alternative.

11.4 ENVIRONMENTAL IMPACT STATEMENT

The findings of the Basic Assessment process and associated specialist studies indicate that there are no environmental fatal flaws that would preclude the proposed Redstone Solar PV Project from proceeding. The specialist assessments concluded that the identified environmental sensitivities can be appropriately managed and that the significance of potential impacts is generally low to moderate and can be reduced through the implementation of the recommended mitigation and management measures.

Based on the nature and extent of the proposed development, the existing disturbed and transformed character of the receiving environment, the findings of the specialist studies, and the assessment of potential environmental impacts, it is the opinion of the Environmental Assessment Practitioner (EAP) and the Basic Assessment project team that the majority of identified negative impacts can be mitigated to acceptable levels

through the implementation of the Environmental Management Programme (EMPr) and specialist recommendations.

Furthermore, the proposed development will contribute to South Africa's renewable energy objectives and is not expected to result in unacceptable environmental impacts that cannot be effectively managed. It is therefore the opinion of the EAP that the proposed Redstone Solar PV Project is environmentally acceptable and that the project should be authorised, subject to the implementation of the recommended mitigation measures and compliance with all applicable legislative and environmental authorisation requirements.

The following impacts were determined to have a medium-to-low negative significance after mitigation:

- Habitat fragmentation and loss of natural vegetation;
- Loss of species of conservation concern;
- Anthropogenic disturbance and the intentional and/or accidental killing of fauna;
- Increased bare surfaces, runoff and erosion potential;
- Degradation of wetland vegetation and the introduction and spread of alien invasive species;
- Increased sediment loads to downstream reaches;
- Alteration of wetland hydrological regimes;
- Loss of agricultural land due to the construction of solar infrastructure;
- Impact on sense of place during the construction phase; and
- Loss of fossil heritage resources.

All remaining negative impacts were assessed as having low negative significance following the implementation of the recommended mitigation measures. Positive impacts associated with GDP contribution, government revenue generation, employment creation and skills development were assessed as medium-to-high positive and are expected to result in socioeconomic benefits during the construction, operational and decommissioning phases of the project.

11.5 RECOMMENDATIONS FOR INCLUSION IN ENVIRONMENTAL AUTHORIZATION

This section contains recommendations from the EAP and various specialists for inclusion in the EA.

11.5.1 EAP

The EAP recommends the inclusion of the following conditions in the environmental authorization should it be granted:

- The final designs should be limited to the assessed areas and should not exceed a maximum footprint of 19.9 ha for the sum of the footprint of the non-linear infrastructure.
- A final layout and specific design should be submitted to the competent authority prior to construction.
- The approved EMPr as submitted must form part of the environmental management framework throughout the life of the project. All conditions therein must be adhered to.

12 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations relating to this assessment should be considered in evaluating and decision-making on this assessment:

- Unless specifically noted, the environmental attributes for the receiving environment have been obtained from best available spatial and scientific data sources. Whilst reasonable effort has been taken to obtain the most recent and relevant data, there may be gaps in baseline data, leading to uncertainties in impact predictions. Where uncertainty exists efforts are made to indicate this in the assessment.
- This study is based on activity information provided by the applicant (including engineering designs, specifications, services reports, etc). The accuracy of this information has not been verified, and it is assumed that no significant changes or deviations to the final designs will occur. Should such occur the significance of the potential impacts may require reassessment and where relevant formal amendment processes.
- The information presented in this report is based on the information available at the time of compilation of the report.
- Whilst reasonable effort has been made to identify all potential environmental impacts, some impacts may not be reasonably foreseeable or may emerge only after project implementation.
- In determining the significance of impacts, with mitigation, it is assumed that mitigation measures proposed in the report are correctly and effectively implemented and managed throughout the life of the project.

The remaining sub-sections present the assumptions and limitations applicable to the respective specialist assessments.

12.1 HERITAGE

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to acknowledge that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, amongst others the subterranean nature of some archaeological sites and existing vegetation cover.

Fieldwork was also focussed on areas that were not previously disturbed by Agricultural fields, thus concentrating on areas with the highest potential to yield indications of the possible presence of heritage resources.

Therefore, should any heritage features and/or objects be located or observed outside the identified heritage sensitive areas during construction activities, a heritage specialist must be contacted immediately. Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time as the heritage specialist has been able to make an assessment of the significance of the site (or material) in question. This also applies to Burial Grounds and Graves (BGG). If any BGG are located or observed during the course of the development, the procedures and requirements pertaining to BGG will apply.

12.2 WETLANDS

The following aspects were considered as limitations:

- It has been assumed that the spatial files provided to the specialist are accurate;
- Only the proposed available area, PV panels, and associated infrastructure was provided as a layout by the time of the site visit;

- The seasonality of the surveys is not considered to be a limiting factor with regard to the identification and delineation of wetlands, the only limitation in this regard would be the identification of certain plant species. The results of the assessment are considered conclusive in the opinion of the specialist;
- Freshwater features within the larger 500 m PAOI were delineated and assessed via desktop;
- Areas characterised by external wetland attributes were the focus for this assessment, where potential wetlands were thereafter confirmed by soil form indicators; and
- The GPS used for water resource delineations is accurate to within five metres. Therefore, the wetland delineation plotted digitally may be offset by a maximum of five metres to either side.

12.3 SOCIAL

Considering the nature of this addendum, the following assumptions and limitations apply for this study:

- Project-related information supplied by the client for the purpose of the analysis is assumed to be reasonably accurate.
- Where necessary and applicable, the recent socio-economic data was utilised in the assessment derived from Quantec database. Otherwise, the socio-economic baseline developed during the Redstone CSP Project socio-economic impact assessment study assumed to be still relevant.
- A google site imagery for March 2009 (no historical imagery available for 2011) and July 2017 shows that the land where the proposed facility is to be located and the area surrounding it has not changed from a land use perspective except for the development of the Lesedi and Jasper Solar PV Power Plants to the south, south-east and south-west of the project site. Importantly, no changes to the land use can be observed in the area where the proposed PV Power Project's footprint may be located or to the west of the possible project's footprint. This suggests that the socio-economic activities on the site and the immediate areas surrounding the site have not changed over the past seven years. Therefore, it was assumed that the socioeconomic characteristics of the immediate receiving environment remained the same as what was observed during the 2011 study.
- The proposed Solar PV Power Project is expected to be smaller than the above-mentioned Redstone CSP Project in terms of:
    - Value of the development, including investment, employment, presence of construction workers on site, and household benefits
    - Footprint of the development
    - Height (and as a result visual effect) of the development
    - Construction phase and decommissioning phase duration of the development

Further to be above, the development and operation of the proposed Solar PV Power Project will coincide with the Redstone CSP Project, which means that many of the resources involved in construction and operation of the two power plants will be shared. On this basis, the following implications were assumed to be relevant:

- The socio-economic impacts for the proposed Solar PV Power Project would be of similar type and nature as those assessed in 2011; while no additional or new impacts to those identified in 2011 study can be expected – given that the socio-economic environment remained unchanged (and no new sensitive receptors are identified) and that the facility is considerably smaller than that analysed back in 2011 - some socio-economic impacts analysed in 2011 may no longer be applicable to the proposed Solar PV Power Project.
- For those impacts that are identified to be relevant, the stakeholder responses and subsequently the significance of the impact were assumed to be no worse than those identified in 2011.

12.4 TERRESTRIAL BIODIVERSITY

Generally a potential limitation associated with the sampling approach is the narrow temporal window of sampling. Ideally, a site should be visited several times during different seasons to ensure a comprehensive database of plant and animal species are captured. However, this is rarely possible due to time and cost constraints and therefore these surveys usually represent a “moment in time” survey. However this area has been surveyed numerous time during the various stages of the project and therefore there is a relatively good database that has been collected over a number of years, which can be used to augment the current survey information. This survey represents a wet season survey as it was conducted in May nearing the end of particularly wet summer and autumn rainfall season . A plant species list was compiled for the site from the site visit, this was augmented by a list of species which are known from other studies to occur in the immediate surrounds of the site. The lists of amphibians, reptiles and mammals for the site are based on those observed at the site as well as those likely to occur in the area based on their distribution and habitat preferences. This represents a sufficiently conservative and cautious approach that takes account of the study limitations. Protected tree species which are of concern within this area are easily accounted for as they are highly visible and timing of the survey does not influence the accuracy of their records.

12.5 VISUAL AND LANDSCAPE

The following assumptions and limitations are included for a visual and landscape perspective:

- The study area is approximately a 3,0 km radius around the proposed Project site. It includes the project site and the full extent of the surrounding landscape within the study area. Given the nature of the receiving landscape, beyond this distance, visible project components will recede significantly into the background of views, have minimal impact on the visual environment, or be screened by topography and/or vegetation.
- The screening did identify landscape and visual as requiring a specialist assessment to be included in the final report.
- The footprint environmental sensitivities for the proposed development footprint, as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.
- The confirmation sensitivity statement of the proposed development areas was established through the following methodology:
    - A desktop analysis using satellite (Google) imagery.
    - On-site inspection conducted on 16 June 2026.
    - Any other available and relevant information from available databases.
- References to Google Earth and fieldwork findings were used to identify potential sensitive landscapes and visual receptors. This information was verified during the site visit.
- The field survey involved travelling along the R385 Provincial Road and the Lime Acres District Road in the areas adjacent to and surrounding the Project site to determine the nature and character of the landscape. The site visit was undertaken on 16 June 2026.
- Due to the area's topography, the proposed Project would be largely screened from the R385 and other sensitive viewing areas, except for Lime Acres Road, where it would be most visible.
- Potentially sensitive viewers would most likely not be alarmed by the addition of the proposed Redstone Solar PV facility.
- It is therefore anticipated that receptor sensitivity would be low for the proposed Project.

- Given the surrounding land uses and the study area's high capacity to absorb visual changes, the landscape would largely shield, or at least partially conceal, the project's potential visual impacts.
- While the site's landscape will undergo a moderate transformation, this change may be perceived neutrally by sensitive viewers.
- The proposed development is unlikely to have a major effect on visual, sense-of-place, or landscape qualities, as it would result in limited changes to the main features of the existing landscape.
- The proposed new solar PV power plant would recede into the landscape, i.e., it would not be visually intrusive or appear out of place within the sub-region.

12.6 PALAEONTOLOGY

Geological maps primarily focus on the lithology and structural geology of an area, and their accompanying sheet explanations were not intended to emphasise palaeontological heritage. Many remote regions of South Africa remain unexplored by palaeontologists, with available data often derived solely from aerial imagery. Furthermore, fossil locality and geological data stored in museum and university collections are frequently outdated or were historically recorded with limited accuracy.

To supplement these gaps, comparable Assemblage Zones and geological formations from better-studied regions are often referenced to infer the potential for fossil presence in previously undocumented areas. In desktop studies, it is typically assumed that fossil heritage may be present where similar stratigraphy is exposed. However, a field-based assessment is essential to validate and refine these assumptions, thereby enhancing the accuracy of the palaeontological sensitivity rating.

12.7 SOILS

The following assumptions and limitations were applicable to the Soils and agricultural study:

- The study used available soil and climate information.
- Existing information was obtained from the map sheet 2822 Postmasburg (Eloff et al., 1986) from the national Land Type Survey, published at a 1:250 000 scale.
- It should be clearly noted that, since the information contained in the land type survey is of a reconnaissance nature, only the general dominance of the soils in the landscape can be given, and not the actual areas of occurrence within a specific land type.
- Other soils that were not identified due to the scale of the survey may also occur.
- The site was not visited during the course of this study, and so the detailed composition of the specific land types has not been groundtruthed.
- The low rainfall in the area means that the only means of cultivation would be by irrigation and the Google Earth image of the area shows absolutely no signs of any agricultural infrastructure and certainly none of irrigation.
- The climatic restrictions mean that this part of the Northern Cape is suited at best for grazing and here the grazing capacity is very low.
- At the end of the project life, it is anticipated that removal of the structures would enable the land to be returned to more or less a natural state, with little impact, especially given the low prevailing agricultural potential.

13 AFFIRMATION REGARDING CORRECTNESS OF INFORMATION

13.1 THE EAP

I Liam Whitlow declare that:

General declaration:

- I act as the independent environmental practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not all the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest (delete whichever is not applicable)

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014.

Signature of the EAP

Environmental Impact Management Services (Pty) Ltd

Name of company:

2026/07/16

Date:

13.2 THE CANDIDATE EAP

I Andre van Rooyen declare that:

General declaration:

- I act as the independent environmental practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not all the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and

- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest (delete whichever is not applicable)

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014.

Signature of the EAP

Environmental Impact Management Services (Pty) Ltd

Name of company:

2026/07/16

Date:

14 REFERENCES

Alexander, G. & Marais, J. 2007. A Guide to the Reptiles of Southern Africa. Struik Nature, Cape Town.

ALMOND, J., PETHER, J. & GROENEWALD, G., 2013. *Palaeontological Impact Assessment Guidelines.* South African Heritage Resources Agency, Cape Town.

ALMOND, J.E. & PETHER, J., 2008. *Palaeontological heritage of the Northern Cape.* Interim SAHRA technical report, 124 pp. Natura Viva cc, Cape Town.

ALMOND, J.E., 2013. *Palaeontological specialist assessment: combined field-based and desktop study. Proposed 16 Mtpa Expansion of Transnet's Existing Manganese Ore Export Railway Line & Associated Infrastructure between Hotazel and the Port of Ngqura, Northern & Eastern Cape. Part 3: Kimberley to De Aar, Northern Cape.* Natura Viva cc, Cape Town.

BARNOSKY, A.D., 2005. Effects of Quaternary climatic change on speciation in mammals. *Journal of Mammalian Evolution* 12, 247–264.

BEUKES, N.J., 1980. Stratigrafie en litofasies van die Campbellrand-Subgroep van die Proterofitiese Ghaap-Group, Noord-Kaapland. *Transactions of the Geological Society of South Africa* 83, 141–170.

BEUKES, N.J., 1986. The Transvaal Sequence in Griqualand West. In: Anhaeusser, C.R. & Maske, S. (eds), *Mineral Deposits of Southern Africa, Volume 1*. Geological Society of South Africa, pp.819–828.

BirdLife International 2012. IUCN Red List of Threatened Species. Version 2013.1. <www.iucnredlist.org>. Downloaded January 2023

Branch W.R. (Ed) 1988: South African Red Data Book – Reptiles and Amphibians. NMB Printers, Port Elisabeth.

CAIRNCROSS, B. & BEUKES, N.J., 2013. *The Kalahari Manganese Field: The Adventure Continues.* Struik Nature, Cape Town, 384 pp.

COUNCIL FOR GEOSCIENCE, 1995. *1:250 000 Geological Map Series, Prieska 2922.* Council for Geoscience, Pretoria.

DE WIT, M.C.J., WARD, J.D. & HART, R.J., 2000. *Diamond-bearing deposits of the Vaal and Orange Rivers, South Africa.* Economic Geology Research Unit Information Circular, University of the Witwatersrand, Johannesburg.

Department of Water Affairs and Forestry (DWAF). 2005a. A Practical Field Procedure for Identification and Delineation of Wetlands and Riparian Areas.

Department of Water and Sanitation (DWS). 2016. General Authorisation in Terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) for water uses as defined in Section 21(c) or section 21(i). Government Gazette Notice: 509 in Government Gazette 40229 of 26 August 2016.

DINGLE, R.V., SIESSER, W.G. & NEWTON, A.R., 1983. *Mesozoic and Tertiary Geology of Southern Africa.* A.A. Balkema, Rotterdam, 375 pp.

Driver, A., Maze, K., Rouget, M., Lombard, A.T., Nel, J., Turpie, J.K., Cowling, R.M., Desmet, P., Goodman, P., Harris, J., Jonas, Z., Reyers, B., Sink, K And Strauss, T. 2005. National Spatial Biodiversity Assessment 2004: priorities for biodiversity conservation in South Africa. Strelitzia 17. South African National Biodiversity Institute, Pretoria.

Du Preez, L. & Carruthers, V. 2009. *A Complete Guide to the Frogs of Southern Africa.* Struik Nature., Cape Town.

ERIKSSON, P.G., ALTERMANN, W. & HARTZER, F.J., 2006. The Transvaal Supergroup and its precursors. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (eds), *The Geology of South Africa,* pp. 237–260. Geological Society of South Africa, Marshalltown.

EWT, 2004. Red Data Book of the Mammals of South Africa: A conservation Assessment. Endangered Wildlife Trust, Johannesburg.

Fairbanks, D.H.K., Thompson, M.W., Vink, D.E., Newby, T.S., Van Den Berg, H.M. & Everard, D.A. 2000. The South African land-cover characteristics database: a synopsis of the landscape. S. Afr. J. Sci. 96: 69–82.

Frisby, A.W. (2016). *Redefining the Griqualand West Centre of plant endemism.* PhD Thesis, University of the Free State, Bloemfontein, South Africa

HADDON, I.G., 2005. *The sub-Kalahari geology and tectonic evolution of the Kalahari Basin, southern Africa.* PhD thesis, University of the Witwatersrand, Johannesburg.

Hockey P.A.R., Dean W.R.J., and Ryan P.G. 2005. Robert's Birds of Southern Africa, seventh edition. Trustees of the John Voelcker Bird Book Fund, Cape Town.

Institute For Water Research, 2012. Implementing Uncertainty Analysis in Water Resources Assessment and Planning, Water Research Commission Project No: K5/2056, Institute for Water Research, Rhodes University.

Kotze, D.C., Macfarlane, D.M., Edwards, R.J. & Madikizela, B. (2020) WET-EcoServices Version 2: A technique for rapidly assessing ecosystem services supplied by wetlands and riparian areas. Water Research Commission, Pretoria.

Land Type Survey Staff. 1972 - 2006. Land Types of South Africa: Digital Map (1:250 000 Scale) and Soil Inventory Databases. Pretoria: ARC-Institute for Soil, Climate, and Water.

Lotter, M.C., Le Maitre, D. 2021. Fine-scale delineation of Strategic Water Source Areas for surface water in South Africa using Empirical Bayesian Kriging Regression Prediction: Technical report. Prepared for the South African National Biodiversity Institute (SANBI), Pretoria. 33p.

Macfarlane, D.M., Bredin, I.P., Adams, J.B., Zungu, M.M., Bate, G.C. and Dickens, C.W.S. 2014. Preliminary guideline for the determination of buffer zones for rivers, wetlands and estuaries. Final Consolidated Report. WRC Report No TT 610/14, Water Research Commission, Pretoria.

MAUD, R.R., 2012. *The geomorphology of southern Africa*. Cambridge: Cambridge University Press.

Mbona, N., Job, N., Smith, J., Nel, J., Holness, S., Memani, S. and Dini, J. 2015. Supporting Better Decision-making Around Coal Mining in the Mpumalanga Highveld Through the Development of Mapping Tools and Refinement of Spatial Data on Wetlands: Report to the Water Research Commission. Pretoria: Water Research Commission.

MCCARTHY, T. & RUBIDGE, B., 2005. *The Story of Earth and Life: A Southern African Perspective on a 4.6-Billion-Year Journey.* Struik, Cape Town.

Minter L.R., Burger M., Harrison J.A., Braak H.H., Bishop P.J., and Kloepfer D. (Eds), 2004. Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland. SI/MBA Series #9. Smithsonian Institute, Washington DC.

Minter L.R., Burger M., Harrison J.A., Braak H.H., Bishop P.J., and Kloepfer D. (Eds), 2004. Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland. SI/MBA Series #9. Smithsonian Institute, Washington DC.

MOEN, H.F.G., 2006. The Olifantshoek Supergroup. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (eds), *The Geology of South Africa,* pp. 319–324. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria.

MTHOMBENI, T.F., 2019. *Vegetation Classification of the Witsand Nature Reserve, Northern Cape Province, South Africa.* MSc dissertation, University of the Free State, Bloemfontein.

MUCINA, L. & RUTHERFORD, M.C. (eds), 2006. *The Vegetation of South Africa, Lesotho and Swaziland.* Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Mucina, L., and Rutherford, M.C., 2010. The vegetation of South Africa, Lesotho and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria South African.

Nel JL, Murray KM, Maherry AM, Petersen CP, Roux DJ, Driver A, Hill L, Van Deventer H, Funke N, Swartz ER, Smith-Adao LB, Mbona N, Downsborough L and Nienaber S. 2011. Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

Nel, J. L., Driver, A., Strydom, W. F., Maherry, A. M., Petersen, C. P., Hill, L., Roux, D. J., Nienaber, S., van Deventer, H., Swartz, E. R. & Smith-Adao, L. B. (2011). Atlas of Freshwater Ecosystem Priority Areas in South Africa: Maps to support sustainable development of water resources, WRC Report No. TT 500/11. Water Research Commission, Pretoria.

NETTERBERG, F., 1978. Prospecting for calcrete road materials in South and South West Africa. *The Civil Engineer in South Africa* 20(1), 3–10.

NETTERBERG, F., 1980. Geology of southern African calcretes I: terminology, description, macrofeatures and classification. *Transactions of the Geological Society of South Africa* 83, 255–283.

Northern Cape Provincial Government. 2012. Northern Cape Provincial Spatial Development Framework (PSDF). Kimberley: Northern Cape Provincial Government.

Ollis DJ, Snaddon CD, Job NM, and 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.

PARTRIDGE, T.C. & BRINK, A.B.A., 1967. Gravels of the Vaal River Basin. *Transactions of the Geological Society of South Africa,* 70, 1–40.

PARTRIDGE, T.C., 1997. Late Neogene and Quaternary palaeoenvironments of the southern African interior: A review. *Quaternary Science Reviews,* 16(8), 807–833.

PARTRIDGE, T.C., BOTHA, G.A. & HADDON, I.G., 2006. Cenozoic deposits of southern Africa. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (eds). *The Geology of South Africa.* Johannesburg: Geological Society of South Africa, pp. 605–628.

PARTRIDGE, T.C., DOLLAR, E.S.J., MOOLMAN, J. & DOLLAR, L.H., 2010. *The geomorphic provinces of South Africa, Lesotho and Swaziland: A physiographic subdivision for earth and environmental scientists*. Transactions of the Royal Society of South Africa, 65(1), pp.1–47.

Paterson, D.G., 2011. Soil information for the proposed Humansrus solar thermal energy power plant, near Postmasburg, Northern Cape. Report No. GW/A/2011/42, Agricultural Research Council-Soil, Climate and Water, Pretoria.

Republic of South Africa. 2000. Local Government: Municipal Systems Act, 2000 (Act No. 32 of 2000). Pretoria: Government Printer.

Republic of South Africa. 2013. Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013). Pretoria: Government Printer.

Rountree, M. & Kotze, D. 2013. Ecological Importance and Sensitivity Assessment. In: Rountree, M., Malan, H. & Weston. ed., Manual for the Rapid Ecological Reserve Determination of Inland Wetlands. Report to the Water Research Commission and Department of Water Affairs. WRC Report No. 1788/1/12. Pretoria. p. 42-46.

RUTHERFORD, M.C. & WESTFALL, R.H., 1994. Biomes of southern Africa: An objective categorization. *Memoirs of the Botanical Survey of South Africa*, 63, pp.1–94.

RUTHERFORD, M.C., MUCINA, L. & POWRIE, L.W., 2006. Biomes and bioregions of southern Africa. In: Mucina, L. & Rutherford, M.C. (eds.), *The vegetation of South Africa, Lesotho and Swaziland*. Pretoria: South African National Biodiversity Institute, pp.30–51.

SMITH, A.J.B. & BEUKES, N.J., 2016. Palaeoproterozoic banded iron formation-hosted high-grade hematite iron ore deposits of the Transvaal Supergroup, South Africa. *Episodes* 39(2), 269–284.

Soil Classification Working Group. 2018. Soil Classification A Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

SUMNER, D.Y. & BEUKES, N.J., 2006. Sequence stratigraphic development of the Neoarchaean Transvaal carbonate platform, Kaapvaal Craton, South Africa. *South African Journal of Geology* 109, 11–22.

SUMNER, D.Y., 2002. Neoarchaean carbonates – clues to early life and early ocean chemistry. Excursion A6, 1–6 July 2002, 24 pp. 16th International Sedimentological Congress, International Association of Sedimentologists, Rand Afrikaans University, Johannesburg.

TOOTH, S. & MCCARTHY, T.S., 2004. Anabranching in mixed bedrock-alluvial rivers: the example of the Orange River above Augrabies Falls, Northern Cape Province, South Africa. *Geomorphology* 57, 235–262.

TRUTER, F.C., WASSERSTEIN, B., BOTHA, P.R., VISSER, D.L.J., BOARDMAN, L.G. & PAVER, G.L., 1938. *The geology and mineral deposits of the Olifantshoek area, Cape Province.* Explanation of Sheet 173 (Olifantshoek), Geological Survey, Pretoria.

Tsantsabane Local Municipality. 2015. Tsantsabane Local Municipality Spatial Development Framework (SDF). Postmasburg: Tsantsabane Local Municipality.

Tsantsabane Local Municipality. 2025. Integrated Development Plan (IDP): 2025/2026–2028/2029. Postmasburg: Tsantsabane Local Municipality.

Van Deventer, H.; Smith-Adao, L.; Mbona, N.; Petersen, C.; Skowno, A.; Collins, N.B.; Grenfell, M.; Job, N.; Lötter, M.; Ollis, D.; Scherman, P.; Sieben, E.; Snaddon, K. 2018. South African Inventory of Inland Aquatic Ecosystems. South African National Biodiversity Institute, Pretoria. Report Number: CSIR report number CSIR/NRE/ECOS/IR/2018/0001/A; SANBI report number http://hdl.handle.net/20.500.12143/5847.

VISSER, D.J.L. (ED) 1984. Geological Map of South Africa 1:100 000. South African Committee for Stratigraphy, Council for Geoscience, Pretoria.

VISSER, D.L.J., 1958. *The geology and mineral deposits of the Griquatown area, Cape Province.* Explanation of Sheet 175 (Griquatown), Geological Survey, Pretoria.

ZF Mgcawu District Municipality. 2012. Spatial Development Framework (SDF). Upington: ZF Mgcawu District Municipality.

ZF Mgcawu District Municipality. 2025. Integrated Development Plan (IDP): 2025/2026 Review of the 2022–2027 IDP. Upington: ZF Mgcawu District Municipality.

ZF Mgcawu District Municipality. n.d. Environmental Management Framework (EMF). Upington: ZF Mgcawu District Municipality.

15 APPENDICES

APPENDIX A: EAP CV

APPENDIX B: SCREENING TOOL REPORT AND SSVR

APPENDIX C: PUBLIC PARTICIPATION

APPENDIX D: SPECIALIST REPORTS

APPENDIX E: IMPACT ASSESSMENT MATRIX

APPENDIX F: ENVIRONMENTAL MANAGEMENT PROGRAMME

APPENDIX G: ADDITIONAL INFORMATION