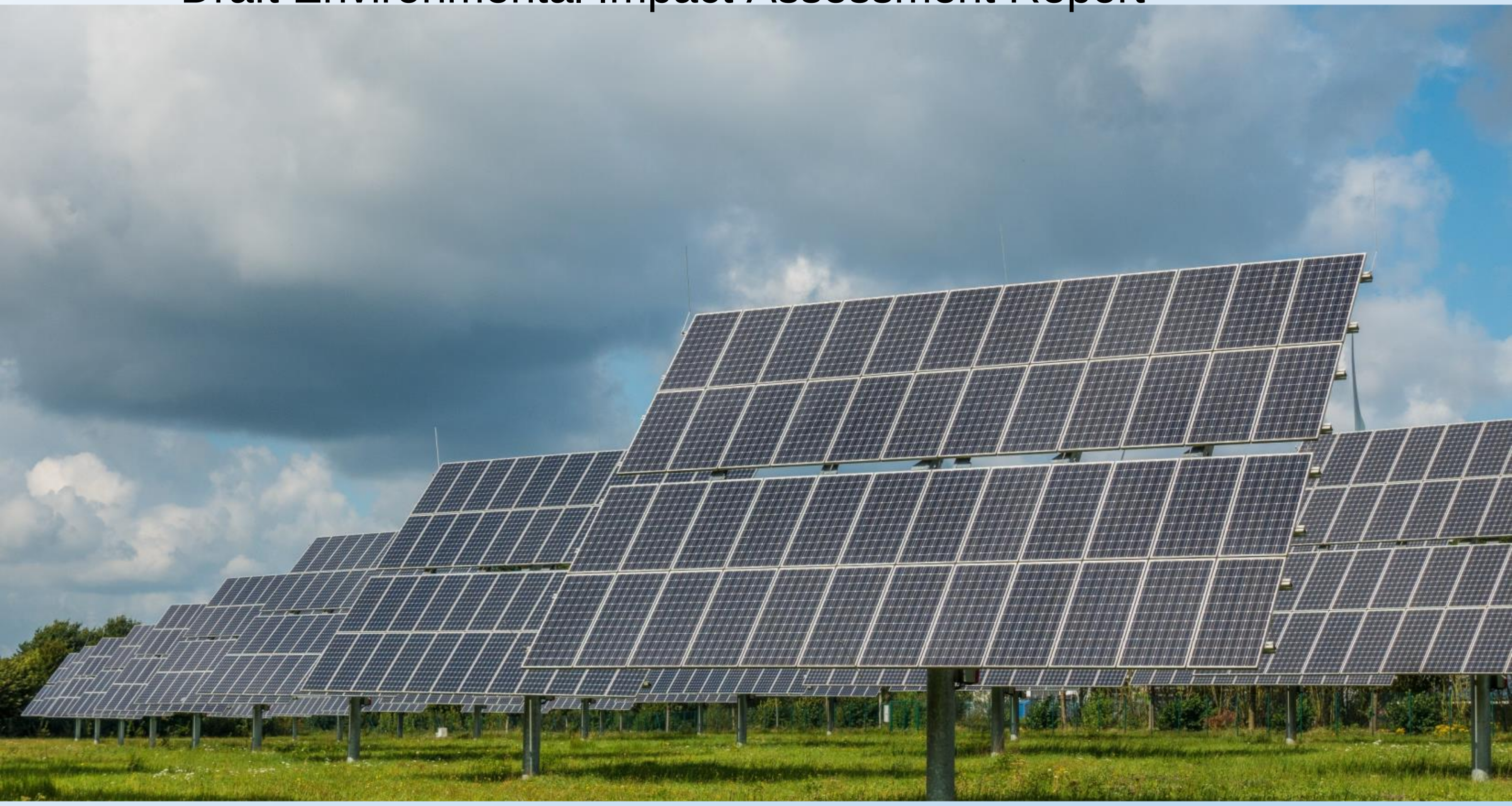
DFFE Reference Number: 14/12/16/3/3/2/2298

Eskom Holdings SOC (Ltd)

KOMATI POWER STATION SOLAR PV FACILITY, BESS AND ASSOCIATED INFRASTRUCTURE, MPUMALANGA PROVINCE

Draft Environmental Impact Assessment Report



JULY 2023

PUBLIC

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PROJECT NO. 41103965

DATE: JULY 2023

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Draft Environmental Impact Assessment Report

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PUBLIC

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Checked by	Ashlea Strong			
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GENERAL SITE INFORMATION

<table>
<tr><th colspan="3">Technical details of the proposed Komati Solar PV Facility</th></tr>
<tr><td>Location of Site</td><td colspan="2">37km from Middelburg, 43km from Bethal and 40km from Witbank in Ward 4 of the Steve Tshwete Local Municipality located within the Nkangala District Municipality in the Mpumalanga Province.</td></tr>
<tr><td>Centre Point Co-ordinate</td><td colspan="2">26°06'05.43"S 29°27'30.68"E</td></tr>
<tr><td rowspan="2">Description of all affected farm portions and 21 digit SG Codes</td><td>Farm Name</td><td>21-Digit SG Code</td></tr>
<tr><td>Portion 0 of Farm Komati Power Station 56-IS</td><td>T0IS00000000005600000</td></tr>
<tr><td>Project Area</td><td colspan="2">▪ Solar Farm A:
• Extent: 156 Ha
• Buildable Area: 127 Ha
▪ Solar Farm B:
• Extent: 54 Ha
• Buildable Area: 50 Ha
▪ Powerline Servitude:
• Between 36 and 40m
• Area will be approximately 26ha
▪ Battery Energy Storage System (BESS):
• Footprints Range from 2 ha up to 6 ha</td></tr>
<tr><th colspan="3">Design Specifications</th></tr>
<tr><td>Solar Field</td><td colspan="2">▪ Solar Photovoltaic facility with AC capacity of up to 100 MW</td></tr>
<tr><td>Solar Farm Substations</td><td colspan="2">▪ Up to two on-site solar substations adjacent to Eskom switching stations that will connect to the approved Nuweveld Collector substation
▪ Maximum height of 12m and will include a high voltage gantry within a 150 m x 75 m substation yard</td></tr>
<tr><td>Grid Connection (i.e. powerlines)</td><td colspan="2">▪ Point of connection of Solar Panels will be to the Komati High Voltage (HV) yard.
▪ Power routed via a medium voltage overhead line or underground cabling.
▪ Servitude of powerlines:
• Between 36 and 40m
• Area will be approximately 26ha
▪ Substations:
• Each of the Solar Sites will be equipped with collector substations.</td></tr>
</table>

	• Infrastructure associated with the substations includes: – O&M buildings housing the control and communication equipment – Access road infrastructure within the substation sites – Site substations and collector substations ▪ Site Access: • New access roads or tracks may be required to provide access to sections of the powerline route. ▪ Access roads will be mostly a two-track gravel road under the OHPL in order to access pylons for construction and maintenance purposes.
Site Substation and BESS	▪ Three BESS facilities ▪ Footprints: Range from 2 ha up to 6 ha. ▪ BESS capacity: 150 MW with four hours standby time. • Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies are being considered
Associated infrastructure	▪ Access roads; ▪ Perimeter roads; ▪ Below ground electrical cables; ▪ Above ground overhead lines; ▪ Meteorological Station; ▪ Operations and Maintenance (O&M) Building including control room, server room, security equipment room, offices, boardroom, kitchen, and ablution facilities); ▪ Spares Warehouse and Workshop; ▪ Hazardous Chemical Store; ▪ Security Building; ▪ Parking areas and roads; ▪ Temporary laydown areas; ▪ Temporary concrete batching plant ▪ Construction camps and temporary laydown areas; and ▪ Onsite substations.

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EMPR

GLOSSARY

Abbreviation	Definition
AC	Alternating current
AIS	Alien and Invasive Species
ATNS	Air Traffic and Navigation Services
BESS	Battery Energy Storage System
BMS	Battery Management System
CA	Competent Authority
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CAT	Cable Avoidance Tool
CBA	Critical Biodiversity Area
CSIR	Council for Scientific and Industrial Research
CSM	Conceptual Site Model
CSP	Concentrated Solar Power
CVB	Channelled valley bottom
DC	Direct current
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EJETP	Just Energy Transition Plan
EP	Equator Principles
EPS	Engineering, Procurement, and Construction

ERA	Electricity Regulation Act
ESF	Environmental and Social Framework
ESI	Energy Supply Industry
ESIA	Environmental and Social Impact Assessment
Eskom	Eskom Holdings SOC (LTD)
EMP	Environmental Management Programme
ESMS	Environmental and Social Management System
ESRMS	Environmental and Social Risk Management Systems
ESS	Environmental and Social Standards
FI	Financial Institution
FSR	Final Scoping Report
GA	General Authorisation
GHG	Greenhouse Gas
GPN	Good Practice Notes
GPR	Ground Penetrating Radar
GQM	Groundwater Quality Management
HIA	Heritage Impact Assessment
HR	Human Resources
I&AP	Interested and Affected Party
IBA	Important Bird Area
IDP	Integrated Development Plan
IEP	Integrated Energy Plan
IFC	International Finance Corporation
ILO	International Labour Organization
IPF	Investment Policy Financing
JETP	Just Energy Transition Plan
KBA	Key Biodiversity Area
LSA	Local Study Area

MEGDP	Mpumalanga Economic Growth and Development Path
MIDP	Mpumalanga Industrial Development Plan
MPHRA	Mpumalanga Provincial Heritage Resource Authority
MPRDA	Mineral and Petroleum Resources Development Act (No. 28 of 2002)
NDM	Nkangala District Municipality
NDP	National Development Plan
NEDLAC	National Economic Development and Labour Council Act
NEMA	National Environmental Management Act (No. 107 of 1998)
NEMAQA	The National Environmental Management: Air Quality (Act 39 of 2004)
NEMBA	National Environmental Management: Biodiversity Act
NEMWA	National Environmental Management: Waste Act (No. 59 of 2008)
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resource Act (Act No. 25 of 1999)
NIP	National Infrastructure Plan
NPAES	National Protected Area Expansion Strategy
NWA	National Water Act (No. 36 of 1998)
NWM	National Wetland Map
OHS	Occupational Health and Safety
OHSA	National Occupational Health and Safety Act (No. 85 of 1993)
PCD	Pollution Control Dam
PCS	Power Conditioning System
PES	Present Ecological State
PICC	Presidential Infrastructure Coordinating Commission
PS	Performance Standards
PV	Photovoltaics
REDZ	Renewable Energy Development Zone
REIPPP	Renewable Independent Power Producer Programme
RFI	Radio Frequency Interference

RSA	Regional Study Area
SAAQIS	South African Air Quality Information System
SACAA	South African Civil Aviation Authority
S&EIR	Scoping and Environmental Impact Reporting
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resource Information System
SANAS	South African National Accreditation System
SANS	South African National Standards
SANBI	South African National Biodiversity Institute
SAWS	South African Weather Service
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SDG	Sustainable Development Goals
SEF	Solar Energy Facility
STLM	Steve Tshwete Local Municipality
ToR	Terms of Reference
UN	United Nations
UNDP	United Nations' Development Programmes
WBG	World Bank Group
WEF	Wind Energy Facility
WHO	World Health Organisation
WMA	Water Management Area
WSP	WSP Group Africa (Pty) Ltd
WUL	Water Use Licence
WULA	Water Use Licence Application

1 INTRODUCTION

WSP Group Africa (Pty) Ltd (WSP) has been appointed by Eskom Holdings SOC (Ltd) (Eskom) to undertake an Environmental Impact Assessment (EIA) to meet the requirements under the National Environmental Management Act (Act 107 of 1998) (NEMA), for the proposed 100 MW Solar Photovoltaics (PV) Energy Facility (SEF); 150 MW Battery Energy Storage System (BESS); and associated infrastructure at the Komati Power Station located in the Mpumalanga Province, South Africa.

In order for the proposed project to proceed, it will require an Environmental Authorisation (EA) from the Competent Authority (CA) (i.e. the National Department of Forestry, Fisheries and Environment, (DFFE)).

1.1 PURPOSE OF THIS REPORT

The Scoping and EIA (S&EIA) process is an interdisciplinary procedure to ensure that environmental and social considerations are included in decisions regarding projects. Simply defined, the process aims to identify the possible environmental and social effects of a proposed activity and how those impacts can be mitigated.

This environmental impact report (EIR) aims to provide stakeholders with information on the proposed development including location, layout and technological alternatives, the scope of the environmental assessment and key impacts identified in the environmental assessment, and the consultation process undertaken through the EIA process.

1.2 BACKGROUND INFORMATION

Eskom is a South African utility that generates, transmits and distributes electricity and supplies approximately 95% of the country's electricity. Eskom's 2035 strategy encompasses the journey that Eskom intends to take in response to the changing energy environment and the impact this has towards a sustainable power utility. This strategy is necessitated by the challenges that Eskom faces as a business as well as the global and local shifts occurring in the energy sector particularly with respect to environmental and climate change challenges, difficulties in accessing financing and changes to the macro industry environment significantly altering the energy supply industry. The road to 2035, includes the shutting down of a number of coal-fired power stations, repurposing and repowering, delivering new clean generation projects, expanding the Transmission grid, and rolling out micro grid solutions.

Several power stations are reaching the end-of-life. These stations will go into extended cold reserve and are most likely to be fully decommissioned in the future. Eskom is considering a shutdown, dismantling and repurposing of some of its fleet as it reaches its end-of-life. Komati Power Station, located near Middelburg in the Mpumalanga Province (Refer to **Figure 1-1**), reached its end-of-life in September 2022. Eskom has developed the Eskom Just Energy Transition Project (EJETP) aimed at mitigating the negative social impacts resulting from the shutting down of the plant and to implement projects for the repowering and repurposing related to the Komati Power Station. This is one of several initiatives in which Eskom proposes to establish a solar energy generating facility which will include the installation of a 100MW SEF as well as 150MW BESS facilities.

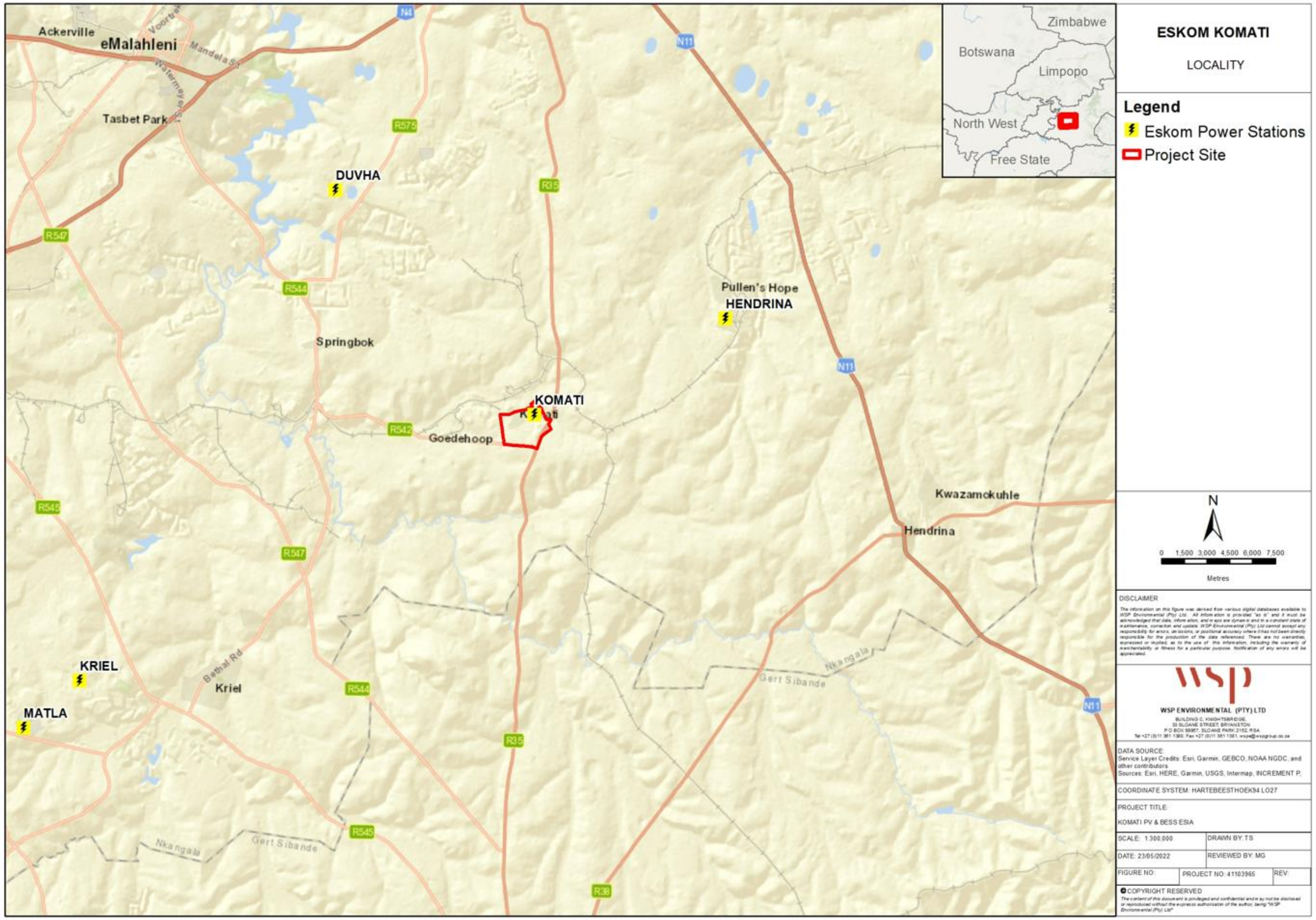


Figure 1-1 – Regional locality map

1.3 DETAILS OF KEY ROLE PLAYERS

1.3.1 PROJECT PROPONENT

Eskom is the project proponent (Applicant) with regards to this project for the construction and operation of the Solar PV, BESS and associated infrastructure. **Table 1-1** provides the relevant details of the project proponent.

Table 1-1 – Details of Project Proponent

Proponent:	Eskom Holdings SOC (Ltd)
Contact Person	Deidre Herbst
Postal Address	PO Box 1091, Johannesburg
Telephone	011 800 3501
Email	Deidre.Herbst@eskom.co.za

1.3.2 COMPETENT AUTHORITY

Section 24C(2)(a) of NEMA stipulates that the Minister of Forestry, Fisheries, and the Environment ("the Minister") must be identified as the CA if the activity has implications for international environmental commitments or relations. GN 779 of 01 July 2016 identifies the Minister as the CA for the consideration and processing of environmental authorisations and amendments thereto for activities related the Integrated Resource Plan (IRP) 2010 – 2030.

The CA (i.e., DFFE) was confirmed during the Pre-Application Meeting held on **06 July 2022**. **Table 1-2** provides the relevant details of the competent authority on the Project.

Table 1-2 – Competent Authority

Aspect	Competent Authority	Contact Details
Competent Authority: Environmental Authorisation	Department of Forestry, Fisheries, and the Environment (DFFE)	Case Officer: Trisha Rene Pillay tpillay@dffe.gov.za Integrated Environmental Authorisations

1.3.3 COMMENTING AUTHORITY

The commenting authorities for the project include:

- Department of Mineral Resources and Energy (DMRE);
- DFFE: Biodiversity Conservation Unit;
- DFFE: Protected Areas;
- Mpumalanga Department Agriculture, Rural Development, Land and Environmental Affairs (MDARDLEA);
- Department of Water and Sanitation (DWS);
- Olifants Water Management Area (WMA) Authority;
- South African Heritage Resource Agency (SAHRA);

- Mpumalanga Heritage Resources Authority (MHRA);
- Mpumalanga Tourism and Parks Agency (MTPA);
- Civil Aviation Authority (CAA);
- Air Traffic and Navigation Services (ATNS);
- Department of Defence (DD) (SA Army);
- Astronomy Management Authority (AMA);
- South African Weather Services (SAWS);
- South African National Roads Agency Limited (SANRAL);
- Nkangala District Municipality; and
- Steve Tshwete Local Municipality.

Refer to the Stakeholder Engagement Report (SER) in **Appendix D** for a full list of commenting authorities.

1.3.4 ENVIRONMENTAL ASSESSMENT PRACTITIONER

WSP was appointed in the role of Independent Environmental Assessment Practitioner (EAP) to undertake the S&EIA process for the proposed project. The CV of the EAP is available in **Appendix A**. The EAP declaration of interest and undertaking is included in **Appendix B**. **Table 1-3** details the relevant contact details of the EAP.

Table 1-3 – Details of the EAP

EAP:	WSP Group Africa (Pty) Ltd
Contact Person:	Ashlea Strong
Physical Address:	Building C, Knightsbridge, 33 Sloane Street, Bryanston, Johannesburg
Postal Address:	P.O. Box 98867, Sloane Park 2151, Johannesburg
Telephone:	011 361 1392
Fax:	011 361 1301
Email:	Ashlea.Strong@wsp.com
EAP Qualifications:	▪ Masters in Environmental Management, University of the Free State ▪ B Tech, Nature Conservation, Technikon SA ▪ National Diploma in Nature Conservation, Technikon SA
EAPASA Registration Number:	EAPASA (2019/1005)

Statement of Independence

Neither WSP nor any of the authors of this Report have any material present or contingent interest in the outcome of this Report, nor do they have any business, financial, personal or other interest that could be reasonably regarded as being capable of affecting their independence. WSP has no beneficial interest in the outcome of the assessment.

1.3.5 SPECIALISTS

To adequately identify and assess potential environmental impacts, a number of specialists have supported the EAP. Specialist input was required in support of this application for EA. The details of the specialists are provided in **Table 1-4** below. The specialist studies are attached in **Appendix H** and their declarations in **Appendix C**.

Table 1-4 – Details of Specialists

Assessment	Name of Specialist	Company	Sections in Report
Geotechnical Desktop Study	Nkosazana Leseka	Eskom Holdings	▪ Section 7.1.4 ▪ Appendix H.1
Air Quality	Kirsten Collet	WSP	▪ Section 7.1.5 ▪ Appendix H.2
Noise	Kirsten Collet	WSP	▪ Section 7.1.6 ▪ Appendix H.3
Surface Water	Eugeshin Naidoo	WSP	▪ Section 7.1.7 ▪ Section 9.1 ▪ Section 10.1 ▪ Section 11.2.1 ▪ Appendix H.4
Groundwater	Sarah Skinner	WSP	▪ Section 7.1.8 ▪ Section 9.2 ▪ Section 10.2 ▪ Section 11.2.2 ▪ Appendix H.5
Soils and Agricultural Potential	Karen King	WSP	▪ Section 7.1.9 ▪ Section 8.1.1 ▪ Section 9.3 ▪ Section 10.3 ▪ Section 11.2.3 ▪ Appendix H.6
Terrestrial Animal Species	Andrew Zinn	Hawkhead Consulting	▪ Section 7.2.1 ▪ Section 8.1.10 ▪ Section 9.4 ▪ Section 10.4 ▪ Section 11.2.4 ▪ Appendix H.7
Terrestrial Plant Species	Andrew Zinn	Hawkhead Consulting	▪ Section 7.2.2 ▪ Section 9.5 ▪ Section 10.5 ▪ Section 11.2.5 ▪ Appendix H.8

Assessment	Name of Specialist	Company	Sections in Report
Aquatic Biodiversity	Lufuno Nemakhavhani	WSP	▪ Section 7.2.3 ▪ Section 8.1.10 ▪ Section 9.6 ▪ Section 10.6 ▪ Section 11.2.6 ▪ Appendix H.9
Traffic	Nico Jonker	Innovative Transport Solutions (Pty) Ltd	▪ Section 7.3.1 ▪ Section 9.7 ▪ Section 10.7 ▪ Section 11.2.7 ▪ Appendix H.10
Visual	Lourens du Plessis	LOGIS	▪ Section 7.3.2 ▪ Section 8.1.2 ▪ Section 9.8 ▪ Section 10.8 ▪ Section 11.2.8 ▪ Appendix H.11
Heritage	Anton Pelser	A Pelser Archaeological Consulting	▪ Section 7.3.3 ▪ Section 8.1.3 ▪ Section 9.9 ▪ Section 10.9 ▪ Section 11.2.9 ▪ Appendix H.12
Palaeontology	Heidi Fourie	Independent Consultant	▪ Section 7.3.4 ▪ Section 8.1.4 ▪ Section 9.10 ▪ Section 10.9 ▪ Section 11.2.10 ▪ Appendix H.13
Social	Stephen Horak	WSP	▪ Section 7.3.5 ▪ Section 9.11 ▪ Section 10.11 ▪ Section 11.2.11 ▪ Appendix H.14

1.4 IMPACT ASSESSMENT TERMS OF REFERENCE

The 2014 EIA Regulations (GNR 982), as amended, identifies the proposed Komati Solar PV Facility as an activity being subject to an S&EIR process due to the applicability of the EIA Listing Notices 1 and 2 (GNR 983 and 984, as amended). In order for the project to proceed it will require an Environmental Authorisation (EA) from DFFE.

WSP has been appointed as the independent EAP to carry out the S&EIR process in accordance with the EIA Regulations, 2014, as amended in 2017.

The Scoping Process has been completed and involved consultation with interested and affected parties and the drafting of the Plan of Study (PoS) for EIA, which culminated in the submission of a Final Scoping Report (FSR) to the DFFE. The DFFE acceptance of the FSR and authorisation to proceed with the EIR was received on 04 May 2023 (**Appendix G**). The final EIR is due to the DFFE on 18 August 2023.

This draft EIAR will be made available for public comment from 05 July 2023 to 04 August 2023.

As defined in Appendix 3 of GNR 982, as amended, the objective of the impact assessment process is to, through a consultative process:

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

Public participation is a requirement of the S&EIR process; it consists of a series of inclusive and culturally appropriate interactions aimed at providing stakeholders with opportunities to express their views, so that these can be considered and incorporated into the S&EIR decision-making process. Effective public participation requires the prior disclosure of relevant and adequate project information to enable stakeholders to understand the risks, impacts, and opportunities of the Proposed Project. The objectives of the public participation process can be summarised as follows:

- Identify relevant individuals, organisations and communities who may be interested in or affected by the Proposed Project;
- Clearly outline the scope of the Proposed Project, including the scale and nature of the existing and proposed activities;
- Identify viable Proposed Project alternatives that will assist the relevant authorities in making an informed decision;
- Identify shortcomings and gaps in existing information;

- Identify key concerns, raised by Stakeholders that should be addressed in the subsequent specialist studies;
- Highlight the potential for environmental impacts, whether positive or negative; and
- To inform and provide the public with information and an understanding of the Proposed Project, issues and solutions.

1.5 OBJECTIVES OF THE S&EIA PROCESS AS PER THE PROCEDURAL FRAMEWORK

The S&EIR process consists of various phases with associated timelines as defined in GNR 982. The process can generally be divided into four main phases, namely, (i) a Pre-application Phase, (ii) an Application and Scoping Phase (current phase), (iii) an Impact Assessment Phase and (iv) Authorisation and Appeal Phase.

The main objectives of the phases can be described as follows:

- Pre-Application Phase (**Completed**):
  - Undertake consultation meetings with the relevant authorities to confirm the required process, the general approach to be undertaken and to agree on the public participation plan;
  - Identify stakeholders, including neighbouring landowners/residents and relevant authorities;
- Application and Scoping Phase (**Completed**):
  - Compile and submit application forms to the CA and pay the relevant application fees;
  - Compile a DSR describing the affected environment and present an analysis of the potential environmental issues and benefits arising from the proposed project that may require further investigation in the Impact Assessment Phase;
  - Develop draft terms of reference for the specialist studies to be undertaken in the Impact Assessment Phase; and
  - Inform stakeholders of the proposed project, feasible alternatives and the S&EIR process and afford them the opportunity to register and participate in the process and identify any issues and concerns associated with the proposed project.
  - Incorporate comments received from stakeholders during the DSR comment period;
  - Should significant amendments be required, release the updated DSR for a 30-day comment period to provide stakeholders with the opportunity to review the amendments as well as provide additional input if required; and
  - Submit the FSR, following the consultation period, to the relevant authorities, in this case the DFFE, for acceptance/rejection.
- Impact Assessment Phase (**Current Phase**):
  - Continue to inform and obtain contributions from stakeholders, including relevant authorities, stakeholders, and the public and address their relevant issues and concerns;
  - Assess in detail the potential environmental and socio-economic impacts of the project as defined in the DSR;
  - Identify environmental and social mitigation measures to avoid and/or address the identified impacts;
  - Develop and/or amend environmental and social management plans based on the mitigation measures developed in the Environmental Impact Assessment Report (EIAr);

- Submit the EIAR and the associated EMPr to the CA to undertake the decision making process;
- Authorisation and Appeal Phase;
- The DFEE to provide written notification of the decision to either grant or refuse EA for the proposed project; and
- Notify all registered stakeholders of the decision and right to appeal.

1.6 IMPACT ASSESSMENT REPORT STRUCTURE

Table 1-5 cross-references the sections where the legislated requirements as per Appendix 3 of GNR 982 of 2014 can been located within the EIR.

Table 1-5 – Legislated Report Requirements as detailed in GNR 982

Appendix 3	Legislated requirements as per the NEMA GNR 982	Relevant Report Section
(a)	Details of	
	the EAP who compiled the report; and	Section 1.3.4 **Appendix A**
	the expertise of the EAP, including a Curriculum Vitae	**Appendix A**
(b)	The location of the activity, including-	
	The 21-digit Surveyor code for each cadastral land parcel;	Section 4.1
	Where available, the physical address and farm name	Section 4.1
	Where the required information in terms of (i) and (ii) is not available, the coordinates of the boundary of the property.	N/A
(c)	A plan which locates the proposed activities applied for at an appropriate scale, or, if it is-	
	A linear activity, a description of the corridor in which the proposed activity or activities is to be undertaken; or	N/A
	On land where the property has not been defined, the coordinates within which the activity is to be undertaken.	N/A
(d)	A description of the proposed activity, including-	
	All listed and specified activities triggered and being applied for;	Section 6.1
	A description of the associated structures and infrastructure related to the development;	Section 4
(e)	A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	Section 6
(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;	Section 4.6
(h)	A full description of the process followed to reach the proposed development footprint within the approved site, including-	

Appendix 3	Legislated requirements as per the NEMA GNR 982	Relevant Report Section
	Details of the development footprint alternatives considered;	Section 5
	Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 3.5
	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;	**Appendix D** Section 2.3
	The environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 7
	The impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated.	Section 9
	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Section 3.4
	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 9
	The possible mitigation measures that could be applied and level of residual risk;	Section 9
	If no alternative development locations for the activity were investigated, the motivation for not considering such; and	Section 5
	A concluding statement indicating the preferred alternative development location within the approved site.	Section 5.5
(i)	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-	
	A description of all environmental issues and risks that were identified during the environmental impact assessment process; and;	Section 9
	An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	Section 9
(j)	An assessment of each identified potentially significant impact and risk, including-	
	Cumulative impacts;	Section 10
	The nature, significance and consequences of the impact and risk;	Section 9
	The extent and duration of the impact and risk;	Section 9
	The probability of the impact and risk occurring;	Section 9
	The degree to which the impact and risk can be reversed;	Section 9

Appendix 3	Legislated requirements as per the NEMA GNR 982	Relevant Report Section
	The degree to which the impact and risk may cause irreplaceable loss of resources; and	Section 9
	The degree to which the impact and risk can be mitigated.	Section 9
(k)	Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report.	Section 11.2
(l)	An environmental impact statement which contains-	
	A summary of the key findings of the environmental impact assessment:	Section 11
	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 indicating any areas that should be avoided, including buffers; and	Section 8.2
	A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	Section 11.1
(m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation.	Section 11.3 **Appendix I**
(n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment.	Section 5
(o)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Section 11.3
(p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed.	Section 3.6
(q)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	Section 11.4
(r)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised.	N/A
(s)	An undertaking under oath or affirmation by the EAP in relation to-	
	The correctness of the information provided in the report;	**Appendix B**
	The inclusion of comments and inputs from stakeholders and I&APs;	**Appendix D**
	The inclusion of inputs and recommendations from the specialist reports where relevant; and	Section 11.2 **Appendix I**

Appendix 3	Legislated requirements as per the NEMA GNR 982	Relevant Report Section
	Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties.	**Appendix D**
(t)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts	N/A
(u)	An indication of any deviation from the approved scoping report, including the plan of study, including-	N/A
	any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and	N/A
	a motivation for the deviation	N/A
(v)	Any specific information required by the competent authority; and	N/A
(w)	Any other matter required in terms of section 24(4)(a) and (b) of the Act	N/A

2 SCOPING PHASE SUMMARY

2.1 PROCEDURAL PROCESS

The application form was compiled and submitted to the DFFE on 02 February 2023. The application form was acknowledged on 02 February 2023. The application form was updated and re-submitted to the DFFE on 16 March 2023.

The DFFE reference number allocated to this application is 14/12/16/3/3/2/2298. This reference number will appear on all official correspondence with the authorities and the public regarding the Proposed Project. A copy of the acknowledgement of receipt of the application is included in the SER (**Appendix D**).

The Draft Scoping Report (DSR) was released for public review between 03 February 2023 to 06 March 2023. Subsequently the scoping report was finalised and submitted to the DFFE on 16 March 2023 for their review and approval. The submission of the final scoping report was within 44 days of receipt of the application by the DFFE as required by GNR 982.

The approval of the Final Scoping Report (FSR) and the PoS for the EIA was received on 04 May 2023 and is included in **Appendix G.**

2.2 AUTHORITY CONSULTATION

A pre-application meeting was held on 06 July 2023 with the DFFE in order to discuss the proposed project. The minutes of this meeting are included in Appendix C-1 of the SER (**Appendix D**). In addition, WSP notified a number of commenting authorities of the Proposed Project via a notification letter, these included:

- DMRE;
- DFFE: Biodiversity and Conservation;
- DFFE: Protected Areas;
- MDARDLEA;
- DWS;
- Olifants WMA Authority;
- SAHRA;
- MHRA;
- MTPA;
- CAA;
- ATNS;
- DD (SA Army);
- AMA;
- SAWS;
- SANRAL;
- Steve Tshwete Local Municipality; and
- Nkangala District Municipality.

WSP received comments on the DSR from the DFFE on 01 March 2023, and comments on the FSR on 04 May 2023. The comments and responses are included in Section 3 of the SER (**Appendix D**).

2.3 STAKEHOLDER CONSULTATION

Stakeholders were identified and will continue to be identified through several mechanisms. These include:

- Utilising existing databases from other projects in the area;
- Networking with local business owners, non-governmental agencies, community based organisations, and local council representatives;
- Field work in and around the project area;
- Advertising in the press;
- Placement of community notices;
- Completed comment sheets; and
- Attendance registers at meetings.

All Stakeholders identified to date have been registered on the project stakeholder database. The EAP endeavoured to ensure that individuals/organisations from referrals and networking were notified of the Proposed Project. Stakeholders were identified at the horizontal (geographical) and vertical extent (organisations level).

A list of stakeholders captured in the project database is included in Appendix A of the SER (**Appendix D**).

Table 2-1 provides a breakdown of stakeholders currently registered on the database.

Table 2-1 – Breakdown of Stakeholders currently registered on the database

Representative sector	Further Explanation
Government Departments	All tiers of government, namely, national, provincial, local government and parastatal organisations including: ▪ DMRE; ▪ DFFE: Biodiversity and Conservation; ▪ DFFE: Protected Areas; ▪ MDARDLEA; ▪ DWS; ▪ Olifants WMA Authority; ▪ SAHRA; ▪ MHRA; ▪ MTPA; ▪ CAA; ▪ ATNS; ▪ DD (SA Army); ▪ AMA; ▪ SAWS; ▪ SANRAL; ▪ Steve Tshwete Local Municipality; and ▪ Nkangala District Municipality.
Business and consultants	Local and neighbouring businesses in the area. Representatives of consulting organisations that provide services in the area.

Representative sector	Further Explanation
	Prospecting/Mineral rights holders within the broader project area which may have an interest in the development. These include:
Non-governmental organisations (NGOs) and community based organisations	Agricultural unions, churches, and environmental NGOs
General public	Local communities, farmers, and other such individuals who may have an interest in the project

All concerns, comments, viewpoints and questions (collectively referred to as 'issues') received to date have been documented and responded to in a Comment and Response Table included in the SER(**Appendix D)**.

2.3.1 STAKEHOLDER NOTIFICATION

Direct Notification

Notification of the proposed Project was issued to potential Stakeholders, via direct correspondence (i.e., site notices) on 09 June 2022. Proof of notification is included Appendix B of the SER.

Newspaper Advertisements

In accordance with the requirements of GNR 982, as amended, the proposed project was advertised in two local newspapers. The purpose of the advertisement was to notify the public about the proposed project and to invite them to register as stakeholders. A copy of the advertisements are included in Appendix B-1 of the SER. The advertisement dates are listed in **Table 2-2**.

Table 2-2 – Dates on which the Adverts were published

Newspaper	Publication Date	Language
Witbank News	10 June 2022	English and IsiZulu
Highvelder	10 June 2022	English and Afrikaans

Site Notices

In accordance with GNR 326 Section 41(2)(a-b) site notices were developed to be placed at strategic points in close proximity to the proposed Project site, as well as in public places within Steve Tshwete Local Municipality and Nkangala District Municipality. Site notices were put up on 09 June 2022 at the following points:

- Komati Power Station Entrance;
- Boundary/access road to the Solar PV Site A and B;
- Blinkplan Police Station;
- OK Foods Super Market;
- Komati Paypoint and Library;
- Nkangala District Municipality Office;
- Gerard Sekoto Library;
- Eastdene Public Library; and

- Hendrina Public Library.

Proof of display has been included in Section 2.3 of the SER (**Appendix D**).

2.4 SCOPING STUDY FINDINGS

The scoping phase identified a number of impacts associated with the proposed project. The findings of the preliminary significance ratings undertaken during the scoping phase for the construction phase, operational phase and decommissioning phase are included in **Table 2-3**, **Table 2-4** and **Table 2-5**.

Table 2-3 – Potential Construction Phase Impacts

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
Air Quality	Dust and Particulate Emissions	Negative	3	1	**Low**
Noise	Increase in construction noise levels	Negative	3	1	**Low**
Surface Water	Stormwater runoff	Negative	2	2	**Low**
	Erosion	Negative	4	2	**Medium**
Groundwater	Decrease in groundwater quality due to hydrocarbon spills from moving equipment	Negative	3	1	**Low**
	Decrease in groundwater quality due to leachate/spills from fuel storage areas	Negative	3	1	**Low**
	Decrease in groundwater quality due to contaminated soil that could leach to the groundwater	Negative	3	1	**Low**
Soils and Land Capability	Soil Erosion	Negative	3	2	**Medium**
	Soil Compaction	Negative	4	3	**High**

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
	Soil Contamination	Negative	2	2	**Medium**
Terrestrial Biodiversity	Direct Loss and disturbance of natural habitat and associated flora SCC	Negative	3	2	**Medium**
	Establishment and spread of AIS	Negative	3	2	**Medium**
	Loss and fragmentation of faunal habitat	Negative	2	3	**Medium**
	Injury and mortality of fauna SCC	Negative	3	1	**Low**
Aquatic Biodiversity	Direct loss of wetland habitat	Negative	4	4	**High**
	Erosion	Negative	3	3	**Medium**
	Establishment and spread of AIS	Negative	3	2	**Medium**
	Catchment land use changes and activities	Negative	3	3	**Medium**
Heritage	Disturbance to Known Cultural Resources	Negative	1	2	**Very Low**
	Chance-find of Cultural Resources	Negative	1	2	**Very Low**
Palaeontology	Loss of fossil resources	Negative	1	2	**Very Low**
Visual	Potential visual intrusion resulting from large construction vehicles and equipment	Negative	3	2	**Medium**

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
	Potential visual effect of construction laydown areas and material stockpiles.	Negative	3	2	**Medium**
	Potential impacts of increased dust emissions from construction activities and related traffic	Negative	3	2	**Medium**
	Potential visual scarring of the landscape as a result of site clearance and earthworks	Negative	3	2	**Medium**
	Potential visual pollution resulting from littering on the construction site	Negative	3	1	**Low**
Traffic	Impact of construction vehicles on roads and access roads	Negative	3	1	**Low**
Social	Economic Impact	Positive	4	2	**Medium**
	Community, Health and Safety Risk	Negative	3	2	**Medium**

Table 2-4 – Potential Operational Phase Impacts

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
Surface water	Flooding	Negative	2	2	**Low**
	Stormwater runoff	Negative	2	2	**Low**

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
	Erosion	Negative	4	2	**Medium**
Groundwater	Reduced recharge due to increase in hardstanding footprint	Negative	3	1	**Low**
	Localised artificial recharge due to washing of solar panels	Negative	3	1	**Low**
	Reduced leachate from contaminated soils	Positive	3	2	**Medium**
	Localised leachate from equipment	Negative	3	2	**Medium**
	Localised increased leachate from contaminated soils due to following washing of solar panels	Negative	3	2	**Medium**
Terrestrial Biodiversity	Establishment and spread of AIS	Negative	3	2	**Medium**
	Fragmentation of fauna habitats/barriers to movement	Negative	2	2	**Low**
	Electrocution of bird SCC	Negative	3	2	**Medium**
	Injury and mortality of fauna SCC	Negative	3	1	**Low**
Aquatic Biodiversity	Catchment land use changes and activities	Negative	3	3	**Medium**
	Habitat quality reductions due to stormwater runoff, land use changes	Negative	3	2	**Medium**
	Spread of AIS	Negative	3	3	**Medium**

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
	Increased run-off, Erosion	Negative	3	3	**Medium**
	Water quality deterioration and contamination of wetland soils	Negative	3	3	**Medium**
Visual	Viewing of the PV facility infrastructure and activities	Negative	2	3	**Medium**
Social	Low Carbon Power Generation	Positive	4	2	**Medium**
	Impact on the community	Negative	4		**Medium**
	Employment and Business Opportunities	Positive	4	2	**Medium**

Table 2-5 – Potential Decommissioning Phase Impacts

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
Air Quality	Dust and Particulate Emissions	Negative	3	1	**Low**
Noise	Increase in construction noise levels	Negative	3	1	**Low**
Surface Water	Stormwater runoff	Negative	2	2	**Low**
	Erosion	Negative	4	2	**Medium**
Groundwater	Decrease in groundwater quality due to hydrocarbon spills from moving equipment	Negative	3	1	**Low**

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
	Decrease in groundwater quality due to leachate/spills from equipment no longer in use	Negative	3	2	**Medium**
Soils and Land Capability	Soil Erosion	Negative	3	2	**Medium**
	Soil Compaction	Negative	4	3	**High**
	Soil Contamination	Negative	2	2	**Medium**
Terrestrial Biodiversity	Establishment and spread of AIS	Negative	3	2	**Medium**
Aquatic Biodiversity	Erosion	Negative	3	3	**Medium**
	Establishment and spread of AIS	Negative	3	2	**Medium**
Visual	Potential visual intrusion resulting from large construction vehicles and equipment	Negative	3	2	**Medium**
	Potential visual effect of construction laydown areas and material stockpiles.	Negative	3	2	**Medium**
	Potential impacts of increased dust emissions from construction activities and related traffic	Negative	3	2	**Medium**
	Potential visual scarring of the landscape as a result of site clearance and earthworks	Negative	3	2	**Medium**
	Potential visual pollution resulting	Negative	3	1	**Low**

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
	from littering on the construction site				
Traffic	Impact of construction vehicles on roads and access roads	Negative	3	1	**Low**
Social	Loss of employment	Negative	4	3	**High**
	Reduced community investment	Negative	4	3	**High**

2.5 SCOPING RECOMMENDATIONS

The scoping report identified and evaluated the feasibility of a range of site and technology options. **Table 2-6** provides a summary of the scoping phase alternatives assessment.

Table 2-6 – Alternatives summary

Alternative Type	Alternative Identified in Scoping	Assessment in EIA Phase (Yes / No)
Technology - Solar	The project is utilising solar technology; therefore, no other technology alternatives are being considered for this project. Wind technology is being considered as a separate additional project at the Komati Power Station footprint.	No
Technology - BESS	With regards to the BESS, Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered during the assessment however the specific technology will only be determined following EPC procurement.	No
Location	The selection of the location of the proposed project is based on the proximity to the Komati Power Station to allow the repurposing of existing infrastructure. Furthermore, the land chosen is owned by Eskom and would not result in the relocation of communities.	No
Layout	Four BESS sites have been identified and will be further investigated. The layout will be further refined during the EIA Phase based on the environmental sensitivities identified by the specialists.	Yes

3 EIA PROCESS

3.1 DFFE WEB-BASED ENVIRONMENTAL SCREENING TOOL

DFFE has developed the National Web-based Environmental Screening Tool in order to flag areas of potential environmental sensitivity related to a site as well as a development footprint and produces the screening report required in terms of regulation 16 (1)(v) of the EIA Regulations (2014, as amended). The Notice of the requirement to submit a report generated by the national web-based environmental screening tool in terms of section 24(5)(h) of the NEMA, 1998 (Act No 107 of 1998) and regulation 16(1)(b)(v) of the EIA regulations, 2014, as amended (GN 960 of July 2019) states that the submission of a report generated from the national web-based environmental screening tool, as contemplated in Regulation 16(1)(b)(v) of the EIA Regulations, 2014, published under Government Notice No. R982 in Government Gazette No. 38282 of 4 December 2014, as amended, is compulsory when submitting an application for environmental authorisation in terms of regulation 19 and regulation 21 of the EIA Regulations, 2014 (as amended) as of 04 October 2019.

The Screening Report generated by the National Web-based Environmental Screening Tool contains a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development footprint as well as the most environmentally sensitive features on the footprint based on the footprint sensitivity screening results for the application classification that was selected.

A screening report for the proposed Eskom Solar PV and BESS Project was generated from the website on 23 May 2022 and is attached as **Appendix F**. The Screening Report for the project identified various sensitivities for the site. The report also generated a list of specialist assessments that should form part of the S&EIA based on the development type and the environmental sensitivity of the site. Assessment Protocols in the report provide minimum information to be included in a specialist report to facilitate decision-making.

Table 3-1 below provides a summary of the sensitivities identified for the development footprint.

Table 3-1 – Sensitivities identified in the DFFE Screening Report

Theme	Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low Sensitivity
Agricultural Theme		✓		
Animal Species Theme		✓		
Aquatic Biodiversity Theme	✓			
Archaeological and Cultural Heritage Theme				✓
Avian Theme				✓
Civil Aviation (Solar PV) Theme			✓	
Defence Theme				✓

Theme	Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low Sensitivity
Landscape (Solar) Theme	✓			
Palaeontology Theme	✓			
Plant Species Theme			✓	
Radio Frequency Interference (RFI) Theme			✓	
Terrestrial Biodiversity Theme	✓			

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the following list of specialist assessments have been identified for inclusion in the assessment report as determined by the screening tool:

- Agricultural Impact Assessment;
- Landscape/Visual Impact Assessment;
- Archaeological and Cultural Heritage Impact Assessment ;
- Palaeontology Impact Assessment;
- Terrestrial Biodiversity Impact Assessment;
- Aquatic Biodiversity Impact Assessment;
- Civil Aviation Assessment;
- Defence Assessment;
- RFI Assessment;
- Geotechnical Assessment;
- Socio-Economic Assessment;
- Plant Species Assessment; and
- Animal Species Assessment.

3.1.1 MOTIVATION FOR SPECIALIST STUDIES

The report recognises that "it is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the footprint situation." The specialist studies required for the proposed Eskom Solar PV and BESS Project, as identified by the DFFE Screening Tool are included in **Table 3-2.** The table also identifies the specialist studies commissioned and provides motivation for specialist studies not commissioned.

Table 3-2 - Specialist Studies identified by the DFFE Screening Tool

Specialist Study Identified	Specialist Study Commissioned	Specialist and Report Reference	Motivation
Agricultural Impact Assessment	Yes	Karen King (WSP) **Appendix H.6**	N/A

Specialist Study Identified	Specialist Study Commissioned	Specialist and Report Reference	Motivation
Landscape/Visual Impact Assessment	Yes	Lourens du Plessis (LOGIS) **Appendix H.11**	N/A
Archaeological and Cultural Heritage Impact Assessment	Yes	Anton Pelser (APAC) **Appendix H.12**	N/A
Palaeontology Impact Assessment	Yes	Heidi Fourie (Independent Consultant) **Appendix H.13**	N/A
Terrestrial Biodiversity Impact Assessment	Yes	Andrew Zinn (Hawkhead) **Appendix H.8**	N/A
Aquatic Biodiversity Impact Assessment	Yes	Lufuno Nemakhavhani (WSP) **Appendix H.9**	N/A
Civil Aviation Assessment	No	N/A	A formal Civil Aviation Assessment will not be undertaken as part of the S&EIA Process. Nevertheless, the relevant Authorities have been included on the project stakeholder database. As of the 1st of February 2022, ATNS has been appointed as the new Obstacle application Service Provider for Solar Plants. Their responsibility would pertain to the assessments, maintenance, and all other related matters in respect to Solar assessments. A Solar Obstacles application have been submitted to ATNS for the project and the required permits will be obtained prior to the development of the project. The SACAA has been included on the project stakeholder database. They will be informed of the proposed Project, and comment will be sought. This theme has been identified as a medium sensitivity, and a compliance statement has been made in Section 8.1.7.

Specialist Study Identified	Specialist Study Commissioned	Specialist and Report Reference	Motivation
Defence Assessment	No	N/A	The Department of Defence has been included on the project stakeholder database. They will be informed of the proposed Project, and comment will be sought. As this theme has been identified as a low sensitivity, no compliance statement is required
RFI Assessment	No	N/A	An RFI Study will not be undertaken. The SAWS and relevant telecommunications stakeholders will be engaged with as part of the Public Participation Process This theme has been identified as a medium sensitivity, and a compliance statement has been made in Section 8.1.9.
Geotechnical Assessment	Yes - Desktop Assessment	Nkosazana Leseka (Eskom) **Appendix H.1**	A detailed Geotechnical Assessment will not be undertaken as this will be undertaken during the design phase
Socio-Economic Assessment	Yes	Tumelo Mathulwe (WSP) **Appendix H.14**	N/A
Plant Species Assessment	Yes	Andrew Zinn (Hawkhead) **Appendix H.7**	N/A
Animal Species Assessment	**Yes**	**Andrew Zinn (Hawkhead)** **Appendix H.8**	N/A

Specialist assessments were conducted in accordance with the Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes, which were promulgated in Government Notice No. 320 of 20 March 2020 and in Government Notice No. 1150 of 30 October 2020 (i.e. “the Protocols”). The assessment protocols followed as well as the site sensitivity verification undertaken by the specialists are indicated in **Section 8**.

3.2 APPLICATION FOR ENVIRONMENTAL AUTHORISATION

The application phase consisted of a pre-application consultation with DFFE and subsequently completing the appropriate application form as well as the submission and registration of the application for EA with the DFFE. The pre-application meeting was held with DFFE on 06 July 2022 (meeting minutes included in the SER in **Appendix D**). The application form was submitted to the DFFE with the DSR on 02 February 2023. An updated application form was submitted with the FSR on 16 March 2023. An updated application form will be submitted with the Draft EIAr. The DFFE Reference Number is 14/12/16/3/3/2/2298.

3.3 BASELINE ENVIRONMENTAL ASSESSMENT

The description of the environmental attributes of the Project area was compiled through a combination of desktop reviews and site investigations. Desktop reviews made use of available information including existing reports, aerial imagery, and mapping. The specialist teams undertook site investigations, between May 2022 and May 2023, to identify sensitive features on site that informed the sensitivity mapping (**Section 8.2**) for the Komati Solar PV and BESS Facility.

3.4 IMPACT ASSESSMENT METHODOLOGY

3.4.1 ASSESSMENT OF IMPACTS AND MITIGATION

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct[1], indirect[2], secondary[3] as well as cumulative[4] impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[5] presented in **Table 3-3.**

Table 3-3 – Impact Assessment Criterion and Scoring System

Criteria	Score 1	Score 2	Score 3	Score 4	Score 5
Impact Magnitude (M)	Very low:	Low:	Medium:	High:	Very High:

[1] Impacts that arise directly from activities that form an integral part of the Project.
[2] Impacts that arise indirectly from activities not explicitly forming part of the Project.
[3] Secondary or induced impacts caused by a change in the Project environment.
[4] Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.
[5] The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

Criteria	Score 1	Score 2	Score 3	Score 4	Score 5
The degree of alteration of the affected environmental receptor	No impact on processes	Slight impact on processes	Processes continue but in a modified way	Processes temporarily cease	Permanent cessation of processes
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
Impact Significance Rating					
Total Score	**4 to 15**	**16 to 30**	**31 to 60**	**61 to 80**	**81 to 100**
Environmental Significance Rating (Negative (-))	**Very low**	**Low**	**Moderate**	**High**	**Very High**
Environmental Significance Rating (Positive (+))	**Very low**	**Low**	**Moderate**	**High**	**Very High**

3.4.2 IMPACT MITIGATION

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

The mitigation sequence/hierarchy is shown in **Figure 3-1** below.

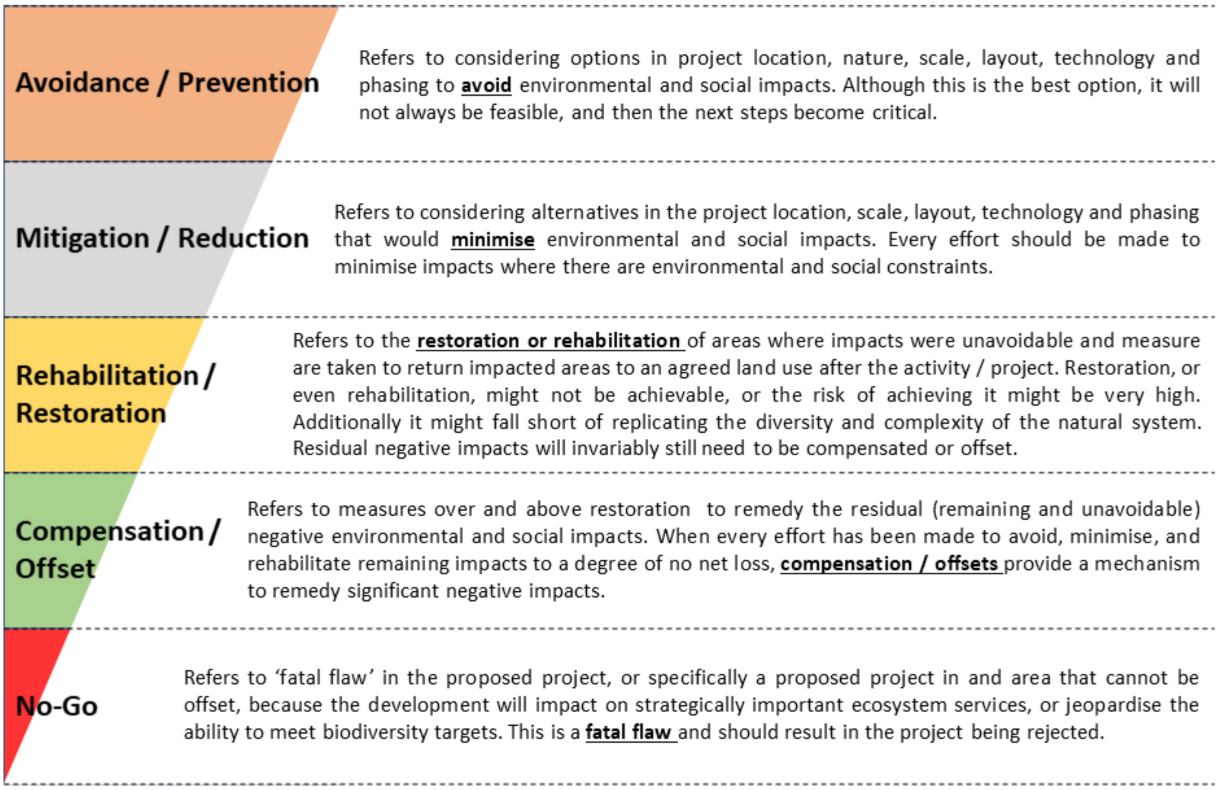


Figure 3-1 - Mitigation Sequence/Hierarchy

The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

3.5 STAKEHOLDER ENGAGEMENT PROCESS

Stakeholder engagement (public participation) is a requirement of the S&EIA process. It consists of a series of inclusive and culturally appropriate interactions aimed at providing stakeholders with opportunities to express their views, so that these can be considered and incorporated into the S&EIA decision-making process. Effective engagement requires the prior disclosure of relevant and adequate project information to enable stakeholders to understand the risks, impacts, and opportunities of the proposed project. The objectives of the stakeholder engagement process can be summarised as follows:

- Identify relevant individuals, organisations and communities who may be interested in or affected by the proposed project;
- Clearly outline the scope of the proposed project, including the scale and nature of the existing and proposed activities;
- Identify viable proposed project alternatives that will assist the relevant authorities in making an informed decision;
- Identify shortcomings and gaps in existing information;
- Identify key concerns, raised by Stakeholders that should be addressed in the specialist studies;
- Highlight the potential for environmental impacts, whether positive or negative; and
- To inform and provide the public with information and an understanding of the proposed project, issues, and solutions.

A SER has been included in **Appendix D** detailing the project's compliance with Chapter 6 of the NEMA EIA Regulations 2014, as amended.

3.5.1 STAKEHOLDER IDENTIFICATION

Stakeholders were identified and will continue to be identified through several mechanisms. These include:

- Utilising existing databases from other projects in the area;
- Advertising in the press;
- Placement of community notices;
- Completed comment sheets; and
- Attendance registers at meetings.

All Stakeholders identified to date have been registered on the project stakeholder database. The EAP endeavoured to ensure that individuals/organisations from referrals and networking were notified of the Proposed Project. Stakeholders were identified at the horizontal (geographical) and vertical extent (organisations level).

A list of stakeholders captured in the project database is included in the SER in **Appendix D**.

3.6 ASSUMPTIONS AND LIMITATIONS

General assumptions and limitations:

- The EAP hereby confirms that they have undertaken to obtain project information from the client that is deemed to be accurate and representative of the project;
- Site visits have been undertaken to better understand the project and ensure that the information provided by the client is correct, based on site conditions observed;
- The EAP hereby confirms their independence and understands the responsibility they hold in ensuring all comments received are accurately replicated and responded to within the EIA documentation;
- The comments received in response to the public participation process, will be representative of comments from the broader community; and
- Based on the Pre-Application meeting and subsequent minutes, the CA would not require additional specialist input, in order to make a decision regarding the application.

Soil and Agricultural Potential:

- PV Site A has been significantly disturbed by existing agricultural activities.
- The BESS sites have been significantly disturbed owing to the historic construction of the Komati Power Station facilities.
- The site could not be traversed such that an even grid matrix of classification points could be set up. As a result, some augmentation of data and extrapolation of findings was necessary.

Terrestrial Animal Species:

- Field work was conducted over a one-day period in December 2022 and focused specifically on the proposed Project's development footprints in the LSA. The timing of the field survey coincided with the mid-summer rainy period;
- The absence or non-recording of a specific fauna species, at a particular time, does not necessarily indicate that 1) the species does not occur there; 2) the species does not utilise resources in that area; or 3) the area does not play an ecological support role in the ecology of that species;
- Given the difficulty in fully sampling and characterising the abundance and distribution of fauna species in the LSA during the short period of time allocated to field work, the baseline descriptions were qualitative; and
- The delineation of habitat units was conducted using available Google Earth imagery. It is predicated on a subjective interpretation of aerial imagery and extrapolation of observations made during the field visit. It must be noted that owing to the spatially complexity and fragmentation of the LSA and limited duration of the field survey, it was not possible to visit and characterise every non-transformed habitat patch.

Terrestrial Plant Species:

- Field work was conducted over a one-day period in December 2022 and focused specifically on the proposed Project's development footprints in the LSA. The timing of the field survey coincided with the mid-summer rainy period. This is an optimal period to conduct botanical field work, however, it is possible that certain herbaceous taxa that are most readily visible or distinguishable when emergent or in flower during the late wet season, may have been overlooked during field visit;
- Given the difficulty in fully sampling and characterising the abundance and distribution of flora species in the LSA during the short period of time allocated to field work, the baseline descriptions were qualitative; and

- The delineation of habitat units was conducted using available Google Earth imagery. It is predicated on a subjective interpretation of aerial imagery and extrapolation of observations made during the field visit. It must be noted that owing to the spatially complexity and fragmentation of the LSA and limited duration of the field survey, it was not possible to visit and characterise every non-transformed habitat patch.

Aquatic Biodiversity:

- The aquatic biodiversity report was prepared on the basis of the site sensitivity verification process undertaken in response to the national web-based screening report. The site sensitivity verification was completed via desktop analysis of the existing baseline knowledge of riparian or wetlands systems in the study area, supplemented by the findings of the field survey conducted on 31 May – 01 June 2022.
- The field survey for the aquatic biodiversity assessment was conducted on 31 May – 01 June 2022, which coincides with the dry season period; however, following a summer of exceptional rainfall, flows in the channelled valley bottom wetland remained high, and dominant wetland vegetation was discernible.
- It is therefore considered that there are no sampling or information limitations pertaining to riparian or wetlands systems impacting on this assessment and the recommendations contained in the report.
- Since the watercourses in the study area are wetland systems, no assessment of macroinvertebrates or fish is included in the baseline description, apart from the diatom assessment results.

Palaeontology:

- The accuracy and reliability of the report may be limited by the following constraints:
  - Most development areas have never been surveyed by a palaeontologist or geophysicist.
  - Variable accuracy of geological maps and associated information.
  - Poor locality information on sheet explanations for geological maps.
  - Lack of published data.
  - Lack of rocky outcrops.

4 PROJECT DESCRIPTION

This section provides a description of the location of the project area and the site location alternatives considered for the project. The descriptions encompass the activities to be undertaken during the construction and operational phases as well as the consideration for site accessibility, water demand, supply, storage, and site waste management. This section also considers the need and desirability of the project in accordance with Appendix 1 of GNR 326.

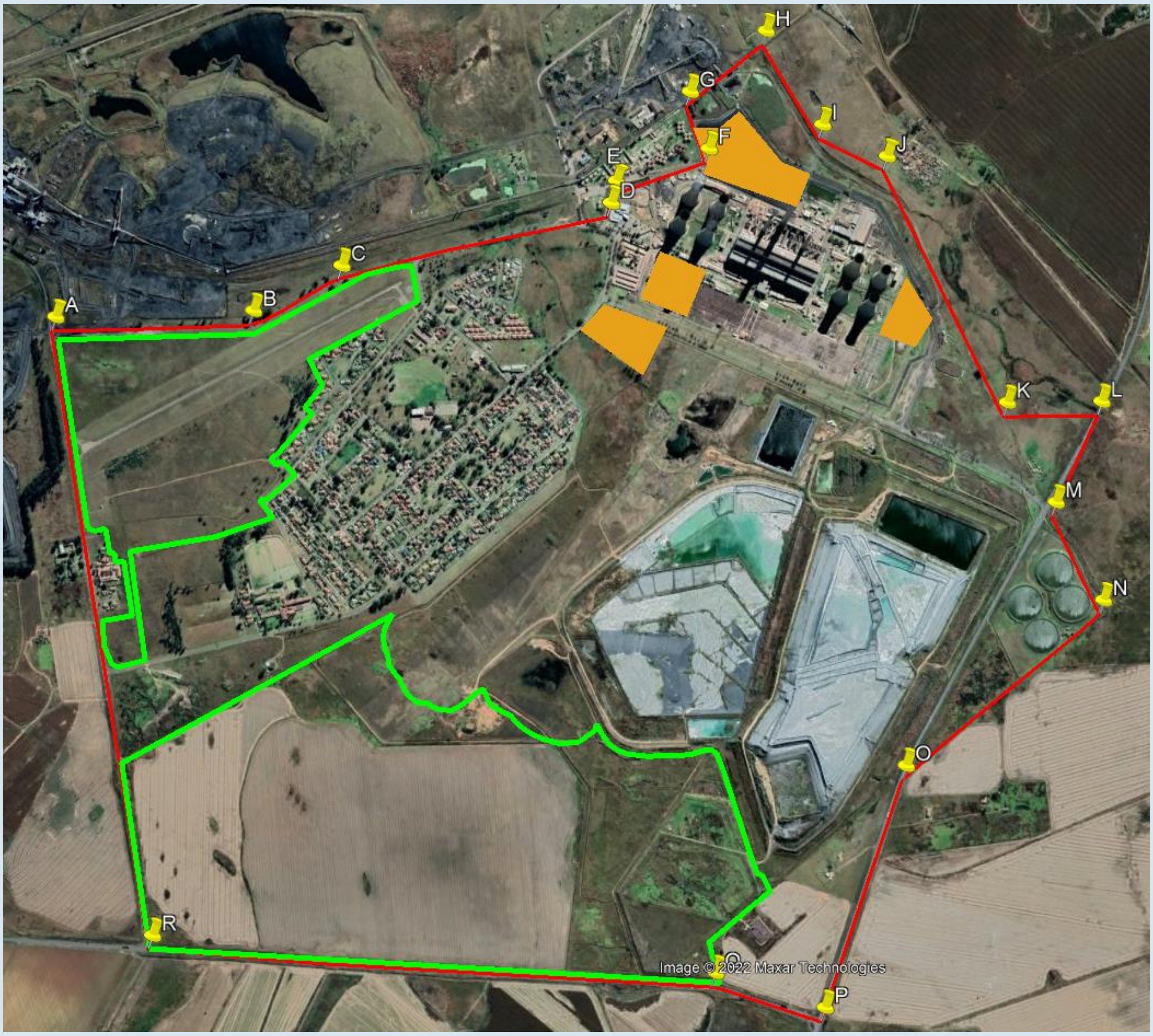
4.1 LOCATION OF THE PROPOSED PROJECT

The Komati Power Station is situated about 37km from Middelburg, 43km from Bethal and 40km from Witbank in Ward 4, Portion 0 of Farm Komati Power Station 56-IS in the Steve Tshwete Local Municipality located within the Nkangala District Municipality in the Mpumalanga Province. The SEF, BESS facilities and associated infrastructure will be located on Eskom owned land. The locality of the facilities is illustrated in **Figure 1-1**. The layout of the project is illustrated in **Figure 4-1**. The outer coordinates of Solar Site A and Solar Site B are indicated in **Table 4-3**, the BESS is indicated in **Table 4-4**, and the powerlines are indicated in **Table 4-5**.

Table 4-1 – Komati SEF Affected Farm Portions

Farm Name	21 Digit Surveyor General Code of Each Cadastral Land Parcel
Portion 0 of Farm Komati Power Station 56-IS	T0IS00000000005600000

Table 4-2 – Coordinate Points of the Cadastral Land Parcel



Point	Longitude	Latitude
AF	22° 25' 30.549" E	31° 54' 31.383" S
A	26° 5'32.63"S	29°26'56.39"E
B	26° 5'31.98"S	29°27'19.25"E
C	26° 5'27.31"S	29°27'29.45"E
D	26° 5'20.81"S	29°28'0.56"E
E	26° 5'18.53"S	29°28'1.16"E
F	26° 5'15.18"S	29°28'11.86"E

Point	Longitude	Latitude
G	26° 5'9.26"S	29°28'9.70"E
H	26° 5'2.93"S	29°28'18.46"E
I	26° 5'12.68"S	29°28'24.99"E
J	26° 5'15.96"S	29°28'32.44"E
K	26° 5'41.52"S	29°28'46.33"E
L	26° 5'41.41"S	29°28'57.23"E
M	26° 5'51.86"S	29°28'51.96"E
N	26° 6'2.02"S	29°28'57.44"E
O	26° 6'19.20"S	29°28'34.65"E
P	26° 6'44.32"S	29°28'25.28"E
Q	26° 6'40.71"S	29°28'12.64"E
R	26° 6'36.83"S	29°27'7.56"E

Table 4-3 –Solar PV Facility Outer Point Coordinates

Point	Longitude	Latitude
Solar PV Site A		
		
A1	26° 6' 17.802" S	29° 27' 5.348" E
A2	26° 6' 34.441" S	29° 27' 8.168" E
A3	26° 6' 36.604" S	29° 27' 15.116" E
A4	26° 6' 39.421" S	29° 28' 12.583" E
A5	26° 6' 36.261" S	29° 28' 11.905" E
A6	26° 6' 30.264" S	29° 28' 18.564" E
A7	26° 6' 16.902" S	29° 28' 12.493" E
A8	26° 6' 15.599" S	29° 28' 0.243" E
A9	26° 6' 15.579" S	29° 27' 52.855" E
A10	26° 6' 12.634" S	29° 27' 48.876" E
A11	26° 6' 12.351" S	29° 27' 40.561" E
A12	26° 6' 13.490" S	29° 27' 36.660" E
A13	26° 6' 5.335" S	29° 27' 30.977" E

Point	Longitude	Latitude
Solar PV Site B		
		
B1	26° 5' 56.158" S	29° 27' 4.155" E
B2	26° 5' 56.041" S	29° 27' 5.107" E
B3	26° 5' 55.156" S	29° 27' 4.970" E
B4	26° 5' 53.573" S	29° 27' 15.258" E
B5	26° 5' 51.765" S	29° 27' 21.235" E
B6	26° 5' 50.154" S	29° 27' 19.896" E
B7	26° 5' 47.533" S	29° 27' 23.880" E
B8	26° 5' 46.583" S	29° 27' 22.916" E
B9	26° 5' 45.779" S	29° 27' 21.300" E
B10	26° 5' 41.333" S	29° 27' 25.639" E
B11	26° 5' 40.744" S	29° 27' 25.217" E
B12	26° 5' 38.476" S	29° 27' 26.959" E

Point	Longitude	Latitude
B13	26° 5' 35.522" S	29° 27' 25.650" E
B14	26° 5' 29.197" S	29° 27' 38.120" E
B15	26° 5' 26.410" S	29° 27' 37.534" E
B16	26° 5' 27.132" S	29° 27' 32.897" E
B17	26° 5' 33.279" S	29° 27' 19.933" E
B18	26° 5' 34.023" S	29° 26' 57.800" E
B19	26° 5' 52.913" S	29° 27' 1.316" E
B20	26° 5' 52.862" S	29° 27' 3.000" E
B21	26° 5' 55.261" S	29° 27' 3.482" E
B22	26° 5' 55.184" S	29° 27' 3.982" E

Table 4-4 –BESS Outer Point Coordinates

Point	Longitude	Latitude
BESS A and BESS B		
		
A1	26° 5' 28.940" S	29° 28' 4.556" E
A2	26° 5' 29.278" S	29° 28' 4.601" E
A3	26° 5' 30.136" S	29° 28' 6.897" E
A4	26° 5' 25.806" S	29° 28' 9.032" E
A5	26° 5' 24.683" S	29° 28' 6.080" E
A6	26° 5' 24.115" S	29° 28' 6.315" E
A7	26° 5' 22.795" S	29° 28' 2.181" E
A8	26° 5' 27.799" S	29° 28' 1.020" E
B1	26° 5' 29.716" S	29° 28' 0.362" E

Point	Longitude	Latitude
B2	26° 5' 32.343" S	29° 27' 57.965" E
B3	26° 5' 37.012" S	29° 28' 4.558" E
B4	26° 5' 32.221" S	29° 28' 6.833" E
BESS C		
		
C1	26° 5' 26.976" S	29° 28' 35.163" E
C2	26° 5' 32.953" S	29° 28' 31.934" E
C3	26° 5' 34.286" S	29° 28' 36.220" E
C4	26° 5' 31.363" S	29° 28' 38.189" E

Table 4-5 – Powerline Bend Point Coordinates

Point	Longitude	Latitude
A	26° 6' 32.959" S	29° 27' 7.084" E
B	26° 6' 24.899" S	29° 27' 13.580" E
C	26° 5' 46.581" S	29° 28' 2.793" E
D	26° 5' 41.212" S	29° 28' 2.948" E
E	26° 5' 33.428" S	29° 28' 7.008" E
F	26° 5' 29.880" S	29° 27' 57.943" E
G	26° 5' 21.659" S	29° 27' 56.067" E
H	26° 5' 40.725" S	29° 28' 25.472" E
I	26° 5' 41.257" S	29° 28' 30.237" E

Point	Longitude	Latitude
J	26° 5' 39.317" S	29° 28' 31.766" E
K	26° 5' 37.895" S	29° 28' 30.630" E
L	26° 5' 36.078" S	29° 28' 30.983" E
M	26° 5' 42.586" S	29° 28' 46.903" E
N	26° 5' 34.071" S	29° 28' 32.614" E
O	26° 5' 35.088" S	29° 28' 34.089" E
P	26° 5' 34.286" S	29° 28' 36.220" E
Q	26° 5' 29.651" S	29° 28' 38.580" E
R	26° 5' 15.099" S	29° 28' 30.518" E
S	26° 6' 37.674" S	29° 27' 10.522" E
T	26° 6' 27.679" S	29° 27' 16.352" E
U	26° 5' 49.659" S	29° 28' 6.596" E
V	26° 5' 35.332" S	29° 28' 16.522" E
W	26° 5' 38.833" S	29° 28' 26.527" E
X	26° 5' 42.591" S	29° 28' 28.326" E
Y	26° 5' 48.385" S	29° 28' 42.998" E
Z	26° 5' 41.518" S	29° 28' 46.324" E

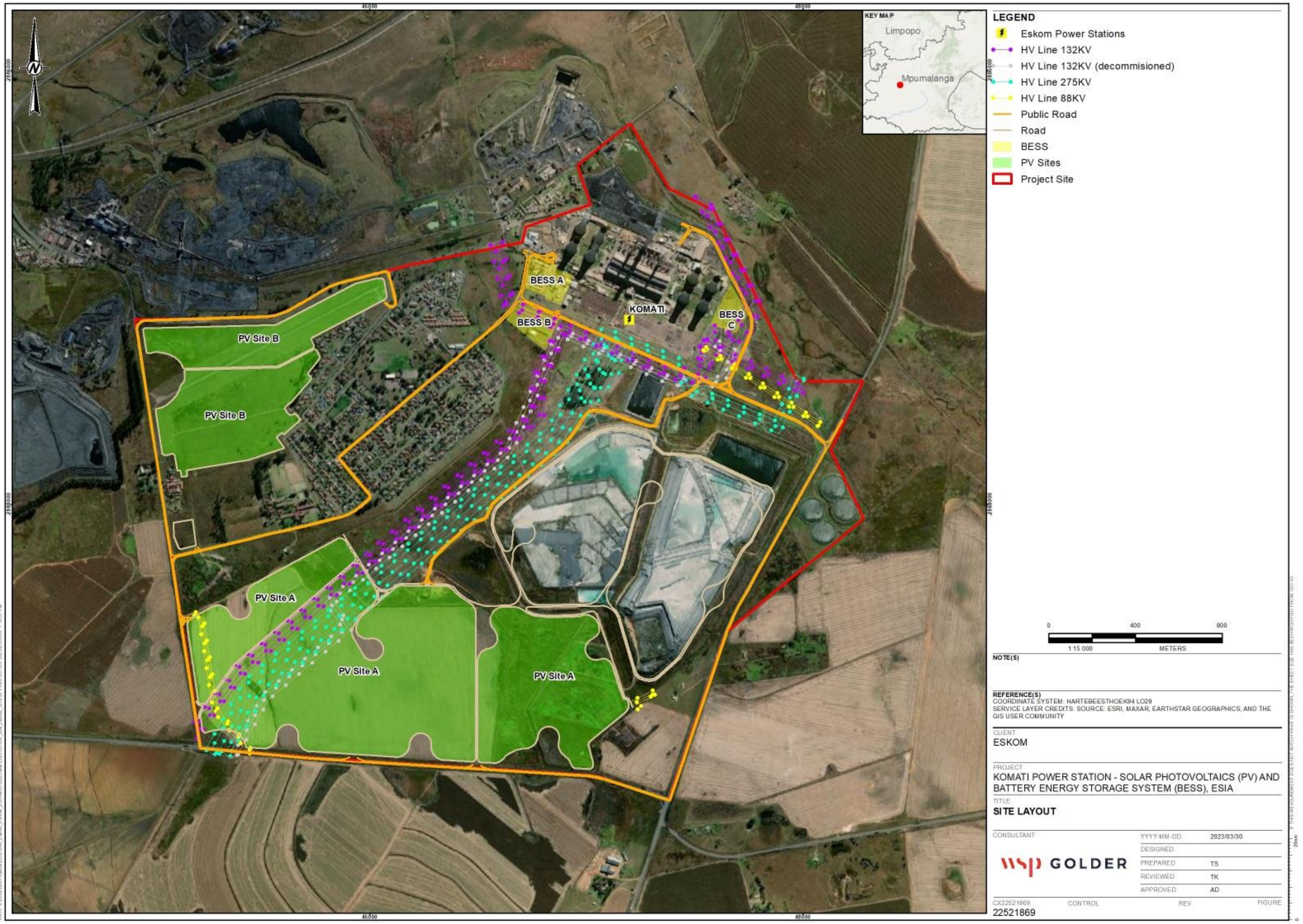


Figure 4-1 – Komati Solar PV Facility Layout Map

4.2 SOLAR PV GENERATION PROCESS

South Africa experiences some of the highest levels of solar radiation in the world between 4.5 and 6.5kWh/m2/day) and therefore, possesses considerable solar resource potential for solar power generation.

In terms of large-scale grid connected applications the most commonly used technology utilised in South Africa is PV installations and is described in some detail in the following section.

It must be noted that this project is specific to solar power generation through the use of solar PV technology only.

4.2.1 PV AND MOUNTING SYSTEM

Internationally, solar PV is the fastest-growing power generation technology. Approximately 139 GW was added to the installed capacity globally in 2020, increasing the installed capacity by 18% from the previous year. The total capacity from PVs was 760 GW globally, producing approximately 3% of the world's electricity. In South Africa the solar PV installed capacity in 2020 grew by 37% compared to the previous year's value. As much as 3.6 GW of PV is planned to be installed by 2026, with approximately 1.48 GW already installed as recorded in 2019.

Large-scale or utility-scale PV systems are designed for the supply of commercial power into the electricity grid. Large-scale PV plants differ from the smaller units and other decentralised solar power applications because they supply power at the utility level, rather than to local users.

PV cells are made from semi-conductor materials that are able to release electrons when exposed to solar radiation. This is called the photo-electric effect. Several PV cells are grouped together through conductors to make up one module. Modules can be connected together to produce power in large quantities. In PV technology, the power conversion source is via PV modules that convert light directly to electricity.

Solar panels produce direct current (DC) electricity; therefore, PV systems require conversion equipment to convert this power to alternating current (AC), that can be fed into the electricity grid. This conversion is done by inverters. **Figure 4-2** provides an illustration of the main components of a solar PV power plant.

The solar PV panels can be mounted in various ways to ensure the maximum exposure to sunlight. The two main mounting systems that form part of a PV facility are either single axis tracking or fixed axis mounting structures. In the fixed axis mounting structures, the panels are installed and set to face north and does not move to follow the sun. With tracking systems, the panels track the sun and thereby ensure maximum exposure to the sunlight. Both mounting systems are considered for this project.

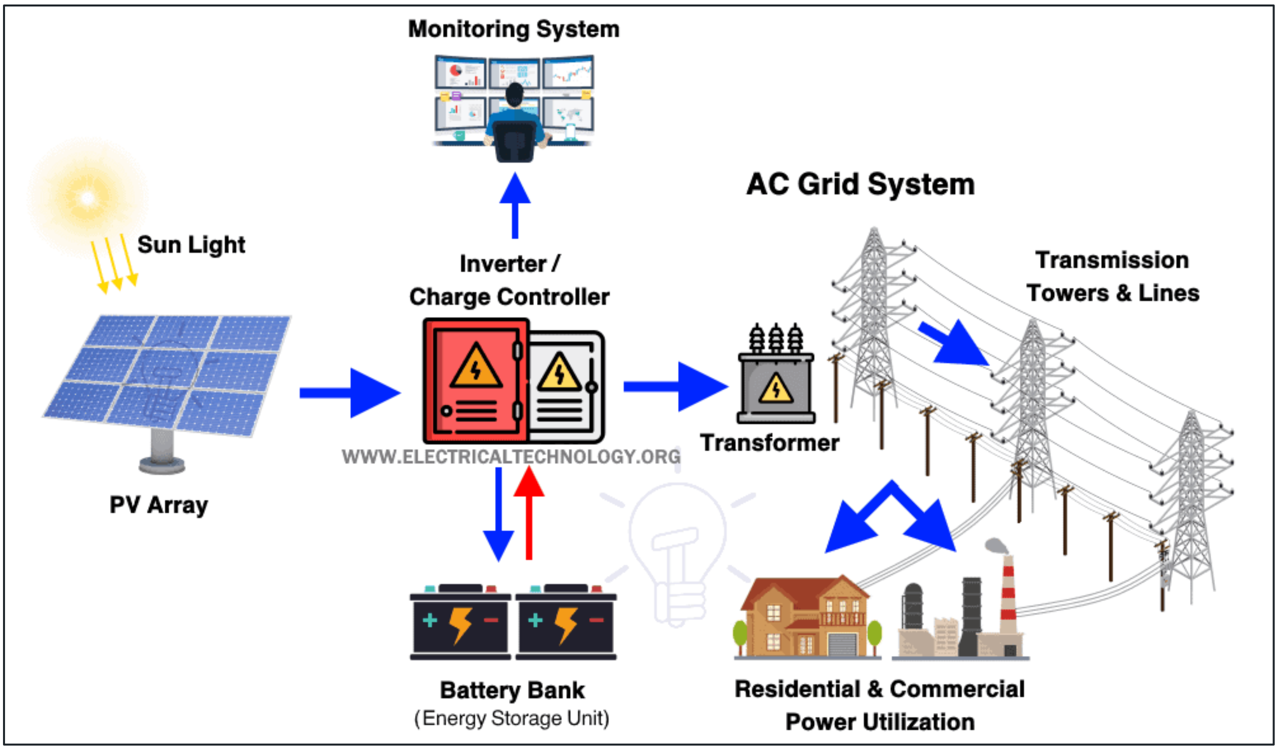


Figure 4-2 - Main components of a Solar PV Plant

Source: *www.electricaltechnology.org/2021/07/solar-power-plant.html*

4.3 BESS TECHNOLOGY

The Komati PV Facility project includes the development of a BESS. There is a growing need for renewable energy technologies, such as solar and wind, to be able to supply a reliable source of electricity to the grid. Energy storage systems capture surplus energy during times of high production/low demand and store it for use during times of low production/high demand. While not a new technology, energy storage is rapidly gaining traction as a way to provide a stable and consistent supply of renewable energy to the grid. The energy storage system of most interest to power producers is the BESS, as these facilities can be designed and constructed to be a standalone facility, charging and discharging from the electrical grid when the demand requires. Furthermore, BESS facilities can be integrated into renewable energy projects.

Being able to store excess energy is also a financial benefit to renewable energy producers. Instead of having to curtail production, at the request of the grid or utility, that curtailment can be stored. When production later goes down, that stored energy is available for sale to fill in the gaps.

4.3.1 BATTERY TYPES

The Proposed Project will utilize either of two BESS technology options; Lithium-ion batteries; or Vanadium Redox Flow Batteries (VRFB), and the different technology types are discussed below.

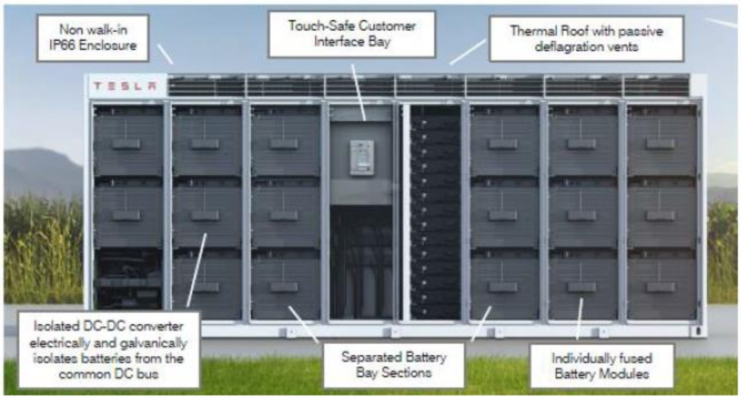
4.3.2 DESIGN OF THE LITHIUM-ION BATTERY FACILITY

In this design, the BESS will be made up of several liquid cooled Lithium-Ion batteries, due to them being a mature and safe technology with regard to being modular and easy to install and due to their technical characteristics, will work well as energy storage systems for solar facilities, as well as supporting grid stability.

The liquid cooled Lithium-Ion batteries consists of multiple battery cells that are assembled together to form modules. Each cell contains a positive electrode and a negative electrode. The BESS will comprise of multiple battery units or modules housed in shipping containers and/or an applicable housing structure which is delivered pre-assembled to the project site. Containers are usually raised slightly off the ground and layout out is rows. They can be stacked if required although this may increase the risk of events in one container spreading to another container.

Supplementary infrastructure and equipment may include substations, power cables, transformers, power converters, substation buildings & offices, HV/MV switch gear, inverters and temperature control equipment that may be positioned between the battery containers. The images in **Figure 4-3** are typical BESS installations. **Figure 4-4** and **Figure 4-5** show typical battery modules in the BESS facility.

Figure 4-3 – Images of Typical BESS Systems



Source – Tesla MegaPack – Safety Overview

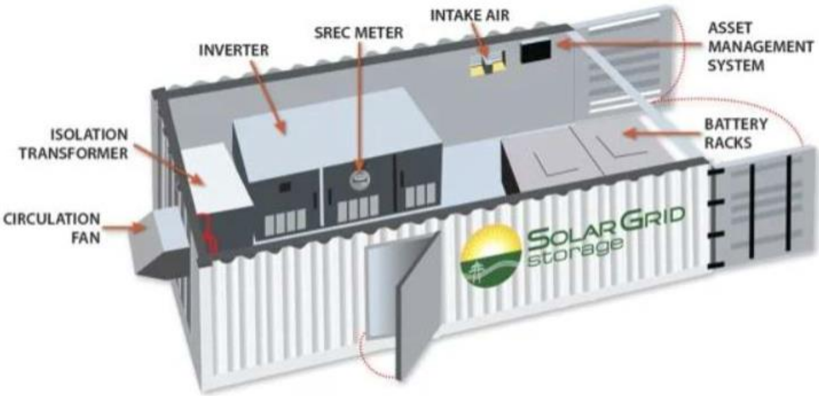


Figure 4-4 – Typical Battery Modules in a BESS with the Separated Sections

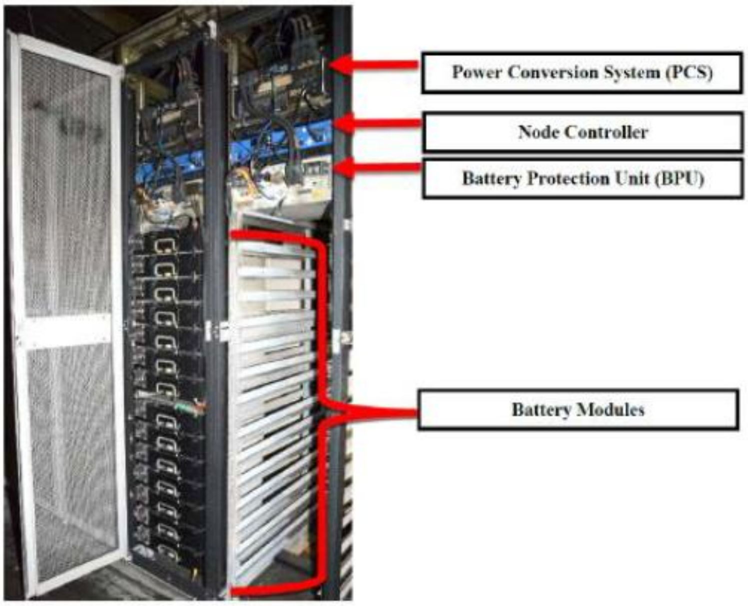


Figure 4-5 - Typical Battery Modules in a BESS with the Power Conversion Systems in the Batteries

4.3.3 DESIGN OF THE VANADIUM REDOX FLOW BATTERIES

In this design, VRFB's are a type of rechargeable battery that utilise a Vanadium electrolyte solution. They are unique in that they use Vanadium ions in different oxidation states (V2+ and V3+ for the negative electrode, V4+ and V5+ for the positive electrode) to store and release electrical energy. A single VRFB unit (**Figure 4-6**) comprises of a number of VRFB stacks, back cooler, flame arrestor, gas barriers, switch cabinets, pre-pressure tanks, electrolyte pumps and electrolyte tanks, additionally associated auxiliary transformers and an HV substation will be required.

The heart of a VRFB is the stack (**Figure 4-7**), which consists of multiple cells stacked on top of each other. Each cell consists of a positive and negative electrode compartment, separated by an ion exchange membrane. The positive and negative electrodes are made of carbon-based materials coated with a catalyst to facilitate the reaction with the vanadium ions.

When the VRFB is in use, the electrolyte solution is pumped from the storage tanks (**Figure 4-8**) through the stack, where the chemical reactions take place, producing electricity. The size of the stack and the number of cells depends on the desired capacity and power output of the battery.

One of the advantages of VRFBs is their scalability, as their capacity can be easily increased or decreased by simply adding or removing electrolyte solution. They also have a long cycle life and are able to maintain their capacity over many charge-discharge cycles.

Another advantage of VRFB stacks is their ability to operate at a constant voltage, which simplifies the power electronics required for the battery system. Additionally, because the chemical reactions take place outside the stack, there is no risk of cross-contamination between the electrolyte solutions, which improves the longevity and reliability of the battery.

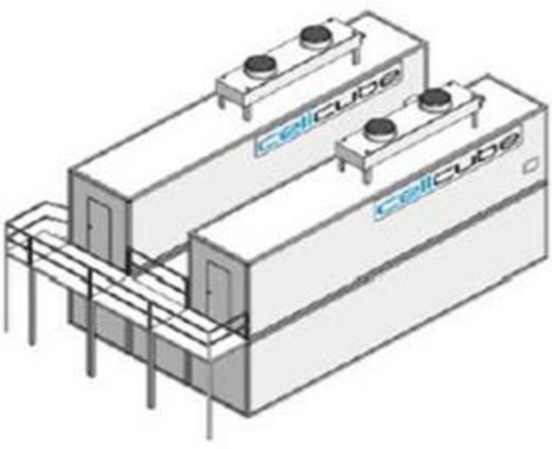


Figure 4-6 - A VRFB unit

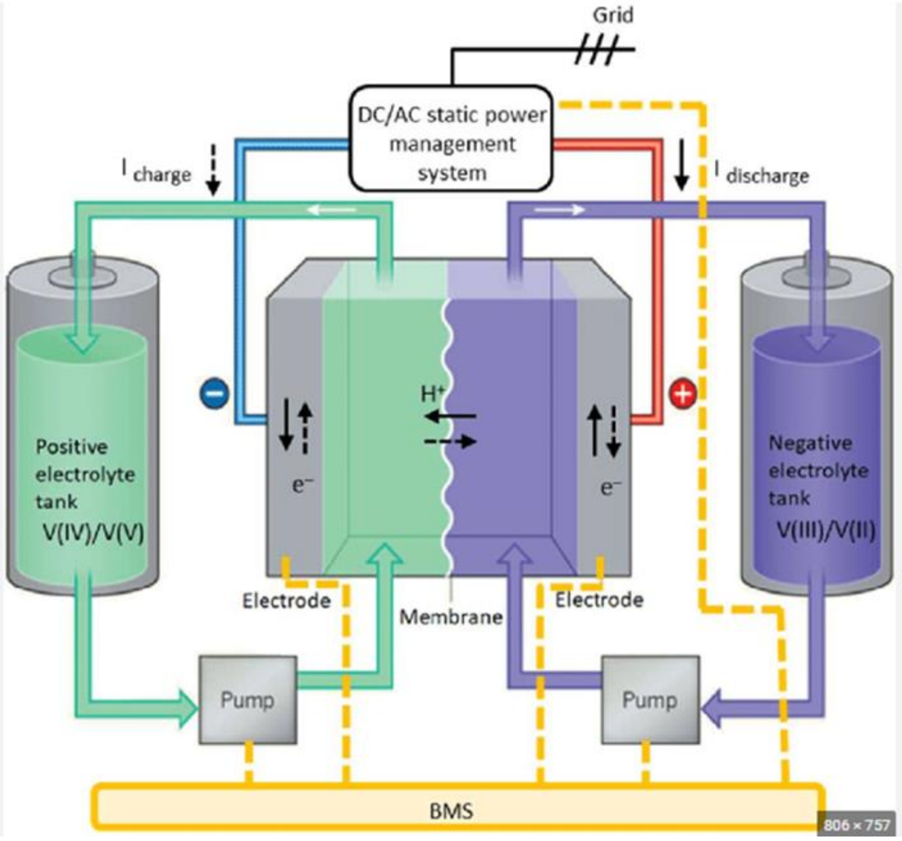


Figure 4-7 – VRFB stack

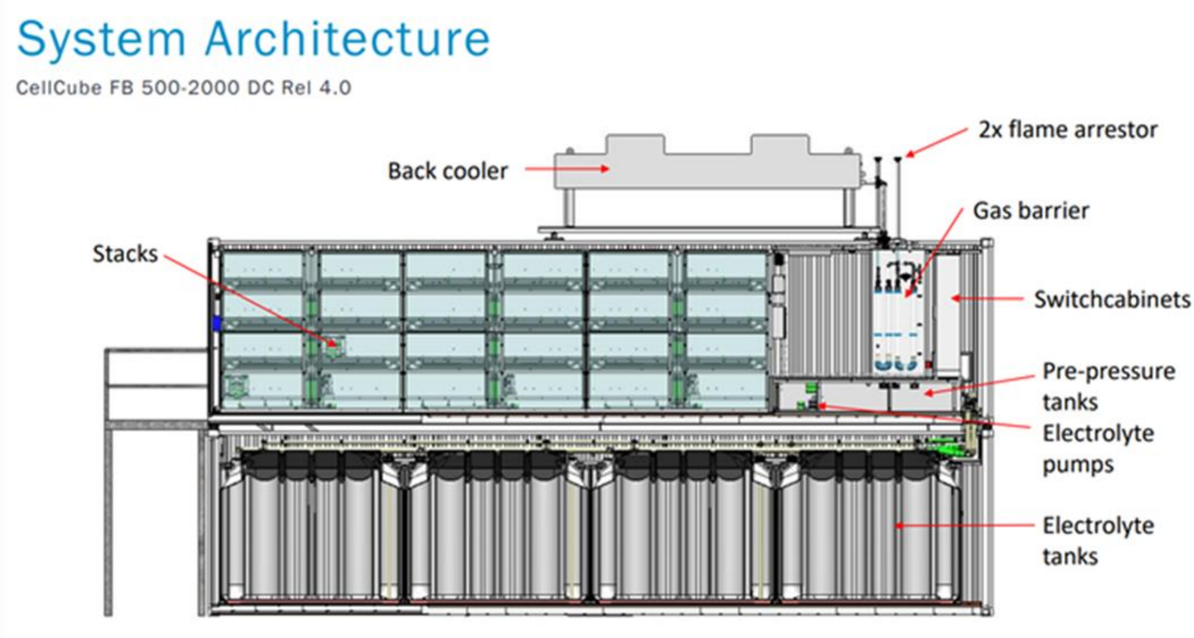


Figure 4-8 - Cross section of a VRFB unit indicating the stacks and electrolyte tanks

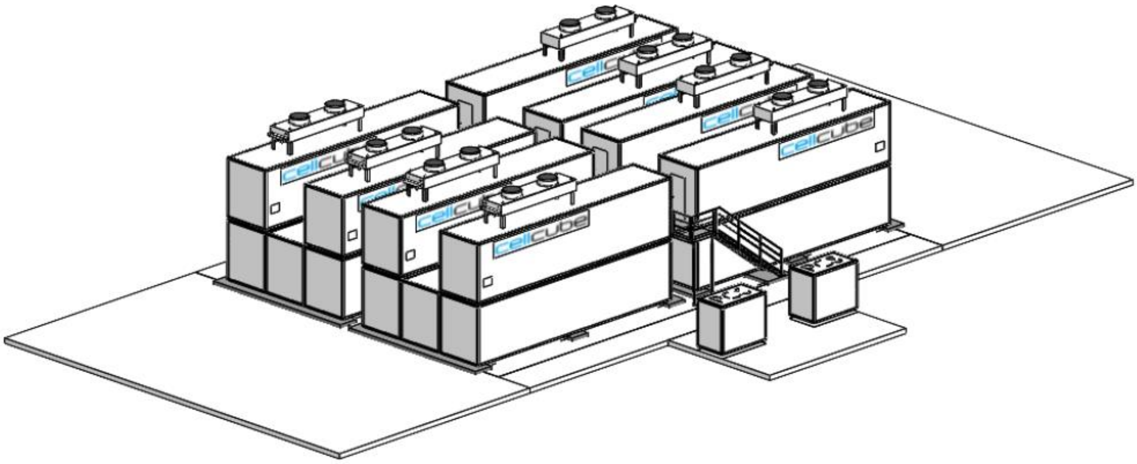


Figure 4-9 - Conceptual VRFB Facility Layout

4.3.4 COMPLIANCE WITH LOCAL AND INTERNATIONAL STANDARDS

The cells, modules, racks and the complete facility will be compliant with all local laws and regulations and health and safety requirements governing such battery facilities. Over and above that they will comply with international standards such as UN 38.3 (Transportation Testing for Lithium Batteries), UL 1642 (Standard for Safety – Lithium-ion Batteries) and IEC 62619 (Secondary cells and batteries containing alkaline or other non-acid electrolytes Safety requirements for secondary lithium cells and batteries, for use in industrial applications). Furthermore, the battery facility will also comply with standards such as UL 1973 (Batteries for Use in Stationary Applications) and IEC 62619-2017 including thermal runaway non-propagation and safety zone region operation limits and a failure mode analysis. The design will be compliant with UL 9540 (Energy Storage Systems and Equipment): this standard defines the safety requirements for battery installation in industrial and grid connected applications.

The stacks, electrolyte tanks, electrical and electronic components, and the complete VRFB facility will be compliant with all local laws and regulations and health and safety requirements governing such battery facilities.

4.4 PROJECT INFRASTRUCTURE

The proposed project will comprise the following key components:

- Solar Energy Facility;
- Grid Connection (i.e. powerlines);
- Site Substation and BESS; and
- Associated infrastructure.

These items are summarised in **Table 4-6** and discussed in more detail below. The SEF is intended to evacuate power to the grid. Part of the design development will be to determine the best option to charge the BESS, either with grid power or power generated from PV.

The current state of this report is based on conceptual design and detailed designs will be made available at a later stage that will be close to the concept design.

Table 4-6 – Key Project Infrastructure

Infrastructure	Description
Solar Energy Facility	▪ Solar Farm A: • Extent: 156 Ha • Buildable Area: 127 Ha • AC Capacity: Up to 70 MW • DC Capacity: Up to 84 MW ▪ Solar Farm B: • Extent: 54 Ha • Buildable Area: 50 Ha • AC Capacity: Up to 30 MW • DC Capacity: Up to 36 MW ▪ Solar modules will be elevated above the ground, and will be mounted on either fixed tilt systems or tracking system
Grid Connection (i.e. powerlines)	▪ Point of connection of Solar Panels will be to the Komati High Voltage (HV) yard. ▪ Power routed via a medium voltage overhead power line (OHPL) or underground cabling. ▪ Servitude of powerlines: • Between 36 and 40m • Area will be approximately 26ha ▪ Substations: • Each of the Solar Sites will be equipped with collector substations. • Infrastructure associated with the substations includes: – Operations and Maintenance (O&M) buildings housing the control and communication equipment – Access road infrastructure within the substation sites – Site substations and collector substations ▪ Site Access: • New access roads or tracks may be required to provide access to sections of the powerline route. • Access roads will be mostly a two-track gravel road under the OHPL in order to access pylons for construction and maintenance purposes.
Site Substation and BESS	▪ Three BESS facilities ▪ Footprints: Range from 2 ha up to 6 ha. ▪ BESS capacity: 150 MW with four hours standby time. ▪ Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies are being considered
Associated infrastructure	▪ Access roads; ▪ Perimeter roads; ▪ Below ground electrical cables;

Infrastructure	Description
	▪ Above ground overhead lines; ▪ Meteorological Station; ▪ O&M Building including control room, server room, security equipment room, offices, boardroom, kitchen, and ablution facilities); ▪ Spares Warehouse and Workshop; ▪ Hazardous Chemical Store; ▪ Security Building; ▪ Parking areas and roads; ▪ Temporary laydown areas; ▪ Temporary concrete batching plant ▪ Construction camps and temporary laydown areas; and ▪ Onsite substations.

4.4.1 SOLAR ENERGY FACILITY

The total site area for PV installation is approximately 200-250 hectares to allow for the construction of a PV facility with an AC capacity of up to 100 MW. Solar PV modules which convert solar radiation directly into electricity, will occupy a space of up to a total of approximately 720,000 m^2. The solar PV modules will be elevated above the ground, and will be mounted on either fixed tilt systems or tracking systems (comprised of galvanised steel and aluminium). The Solar PV modules will be placed in rows in such a way that there is allowance for a perimeter road and security fencing along the boundaries, and O&M access roads in between the PV module rows. **Table 4-7** provides a high-level project summary of the proposed Facilities. **Table 4-8** shows the approximate middle point coordinates of the Solar Facilities.

Table 4-7 – High-level Project Summary – Renewable Energy Facilities

	Solar Site A	Solar Site B
Extent	156 Ha	54 Ha
Buildable Area	127 Ha	50 Ha
AC Capacity	70MW	30 MW

Table 4-8 – Solar Facilities Approximate Central Coordinates

Point	Latitude	Longitude
PV Site A	26° 6'30.28"S	29°27'37.79"E
PV Site B	26° 5'44.86"S	29°27'13.29"E

4.4.2 GRID CONNECTION

The Solar Facilities will be allocated a point of connection to the Komati 275 kV High Voltage (HV) yard. Each of the Solar Sites will be equipped with collector substations that will the route the power output to the point of connection via a medium voltage OHPL or underground cabling. The method and final route to the points of connection will form part of the final designs. The existing Komati points of connections will be used with the existing infrastructure to connect to the Komati 275kV HV yard. The existing power evacuation infrastructure consist of step up transformers (140 megavolt Amperes (MVA)), surge arrestors, transmission lines, HV breakers and links to the 275kV busbar.

4.4.2.1 Servitude

The registered servitude will likely between 36 and 40m. The length of the transmission will be determined during the design stage. The servitude area will be approximately 26ha. The servitude is required to ensure safe construction, maintenance and operation of the powerline.

4.4.2.2 Substations

On site substations will be established within the extent of the Solar Site A and Solar Site B. The site itself is very homogenous and there are no significant features in the immediate vicinity of the substation location that might be affected by the development. The following infrastructure is proposed but will be confirmed during the design stage:

- O&M buildings housing the control and communication equipment;
- All the access road infrastructure within the substation sites; and
- Site substations and collector substations to consolidate and distribute power to the connection points.

4.4.2.3 Site Access

The project area and surrounding areas are already easily accessible due to existing access roads. New access roads or tracks may be required to provide access to sections of the powerline route. Access roads will be mostly a two-track gravel road under the OHPL in order to access pylons for construction and maintenance purposes. The width of the access roads will be determined during the design phase.

4.4.3 BESS

Eskom proposes to establish three BESS facilities with the existing footprint of the Komati Power Station.

The BESS footprints will range from 2 ha up to 6 ha, depending on design and optimisation of the site and technology selected. The BESS capacity is envisaged to be 150 MW with four hours standby time.

It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology however the specific technology will only be determined following Engineering, Procurement, and Construction (EPC) procurement. The main components of the BESS include the batteries, power conversion system and transformer which will all be stored in various rows of containers. The BESS components will arrive on site pre-assembled. **Table 4-9** shows the approximate middle point coordinates of the BESS facilities.

Table 4-9 – BESS Facilities Approximate Central Coordinates

Point	Latitude	Longitude
BESS Site A	26° 5'14.82"S	29°28'15.73"E
BESS Site B	26° 5'31.37"S	29°28'35.66"E
BESS Site C	26° 5'28.27"S	29°28'7.83"E

4.4.4 ANCILLARY INFRASTRUCTURE

The additional ancillary infrastructure will be confirmed once the Conceptual Design is complete, however, it is anticipated that the following will be applicable:

- Access roads;
- Perimeter roads;
- Below ground electrical cables;
- Above ground overhead lines;
- Meteorological Station;
- O&M Building including control room, server room, security equipment room, offices, boardroom, kitchen, and ablution facilities);
- Spares Warehouse and Workshop;
- Hazardous Chemical Store;
- Security Building;
- Parking areas and roads;
- Temporary laydown areas;
- Temporary concrete batching plant
- Construction camps and temporary laydown areas; and
- Onsite substations.

4.5 PROJECT ACTIVITIES

The construction process will follow industry standard methods and techniques. Key activities associated with the construction phase are described in **Table 4-10**.

Table 4-10 – Construction Activities

Activity	Description
Establishment access and internal roads	Internal gravel roads will be developed. The roads will be approximately 8m wide and may require widening to ensure that it is suitable for use.
Site preparation and establishment	Site establishment will include clearing of vegetation and any bulk earthworks that may be required. The temporary laydown area will be constructed, including establishment of the construction camp (temporary offices, storage containers, concrete batching plant etc). The site laydown areas are expected to occur within the footprint of Site A and Site B. Site establishment will also entail the installation and/or connection of services (sanitation, electricity etc).
Transport of components and equipment to site	All construction material (i.e. PV support structure materials), machinery and equipment (i.e. graders, excavators, trucks, cement mixers etc.) will be transported to site utilising the national, regional and local road network. Large components (such as substation transformers) may be defined as abnormal loads in terms of the Road Traffic Act (No. 29 of 1989). In such cases a permit may be required for the transportation of these loads on public roads.
Establishment of a laydown area on site	Construction materials, machinery and equipment will be kept at relevant laydown and/or storage areas. A laydown area of approximately 2ha has been proposed for this project. The laydown area will also be utilised for the assembly of the PV panels. The laydown area will limit potential environmental impacts associated with the construction phase by limiting the extent of the activities to one designated area.
Erection of PV Panels	The PV panels will be arranged in arrays. The frames will be fixed onto vertical posts that will be driven into ground utilising the relevant foundation method identified during the geotechnical studies, including potentially employing concrete foundations for the panel frames. PV panels will have a maximum height of 5m.
Construction of substation and inverters	The facility output voltage will be stepped up from medium voltage to high voltage in the transformer. The medium voltage cables will be run underground in the facility (except where a technical assessment suggest that overhead lines are applicable) to a common point before being fed to the onsite substation.
Establishment of ancillary infrastructure	Ancillary infrastructure will include a workshop, storage areas, office and a temporary laydown area for contractor's equipment.
Rehabilitation	Once all construction is completed on site and all equipment and machinery has been removed from the site, the site will be rehabilitated.

4.5.1 OPERATIONAL PHASE

During operation the key activities will include inspection and maintenance of the solar panels, substations, BESS, and other associated infrastructure.

4.5.2 DECOMMISSIONING PHASE

The decommissioning phase will include activities similar to that of the construction phase as indicated in **Table 4-10.**

4.6 NEED AND DESIRABILITY OF THE PROJECT

South Africa is faced with significant increases in electricity demand and a shortage in electricity supply. South Africa is the seventh largest coal producer in the world, with approximately 82% of the country's electricity generated from coal. This large dependence on coal and its use has also resulted in a variety of negative environmental impacts, including the contribution to climate change. South Africa is also the highest emitter of GHGs in Africa; attributed to the country's energy-intensive economy that largely relies on coal-based electricity generation.

At the United Nations Framework Convention on Climate Change COP26 in November 2021, the governments of South Africa, with France, Germany, the United Kingdom, the United States of America, and the European Union – together forming the International Partners Group (IPG) – announced a new ambitious, long-term Just Energy Transition Partnership (JETP) to support the South Africa's decarbonisation effort in the context of domestic climate policy, including transitioning its economy towards cleaner energy sources. A distinguishing feature of the JETP is its emphasis on the centrality of a just transition in the structuring of the investment plan and financing package.

The JETP is a pathbreaking initiative and the first of its kind. It is long-term and ambitious in its aspiration to support South Africa's pathway to a low carbon economy and climate resilient society; to accelerate the just transition and the decarbonisation of the electricity system (including rehabilitation and repurposing of mines); and to support the development of new economic opportunities such as green hydrogen and electric vehicles amongst other interventions to support South Africa's shift towards a greener future (Source: https://ukcop26.org/six-month-update-on-progress-in-advancing-the-just-energy-transition-partnership-jetp/).

The EJETP aligns to international and national requirements to address climate change and move toward the use of cleaner technologies for the supply of electricity. JETP's vision focuses on achieving "Net Zero" carbon emissions by 2050, with an increase in sustainable jobs. Some of the additional benefits of moving towards lower carbon technologies, is the positive impact on air quality and water usage, the potential to create exciting new jobs, and a greater preservation of biodiversity in South Africa.

Over the next decade, more than half of the coal-fired power stations will be shut down, including Komati Power Station. While this will result in a lower impact on the environment, the shutdown of power stations will potentially lead to negative social impacts. The EJETP is aimed at, as far as possible, ensuring that the transition to cleaner technologies and the closure of power stations is carried out in a just way. The repurposing and repowering of Komati Power Station to utilise renewable energy is part of the EJETP.

Renewable energy development is regarded as an important contribution to meeting international and national targets of reducing reliance on fossil fuels, such as coal, which contribute towards GHG emissions and resultant climate change. The need and desirability of proposed Komati SEF and BESS project has been considered from an international, national and regional perspective.

4.6.1 INTERNATIONAL PERSPECTIVE

The proposed project will align with internationally recognised and adopted agreements, protocols and conventions. This includes the Kyoto Protocol (1997) which calls for countries internationally to reduce their GHG emissions through cutting down on their reliance on fossil fuels and investing in renewable energy technologies for electricity generation.

South Africa is also signatory to the United Nations' Development Programmes' (UNDP) Sustainable Development Goals (SDGs), particularly SGD 7 relating to affordable and clean energy. The proposed SEF qualifies as a clean technology that will generate 100MW of affordable energy to contribute to South Africa's energy mix.

The project will also greatly contribute to the countries' efforts to reduce their carbon emissions and play their role as part of the Paris Climate Accord. The Paris Agreement is a legally binding international treaty signed by 196 countries at the COP 21 in Paris, on the 12th of December 2015 to combat climate change. The goal of the Paris Accord is to limit global warming to well below 2 degrees Celsius, compared to industrial levels to avoid catastrophic natural disasters which are driven by the global temperature increase. Therefore, to achieve this long-term temperature goal, countries aim to reach global peaking of GHG emissions as soon as possible to achieve a climate-neutral world by 2050.

The authorisation of the Project will further align with South Africa's National Climate Response White Paper which outlines the countries efforts to manage the impacts of climate change and to contribute to the global efforts to stabilize the GHG concentrations in the atmosphere.

4.6.2 NATIONAL PERSPECTIVE

The proposed project will pave the way for the Just Energy Transition (JET) in South Africa and promote the transition from a fossil fuel-based economy to a low carbon economy. The proposed project is part of the EJETP for the repowering and repurposing of coal fired power stations which will come to the end of life in the next decade. Komati power station being the first power station to shut down in September 2022. This project will also contribute the introduction of cleaner technologies for the supply of electricity.

In terms of policy, the South African Government, through the IRP, has set a target to secure 17 800 MW of renewable energy by 2030. This is an effort to diversify the country's energy mix in response to the growing electricity demand and promote access to clean sources of energy.

The NDP is aimed at reducing and eliminating poverty in South Africa by 2030. The NDP also outlines the need to increase electricity production by 2030, with 20 000 MW of electricity capacity generated from renewable sources in order to move to less carbon-intensive electricity production. The Plan also envisages that South Africa will have an energy sector that provides reliable and efficient energy service at competitive rates, while supporting economic growth through job creation.

The authorisation of the proposed project will further align with South Africa's National Climate Response White Paper which outlines the countries efforts to manage the impacts of climate change and to contribute to the global efforts to stabilise the GHG concentrations in the atmosphere.

The proposed project will also aid in overcoming the power shortages that are currently faced in the country. Over the years, the construction of SEFs has become cheaper, and less time-consuming. Thus, acting as a faster and more efficient method of meeting the ever-growing demand for electricity in the country.

In addition, the Council for Scientific and Industrial Research (CSIR) reported that renewable energy assisted in relieving pressure on the constrained South African power system during load shedding in the first quarter of 2019. This indicates that renewable energy is a key factor in ensuring that the country does not face further load shedding in the future.

4.6.3 REGIONAL AND LOCAL PERSPECTIVE

4.6.3.1 Just Energy Transition

Coal power stations and the coal mining industry play a vital component in the economic and social components of the local Mpumalanga economy. Shifting to a low carbon economy will thus need to offset or exceed the benefits being realised by fossil fuels in the province. Thus, a key factor to ensuring the success of the JET is not only to focus on the transition from fossil fuels to renewable energy resources but to simultaneously ensure that the power stations are repurposed to achieve a just process in Mpumalanga through new infrastructure and the Just Transition of jobs and skills.

4.6.3.2 Multiple Land Use

Unlike opencast coal mining within the broader Komati study area, the Project facilitates multiple land use functions within the development area. As solar modules are clustered on surface developments, this allows multiple land use functions. This will boost the economic activities in the area which will in turn increase job opportunities in that area and help improve the local community's welfare without jeopardising the environment.

4.6.3.3 Desirability of the Project Site

Four of Eskom's coal-fired power stations have been targeted for decommissioning in the short term: Komati, Camden, Grootvlei, and Hendrina. Eskom is looking to decommission 5 400MW of electricity from coal generation by the year 2022, increasing to 10 500MW by 2030, 22 000MW by 2035 and 35 000MW by 2050. Simultaneously Eskom has been looking at options for repurposing these power stations with the core aims of reusing existing power transmission infrastructure, developing new generation capacity, providing ancillary services, and mitigating socio-economic impact. This project is one of several initiatives in which Eskom proposes.

5 PROJECT ALTERNATIVES

The EIA Regulations of 2014 (as amended) require that the S&EIA process must identify and describe alternatives to the proposed activity that were considered, or motivation for not considering alternatives. Different types or categories of alternatives could be considered including different locations, technology types, and project layouts. At the scoping level the evaluation of alternatives is provided at a high level in the absence of detailed environmental comparators for each alternative; due to the two-staged nature of the S& EIA process it is more suitable to identify and describe the potential alternatives on a high-level basis within scoping, and to perform a more detailed analysis of alternatives (with environmental comparators) in the EIA phase of the project. As such, the S&EIA will holistically assess the impacts and risks of each alternative comparatively, as suggested by Appendix 2 of the EIA Regulations of 2014 (as amended).

All alternatives outlined below are considered both feasible and reasonable. Extensive consideration of alternatives and avoidance of impacts took place in the screening/design phase. This is discussed in detail in the section below.

5.1 LOCATION ALTERNATIVES

The selection of the location of the proposed project is based on the outcome of a feasibility assessment by the proponent, which inter alia served to identify site options that would be optimal for energy production and grid interconnection. The proposed site was selected because it is strategically located due to the following factors

- Proximity to the Komati Power Station:
  - The proposed project location is adjacent to the Komati Power Station which has reached its end of life and is currently undergoing decommission. The Komati Power Station is being repurposed to use renewable energy (solar and wind).
  - The proposed SEF requires connection to the Eskom grid to transmit the generated electricity. As such, the location of the facility would benefit from being close to the existing grid connection at the Komati Power Station. Furthermore, the location and proximity of the site to the Komati Power Station reduces environmental impacts associated with long connection lines.
- Land Availability:
  - The availability of land is a key feasibility criterion in the site selection process. The project site is of a suitable land size for the proposed development. The land available for the development of the Komati SEF is approximately XX ha. The land is owned by Eskom and there are no citizens living on the land therefore relocation of communities would not be required.
- Road and labour pool accessibility:
  - The site is in close proximity to the R542 and R36 highways and 37km from Middelburg, 43km from Bethal and 40km from Witbank, which will benefit construction logistics and provide a labour resource respectively. The project area and surrounding areas are already easily accessible due to existing access roads.

- Environment:
  - The environment is a key factor when it comes to the development of its projects. The proponent aims to ensure that its projects are developed in a sustainable manner. All the environmental factors were considered in the area when Eskom was scoping for potential sites for the Project. The area selected is already disturbed and thus, it was concluded that the development of SEF would have a minimal impact on the region's flora, fauna and water resources.

The site is considered suitable and the investigation of an alternative site is not currently proposed within this S&EIA.

5.2 TECHNOLOGY ALTERNATIVES

The project is utilising solar and BESS technology; therefore, no other technology alternatives are being considered for this project. Wind technology is being considered as a separate additional project at the Komati Power Station footprint.

5.2.1 SOLAR TECHNOLOGY ALTERNATIVES

The project is utilising solar technology to generate power. Therefore, no other renewable energy technology alternatives are being considered for this project. Wind technology is being considered as a separate additional project at the Komati Power Station footprint. The motivation for the use of solar PV technology for this project is provided below.

Solar Resource

The Project site was also selected on the availability of solar resource in the Mpumalanga region. The availability of the solar resource is the main drivers of project viability. The Project site was identified by the proponent through a desktop pre-feasibility analysis based on the estimation of the solar energy resource. The site location provides sufficient solar resource to ensure the economic viability of a solar PV facility. This viable solar resource ensures the best value for money is gained from the project, allowing for competitive pricing and maximum generation potential, with the resulting indirect benefits for the South African economy. Furthermore, within the proposed Project site the proponent has also identified a suitable area to develop a complementary wind facility that will assist to balance the supply of electricity.

Topography

The surrounding landscape has a relatively flat topography which is suitable for the development of a solar project. The Project site itself is located on the flattest ground near the Komati Power Station and thus in combination with suitable solar resource within the study area is optimized from a construction and technical perspective.

5.2.2 BESS TECHNOLOGY ALTERNATIVES

With regards to the BESS, Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered during the assessment however the specific technology will only be determined following EPC procurement. Therefore, both technologies are currently being considered.

5.2.2.1 Liquid-cooled Lithium-Ion

In this design, the BESS will be made up of several liquid cooled Lithium-Ion batteries, due to them being a mature and safe technology with regard to being modular and easy to install and due to their technical characteristics, will work well as energy storage systems for solar facilities, as well as supporting grid stability.

The liquid cooled Lithium-Ion batteries consists of multiple battery cells that are assembled together to form modules. Each cell contains a positive electrode and a negative electrode. The BESS will comprise of multiple battery units or modules housed in shipping containers and/or an applicable housing structure which is delivered pre-assembled to the project site. Containers are usually raised slightly off the ground and layout out is rows. They can be stacked if required although this may increase the risk of events in one container spreading to another container.

Supplementary infrastructure and equipment may include substations, power cables, transformers, power converters, substation buildings & offices, HV/MV switch gear, inverters and temperature control equipment that may be positioned between the battery containers. The images in **Figure 4-3** are typical BESS installations. **Figure 4-4** and **Figure 4-5** show typical battery modules in the BESS facility.

5.2.2.2 VRFB

In this design, VRFB's are a type of rechargeable battery that utilise a Vanadium electrolyte solution. They are unique in that they use Vanadium ions in different oxidation states (V^{2+} and V^{3+} for the negative electrode, V^{4+} and V^{5+} for the positive electrode) to store and release electrical energy. A single VRFB unit (**Figure 4-6**) comprises of a number of VRFB stacks, back cooler, flame arrestor, gas barriers, switch cabinets, pre-pressure tanks, electrolyte pumps and electrolyte tanks, additionally associated auxiliary transformers and an HV substation will be required.

The heart of a VRFB is the stack (**Figure 4-7**), which consists of multiple cells stacked on top of each other. Each cell consists of a positive and negative electrode compartment, separated by an ion exchange membrane. The positive and negative electrodes are made of carbon-based materials coated with a catalyst to facilitate the reaction with the vanadium ions.

When the VRFB is in use, the electrolyte solution is pumped from the storage tanks (**Figure 4-8**) through the stack, where the chemical reactions take place, producing electricity. The size of the stack and the number of cells depends on the desired capacity and power output of the battery.

One of the advantages of VRFBs is their scalability, as their capacity can be easily increased or decreased by simply adding or removing electrolyte solution. They also have a long cycle life and are able to maintain their capacity over many charge-discharge cycles.

Another advantage of VRFB stacks is their ability to operate at a constant voltage, which simplifies the power electronics required for the battery system. Additionally, because the chemical reactions take place outside the stack, there is no risk of cross-contamination between the electrolyte solutions, which improves the longevity and reliability of the battery.

5.3 LAYOUT ALTERNATIVES

The process undertaken for this project is an iterative design process whereby through various assessment phases and iteratively updating the site sensitivities to avoid environmental features (as outlined within **Section 8.2**) the site boundaries were determined. The solar field layout was also updated to accommodate the wind turbines being considered within the project site as part of a separate application.

Four alternatives layouts for the BESS facilities were investigated during the scoping phase. BESS D has since been removed as an option as it was located within the coal stockyard of the Komati Power Station and would require an extensive decommissioning process. BESS A, BESS B and BESS C is being taken forward and will require EA.

The original site layout that was presented in the Scoping Report is indicated in **Figure 5-1** and the revised site layout for consideration in this EIA is presented in **Figure 5-2**.

Figure 5-1 – Komati Solar PV and BESS Facility Previous Layout

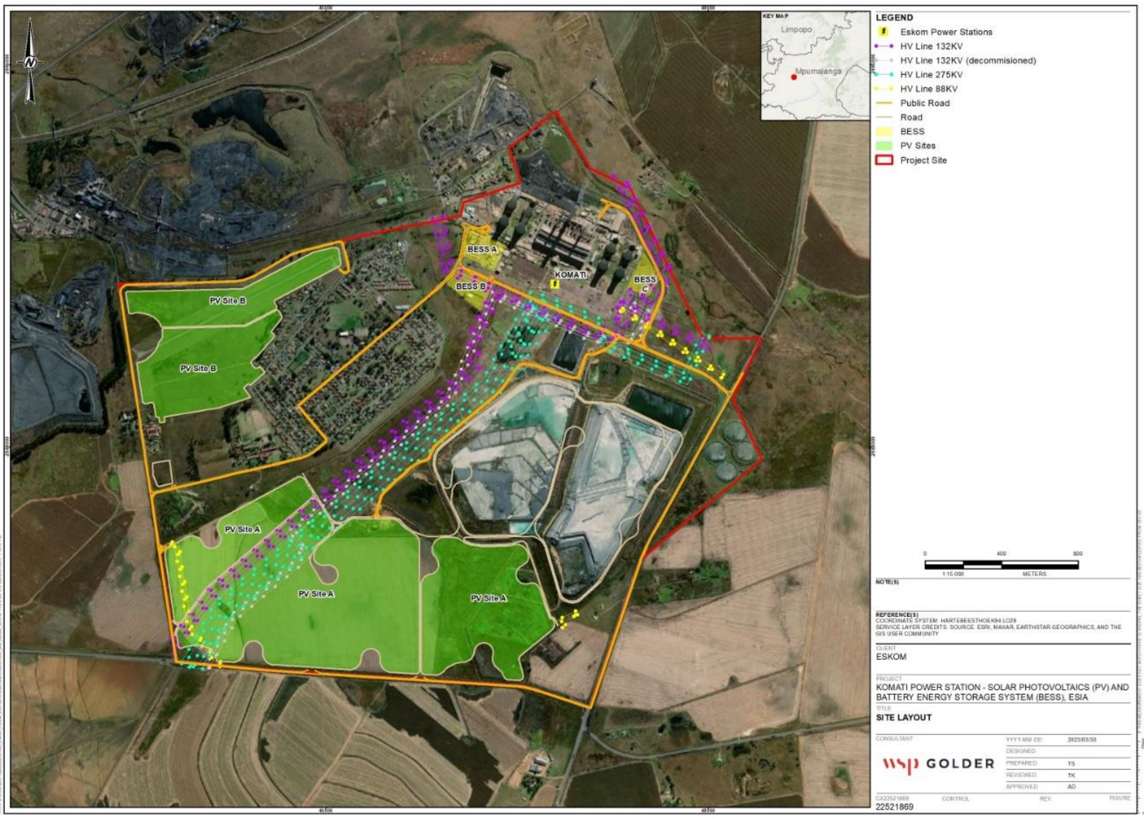


Figure 5-2 – Komati Solar PV and BESS Facility Current Layout

5.4 NO-GO ALTERNATIVE

In the "no project" alternative, the proposed project will not be developed. In this scenario, there could be a missed opportunity to address the need for a just transition within the Province and Nationally. This project will also support the need to increase renewable energy generation in an effort to mitigate against concerns of climate change and exploitation of non-renewable resources. The no-go alternative would not assist in responding to the growing electricity demand in South Africa and would not contribute to the reliability of electricity supply at a national scale.

The proposed project is to assist with the repurposing of the Komati Power Plant. The "no project" alternative would result in the entire power station being dismantled without creating new infrastructure and repurposing of the plant.

Without implementing this project, the use of renewable options for power supply would be compromised in the future, potentially leading to significant negative impacts on environmental and social well-being. Therefore, the No-Go option is not considered a feasible choice for this proposed project.

5.5 ALTERNATIVES ASSESSMENT SUMMARY

A summary of the project alternatives considered in terms of activity, technology, location and layout that were considered as part of the EIA Process are included in **Table 5-1**.

Table 5-1 – Alternatives summary

Alternative Type	Preferred Alternative	Comment
Location Alternative	N/A	The site is considered suitable and the investigation of an alternative site is not currently proposed.
Technology Alternative - Solar	N/A	No other technology alternatives are being considered for this project. Wind technology is being considered as a separate additional project at the Komati Power Station footprint.
Technology Alternative - BESS	N/A	Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered during the assessment however the specific technology will only be determined following EPC procurement. No other BESS technology is being considered for this project..
Layout	BESS A, BESS B and BESS C	Four alternative layouts for the BESS facilities were investigated during the scoping phase. BESS D has since been removed as an option as it was located within the coal stockyard of the Komati Power Station and would require an extensive decommissioning process. BESS A, BESS B and BESS C is being taken forward and will require EA.
Layout	Solar field	The solar field layout was revised after the scoping phase to avoid sensitive environmental features and to accommodate the wind turbines being considered within the project site as part of a separate application.

6 GOVERNANCE FRAMEWORK

6.1 NATIONAL LEGAL AND REGULATORY FRAMEWORK

The South African regulatory framework establishes well-defined requirements and standards for environmental and social management of industrial and civil infrastructure developments. Different authorities at both national and regional levels carry out environmental protection functions. The applicable legislation and policies are shown in **Table 6-1**.

Table 6-1 – Applicable National Legislation

Legislation	Description of Legislation and applicability
The Constitution of South Africa (No. 108 of 1996)	The Constitution cannot manage environmental resources as a stand-alone piece of legislation hence additional legislation has been promulgated in order to manage the various spheres of both the social and natural environment. Each promulgated Act and associated Regulations are designed to focus on various industries or components of the environment to ensure that the objectives of the Constitution are effectively implemented and upheld in an on-going basis throughout the country. In terms of Section 7, a positive obligation is placed on the State to give effect to the environmental rights.
National Environmental Management Act (No. 107 of 1998)	In terms of Section 24(2) of the NEMA, the Minister may identify activities, which may not commence without prior authorisation. The Minister thus published GNR 983 (as amended) (Listing Notice 1), GNR 984 (as amended) (Listing Notice 2) and GNR 985 (as amended) (Listing Notice 3) listing activities that may not commence prior to authorisation. The regulations outlining the procedures required for environmental authorisation (EA) are published in the EIA Regulations of 2014 (GNR 982) (as amended). Listing Notice 1 identifies activities that require a basic assessment (BA) process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. Listing Notice 2 identifies activities that require an S&EIR process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. Listing Notice 3 identifies activities within specific areas that require a BA process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. WSP undertook a legal review of the listed activities according to the proposed project description to conclude that the activities listed in in this section are considered applicable to the development: An S&EIR process must be followed. An EA is required and will be applied for with the DFFE as the CA.
Listing Notice 1: GNR 983	**Activity 11(i)** The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts **Description** The Komati Solar PV facility will require more than 33 kilovolt (kV) but less than 275 kV Powerline boards (to evacuate power to the grid) and to the BESS facilities. The transmission lines are outside of the urban edge.

Legislation	Description of Legislation and applicability
	Activity 12(ii) The development of - (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (a) within a watercourse; **Description:** Internal access roads will be required for access to the Facility. The physical footprint of internal access roads and electrical cabling required to connect the various components of the Facilities will either traverse the delineated watercourses on site, or be located within 32m of the outer extent of the delineated watercourses on site. The access roads will fall within the solar PV development areas.
	Activity 14 The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. **Description:** The proposed BESS facilities will potentially result in the handling of between 80 and 500 cubic metres of dangerous goods. This activity will only be applicable in the event that the BESS facilities are assembled on site. This is currently unknown. The Facility will also require storage and handling of dangerous goods, including fuel, cement and chemical storage onsite, that will be greater than $80m^3$ but not exceeding $500m^3$.
	Activity 19 The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse. **Description:** The proposed infrastructure, with specific reference to access roads and the grid infrastructure, will require the removal of soil more than 10 cubic metres from a watercourse.
	Activity 24 (ii) The development of a road— (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres. **Description:** The proposed access roads for the Solar facility will be 8 metres wide.
Listing Notice 2: GNR 983	**Activity 1** The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or

Legislation	Description of Legislation and applicability
	more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs — (a) within an urban area. **Description:** Eskom is proposing the establishment of a solar electricity generating facility and ancillary infrastructure as part of its repurposing programme for Komati Power Station. The plan is to install 100MW of Solar PV and 150MW of BESS.
	Activity 15(ii) The clearance of an area of 20 hectares or more of indigenous vegetation. **Description:** The proposed solar generating facilities will require the clearance of vegetation between 200 and 250 ha.
Listing Notice 3: GNR 985	**Activity 4** The development of a road wider than 4 metres with a reserve less than 13,5 metres. f. Mpumalanga i. Outside urban areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. **Description:** The proposed access roads for the Solar facility will potentially be less than 13.5 metres wide within a critical biodiversity area (CBA).
	Activity 10 The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. f. Mpumalanga i. Outside urban areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. **Description:** The proposed BESS facilities will potentially result in the handling of between 80 and 500 cubic metres of dangerous goods. This activity will only be applicable in the event that the BESS facilities are assembled on site. This is currently unknown. The Facility will also require storage and handling of dangerous goods, including fuel, cement and chemical storage onsite, that will be greater than $80m^3$ but not exceeding $500m^3$.

Legislation	Description of Legislation and applicability
	Activity 12 The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. f. Mpumalanga ii. Within critical biodiversity areas identified in bioregional plans. **Description:** The total footprint to be cleared is between 200 and 250 ha. The approximate extent of loss for the Natural Habitats is 484 300 m^2.
Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes (GNR 320, 20 March 2020 and GNR 1150, 30 October 2020)	The protocols provide the criteria for specialist assessment and minimum report content requirements for impacts for various environmental themes for activities requiring environmental authorisation. The protocols replace the requirements of Appendix 6 of the EIA Regulations, 2014, as amended. The assessment and reporting requirements of the protocols are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (screening tool). The following environmental themes were applicable to the Komati Solar PV and BESS project: ▪ Agricultural Theme ▪ Animal Species Theme ▪ Aquatic Biodiversity Theme ▪ Archaeological and Cultural Heritage Theme ▪ Avian Theme ▪ Civil Aviation (Solar PV) Theme ▪ Defence Theme ▪ Landscape (Solar) Theme ▪ Palaeontology Theme ▪ Plant Species Theme ▪ Radio Frequency Interference (RFI) Theme ▪ Terrestrial Biodiversity Theme
National Environmental Management: Waste Act (59 of 2008) (NEM:WA)	This Act provides for regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation. The Act also provides for the licensing and control of waste management activities through GNR. 921 (2013): List of Waste Management Activities that Have, or are Likely to Have, a Detrimental Effect on the Environment. The proposed project does not constitute a Listed Activity requiring a Waste Management Licence as defined in GNR 921. However, the contents of this Scoping Report will include reasonable measures for the prevention of pollution and good international industry practice.
National Environmental Management: Biodiversity Act,	The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) was promulgated in June 2004 within the framework of NEMA to provide for the management and conservation of national biodiversity. The NEMBA's primary aims are for the protection of species and

Legislation	Description of Legislation and applicability
2004 (Act No. 10 of 2004)	ecosystems that warrant national protection, the sustainable use of indigenous biological resources, the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources. In addition, the NEMBA provides for the establishment and functions of a South African National Biodiversity Institute (SANBI). SANBI was established by the NEMBA with the primary purpose of reporting on the status of the country's biodiversity and conservation status of all listed threatened or protected species and ecosystems. The Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA) Regulations with regards to alien and invasive species (AIS) have been superseded by the National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) –AIS Regulations which became law on 1 October 2014. Specific management measures for the control of alien and invasive plants have been included in the Environmental Management Plan (EMP).
National Environmental Management Protected Areas Act (No. 57 of 2003)	The purpose of the National Environmental Management Protected Areas Act (No. 57 of 2003) (NEMPAA) is to, inter alia, provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. To this end, it provides for the declaration and management of various types of protected areas. *Section 50(5) of NEMPAA states that "no development, construction or farming may be permitted in a nature reserve or world heritage site without the prior written approval of the management authority."* According to the National Parks Area Expansion Strategy (NPAES), there are no areas within the study area that have been identified as priority areas for inclusion in future protected areas. The study area is therefore outside the NPAES focus area.
The National Water Act (No. 36 of 1998)	The National Water Act, 1998 (Act No. 36 of 1998) (NWA) provides the framework to protect water resources against over exploitation and to ensure that there is water for social and economic development, human needs and to meet the needs of the aquatic environment. The Act defines water source to include watercourses, surface water, estuary or aquifer. A watercourse is defined in the Act as a river or spring, a natural channel in which water flows regularly or intermittently, a wetland, lake or dam into which or from which water flows, and any collection of water that the Minister may declare a watercourse. Section 21 of the Act outlines a number of categories that require a water user to apply for a Water Use Licence (WUL) and Section 22 requires water users to apply for a General Authorisation GA with the DWS if they are under certain thresholds or meet certain criteria. The list of water uses applicable to the proposed Project include: (c) Impeding or diverting the flow of water in a watercourse; (i) Altering the bed, banks, course or characteristics of a watercourse; The DWS will make the final decision on water uses that are applicable to the project through a pre-application meeting after which a WUL Application as determined by the risk assessment will be undertaken in compliance with procedural regulations published by the DWS within General Notice 267 (GN267). These regulations specify required information per water use and the reporting structure of required supporting technical information.

Legislation	Description of Legislation and applicability
The National Heritage Resources Act (No. 25 Of 1999)	The National Heritage Resource Act (Act No. 25 of 1999) (NHRA) serves to protect national and provincial heritage resources across South Africa. The NHRA provides for the protection of all archaeological and palaeontological sites, the conservation and care of cemeteries and graves by the SAHRA, and lists activities that require any person who intends to undertake to notify the responsible heritage resources agency and furnish details regarding the location, nature, and extent of the proposed development. Part 2 of the NHRA details specific activities that require a Heritage Impact Assessment that will need to be approved by SAHRA. Parts of Section 35, 36 and 38 apply to the proposed project, principally: ■ Section 35 (4) - No person may, without a permit issued by the responsible heritage resources authority- ■ destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite; ■ destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite. ■ Section 38 (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as- ■ any development or other activity which will change the character of a site— (i) exceeding 5 000m^2 in extent, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development. In terms of Section 38(8), approval from the heritage authority is not required if an evaluation of the impact of such development on heritage resources is required in terms of any other legislation (such as NEMA), provided that the consenting authority ensures that the evaluation of impacts fulfils the requirements of the relevant heritage resources authority in terms of Section 38(3) and any comments and recommendations of the relevant resources authority with regard to such development have been taken into account prior to the granting of the consent. However, should heritage resources of significance be affected by the proposed project, a permit is required to be obtained prior to disturbing or destroying such resources as per the requirements of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668). A Heritage Assessment (**Appendix H.12**) has been carried out by a suitably qualified specialist. The proposed project will be loaded onto the SAHRIS portal for comment by SAHRA and the MHRA.
Mineral and Petroleum Resources Development Act (No. 28 of 2002)	The aim of the Mineral and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA) is to make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources. Section 53(1) of the MPRDA provides that any person who intends to use the surface of any land in any way that may be contrary to any object of the MPRDA, or which is likely to impede any such object, must apply to the Minister of Mineral Resources (the Minister) for approval. Section 53 of the MPRDA provides a mechanism for ensuring that, inter alia, the mining of mineral resources is not detrimentally affected through the use of the surface of land and which may, for example, result in the sterilisation of a mineral resource.

Legislation	Description of Legislation and applicability
Noise Control Regulations in terms of the Environmental Conservation, 1989 (Act 73 of 1989)	In South Africa, environmental noise control has been in place for three decades, beginning in the 1980s with codes of practice issued by the South African National Standards (formerly the South African Bureau of Standards, SABS) to address noise pollution in various sectors of the country. Under the previous generation of environmental legislation, specifically the Environmental Conservation Act 73 of 1989 (ECA), provisions were made to control noise from a National level in the form of the Noise Control Regulations (GNR 154 of January 1992). In later years, the ECA was replaced by NEMA as amended. The National Environmental Management: Air Quality Act 39 of 2004 (NEMAQA) was published in line with NEMA and contains noise control provisions under Section 34: *(1) The minister may prescribe essential national standards –* *(a) for the control of noise, either in general or by specific machinery or activities or in specified places or areas; or* *(b) for determining –* *(i) a definition of noise; and* *(ii) the maximum levels of noise.* *(2) When controlling noise, the provincial and local spheres of government are bound by any prescribed national standards.* Under NEMAQA, the Noise Control Regulations were updated and are to be applied to all provinces in South Africa. The Noise Control Regulations give all the responsibilities of enforcement to the Local Provincial Authority, where location specific by-laws can be created and applied to the locations with approval of Provincial Government. Where province-specific regulations have not been promulgated, acoustic impact assessments must follow the Noise Control Regulations. Furthermore, NEMAQA prescribes that the Minister must publish maximum allowable noise levels for different districts and national noise standards. These have not yet been accomplished and as a result all monitoring and assessments are done in accordance with the South African National Standards (SANS) 10103:2008 and 10328:2008.
Conservation of Agricultural Resources Act (No. 43 of 1983)	The CARA provides for the implementation of control measures for soil conservation works as well as alien and invasive plant species in and outside of urban areas. In terms of the amendments to the regulations under the CARA, landowners are legally responsible for the control of alien species on their properties. Various Acts administered by the DFFE and the DWS, as well as other laws (including local by-laws), spell out the fines, terms of imprisonment and other penalties for contravening the law. Although no fines have yet been placed against landowners who do not remove invasive species, the authorities may clear their land of invasive alien plants and other alien species entirely at the landowners' cost and risk. The CARA Regulations with regards to alien and invasive species have been superseded by NEMBA AIS Regulations which became law on 1 October 2014.
Civil Aviation Act (No. 13 of 2009)	Civil aviation in South Africa is governed by the Civil Aviation Act (Act 13 of 2009). This Act provides for the establishment of a stand-alone authority mandated with controlling, promoting, regulating, supporting, developing,

Legislation	Description of Legislation and applicability
	enforcing and continuously improving levels of safety and security throughout the civil aviation industry. This mandate is fulfilled by South African Civil Aviation Authority (SACAA) as an agency of the Department of Transport. SACAA achieves the objectives set out in the Act by complying with the Standards and Recommended Practices of the International Civil Aviation Organisation, while considering the local context when issuing the South African Civil Aviation Regulations. As of the 1st of May 2021, ATNS has been appointed as the new Obstacle application Service Provider for Windfarms and later Solar Plants. Their responsibility would pertain to the assessments, maintenance, and all other related matters in respect to Windfarms and in due time Power Plant assessments. The DFFE Screening Tool Report identified Civil Aviation as having medium sensitivity for the proposed project, and no major or other types of civil aviation aerodromes. ATNS and SACAA will be included on the project stakeholder database. They will be informed of the proposed Project, and comment will be sought from these authorities as applicable.
Occupational Health and Safety Act (No. 85 of 1993)	The National Occupational Health and Safety Act (No. 85 of 1993) (OHSA) and the relevant regulations under the Act are applicable to the proposed project. This includes the Construction Regulations promulgated in 2014 under Section 43 of the Act. Adherence to South Africa's OHSA and its relevant Regulations is essential.
National Energy Act (No. 34 of 2008)	The National Energy Act aims to ensure that diverse energy resources are available, in sustainable quantitates, and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, taking into account environmental management requirements and interactions amongst economic sectors. The main objectives of the Act are to: ▪ Ensure uninterrupted supply of energy to the Republic; ▪ Promote diversity of supply of energy and its sources; ▪ Facilitate effective management of energy demand and its conservation; ▪ Promote energy research; ▪ Promote appropriate standards and specifications for the equipment, systems and processes used for producing, supplying and consuming energy; ▪ Ensure collection of data and information relating to energy supply, transportation and demand; ▪ Provide for optimal supply, transformation, transportation, storage and demand of energy that are planned, organised and implemented in accordance with a balanced consideration of security of supply, economics, consumer protection and a sustainable development; ▪ Provide for certain safety, health and environment matters that pertain to energy; ▪ Facilitate energy access for improvement of the quality of life of the people of Republic; ▪ Commercialise energy-related technologies; ▪ Ensure effective planning for energy supply, transportation, and consumption; and ▪ Contribute to sustainable development of South Africa's economy.

Legislation	Description of Legislation and applicability
	In terms of the act, the Minister of Energy is mandated to develop and, on an annual basis, review and publish the Integrated Energy Plan (IEP) in the Government Gazette. The IEP analyses current energy consumption trends within different sectors of the economy (i.e. agriculture, commerce, industry, residential and transport) and uses this to project future energy requirements, based on different scenarios. The IEP and the Integrated Resource Plan are intended to be updated periodically to remain relevant. The framework is intended to create a balance between energy demand and resource availability so as to provide low-cost electricity for social and economic development, while taking into account health, safety and environmental parameters.
Electricity Regulation Act (No. 4 of 2006)	The Electricity Regulation Act (No. 4 of 2006) aims to: ▪ Achieve the efficient, effective, sustainable and orderly development and operation of electricity supply infrastructure in South Africa; ▪ Ensure that the interests and needs of present and future electricity customers and end users are safeguarded and met, having regard to the governance, efficiency. effectiveness and long-term sustainability of the electricity supply industry within the broader context of economic energy regulation in the Republic: ▪ Facilitate investment in the electricity supply industry; ▪ Facilitate universal access to electricity; ▪ Promote the use of diverse energy sources and energy efficiency; ▪ Promote competitiveness and customer and end user choice; and ▪ Facilitate a fair balance between the interests of customers and end users, licensees, investors in the electricity supply industry and the public. The Act establishes a National Energy Regulator as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licenses and registration as the manner in which generation, transmission, distribution, trading and the import and export of electricity are regulated.

6.2 POLICIES AND PLANS

Table 6-2 summarised key policies and plans as an outline of the governance framework for the project.

Table 6-2 – Applicable Regional Policies and Plans

Applicable Policy	Description of Policy
National Development Plan	The National Development Plan (NDP) aims to eliminate poverty and reduce inequality by 2030. The NDP identifies a number of enabling milestones. Of relevance to the proposed development the NDP refers to the need to produce sufficient energy to support industry at competitive prices and ensure access for poor households, while reducing carbon emissions per unit of power by about one-third. In this regard the infrastructure is not just essential for faster economic growth and higher employment. It also promotes inclusive growth, providing citizens with the means to improve their own lives and boost their incomes. Infrastructure is essential to development.

Applicable Policy	Description of Policy
	Chapter 3, Economy and Employment, identifies some of the structural challenges specific to South Africa, including an energy constraint that will act as a cap on growth and on options for industrialisation. The NDP notes that from an environmental perspective South Africa faces several related challenges. The reduction of greenhouse gas (GHG) emissions and shift to a green low-carbon economy, is one of these challenges. In terms of implementation the NDP identifies three phases. The first two are of specific relevance to the proposed project. The first phase (2012–2017) notes that ensuring the supply of energy and water is reliable and sufficient for a growing economy. The second phase (2018–2023) involves building on the first phase to lay the foundations for more intensive improvements in productivity. The provision of affordable and reliable energy is a key requirement for this to take place. Chapter 4, Economic infrastructure, notes that economic infrastructure provides the foundation for social and economic development. In this regard South Africa must invest in a strong network of economic infrastructure designed to support the country's medium- and long-term economic and social objectives. The plan envisages that, by 2030, South Africa will have an energy sector that promotes: ▪ Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation. ▪ Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change. More specifically, South Africa should have adequate supply security in electricity and in liquid fuels, such that economic activity, transport, and welfare are not disrupted. The plan sets out steps that aim to ensure that, in 20 years, South Africa's energy system looks very different to the current situation. In this regard coal will contribute proportionately less to primary-energy needs, while gas and renewable energy resources, will play a much larger role.
Integrated Resource Plan 2010 – 2030	The IRP is an electricity capacity plan which aims to provide an indication of the country's electricity demand, how this demand will be supplied and what it will cost. On 6 May 2011, the then Department of Energy released the Integrated Resource Plan 2010-2030 (IRP 2010) in respect of South Africa’s forecast energy demand for the 20-year period from 2010 to 2030. The promulgated IRP 2010–2030 identified the preferred generation technology required to meet expected demand growth up to 2030. It incorporated government objectives such as affordable electricity, reduced GHG emissions, reduced water consumption, diversified electricity generation sources, localisation and regional development. The IRP recognises that solar PV, wind and Concentrated Solar Power (CSP) with storage present an opportunity to diversify the electricity mix, to produce distributed generation and to provide off-grid electricity. Renewable technologies also present huge potential

Applicable Policy	Description of Policy
	for the creation of new industries, job creation and localisation across the value chain.
New Growth Path	Government released the New Economic Growth Path Framework on 23 November 2010. The aim of the framework is to enhance growth, employment creation and equity. The policy's principal target is to create five million jobs over the next 10 years and reflects government's commitment to prioritising employment creation in all economic policies. The framework identifies strategies that will enable South Africa to grow in a more equitable and inclusive manner while attaining South Africa's developmental agenda. Central to the New Growth Path is a massive investment in infrastructure as a critical driver of jobs across the economy. In this regard the framework identifies investments in five key areas namely: energy, transport, communication, water, and housing.
National Infrastructure Plan	The South African Government adopted a National Infrastructure Plan (NIP) in 2012. The NIP aims to transform the South African economic landscape while simultaneously creating significant numbers of new jobs and strengthening the delivery of basic services. It outlines the challenges and enablers which needs to be addressed in the building and developing of infrastructure. The Presidential Infrastructure Coordinating Commission was established by the Cabinet to integrate and coordinate the long-term infrastructure build. The plan also supports the integration of African economies. In terms of the plan Government will invest R827 billion over the next three years to build new and upgrade existing infrastructure. The aim of the investments is to improve access by South Africans to healthcare facilities, schools, water, sanitation, housing and electrification. The plan also notes that investment in the construction of ports, roads, railway systems, electricity plants, hospitals, schools and dams will contribute to improved economic growth.
Integrated Energy Plan	The development of a National IEP was envisaged in the White Paper on the Energy Policy of the Republic of South Africa of 1998 and, in terms of the National Energy Act, 2008 (Act No. 34 of 2008), the Minister of Energy is mandated to develop and, on an annual basis, review and publish the IEP in the Government Gazette. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development. The IEP notes that South Africa needs to grow its energy supply to support economic expansion and in so doing, alleviate supply bottlenecks and supply-demand deficits. In addition, it is essential that all citizens are provided with clean and modern forms of energy at an affordable price. As part of the Integrated Energy Planning process, eight key objectives are identified, namely: ▪ Objective 1: Ensure security of supply. ▪ Objective 2: Minimise the cost of energy. ▪ Objective 3: Promote the creation of jobs and localisation. ▪ Objective 4: Minimise negative environmental impacts from the energy sector. ▪ Objective 5: Promote the conservation of water.

Applicable Policy	Description of Policy
	■ Objective 6: Diversify supply sources and primary sources of energy. ■ Objective 7: Promote energy efficiency in the economy. ■ Objective 8: Increase access to modern energy. The IEP provides an assessment of current energy consumption trends within different sectors of the economy (i.e., agriculture, commerce, industry, residential and transport) and uses this information to identify future energy requirements, based on different scenarios. The scenarios are informed by different assumptions on economic development and the structure of the economy and also take into account the impact of key policies such as environmental policies, energy efficiency policies, transport policies and industrial policies, amongst others. Based on this information the IEP then determines the optimal mix of energy sources and technologies to meet those energy needs in the most cost-effective manner for each of the scenarios. The associated environmental impacts, socio-economic benefits and macroeconomic impacts are also analysed. The IEP is therefore focused on determining the long-term energy pathway for South Africa, taking into account a multitude of factors which are embedded in the eight objectives. As part of the analysis four key scenarios were developed, namely the Base Case, Environmental Awareness, Resource Constrained and Green Shoots scenarios: ■ The Base Case Scenario assumes that existing policies are implemented and will continue to shape the energy sector landscape going forward. It assumes moderate economic growth in the medium to long term. ■ The Environmental Awareness Scenario is characterised by more stringent emission limits and a more environmentally aware society, where a higher cost is placed on externalities caused by the supply of energy. ■ The Resource Constrained Scenario in which global energy commodity prices (i.e. coal, crude oil and natural gas) are high due to limited supply. ■ The Green Shoots Scenario describes an economy in which the targets for high economic growth and structural changes to the economy, as set out in the NDP, are met. The IEP notes that South Africa should continue to pursue a diversified energy mix which reduces reliance on a single or a few primary energy sources. In terms of existing electricity generation capacity, the IEP indicates that existing capacity starts to decline notably from 2025, with significant plant retirement occurring in 2031, 2041 and 2048. By 2050 only 20% of the current electricity generation capacity remains. As a result, large investments are required in the electricity sector in order to maintain an adequate supply in support of economic growth. By 2020, various import options become available, and some new coal capacity is added along with new wind, solar and gas capacity. The mix of generation capacity technologies by 2050 is considerably more diverse than the current energy mix, across all scenarios. The main differentiating factors between the scenarios are the level of

Applicable Policy	Description of Policy
	demand, constraints on emission limits and the carbon dioxide externality costs. In all scenarios the energy mix for electricity generation becomes more diverse over the period to 2050, with coal reducing its share from about 85% in 2015 to 15–20% in 2050 (depending on the scenario). Solar, wind, nuclear, gas and electricity imports increase their share. The Environmental Awareness and Green Shoots scenarios take on higher levels of renewable energy. An assessment of each scenario against the eight objectives with reference to renewable energy notes while all scenarios seek to ensure that costs are minimised within the constraints and parameters of each scenario, the Base Case Scenario presents the least cost followed by the Environmental Awareness, Resource Constrained and Green Shoots scenarios respectively when total energy system costs are considered. In terms of promoting job creation and localisation potential the Base Case Scenario presents the greatest job creation potential, followed by the Resource Constrained, Environmental Awareness and Green Shoots scenarios respectively. In all scenarios, approximately 85% of total jobs are localisable. For electricity generation, most jobs result from solar technologies followed by nuclear and wind, with natural gas and coal making a smaller contribution. The Environmental Awareness Scenario, due to its stringent emission constraints, shows the lowest level of total emissions over the planning horizon. This is followed by the Green Shoots, Resource Constrained and Base Case scenarios. These trends are similar when emissions are considered cumulatively and individually by type.
National Protected Area Expansion Strategy, 2010	The NPAES areas were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2010). According to the NPAES, there are no areas within the study area that have been identified as priority areas for inclusion in future protected areas. **The study area is therefore outside the NPAES focus area.**
Just Transition	Eskom has a Just Energy Transition Office which was established in 2020. According to Eskom “Transition” describes the gradual movement towards lower carbon technologies, while “Just” qualifies that this transition will not negatively impact society, jobs and livelihoods. It is therefore important that the planning for the repurposing/repowering of Komati Power Station adhere to the principles of a just transition. South Africa has had a long and critical engagement with just transitions. This includes the early development of labour movement policies in 2011 and the inclusion of just transitions in the NDP in 2012. More recently, a commitment to a just transition was incorporated into the 2016 Nationally Determined Contributions that

Applicable Policy	Description of Policy
	was aligned with the Paris Agreement and followed by a national consultation process on just transitions to inform the revision of NDP in 2019. As of 2020, the Presidential Climate Commission (PCC) drives the clarification and implementation of a just transition. To underline the importance of a Just Transition on national level the PCC has been established by the President of the Republic of South Africa to advise on the country's climate change response and pathways to a low-carbon climate-resilient economy and society. The PCC is a multi-stakeholder body with the aim to build social consensus around the complex and challenging decisions required to successfully navigate the climate transition, which includes the phasing out of coal fired power stations. The PCC's mandate emanates from the Presidential Jobs Summit held in 2018, and one of the first tasks of the PCC is to understand the impacts of climate change on jobs, both positive and negative. The PCC need to ensure that the transition is socially just and that the needs of vulnerable groups are addressed.

6.3 PROVINCIAL AND MUNICIPAL LEGAL AND REGULATORY FRAMEWORK

Table 6-3 – Provincial Plans

Applicable Plan	Description of Plan
Mpumalanga Growth and Development Path	The primary objective of the Mpumalanga Economic Growth and Development Path (MEGDP) (2011) is to foster economic growth that creates jobs, reduce poverty and inequality in the Province. The MEGDP identifies supporting the development of clean forms of energy such as wind and hydro power generation opportunities, as well as opportunities including gas production from landfill and organic waste, as one of the key interventions to facilitate growth and job creation in the manufacturing sector. A focal point of the MEGDP is massive investments in infrastructure as a key driver of job creation across the economy, with alternative energy production identified as one of the key opportunities in the Mpumalanga Economic sectors.
Mpumalanga Spatial Development Framework (MSDF), 2019	The Mpumalanga Spatial Development Framework (SDF) (2019) identifies that tourism is an important economic sector and has emerged as a robust driver of growth for emerging economies. The SDF also notes that a significant portion of Mpumalanga's land area is classified as Moderate to High-Very High agricultural potential which can be utilised for agricultural production. However, there are other factors affecting the agricultural sector including loss of agricultural land to other activities, availability of water, contamination of the water used for irrigation by other economic activities, and access to the market. The SDF further notes that mining is the largest economic sector in the province and has assisted other sectors such as manufacturing and power generation, to grow in the province. However, the mining sector has posed some key challenges, including soil and water contamination and environmental pollution, development of mines on good agricultural soil thus threatening food security, restriction of animal movement due to open cast mining thus affecting the ecosystem etc. It also notes that Mpumalanga's

Applicable Plan	Description of Plan
	manufacturing plants and coal fired power plants are the key polluters of air, with climate change also identified as a key challenge in the province. Therefore, the province must carefully design interventions that provide a gradual shift from mining oriented sectors to the sustainable economic sectors to maintain sustained growth of the provincial economy. The SDF notes that a significant amount of the country's electricity comes from coal-fired stations in Mpumalanga. It also observes that there is a steady increase in the demand for electricity in the province, mostly attributed to residential, commercial and industrial development, including mining and heavy industry. The Provincial SDF also notes that the abundance of coal has led to the development of many coal-fired power stations in the province, however these coalfields are depleting, therefore making it necessary to consider renewable power sources in Mpumalanga. The SDF also recognises that Mpumalanga's Coal Mining and Coal Fired Power Plant region (mainly the Highveld area) will be under immense pressure for environmental considerations and as a result, the region will witness a possible decline in demand of coal and large-scale employment. The SDF proposes to diversify the regional economy and facilitate the gradual transition of economic activities in the region. According to the SDF, power stations using renewable sources (such as wind and solar) can be developed on the unused fallow lands.
Mpumalanga Industrial Development Plan	In terms of industry, the purpose of the Mpumalanga Industrial Development Plan (MIDP) (2015) is to promote the establishment of new industries and promote growth of existing industries in the province.
Mpumalanga Conservation Act (No. 10 of 1998)	This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project: ▪ Various species are protected; ▪ The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species. The Act provides lists of protected species for the Province. According to the Mpumalanga Nature Conservation Act, a permit is required for the removal of any species on this list.
Mpumalanga Biodiversity Sector Plan	The Mpumalanga Biodiversity Sector Plan (MBSP) is a spatial tool with land-use guidelines to inform permissible land-uses that support biodiversity patterns and ecological processes. It is used as a land-use decision support tool (to assist with evaluating EIAs). The MBSP has been used for this project and indicates the project location falls within areas categorised Heavily or Moderately Modified Areas, whilst Other Natural Areas occur at some of the proposed development site portions. A CBA occurs at the west, largely covering the portion proposed for the establishment of the solar PV Site B. CBAs are those areas (outside of Protected Areas) that are required to meet biodiversity targets for biodiversity pattern (species and

Applicable Plan	Description of Plan
	ecosystems) and ecological processes. These are areas of high biodiversity value and should remain in a natural state that is maintained in good ecological condition (Lötter, 2015). The CBA within which the proposed PV Site B is situated is bordered by the Goedehoop Colliery operations on the north and west, and a residential area on the east and farmlands on the south, all of which encompass Heavily or Moderately Modified Areas. Thus the level of anthropogenic disturbance renders the CBA unlikely to meet biodiversity targets for species and ecosystems and ecological processes.

Table 6-4 – District and Local Municipality Plans

Applicable Plan	Description of Plan
Nkangala Municipality Integrated Development Plan	According to the Municipal Systems Act (Act 32 of 2000), all municipalities have to undertake an IDP process. The IDP is a legislative requirement thus it has legal status and supersedes all other plans that guide development at local government level. The need for a district-based coordination model was announced in the Presidency budget speech in 2019, and the District Development Model was conceived (Nkangala DM IDP 2021/22). The District Development Model DDM is an operational model for improving cooperative governance aimed at building a capable, ethical, and developmental State. It embodies an approach where the three spheres of government and state entities work collaboratively in an impact-oriented way, and where there is higher performance and accountability for coherent service delivery and development out-comes. The district municipality has a Local Economic Development (LED) unit that is tasked with planning and coordinating LED activities in the district as well as collecting and disseminating economic information to the Local Municipalities and other stakeholders with LED interventions. In addition to the LED unit, the municipality has established a Trade and Investment office that offer the following services to SMMEs, investors and other economic agents: ▪ Facilitating feasibility studies and business plans ▪ Facilitating access to funding through DFIs and private funders ▪ Assisting with obtaining factory space and/or land ▪ Facilitating joint ventures via the identification of local partners ▪ Providing opportunities for emerging B-BBEE businesses ▪ Providing counselling and training to SMMEs regarding export issues ▪ Advising local business on technical trade issue ▪ Facilitating access to national and local government incentives ▪ Hosting and coordinating business events/exhibitions and delegations to promote Nkangala as a premier trade and investment destination
Steve Tshwete Local Municipality Integrated Development Plan	The Steve Tshwete Local Municipality aims to achieve economic growth and poverty alleviation by coordinating sustainable social and economic development programs. LED projects driven by the municipality are: ▪ The Community Works Programme CWP provides a job safety net for unemployed people of working age where participants engage in community work. ▪ The Expanded Public Works Programme EPWP is a nationwide programme that covers all spheres of government and state-owned enterprises that aims to draw significant numbers of unemployed people into productive work, accompanied by training. ▪ Township economic development ▪ Tourism development ▪ Sector development consisting of a sector analysis (tourism, agri-processing, mining, and manufacturing), investigation of a funding model for economic infrastructure development (roads, social housing) and the development of Centre of Excellence (skills development, incubation, SMME development).

Applicable Plan	Description of Plan
	▪ Mining that involved a mining survey that included GIS mapping of all existing mines in the municipal area and social and labour plans. The project aims at promoting accountability among mines and improve communication between the municipality, communities, mines and the DMR. ▪ Investment summit and drive

6.4 INTERNATIONAL ENVIRONMENTAL AND SOCIAL STANDARDS

6.4.1 WORLD BANK ENVIRONMENTAL AND SOCIAL FRAMEWORK

The Environmental and Social Framework (ESF) became effective on October 1, 2018 and applies to all Investment Policy Financing (IPF) projects initiated after this date. It makes important advances in areas such as labour, non-discrimination, climate change mitigation and adaptation, biodiversity, community health and safety, and stakeholder engagement – including expanding the role of public participation and grievance mechanisms. The ESF enhances the World Bank Group's (WBG's) commitment to sustainable development through ten Environmental and Social Standards (ESS) that are designed to support Borrowers' environmental and social (E&S) risk management. This Project is being considered for funding from the World Bank. A separate Environmental and Social Impact Assessment (ESIA) is being undertaken in line with the ESS to meet the WBG requirements. A draft ESIA was compiled and disclosed in August 2022 as part of the WB requirements. The ten ESS are outlined in **Table 6-5**.

Table 6-5 – Environmental and Social Standards applicable to the project

Standard	Reference	Applicability
ESS 1: Assessment and Management of Environmental and Social Risks and Impacts	ESS 1 sets out the Borrower's responsibilities for assessing, managing and monitoring environmental and social risks and impacts associated with each stage of a project supported by the Bank through IPF, in order to achieve environmental and social outcomes consistent with the ESSs. The following objectives are applicable: ▪ To identify, evaluate and manage the environment and social risks and impacts of the project in a manner consistent with the ESSs. ▪ To adopt a mitigation hierarchy approach to: • a) Anticipate and avoid risks and impacts; • b) Where avoidance is not possible, minimize or reduce risks and impacts to acceptable levels; • c) Once risks and impacts have been minimized or reduced, mitigate; and	This document is the Draft EIR being undertaken for this project. The impact assessment comprehensively assesses the key environmental and social impacts and complies with the requirements of the South African EIA Regulations. In addition, an EMP has been complied and included in Appendix I.

Standard	Reference	Applicability
	• d) Where significant residual impacts remain, compensate for or offset them, where technically and financially feasible. ▪ To adopt differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in sharing development benefits and opportunities resulting from the project. ▪ To utilize national environmental and social institutions, systems, laws, regulations and procedures in the assessment, development and implementation of projects, whenever appropriate. ▪ To promote improved environmental and social performance, in ways which recognize and enhance Borrower capacity	
ESS 2: Labour and Working Conditions	ESS 2 recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. Borrowers can promote sound worker-management relationships and enhance the development benefits of a project by treating workers in the project fairly and providing safe and healthy working conditions. The following objectives are applicable: ▪ To promote safety and health at work. ▪ To promote the fair treatment, non-discrimination and equal opportunity of project workers. ▪ To protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with this ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate. ▪ To prevent the use of all forms of forced labour and child labour. ▪ To support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law. ▪ To provide project workers with accessible means to raise workplace concerns.	The construction activities will require contractors for completion. A safe working environment and fair contractual agreements must be in place. The operational phase will have permanent employees for day-to-day activities as well as contractors who will all need a safe working environment and fair contractual agreements. Whilst ESS 2 will be applicable to the Project, it is not intended to be addressed in detail at the EIA stage. Recommendations are provided concerning development of a detailed HR and OHS system by the developer and its partners as the Project moves towards implementation. The EMP compiled and included in Appendix I does incorporate the requirements for compliance with local and international Labour and Working legislation and good practice on the part of the contractors.

Standard	Reference	Applicability
ESS 3: Resource Efficiency and Pollution Prevention and Management	ESS 3 recognizes that economic activity and urbanization often generate pollution to air, water, and land, and consume finite resources that may threaten people, ecosystem services and the environment at the local, regional, and global levels. This ESS sets out the requirements to address resource efficiency and pollution prevention and management throughout the project life-cycle. The following objectives are applicable: ▪ To promote the sustainable use of resources, including energy, water and raw materials. ▪ To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities. ▪ To avoid or minimize project-related emissions of short and long-lived climate pollutants. ▪ To avoid or minimize generation of hazardous and non-hazardous waste. ▪ To minimize and manage the risks and impacts associated with pesticide use.	ESS 3 related impacts, such as the management of construction waste, hazardous substances, and stormwater are assessed in Section 9 of this report. There are no material resource efficiency issues associated with the Project. The EMP includes general resource efficiency measures. The project is not GHG emissions intensive and a climate resilience study or a GHG emissions-related assessment is not deemed necessary for a project of this nature. However, the proposed project seeks to facilitate resource efficiency and pollution prevention by contributing to the South African green economy. Dust air pollution in the construction phase has been addressed in the EMP. The Project will not result in the release of industrial effluents. Potential pollution associated with sanitary wastewater is low and mitigation measures are included in the EMP. The waste generation profile of the project is not complex. Waste mitigation and management measures are included in EMP. Hazardous materials are not a key issue; small quantities of construction materials (oil, grease, diesel fuel etc.) are the only wastes expected to be associated with the project. The EMP takes these anticipated hazardous materials into account and recommend relevant mitigation and management measures.

Standard	Reference	Applicability
ESS 4: Community Health and Safety	ESS 4 addresses the health, safety, and security risks and impacts on project-affected communities and the corresponding responsibility of Borrowers to avoid or minimize such risks and impacts, with particular attention to people who, because of their particular circumstances, may be vulnerable. The following objective are applicable: ▪ To anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project life cycle from both routine and non-routine circumstances. ▪ To promote quality and safety, and considerations relating to climate change, in the design and construction of infrastructure, including dams. ▪ To avoid or minimize community exposure to project-related traffic and road safety risks, diseases and hazardous materials. ▪ To have in place effective measures to address emergency events. ▪ To ensure that the safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.	The requirements included in ESS 4 is addressed in the EIA process and included in the EMP. During the construction phase there will be an increase in vehicular traffic along public roads, largely due to the need for importation of construction material. Pedestrian and road safety risks will be qualitatively evaluated in the EIA process and the clients' standard safety and security measures, as well as potential additional measures recommended by WSP, will be detailed in the EMP.
ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	The main objectives of ESS 5 are to: ▪ To avoid involuntary resettlement or, when unavoidable, minimize involuntary resettlement by exploring project design alternatives. ▪ To avoid forced eviction. ▪ To mitigate unavoidable adverse social and economic impacts from land acquisition or restrictions on land use by: • (a) providing timely compensation for loss of assets at replacement cost and • (b) assisting displaced persons in their efforts to improve, or at least restore, their livelihoods and living standards, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher. ▪ To improve living conditions of poor or vulnerable persons who are physically displaced, through provision of adequate housing, access to services and facilities, and security of tenure.	ESS 5 is not applicable to the proposed project as no physical or economic displacement or livelihood restoration will be required. The proposed project is located on Eskom owned land.

Standard	Reference	Applicability
	▪ To conceive and execute resettlement activities as sustainable development programs, providing sufficient investment resources to enable displaced persons to benefit directly from the project, as the nature of the project may warrant. ▪ To ensure that resettlement activities are planned and implemented with appropriate disclosure of information, meaningful consultation, and the informed participation of those affected.	
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	ESS 6 recognizes that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development and it recognizes the importance of maintaining core ecological functions of habitats, including forests, and the biodiversity they support. ESS 6 also addresses sustainable management of primary production and harvesting of living natural resources, and recognizes the need to consider the livelihood of project-affected parties, including Indigenous Peoples, whose access to, or use of, biodiversity or living natural resources may be affected by a project. The following objectives are applicable: ▪ To protect and conserve biodiversity and habitats. ▪ To apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity. ▪ To promote the sustainable management of living natural resources. ▪ To support livelihoods of local communities, including Indigenous Peoples, and inclusive economic development, through the adoption of practices that integrate conservation needs and development priorities.	The Project Area falls within CBAs. A Plant and Biodiversity Impact Assessment has been included in Appendix H.8. The methodologies for the specialist assessments include a combination of literature review, in-field surveys and sensitivity mapping. This substantively complies with the ESS 6 general requirements for scoping and baseline assessment for determination of biodiversity and ecosystem services issues. The determination of habitat sensitivity was undertaken within the legal and best practice reference framework for South Africa. The prevalence of invasive alien species has been determined, and mitigation and management measures are included in the EMP.
ESS 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities;	ESS 7 ensures that the development process fosters full respect for the human rights, dignity, aspirations, identity, culture, and natural resource-based livelihoods of Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities. ESS 7 is also meant to avoid adverse impacts of projects on Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities, or when avoidance is not possible, to	As per the international instruments under the United Nations (UN) Human Rights Conventions, no indigenous peoples are present within the study area. The Project does not involve displacement. ESS 7 will not be triggered.

Standard	Reference	Applicability
	minimize, mitigate and/or compensate for such impacts. The following objective are applicable: ▪ To ensure that the development process fosters full respect for the human rights, dignity, aspirations, identity, culture, and natural resource-based livelihoods of Indigenous Peoples/ Sub-Saharan African Historically Underserved Traditional Local Communities. ▪ To avoid adverse impacts of projects on Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities, or when avoidance is not possible, to minimize, mitigate and/or compensate for such impacts. ▪ To promote sustainable development benefits and opportunities for Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities in a manner that is accessible, culturally appropriate and inclusive. ▪ To improve project design and promote local support by establishing and maintaining an ongoing relationship based on meaningful consultation with the Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities affected by a project throughout the project's life cycle. ▪ To obtain the Free, Prior, and Informed Consent (FPIC) of affected Indigenous Peoples/ Sub-Saharan African Historically Underserved Traditional Local Communities in the three circumstances described in this ESS. ▪ To recognize, respect and preserve the culture, knowledge, and practices of Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities, and to provide them with an opportunity to adapt to changing conditions in a manner and in a timeframe acceptable to them.	
ESS 8: Cultural Heritage	ESS 8 recognizes that cultural heritage provides continuity in tangible and intangible forms between the past, present and future. ESS 8 sets out measures designed to protect cultural heritage throughout the project life cycle. The following objective are applicable:	A Heritage Assessment has been compiled by a suitably qualified specialist and included in **Appendix H.12**. A Chance Find Procedure has been included in the EMP in Section 8.14.

Standard	Reference	Applicability
	▪ To protect cultural heritage from the adverse impacts of project activities and support its preservation. ▪ To address cultural heritage as an integral aspect of sustainable development. ▪ To promote meaningful consultation with stakeholders regarding cultural heritage. ▪ To promote the equitable sharing of benefits from the use of cultural heritage.	
ESS 9: Financial Intermediaries	ESS9 recognizes that strong domestic capital and financial markets and access to finance are important for economic development, growth and poverty reduction. The Bank is committed to supporting sustainable financial sector development and enhancing the role of domestic capital and financial markets. The following objectives are applicable: ▪ To set out how the Financial Intermediaries (FI) will assess and manage environmental and social risks and impacts associated with the subprojects it finances. ▪ To promote good environmental and social management practices in the subprojects the FI finances. ▪ To promote good environmental and sound human resources management within the FI.	ESS 9 is not applicable to this project.
ESS 10: Stakeholder Engagement and Information Disclosure	ESS 10 recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation. The following objectives are applicable: ▪ To establish a systematic approach to stakeholder engagement that will help Borrowers identify stakeholders and build and maintain a constructive relationship with them, in particular project-affected parties. ▪ To assess the level of stakeholder interest and support for the project and to enable stakeholders' views to be taken into account in project design and environmental and social performance.	The S&EIR process includes an extensive stakeholder engagement process which complies with the South African EIA Regulations. The process includes consultations with local communities, nearby businesses, and a range of government sector stakeholders (state owned enterprises, national, provincial and local departments). The stakeholder engagement process solicits interest from potentially interested parties through the placement of site notices and newspaper advertisements as well as written and telephonic communication.

Standard	Reference	Applicability
	■ To promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle on issues that could potentially affect them. ■ To ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner and format. ■ To provide project-affected parties with accessible and inclusive means to raise issues and grievances, and allow Borrowers to respond to and manage such grievances.	

6.4.2 WORLD BANK GROUP ENVIRONMENTAL HEALTH AND SAFETY GUIDELINES

In support of the Performance Standards, the WBG has published Environmental Health and Safety (EHS) Guidelines. The EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice. They are designed to assist managers and decision makers with relevant industry background and technical information. This information supports actions aimed at avoiding, minimising, and controlling EHS impacts during the construction, operation, and decommissioning phase of a project or facility. The EHS Guidelines serve as a technical reference source to support the implementation of the World Bank Environmental and Social Standards, particularly in those aspects related to the occupational health and safety aspects contained in ESS 2 – Labour and working conditions, ESS 3 Resource Efficiency and Pollution Prevention and Management, as well as ESS4: Community Health and Safety.

Where host country regulations differ from the levels and measures presented in the EHS Guidelines, projects seeking international funding may be expected to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, a full and detailed justification for any proposed alternatives is required.

The following WBG EHS Guidelines have been generally consulted during the preparation of the EIA in order to aid the identification of EHS aspects applicable to the project:

- *Electric Power Transmission and Distribution (2007)* - information relevant to power transmission between a generation facility and a substation located within an electricity grid, in addition to power distribution from a substation to consumers located in residential, commercial, and industrial areas
- *General EHS Guidelines* – this includes a section on a range of environmental, occupational health and safety, community health and safety, and construction activities that would apply to the project. The guideline also contains recommended guidelines adopted form the World Health Organisation (WHO) for ambient air and water quality, which are referred to in the relevant impact assessment sections in the EIA report

6.5 OTHER GUIDELINES AND BEST PRACTICE RECOMMENDATIONS

6.5.1 GENERIC EMPR RELEVANT TO AN APPLICATION FOR SUBSTATION AND OVERHEAD ELECTRICITY TRANSMISSION AND DISTRIBUTION INFRASTRUCTURE

NEMA requires that an EMPr be submitted where an EIA has been identified as the environmental instrument to be utilised as the basis for a decision on an application for environmental authorisation. The content of an EMPr must either contain the information set out in Appendix 4 of the EIA Regulations, 2014, as amended, or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a government notice. Once the Minister has identified, through a government notice, that a generic EMPr is relevant to an application for EA, that generic EMPr must be applied by all parties involved in the EA process, including, but not limited to, the applicant and the CA.

GN 435 of 22 March 2019 identified a generic EMPr relevant to applications for substations and overhead electricity transmission and distribution infrastructure which require authorisation in terms of Section 42(2) of NEMA. Applications for overhead electricity transmission and distribution infrastructure that trigger Activity 11 of Listing Notice 1 or Activity 9 of Listing Notice 2 and any other listed or specified activities must use the generic EMPr.

The objective of the generic EMPr is "to prescribe and pre-approve generally accepted impact management outcomes and impact management actions, which can commonly and repeatedly be used for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of overhead electricity transmission and distribution infrastructure. The use of a generic EMPr is intended to reduce the need to prepare and review individual EMPrs for applications of a similar nature."

The generic EMPr for Substations and powerlines have been included in the Site-Specific EMPr (**Appendix I**).

6.6 ADDITIONAL PERMITS AND AUTHORISATIONS

Table 6-6 outlines the additional permits and authorisations required for the proposed development, as well as the relevant Competent Authorities responsible.

Table 6-6 – Additional Permits and Authorisations required for the proposed development

Permits / Authorisation	Legislation	Relevant Authority	Status
Water Use Licence / General	National Water Act (Act No. 36 of 1998)	Department of Water and Sanitation	An application will be submitted during or following the conclusion of the EIA process
Obstacle Permit	Civil Aviation Act (Act 13 of 2009)	Air Traffic and Navigation Services / Civil Aviation Authority	An application will be submitted during or following the

Permits / Authorisation	Legislation	Relevant Authority	Status
			conclusion of the EIA process
Section 53 Approval	Minerals and Petroleum Resources Development Act (No. 28 of 2002)	Department of Mineral Resources and Energy	An application will be submitted during or following the conclusion of the EIA process

7 ENVIRONMENTAL AND SOCIAL CONTEXT

The following chapter presents an overview of the biophysical and socio-economic environment in which the proposed Project is located. It is important to gain an understanding of the Project area and its surroundings, as it will provide for a better understanding of the receiving environment in which the Project is being considered.

The description of the baseline environment is essential in that it represents the conditions of the environment before the construction of the proposed Project (i.e. the current, or status quo, environment) against which environmental impacts of the proposed Project can be assessed and future changes monitored.

The area has previously been studied to some extent and is recorded in various sources. Consequently, some components of the baseline have been generated based on literature review. However, where appropriate, baseline information has been supplemented or generated by specialists appointed to undertake baseline and impact assessments for the proposed Project.

7.1 PHYSICAL ENVIRONMENT

7.1.1 CLIMATE AND METEOROLOGY

*The following is extracted from the Air Quality Desktop Impact Assessment Report the Soil and Agricultural Potential Assessment compiled by WSP and included as **Appendix H.3** and **Appendix H.6** respectively.*

7.1.1.1 Meteorological Overview

To assess site-specific meteorological conditions, data was sourced from the South African Air Quality Information System (SAAQIS) for the Komati station and analysed for the best recovery period over the last five years; namely January to December 2018. The Komati station is owned by Eskom and is located on site.

The South African National Accreditation System (SANAS, 2012) TR 07-03 standards stipulate a minimum data recovery of 90% for the dataset to be deemed representative of conditions during a particular reporting period. The percentage recovery for parameters recorded is above 90 % and is thus considered reliable for use in this assessment.

7.1.1.2 Temperature, Rainfall and Humidity

Rainfall in the area is almost exclusively in the form of showers and thunderstorms and falls mainly in the summer months from October to March. The maximum rainfall usually occurs in January. The winter months are usually dry. The mean annual precipitation for Catchment B11B is 687 mm and the mean annual evaporation is 1550 mm. Mean monthly evaporation exceeds the mean monthly precipitation for every month of the year thus this is a water deficit area.

The summer temperatures for the region averaged at 20 °C while winter temperatures averaged at 11 °C (**Figure 7-1**). Komati received approximately 1082 mm of rainfall for 2018. Higher rainfall occurred during the warmer summer months (December, January and February), with drier conditions during cooler winter months (June, July and August). It was noted that the month of March also experienced high volumes of rainfall (**Figure 7-2**). Relative humidity was generally moderate for 2018 at 63% (**Figure 7-2**).

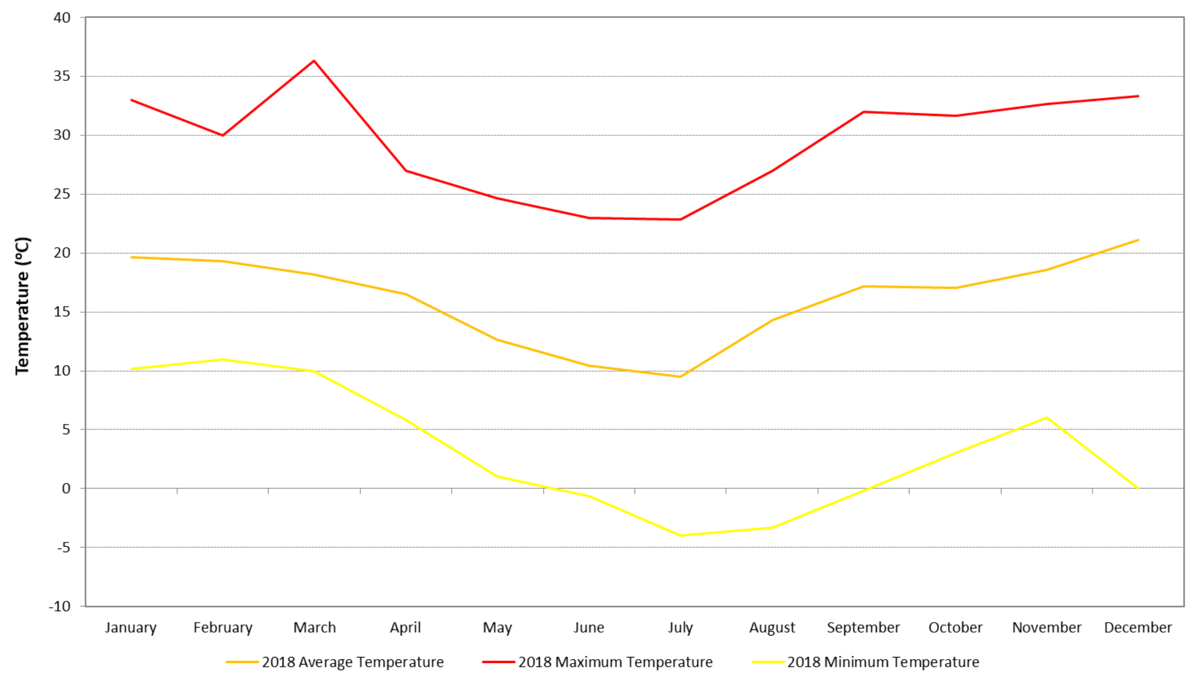


Figure 7-1 – Average, maximum and minimum temperatures for the period January to December 2018 from the Komati station (SAAQIS)

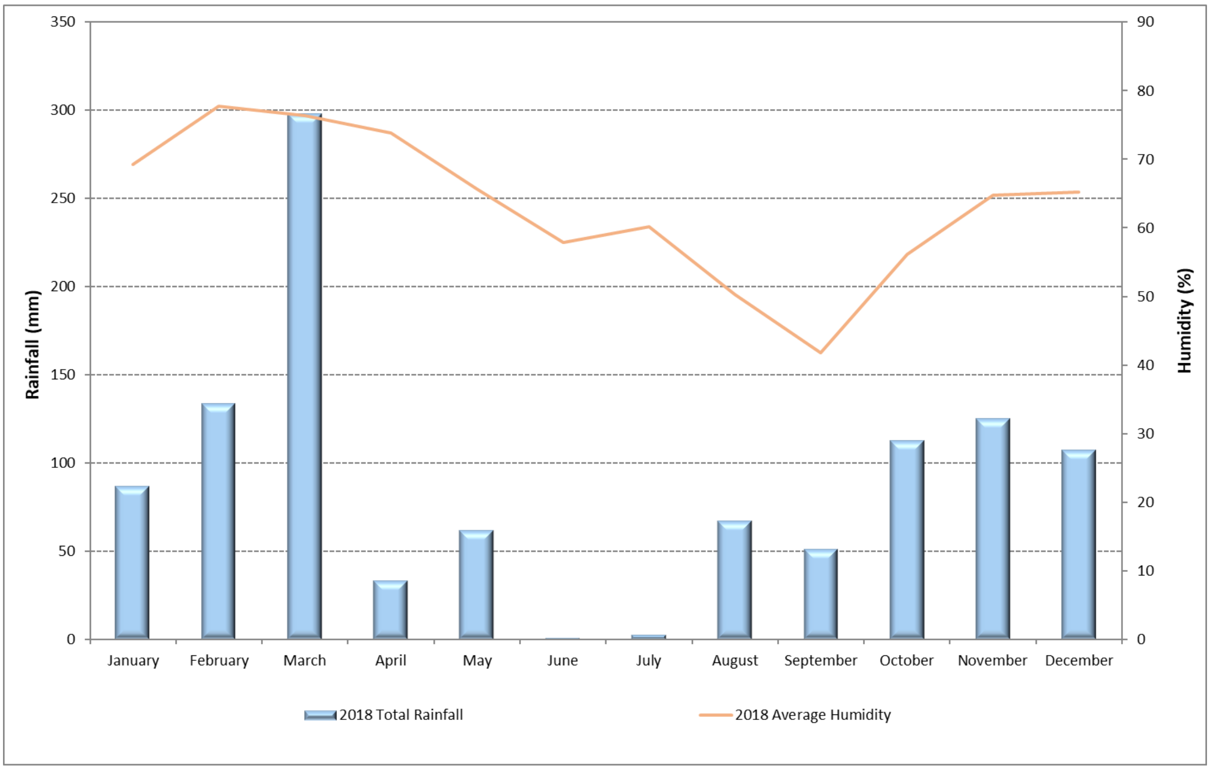


Figure 7-2 – Monthly rainfall and average humidity for the period January to December 2018 from the Komati station (SAAQIS)

7.1.1.3 Local Wind Field

Wind roses summarize wind speed and directional frequency at a location. Calm conditions are defined as wind speeds less than 1.0 m/s. Each directional branch on a wind rose represents wind originating from that direction. Each directional branch is divided into segments of colour, each representative of different wind speeds.

Typical wind fields are analysed for the full period (January to December 2018); diurnally for early morning (00h00–06h00), morning (06h00–12h00), afternoon (12h00–18h00) and evening (18h00–23h00); and seasonally for summer (December, January and February), autumn (March, April and May), winter (June, July and August) and Spring (September, October and November).

Wind roses from the Komati meteorological station are presented in **Figure 7-3** and are further discussed below:

- During the January to December 2018 period, light to strong north-north-easterly and westerly winds prevail in the region (calm conditions occurring 17 % of the time), with average wind speeds of 2.7 m/s expected.
- During the early morning hours (00h00-06h00) north-north-easterly, north-north-westerly, north and north-westerly winds prevail.
- Towards the latter morning (06h00-12h00) hours, a shift in winds is experienced with dominant winds from the west.
- In the afternoon (12h00-18h00) the westerly wind prevails.
- During the night (18h00-00h00) the north-north-easterly wind prevails yet again.
- Highest winds are experienced during the 12h00-18h00 period.
- Winds from the north-north-easterly prevail during the summer and autumn months whilst the winter and spring months show great directional variability. Additionally, winter and spring experience the strongest winds.

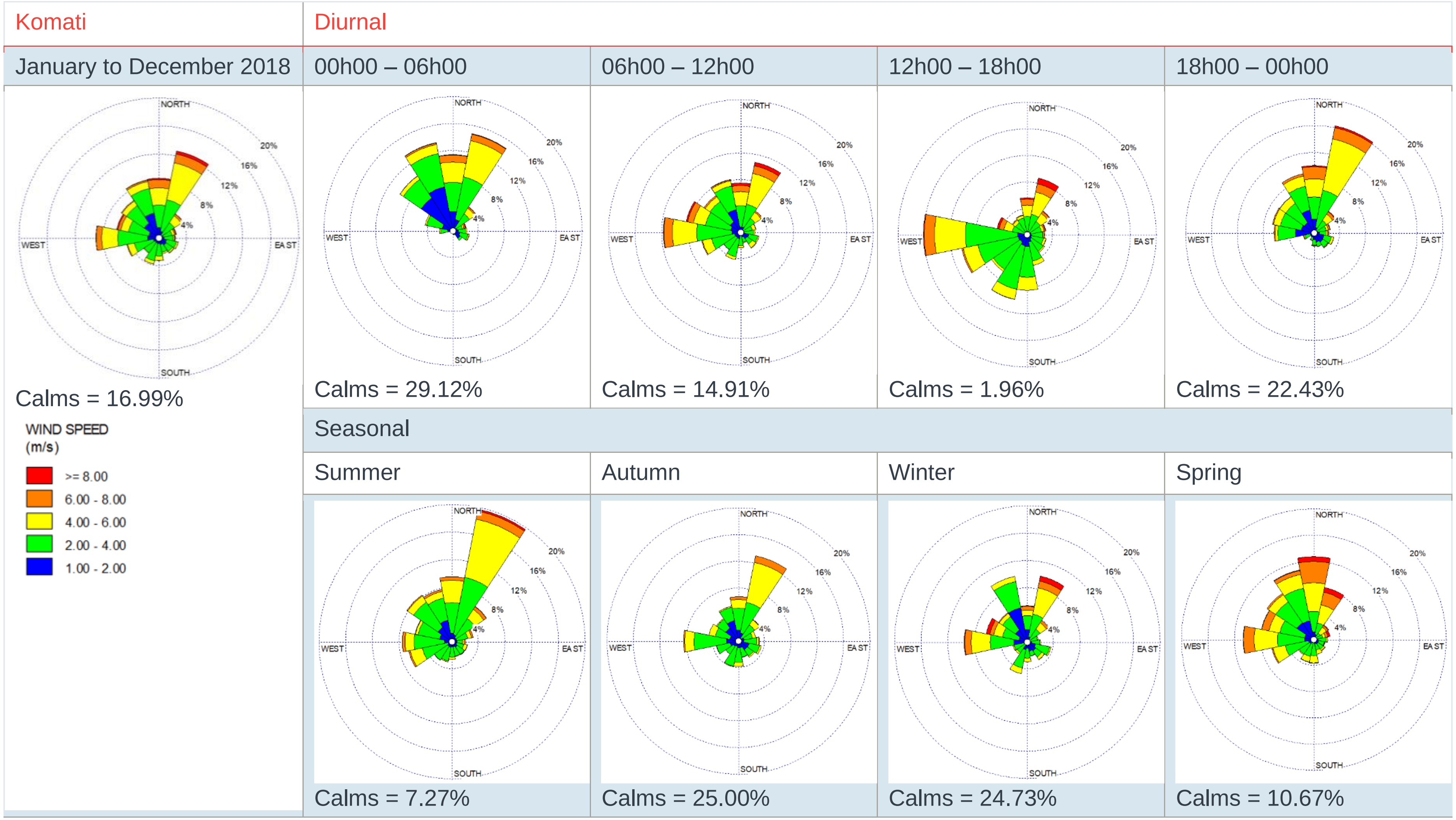


Figure 7-3 - Local wind conditions for the period January to December 2018 from the Komati station (SAAQIS)

7.1.2 TOPOGRAPHY

*The following is extracted from the Visual Impact Assessment compiled by LOGIS and included as **Appendix H.11**.*

The study area is situated on land that ranges in elevation from approximately 1,530m above sea level (asl) in the south-west of the study area to 1,700m asl in the east (**Figure 7-4**). The project site itself is located at an average elevation of approximately 1,626m above sea level. The terrain morphological unit identified for the entire study area is described as flat to undulating plains. The most prominent elevated topographical units are the ash dumps, slimes dams and mine dumps surrounding the power station and the Goedehoop Colliery located west of the power station.

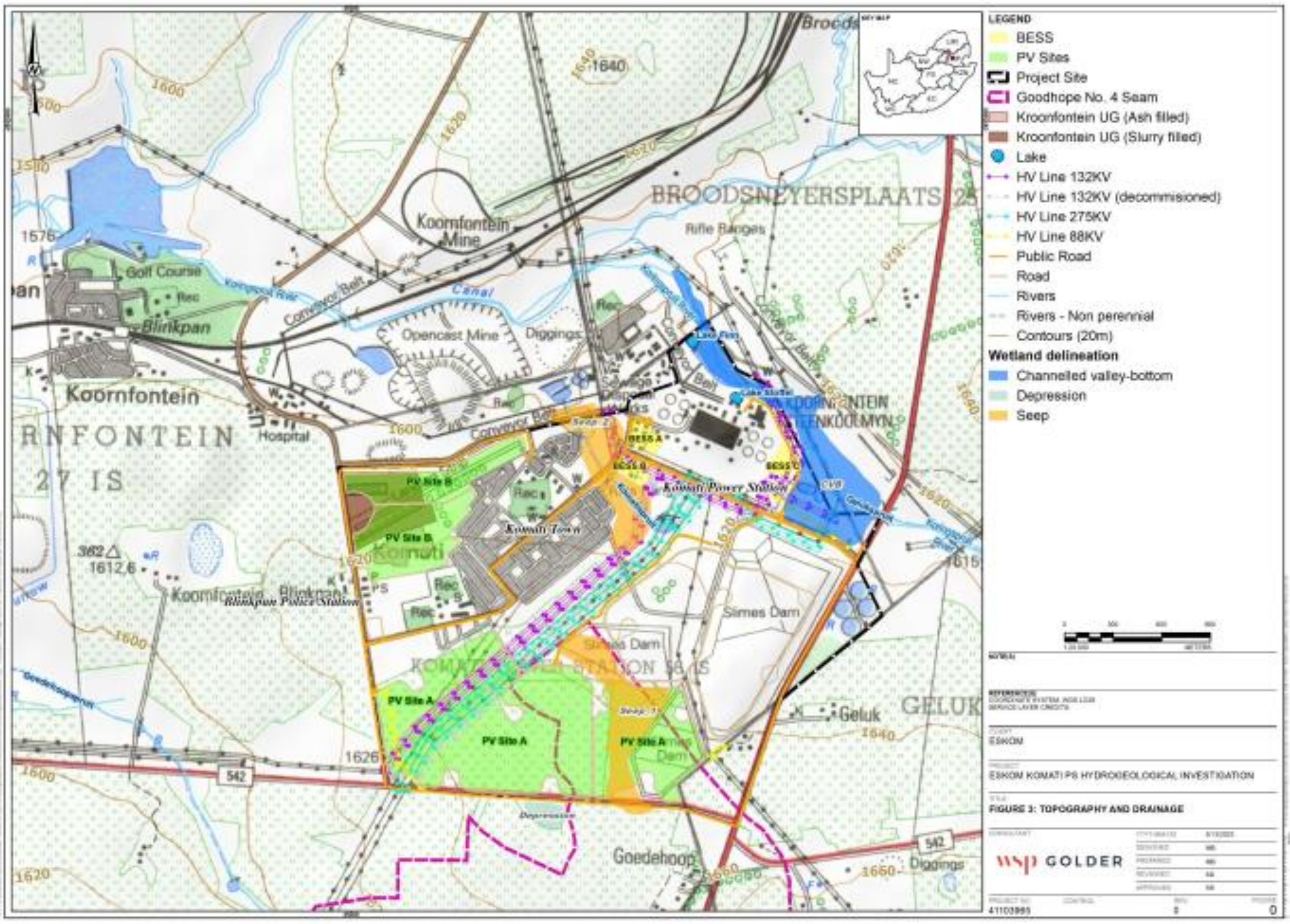


Figure 7-4 - Topography

7.1.3 GEOLOGY

*The following is extracted from the Palaeontology Impact Assessment compiled by Dr H Fourie and included as **Appendix H.13**.*

Large areas of the southern African continent are covered by the Karoo Supergroup (**Figure 7-5**). It covers older geological formations with an almost horizontal blanket. Several basins are present with the main basin in the central part of south Africa and several smaller basins towards Lebombo, Springbok Flats and Soutpansberg. An estimated age is 150 – 180 Ma. And a maximum thickness of 7000 m is reached in the south. Three formations overlie the Beaufort Group, they are the

Molteno, Elliot and Clarens Formations. The Elliot Formation is also known as the Red Beds and the old Cave Sandstone is known as the Clarens Formation. At the top is the Drakensberg Basalt Formation with its pillow lavas, pyroclasts, etc. (Kent 1980, Snyman 1996). The Beaufort Group is underlain by the Ecca Group which lies on the Dwyka Group.

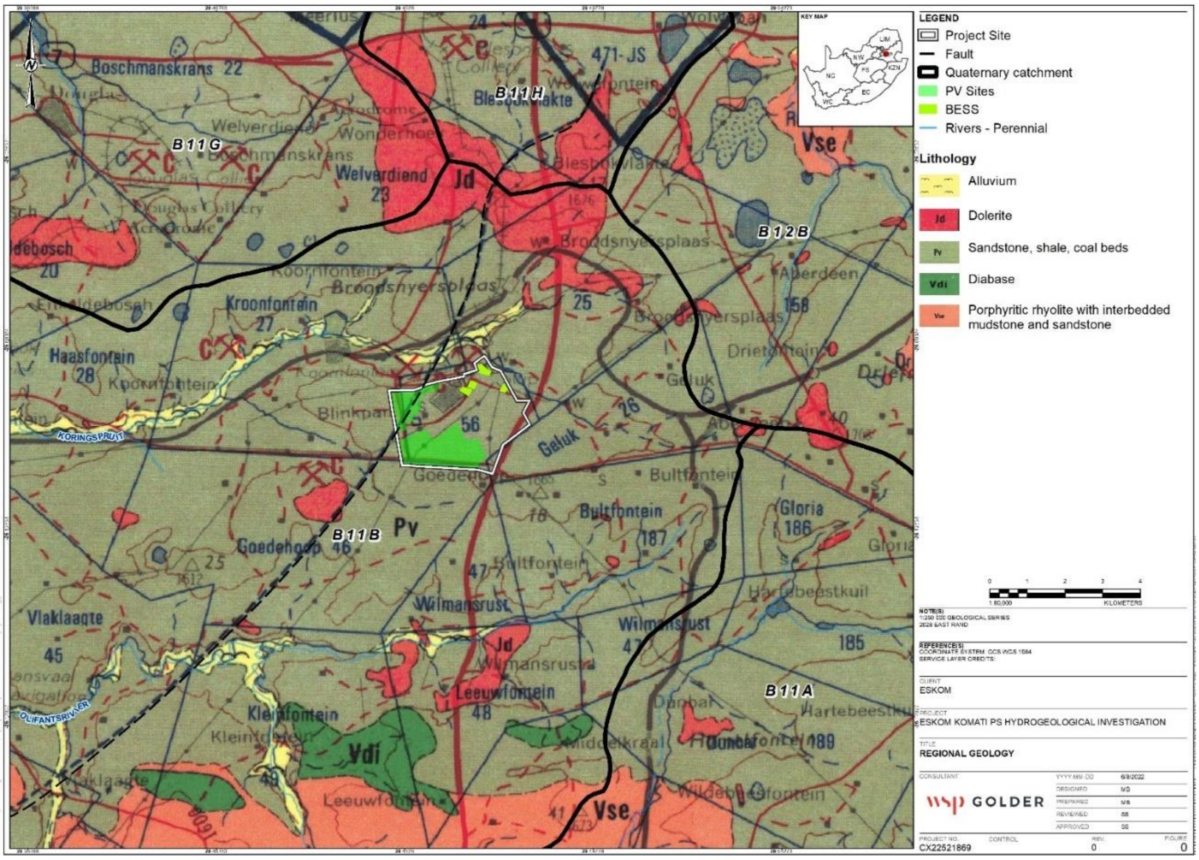


Figure 7-5 - Geological map of the area

Dolerite dykes (Jd) occur throughout the Karoo Supergroup. Structural geological features such as dykes and faults can have a measurable influence on ground water flow and mass transport. Permian sediments are extensively intruded and thermally metamorphosed (baked) by sub-horizontal sills and steeply inclined dykes of the Karoo Dolerite Suite. These early Jurassic (183 Ma) basic intrusions baked the adjacent mudrocks and sandstones to form splintery hornfels and quartzites respectively. Thermal metamorphism by dolerite intrusions tends to reduce the palaeontological heritage potential of the adjacent sediments.

The Ecca Group is early to mid-Permian (545-250 Ma) in age. Sediments of the Ecca group are lacustrine and marine to fluvio-deltaic (Snyman 1996). The Ecca group is known for its coal (mainly the Vryheid Formation) (five coal seams) and uranium. Coalfields formed due to the accumulation of plant material in shallow and large swampy deltas (see Appendix 1). The Ecca Group conformably overlies the Dwyka Group and is conformably overlain by the Beaufort Group, Karoo Supergroup. It consists essentially of mudrock (shale), but sandstone-rich units occur towards the margins of the present main Karoo basin in the south, west and north-east, with coal seams also being present in the north-east (Kent 1980, Johnson 2009).

The Vryheid Formation is named after the type area of Vryheid-Volksrust. In the north-eastern part of the Karoo basin the Vryheid Formation thins and eventually wedges out towards the south, southwest and west with increasing distance from its source area to the east and northeast (Johnson 2009). The Vryheid Formation consists essentially of sandstone, shale, and subordinate coal beds, and has a maximum total thickness of 500 m. It forms part of the Middle Ecca (Kent 1980). This formation has the largest coal reserves in South Africa. The pro-delta sediments are characterised by trace and plants fossils (Snyman 1996).

Coal has always been the main energy source in industrial South Africa. It is in Mpumalanga, south of the N4, that most of the coal-fired power stations are found. Eskom is by far the biggest electricity generator in Africa. Thick layers of coal just below the surface are suited to open-cast mining and where the overlying sediments are too thick, shallow underground mining. In 2003, coal was South Africa's third most valuable mineral commodity and is also used by Sasol for fuel- and chemicals-from-coal (Norman and Whitfield 2006). Grodner and Cairncross (2003) proposed a 3-D model of the Witbank Coalfield to allow easy evaluation of the sedimentary rocks, both through space and time. Through this, one can interpret the environmental conditions present at the time of deposition of the sediments. This can improve mine planning and mining techniques. The Vryheid Formation is underlain by the Dwyka Group and is gradually overlain by mudstones (and shale) and sandstones of the Volksrust Formation. The typical colours for the Vryheid Formation are grey and yellow for the sediments and black for the coal seam. The thickness of the grey shale can vary and this is interlayered with the also variable yellow sandstone and coal seams.

Ecca rocks are stable and lend themselves well to developments. It is only unstable in or directly above mining activities (Snyman 1996). Dolerite dykes occur throughout the Karoo Supergroup. Structural geological features such as dykes and faults can have a measurable influence on ground water flow and mass transport. The Vryheid Formation sediments may attain a thickness of 120 – 140 m. A typical profile includes soil and clay, sandstone and siltstone, shale, 2 upper seam, shale, 2 seam, sandstone, no 1 seam, shale and dolomite at the bottom. The typical colours for the Vryheid Formation are grey and yellow for the sediments and black for the coal seam. The thickness of the grey shale can vary and this is interlayered with the also variable yellow sandstone and coal seams.

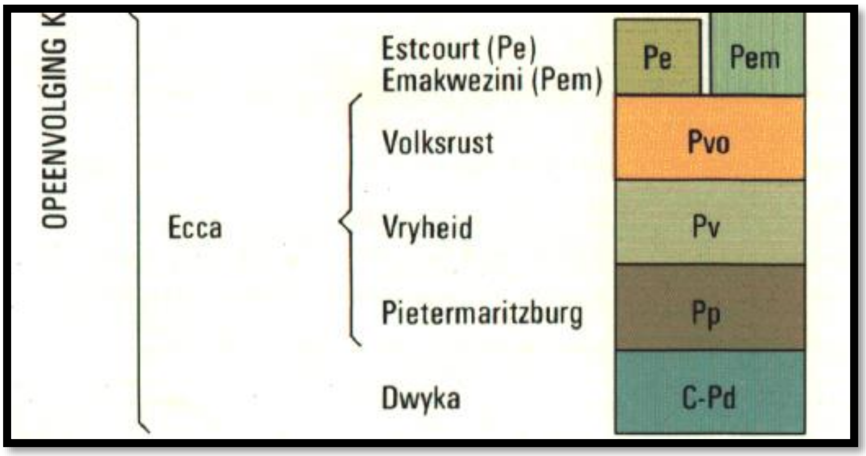


Figure 7-6 - Lithostratigraphic column of the development area (East Rand 2628)

7.1.4 SEISMICITY

*The following is extracted from the Geotechnical Desktop Study compiled by Eskom Holdings SOC (Ltd) and included as **Appendix H.1**.*

The South African National Standards (SANS) code (Seismic actions and general requirements for buildings) SANS 10160-4:2011, shows that the site is situated in the area where the peak ground acceleration has a probability of being exceeded in 50 year period is 0.1g.

Figure 7-7 shows the zone (Zone 1) where compliance with the minimum requirements is specified by the code. Zone 1 is defined as “Regions of natural seismic activity”.

A more recent illustration produced by the Council of Geoscience is presented in **Figure 7-8**, showing peak ground acceleration with a 10% probability of being exceeded in 50 years. On this figure, the five sites are classified with ground acceleration of 0.1g (98cm/sec²).

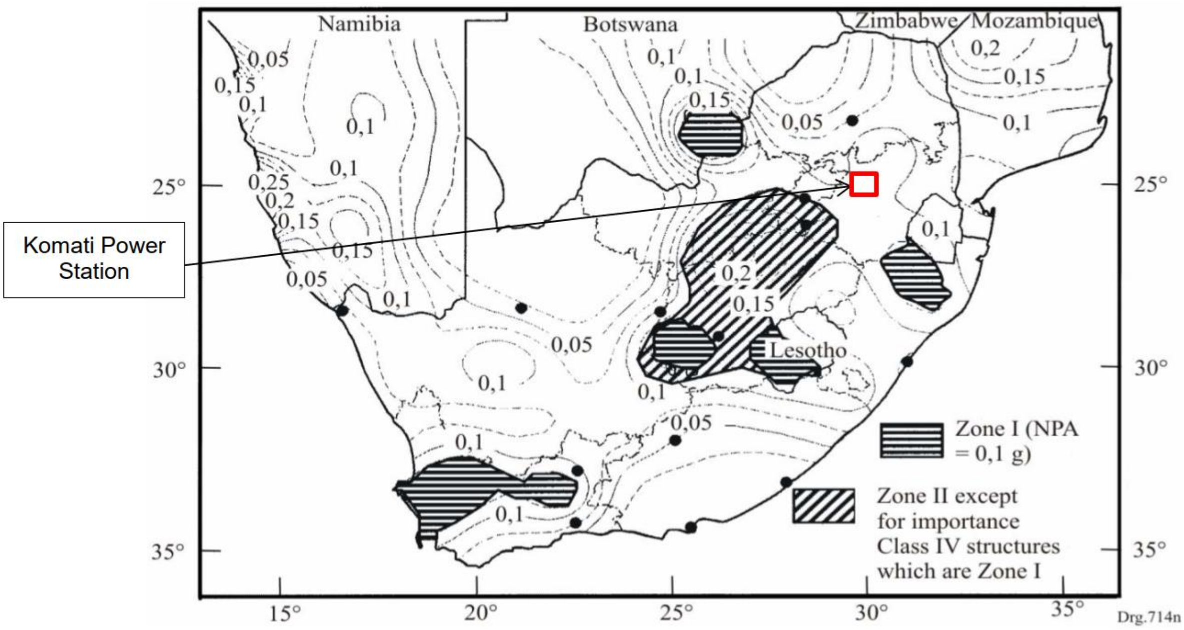


Figure 7-7 - Seismic Hazard map and Zones (Source: Eskom, 2022)

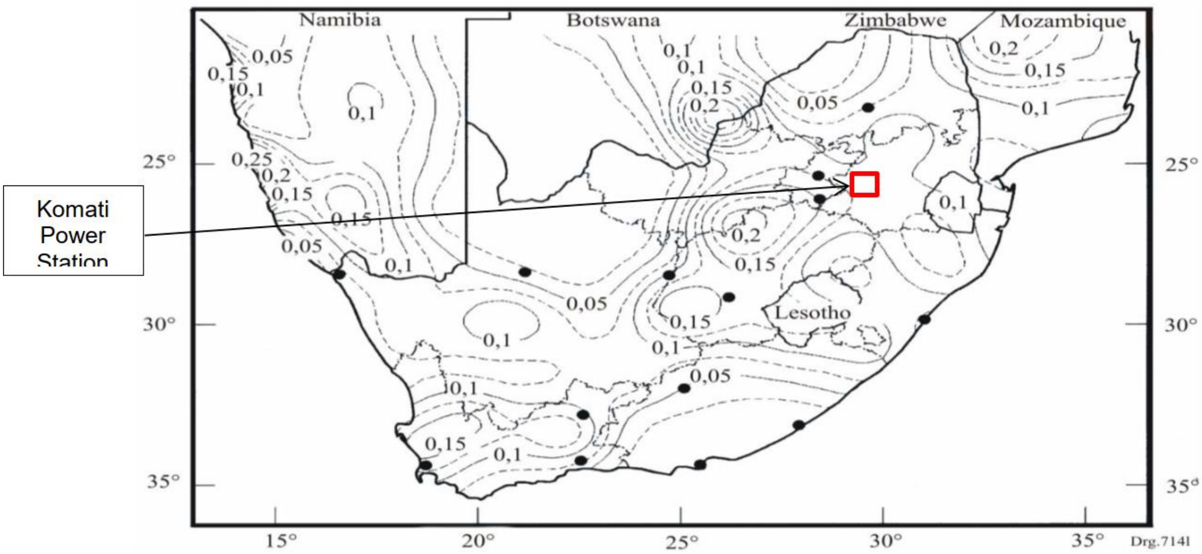


Figure 7-8 - A recent seismic hazard map (2003) obtained from the Council for Geoscience (Source: Eskom, 2022)

7.1.5 AIR QUALITY BACKGROUND

The following is extracted from the Air Quality Desktop Impact Assessment Report compiled by WSP and included as ***Appendix H.2****.*

Existing air pollution sources in the vicinity of the proposed project include:

- Agricultural activities mostly from maize and livestock.
- Vehicle emissions from the R35, R542, nearby Goedehoop Colliery and internal Komati power station roads.
- Mining activities from the nearby Goedehoop Colliery.
- Industrial activities from the Komati Power Station.
- Domestic fuel burning from the Komati Village and nearby residential areas.
- Dust from unpaved roads from the nearby Goedehoop Colliery.
- Other fugitive dust sources such as wind erosion of exposed areas.

Background concentrations for particulate matter (i.e most specifically particle size of aerodynamic diameter of less than 10 and 2.5 microns (PM10 and PM2.5)) were also sourced from the SAAQIS for the Komati station to evaluate the current situation within the receiving environment. The best recovery period over the last five years; namely January to December 2018 was utilized. Annual averages for PM10 and PM2.5 were 62.7 µg/m3 (above the annual average PM10 standard of 40 µg/m3) and 6.5 µg/m3, respectively (below the annual average PM2.5 standard of 20 µg/m3). The high existing sources of emissions for PM10 are likely a result of the abovementioned background sources, however it must be noted that the background concentrations are likely to decrease once the existing Komati Power Station is fully decommissioned,, possibly resulting in compliance with the annual average PM10 standard of 40 µg/m3. Further, the data recovery for PM10 and PM2.5 was 82% and 85%, respectively, slightly below the recommended data recovery of 90% for the dataset to be deemed reliable.

Table 7-1 presents the sensitive receptors within the surrounding environment. Sensitive receptors are defined by the United States Environmental Protection Agency as are as where occupants are more susceptible to the adverse effects of exposure to pollutants. These areas include but are not limited to residential areas, hospitals/clinics, schools and day care facilities and elderly housing. The site layout and receptors are presented in **Figure 7-9**.

Table 7-1 - Sensitive receptors within a 10 km radius of the proposed project

ID	Sensitive Receptor Name	Latitude (s)	Longitude (E)	Distance from site boundary (KM)	Direction from site
SR1	Komati Village	26° 5'46.52"	29°27'37.62"	Within the boundary	
SR2	Residential Area 1	26° 8'37.05"	29°32'5.14"	7.3	Southeast
SR3	Residential Area 2	26° 4'9.85"	29°25'16.62"	3.7	Northwest
SR4	Residential Area 3	26° 5'14.28"	29°26'18.46"	1.2	Northwest
SR5	Residential Area 4	26° 5'24.70"	29°26'47.50"	0.4	Northwest
SR6	Residential Area 5	26° 2'5.40"	29°31'6.68"	7.2	Northeast

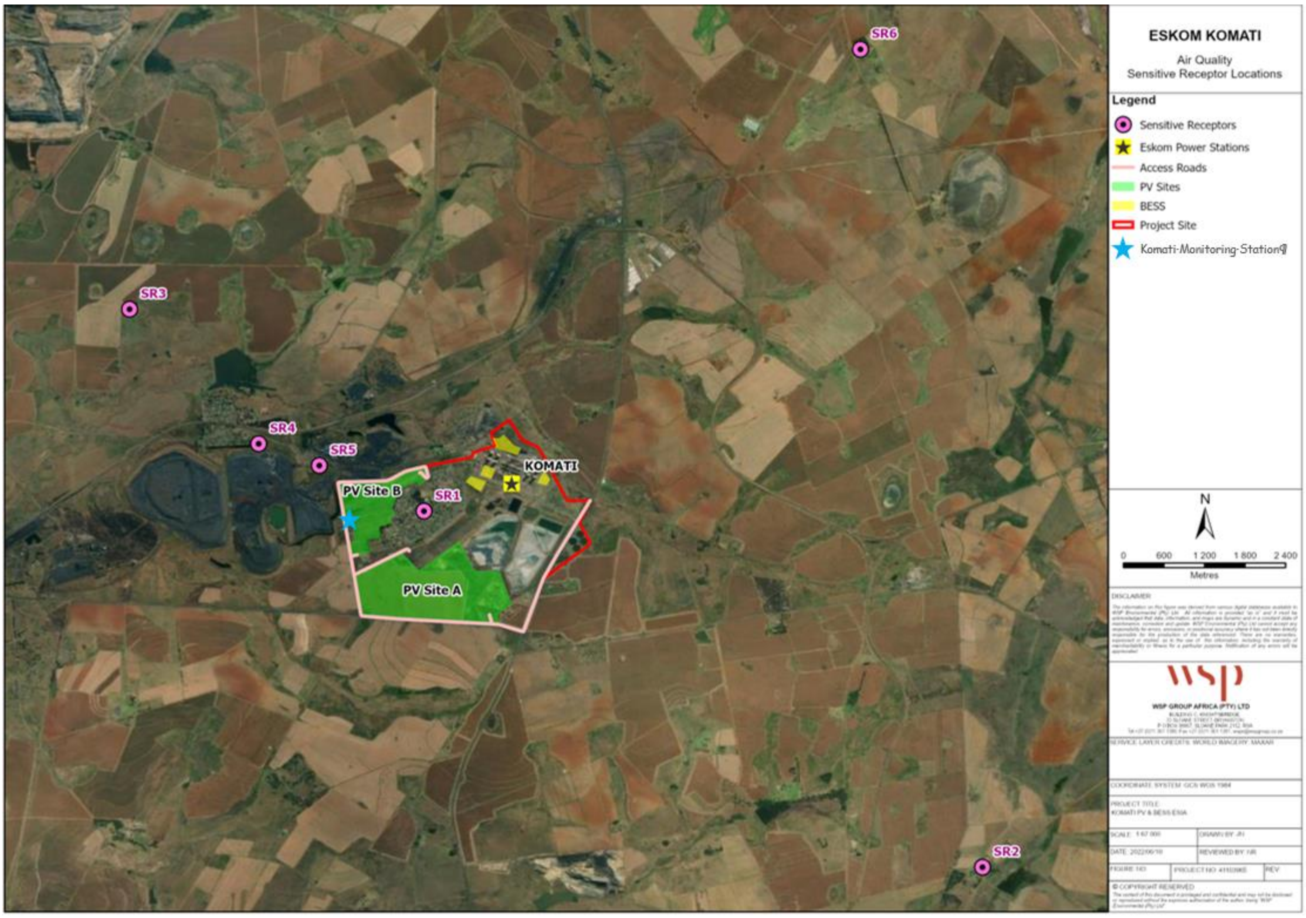


Figure 7-9 - Site layout and sensitive receptors for the proposed project

7.1.6 NOISE

The following is extracted from the Noise Desktop Impact Assessment Report compiled by WSP and included as ***Appendix H.3****.*

Existing noise sources in the vicinity of the proposed project include:

- Agricultural activities mostly from maize and livestock.
- Vehicles along the R35, R542, nearby Goedehoop Colliery and internal Komati power station roads.
- Mining activities from the nearby Goedehoop Colliery.
- Industrial activities from the Komati Power Station.

Sensitive receptors are identified as areas that may be impacted negatively due to noise associated with the proposed project. Examples of receptors include, but are not limited to, schools, shopping centres, hospitals, office blocks and residential areas. The site layout and receptors are presented in **Table 7-2** and **Figure 7-10**.

Table 7-2 - Sensitive receptors within a 5 km radius of the proposed project

ID	Sensitive Receptor Name	Latitude (s)	Longitude (E)	Distance from site boundary (KM)	Direction from site
SR1	Komati Village	26° 5'46.52"	29°27'37.62"	Within the boundary	
SR2	Residential Area 1	26° 4'9.85"	29°25'16.62"	3.7	Northwest
SR3	Residential Area 2	26° 5'14.28"	29°26'18.46"	1.2	Northwest
SR4	Residential Area 3	26° 5'24.70"	29°26'47.50"	0.4	Northwest

Figure 7-10 - Site layout and sensitive receptors for the proposed project

7.1.7 SURFACE WATER

*The following is extracted from the Surface Water Scoping Assessment compiled by WSP and included as **Appendix H.4**.*

The Komati Power Station occurs within the upper Olifants Water Management Area (WMA), in the B11B quaternary catchment (**Figure 7-11**) and can be sub-divided into secondary drainage regions compromising of smaller streams and creeks. This catchment receives 687 mm rainfall per year and experiences 1550 mm of evaporation annually. The surface topography of the area is typical of the Mpumalanga Highveld, consisting in the main of a gently undulating plateau. The flood plains of the local streams are at an average elevation of approximately 1595 meters above mean sea level (mamsl). Altitudes vary from ±1650 mamsl at the higher parts south of the ashing facility to ±1595 mamsl which defines the base of the Koringspruit to the north of the Komati Power Station.

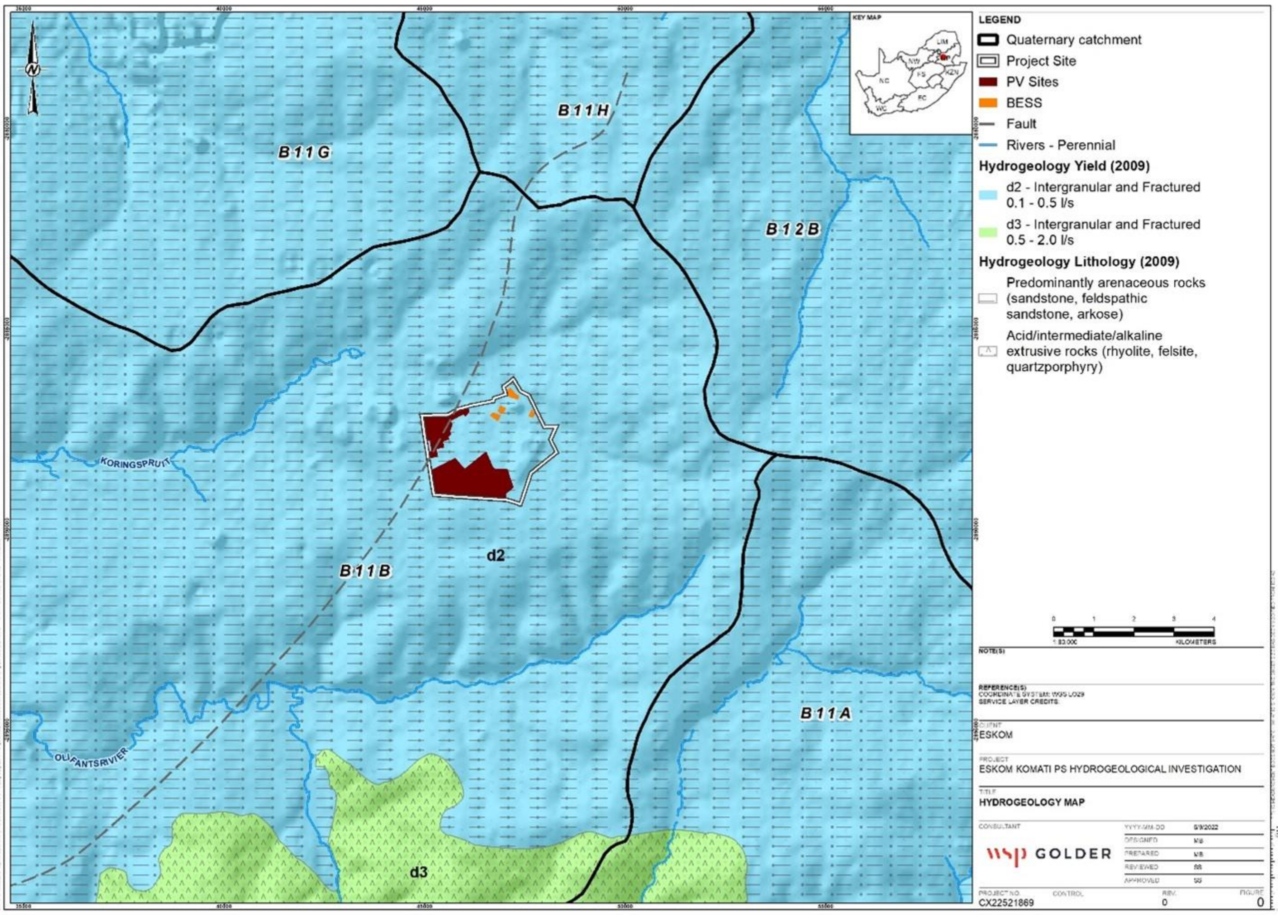


Figure 7-11 - Hydrogeology Map

7.1.7.1 Delineation Of Sub-Catchments

The two catchments draining the area affecting the proposed development is shown on **Figure 7-12**. The catchment for PV Site A covers an area of 156 ha and the catchment for PV Site B extends over an area of 54 ha. Together, the total area drained is 210 ha.

In adherence to the National Water Act 36 of 1998, GN 704 guidelines, it is crucial to ensure that the proposed development does not encroach upon the floodplain of the Koringspruit. To assess the potential encroachment, a buffer zone of 100 meters from the watercourse has been utilised as a guiding principle. Through a desktop analysis, it has been confirmed that the proposed development remains well outside the designated floodplain (**Figure 7-12**). Furthermore, the development is bordered by existing roads, and those roads adjacent to the streams are at a higher elevation than the streams, thus mimicking a flood wall, thereby mitigating any adverse impacts on the Koringspruit's hydrological regime and flood risk dynamics. This strategic adherence to the established guidelines underscores the commitment to environmentally responsible practices and safeguards the integrity of the surrounding natural watercourses and floodplain areas.

To delineate the catchments, a Digital Terrain Model (DTM) was created for use in GIS to determine these delineations and characterisation of the catchments.

The delineated catchments are as shown in **Figure 7-12** below.

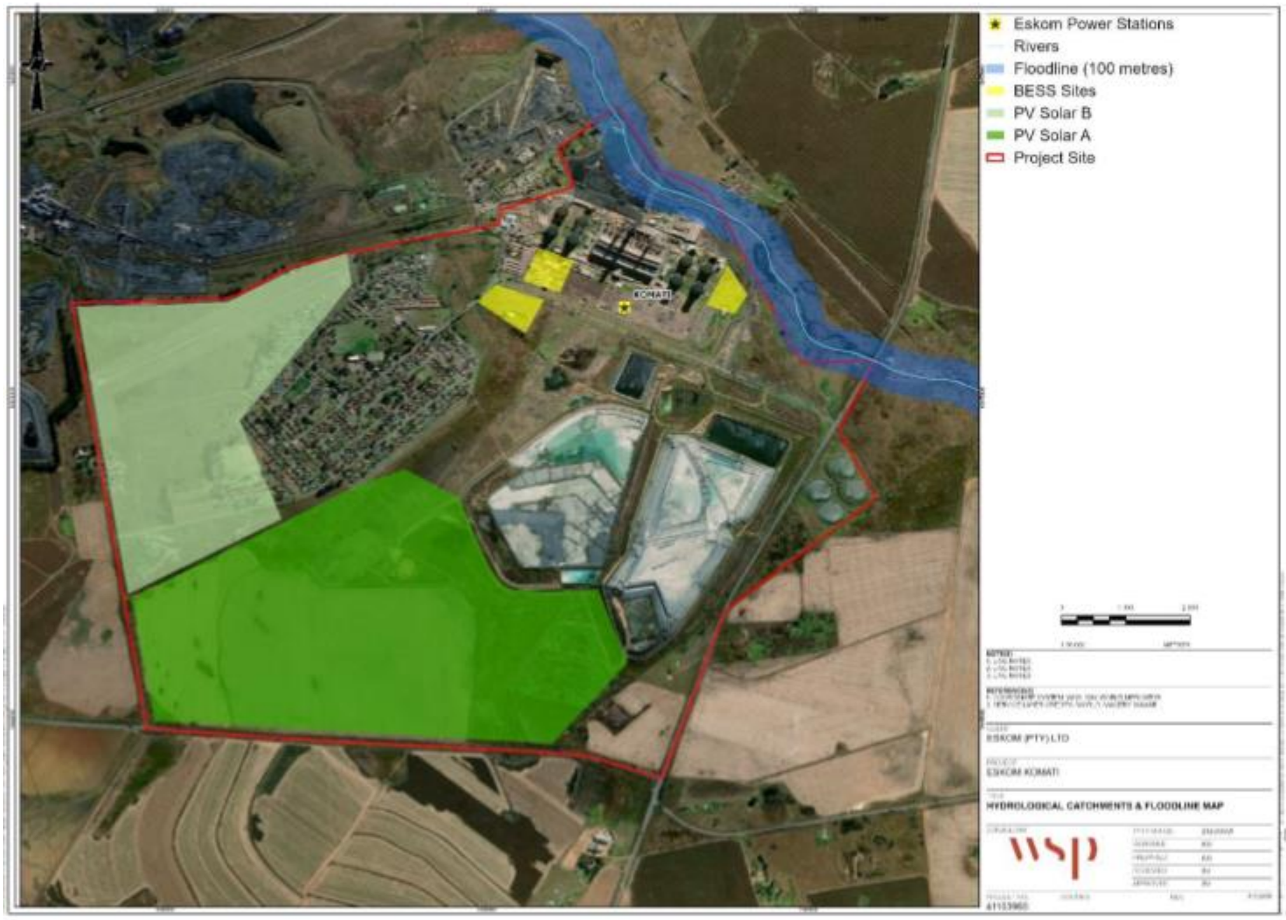


Figure 7-12 – Hydrological Catchments and Floodline Map

7.1.7.2 Catchment Parameters

The slope of a catchment is a very important characteristic in the determination of flood peaks. Steep slopes cause faster runoff to shorten the critical duration of flood inducing storms, thus leading to higher rainfall intensities in the runoff formulae. On steep slopes, the vegetation is generally less dense, soil layers are shallower, and there are fewer depressions, all of which cause water to run off more rapidly. The result is that infiltration is reduced, and flood peaks are consequently elevated. For flat catchments such as those encountered on this site, the opposite holds true.

Land use is another critical characteristic as it alters the vegetation present and the degree of soil compaction. Compacted soil is less permeable, and vegetation can slow down stormflows over the land surface. Lastly, the soil type can also be important with some soils allowing quicker infiltration resulting in runoff for each catchment. Detailed geotechnical testing would be required to determine the necessary infiltration parameters for explicit groundwater modelling, but in terms of general hydrological response, it was assumed the soils in the catchments fall into a single broad category.

While the vegetation across both catchments for PV Site A and B appears to be grassland, much of the catchment for PV Site A appears to have been used for agriculture, specifically row cropping.

Even though there are relatively steep zones in the catchment, the majority of aboveground runoff is likely to be in the form of shallow sheet flow and consequently, flow velocities will be relatively low.

Table 7-3 presents the conceptual catchment characteristics used in this study.

Table 7-3 - Conceptual Catchment Characteristics

Catchment	Catchment Area (ha)	Permeability (desktop assessment, not lab tested)	Flow type	Vegetation
PV Site A	156 ha	Permeable to Semi-Permeable	Overland Flow	Grasslands and bare row cropping
PV Site B	54 ha	Permeable to Semi-Permeable	Overland Flow	Grasslands

A detailed survey will be required to determine the actual dimensions of drainage paths, but examination of the available topographical information and aerial photography reveals no obvious areas where erosion is taking place.

7.1.7.3 Design Rainfall

The Intensity-duration-frequency (IDF) data was derived from Rainfall Statistics for Design Flood Estimation in South Africa (Smithers & Schulze. 2012) for reference point 26° 6'30.28"S, 29°27'37.79"E for the project site.

The utilisation of 5 and 50-year return periods to assess stormwater modelling impacts is justified based on applicable legislation and guidelines.

The GN 704 guideline stipulates the requirements for water systems in a mine as follows: "design, construct and maintain all water systems in such a manner as to guarantee the serviceability of such conveyances for flows up to and including those arising as a result of the maximum flood with an average period of recurrence of once in 50 years".

The South African National Water Act (Act No. 36 of 1998) and its accompanying regulations, such as the National Environmental Management: Integrated Coastal Management Act (Act No. 24 of 2008) and the National Environmental Management: Waste Act (Act No. 59 of 2008), provide guidance on managing stormwater and potential impacts on water resources.

The Guidelines for Human Settlement Planning Sanitation's Guideline (2003) recommends the use of 5 and 50-year return periods as a standard practice for stormwater management. These return periods allow for the assessment of routine storm events and extreme rainfall events that may have significant impacts on the environment and infrastructure. By considering these return periods, the stormwater modelling can evaluate the facility's ability to handle both typical and severe rainfall events, ensuring compliance with the relevant legislation and guidelines.

Additionally, the South African Green Building Council's Green Star SA - Sustainable Precincts Tool provides further support for considering 5 and 50-year return periods in stormwater management. This tool promotes sustainable and resilient design practices, including the assessment of stormwater management measures against different return period scenarios.

Therefore, by incorporating the 5 and 50-year return periods in the stormwater modelling to assess impacts, the report aligns with applicable legislation and guidelines, ensuring comprehensive evaluation of the facility's stormwater management strategies in compliance with environmental regulations and sustainable development principles.

The IDF data is tabulated below for design storm events with return period of 5 and 50 years for various durations:

Table 7-4 - Average Intensity for various design storm durations

Return Period (years)	Design Storm Duration								
	10 min	15 min	30 min	1 hr	2 hr	4 hr	8 hr	12 hr	24 hr
	Average Intensity (mm/hr)								
5	102.0	84.4	54	34.5	22.1	13.18	7.85	5.81	3.46
50	162.6	134.4	86.0	55.0	35.15	20.98	12.50	9.24	5.51

7.1.7.4 Runoff Parameters

The runoff parameters used are listed below:

- Impervious area roughness coefficient: 0.018
- Pervious area roughness coefficient: 0.050
- Impervious area depression storage: 1 mm
- Pervious area depression storage: 5 mm
- Infiltration method: SCS
- SCS Curve Number (CN): 61

7.1.7.5 Pre-Development Runoff

Runoff was computed for both minor (5-year) and major (50-year) design events of various durations up to 24 hours. The peak flows were cross-checked via the Rational Method and found to be reasonable.

The pre-development peak flows are tabulated below.

Table 7-5 - Pre-development peak flows

	5-year Return Period	50-year Return Period
Sub-catchment ID	**Peak flow (m3/s)**	**Peak flow (m3/s)**
PV Site A	0.08	0.12
PV Site B	0.03	0.05

Due to the relatively permeable nature of the soil, the majority of the rainfall from short-duration events infiltrates events infiltrates into the ground. Only when the soil becomes saturated does significant overland runoff occur. Consequently, longer-duration storms result in the highest peak flows. Saturation happens more quickly for high-order events, which means that peak flows typically occur for shorter-duration design storms compared to low-order events.

For design storm events with a return period of up to 50 years, flow velocities will be low (< 0.19 m/s). Flow depths outside of preferential drainage paths are likely to be shallow. However, where preferential drainage routes converge to form natural earth channels that are more clearly defined, the depth of flow will increase.

A detailed survey will be required to model specific drainage paths accurately and provide more precise flow computations.

7.1.7.6 Post-Development Runoff

The primary difference between the pre-development and the post-development scenarios lies in the presence of the solar PV panels and associated infrastructure. While the solar PV panels themselves are impervious, their distributed arrangement with spaces in between and elevation above the natural ground level sets them apart from typical hardened surfaces. Essentially, they do not significantly impede infiltration or obstruct existing flow paths.

This does not apply to the access and internal roads or the site management/plant areas, as they effectively form impervious surfaces and consequently contribute to increased runoff. The increase in impervious area for the post-development scenario was measured using GIS overlays and estimated coverage percentages for the relevant items. However, the estimated catchment surface characteristics need to be re-evaluated during the detailed design stage.

Runoff was computed for both minor (5-year) and major (50-year) design events, considering various durations of up to 24 hours.

The post-development peak flows are tabulated below.

Table 7-6 - Post-development peak flows

	5-year Return Period	50-year Return Period
Sub-catchment ID	**Peak flow (m3/s)**	**Peak flow (m3/s)**
PV Site A	0.11	0.17
PV Site B	0.04	0.06

Table 7-7 - Change in maximum peak flow for Site A and B

	50-year return period peak flow (m3/s)		Change	
Sub-catchment ID	**Pre-development**	**Post-development**	**Peak flow (m3/s)**	**%**
PV Site A	0.12	0.14	0.02	16.7
PB Site B	0.03	0.04	0·01	33.3

As indicated in **Table 7-7**, the increase in runoff from the sub-catchments over the pre-development situation is small, both in quantity and percentage (less than 0.02 m3/s and 0.01 m3/s for Site A and B, respectively). This justification supports the exclusion of detention ponds in the stormwater management plan. This conclusion is based on a comprehensive analysis of the site characteristics, hydrological modeling, and the implementation of recommended stormwater measures. Several factors contribute to the limited increase in stormwater runoff. Firstly, both sites have undergone careful design and engineering considerations to minimise impervious surfaces, ensuring a substantial portion of the rainfall infiltrates into the soil. Additionally, advanced stormwater management practices, such as vegetated swales, bio-retention basins, and permeable pavement, effectively promote on-site retention, infiltration, and evapotranspiration. These measures further contribute to the reduction of stormwater volume and peak flows. Furthermore, the geographic locations of the sites are strategically chosen, considering existing natural drainage patterns and topography, which naturally facilitate the conveyance and dispersion of stormwater.

7.1.8 GROUNDWATER

*The following is extracted from the Groundwater Assessment compiled by WSP and included as **Appendix H.5**.*

7.1.8.1 Hydrogeology

Unsaturated zone

Twenty-five auger holes (AH01–AH25) were manually advanced to depths ranging from 0.3–1.7 mbgl with geotechnical refusal was encountered in most of the holes in addition to the ten shallow boreholes. The deepest soil profile that could be achieved was at PV Site A within the area previously used for crops. The soil profile comprised darker brown clayey sand which become lighter brown with depth. No crops were evident at the time of the investigation.

The “natural” soil horizon (weathered bedrock) comprises a moist, orange, brown to red-brown sandy clay or clayey sand (residual Vryheid formation) with occasional mottled clayey sand with ferricrete nodules in most of the areas inferring a seasonally fluctuating water table.

Localised Fill/made ground comprising coal was encountered in the coal stockyard, Ash observed downgrade of the Ashing Area in BH05 and BH06 and gravelly fill located in the historical Coal discard dump in the vicinity of PV Site B (BH9, BH10). A seepage zone was noted as perched on mottled sandy clay under this layer in the auger holes drilled in this vicinity.

Saturated zone

A monitoring program has been established for the KPS with the available boreholes presented on **Figure 7-13**. The boreholes are distinguished as shallow or deep but there is limited lithological information provided. Groundwater monitoring in the areas proposed for the BESS and PV Sites are limited to around PV Site A.

Whilst borehole logs and depth are not provided for all the monitoring boreholes, the available information implies that there are two distinct aquifers present in the Komati area, namely:

- Seasonal shallow, discontinuous perched aquifer within the overlying weathered rock matrix. This zone is conceptualised (Kimopax, 2019) as an upper zone of completely weathered material to a depth of 8 to 10 m with a higher hydraulic conductivity (k of around 1 m/d). Monitoring boreholes which intercept this zone are typically less than 10 m deep. Boreholes drilled in May 2022 target this aquifer.
- Regional weathered and/or fractured rock aquifer within the Vryheid Formation. These aquifers are commonly confined along essentially horizontal bedding interfaces between different lithologies. This aquifer occurs below the unsaturated zone (> 10 mbgl) in slightly weathered or fractured bedrock with monitoring boreholes typically being > 30 m deep. GHT Consulting, 2009 indicate that the aquifer hydraulic conductivity for the regional aquifer ranges from 0.007 m/d at AB07 to 2.4 m/d for AB04 with an average of 0.51 m/d. This aquifer is likely to be highly heterogeneous.

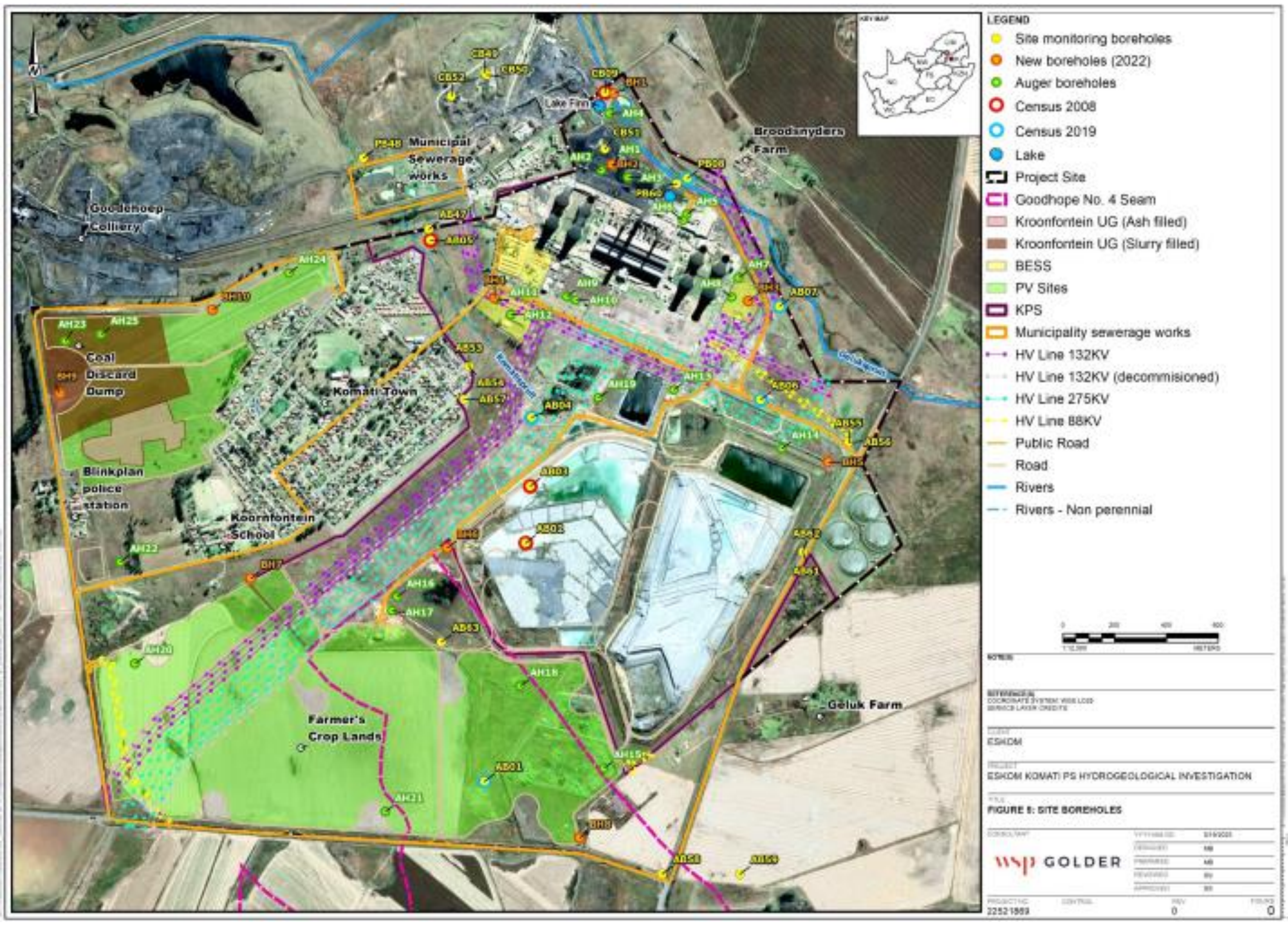


Figure 7-13: Site boreholes

Hydraulic conductivity

Hydraulic conductivity was estimated based on falling head tests (GHT, 2009) as ranging from 0,007 m/d at AB07 to 2.4 m/d for AB04 with an average of 0,51 m/d. Porosity was estimated as 0,3.

7.1.8.2 Groundwater levels

Water levels typically vary from around 1.4 to 12 mbgl with shallow groundwater at surface in AK62 between the Raw Water dams and Ashing Area. Eskom, 2021 indicates that the groundwater flow mimics the topography, and the direction of flow is towards the surface stream, particularly the Koringspruit. The water levels for the other monitoring boreholes located within the KPS area vary from 0 (AB62) to around 6 mbgl are provided for reference. Except for AB55 and AB58, water levels vary between 0,6 and 3.6 m over the period provided (2016 to 2021).

SRK 5666657 (2020) report that regional water levels have been lowered through dewatering of mine workings at Goedehoop Collieries. Water levels in the monitoring boreholes at KPS vary only slightly over time and do not appear to have been affected by dewatering at Goedehoop at the present time. Future undermining by Goodehoop Collieries to the south-east of the Ashing area may influence the local water levels.

There is limited information for PV Site B, BESS A, BESS B and BESS C, however additional information was obtained in June 2022 from the new boreholes. Measurements of static groundwater levels were carried out following stabilisation of the borehole after one week. The water level depths varied from 0.86 to 1.97 mbgl which is broadly consistent with the existing dataset (Komati WISH database, 2022).

7.1.8.3 Flow Direction And Hydraulic Gradient

Eskom, 2021 indicates that the groundwater flow mimics the topography, and the direction of flow are towards the surface stream, particularly the Koringspruit River. There is little seasonal variation noted. The contoured groundwater level is provided after Kimopax, 2019 (**Figure 7-14**). The piezometric contours were also plotted based on the water levels for the boreholes drilled in May 2022 (**Figure 7-15**).

Comparing topographic and groundwater elevations an R2 value of 0.99 is calculable resulting in a very strong correlation coefficient and consistent with previous works. Very broadly, an average hydraulic gradient is calculated with reference to groundwater elevations at BH08 in the south and BH01 in the north. This represents a difference of ~52.82 m over a lateral distance of approximately 2,866 m, equating to a hydraulic gradient of ~0.018. It should be stressed that hydrogeological conditions are unlikely to be homogenous especially recognising that the shallow aquifer is discontinuous and, therefore, local variability should be expected that may differ markedly from this calculated average.

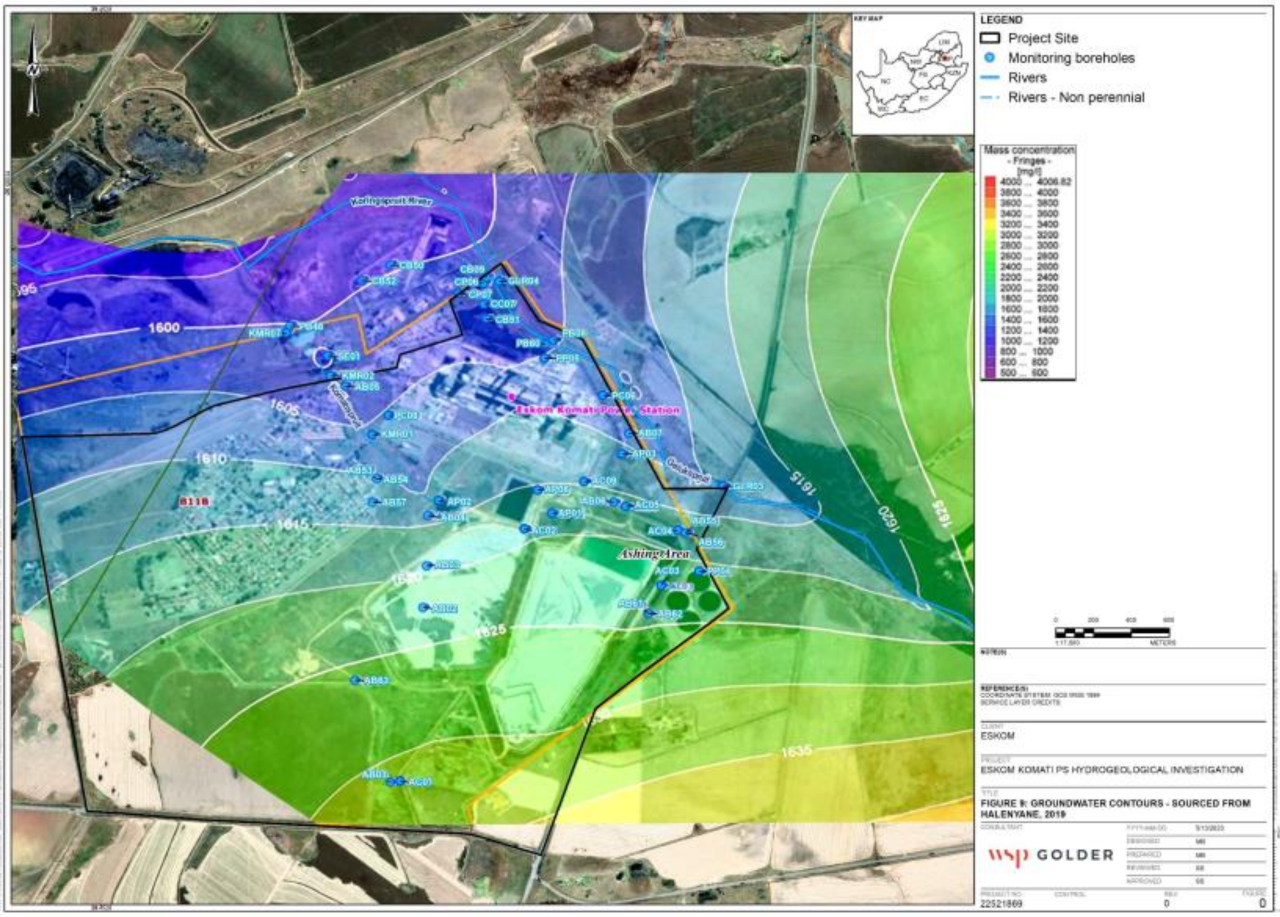


Figure 7-14: Groundwater Contours – sourced from Kinomax, 2019

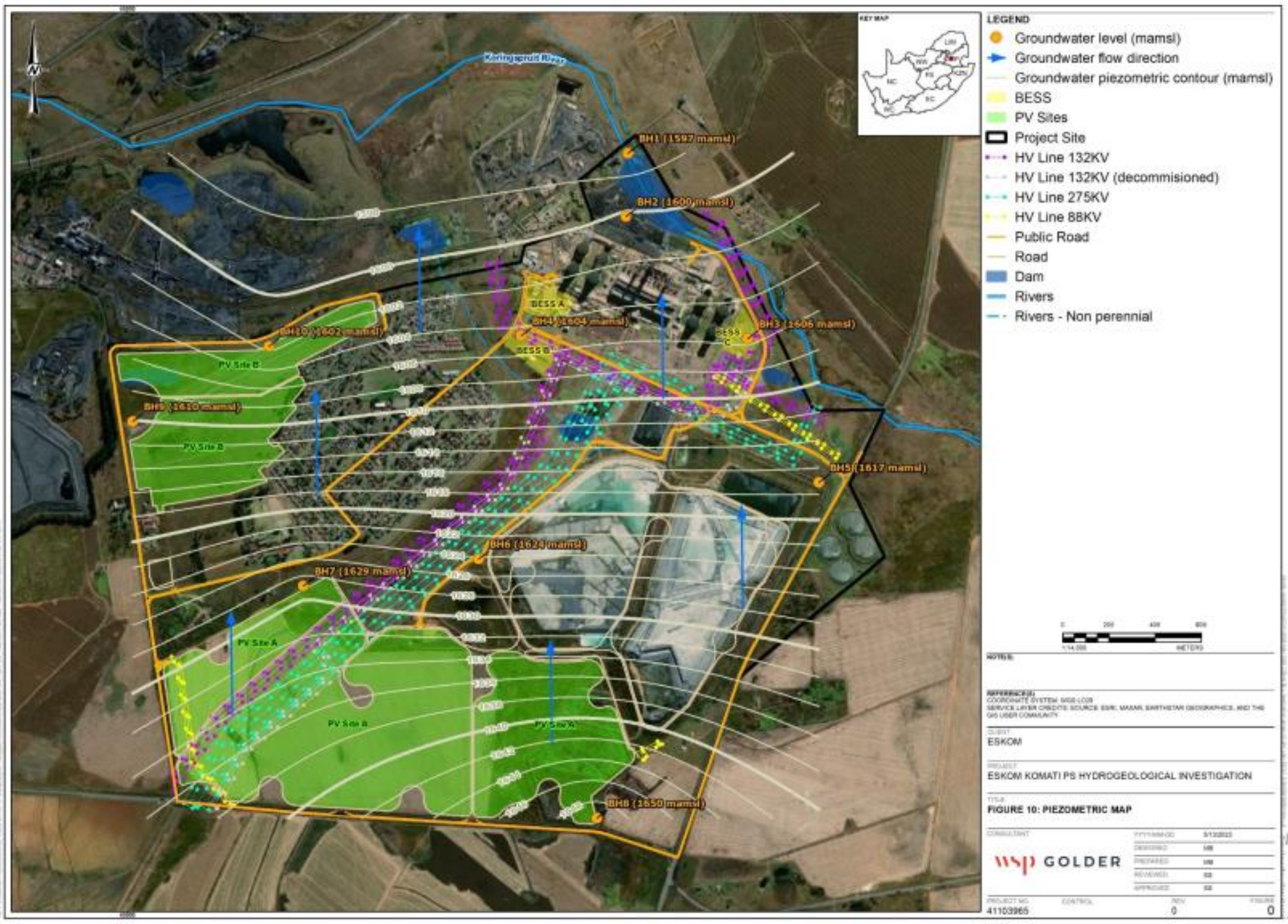


Figure 7-15: Piezometric contours for boreholes drilled in 2022

7.1.8.4 Groundwater Potential Contaminants

Residual contamination may be present in the PV and BESS areas due to historical activities generally related to the KPS. A contaminant land investigation was carried out to assess the potential for contamination to the groundwater. Of note is the residual ash footprint noted to the east of PV Site A and coal stock yard and coal stockyard pollution control dam as well as the settling ponds located on the boundary of KPS. Additional potential sources within the KPS area include a domestic waste dump, sewage plant and fuel depot.

7.1.8.5 Groundwater quality

Water quality data is captured in the WISH database for all parameters. Groundwater quality parameters that need to be analysed are specified in the WUL (Appendix IV Appendix B Clause 3.6) as pH, Electrical conductivity (EC), Total Dissolved Solids (TDS), Total Suspended Solids (SS), Total Alkalinity, chloride (as Cl), sodium (as Na), sulphate, nitrate, ammonia, orthophosphate, fluoride, potassium, manganese, copper, iron, zinc, arsenic and chromium. As noted above, the groundwater flow direction is from south to north. On this basis background groundwater quality is likely best represented by two boreholes located up-gradient of the KPS boundary (AB58 and AB59). The background water quality has been defined by the 95th percentile concentrations of determinants as sourced from the existing Komati Wish database supplied by Eskom with groundwater quality for selected boreholes presented for reference in Appendix B of the

Groundwater Study (**Appendix H.5**). The laboratory certificates for boreholes sampled in June 2022 are included in Appendix C of the Groundwater Study (**Appendix H.5**).

Water quality discussion

The following is noted regarding the monitoring borehole data presented by Eskom:

- Ambient groundwater quality (as represented by AB58 and AB59) is generally alkaline with an average pH of 8.3. Electrical conductivity (EC) (average 17 and 32 mS/m for AB58 and AB59 respectively) is below the groundwater reserve of 112 mS/m.
- Water quality is affected by KPS activities particularly from the Ashing Area and coal stockyard. This is indicated by an increase in salinity associated with elevated chloride, sulphate, calcium, magnesium, sodium and fluoride in the coal stockyard area. Metal concentrations for iron and manganese are elevated compared to the ambient groundwater quality (<0.1 mg/l for iron and <0.5 mg/l for manganese) at AB07 (downgrade of the Ashing Area) and in CB09 (coal stockyard).
- Salinity is elevated exceeding ambient groundwater quality and the reserve for AB01, AB07, CB51, CB09, PB60. The localized increase in salinity is associated with elevated chloride, sulfate, calcium, magnesium, and sodium. Fluoride is near the groundwater reserve of 0,4 mg/lin the ambient boreholes (95th percentile of 0,3 and 0,4 mg/l) and is locally elevated particularly in the coal stock yard area with the 95th percentile of 1.1 mg/l at CB09.
- Boreholes located on and near the northern boundary (CB52, AB47 and CB51) comprise of sulphate, fluoride and manganese concentrations which are elevated compared to the ambient water quality and South African drinking water standards.

The following is noted from the Contaminated Land report regarding the water quality for the boreholes drilled in 2022. In terms of pH and although lower than background (8.8–9.1) the shallow groundwater is generally near neutral (6.62–7.54) and satisfies the lower pH limit (6.6) specified within the WUL. The other determinants provided for within the WUL are also seen as being broadly compliant; however, exceptions are noted as follows:

- A high salt content is recorded at BH03 (BESS C) where, together with elevated concentrations of sodium and sulphate, electrical conductivity, calcium, magnesium and chloride were above their respective reserve limits. This is expected due to the known groundwater plume extending from the up-gradient Ashing Area and concentrations decrease further down-gradient of the KPS (BH02, BESS D) to below the reserve limits. However, increases in the concentrations of several determinants are noted at the further down-gradient position (BH01), with magnesium and chloride again above the reserve criteria, albeit at far lower concentrations than BH03.
- Electrical conductivity and magnesium are above their reserve limits at BH08. This is located up-gradient of KPS activities on the southern boundary of PV Site A but slightly down-gradient of the background borehole (AB58).
- Chloride was above its reserve limit at both BH05 (northeast of the Ashing Area and north of Raw Water Dams) and BH04 (BESS B).

The underlying shallow aquifer targeted as part of this investigation is considered a non-aquifer due to the low yield and discontinuous nature. Nonetheless, the possibility of vertical migration of contaminant impacts from this to the regional deeper weathered/fractured rock aquifer is recognised.

In recognition of groundwater use within 1 km together with the proximal freshwater aquatic surface water environs, the known plume associated with the Ashing Area expectedly dominates the signature of down-gradient groundwater quality with manganese at a concentration (1,718.3 µg/l) above both the drinking water chronic health standard (400 µg/l) and freshwater aquatic guideline (180 µg/l). While this plume has been shown to extend off-site to the north, seemingly additional contributions from the KPS and particularly the coal stockyard are also observed with a doubling in the concentration of manganese recorded at BH01 (3,269.5 µg/l). The likely lateral dispersivity of this plume is also apparent at BH05 to the northeast and BH06 to the west where manganese concentrations of 809.5 µg/l and 496.8 µg/l were respectively recorded. Manganese was not otherwise recorded above either its freshwater aquatic guideline or chronic health standard for drinking water, although was noted to be above its aesthetic drinking water standard at BH04 (BESS B).

Compared to the background range (6.2–10 µg/l) concentrations of zinc appear elevated within the shallow groundwater across the entire property (16.2–59 µg/l). While far below the drinking water standard of 2 000 µg/l, these are above both the Target Water Quality Range (TWQR) and Chronic Effect Value (CEV) of 2 µg/l and 3.6 µg/l, respectively for aquatic ecosystems, and also above the Acute Effect Value (AEV) of 36 µg/l in four of ten boreholes (40%) sampled under the current scope. This includes positions both up- and down-gradient and therefore the source of zinc remains uncertain.

While absent in the background, lead has been detected within all shallow groundwater samples obtained. Notably, however, this is an approximate order of magnitude greater, and above the drinking water standard, within the west of the property (BH06, BH07 and BH08 [PV Site A] and BH09 [PV Site B]). While the combustion of fossil fuels (i.e. coal) is a recognised source of environmental lead, the reason for the noted distribution is uncertain and therefore remains unconfirmed; however, appears to correlate with typically higher concentrations of lead in soils in the west of the premises.

Exceedances of the adopted standards/guidelines does not necessarily confirm the presence of an unacceptable risk but provides a conservative indication of where the shallow groundwater may represent a source of impact for the identified receptors. It is understood (VPC, 2021) that rehabilitation and management is planned for the plume associated with the Ashing Area and, as such, long term improvements in the quality of shallow groundwater would be expected once this process is implemented. While the sources of lead and zinc cannot be categorically confirmed these are almost certainly related to the activities at both KPS and the neighbouring colliery, and more detailed assessment/s are recommended to ensure appropriate protection of any potential receptors. **Otherwise, the demonstrated impacts to shallow groundwater are not considered to represent substantial constraints to the proposed development specific to the two PV and BESS sites.**

7.1.8.6 Aquifer Characterisation

Groundwater vulnerability

The KPS is vulnerable to groundwater contamination due to the shallow water table. This is mitigated by the low k and low recharge. Due to the surrounding use of groundwater by communities, the aquifer is considered to have a high vulnerability to contamination as is indicated by the observed localised impact from existing sources.

Aquifer classification

The aquifer is classified as a Minor aquifer (Parsons, 1995; DWAF, 1998) or Poor (DEA, 2010) due to the low exploitation potential and low yields. It does, however, represent an important source of water for domestic supply to the local communities. The aquifer beneath the site (> 35m) is classified as Minor/Poor with the overlying shallow weathered zone (<10m) being perched and discontinuous.

The overlying shallow aquifer is not considered a viable groundwater resource but may contribute to seepage in the wetland areas as well as vertical migration into the regional deeper weathered/fractured rock aquifer. It is again noted that the underlying groundwater is known to have been impacted by mining and activities at KPS. Future mining of the No.4 coal seam underlying PV Site A is understood to be planned. The seam is located 20 to 100 m below ground surface (Anglo American, 2015).

Aquifer protection classification

A weighting and rating approach is used to decide on the appropriate level of groundwater protection (Table 7-8). After rating the aquifer system management and the aquifer vulnerability, the points are multiplied to obtain a Groundwater Quality Management (GQM) index.

Table 7-8 - Ratings for the Aquifer Quality Management Classification System

Aquifer Characterisation		Vulnerability	
Class	Points	Class	Points
Sole Source Aquifer System	6	High	3
Major Aquifer System	4	Medium	2
Minor Aquifer System	2	Low	1
Non-Aquifer System	0		
Special Aquifer System	0 - 6		

Table 7-9 - Appropriate level of groundwater protection required

GQM Index	Level of Protection
<1	Limited Protection
1 – 3	Low Level Protection
4 – 6	Medium Level Protection
7 – 10	High Level Protection
>10	Strictly Non-degradation

Table 7-10 - Aquifer classification and vulnerability assessment

Description	Aquifer	Vulnerability	Rating	Protection
Regional Aquifer	Minor (2)	1-2	4	Medium

The above classification implies that the regional aquifer is less sensitive due to the low recharge and low conductivity (k) and hence a medium level of protection is required.

7.1.9 SOILS AND AGRICULTURAL POTENTIAL

*The following is extracted from the Soil and Agricultural Potential Assessment compiled by WSP and included as **Appendix H.6**.*

7.1.9.1 Soil Classification

The classification of the soil forms identified on site was undertaken using the South African soil taxonomic system (Soil Classification Working Group, 1991). All South African soil forms fall within 12 soil types; Duplex (marked accumulation of clay in the B horizon), Humic (intensely weathered, low base status, exceptional humus accumulation), Vertic (swelling, cracking, high activity clay), Melanic (dark, structured, high base status), Silicic (Silica precipitates as a dorbank horizon), Calcic (accumulation of limestone as a horizon), Organic (peaty soils where water inhibits organic breakdown), Podzolic (humic layer forms beneath an Ae or E), Plinthic (fluctuating water table causes iron re-precipitation as ferricrete), Oxidic (iron oxides weather and colour soils), Hydromorphic (reduced lower horizons) and Inceptic (young soils - accumulation of unconsolidated material, rocky B or disturbed) soils.

7.1.9.2 Land Capability Assessment

The South African land capability classification system by Scotney et al. (1987) was used to classify and map land capability (see Table 7-11). This system is useful in that it is able to quickly provide an overview of the agricultural capability and limitations of the soils in question and is useful for land capability comparisons. This system is based on a series of groups and classes, as highlighted in Table 7-11 and Table 7-12.

Table 7-11 – Land Capability: Class Concepts

Class	Concepts
I	Land in Class I has few limitations that restrict its use; it may be used safely and profitably for cultivated crops; the soils are nearly level and deep; they hold water well and are generally well drained; they are easily worked, and are either fairly well supplied with plant nutrients or are highly responsive to inputs of fertilizer; when used for crops, the soils need ordinary management practices to maintain productivity; the climate is favourable for growing many of the common field crops.
II	Land in Class II has some limitations that reduce the choice of plants or require moderate conservation practices; it may be used for cultivated crops, but with less latitude in the choice of crops or management practices than Class I; the limitations are few and the practices are easy to apply.
III	Land in Class III has severe limitations that reduce the choice of plants or require special conservation practices, or both; it may be used for cultivated crops, but has more restrictions than Class II; when used for cultivated crops, the conservation practices are usually more difficult to apply and to maintain; the number of practical alternatives for average farmers is less than that for soils in Class II.
IV	Land in Class IV has very severe limitations that restrict the choice of plants, require very careful management, or both; it may be used for cultivated crops, but more careful management is required than for Class III and conservation practices are more difficult to apply and maintain; restrictions to land use are greater than those in Class III and the choice of plants is more limited.
V	Land in Class V has little or no erosion hazard but has other limitations which are impractical to remove that limit its use largely to pasture, range, woodland or wildlife food and cover. These limitations restrict the kind of plants that can be grown and prevent normal tillage of cultivated crops; it is nearly level; some occurrences are wet or frequently flooded; others are stony, have climatic limitations, or have some combination of these limitations.
VI	Land in Class VI has severe limitations that make it generally unsuited to cultivation and limit its use largely to pasture and range, woodland or wildlife food and cover; continuing limitations that cannot be corrected include steep slope, severe erosion hazard, effects of past erosion, stoniness, shallow rooting zone, excessive wetness or flooding, low water-holding capacity; salinity or sodicity and severe climate.
VII	Land in Class VII has very severe limitations that make it unsuited to cultivation and that restrict its use largely to grazing, woodland or wildlife; restrictions are more severe than those for Class VI because of one or more continuing limitations that cannot be corrected, such as very steep slopes, erosion, shallow soil, stones, wet soil, salts or sodicity and unfavourable climate.
VIII	Land in Class VIII has limitations that preclude its use for commercial plant production and restrict its use to recreation, wildlife, water supply or aesthetic purposes; limitations that cannot be corrected may result from the effects of one or more of erosion or erosion hazard, severe climate, wet soil, stones, low water-holding capacity, salinity or sodicity.

Table 7-12 – Land Capability: Broad Land Use Options

Land Capability Group	Land Capability Class	Increased intensity of use									Limitations
Arable	I	W	F	LG	MG	IG	LC	MC	IC	VIC	No or few limitations. Very high arable potential. Very low erosion hazard
	II	W	F	LG	MG	IG	LC	MC	IC	-	Slight limitations. High arable potential. Low erosion hazard
	III	W	F	LG	MG	IG	LC	MC	-	-	Moderate limitations. Some erosion hazards
	IV	W	F	LG	MG	IG	LC	-	-	-	Severe limitations. Low arable potential. High erosion hazard.
Grazing	V	W	-	LG	MG	-	-	-	-	-	Water course and land with wetness limitations
	VI	W	F	LG	MG	-	-	-	-	-	Limitations preclude cultivation. Suitable for perennial vegetation
	VII	W	F	LG	-	-	-	-	-	-	Very severe limitations. Suitable only for natural vegetation
Wildlife	VIII	W	-	-	-	-	-	-	-	-	Extremely severe limitations. Not suitable for grazing or afforestation.

W - Wildlife; F - Forestry; LG - Light grazing
MG – Moderate grazing; IG - Intensive grazing; LC - Light cultivation
MC - Moderate cultivation; IC - Intensive cultivation.; VIC – Very intensive cultivation

7.1.9.3 Soil Form Identification and Classification

The study area land types (DFFE, 2018) are shown in **Figure 7-19**. This dataset describes the project site as dominated by a plinthic catena land type, which is characterised by a grading of soils from red through yellow to grey soils down a slope. The colour sequence is ascribed to different iron minerals stable at increasing degrees of wetness. Locations of the soil forms identified on site are shown in **Figure 7-21** and are described below. The likely soil form areas are shown in **Figure 7-22**. These soil forms agree with the DFFE database in that they include red, iron-rich, arable soils and yellow soils – some with signs of wetness. It is likely that grey soils exist in the lower-lying areas to the north-east of the site. The soil forms identified were clay-rich and well structured.

Shortlands

A soil form identified at the site is what is called a Shortlands in the South Africa taxonomic system (see **Figure 7-16**). These soils comprise an orthic topsoil and a red, structured B horizon with clayskins. The red colour is the result of the accumulation of iron oxides following mineral weathering. The Shortlands soil form is a potentially fertile, manageable soil. It has good moisture intake and moisture holding characteristics.

Figure 7-16 - Shortlands Soil

Valsrivier

The Valsrivier soil form dominated the site and is characterised by an orthic A over a pedocutanic B horizon over unconsolidated material without signs of wetness (see **Figure 7-17**). This is a duplex soil which means that there is a clear transition from the A to the B horizon as a result of clay illuviation. The B horizon is generally an impediment to root growth and water movement.

Figure 7-17 - Valsrivier Soil

Sepane

The Sepane soil form was found in a limited area on site and is characterised by an orthic A over a pedocutanic B horizon over unconsolidated material with signs of wetness (see **Figure 7-18**). This is also a duplex soil such that there is again a clear transition from the A to the B horizon as a result of clay illuviation.

Figure 7-18 - Sepane Soil

Witbank

The final 'soil form' identified at the site was a Witbank. This is commonly found in areas of man-made activities and is a man-made soil deposit.

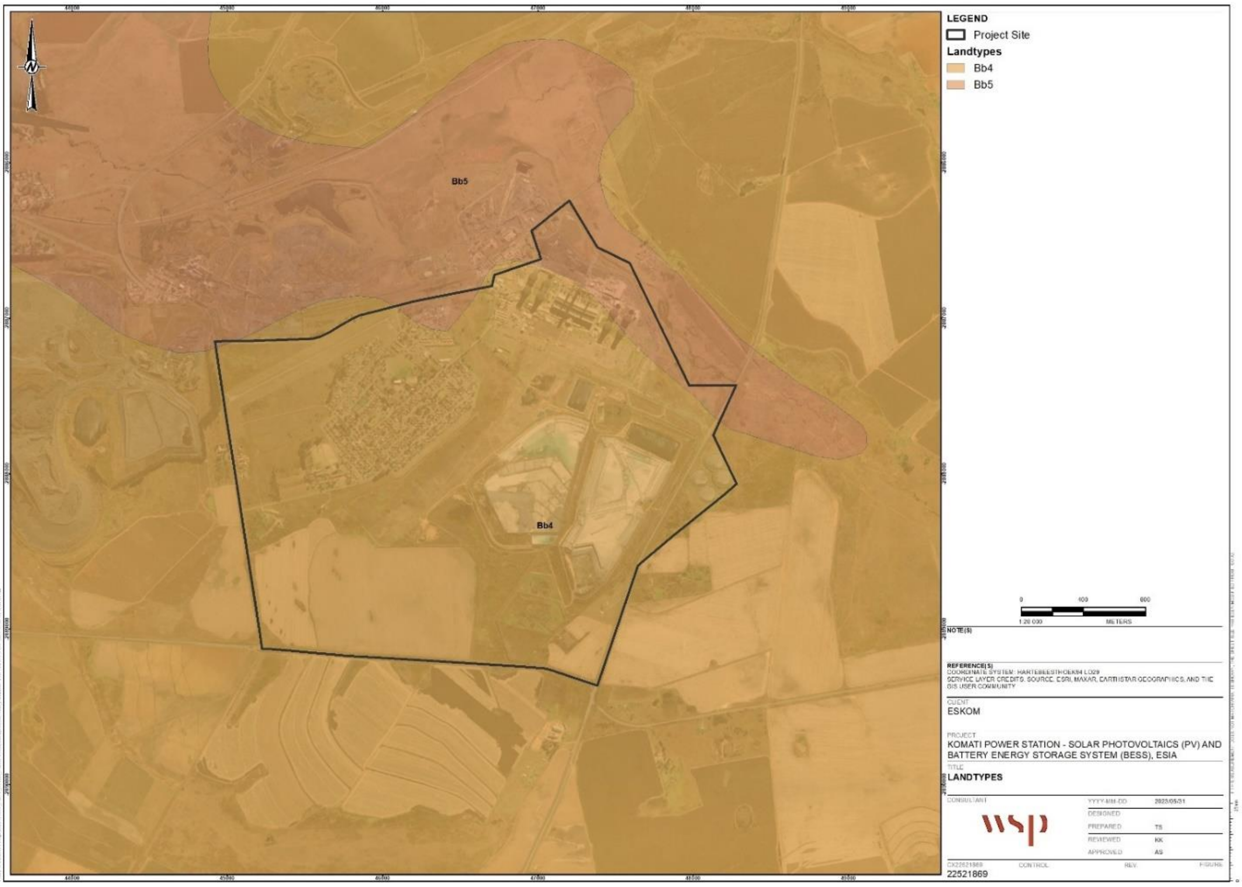


Figure 7-19 - Komati Site Land Types (DFFE, 2018)

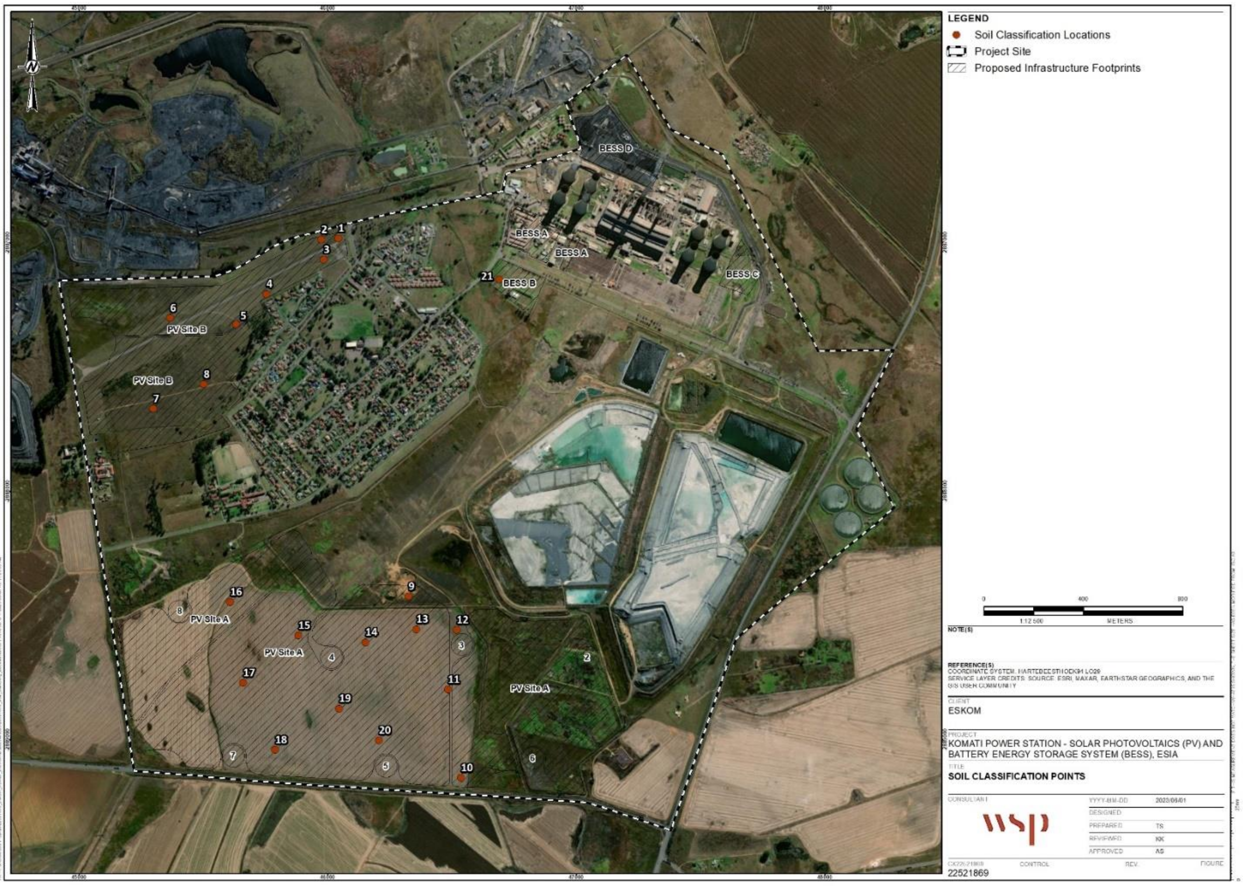


Figure 7-20 – Komati Identified Site Soil Form Points

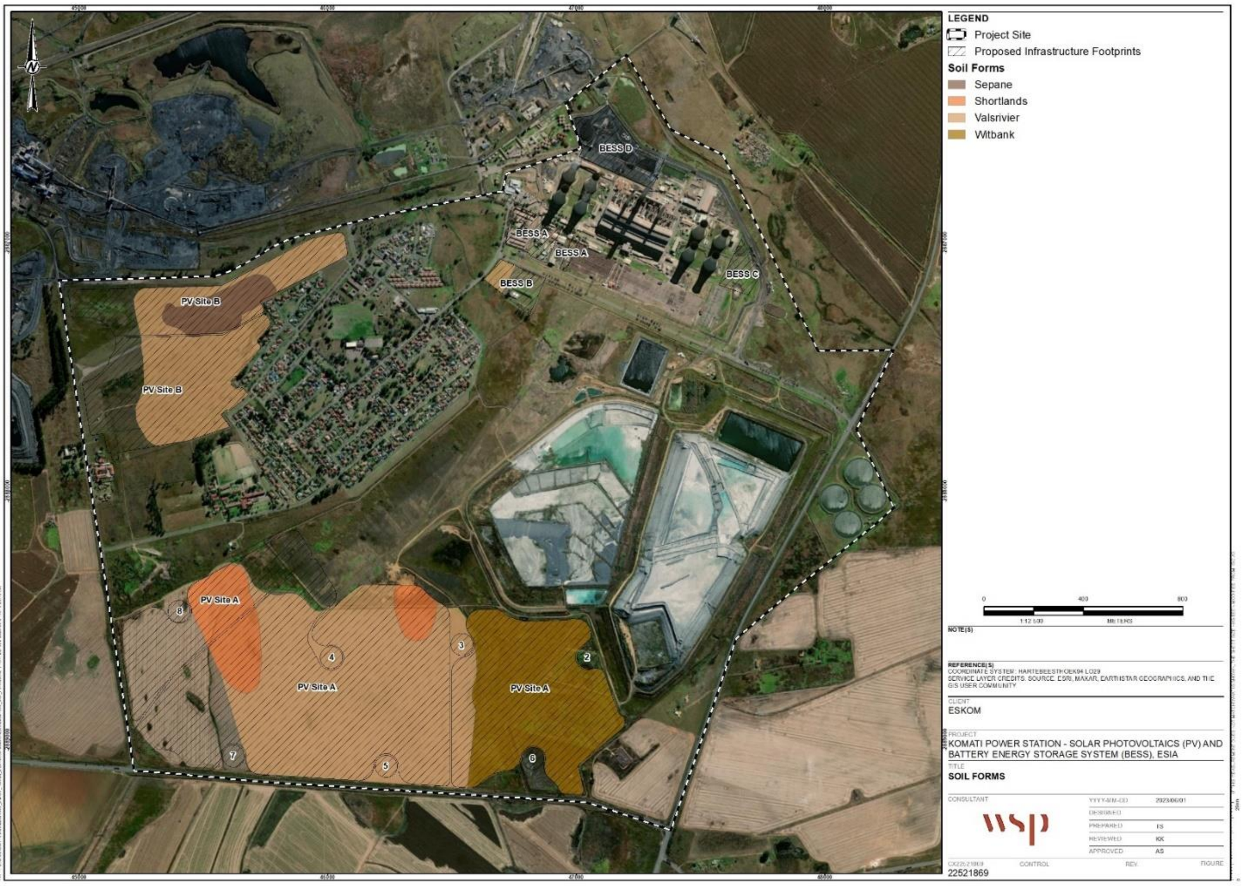


Figure 7-21 - Komati Extrapolated Site Soil Form Areas

7.1.9.4 Soil Capability Analysis

Land capability is the inherent capacity of land to be productive under sustained use and specific management methods. The land capability of an area is the combination of the inherent soil properties and the climatic conditions as well as other landscape properties, such as slope and drainage patterns that may have resulted in the development of wetlands, as an example.

Using the Scotney *et al.* (1987) system and based on the soils identified on the Project site, a portion of the site's land capability class is Arable II (underlain by Shortlands soils), a portion is Grazing VI (underlain by Valsrivier soils), a portion is Grazing V (underlain by the Sepane soils) and a remaining portion is Wildlife VII (underlain by the Witbank soils). Because the site soil classification was undertaken in a freeform manner and not based on a set grid across the whole site, land use (DFFE, 2021) information has been used to augment the soil forms information in order to better inform the soil capability mapping (see **Figure 7-22**).

According to the DFFE 2021 database, the current land use of the portions of the site proposed for infrastructure is a combination of cultivated fields and grassland in the main, with small built up and forested sections. **Figure 7-23**shows the DFFE land uses of the project area. When combining the soils and land use information, the cultivated fields and areas underlain by Shortlands soils have been ascribed Arable II, the grassland and areas underlain by Valsrivier soils have been ascribed Grazing VI, the area underlain by Sepane soil has been ascribed Grazing V and the area underlain by Witbank soil has been ascribed Wildlife VII (see **Figure 7-23**).

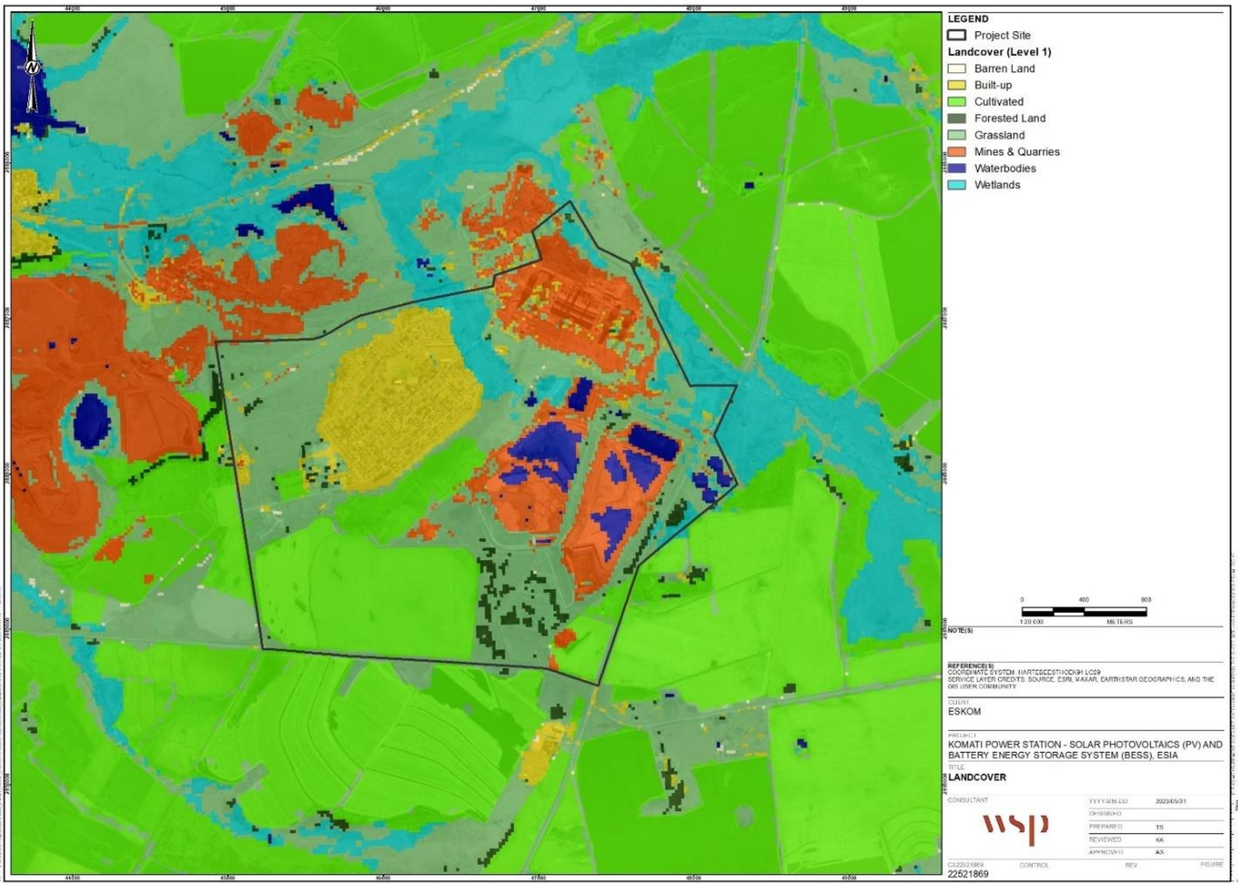


Figure 7-22 – Komati Site Land Cover (DFFE, 2021)

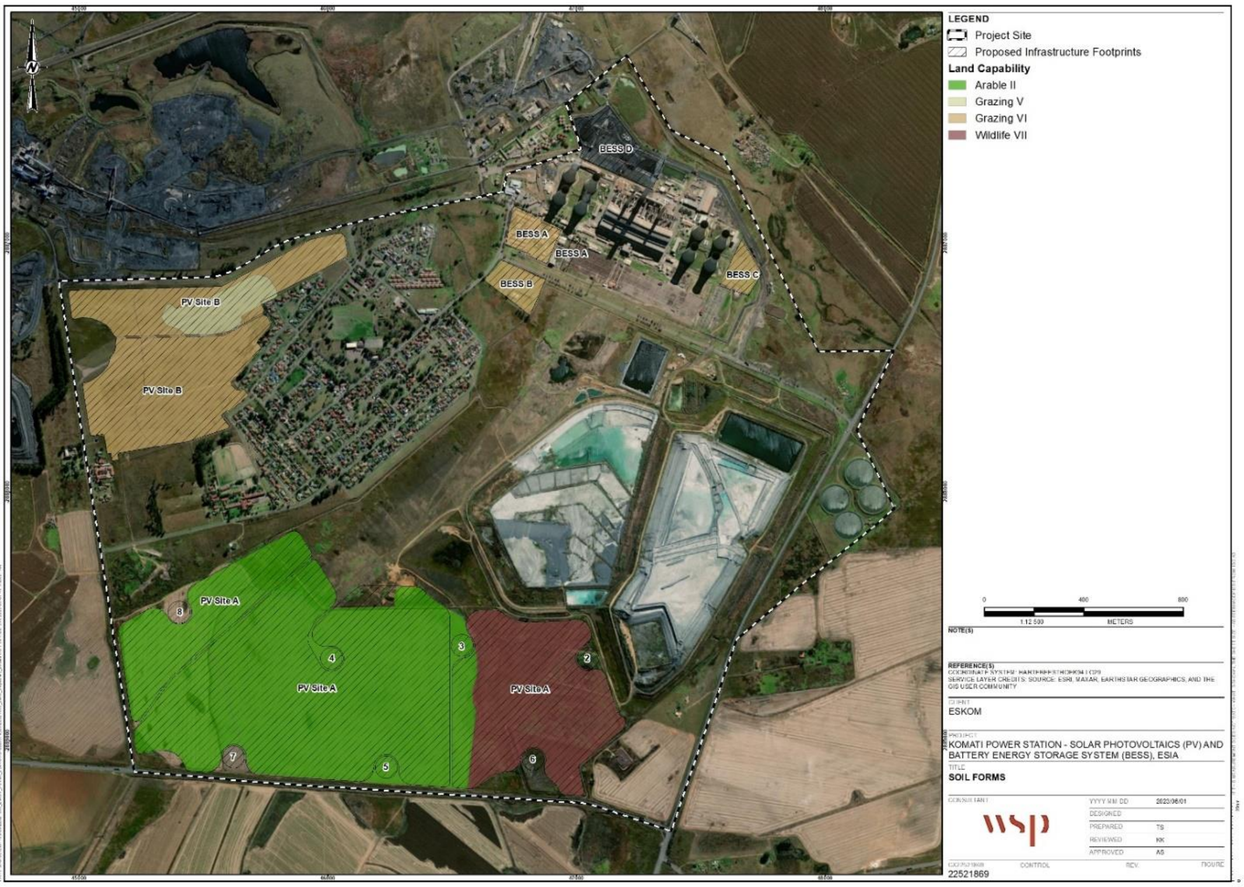


Figure 7-23 – Komati Site Soil Capability (Scotney et al. 1987)

7.2 BIOLOGICAL ENVIRONMENT

7.2.1 TERRESTRIAL ANIMAL SPECIES

The following is extracted from the Terrestrial Animal Species Assessment compiled by Hawkhead Consulting and included as ***Appendix H.7****.*

Two spatial scales were considered for this assessment:

A Local Study Area (LSA), which encompasses the proposed Project's development footprints and all areas encompassed by the Project site boundary, within which direct impacts on biodiversity receptors (i.e., direct habitat loss, fauna mortality) are likely to occur; and

A Regional Study Area (RSA), which comprised the catchment within which the proposed Project is situated and is considered to be an ecologically appropriate area of analysis for the identification of sensitive biodiversity receptors with potential to occur in the LSA, and which may be indirectly impacted by the proposed Project.

These are shown in **Figure 7-24**.

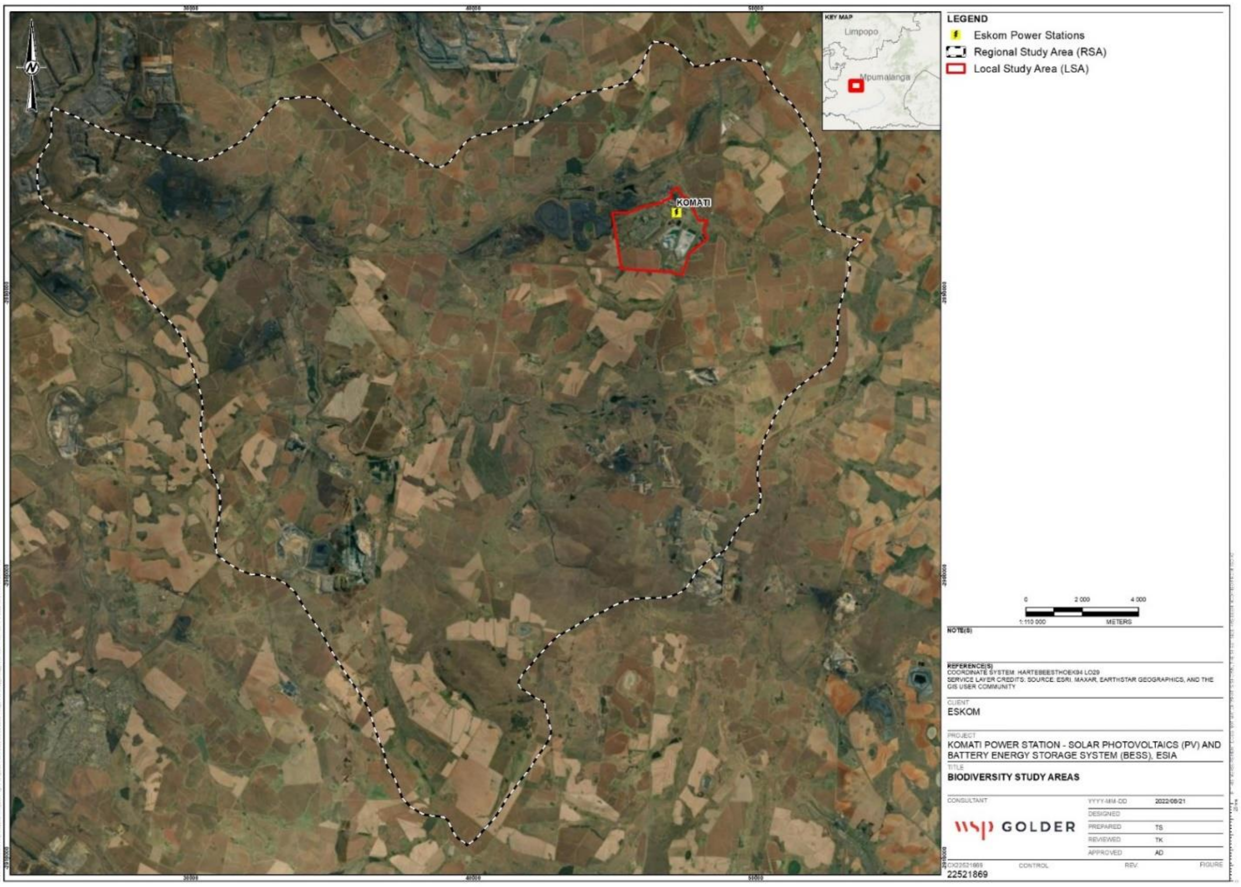


Figure 7-24: Aerial view showing the extent of the regional and local study areas

The RSA is characterised by a mosaic of natural and modified habitats. Modified habitats are dominated by extensive areas of cultivation, with smaller areas comprising inter alia, various mining operations and alien tree plantations. Natural habitat is mostly confined to linear patches of grassland and wetland that are typically aligned with drainage features.

The LSA has also been heavily impacted by historic and contemporary anthropogenic activities. These are summarised below:

- Prominent infrastructure and disturbances include the power station complex and associated facilities (e.g., ash dumps, pollution control dams) (shown in **Figure 7-25** and **Figure 7-26**) and Komati village. The village is a fully operational residential zone, with accompanying road network, police station, schools and commercial shops;
- Extensive areas are also dominated by cultivated fields, which are regularly disturbed by ploughing and crop harvesting. Cultivated fields that lie fallow are colonised by dense stands of alien weeds and pioneer flora;
- Prominent alien tree stands are present adjacent to the village. Colonisation by other alien species, including several listed invasive species, is also common and widespread throughout the LSA;
- Numerous informal drainage trenches have been excavated across the power station property in order to channel water away from access roads and improve general site accessibility. The earth works associated with these drainage trenches has resulted in vegetation clearing and disturbance, and this has facilitated the establishment of several alien invasive species;
- The LSA is also criss-crossed by large transmission line corridors which are maintained by Eskom;
- Other anthropogenic facilities and activities noted in the LSA during the field survey that have caused habitat disturbance and fragmentation include inter alia; gravel access roads (**Figure 7-27**), fencing, and refuse dumping (**Figure 7-28**) and burning; and
- Goedehoop Colliery is located along the northern and western boundary of the LSA. The colliery is characterised by large areas that have been completely transformed by mining activities.

The above listed features and activities have caused environmental degradation, which has reduced the overall extent and integrity of natural habitat in the LSA and in the immediate surrounding landscape, and this has impacted on-site ecological functioning and species diversity.

Figure 7-25: The completely transformed coal deposit area at Komati Power Station

Figure 7-26: View over the ash dam facilities in the local study area

Figure 7-27: Amongst other features, gravel roads and drainage trenches have fragmented habitat in the local study area, and facilitated alien invasive species colonisation

Figure 7-28: Rubble and refuse dumping site adjacent to the western boundary of the local study area

7.2.1.1 On-Site Habitat Units

The Terrestrial Plant Species Assessment identified five habitat units in the LSA. As per IFC PS 6, three units meet the definition of 'modified habitat', i.e., anthropogenic activity has substantially modified primary ecological functioning and species composition. The remaining two units are classified as 'natural habitat' as they comprise viable assemblages of indigenous species and retain their primary ecological functions:

- Modified Habitats
  - Cultivated Fields;
  - Alien Tree Stands; and
  - Transformed Areas with Disturbed or Landscaped Vegetation.
- Natural Habitats
  - Mixed *Themeda triandra* Grassland; and
  - Mixed Moist Grassland.

Table 7-13 presents the total extent of modified and natural habitats in the LSA. **Figure 7-29** presents a habitat unit map for the study area.

For full descriptions of each habitat unit refer to the Terrestrial Plant Species Assessment report (**Appendix H.8**).

Table 7-13 – Extent of modified and natural habitats in the local study area

Habitat Type	Habitat Units	Current Extent (Ha)
Modified Habitats	Cultivated Fields	107.49
	Alien Tree Stands	4.25

Habitat Type	Habitat Units	Current Extent (Ha)
	Transformed Areas with Disturbed or Landscaped Vegetation	382.14
	Sub Total	493.87
Natural Habitats	Mixed *Themeda triandra* Grassland	31.01
	Mixed Moist Grassland	145.83
	Sub Total	176.84

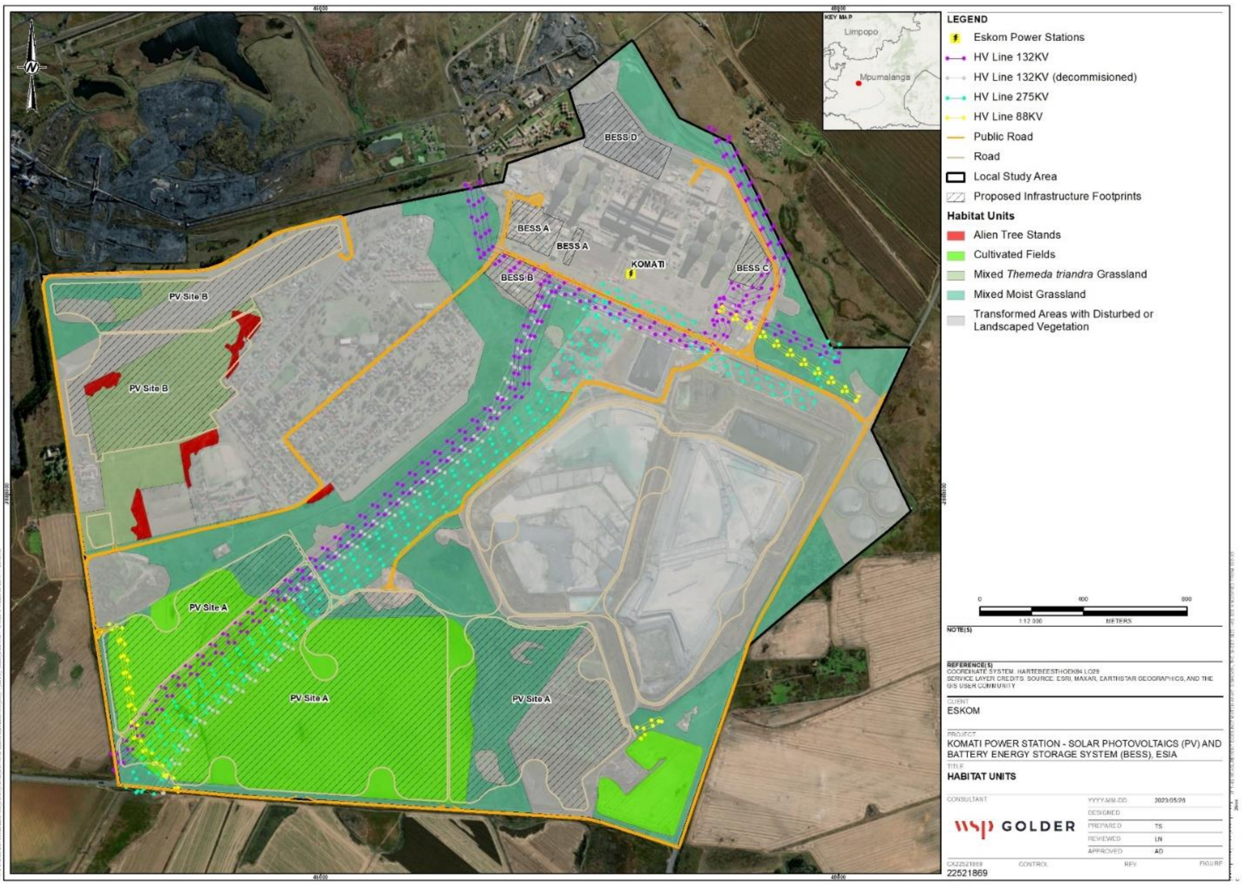


Figure 7-29: Habitat unit map of the local study area, showing proposed Project infrastructure, as well as existing Eskom facilities

7.2.1.2 Fauna Assessment

Mammals

Mammal Richness and Habitat Availability

Based on historic distribution ranges, up to 69 mammal species potentially occurring in the region in which the RSA is located. MammalMAP records indicate that, of these, 23 species have previously been recorded in the 2629AB and 2629BA QDS. Recorded mammals range from several small rodents to medium-sized antelope, such as the Blesbok (*Damaliscus pygargus phillipsi*) and Oribi (*Ourebia ourebi*).

During the 2022 field survey, tracks of three mammal species was recorded in the LSA, including Water Mongoose (*Atilax paludinosus*) (**Figure 7-30**), Porcupine (*Hystrix africaeaustralis*) (**Figure 7-31**), and a small cat. The latter is potentially an African Wildcat (*Felis silvestris*) or a domestic/feral cat. The Komati environmental manager also indicated that Serval (*Leptailurus serval*) are known to be present in the LSA.

The LSA is highly modified and fragmented by various built infrastructure, including restrictive linear features, such as boundary and internal security fences. This, coupled with the relatively large human population and high levels of anthropogenic activity, render habitat in the local study area mostly unsuitable for many mammal species.

Figure 7-30: Water Mongoose (*Atilax paludinosus*) tracks

Figure 7-31: Porcupine (*Hystrix africaeaustralis*) tracks

Mammals of Conservation Concern

Of mammal species potentially occurring in the RSA, 23 are of conservation concern. These are listed in **Table 7-14**, along with their habitat preferences and a probability of occurrence. Serval, which was noted to be present in the LSA based on anecdotal evidence, is a SCC. This species is listed as Near Threatened on both the Regional and Mpumalanga Red Lists. It is also listed as Protected on the NEMBA ToPS List (2007).

The environmental sensitivity screening report for the proposed Project rated the Animal Species Theme as 'High Sensitivity', and highlighted the potential presence of five sensitive mammal features, namely Black-footed Cat (Felis nigripes), Maquassie Musk Shrew (*Crocidura maquassiensis*), Spotted-necked Otter (*Hydrictis maculicollis*), African Marsh Rat (*Dasymys robertsii*) and Oribi (*Ourebia ourebi ourebi*). These, as well as the Serval, are discussed in more detail below:

- Black-footed Cat (Vulnerable, Global & SA): A secretive and nocturnal species that generally occurs at low densities, with an estimated regional population size ranging from 7 526-11 905 km2 (Wilson, et al., 2016). Black-footed Cats favour short, open grassland habitats where they shelter in abandoned Aardvark burrows or hollowed out termite mounds (Wilson, et al., 2016). Suitable habitat is present in both the regional and local study areas; however, it unlikely the Black-footed Cat is present in the LSA due to the high levels of anthropogenic activity;

- Maquassie Musk Shrew (Vulnerable, SA): A species endemic to southern Africa. The EOO of the Maquassie Musk Shrew is estimated at 284 735 km2, however it is patchily distributed, with an AOO of between 40 496 – 47 246 km2 (based on a 500 m buffer strip around wetlands) (Taylor, et al., 2016). Population size is estimated at 179 000 individuals. Little is known about the habitat preferences of the Maquassie Musk Shrew. It has been recorded in moist grassland-type habitats, but is also likely to tolerate urban and rural landscapes (Taylor, et al., 2016). It is therefore possible that this species is present in both the regional- and local study areas;
- Spotted-necked Otter (Near Threatened, Global & Vulnerable, SA): A widespread species that is restricted to areas of permanent water (Ponsonby, et al., 2016). The estimated range of Spotted-necked Otter totals 31 407 km of river, resulting in an estimated population size (taking into account both undisturbed and disturbed river habitats), of 17 117 individuals (Ponsonby, et al., 2016). Although there is suitable habitat across the RSA for this species, there is limited suitable habitat available in the LSA. It is therefore considered unlikely that Spotted-necked Otter is present in the LSA;
- African Marsh Rat (Vulnerable, SA): This species favours intact river and wetland systems, and has not been found in degraded wetlands (Pillay et. al., 2016). The EOO of the African Marsh Rat is estimated at greater than 10 000 km2, while its AOO is calculated at between 1 030-11 382 km2. The population size for this species is unknown (Pillay et. al., 2016). Considering the disturbed nature of wetland habitats in the LSA, it is considered unlikely that the African Marsh Rat is present. It is probable however, that this species is present in the RSA;
- Oribi (Endangered, Global, SA & MP): A grassland species, requiring a matrix of short- and tall grass habitats for feeding and sheltering. Regional population is estimated at 1 859 to 2 169 mature individuals (Shrader, et al., 2016). Subpopulations of Oribi are highly fragmented and movement between subpopulation is probably rare (Shrader, et al., 2016). Considering the highly fragmented and disturbed nature of the LSA, coupled with the high levels of anthropogenic activity, it is considered unlikely that Oribi is present. Its presence in the regional study area is considered possible; and
- The Serval (Near Threatened, SA & MP): Solitary and territorial cat, that favours wetland, tall grassland and well-watered savanna habitats (Estes, 1991). Population densities range from 0.1 to 1.5 individuals per km2, with a regional population estimated at 10 264 ±812 individuals (Ramesh, et al., 2016). Based on anecdotal evidence, this species was noted to be present in the LSA and is likely to be fairly abundant across the RSA. Moreover, Serval are able tolerate relatively high levels of anthropogenic activity, and is frequently found in farmland and mining/industrial land, provided sufficient suitable habitat is present and levels of persecution remain low (Ramesh, et al., 2016). In light of these factors, habitat disruptions associated with the proposed Project are unlikely to negatively impact the local Serval population.

Table 7-14 – Mammal species of conservation concern occurring or potentially occurring in the study area

Family	Scientific Name	Common Name	Global Red List Status (IUCN, 2022-2)	Regional Red List Status (2016)	NEMBA ToPS List (2007)	Mpumalanga Status	Habitat Preferences*	Probability of Occurrence	
								Regional Study Area	Local Study Area
Bathyergidae	*Cryptomys hottentotus*	Common Mole-rat	Least Concern	Data Deficient	-	Data Deficient	Prefers deep sandy soils along rivers.	Probable	Unlikely – limited suitable habitat.
Bathyergidae	*Georychus capensis*	Cape Mole-rat	Least Concern	Data Deficient		-	Prefers deep sandy soils along rivers.	Probable	Unlikely – limited suitable habitat.
Bovidae	*Connochaetes gnou*	Black Wildebeest	Least Concern	Least Concern	Protected	-	Open grassland plains and arid shrubland.	Unlikely	Unlikely – no suitable habitat and high levels of anthropogenic disturbance.
Bovidae	*Ourebia ourebi ourebi*	Oribi	Least Concern	Endangered	Endangered	Endangered / Protected	Short open grassland, with patches of taller grass.	Possible	Unlikely – no suitable habitat and high levels of anthropogenic disturbance.
Bovidae	*Pelea capreolus*	Grey Rhebok	Near Threatened	Near Threatened	-	Protected	Sourveld grassland and scrubland in hills and mountainous areas.	Unlikely	Unlikely – no suitable habitat and high levels of anthropogenic disturbance.

Family	Scientific Name	Common Name	Global Red List Status (IUCN, 2022-2)	Regional Red List Status (2016)	NEMBA ToPS List (2007)	Mpumalanga Status	Habitat Preferences*	Probability of Occurrence	
								Regional Study Area	Local Study Area
Bovidae	*Raphicerus campestris*	Steenbok	Least Concern	Least Concern	-	Protected	Range of habitats, including grassland and savanna.	Probable	Possible – suitable habitat present
Bovidae	*Redunca arundinum*	Southern Reedbuck	Least Concern	Least Concern	Protected	Protected	Savanna and grassland habitats in mountainous areas.	Probable	Unlikely – limited suitable habitat and high levels of anthropogenic disturbance.
Bovidae	*Redunca fulvorufula fulvorufula*	Mountain Reedbuck	Endangered	Endangered	-	Protected	Rolling grassy hillsides and mountain slopes.	Unlikely	Unlikely – no suitable habitat and high levels of anthropogenic disturbance.
Canidae	*Vulpes chama*	Cape Fox	Least Concern	Least Concern	Protected	-	Range of habitats, including grassland and arid savanna.	Possible	Unlikely – limited suitable habitat and high levels of anthropogenic disturbance.
Chrysochloridae	*Amblysomus robustus*	Robust Golden Mole	Vulnerable	Vulnerable	Endangered	Vulnerable	Sandy soils in grassland areas.	Possible	Possible – suitable habitat present

Family	Scientific Name	Common Name	Global Red List Status (IUCN, 2022-2)	Regional Red List Status (2016)	NEMBA ToPS List (2007)	Mpumalanga Status	Habitat Preferences*	Probability of Occurrence	
								Regional Study Area	Local Study Area
Chrysochloridae	*Amblysomus septentrionalis*	Highveld Golden Mole	Near Threatened	Near Threatened	-	Near Threatened	Sandy soils in grassland areas.	Possible	Possible – suitable habitat present
Chrysochloridae	*Chrysospalax villosus*	Rough-haired Golden Mole	Vulnerable	Vulnerable	Critically Endangered	-	Sandy soils in grassland areas.	Possible	Possible – suitable habitat present
Erinaceidae	*Atelerix frontalis*	South African Hedgehog	Least Concern	Near Threatened	Protected	Near Threatened / Protected	Range of habitats, including grassland and savanna.	Possible	Possible – suitable habitat present
Felidae	*Felis nigripes*	Black-footed Cat	Vulnerable	Vulnerable	Protected	Near Threatened	Open short grass areas in savanna and grassland habitats.	Probable	Unlikely - suitable habitat present
Felidae	*Felis silvestris*	African Wildcat	Least Concern	Least Concern		Near Threatened	Range of habitats, including grassland and savanna.	Probable	Recorded (tentative – based on tracks)
Felidae	*Leptailurus serval*	Serval	Least Concern	Near Threatened	Protected	Near Threatened	Wetland, tall grassland and well-watered savanna habitats.	-	Recorded (anecdotal evidence)

Family	Scientific Name	Common Name	Global Red List Status (IUCN, 2022-2)	Regional Red List Status (2016)	NEMBA ToPS List (2007)	Mpumalanga Status	Habitat Preferences*	Probability of Occurrence	
								Regional Study Area	Local Study Area
Hyaenidae	*Parahyaena brunnea*	Brown Hyaena	Near Threatene d	Near Threatene d	Protected	Near Threatened / Protected	Savanna and grassland habitats.	Possible	Unlikely – high levels of anthropogenic disturbance.
Hyaenidae	*Proteles cristata*	Aardwolf	Least Concern	Least Concern	-	Protected	Savanna and grassland habitats.	Possible	Unlikely – high levels of anthropogenic disturbance.
Muridae	*Dasymys robertsii*	African Marsh Rat	-	Vulnerable	-	Near Threatened	Moist grassland and wetland habitats. I unlikely to occur in disturbed wetland habitats.	Probable	Unlikely – high levels of habitat disturbance.
Muridae	*Otomys auratus*	Vlei Rat (Grassland type)	Near Threatene d	Near Threatene d	-	-	Moist grassland and wetland habitats.	Probable	Possible – suitable habitat present
Mustelidae	*Aonyx capensis*	Cape Clawless Otter	Near Threatene d	Near Threatene d	Protected	Protected	Riparian habitats, with permanent water.	Probable	Unlikely – limited suitable habitat available.
Mustelidae	*Hydrictis maculicollis*	Spotted-necked Otter	Near Threatene d	Vulnerable	Protected	Near Threatened / Protected	Riparian habitats, favouring large, open water bodies.	Probable	Unlikely – limited suitable habitat available.

Family	Scientific Name	Common Name	Global Red List Status (IUCN, 2022-2)	Regional Red List Status (2016)	NEMBA ToPS List (2007)	Mpumalanga Status	Habitat Preferences*	Probability of Occurrence	
								Regional Study Area	Local Study Area
Mustelidae	*Mellivora capensis*	Honey Badger	Least Concern	Least Concern	Protected	Near Threatened / Protected	Savanna and grassland habitats	Probable	Possible – suitable habitat present
Orycteropodidae	*Orycteropus afer*	Aardvark	Least Concern	Least Concern	-	Protected	Savanna and grassland habitats.	Probable	Unlikely – high levels of anthropogenic disturbance.
Mustelidae	*Poecilogale albinucha*	African Striped Weasel	Least Concern	Near Threatened		Vulnerable	Savanna and grassland habitats.	Probable	Possible – suitable habitat present
Soricidae	*Crocidura maquassiensis*	Maquassie Musk Shrew	Least Concern	Vulnerable	-	Vulnerable	Little is known of habitat preferences. Thought to favour rocky or montane grasslands.	Possible	Possible – limited suitable habitat present
Soricidae	*Crocidura mariquensis*	Swamp Musk Shrew	Least Concern	Near Threatened	-	Near Threatened	Reedbeds, wetlands and thick moist grassland in riverine habitats.	Probable	Probable – suitable habitat present

*Habitat preferences as per Skinner and Smithers (1990), Stuart and Stuart (2007) and Childs et al., (2016).

Herpetofauna

Herpetofauna Richness and Habitat Availability

Based on known distribution ranges presented in Du Preez and Carruthers (2009), up to 20 amphibian species are known from the regon and potentially occur in the RSA (refer to Appendix D). Of these, 14 taxa have previously been recorded in the QDS in which the LSA is located, as per FrogMAP records (listed in **Table 7-15**). These are all common species with widespread distributions.

No amphibians were recorded in the LSA during the field survey. However, considering the availability of suitable habitat, it is expected that several of the species listed in **Table 7-15** are likely to be present.

Table 7-15 - Amphibian species previously recorded in the2629AB and 2629BA QDS

Family	Scientific Name	Common Name
Bufonidae	Schismaderma carens	Red Toad
Bufonidae	Sclerophrys gutturalis	Guttural Toad
Bufonidae	Sclerophrys capensis	Raucous Toad
Hyperoliidae	Kassina senegalensis	Bubbling Kassina
Hyperoliidae	Semnodactylus wealii	Rattling Frog
Phrynobatrachidae	Phrynobatrachus natalensis	Snoring Puddle Frog
Pipidae	Xenopus laevis	Common Platanna
Pyxicephalidae	Amietia delalandii	Delalande's River Frog
Pyxicephalidae	Cacosternum boettgeri	Common Caco
Pyxicephalidae	Strongylopus fasciatus	Striped Stream Frog
Pyxicephalidae	Amietia fuscigula	Cape River Frog
Pyxicephalidae	Tomopterna cryptotis	Tremelo Sand Frog
Pyxicephalidae	Tomopterna natalensis	Natal Sand Frog
Pyxicephalidae	Tomopterna tandyi	Tandy's Sand Frog
Source: FrogMAP records for 2629AB and 2629BA QDS.		

No reptiles were recorded in the LSA during the field survey. The distribution maps presented in Bates et al., (2014) indicate that up to 44 reptile species are known from the region in which the RSA is located. Of these, 24 common and widespread taxa have been recorded in the relevant QDS, according to data obtained from ReptileMAP (listed in **Table 7-16**).

Table 7-16 - Reptile species previously recorded in the 2629AB and 2629BA QDS

Family	Scientific Name	Common Name
Agamidae	*Agama aculeata distanti*	Distant's Ground Agama
Colubridae	*Crotaphopeltis hotamboeia*	Red-lipped Snake
Colubridae	*Dasypeltis scabra*	Rhombic Egg-eater
Elapidae	*Naja mossambica*	Mozambique Spitting Cobra
Elapidae	*Hemachatus haemachatus*	Rinkhals
Gekkonidae	*Lygodactylus ocellatus*	Spotted Dwarf Gecko
Gekkonidae	*Pachydactylus affinis*	Transvaal Gecko
Gekkonidae	*Pachydactylus capensis*	Cape Gecko
Gekkonidae	*Pachydactylus vansoni*	Van Son's Gecko
Lamprophiidae	*Boaedon capensis*	Brown House Snake
Lamprophiidae	*Lycodonomorphus inornatus*	Olive House Snake
Lamprophiidae	*Lycodonomorphus rufulus*	Brown Water Snake
Lamprophiidae	*Lycophidion capense capense*	Cape Wolf Snake
Lamprophiidae	*Psammophylax rhombeatus*	Spotted Grass Snake
Lamprophiidae	*Aparallactus capensis*	Black-headed Centipede-eater
Lamprophiidae	*Homoroselaps lacteus*	Spotted Harlequin Snake
Lamprophiidae	*Psammophis crucifer*	Cross-marked Grass Snake
Lamprophiidae	*Pseudaspis cana*	Mole Snake
Leptotyphlopidae	*Leptotyphlops sp.*	-
Leptotyphlopidae	*Leptotyphlops scutifrons conjunctus*	Eastern Thread Snake
Scincidae	*Trachylepis capensis*	Cape Skink
Scincidae	*Trachylepis punctatissima*	Speckled Rock Skink
Typhlopidae	*Afrotyphlops bibronii*	Bibron's Blind Snake
Viperidae	*Causus rhombeatus*	Rhombic Night Adder
Source: ReptileMAP records for 2629AB and 2629BA QDS.		

Herpetofauna Of Conservation Concern

The Giant Bullfrog (*Pyxicephalus adspersus*) is the only amphibian of conservation concern potentially occurring in the regional and local study areas. This species is listed as Least Concern on both the Global and Regional Red Lists, but it is listed as 'protected' on the NEMBA ToPs list (2007), as well as 'protected' in Mpumalanga Province according to the Mpumalanga Nature Conservation Act, 1998). It is further listed as Vulnerable on the Mpumalanga Red List. Giant Bullfrog inhabit seasonally shallow pans, wetland and rained-filled depressions in savanna and grassland ecosystems. These habitats are present in both the RSA and LSA. It is possible that the Giant Bullfrog is present in the RSA, however, considering the degree of local habitat disturbances, it is unlikely that Giant Bullfrog are present in the LSA.

Five reptile species potentially occurring in the RSA and LSA are of conservation concern. These are listed in **Table 7-17**, along with their conservation status, habitat preferences and a probability of occurrence.

Table 7-17 - Reptile species of conservation concern occurring and potentially occurring in the study area

Family	Scientific Name	Common Name	Global Red List Status (IUCN, 2022-2)	Regional Red List Status	NEMBA ToPS List (2007)	Mpumalanga Status	Habitat Preferences*	Probability of Occurrence	
								Regional Study Area	Local Study Area
Cordylidae	*Chamaesaura aenea*	Coppery Grass Lizard	Near Threatened	Least Concern	-	Near Threatened	Grassy slopes and plateau.	Possible	Possible – Suitable habitat present.
Cordylidae	*Smaug giganteus*	Giant Dragon Lizard	Vulnerable	Vulnerable	-	Vulnerable	Favours flat to sloping highveld grassland habitats.	Unlikely	Unlikely – known distribution mainly to the south of the study area
Lamprophiidae	*Amplorhinus multimaculatus*	Many-spotted Snake	Least Concern	Least Concern		Near Threatened	Reed beds, wetlands and riparian vegetation in grasslands.	Possible	Possible – Suitable habitat present.
Lamprophiidae	*Homoroselaps lacteus*	Spotted Harlequin Snake	Least Concern	Least Concern	-	Near Threatened	Semi-fossorial, favouring sandy soils, abandoned termitaria and rocky areas.	Probable	Possible – Suitable habitat present.
Scincidae	*Acontias breviceps*	Short-headed Legless Skink	Least Concern	Least Concern	-	Vulnerable	Fossorial and found in montane grassland.	Unlikely	Unlikely – No suitable habitat present.

*Habitat preferences as per Branch (1998) and Bates et al., (2014).

Invertebrates

Limited invertebrate data are available for the 2629AB and 2629BA QDS. The Virtual Museum platform only lists seven butterfly and four dragonflies for the QDS, but no spiders, scorpions or lacewings. A further review of the distribution maps of members of the Family Theraphosidae (baboon spiders) presented in Dippenaar-Schoeman (2014), also suggests that none of these taxa, which are of conservation concern, have previously been recorded in the region in which the RSA is located.

Notwithstanding the above, one species of butterfly listed on LepiMAP is of conservation concern, namely the Marsh Sylph (*Metisella meninx*). This species is listed as Near Threatened on the Global, Regional and Mpumalanga Red Lists. Marsh Sylph favour marsh and wetland areas, as well as open grassland habitats, from 1 400 to 1 700 m. These habitats are presented in the RSA and LSA and it is therefore possible that the Marsh Sylph is present.

7.2.1.3 Key Ecological Attributes And Processes In The Local Study Area

Habitat Corridors, Resources And Refugia

The LSA is highly fragmented and large portions are dominated by anthropogenic infrastructure, such as the power station and its associated facilities (ash dams), the Komati village, and cultivated fields. Patches of natural habitat are present; however, these are typically either bounded by built infrastructure or enclosed by fencing (e.g., concrete palisade fence). The immediate landscape surrounding the LSA is similarly transformed and fragmented, and thus habitat connectivity across the LSA and the surrounding landscape is poor. This will affect the ability of fauna, particularly larger mammal species, to move and disperse across the study area and access the surrounding landscape. This is likely to negatively affect the fauna richness of the LSA.

Key Ecological Processes And Drivers Of Change

The following notes summarise the key processes and drivers of change that are present in the LSA and surrounding landscape and their possible influence on the character of on-site terrestrial fauna communities:

Wildfire - Grassland Burning

Fire is considered a natural, albeit often human initiated disturbance agent in grassland ecosystems. Mesic Highveld Grasslands are considered fire-prone and fire-dependent landscapes, and fire is essential to the maintenance of biodiversity patterns and ecological processes (SANBI, 2013). Key ecological benefits of fire, with respect to fauna communities, include *inter alia*:

- Removes moribund vegetation and enhances plant primary productivity and palatability, which improves grazing for wild herbivores. Fire also stimulates germination / flowering of fire-adapted flora species (e.g., certain orchid species);
- Controls the encroachment of both alien and indigenous woody plant species and weeds; and
- Increases overall habitat heterogeneity by creating a structural mosaic of tall- and short grassland.

A review of available historic satellite imagery indicates that grassland habitat in the LSA does burn occasionally. Fires are likely set either intentionally or accidentally by local community members and are not part of a formal burning programme. This notwithstanding, fire is considered an important driver of change in the LSA.

<u>*Alien Invasive Species Colonisation*</u>

Nineteen AIS were recorded in the LSA during the field survey. If not actively controlled, many AIS have the capacity to spread into adjacent natural habitat, where they could competitively exclude many indigenous woody and herbaceous species. This will have several deleterious impacts on the integrity and functioning of these habitats, such as inter alia:

- A loss of floristic diversity, with the resulting habitat patches unable to support diverse fauna communities;
- A reduction in grass productivity for grazing herbivores, and
- Increased exposed soil surfaces and incidences of erosion.

Several species recorded in the LSA are highly invasive and adept at colonising undisturbed grassland and wetland habitats, such as *Acacia dealbata, Acacia mearnsii, Campuloclinium macrocephalum, Flaveria bidentis* and *Verbena bonariensis*. The spread of alien invasive vegetation is therefore considered a significant driver of change in the LSA and surrounding landscape, and one capable of severely negatively impacting biodiversity.

7.2.2 TERRESTRIAL PLANT SPECIES

*The following is extracted from the Terrestrial Plant Species Assessment compiled by Hawkhead Consulting and included as **Appendix H.8**.*

7.2.2.1 Regional Vegetation Characteristics

The RSA is located in the grassland biome and according to the regional mapping of South Africa's vegetation types, it is dominated by the Eastern Highveld Grassland vegetation type **Figure 7-32**). The general characteristics of the grassland biome and Eastern Highveld Grasslands, are discussed in more detail below:

Grassland Biome

The regional study area is located in the grassland biome, which covers approximately 28% of South Africa and is the dominant biome of the central plateau and inland areas of the eastern subcontinent (SANBI, 2013). Grasslands are typically situated in moist, summer rainfall regions that experience between 400 mm and 2000 mm of rainfall per year. Vegetation consists of a dominant field-layer comprising grasses and herbaceous perennials, with little- to no woody plants present.

South Africa's grassland ecosystems are parsed into five groups, with the RSA forming part of the Mesic Highveld Grasslands group (SANBI 2013). Mesic Highveld Grasslands occur at mid-altitudes and experience warm, wet summers (MAP 700-1200 mm) and cold winters. They are typically highly productive sourveld grasslands that are dominated by long-lived perennial grasses (SANBI, 2013).

Fire is common in Mesic Highveld Grasslands and maintains these ecosystems in a relatively treeless form (SANBI, 2013). Apart from their importance as rich stores of biodiversity, grasslands are critically important water production landscapes, constituting about half of South Africa's Strategic Water Source Areas (SANBI, 2013).

Eastern Highveld Grassland

Eastern Highveld Grasslands extend from Johannesburg in the east through to Bethel, Ermelo and Piet Retief in the west. This vegetation type is found on slightly- to moderately undulating plains, low hills and wetland depressions. Grasses are typical Highveld species from the genera *Aristida,* *Digitaria, Eragrostis* and *Tristachya*. Indigenous woody species are mainly restricted to rocky areas and include *Celtis africana, Protea caffra, Protea welwitschii, Diospyros lycioides, Searsia magalismontana* and *Senegalia caffra* (Mucina & Rutherford, 2011).

Mucina & Rutherford (2011) note the following species, amongst several others, as important taxa in Eastern Highveld Grassland:

- **Shrubs**: *Anthospermum rigidum* and *Seriphium plumosum*.
- **Graminoides**: *Aristida aequiglumis, Aristida congesta, Aristida junciformis, Cynodon dactylon, Digitaria monodactyla, Eragrostis chloromelas, Eragrostis curvula, Eragrostis plana, Eragrostis racemosa, Heteropogon contortus, Loudetia simplex, Setaria sphacelata, Sporobolus africanus, Themeda triandra, Alloteropsis semialata* and *Monocymbium ceresiiforme*.
- **Herbs**: *Berkheya setifera, Haplocarpha scaposa, Euryops gilfillanii, Euryops transvaalensis, Justicia anagalloides, Acalypha angusta, Chamaecrista mimosoides, Dicoma anomala, Kohautia amatymbica, Lactuca inermis, Gladiolus crassifolius, Haemanthus humilis* and *Selago densiflora*.
- **Endemic Taxa**: The geophytic *herbs Agapanthus inapertus, Eucomis vandermerwei* and the succulent herb *Huernia insigniflora* are endemic to the region in which Eastern Highveld Grassland is prevalent.

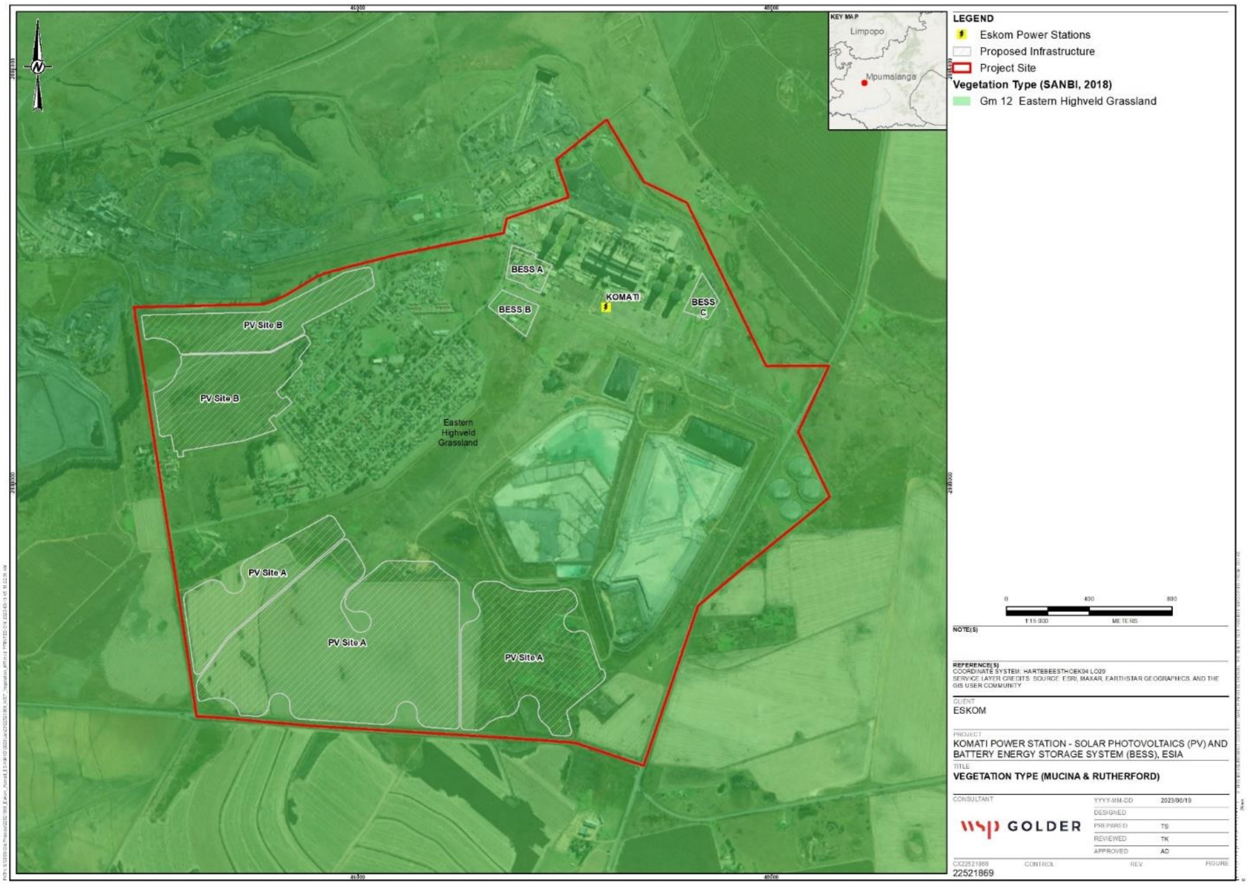


Figure 7-32 - Local study area in relation to South Africa's regional vegetation types

7.2.2.2 Regional Ecological Sensitivity and Conservation Setting

Nationally Threatened Ecosystems

Cultivation, mining, plantation forestry and other forms of development have resulted in the transformation of large areas of Eastern Highveld Grasslands, with Mucina & Rutherford (2011) indicating that 44% of this vegetation type has been modified. Accordingly, the Eastern Highveld Grassland vegetation type has up listed from Vulnerable to Endangered on the revised national list of threatened ecosystems (NEMBA Threatened Ecosystems, 2021).

Terrestrial Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs)

The Mpumalanga Biodiversity Sector Plan (MBSP) technical report defines five categories of conservation focus; protected areas, critical biodiversity areas (CBA), ecological support areas (ESA), other natural areas, and modified habitats:

- **Protected Areas**: protected areas recognised in terms of the National Environmental Management Protected Areas Act, No. 57 of 2003, that are currently considered to meet biodiversity targets in the MBSP;
- **Critical Biodiversity Area**: areas (outside of Protected Areas) that are required to meet biodiversity targets for biodiversity pattern (species and ecosystems) and ecological processes. Two CBA are recognised; CBA Irreplaceable and CBA Optimal. They should remain in a natural state that is maintained in good ecological condition;
- **Ecological Support Area**: play an important role in supporting the ecological functioning of critical biodiversity areas or for generating or delivering important ecosystem services. They support landscape connectivity and resilience to climate change adaptation. They need to be maintained in at least an ecologically functional state;
- **Other Natural Areas**: often retain much of their natural character and may contribute significantly to maintenance of viable species populations and natural ecosystem functioning, and may provide important ecological infrastructure and ecosystem services. They are not, however, prioritized for immediate conservation action in the MBSP; and
- **Modified**: often referred to as transformed, these areas have lost a significant proportion (or all) of their natural biodiversity and in which ecological processes have broken down (in some cases irretrievably), as a result of biodiversity-incompatible land-use practices such as ploughing, hardening of surfaces, mining, cultivation and the construction of houses or other built infrastructure.

According to the Mpumalanga Biodiversity Sector Plan (2019), the LSA is dominated by land categorised as ‘Heavily or Moderately Modified Areas’, with small patches of land categorised as ‘Other Natural Areas’. An area categorised as Critical Biodiversity Area (CBA) Optimal, which overlaps with the proposed PV Site B development footprint is present in the north-west corner of the LSA – see **Figure 7-33**. Other patches of land designated as CBA Optimal are located to the north and east of the LSA. CBAs are those areas (outside of Protected Areas) that are required to meet biodiversity targets for biodiversity pattern (species and ecosystems) and ecological processes (MPTA 2014). According to (MPTA 2014), these are areas of high biodiversity value and should remain in a natural state that is maintained in good ecological condition in order to meet biodiversity conservation targets.

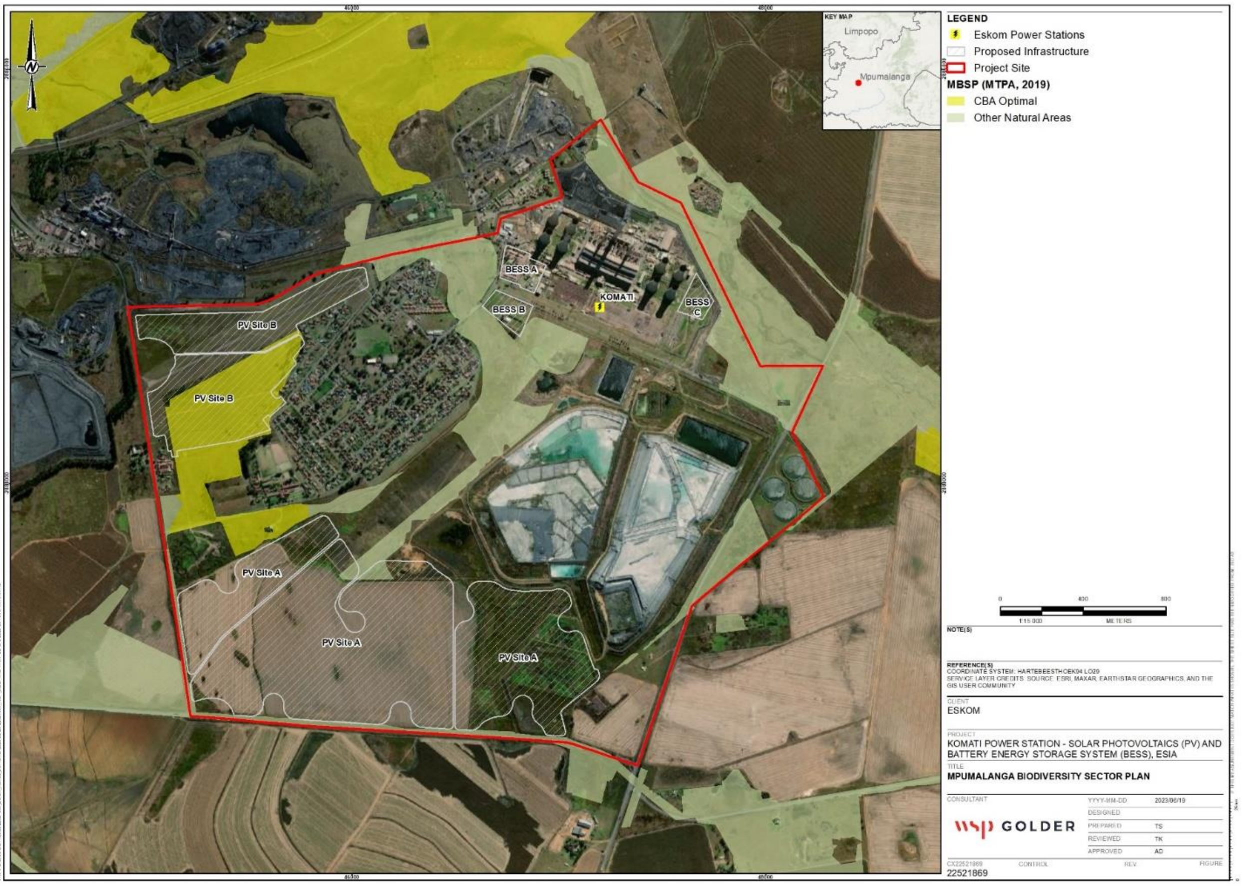


Figure 7-33 - The Local Study Area and mapping of Critical Biodiversity Areas, as per the Mpumalanga Biodiversity Sector Plan (2019)

Indigenous Forests

No indigenous forests occur in the LSA or RSA. Both areas are dominated by modified habitats such as cultivated fields, the power station infrastructure, mining areas and residential sites, and small patches of natural wetland and grassland habitats.

Protected Areas and Conservation Areas

No Protected Areas (PA) occur within the LSA or the RSA (**Figure 7-34**). The nearest mapped PA, as per the SAPAD (2021), is Heyns Private Nature Reserve, which is located approximately 12.3 km to the north of the LSA's northern boundary (shown in **Figure 7-34**).

According to the National Protected Area Expansion Strategy, small portions of land to the immediate north and south-east of the local study area are designated as Priority Focus Areas, while other small patches designated as Priority Focus Areas are scattered across the broader landscape (SAPAD, 2021).

The nearest IBA is Amersfoort - Bethal - Carolina District, which is situated approximately 15 km southeast of the LSA. IBA trigger species include several globally listed threatened species, such as Botha's Lark (*Spizocorys fringillaris*), Blue Crane (*Anthropoides paradiseus*), Southern Bald Ibis

(*Geronticus calvus*), Black Harrier (*Circus maurus*), Blue Korhaan (*Eupodotis caerulescens*), Black-winged Pratincole (Glareola nordmanni), Secretarybird (*Sagittarius serpentarius*), Martial Eagle(*Polemaetus bellicosus*), Denham's Bustard (*Neotis denhami*),and the White-bellied Korhaan (*Eupodotis senegalensis*), as well as two regionally threatened species, namely African Grass Owl (*Tyto capensis*) and Lanner Falcon (*Falco biarmicus*) (Marnewick, et al. 2015).

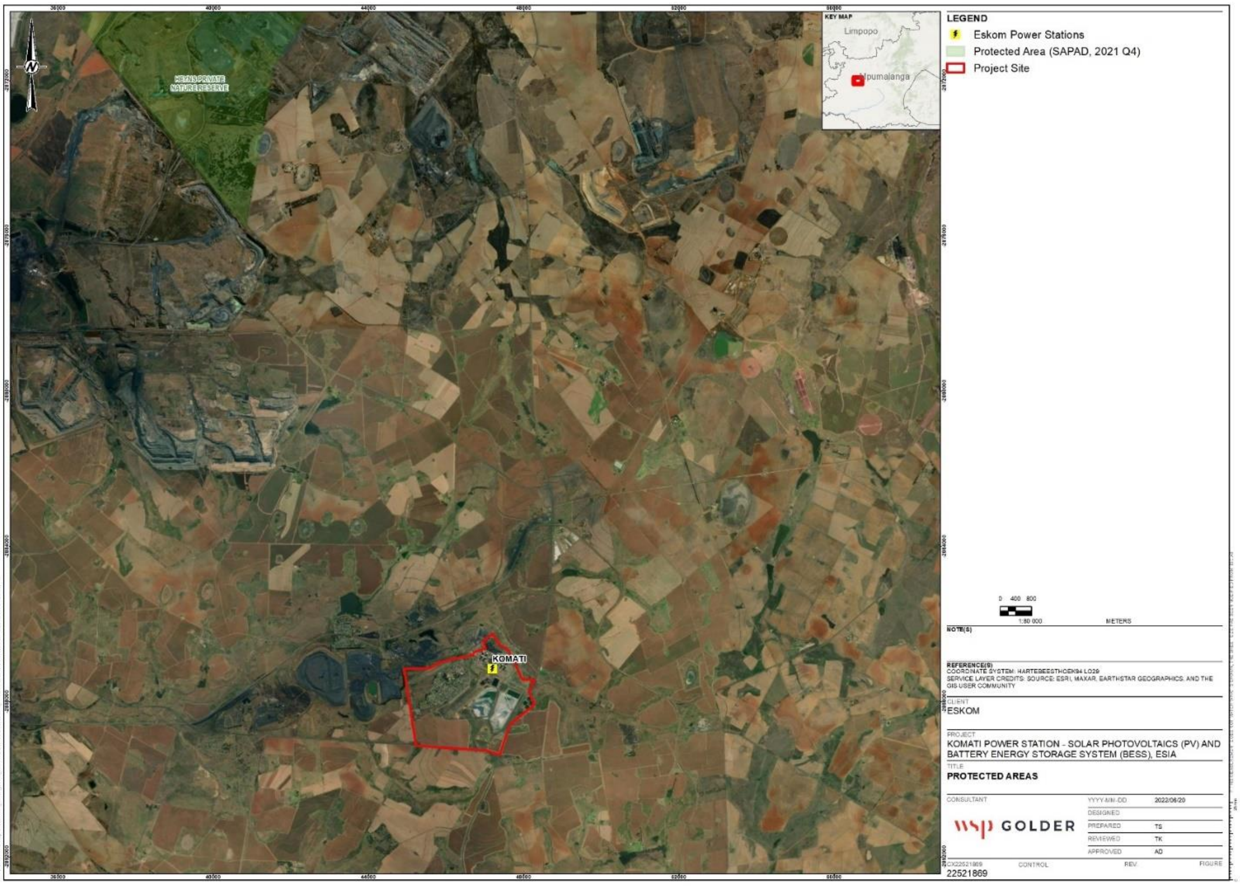


Figure 7-34 - Protected areas in the broader landscape surrounding the local study area

7.2.2.3 Landscape Context and Existing Impacts

The RSA is characterised by a mosaic of natural and modified habitats. Modified habitats are dominated by extensive areas of cultivation, with smaller areas comprising inter alia, various mining operations and alien tree plantations. Natural habitat is mostly confined to linear patches of grassland and wetland that are typically aligned with drainage features.

- The LSA has also been heavily impacted by historic and contemporary anthropogenic activities. These are summarised below:
- Prominent infrastructure and disturbances include the power station complex and associated facilities (e.g., ash dumps, pollution control dams) (shown in Figure 7-35 and Figure 7-36) and Komati village. The village is a fully operational residential zone, with accompanying road network, police station, schools and commercial shops;
- Extensive areas are also dominated by cultivated fields, which are regularly disturbed by ploughing and crop harvesting. Cultivated fields that lie fallow are colonised by dense stands of alien weeds and pioneer flora;

- Prominent alien tree stands are present adjacent to the village. Colonisation by other alien species, including several listed invasive species, is also common and widespread throughout the LSA;
- Numerous informal drainage trenches have been excavated across the power station property in order to channel water away from access roads and improve general site accessibility. The earth works associated with these drainage trenches has resulted in vegetation clearing and disturbance, and this has facilitated the establishment of several alien invasive species;
- The LSA is also criss-crossed by large transmission line corridors which are maintained by Eskom;
- Other anthropogenic facilities and activities noted in the LSA during the field survey that have caused habitat disturbance and fragmentation include inter alia; gravel access roads (**Figure 7-37**), fencing, and refuse dumping (**Figure 7-38**) and burning; and
- Goedehoop Colliery is located along the northern and western boundary of the LSA. The colliery is characterised by large areas that have been completely transformed by mining activities.

The above listed features and activities have caused environmental degradation, which has reduced the overall extent and integrity of natural habitat in the LSA and in the immediate surrounding landscape, and this has impacted on-site ecological functioning and species diversity.

Figure 7-35 - The completely transformed coal deposit area at Komati Power Station

Figure 7-36 - View over the ash dam facilities in the local study area

Figure 7-37 - Amongst other features, gravel roads and drainage trenches have fragmented habitat in the local study area, and facilitated alien invasive species colonisation

Figure 7-38 - Rubble and refuse dumping site adjacent to the western boundary of the local study area

7.2.2.4 Vegetation and Flora Assessment

Predicated on the findings of the field survey, five habitat units were identified in the LSA. As per IFC PS 6, three units meet the definition of 'modified habitat', i.e., anthropogenic activity has substantially modified primary ecological functioning and species composition. The remaining two units are classified as 'natural habitat' as they comprise viable assemblages of indigenous species and retain their primary ecological functions:

- Modified Habitats
  - Cultivated Fields;
  - Alien Tree Stands; and
  - Transformed Areas with Disturbed or Landscaped Vegetation.
- Natural Habitats
  - Mixed *Themeda triandra* Grassland; and
  - Mixed Moist Grassland.

Table 7-18 presents the total extent of modified and natural habitats in the LSA. A habitat unit map is presented in **Figure 7-39**.

Table 7-18 - Extent of modified and natural habitats in the local study area

Habitat Type	Habitat Units	Current Extent (Ha)
Modified Habitats	Cultivated Fields	107.49
	Alien Tree Stands	4.25
	Transformed Areas with Disturbed or Landscaped Vegetation	382.14

	Sub Total	493.87
Natural Habitats	Mixed *Themeda triandra* Grassland	31.01
	Mixed Moist Grassland	145.83
	Sub Total	176.84

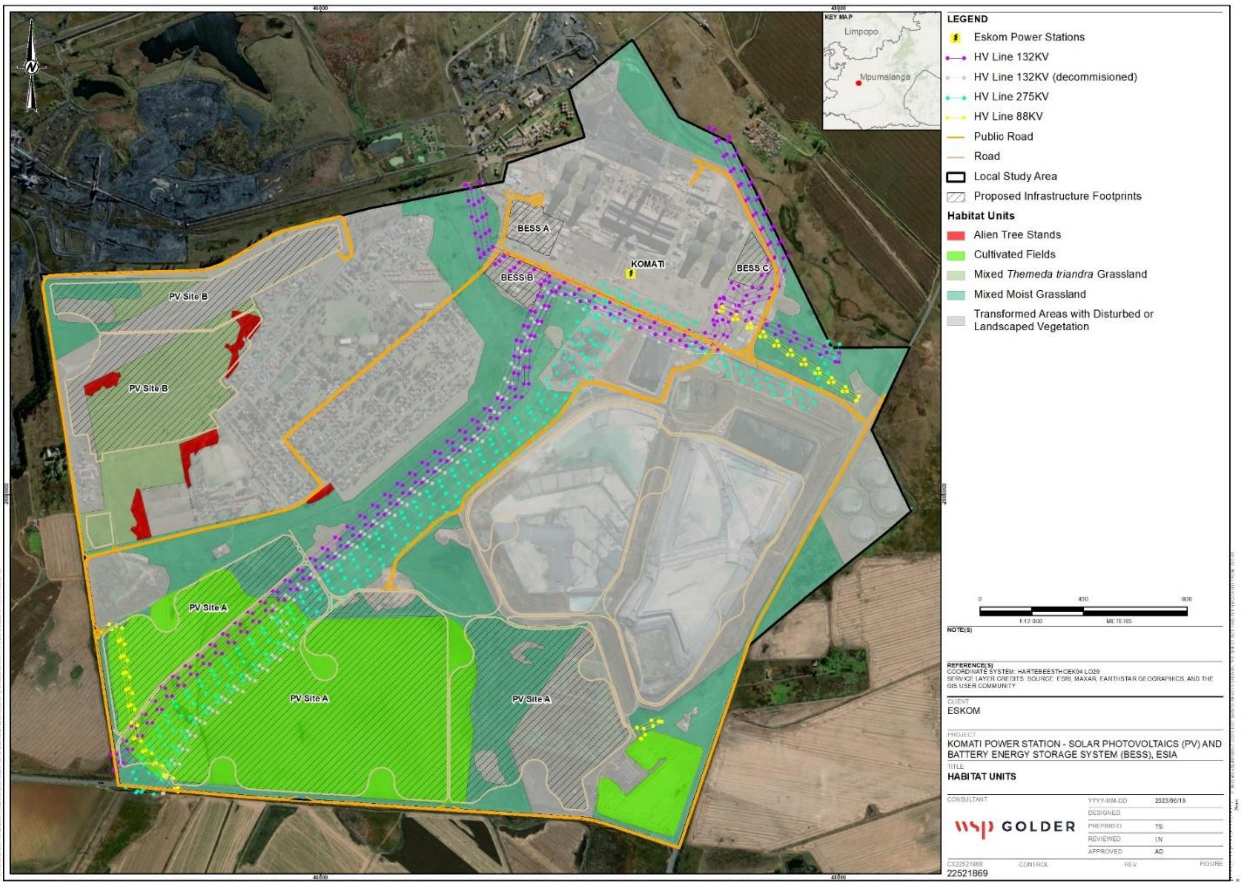


Figure 7-39 - Habitat unit map of the local study area, showing proposed Project infrastructure, as well as existing Eskom facilities

Modified Habitat Units

<u>*Cultivated Fields*</u>

Cultivated fields are located along the southern boundary of the LSA. At the time of the field survey, these were planted with maize – shown in **Figure 7-40**.

Areas characterised by this habitat unit are subject to regular anthropogenic disturbance in the form of ploughing, seeding and harvesting. They are typically denuded of indigenous vegetation or, in the case of fallow fields, dominated by ruderal alien weedy flora, and have lost all primary ecological functioning. Accordingly, as per the definition prescribed in IFC PS6, cultivated fields are classified as a modified habitat.

Figure 7-40 - Cultivated field under maize in the local study area

Alien Tree Stands

This is a small habitat unit. It is defined by closely-spaced aggregations of alien trees occurring in discrete patches in the LSA. Trees range in height from short (±3 m) to tall (> 10 m). Eucalyptus species are the dominant taxa in this unit, with *Populus deltoides* and *Robinia pseudoacacia* (shown in **Figure 7-41**) also recorded.

This habitat unit is defined by alien tee dominated woodland, which is both compositionally and structurally incongruous with the grassland reference conditions of the landscape. The primary ecological integrity and functioning of this habitat unit is thus highly limited, and accordingly alien tree stands are classified as modified habitats, as per IFC PS6.

Figure 7-41 - Short stand of Eucalyptus trees located in the north of the local study area

Transformed Areas with Disturbed or Landscaped Vegetation

This unit characterises the highly modified land associated with the power station and other developed areas (e.g., Komati village, police station, coal stockpiles) in the LSA. Most land is completely transformed and under various built-infrastructure and thus has no ecological value (shown in **Figure 7-35**).

Where vegetation does occur, it is secondary and either actively managed and landscaped (e.g., maintained lawns adjacent to infrastructure – see **Figure 7-42**), or heavily degraded and dominated by ruderal and/or invasive species (e.g., vegetation colonising the ash dams – shown in **Figure 7-43**).

Landscaped areas are regularly mown/managed, and thus are characterised by short lawn grasses such as *Cynodon dactylon, Paspalum notatum** and *Pennisetum clandestinum** or *Eragrostis pastures grasses* (*denotes alien species), as well as several alien herbaceous weeds including, inter alia*; Hypochaeris radicata, Plantago major, Richardia brasiliensis* and *Trifolium repens*.

Ruderal vegetation growing in degraded sites comprises a mixture of indigenous and alien herbaceous species, as well as aggregated or scattered alien woody species. Recorded herbaceous species include graminoides such *as Cenchrus ciliaris, Cyperus esculentus*, Eragrostis curvula, Hyparrhenia dregeana, Imperata cylindrica* and *Pennisetum clandestinum**, and alien forbs like *Cirsium vulgare, Datura stramonium, Melilotus albus* and *Verbena bonariensis*. Alien woody species recorded in these areas include *Acacia mearnsii*, *Nicotiana glauca* and *Tamarix ramosissima*.

This habitat unit has been derived from, and continues to be defined by, ongoing anthropogenic activities and disturbances. As a result, most ecological functioning has either been completely lost or is severely diminished. Although some indigenous pioneer flora species are present, there is a general dominance of alien flora, many of which are listed invasive species. Rehabilitation potential is also severely limited. Accordingly, areas of this unit are classified as modified habitat, as per IFC PS6.

Figure 7-42 - Landscaped lawns adjacent to the Komati cooling towers

Figure 7-43 - Vegetated side slopes of the Komati ash dam

Natural Habitat Units

The LSA is characterised by two primary natural habitat units, namely Mixed *Themeda triandra* Grassland and Moist Mixed Grassland. Despite variable degrees of anthropogenic disturbance and the localised presence of alien invasive species, both units are characterised by viable assemblages of indigenous vegetation and retain a degree of ecological functioning. These habitat units are described in more detail below:

Mixed Themeda triandra Grassland

The habitat unit mostly characterises the patch of natural dry grasslands in the north-west corner of the LSA, with smaller patches embedded within Mixed Moist Grassland also present. Although localised disturbances are present, in general Mixed Themeda triandra Grasslands are relatively species rich and considered a primary vegetation community (**Figure 7-44**).

Structurally, this community is characterised by low closed grassland, as per Edwards (1983). In terms of composition, apart from the dominant *Themeda triandra*, other commonly recorded grass species in this unit include *Brachiaria serrata, Eragrostis curvula, Eragrostis chloromelas* and *Heteropogon contortus*.

Commonly recorded forbs include inter alia; *Chamaecrista comosa, Haplocarpha scaposa, Hilliardiella aristata, Helichrysum harveyanum, Helichrysum nudifolium var. pilosellum, Helichrysum rugulosum, Hypoxis acuminata, Hypoxis hemerocallidea, Ipomoea ommaneyi* and *Pelargonium luridum*. Woody species mostly occur as scattered individual plants, and include indigenous taxa such as *Elephantorrhiza elephantina, Seriphium plumosum* and *Ziziphus zeyheriana*, and alien taxa including *Eucalyptus* trees and *Populus deltoides*.

Embedded within this habitat unit are small patches that are characterised by a dominance of *Eragrostis* grass species and low forb diversity – typical traits of a more secondary grassland community resulting from historic disturbances, such soil disturbances.

Three flora SCC were recorded in this habitat unit, namely *Eulophia ovalis var. ovalis*, *Orthochilus leontoglossus* and an unidentified *Gladiolus* species (no flowers).

Figure 7-44 - Typical patch of Mixed *Themeda triandra* Grassland in the local study area

Mixed Moist Grassland

Mixed Moist Grassland dominates most of the non-transformed land on the power station property and immediately adjacent areas. In the LSA, this broad habitat unit has been impacted by various on-site operations, such as the excavation of a network of drainage channels (**Figure 7-45**) and the maintenance of a transmission line servitude, and accordingly, certain portions are highly disturbed.

Vegetation structure ranges from low- to tall closed grassland (sensu. Edwards 1983). In terms of composition, species such as *Phragmites australis, Typha capensis* and various *Cyperaceae* species typically dominate the more permanently moist areas (**Figure 7-46**), while several other herbaceous species are common throughout this unit, including graminoids such as *Agrostis lachnantha, Eragrostis curvula, Imperata cylindrica, Juncus effusus, Juncus oxycarpus, Kyllinga erecta, Leersia hexandra and Panicum schinzii; and various forbs such as inter alia, Chironia palustris, Haplocarpha scaposa, Helichrysum aureonitens, Helichrysum nudifolium var. pilosellum, Nidorella anomala* and *Pseudognaphalium luteo-album*.* In terms of woody taxa*, Seriphium plumosum* was noted to be a common species, particularly beneath the transmission line servitude (**Figure 7-47**).

Sites that have been disturbed by earth works are typically dominated by the alien invasive lawn grass *Pennisetum clandestinum* (**Figure 7-48**), as well as several other weedy taxa including commonly *Melilotus albus*, and the listed invasive species *Flaveria bidentis, Nicotiana glauca* and *Tamarix ramosissima.*

In terms of SCC, an unidentified Orchidaceae species (senescent flowers) was recorded in this habitat unit.

Figure 7-45 - Drainage channels that have been excavated by power station management to prevent the flooding of access roads

Figure 7-46 - Typical area of mixed moist grassland in the local study area, characterised by species such as *Agrostis lachnantha* and *Typha capensis*

Figure 7-47 - *Seriphium plumosum* dominated area of mixed moist grassland below the powerline servitude.

Figure 7-48 - *Pennisetum clandestinum*, amongst other invasive species, dominate disturbed sites in this habitat unit

Floristic Analysis

General Floristics

In total, 121 flora species, representing 39 families, were identified during the field survey. The most represented family is the Poaceae with 39 species, followed by the Asteraceae with 21 species and Fabaceae with 9 species. The majority of identified species are indigenous taxa (64%), with the remaining 36% comprising alien taxa.

The most abundant growth form are herbs with 51 species, followed by graminoids with 48 species. Sixteen tree / shrub species, two dwarf trees and four geophytes were also recorded. For a list of flora species identified in the LSA during the field survey refer to Appendix C of the Terrestrial Plant Species Assessment (**Appendix H.8**).

Flora Species of Conservation Concern

In line with the internationally endorsed IUCN Red List Categories and Criteria, the Red List of South African Plants and the Mpumalanga Red List recognise three categories of threatened species, namely Critically Endangered (CR), Endangered (EN) and Vulnerable (VU), and five ‘other categories of conservation concern’ that are recognised as having high conservation importance, namely Near Threatened (NT), Critically Rare, Rare, Declining, and Data Deficient – Insufficient Information (DDD). Flora species listed under all eight categories are regarded as being of conservation concern. Moreover, as they are subject to national and/or provincial environmental legislation and require specific conservation management, flora species that are listed as either threatened or protected on the NEMBA ToPS List (2007) and Mpumalanga Nature Conservation Act (Act No. 10 of 1998) are also included as flora SCC and discussed in this section.

In terms of SCC, four protected species were recorded in the LSA during the field visit, namely *Eulophia ovalis var. ovalis* (**Figure 7-49**), *Orthochilus leontoglossus* (**Figure 7-50**) and an unidentified Orchid and Gladiolus species (no flowers). These are not listed as threatened on the Global, Regional or Mpumalanga Red Lists, but they are listed at ‘Protected’ according to Mpumalanga Nature Conservation Act (Act No. 10 of 1998). Refer to **Table 7-19** for the number and co-ordinates of flora SCC.

The National Web Based Screening Tool indicated that the LSA is an area of 'Medium Sensitivity' for plant species, with three sensitive features potentially present, namely *Pachycarpus suaveolens*, Sensitive Species 41 and Sensitive Species 691. These are discussed **Table 7-20**, along with other flora SCC potentially occurring in the RSA and LSA, as per review literature and datasets.

Table 7-20 includes the habitat preferences and a 'probability of occurrence' (as informed by habitat suitability assessments) of SCC. It must be noted that none of these species are listed as threatened on the Global Red List (IUCN, 2022-2) or on the NEMBA ToPS List (2007).

Table 7-19 - Location of protected flora species recorded in the local study area

Species	Number of Plants	Co-ordinates
Orthochilus leontoglossus	1	S26 05.977 E29 27.131
Eulophia ovalis var. ovalis	1	S26 05.927 E29 27.131
Eulophia ovalis var. ovalis	1	S26 05.914 E29 27.129
Orchid species (no flowers)	1	S26 05.993 E29 27.845
Gladiolus species (no flowers)	6	S26 06.129 E29 27.329

Figure 7-49 - *Eulophia ovalis var. ovalis*

Figure 7-50 - *Orthochilus leontoglossus*

Table 7-20 - Flora species of conservation concern recorded or potentially occurring in the regional- and local study areas

Family	Scientific Name	Regional Red List Status	Mpumalanga Red List Status	Mpumalanga Nature Conservation Act (1998)	Habitat Preferences	Probability of Occurrence	
						Regional Study Area	Local Study Area
Aizoaceae	*Khadia carolinensis*	Vulnerable	Vulnerable	-	This species favours highveld grassland where it occurs on well-drained, sandy loam soils among rocky outcrops, or at the edges of sandstone sheets, at an altitude of 1700 m (Lotter, et al., 2007a)	Possible	Unlikely - no suitable habitat present.
Amaryllidaceae	*Boophone disticha*	Least Concern	-	Least Concern	Open grassland habitat.	Probable	Probable – Suitable habitat present.
Amaryllidaceae	*Crinum bulbispermum*	Least Concern	-	Declining	Range of grassland habitats, including wetlands.	Probable	Probable – Suitable habitat present.
Apocynaceae	*Pachycarpus suaveolens*	Vulnerable	Vulnerable		Favours short, annually burn grassland, between 1400-2000m. EOO estimated at 19 900 km2 (Lotter et al., 2007b)	Probable	Possible – Suitable habitat present.
Hyacinthaceae	*Eucomis autumnalis*	Least Concern	Declining	Protected	Favours damp open grassland and wetland habitats, from the coast to 2450 m (Williams, et al., 2016)	Probable	Probable – Suitable habitat present.
Iridaceae	*Gladiolus elliotii*	Least Concern	-	Protected	Highveld grasslands.	Probable	Probable – Suitable habitat present.

Family	Scientific Name	Regional Red List Status	Mpumalanga Red List Status	Mpumalanga Nature Conservation Act (1998)	Habitat Preferences	Probability of Occurrence	
						Regional Study Area	Local Study Area
Orchidaceae	*Disa woodii*	Least Concern	-	Protected	Found in damp grasslands, from seas level to 1 400 m (Johnson, et al., 2015).	Probable	Probable – Suitable habitat present.
Orchidaceae	*Orthochilus leontoglossus*	Least Concern	-	Protected	Open grassland from sea level to 1 800 m (Johnson, et al., 2015).	-	Recorded
Orchidaceae	*Eulophia ovalis var. ovalis*	Least Concern	-	Protected	Open grassland, between 500-1900m (Johnson, et al., 2015).	-	Recorded
Orchidaceae	*Brachycorythis conica subsp. transvaalensis*	Critically Endangered	-	Critically Endangered	Occurs in open grassland and woodland, where is prefers sandy gravel, overlying dolomite and occasionally quartzite. Between 100 - 1705 m (von Staden et al., 2015)	Possible	Unlikely – no Suitable habitat present.
-	Sensitive Species 41	Vulnerable	Vulnerable	Protected	Widespread (EOO < 19 940 km2), but rare species with a AOO of < 2000 km2. Favours high altitudes wetlands that remain wet for most of the year (von Staden & Lotter, 2013).	Probable	Possible – Suitable habitat present.
-	Sensitive Species 691	Vulnerable	Near Threatened		Favours damp areas in undulating grasslands. Thought to occur in less than 10 locations and with an EOO estimated between 445 and 11158 km2 (Raimondo, 2013).	Probable	Possible – Suitable habitat present.

Declared Alien Invasive Species

Nineteen NEMBA declared alien invasive plant species were recorded in the LSA during the field survey - listed in **Table 7-21**.

Several of these taxa including *Nicotiana glauca, Pennisetum clandestinum, Tamarix ramosissima* and *Verbena bonariensis* are particularly abundant in disturbed sites in the LSA (**Figure 7-51** and **Figure 7-52**).

Table 7-21 - Declared alien invasive species recorded in the local study area

Scientific Name	Common Name	Growth Form	NEMBA Category
Acacia dealbata	Silver Wattle	Tree	2
Acacia mearnsii	Black Wattle	Tree	3
Acacia melanoxylon	Blackwood	Tree	2
Acer buergerianum	Chinese Maple	Tree	2
Argemone ochroleuca	White-flowered Mexican Poppy	Herbaceous forb	1b
Campuloclinium macrocephalum	Pom Pom Weed	Herbaceous forb	1b
Cirsium vulgare	Spear Thistle	Herbaceous forb	1b
Datura stramonium	Common Thorn-apple	Herbaceous forb	1b
Eucalyptus spp.	Gum	Tree	1b or 2
Flaveria bidentis	Smelter's Bush	Herbaceous forb	1b
Fraxinus sp.	Ash	Tree	3
Nicotiana glauca	Wild Tobacco	Tree	2
Pennisetum clandestinum	Kikuyu	Graminoid	1b
Pinus sp.	Patula Pine	Tree	2
Robinia pseudoacacia	Black Locust	Tree	1b
Solanum sisymbriifolium	Dense-throned Bitter Apple	Herbaceous forb	1b
Solanum mauritianum	Bugweed	Tree	1b
Tamarix ramosissima	Pink Tamarisk	Tree	1b
Verbena bonariensis	Verbena	Herbaceous forb	1b

Figure 7-51 - Nicotiana glauca

Figure 7-52 - Tamarix ramosissima

Flora of Medicinal Value

Nine flora species recorded in the LSA have recognised medicinal value. These are listed in **Table 7-22**, accompanied by a description of their use, as per Van Wyk et al., (2009).

Table 7-22 - Flora species of medicinal value recorded in the local study area

Scientific Name	Medicinal Use*
Datura stramonium	Relieves asthma and acts to reduce pain. Weak infusions are used as an aphrodisiac.
Elephantorrhiza elephantina	Used as a remedy for diarrhoea and dysentery, stomach ailments and haemorrhoids.
Gomphocarpus fruticosus	Dried leaves are used to treat headaches and tuberculosis. The roots are purported to treat stomach pain and general body ache.
Helichrysum species	Treats a variety of afflictions, including coughs, colds, fever, headaches and infections.
Hypoxis species	Infusions of the corm are used to treat dizziness, bladder disorders and insanity.
Pelargonium luridum	Taken orally to treat diarrhoea and dysentery.
Rumex crispus	Used as a remedy for internal parasites, as well as vascular diseases and internal bleeding.
Typha capensis	Decoctions used to treat venereal disease, as well as diarrhoea, dysentery and enhance male libido.
*Medicinal use, as per Van Wyk, et al. (2009).	

7.2.2.5 Key Ecological Attributes and Processes in the Local Study Area

Habitat Corridors, Resources and Refugia

The LSA is highly fragmented and large portions are dominated by anthropogenic infrastructure, such as the power station and its associated facilities (ash dams), the Komati village, and cultivated fields. Patches of natural habitat are present; however, these are typically either bounded by built infrastructure or enclosed by fencing (e.g., concrete palisade fence). The immediate landscape surrounding the LSA is similarly transformed and fragmented, and thus habitat connectivity across the LSA and the surrounding landscape is poor.

Key Ecological Processes and Drivers of Change

The following notes summarise the key processes and drivers of change that are present in the LSA and surrounding landscape and their possible influence on the character of on-site terrestrial flora:

Wildfire – Grassland Burning

Fire is considered a natural, albeit often human initiated disturbance agent in grassland ecosystems. Mesic Highveld Grasslands are considered fire-prone and fire-dependent landscapes, and fire is essential to the maintenance of biodiversity patterns and ecological processes (SANBI, 2013). Key ecological benefits of fire, include inter alia:

- Removes moribund vegetation and enhances plant primary productivity and palatability, which improves grazing for wild herbivores. Fire also stimulates germination / flowering of fire-adapted flora species (e.g., certain orchid species);
- Controls the encroachment of both alien and indigenous woody plant species and weeds; and
- Increases overall habitat heterogeneity by creating a structural mosaic of tall- and short grassland.

A review of available historic satellite imagery indicates that grassland habitat in the LSA does burn occasionally. Fires are likely set either intentionally or accidentally by local community members and are not part of a formal burning programme. This notwithstanding, fire is considered an important driver of change in the LSA.

Alien Invasive Species Colonisation

Nineteen AIS were recorded in the LSA during the field survey. If not actively controlled, many AIS have the capacity to spread into adjacent natural habitat, where they could competitively exclude many indigenous woody and herbaceous species. This will have several deleterious impacts on the integrity and functioning of these habitats, such as inter alia:

- A loss of floristic diversity, with the resulting habitat patches unable to support diverse flora communities;
- A reduction in grass productivity for grazing herbivores, and
- Increased exposed soil surfaces and incidences of erosion.

Several species recorded in the LSA are highly invasive and adept at colonising undisturbed grassland and wetland habitats, such as *Acacia dealbata, Acacia mearnsii, Campuloclinium macrocephalum, Flaveria bidentis* and *Verbena bonariensis*. The spread of alien invasive vegetation is therefore considered a significant driver of change in the LSA and surrounding landscape, and one capable of severely negatively impacting botanical diversity.

7.2.3 AQUATIC BIODIVERSITY

*The following is extracted from the Aquatic Biodiversity compiled by WSP and included as **Appendix H.9**.*

The study area is located within the B11B quaternary sub-catchment of the upper Olifants Water Management Area (WMA). An unnamed tributary of the Koringspruit passes immediately to the north of the study area, while a small drainage line runs through the centre of the study area, eventually reporting to the Koornfontein River via the Gras Dam, and ultimately draining into the Olifants River (Synergistics Environmental Services, 2008).

7.2.3.1 Freshwater Critical Biodiversity Areas (CBAs) And Ecological Support Areas (ESAs)

The proposed development site was compared to available relevant spatial biodiversity planning datasets in order to assess the local and regional biodiversity context of the site. The following datasets were considered:

- Mpumalanga Biodiversity Sector Plan Freshwater Assessment (2011).

The MBSP (2011) freshwater assessment spatial dataset includes various areas mapped as 'other natural areas' throughout the local study area (**Figure 7-53**), as well as part of the channelled valley bottom wetland associated with the Koringspruit which was classified as 'Ecological Sensitivity Area (ESA): wetland'.

It is important to note that the MBSP freshwater assessment was based largely on remotely sensed imagery, and thus some wetlands are not included (e.g. historic wetlands lost through drainage or ploughing); similarly, some features have been mapped as wetlands, which, once examined in the field, are not in fact wetlands. The most up-to-date spatial dataset at the national level is now considered to be the National Wetland Map 5 (see **Figure 7-56**), which displays a more accurate desktop derived coverage of wetlands in South Africa, and which indicates wetland habitat is located on the site.

7.2.3.2 Strategic Water Source Areas (SWSAs)

No strategic water source areas occur in the region of the proposed development footprint; as such these are not included as receptors for the current scoping impact assessment or considered further here.

7.2.3.3 Freshwater Ecosystem Priority Area (FEPA) Sub-Catchments

The proposed development footprint in relation to FEPA sub-catchments and mapped National Freshwater Ecosystem Priority Areas (NFEPA) wetlands is illustrated on **Figure 7-54** and **Figure 7-55** respectively. As mentioned above, the National Wetland Map version 5 (NWM5) (Van Deventer et al., 2019), is the most up-to-date representation of the spatial extent and type of inland wetland ecosystem types at desktop level in South Africa. The NWM5 dataset indicates the presence of channelled valley bottom and seep wetland habitat within the study area (**Figure 7-56**); these systems were prioritised for infield verification, and site based assessments of wetland health and ecological importance, during the field survey.

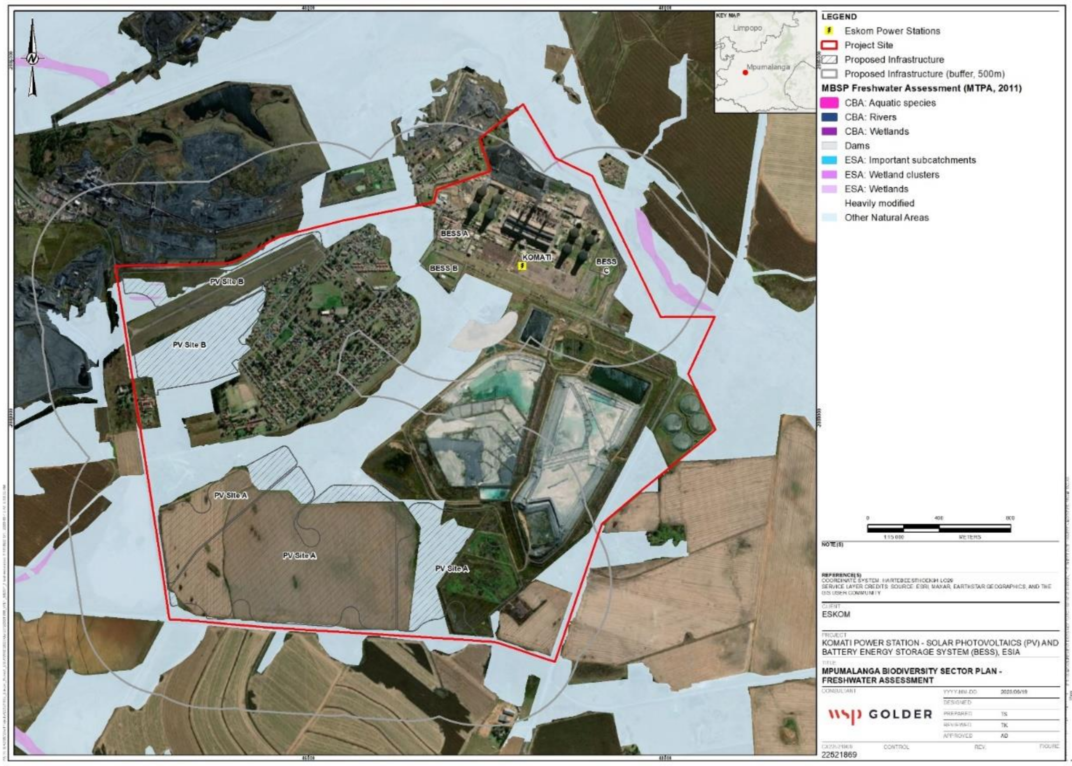


Figure 7-53: Study area in relation to MBSP Freshwater Assessment (MTPA, 2011)

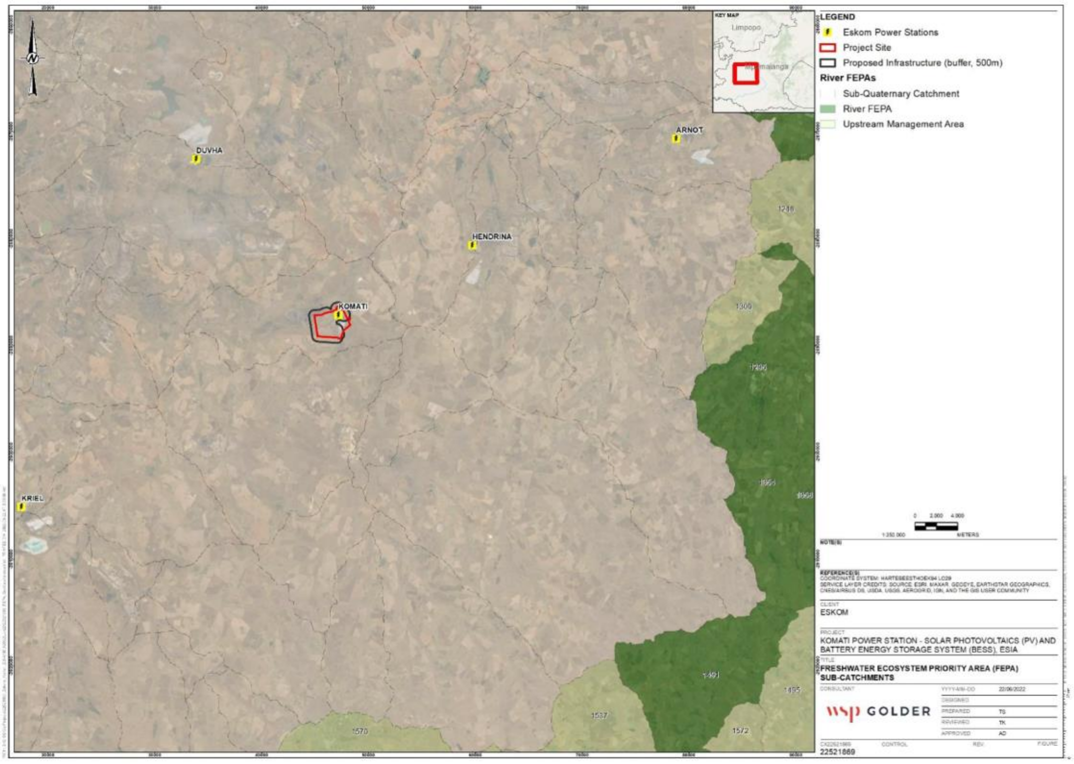


Figure 7-54: Study area in relation to FEPA sub-catchments

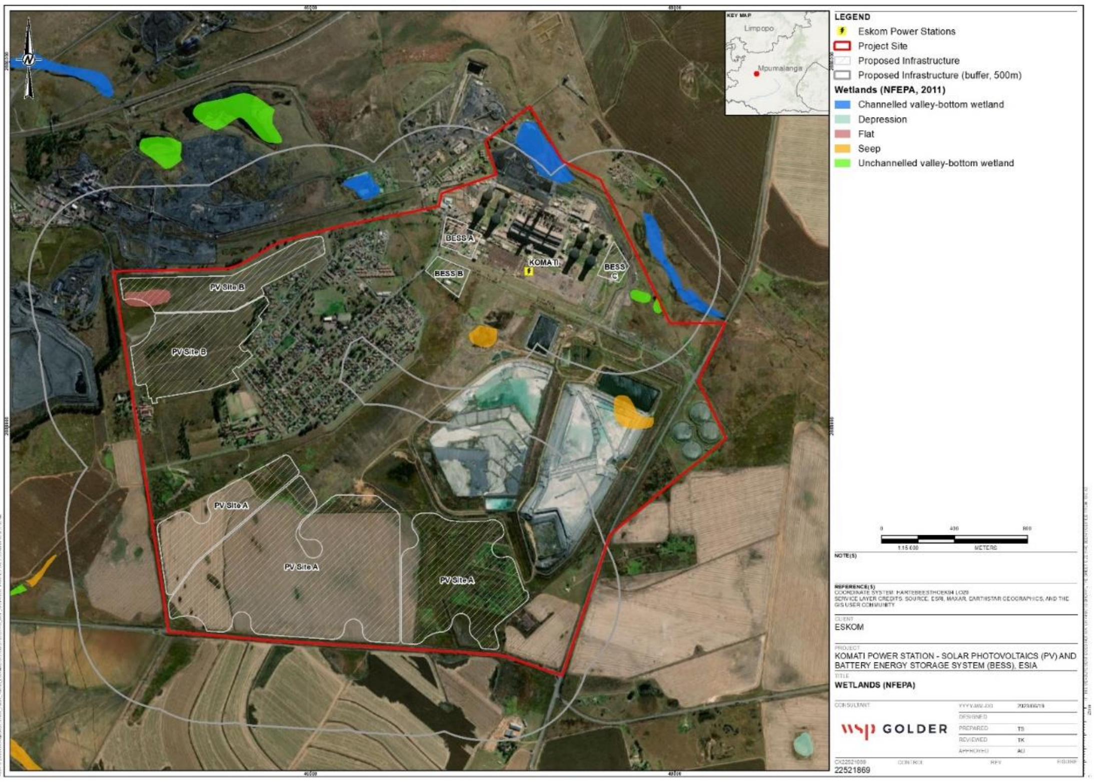


Figure 7-55: Proposed development in relation to NFEPA wetlands (NFEPA, 2011)

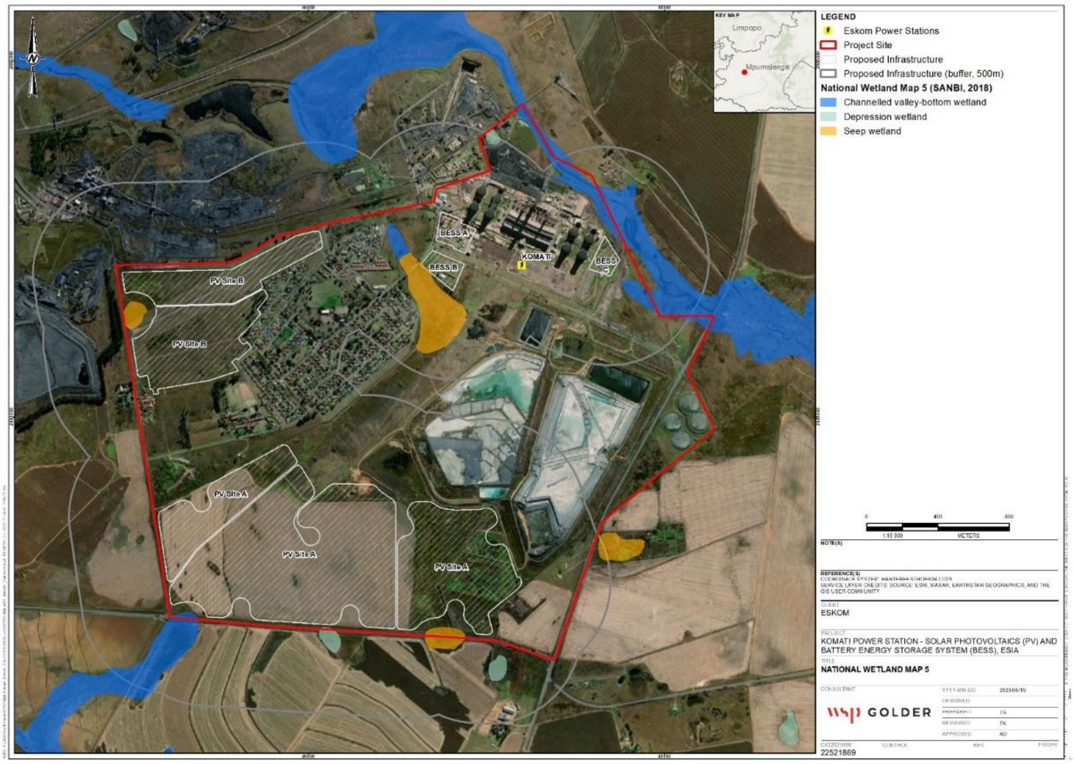


Figure 7-56: Proposed development in relation to NWM5 wetlands (2018)

7.2.3.4 Wetlands

Delineation And Classification

Four wetlands have been identified to occur within a 500m of the proposed Project development (**Figure 7-62**). The infield sampling of soil and vegetation in conjunction with the recording of diagnostic topographical /terrain indicators and features, enabled the delineation of the following distinct watercourse units:

- A Channelled valley bottom wetland (CVB),
- Two isolated seepage wetlands (Seep 1 and Seep 2), and
- Depression wetland

Several areas of highly disturbed grassland were also identified within the study area. Excavations and earthworks in these areas have resulted in high levels of disturbance of the soil profile, with some ephemeral accumulation of water during periods of high rainfall enabling *Imperata cyclindrica* (which although it occurs in wetlands, is not a reliable wetland indicator, since it can proliferate in disturbed terrestrial areas with high rainfall) to proliferate; however water is not retained in these disturbed soils for long enough to sustain hydrophytic plant species, or soil form indicators to develop. These areas were therefore not classified as wetland habitat.

Channelled Valley Bottom wetland

A channelled valley bottom wetland associated with the Koringspruit occurs within the study area (**Figure 7-57** and **Figure 7-62**). Channelled valley bottoms wetlands (CVB) are characterised by having a well-defined stream channel but lacking characteristic floodplain features, which was the case for the CVB wetland on site. These systems receive water inputs from the main channel and from adjacent slopes (Kotze et al., 2008). The CVB wetland was dominated by permanent and seasonal wetland plant species including *Typha capensis, Phragmites australis, Schoenoplectus paludicola,* and *Cyperus latifolius* as well as hygrophilous grassland community such as *Eragrostis rotifer*. The wetland was also characterised by temporary and seasonal hydromorphic soil characteristics (**Figure 7-58**), indicating brown wetland soils.

The wetland is highly impacted and appears to receive effluent discharge from the Power Station. The wetland channel shows signs of extensive flows during large storm events and also lateral inputs from surrounding land uses. The CVB is situated adjacent to the proposed Battery Energy Storage System (BESS) footprint.

Figure 7-57 - An overview of the Channelled Valley Bottom wetland (upstream)

Figure 7-58 - Soil Sample taken at 50-60 cm in the seasonal zone of the wetland

Seep 1

A seep wetland of approximately 24.5 ha traverses the eastern extent of the proposed PV site A footprint. The wetland is bordered by the Ash dam facility towards the north-east and crop fields to the south-west (**Figure 7-62**). The hydrology of the seep wetland is largely impacted by flow input from surrounding activities, particularly the seepage from the Ash dam, as evidenced by the soil sample taken at the permanent zone of the wetland (**Figure 7-59**). Furthermore, a dam which has been excavated in the wetland HGM, has resulted in impounding and pooling of water in the wetland (**Figure 7-59**). Dominant wetland vegetation at this site includes *Typha capensis, Phragmites australis* which dominated the permanent wet area, and *Imperata cylindrica*, which dominated much of the seasonal zone.

Figure 7-59 - a) An overview of Seep 1 wetland and pooling of water at small dam, b) Soil sample taken in the permanent zone of the seep wetland indicating signs of soil contamination from the Ash dam

<u>*Seep 2*</u>

A second seep wetland of approximately 20 ha in extent was identified in the northern extent of the study area (**Figure 7-62**). This wetland is located downslope of Eskom's pollution control dams and is bordered by the Komati village to the west. The wetland is dominated by seasonal to permanent hydromorphic soil characteristics (**Figure 7-61**), with sedges and obligate wetland vegetation including *Typha capensis, Phragmites australis* and *Cyperus latifolius* occurring in the permanent zone, and *I. cylindrica* occurring in temporary-seasonally wet areas. Evidence of significant levels of disturbance in the form of small drains and berms diverting the water from the Eskom property into the receiving environment was observed in the Seep.

Figure 7-60 - An overview of the seep wetland: upstream and downstream

Figure 7-61 - Soil sample taken at the permanent zone of the wetland

Depression

A shallow depression wetland is located within a crop field in the southern extent of the study area, outside of the Project site boundary. The wetland is approximately 3 ha in extent and is cut off from the Project site by the tarred R542 (**Figure 7-62**). The wetland appears to be geomorphologically intact (other than loss likely sustained to the R542 construction) and driven entirely by rainfall accumulation. The wetland is considered to be ephemeral in nature.

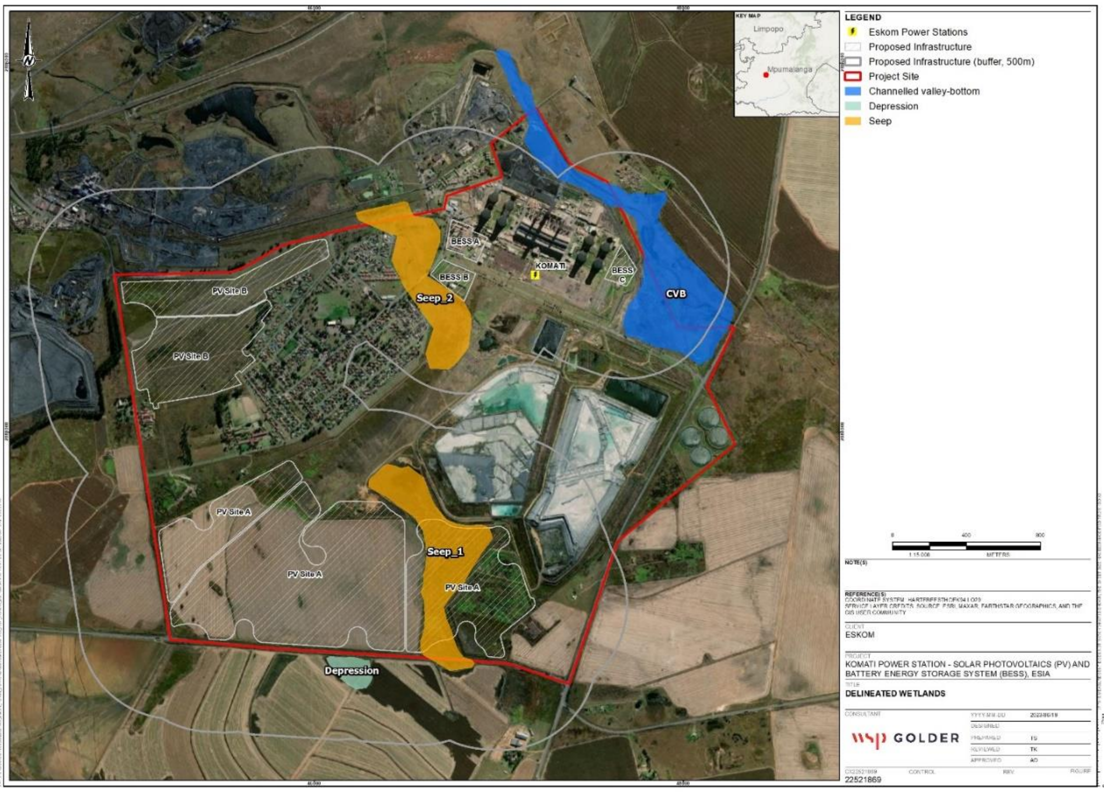


Figure 7-62 - Wetland delineation and classification

Present Ecological State

The most significant drivers of change currently present in the study area include industrial operations (seepage from ash dam, increased water inflow from Eskom operations) impoundment of water at dams, road crossings, mining operations in the catchments, spread of alien invasive species as well as formal and informal settlements within the wetland's catchment. The Present Ecological State (PES) score for the wetlands in the study area are presented in **Table 7-23**, and discussed in greater detail in the paragraphs that follow.

Table 7-23 - Summary of Impact Scores and PES Class

Wetland Unit	Hydrology Impact Score	Geomorphology Impact Score	Water Quality Impact Score	Vegetation Impact Score	Overall PES score and Class	
CVB	4.8	3.8	6.0	4.0	4.6	D
Seep 1	5.0	3.9	6.0	3.5	4.6	D
Seep 2	5.0	4.2	5.8	5.0	5.0	D
Depression	3.0	3.0	4.6	4.0	3.5	C

Channelled Valley Bottom

Major impacts identified within the channelled valley bottom wetland include head cut erosion, impoundment of flow in dams and at road crossings, cattle farming and crop farming, and effluent discharge from industrial operations (Power Station). These impacts resulted in a Largely Modified Impact category (PES D), with the hydrology and water quality component contributing substantially to the modified state of the wetland.

Figure 7-63 - Impacts: a) Soil Erosion at CVB main channel; b) pooling of water in dam; c) effluent discharge into the wetland; d0 crop farming and cattle grazing in the wetland

Seep 1

The Present Ecological Status of the Seep 1 wetland was considered Largely Modified (PES D), on account of the hydrological state and the water quality of the wetland. The wetland appears to be substantially impacted by the adjacent infrastructure and activities, particularly the ash dam facility. As seen in **Figure 7-59** the wetland soils are contaminated by sediment inputs from the ash dam. Furthermore, the increased surface water input from the ash dam facility and the impoundment of flow in the excavated dam (**Figure 7-64**) have changed the hydrological regime of the wetland.

Figure 7-64 - Ash dam facility and pooling of water at dam

Seep 2

Major impacts identified in the Seep 2 wetland include increased water inputs into the wetland system from the PCD, spread of alien invasive species, impoundment of flow along roads and dams, and the presence of drains and trenches. These disturbances, together with the likely impact on water quality as a result of seepage from the PCDs, have contributed to the Largely Modified state (PES Category D) of the wetland.

Figure 7-65 - Impacts: a) pooling of water at dam; b) trenches and berms in wetland; c) effluent discharge into the wetland from a leaking pipe; d) impoundment of water at roads in wetland

Depression

The present ecological state of the depression wetland was considered Moderately Modified (PES category C), largely due to the presence of surrounding crop farming and the tarred R542 road in close proximity to the system.

Ecological Importance And Sensitivity

All wetlands in the study area were assessed as being of Low /Marginal EIS, with the exception of the CVB wetland which was assessed as being of Moderate EIS (**Table 7-24**). The moderate EIS of the CVB was attributed to its hydrological functional importance as this wetland performs a role in landscape connectivity at the regional level, providing regulating and supporting benefits such as streamflow regulation and flood attenuation.

Table 7-24 - Summary of wetland EIS scores and ratings

Wetland Unit	Ecological Importance and Sensitivity Score	Hydrological Functions Score	Direct Human Benefits Score	Integrated EIS Score	Overall PES score and Class
CVB	1.2	1.0	0.0	1.2	Moderate
Seep 1	0.8	0.9	00	0.9	Low/Marginal
Seep 2	0.8	0.9	0.0	0.9	Low/Marginal
Depression	0.8	0.9	0.0	0.9	Low/Marginal

Ecoservices

The importance scores for the ecosystem services provided by wetlands within the study area are illustrated in the spider diagrams presented in **Figure 7-66**, **Figure 7-67** and **Figure 7-68**. The majority of the ecosystem services were rated as very low in terms of their overall importance. Regulating and supporting services such as sediment trapping, phosphate assimilation, nitrate assimilation and toxicant assimilation were determined as moderate, particularly for the CVB wetland which is also important in terms of streamflow regulation and flood attenuation.

The CVB was also assessed as having a Moderately High importance in terms of the biodiversity maintenance (**Figure 7-66**). This was attributed to the likelihood of the African Grass Owl (Tyto capensis) to occur on site, based on the site sensitivity report generated by the national screening tool as well as the results of the avifauna survey undertaken on 17 June 2022 which confirmed suitable habitat for Grass Owl on site. Furthermore, the MBSP freshwater assessment (2011) maps the CVB wetland as an ecological support area.

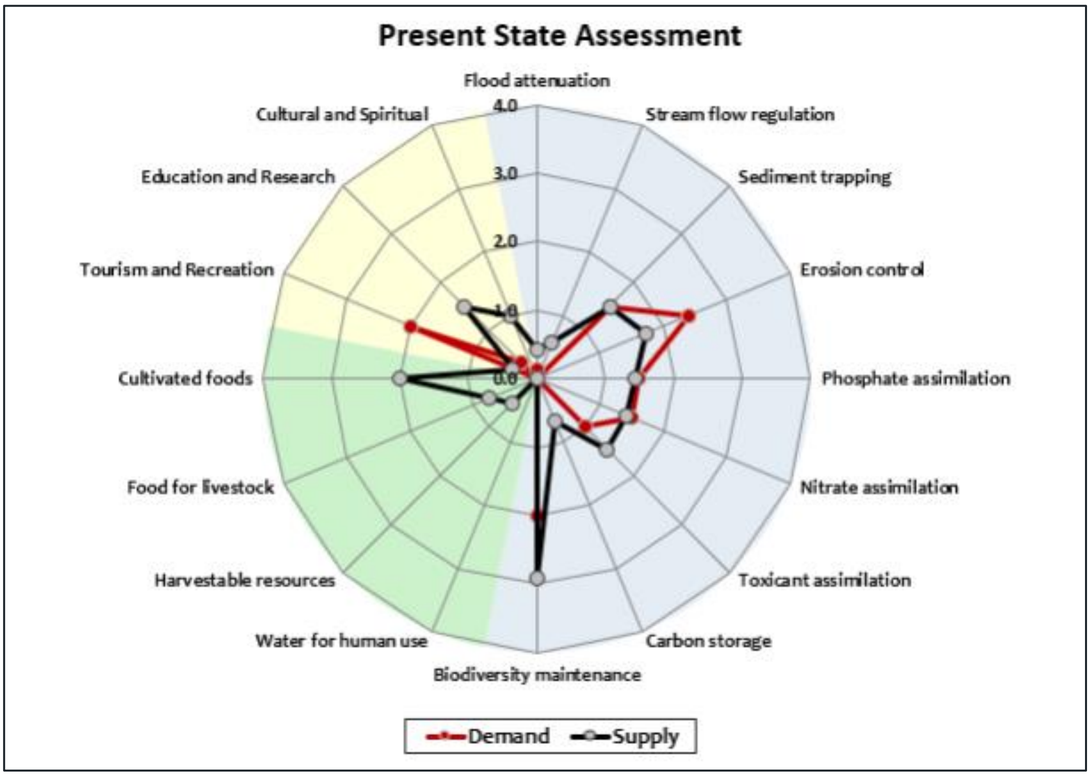


Figure 7-66 - Ecosystem Services supplied by/demanded from the CVB wetland

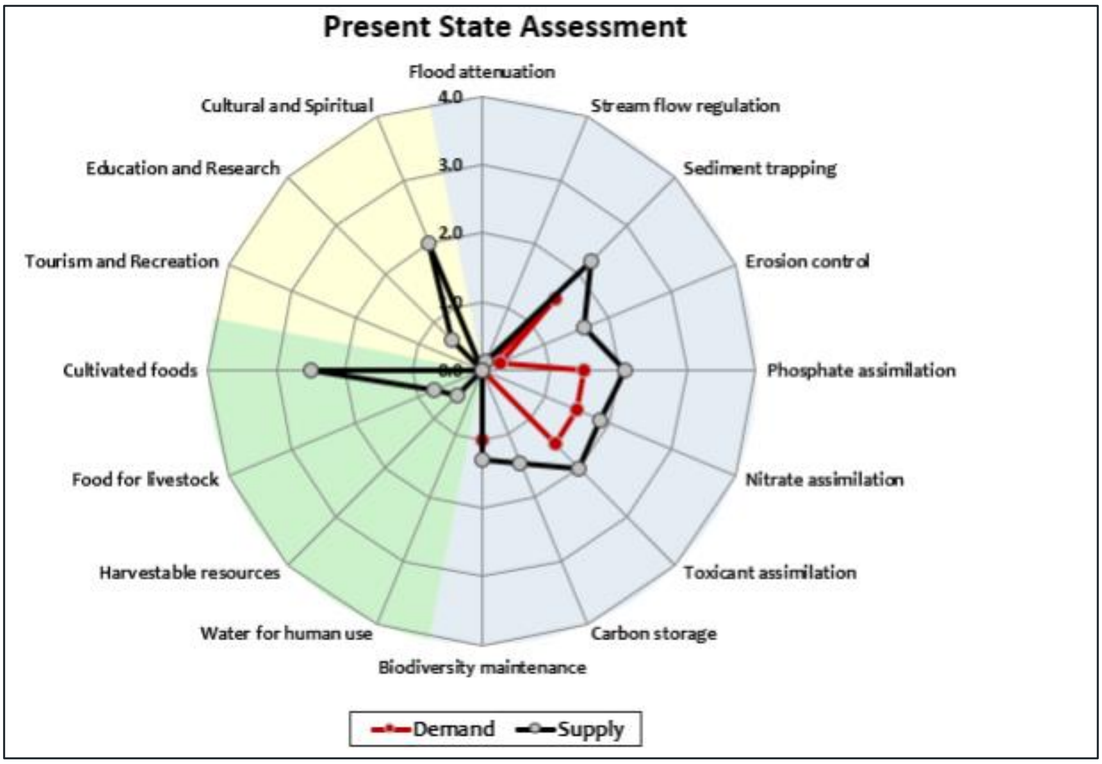


Figure 7-67 - Ecosystem Services supplied by/demanded from seep wetlands

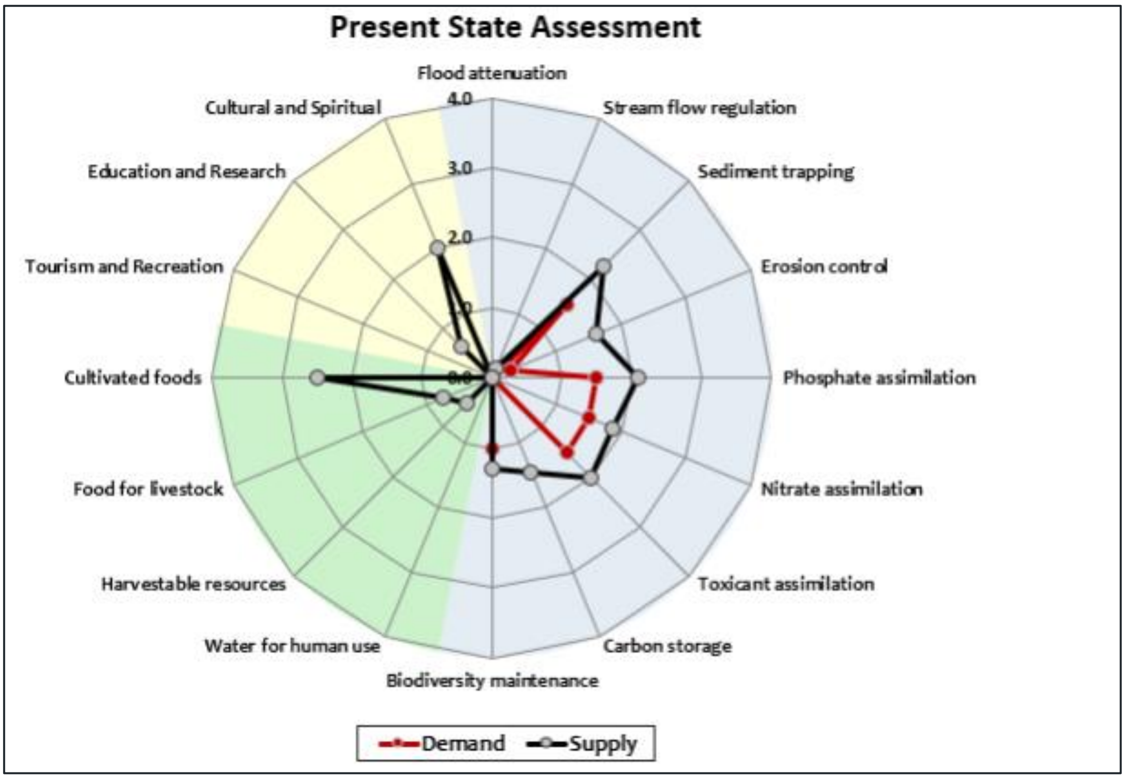


Figure 7-68 - Ecosystem Services supplied by/demanded from Depression wetland

7.2.3.5 Existing Impacts On Biodiversity And Drivers Of Change

The proposed project infrastructure will be situated in close proximity to the existing power generation facilities and activities. All areas visited are currently experiencing some level of impact from the surrounding agricultural and industrial activities primarily through habitat transformation, and disturbance arising from power generation facilities and activities.

The presence of the existing facilities within close proximity to the proposed development footprint is expected to have an exacerbating effect on nearby wetlands through the interruption of surface hydrology, and erosion as a result of increased surface water runoff due to the increased area of hardened surfaces in the study area.

7.2.3.6 Natural, Modified And Critical Habitats

The study area is dominated by agricultural cultivation, power station infrastructure and residential/industrial areas, interspersed with some remnant wetland habitat. While some very disturbed wetland habitat has been identified in the eastern extent of PV Site A, it is no longer considered to constitute 'Natural' habitat as defined by WB ESS6 or IFC PS6, due to its heavily degraded state and loss of ecological function. The channelled valley bottom wetland to the north east of the site, and the seep wetland that crosses the northern boundary of the site, while moderately modified/disturbed, still support biodiversity and deliver ecological services to an extent that enables them both to be considered 'Natural' habitat (**Figure 7-69**) as defined by the lender standards.

At present, no areas of potentially Critical Habitat, as defined by IFC and WB standards, have been identified within the study area.

7.2.3.7 Diatoms

The assessment of diatoms was incorporated into this aquatic assessment study to provide further insight into the health and integrity of the watercourses in the study area. Diatoms have a rapid response to specific physico-chemical conditions in the water and are thus often the first indicator of environmental change. A sample was collected from the Koringspruit associated with the channelled valley bottom wetland and was submitted to Ecotone Freshwater Consultants cc for analysis. A comprehensive diatom report received from Ecotone Freshwater Consultants is included A of the Aquatic Biodiversity Specialist Report.

A total of 11 diatom species were recorded at this site during the June 2022 assessment, and the dominant species recorded included *Sellaphora* sp., *Navicula* sp., and *Nitzschia* sp. These taxa are cosmopolitan in nature and have wide ecological amplitudes and thus caution must be taken when analysing the predominance of these species at specific sites. Diatom communities reflect ecological conditions over a period of 2-3 weeks and thus establishment of communities requires enough time to establish to reflect these conditions. Ecological information is provided below for the dominant and sub-dominant species in order to make ecological inferences for this site (**Table 7-25**; Taylor et al., 2007, Cantonati et al., 2017):

- The ecological water quality at this site reflected High quality with very low to no organic pollution (**Table 7-25**;):
  - The dominant diatom taxa pointed to well-oxygenated waters and eutrophic conditions with moderate to high electrolyte content.
  - The presence of some taxa pointed to brackish conditions. These taxa are tolerant to slightly polluted conditions.
  - The %PTV score indicated that there were low levels of organic pollution present at this site.

Table 7-25 – Diatom analysis results and ecological water quality results

Site	%PTV	SPI	Ecological Category	Class
CVB (Koringspruit)	9.6	20.7	A	High

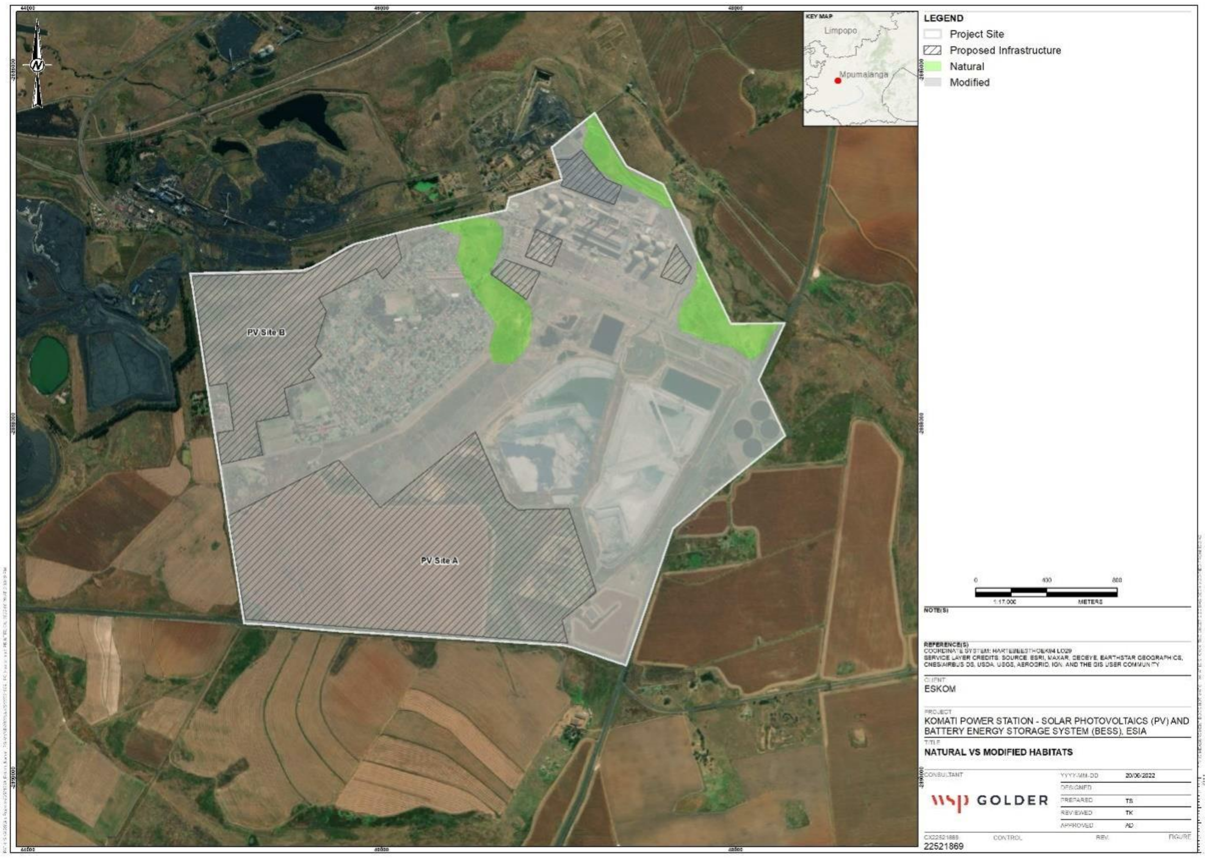


Figure 7-69: Natural, modified and critical habitat

7.3 SOCIAL ENVIRONMENT

7.3.1 TRAFFIC

*The following is extracted from the Traffic Scoping Assessment compiled by Innovative Transport Solutions (Pty) Ltd (ITS) and included as **Appendix H.10**.*

Existing Road Network

The roads in the vicinity of the proposed development are as follows:

- R543: Is a Class 3 provincial road and is located to the south of the proposed PV Site A and the town of Komati. This road serves as an East-West link between the R544 and the R35.
- R35: Is a Class 3 provincial road and is located to the northeast of the proposed developments and the town of Komati. This road serves as the link between Middelburg and Bethal.
- Main Road: Is a Class 4 municipal road and borders the proposed developments on the western boundaries of PV Site A and PV Site B.
- Flamingo Street: Is a Class 5 municipal road and borders the proposed PV Site A on the northern boundary of the site. Flamingo Street also provides access to the town of Komati.

The locations of these roads relative to the proposed development are shown in **Figure 7-70**.

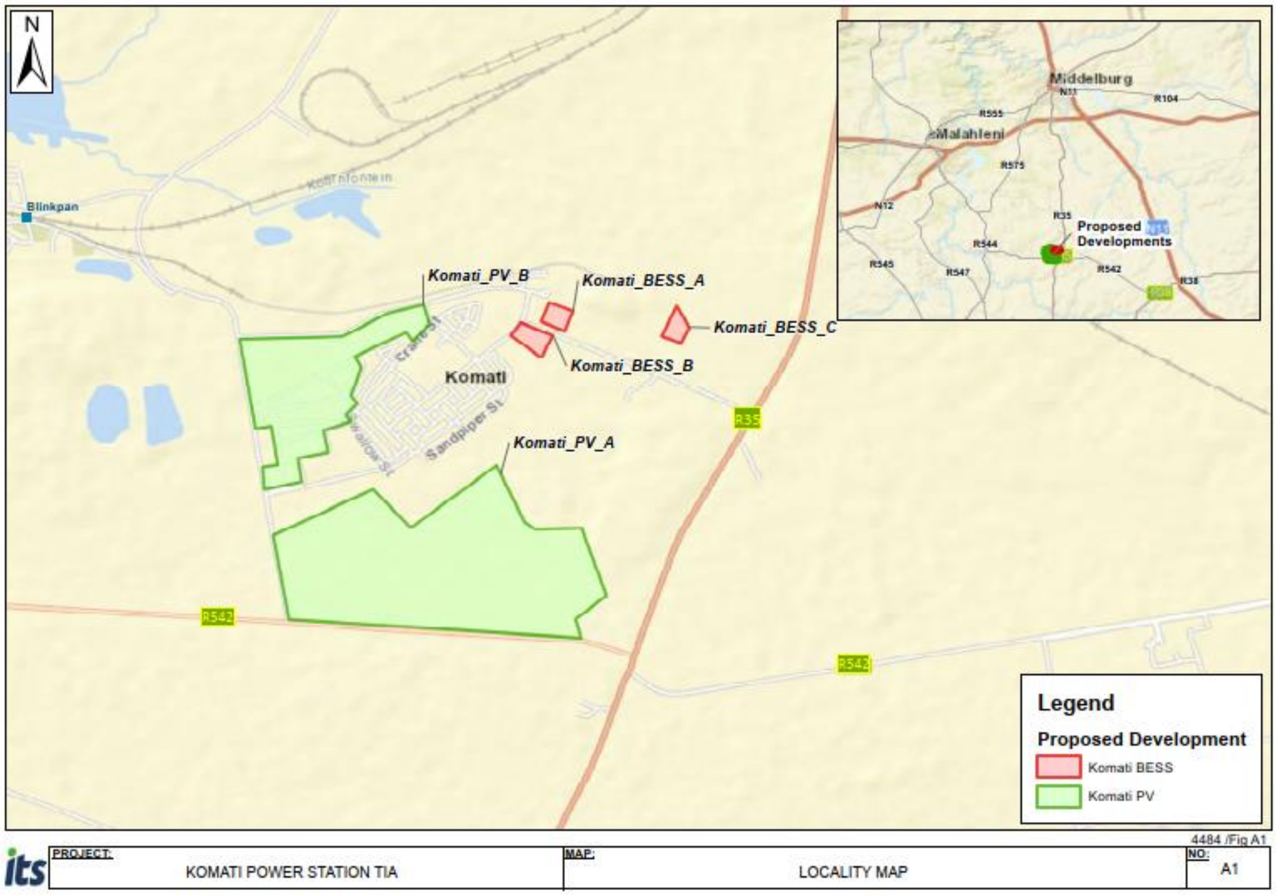


Figure 7-70: Locality map showing roads in the vicinity of the development (ITS, 2022)

Access

The project area and surrounding areas are already easily accessible due to existing access roads. New access roads or tracks may be required to provide access to sections of the powerline route.

Access to the proposed developments is proposed from Flamingo Street for PV Site A and from the current road that borders the airfield to the north, for PV Site B respectively.

Access roads will be mostly a two-track gravel road under the OHPL in order to access pylons for construction and maintenance purposes. The width of the access roads will be determined during the design phase..

Capacity Analysis

Traffic counts were conducted, at the intersections shown in **Figure 7-71**, covering a 12- hour period on Wednesday, 1 June 2022.

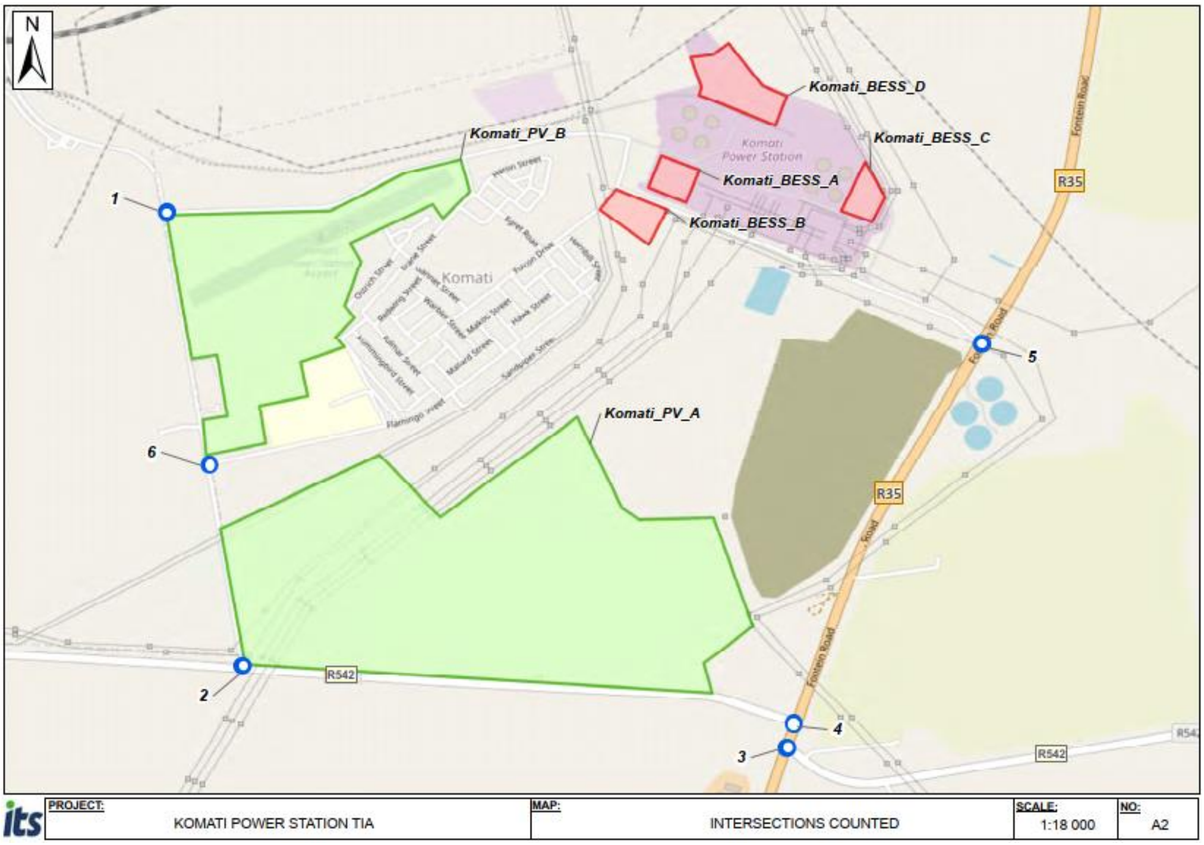


Figure 7-71:   Intersections for traffic count

PTV Vistro software was used to conduct the capacity analysis for the intersections included in the study area. The intersections that were included in the analysis are:

- Int 1 – Main Road / Koornfontein Mine Access
- Int 2 – R542 / Main Road
- Int 3 – R35 / R542 to Emalahleni
- Int 4 – R35 / R542 to Hendrina
- Int 5 – R35 / Komati Power Station
- Int 6 – Main Road / Flamingo St

The capacity analysis results for the intersections included in the study area are included in the Traffic Impact Assessment (**Appendix H.10).**

The existing road network is operating at acceptable levels of service with the existing geometry. The future traffic scenarios are also expected to operate at acceptable levels of service with the existing geometry. The existing geometry of the road network is shown schematically in Annexure A, **Figure 7-72**. No road upgrades are expected to be required to accommodate the additional traffic generated by the proposed developments.

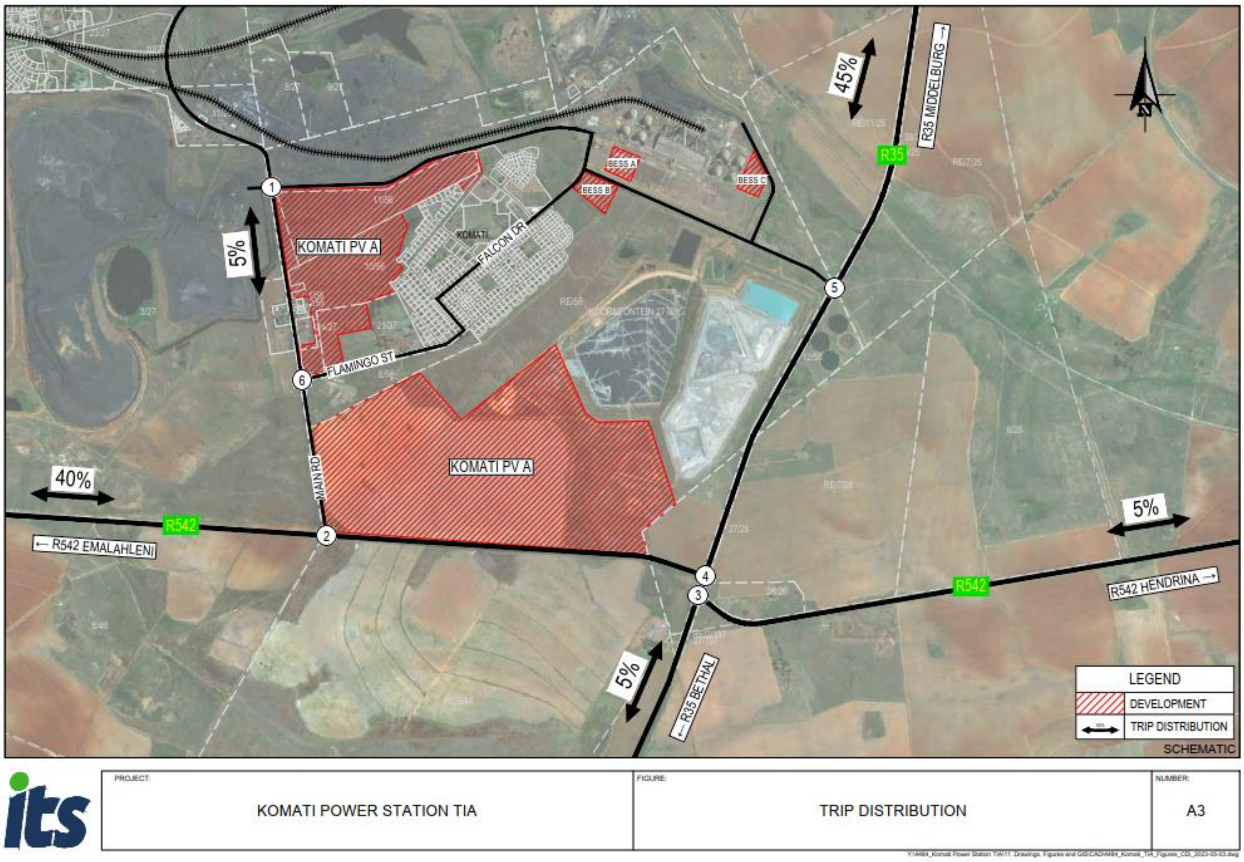


Figure 7-72: Trip Distribution

Public Transport

Due to the locality of the proposed developments, no formal public transport facilities are located in close approximation to the proposed development. It is unlikely that public transport facilities will be required.

7.3.2 VISUAL

*The following is extracted from the Visual Impact Assessment compiled by LOGIS and included as **Appendix H.11**.*

7.3.2.1 Land use and settlement patterns

The majority of the study area is relatively sparsely populated with a population density of less than approximately 33 people per km2. Most of these people are located within the towns of Komati (at the power station) or at Blinkpan just north of the Goedehoop Colliery. Other than these towns, or residential areas, the rest of the study area is dotted with farm residences or homesteads. These residences are inhabited by the farmers producing mainly maize crops (dryland agriculture) within the region. Besides the agricultural activities the most prominent land use within the area is the mining and the associated power generation activities at the power station.

Some of the homesteads within the study area include[6]:

- Rooiblom
- Welverdiend (1, 2 and 3)
- Broodsnyersplaas
- Blinkpan
- Geluk
- Bultfontein (1 – 8)
- Willmansrust
- Goedehoop (1, 2 and 3)
- Koornfontein

It is uncertain whether all of these farmsteads are inhabited or not. It stands to reason that farmsteads that are not currently inhabited will not be visually impacted upon at present. These farmsteads do, however retain the potential to be affected visually should they ever become inhabited again in the future. For this reason, the author of this document operates under the assumption that they are all inhabited.

The R35 and R542 arterial roads provide motorised access to the project site from respectively the N4 and N12 national roads traversing north and north-west of the larger region.

There are no identified tourist attractions of designated protected areas within the study area.

In spite of the overall rural character of the region, there are a large number of power lines and substations in the study area, mostly associated with the Komati Power Station, the coal mines and the railway lines traversing the study area. These include:

- Camden-Duvha 400kV
- Komati-Matla 275kV
- Arnot-Kruispunt 275kV
- Camden-Komati 275kV
- Komati-Kruispunt 275kV
- Halfgewonnen-Kudu 88kV
- Kudu-Export 132kV
- Broodsnyersplaas-Spoornet 132kV
- Aberdeen-Gloria Colliery 132kV
- Export-Duvha Colliery 132kV
- Kudu-Nasarete 132kV

[6] The names listed below are of the homestead or farm dwelling as indicated on the SA 1: 50 000 topographical maps and do not refer to the registered farm name.

- Hendrina-Aberdeen 132kV
- Aberdeen-Kudu 132kV
- Aberdeen-Ysterkop 132kV
- Duvha Colliery-Kudu 132kV
- Abina 132kV Overhead Line
- Kudu-Dorstfontein 88kV
- Komati-Kudu 1 and 2 132kV
- Aberdeen-Spoornet 132kV
- Klicoal-Kudu 132kV
- Aberdeen-Gloria Shaft 132kV

There are no additional solar or wind energy generation plants (or applications) within the study area. The closest approved application is the proposed installation of a solar photovoltaic power plant at the Eskom Duvha Power Station, some 18km north-west of the project site.

The photographs below aid in describing the general environment within the study area and surrounding the proposed project infrastructure.

Figure 7-73: The town of Komati located adjacent to the proposed sites (LOGIS, 2023)

Figure 7-74: The town of Blinkpan just north of the Goedehoop Colliery (LOGIS, 2023)

Figure 7-75: View over the Goedehoop Colliery (LOGIS, 2023)

Figure 7-76: Example of a typical homestead located within the study area (LOGIS, 2023)

Figure 7-77: View from the R542 towards the site from the west (LOGIS, 2023)

Figure 7-78: View from the R35 towards the site from the south (LOGIS, 2023)

Figure 7-79: View over PV Site A from the R542 (LOGIS, 2023)

Figure 7-80: View over PV Site A from the outskirts of the town of Komati (LOGIS, 2023)

Figure 7-81: View over PV Site B from the adjacent secondary road (LOGIS, 2023)

Figure 7-82: Airstrip noted within PV Site B (LOGIS, 2023)

7.3.3 HERITAGE

*The following is extracted from the Heritage Impact Assessment compiled by APAC and included as **Appendix H.12**.*

The Stone Age is the period in human history when lithic (stone) material was mainly used to produce tools. In South Africa the Stone Age can be divided in basically into three periods. It is however important to note that dates are relative and only provide a broad framework for interpretation. A basic sequence for the South African Stone Age (Lombard et.al 2012) is as follows:

- Earlier Stone Age (ESA) up to 2 million – more than 200 000 years ago
- Middle Stone Age (MSA) less than 300 000 – 20 000 years ago
- Later Stone Age (LSA) 40 000 years ago – 2000 years ago

It should also be noted that these dates are not a neat fit because of variability and overlapping ages between sites (Lombard et.al 2012: 125).

There are no known Stone Age sites in close proximity to the study area, although rock paintings (associated with the Later Stone Age) are known south of eMalahleni (Witbank) near the confluence of the Olifants River and Rietspruit, as well as a rock art site to the southeast of Middelburg (Bergh 1999:4-5). Heritage surveys have recorded few outstanding Stone Age sites, rock paintings and engravings in the Eastern Highveld - mainly as a result of limited extensive archaeological surveys. Stone tools have however been recorded around some of the pans which occur on the Eastern Highveld (Pistorius 2010:16). Some individual Later Stone Age artifacts were identified in the larger area during a 2007 HIA for Goedgevonden Colliery, but the location of the site is not indicated (De Jong 2007: 19).

No Stone Age sites or material were identified in the study area during the May 2023 field assessments. If any were to be present, they would most likely be individual stone tools or low-density scatters in open-air surface scatters around the area.

The Iron Age is the name given to the period of human history when metal was mainly used to produce metal artifacts. In South Africa it can be divided in two separate phases (Bergh 1999: 96-98), namely:

- Early Iron Age (EIA) 200 – 1000 A.D
- Late Iron Age (LIA) 1000 – 1850 A.D.

Huffman (2007: xiii) however indicates that a Middle Iron Age should be included. His dates, which now seem to be widely accepted in archaeological circles, are:

- Early Iron Age (EIA) 250 – 900 A.D.
- Middle Iron Age (MIA) 900 – 1300 A.D.
- Late Iron Age (LIA) 1300 – 1840 A.D.

No Early or Middle Iron Age sites are known to occur in the study area (Bergh 1999: 6-7). According to Pistorius the Eastern Highveld had probably not been occupied by Early Iron Age communities, but was occupied by Late Iron Age farming communities such as the Sotho, Swazi and Ndebele who established stone walled settlement complexes. Seemingly these sites are more common towards the eastern perimeters of the Eastern Highveld. Small, inconspicuous stone walled sites have been observed along the Olifants River but are an exception and not the rule (Pistorius 2010:16-17).

There are a fairly large number of Late Iron Age stone walled sites in the bigger geographical area that includes Lydenburg, Dullstroom, Machadodorp, Badplaas and Belfast (Bergh 1999: 6-7). Late Iron Age sites have been identified to the north and east of Middelburg in the vicinity of Belfast (Bergh 1999: 7). Some of these sites might be related to the so-called Marateng facies of the Urewe pottery tradition of the LIA, dating to between AD1650 and 1840 (Huffman 2007: 207). During the 19th century the Ndzundza Ndebele inhabited the land to the north of Middelburg, but it seems as if the area directly surrounding the town was largely uninhabited. The Ndebele of Mzilikazi did move through this area during the difaqane which probably left it uninhabited for some time (Bergh 1999: 10-11).

No Iron Age sites, features or material were identified in the area during the May 2023 assessments.

The historical age started with the first recorded oral histories in the area. The first European people to move through this area were the party of the traveller Robert Schoon who passed through during

1836 (Bergh 1999: 13). Although the Voortrekkers moved across the Vaal River during the 1830's, it seems as if Europeans only settled here after 1850 (Bergh 1999: 14-15).

One historic event took place in the region. During the Anglo-Boer War, the British forces under Brigadier-General Beatson were attacked by the ZAR forces, led by Gen. Muller. More than 50 British soldiers were killed. Afterwards, Brigadier-Gen. Beatson accused the Australian forces of cowardice. They mutinied against him and some were arrested, court-martialled and sentenced to death. Fortunately, these sentences were later commuted to imprisonment. This battle took place on the farm Wilmansrust 47IS, just to the south of the power station. A monument to commemorate this event was erected on this farm, but during the early 1970s it was relocated to the town of Bethal. The site investigation for the power station was started in 1957, and the first unit was commissioned in 1961 and the last in 1966. In 1990 the station was completely mothballed (Van Schalkwyk 2007: 4). Construction of the power station began during 1961.

No recent historical sites and features were identified and recorded in the study & development area in May 2023.

Results of the May 2023 Field Assessment

It was evident from the desktop study that archaeological/historical sites and finds do occur in the larger geographical landscape within which the specific study area is located. Based on this it is always possible that open-air Stone Age sites could be found in the area, in the form of individual stone tools or small scatters of tools if present. The possibility of Iron Age sites in the area is highly unlikely with no rocky outcrops, ridges and hills present. The likelihood of recent historical sites and features being present in the area is also low, although this could not be excluded. If any were to be present, it would most likely be remnants of homesteads and unknown/unmarked graves. During a 2007 Heritage Survey for the Komati Power Station Ash Dam Extension (on the farm Komati Power Station 58IS, a subdivision of the original farm Koornfontein 27IS), no Stone Age, Iron Age or recent historical sites, features or material were identified in the area (Van Schalkwyk 2007: 4).

During the May 2023 field assessment, no sites, features or material of cultural heritage (archaeological and/or historical) origin or significance were identified in the study and proposed SEF development area. The planned SEF development and related infrastructure is located in already heavily disturbed areas and the likelihood of any cultural heritage sites or features being located here is very low. The often subterranean nature of archaeological and/historical sites and features should however always be taken into consideration and there is always a possibility of these occurring in an area earmarked for development. This could include unmarked or unknown graves or burials.

Figure 7-83: A view of the Komati Power Station (APAC, 2023)

Figure 7-84: General view of a section of the area. Note the fairly open but disturbed nature of the area (APAC, 2023)

Figure 7-85: Some open areas exist in Komati between the Power Station and the town (APAC, 2023)

This is taken from the direction of the Power Station down the Eskom Powerline Corridor.

Figure 7-86: A view of the area with the Ash Discard Dump visible (APAC, 2023)

Figure 7-87: A view of a section of the area close to the proposed PV B area. Recently ploughed fields are evident here (APAC, 2023)

Figure 7-88: More agricultural fields next to the R542 road, with the Power Station visible in the distance (APAC, 2023)

Figure 7-89: Another section of the study and development area near the proposed PV A area (APAC, 2023)

Figure 7-90: The impacts of agricultural and ESKOM related activities on the area is clearly visible in this image (APAC, 2023)

Figure 7-91: A view of a part of Komati Town (APAC, 2023)

7.3.4 PALAEONTOLOGY

*The following is extracted from the Palaeontology Desktop Assessment compiled by Dr H Fourie and included as **Appendix H.13**.*

The Ecca Group, Vryheid Formation (**Figure 7-92**) may contain fossils of diverse non-marine trace, Glossopteris flora, mesosaurid reptiles, palaeoniscid fish, marine invertebrates, insects, and crustaceans (Johnson 2009). Glossopteris trees rapidly colonised the large deltas along the northern margin of the Karoo Sea. Dead vegetation accumulated faster than it could decay, and thick accumulations of peat formed, which were ultimately converted to coal. It is only in the northern part of the Karoo Basin that the glossopterids and cordaitales, ferns, clubmosses and horsetails thrived (McCarthy and Rubidge 2005).

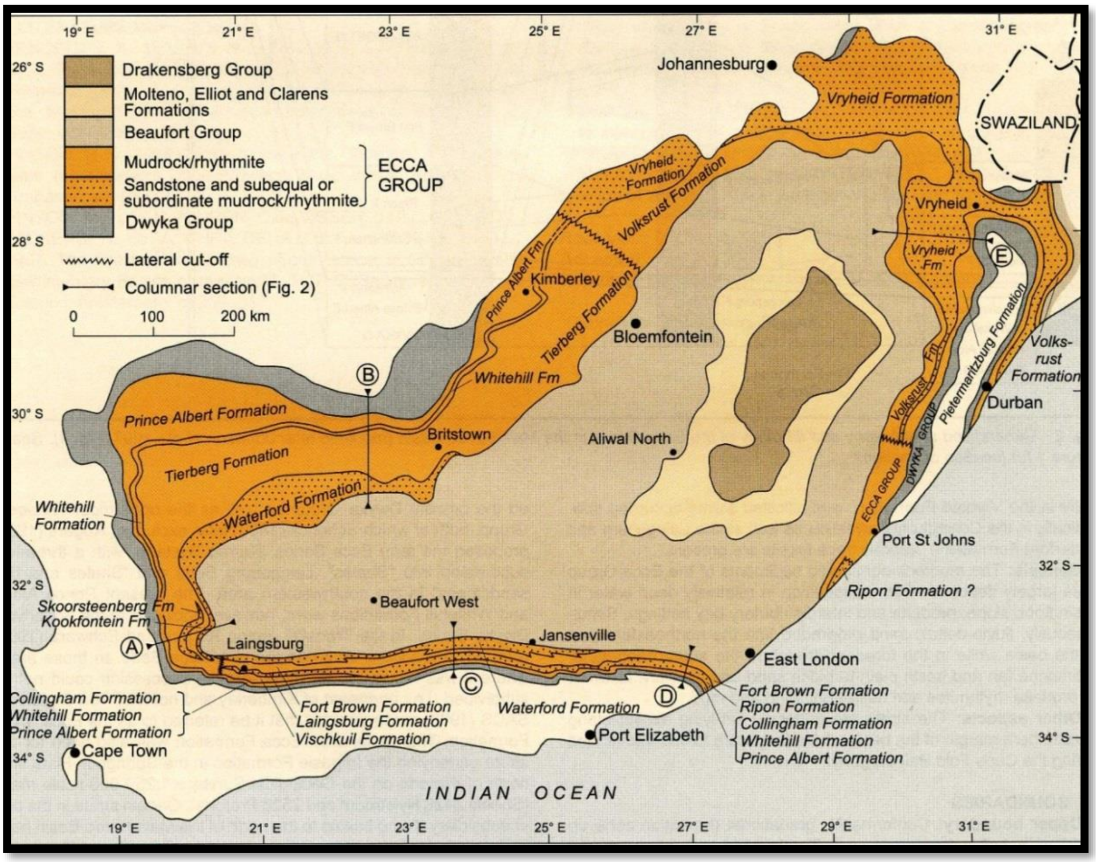


Figure 7-92: Extent of the Karoo Supergroup (Johnson 2009)

The Glossopteris flora is thought to have been the major contributor to the coal beds of the Ecca. These are found in Karoo-age rocks across Africa, South America, Antarctica, Australia and India. This was one of the early clues to the theory of a former unified Gondwana landmass (Norman and Whitfield 2006).

Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity is generally LOW to VERY HIGH. The development footprint is situated on the Vryheid Formation (Pv) of the Ecca Group, Karoo Supergroup.

7.3.5 SOCIO-ECONOMIC PROFILE

*The following is extracted from the Social Scoping Assessment compiled by WSP and included as **Appendix H.14**, as well as the Socio-Economic Impact Study for the Shutdown and Repurposing of Komati Power Station undertaken by Urban-Econ (2020).*

7.3.5.1 Mpumalanga Province

Mpumalanga Province is located in the north-eastern part of South Africa. The province borders two of South Africa's neighbouring countries, Mozambique and Swaziland; and four other South African provinces, namely, Gauteng, Limpopo, KwaZulu-Natal and Free State Provinces (**Figure 7-93**). Mpumalanga is characterised by the high plateau grasslands of the Middleveld, which roll eastwards for hundreds of kilometres. It rises towards mountain peaks in the northeast and terminates in an immense escarpment.

Figure 7-93: South African regional map

Mpumalanga province covers an area of 76 495km² and has a population of approximately 4 300 000. The capital city of Mpumalanga is Mbombela, and other major cities and towns include Emalahleni, Standerton, eMkhondo, Malelane, Ermelo, Barberton and Sabie. The province is divided into three district municipalities: Gert Sibande, Ehlanzeni and Nkangala District Municipalities. These three districts are further subdivided into 17 Local Municipalities. The proposed development falls within the STLM. The STLM falls within the NDM.

The connection of key economic nodes in the province by a vast network of roads provides key opportunities for economic growth and development. The most notable development corridors for development are the Pretoria-Maputo and Johannesburg-Durban lines. As such, there exists multiple corridors for development in the province which may exploit opportunities various opportunities. However, it should be noted that the road transportation network in Mpumalanga is often considered as unmaintained, which may impede economic activity (Urban-Econ, 2020). For full context refer to Section 3.2 of the Urban-Econ Socio-Economic Study.

7.3.5.2 Nkangala District Municipality

The NDM has municipal executive and legislative authority in an area that includes more than one municipality which makes it a Category C municipality , located in the Mpumalanga Province. It is one of three district municipalities in the province, making up 22% of its geographical area. The NDM comprises the Victor Khanye, Emalahleni, Steve Tshwete, Emakhazeni, Thembisile Hani, and Dr JS Moroka local municipalities (**Figure 7-94**). The NDM is headquartered in Middelburg. The NDM is the economic hub of Mpumalanga and is rich in minerals and natural resources.

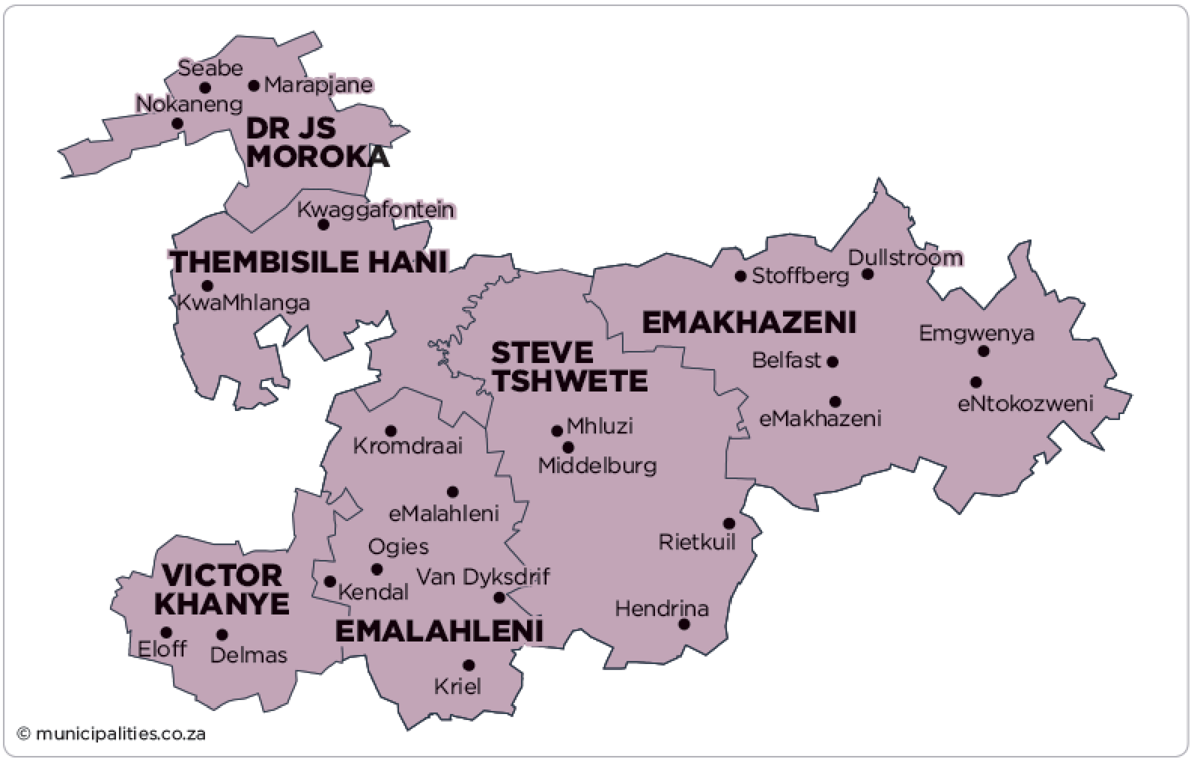


Figure 7-94: Nkangala District Municipality

7.3.5.3 Steve Tshwete Local Municipality

STLM is approximately 3,976 square kilometres in extent, representing 23.7% of the NDM's land mass. To the west it is bordered by the Emalahleni and Thembisile Hani Local Municipalities; the Govan Mbeki and Msukaligwa Local Municipalities in Gert Sibande District to the south; and the Emakhazeni and Chief Albert Luthuli Local Municipalities to the east (Figure 7-94). Adjacent to the north of the STLM is Elias Motsoaledi Municipality which forms part of the Sekhukhune District Municipality in Limpopo Province.

Population

The STLM's population increased to 278 749 between 2011 and 2016 (**Figure 7-95**) which represents an increase of 21.3% over the five-year period. The growth rate was 4.3% over the same period. It is estimated that in 2030 the population of the municipality will be approximately 510 000.

Based on the Census 2011 data, the Komati PSA had a population of between 4 000 and 5 000 persons a decade ago. Most of the persons within the study area resided in Komati village, with Sizanane representing the smallest community in the study area.

The Blinkpan settlement has the largest population size of the mentioned main settlements within the study area of Komati. However, it has the smallest household size when compared to the Komati and Sizanane settlements. The Komati and Blinkpan settlements each have an average household size of 2.5 persons per household, while the Sizanane settlement has the smallest average household size at 1.4 persons per household.

For full context refer to Section 3.4.5 of the Urban-Econ Socio-Economic Study.

Gender

The gender distribution of the municipality was almost equal with females representing 48% and males 52% of the population in 2011(**Figure 7-96**).

As per the Census 2011, there were more males than females in the area, with an average male-to-female ratio of 1.55 to 1 (i.e. 155 males per 100 females). Sizanane had the highest male-to-female ratio despite being the smallest community within the PSA. The above ratio reflects the nature of the settlements being largely linked to the mining operations and hosting workers who migrate into the area.

Representatives of the local communities suggested that the distribution between males and females may have changed since the Census due to the change in the structure of the local economies linked to the closure of mining operations. Conversely, some of the community members suggest that there is an equal distribution between males and females in the PSA. Importantly, a significant shift in the area in terms of gender distribution is apparent and the 2011 status quo no longer stands (Urban-Econ, 2020).

For full context refer to Section 3.4.5 of the Urban-Econ Socio-Economic Study.

Age

People aged between 15 and 64 years old represent 70.7% of the population with 25% of the population representing the young and 4.3%, the elderly.

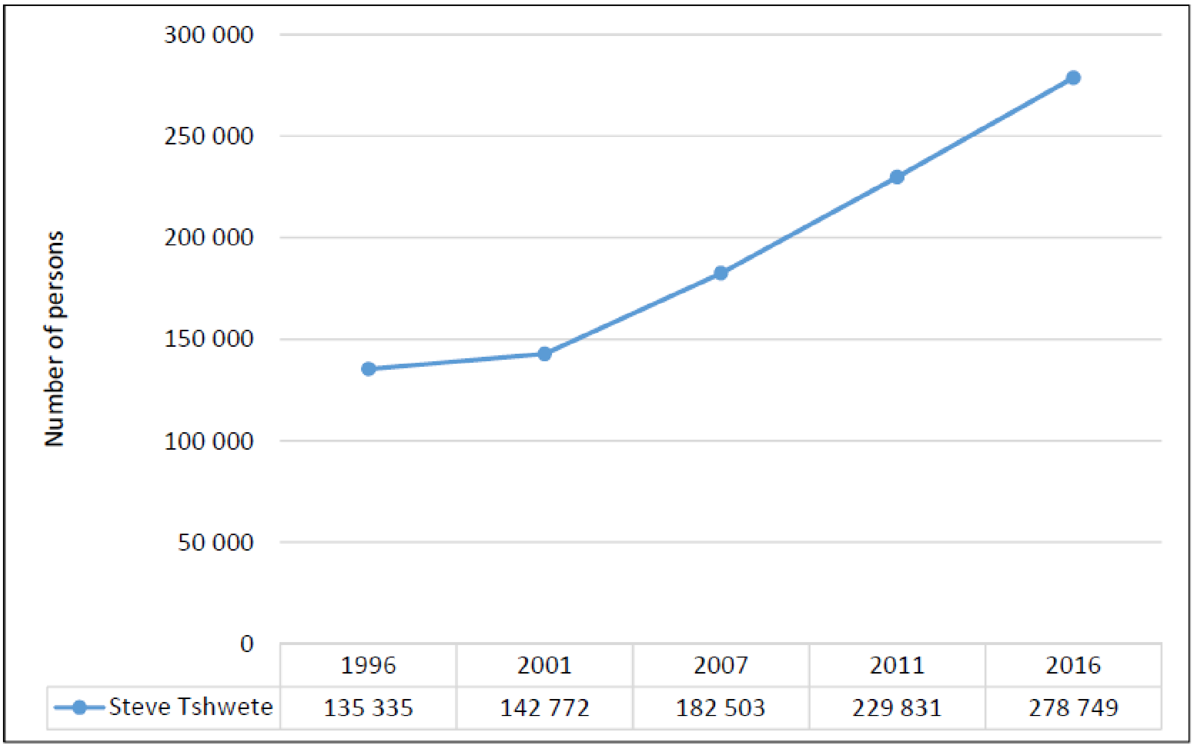


Figure 7-95: STLM population size

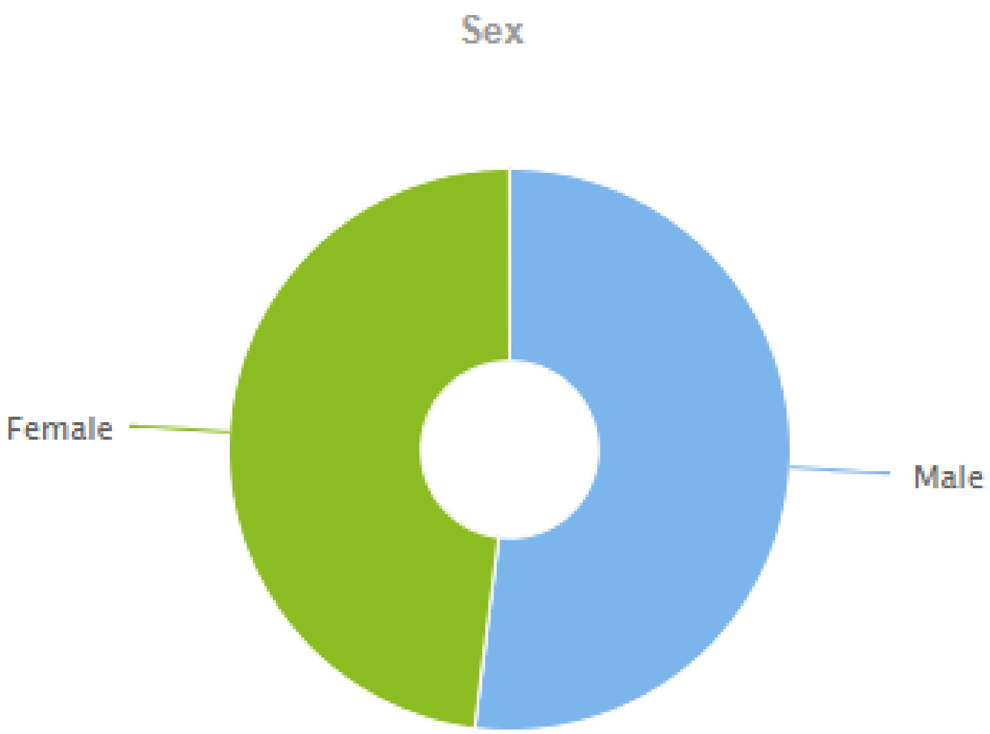


Figure 7-96: STLM gender distribution

Ethnicity and Language

Almost 74% of the municipality is represented by Black African people followed by nearly 22 % White and smaller portions representing remaining ethnicities as shown in **Table 7-26**.

Table 7-26 - Distribution of STLM by population group

Group	Percentage
Black African	73.6%
Coloureds	2.6%
Indian or Asian	1.6%
White	21.8%
Other	0.4%

Isizulu is the language most spoken in the municipality followed by Afrikaans, isiNdebele, Sepedi and other in smaller proportions (**Table 7-27**).

Table 7-27 - Distribution of STLM by language spoken

Group	Percentage
IsiZulu	27,8%
Afrikaans	22,1%
IsiNdebele	14,6%
Sepedi	10,6%
English	5,8%
Others	19.1%

Education

In 2011, approximately 17 000 people over the age of 20 had no form of formal education and approximately 42 500 people have completed secondary education. Approximately 2.2 % (5 050 people) have received higher educational training. **Table 7-28** shows the levels of education represented in the municipality.

Table 7-28 - Distribution of the levels of education represented in the municipality

Group	Percentage
No Schooling	3,1%
Some Primary	37,8%
Completed Primary	5,8%
Some Secondary	31,1%
Completed Secondary	18,5%
Higher Education	2,2%
Not Applicable	1,5%

Vulnerable Groups

Vulnerable groups include the economically disadvantaged, racial and ethnic minorities, the uninsured, low-income children, the elderly, the homeless, those with HIV, and those with other chronic health conditions, including severe mental illness and indigenous people. There are no identified vulnerable groups in the project area.

Indigenous People

Due to the varied and changing contexts in which indigenous peoples live, there is no universally accepted definition of indigenous peoples. For this Project, the term indigenous people is used in a generic sense to refer to a distinct, vulnerable, social, and cultural group, which possess the following characteristics in varying degrees:

- Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others
- Collective attachment to geographically distinct habitats or ancestral territories in the Project area and the natural resources in these habitats and territories
- Customary cultural, economic, social, or political institutions that are separate from those of the dominant society and culture; and
- An indigenous language, often different from the official language of the country or region (World Bank, 2013)

The screening was undertaken to determine whether indigenous peoples are present in, or have a collective attachment to, the Project-affected area. There are no indigenous people as defined above in the Komati power station area.

Employment and Income Profile

The unemployment rate of STLM decreased from 19.7% in 2011 to 16.4% and is among the lowest in the municipalities within the Mpumalanga province. The unemployment rate for females of 21.8% is nearly double that of males at 12.9%. The youth unemployment, as recorded by the 2011 census, is 27.1%.

Types of Employment

In 2011, there were 682 people employed in the formal sector and 76 in the informal sector (Urban-Econ, 2020). Eskom is the major employer in the area. Komati is also surrounded by agricultural land where people will be employed in this sector.

Labour

Eskom will adhere to the International Labour Organisation Conventions which have been ratified by South Africa. It is estimated that the Solar PV, BESS and WEF Project will create approximately 1300 direct employment jobs during the construction phase and approximately 150 jobs during the operational phase.

Child labour

Eskom will not employ child labour in the construction or in the operation of the facilities.

Housing

The number of households in the STLM increased by almost 22 000 from 64 971 in 2011 to a total of 86 713 in 2016. The STLM provides services such as water, electricity and waste to these households. The average size of a household has declined from 3.5 to 3.2 people in the same period.

Health

The main challenges to the health care in the STLM is the prevalence of HIV/AIDS. A decrease in the HIV/AIDS prevalence rate was recorded between 2011 and 2013, seeing a decline from 52% to 43%. This decrease is attributed to increased HIV Counselling and Testing campaigns in the local municipality and increased community awareness.

Security and Safety

The Komati community is serviced by the Blinkpan Police Station. The crime statistic published for the 2020/2021 financial year by the South African Police Service indicated that only 62 contact crimes were committed during the period with Assault with the intent to inflict grievous bodily harm being record, Common assault and Robbery with aggravating circumstances representing 89% of contact crimes.

In total, 298 community reported serious crimes were reported at the Blinkpan Police Station with 71% (208) being theft, followed by contact crimes (21%) and property related crimes (6%).

Eskom will either provide or contract security during the construction and operation of the Project these will be trained professionals and will need to sign a code of conduct committing themselves to the protection of the local communities.

Gender-based Violence (GBV)

In terms of gender-based violence, i.e. rape, sexual assault, and contact sexual offences, two cases were recorded at the Blinkpan Police Station during the 2020/2021 period. Both cases were rape cases. GBV cases are not always reported however updates will be made as studies progress throughout the project.

There is no organisation based in the Komati area that offer GBV services to victims. However, the Department of Social Development established a GBV command centre in 2013 that allows a survivor to contact the centre and be assigned a social worker close to them. There are national NGOs that offer services to GBV victims namely, People Opposing Woman Abuse (POWA), Sonke Gender Justice and Shukumisa.

GBV victims can also include men and support services for this group in the area is currently unknown.

No further information was available from the Urban Econ Socio-Economic Studies.

Agricultural Lands

There are 8 681 households that take part in agricultural activities in the STLM. The main types are poultry (28%), livestock (24%) and vegetable growing (21%). Other crops and other types of agriculture represent 9% and 19% respectively.

Urban-Econ (2020) states the there is a richness of agricultural resources and land capability in the area surrounding the Komati Power Station. The vast portions of land in the PSA have the potential for cultivation. Most of the agricultural activities undertaken in the area are done on a commercial scale, albeit on dryland. There are few portions, however, where there is irrigated commercial farming in the area. Considering that the area has potential for agricultural production, there is an opportunity to introduce or enhance agro-processing activities.

For full context refer to Section 3.4.4 of the Urban-Econ Socio-Economic Study.

7.3.5.4 Social and Physical Infrastructure

Schools

There is one school in the Komati area (Laerskool Koornfontein). The nearest secondary school (Allendale Secondary School) is 27 kilometres from Komati.

Healthcare

The nearest hospital to the project location is the Impungwe Public Hospital which is 30 kilometres from Komati power station. The nearest provincial hospital is the Middleburg Provincial Hospital, which is 42 kilometres from Komati, in Middelburg

Water

In the STLM, 60.8% of households have access to piped water inside dwellings and 24.2% have access to piped water inside the yard. Community stands provide piped water to 13.1% of households while the remainder of the households rely on tankers, boreholes, dams and other sources of water.

Raw water for Komati Power Station is obtained from the Nooitgedacht Dam (with a capacity of 78 477 m^3) on the Komati River. Water is pumped to reservoirs at Klipfontein from where it gravitates to the power station; the total distance is approximately 64km. The water is treated by Komati Power Station to potable water standards as well as for power production.

The water treatment plant also supplies water to certain communities. The plant's capacity is 4.3 ML/day for potable water and 5.7 ML/day for demineralized water (Urban-Econ, 2020).

The following communities receive water directly from the power station:

- Komati Village – 45 ML/month;
- Lakama Guesthouse – 1.5 ML/month; and
- Koornfontein mine – 8 ML/month.

For full context refer to Section 3.4.4 of the Urban-Econ Socio-Economic Study.

Electricity

Based on the District Municipality's IDP, the STLM's energy supply is licensed from a third party. The supply has become strained due to supply infrastructure failures and the unwillingness of coal suppliers to become long-term suppliers to Eskom. The export market is more lucrative for the coal suppliers.

The STLM must make efforts to address the electricity supply issues by emphasising the following:

- Partially licenced municipalities to provide electricity;
- Municipalities exceeding their notified maximum demand;
- Non-payment of bulk electricity;
- Ageing of bulk electricity Infrastructure;
- Inadequate bulk electricity infrastructure to meet the demand;
- Lack of operation and maintenance plan;
- Theft of solar panels from the borehole pump station; and

With the stated supply constraints, households in the STLM have good access to electricity with a 91% of households having access to electricity.

Access to Sanitation

Over half (51%) of NDM households have access to flush toilet facilities and 43% use pit latrines. The rest of the households rely on other types of sanitation facilities. The majority of STLM households (84%) have access to flush toilet facilities,9% use pit latrines and the rest rely on other types of facilities.

Access to Waste Removal

In contrast to the NDM, who only 40% of its population makes use of refuse dumps, 84.7% of the households in the STLM have their waste removed weekly by the municipality and only 11% of the households make use of a refuse dump.

Telecommunications

Komati is serviced by all the major network providers in the country. It has access to 4G/LTE coverage and access to the internet via the service provider rain.

Public Transport

The Komati area relies on taxis as the main form of public transportation. The area is serviced by the Middelburg District Taxi Association. Buses also operate in the area but are mainly used as scholar transport.

7.4 RISK

The main risks to the environment, as a result of BESS installations, are fires and pollution arising from spillage of the liquid component of the cells by accident. The risk sources are shown schematically in **Figure 7-97** and discussed below. In terms of other environmental impacts such as the impact of the clearance of vegetation, the visual impact and increase traffic, these have been assessed within the respective specialist assessments (see **Section 9**).

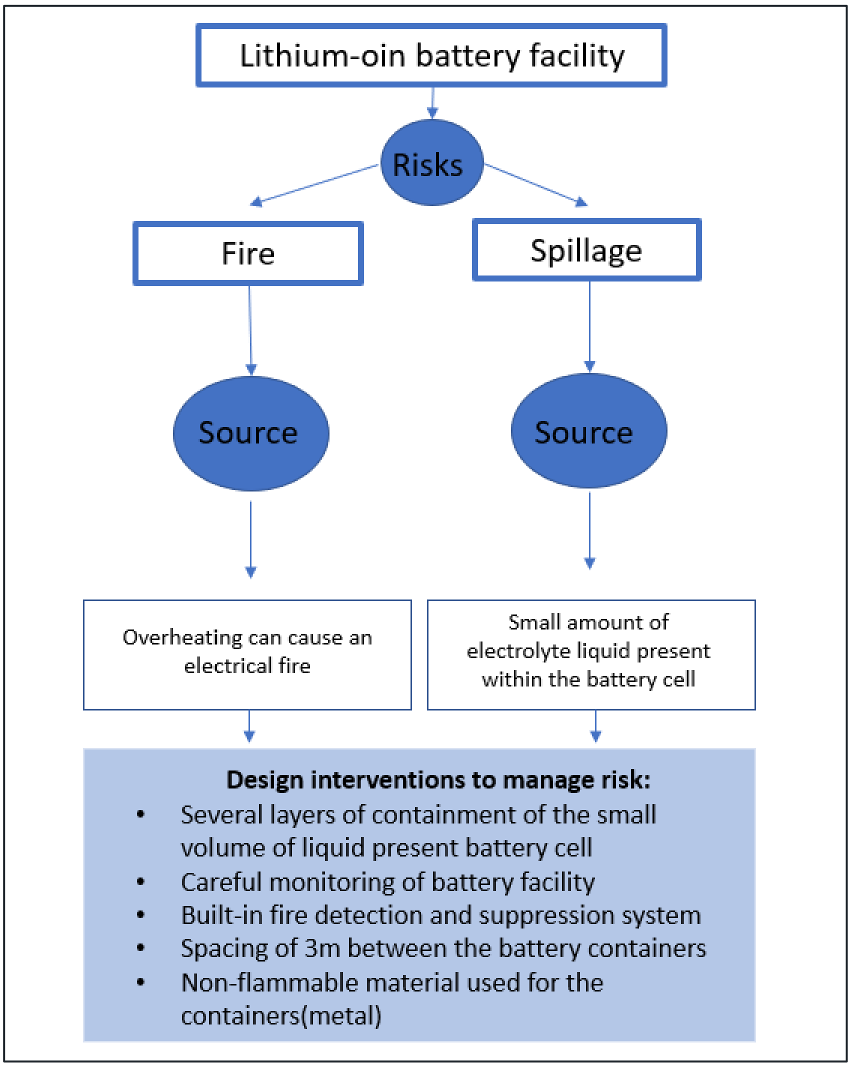


Figure 7-97 - Risk sources of the battery facility

As has been noted above, there is a small volume of liquid within the cells (most of which is absorbed into the solid components of the battery) and this is sealed in a plastic housing at the cell level as well as at the module level and then these are housed in a container ensuring there are three levels of containment. This ensures that the risk of a spill of any liquid is unlikely to the extent that it does not warrant detailed assessment in the impact assessment phase and has been screened out.

Regarding the potential fire, the design of these battery systems will be undertaken in compliance with all the local and international standards that ensures that fire risk is minimal. The electrical nature of the facility is such that there is a risk of overheating of components that could lead to electrical fire. Due to the risk overheating batteries may have on human health (in terms of off-gassing) and implications for the performance of the batteries, the facility is carefully monitored to prevent this. Each container is equipped with a built-in fire detection and suppression system that in an unlikely event of a fire will supress the fire using an inert gas. The nature of the vegetation of the site is also such that the risk of the facility being exposed to a significant wildfire leading to the ignition of the facility is also remote (assuming the facility is kept free of combustible materials).

Each container is also spaced about 3m apart ensuring the chance of a fire spreading between two containers (which are made of metal and thus not easily flammable) is also minimal. These design measures, the HVAC systems and the continuous monitoring of the battery cells for heat/fire are such that the likelihood of a fire spreading in the facility following ignition is very remote.

When the battery cells reach end of life they will be returned to a battery provider for recycling or disposal in accordance with the legal practices. Currently there are no Lithium-Ion Battery Recycling facilities in South Africa but EWASA are lobbying for one (Dataweek, 2019). Due to the value of these materials making up the batteries it is unlikely they will end up in landfill, and more likely be recycled by a future bespoke facility in South Africa or exported for recycling. In terms of air emissions from the battery facility during operations, this is not considered to be an issue and does not pose a risk during operation to the environment or staff.

Based on the technology used and the safety mechanisms forming part of the design of the facility, the likelihood of the construction and/or operation of the battery storage facility causing a fire/spill is considered to be low and therefore the risk of having the battery facility on site is considered to be negligible.

8 SITE SENSITIVITY AND VERIFICATION

8.1 ENVIRONMENTAL SENSITIVITIES

Specialist assessments were conducted in accordance with the Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes, which were promulgated in Government Notice No. 320 of 20 March 2020 and in Government Notice No. 1150 of 30 October 2020 (i.e. “the Protocols”), or Appendix 6 of the EIA Regulations, depending on which legislation apply to the assessment under consideration. A summary of the DFFE screening tool, the applicable legislation as well as the specialist sensitivity verification are detailed in **Table 8-1** below. The site verification process is discussed in the section below.

Table 8-1 – Assessment Protocols and Site Sensitivity Verifications

Specialist Assessment	Assessment Protocol	DFFE Screening Tool Sensitivity	Specialist Sensitivity Verification
Agricultural Impact Assessment	Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources by onshore wind and/or solar photovoltaic energy generation facilities where the electricity output is 20 megawatts or more	High Sensitivity	The areas of the site underlain by arable soils (Shortlands) and those that have been cultivated have been considered medium sensitivity areas. The areas of the site underlain by the uncultivated Valsrivier soils, the Sepane soils and the grassland areas were considered low sensitivity areas and the areas underlain by Witbank soils were considered very low sensitivity areas.
Landscape/Visual Impact Assessment	Site Sensitivity Verification Requirements where a specialist Assessment is required but no Specific Assessment Protocol has been prescribed	Very High Sensitivity	Medium Sensitivity
Archaeological and Cultural Heritage Impact Assessment	Site Sensitivity Verification Requirements where a specialist Assessment is required but no Specific Assessment Protocol has been prescribed	Low Sensitivity	Low Sensitivity
Palaeontology Impact Assessment	Site Sensitivity Verification Requirements where a specialist Assessment is required but no Specific Assessment Protocol has been prescribed	Very High Sensitivity	Very High Sensitivity
Terrestrial Biodiversity Impact Assessment	Protocol for the Specialist Assessment and Minimum Report Content Requirements	Very High Sensitivity	This very high sensitivity rating, however, is only partly supported by the

Specialist Assessment	Assessment Protocol	DFFE Screening Tool Sensitivity	Specialist Sensitivity Verification
	for Environmental Impacts on Terrestrial Biodiversity		findings of this study. Most of the LSA is either modified or disturbed and therefore is not of very high sensitivity. Only the area of Mixed *Themeda triandra* Grassland, most of which is designated as CBA Optimal, is rated as having a High ecological importance.
Aquatic Biodiversity Impact Assessment	Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity	Very High Sensitivity	Medium Sensitivity
Civil Aviation Assessment	Protocol For The Specialist Assessment And Minimum Report Content Requirements For Environmental Impacts On Civil Aviation Installations	Medium Sensitivity	Low Sensitivity
Defence Assessment	Protocol For The Specialist Assessment And Minimum Report Content Requirements For Environmental Impacts On Civil Aviation Installations	Low Sensitivity	The Department of Defence has been included on the project stakeholder database. No comment has been received to date.
RFI Assessment	Site Sensitivity Verification Requirements where a specialist Assessment is required but no Specific Assessment Protocol has been prescribed	Medium Sensitivity	The proposed development area is not located within any Astronomy Advantage Area and is therefore considered to be of low sensitivity. The SAWS and relevant telecommunications stakeholders have been included on the project stakeholder database. No comment has been received to date.
Geotechnical Assessment	Site Sensitivity Verification Requirements where a specialist Assessment is required but no Specific Assessment Protocol has been prescribed	No sensitivity identified by the screening tool	-
Socio Economic Assessment	Site Sensitivity Verification Requirements where a specialist Assessment is required but no	No sensitivity identified by the screening tool	-

Specialist Assessment	Assessment Protocol	DFFE Screening Tool Sensitivity	Specialist Sensitivity Verification
	Specific Assessment Protocol has been prescribed		
Plant Species Assessment	Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species	Medium Sensitivity	Medium Sensitivity
Animal Species Assessment	Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species	High Sensitivity	Medium Sensitivity

8.1.1 AGRICULTURAL IMPACT ASSESSMENT

The output of the DFFE Screening Tool for the Agriculture Theme is illustrated in **Figure 8-1** and indicates that the site is classified as High Sensitivity.

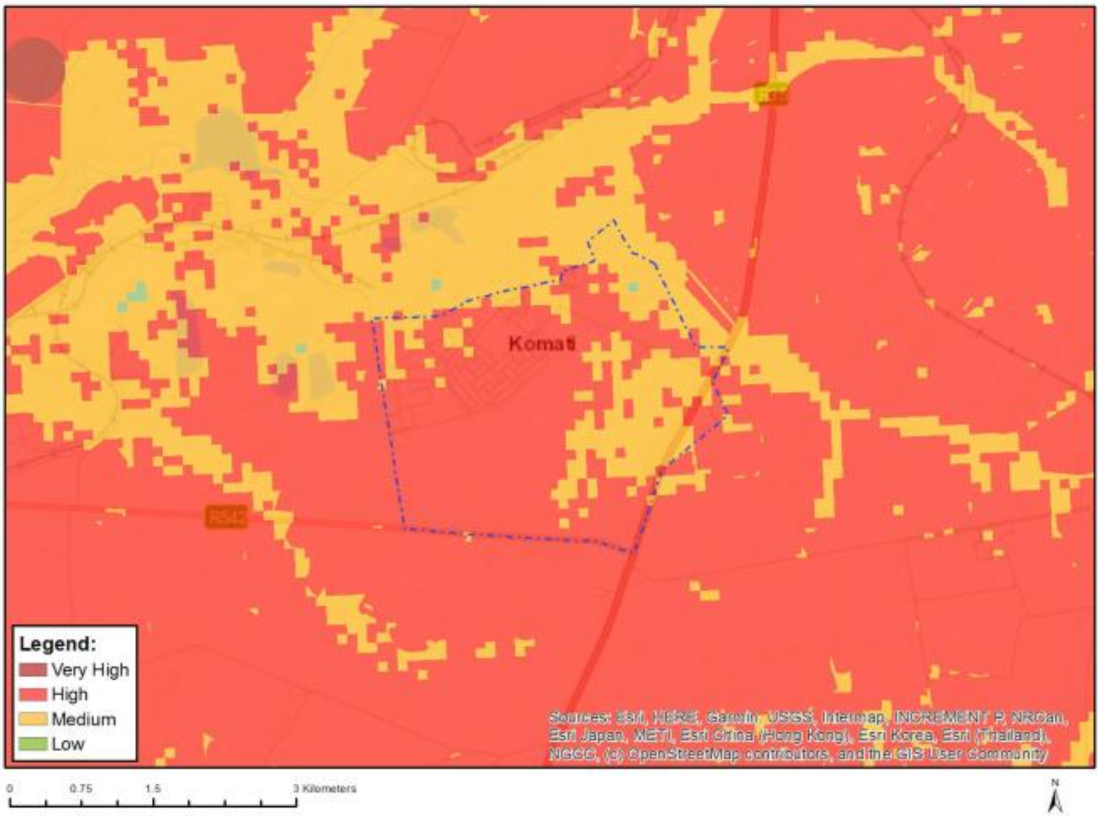


Figure 8-1 - Map of Agriculture Sensitivity

Source: DFFE Screening Report

The project site areas were allocated agricultural sensitivities in accordance with **Table 8-2**.

The DFFE 2021 land sensitivity database shows that the Project site comprises a combination of high and medium agricultural sensitivity areas, with a very small area of low sensitivity (see **Figure 8-2**). The soils survey of the site undertaken for this study showed that the site is less agriculturally sensitive than the DFFE database indicates. For the purposes of this study, the areas of the site underlain by arable soils (Shortlands) and those that have been cultivated have been considered moderate sensitivity areas (see **Figure 8-3**) because some of the Shortlands identified were relatively shallow and much of the previously cultivated land was underlain by Valsrivier soils. Limited development is typically allowed on agricultural land as the major agricultural concern for any development is the loss of high potential agricultural land and there is already a shortage of arable land available in South Africa. What is available is under threat from competing land uses, leading to a cumulative loss of arable land across the country. Further to this, subdivision of land may create portions that are too small to be agriculturally economically viable. The Department of Agriculture, Forestry and Fisheries (DAFF) thus limits the portion of agricultural land that can be utilised for renewable energy development to 10% (CSIR, 2015). The areas of the site underlain by the uncultivated Valsrivier soils, the Sepane soils and the grassland areas were considered low sensitivity areas and the areas underlain by Witbank soils were considered very low sensitivity areas.

Table 8-2 - Sensitivity Classes

Sensitivity	Areas	Permitted
Moderate	Cultivated areas	Linear infrastructure such as cabling and powerlines are allowed. Solar PV and associated infrastructure and roads should be avoided, if possible.
Low	Grassland	Solar PV and associated infrastructure and roads are allowed.
Very Low	Developed areas	Solar PV and associated infrastructure and roads are allowed.

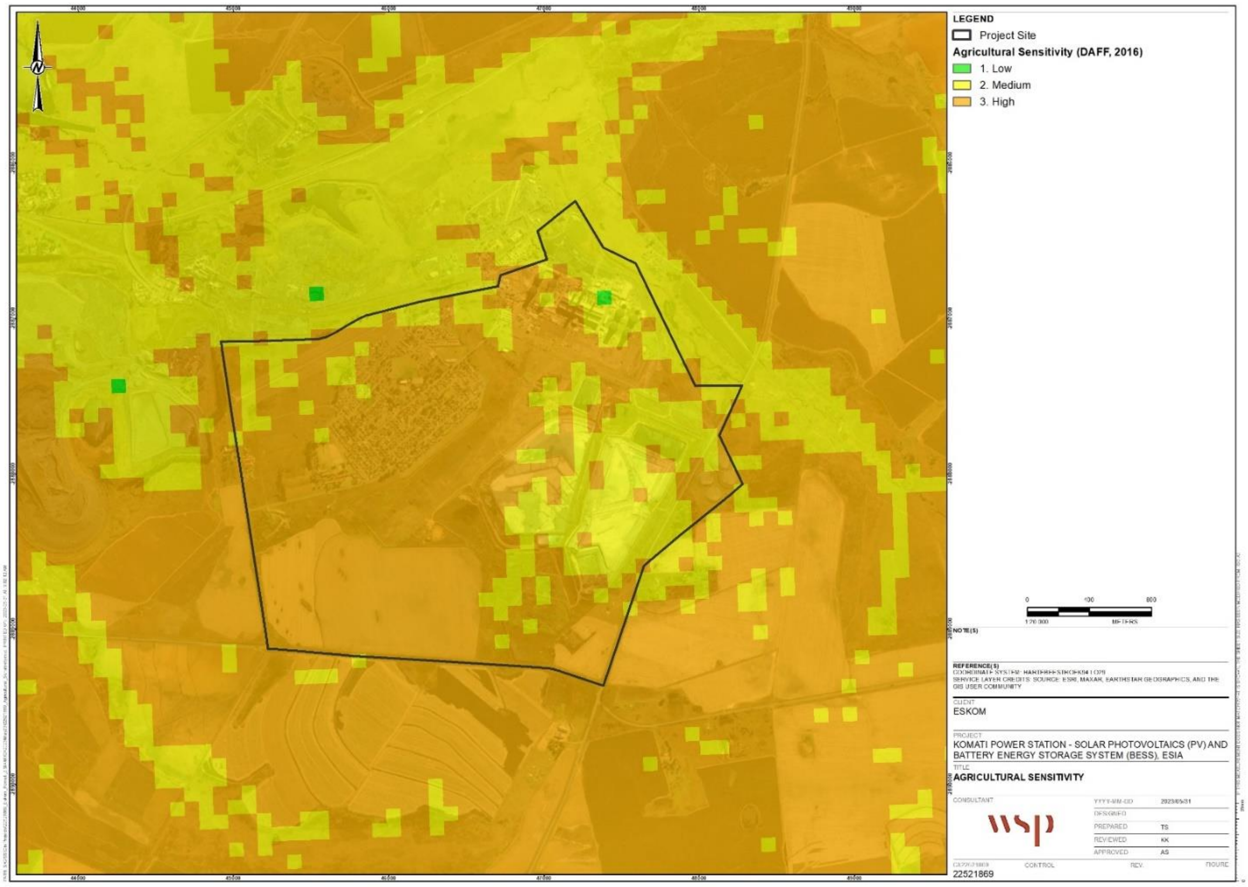


Figure 8-2 - Komati Site Agricultural Sensitivity

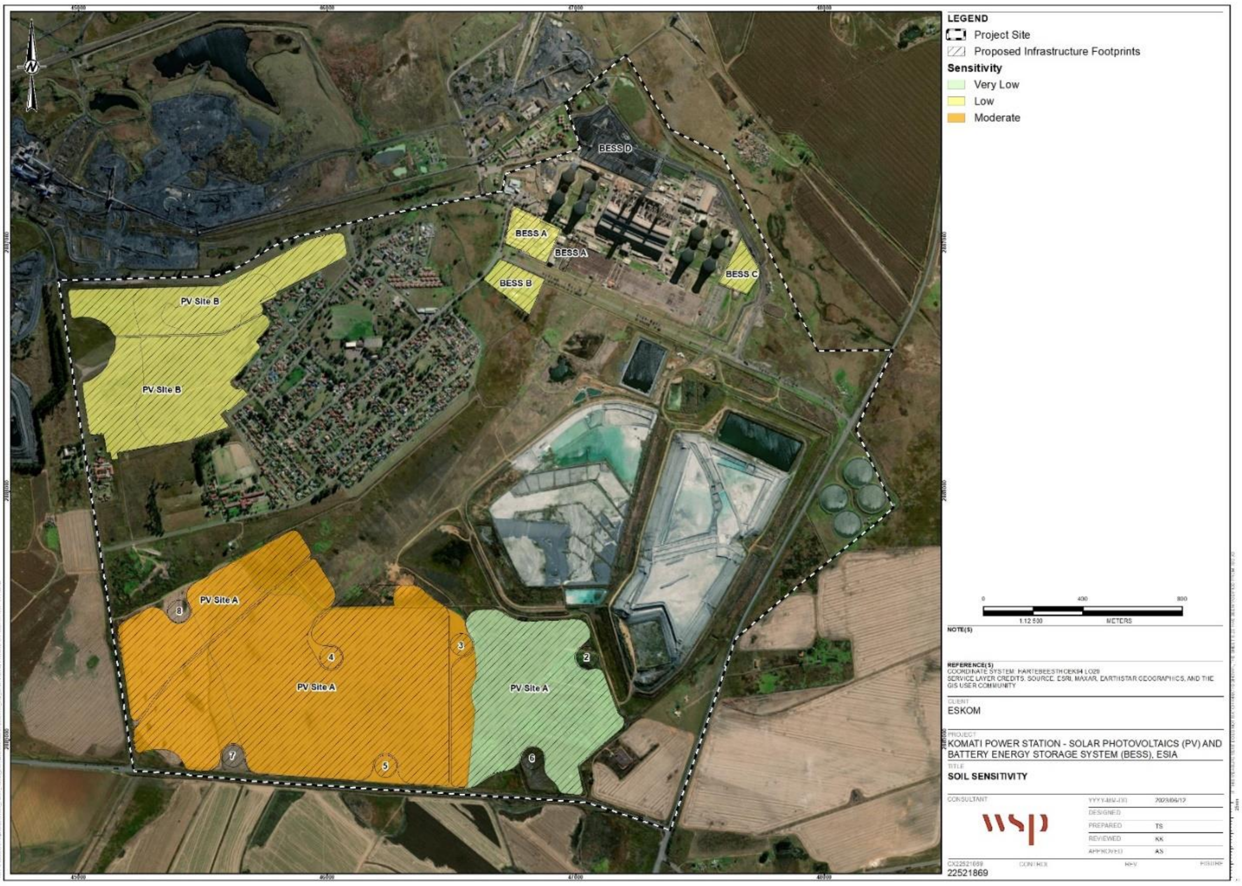


Figure 8-3 - Komati Site Soil Sensitivity Areas

8.1.2 LANDSCAPE/VISUAL IMPACT ASSESSMENT

The output of the DFFE Screening Tool for the Landscape/Visual Theme is illustrated in **Figure 8-4** and indicates that the site is classified as Very High Sensitivity. The Screening Tool shows that the site for the proposed Komati Solar PV and BESS facility contains sensitivities ranging from medium to very high owing to the fact that the site is located between 500 - 1000m of a town or village, between a and 2km of a town or village, within 500m of a town or village and located on mountain tops and high ridges.

The current visual sensitivity mapping undertaken in the VIA is in greater detail at the site scale for the proposed solar PV facilities and BESS infrastructure, and takes into account detailed viewshed mapping and local site conditions.

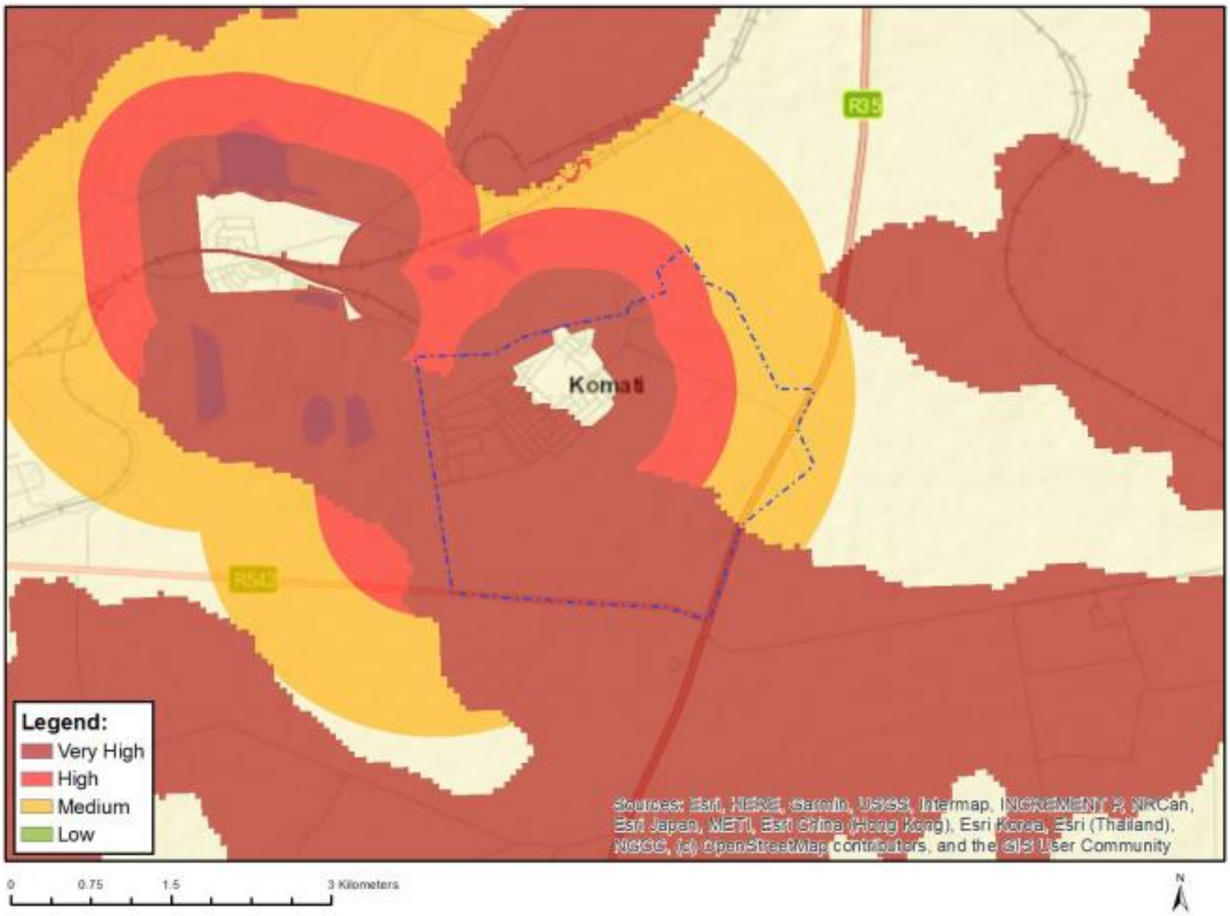


Figure 8-4 - Map of Landscape / Visual Sensitivity

Source: DFFE Screening Report

In order to determine the overall visual sensitivity of the proposed sites in the absence of any mitigation, the matrix in **Table 8-3** was utilised:

Table 8-3 - Matrix to determine overall visual sensitivity for the proposed Komati Solar PV and BESS Facility

	Sensitive Receptor	Very High Sensitivity (4)	High Sensitivity (3)	Moderate Sensitivity (2)	Low Sensitivity (1)
1.	Topographic features incl mountain ridges	Within 250m	Within 250-500m	Within 500m – 1km	>1km
2.	Steep slopes	Slopes with more than 1:4	Slopes between 1:4 and 1:10	-	-
3.	Major rivers, water bodies, perennial rivers and wetlands with scenic value	Within 250m	Within 250-500m	Within 500m – 1km	>1km

	Sensitive Receptor	Very High Sensitivity (4)	High Sensitivity (3)	Moderate Sensitivity (2)	Low Sensitivity (1)
4.	Coastal zone	Within 1km	Within 1-2km	Within 2-3km	>3km
5.	Protected area: National Parks	Within 2km	Within 2-4km	Within 4-6km	>6km
6.	Protected areas: Nature Reserves	Within 1km	Within 1-2km	Within 2-3km	>3km
7.	Private reserves and game farms	Within 500m	Within 500m - 1km	Within 1-2km	>2km
8.	Cultural landscape	On the site itself	Within 500m	Within 500m – 1km	>1km
9.	Heritage Sites Grades I, ii and iii	On the site itself	Within 500m	Within 500m – 1km	>1km
10.	Towns and Villages	Within 500m	Within 500m - 1km	Within 1-2km	>2km
11.	Home/farmsteads	Within 500m	Within 500m - 1km	Within 1-2km	>2km
12.	National Roads	Within 500m	Within 500m – 1km	Within 1-2km	>2km
13.	Provincial/arterial roads	Within 1km	Within 1-3km	Within 3-6km	>6km
14.	Scenic routes	Within 500m	Within 500m – 1km	Within 1-2km	>2km
15.	Passenger rail lines	Within 250m	Within 250 - 500m	Within 500m – 1km	>1km
16.	Located with Renewable energy development zone	No	-	-	Yes
17.	VAC	Low VAC	Moderate VAC	High VAC	Very High VAC
18.	Glint and Glare	YES – Major Road, airfield, or static ground-based receptors within 1km	YES – Major Road, airfield, or static ground-based receptors within 1 - 2km	YES – Major Road, airfield, or static ground-based receptors within 2 - 3km	No
19.	Visual Quality	Natural environment intact with no built infrastructure	Natural environment intact with limited built infrastructure	Natural environment somewhat intact with fair	Built infrastructure is dominant with little to no natural

	Sensitive Receptor	Very High Sensitivity (4)	High Sensitivity (3)	Moderate Sensitivity (2)	Low Sensitivity (1)
				amount of built infrastructure	environment remaining
20.	Presence of existing infrastructure	Absent	Very low densities	Present in moderate quantities	High densities
	Total	**Moderate (40)**			

Overall visual sensitivity rating:

- Low (0-20)
- Moderate (21-40)
- High (41-60)
- Very High (61-80)

The greater environment has been transformed owing mainly to dryland agriculture, as well as mining and other industrial activities (i.e. power stations, substations, etc.). Additionally, there are numerous existing powerlines that lie in close proximity to the site and traverse the study area, resulting in an overall low to moderate visual quality.

Visual Absorption Capacity (VAC) of the receiving environment is deemed to be low owing to the low growing vegetation, predominant land use (dryland agriculture) and the high contrast of the proposed PV panels within the surrounding environment.

The immediate area surrounding the proposed sites are the most populated with the study area with majority of the people residing in the residential areas of the towns of Komati, located directly adjacent to the proposed sites and Blinkpan to the north east. The R542, which is located along the southern boundary of PV Site A, is a provincial route that connects Emalahleni to Hendrina. Additionally, the R35, located further afield to the east of the proposed sites, is also a provincial route that connects Middelburg to the town of Bethal. Other than these arterial roads, a number of secondary roads also cross the study area. One airstrip, presumed to service the Komati Power Station was noted within the proposed development area of PV Site B. It is therefore assumed that this airstrip will no longer be in use following the development of PV Site B.

Homesteads and farmsteads, by virtue of their visually exposed nature, are considered to be sensitive visual receptors. Residential receptors in natural contexts are more sensitive than those in more built-up contexts, due to the absence of visual clutter in these undeveloped and undisturbed areas. Commuters and possible tourists using the main arterial and secondary roads may also be negatively impacted upon by the visual exposure to the proposed facilities, however, this intrusion would be fleeting.

The DFFE screening tool generated for the proposed Komati Solar PV and BESS Facility indicated that the Facility has an overall very high sensitivity owing to the fact that the site is located between 500 - 1000m of a town or village, between a and 2km of a town or village, within 500m of a town or village and located on mountain tops and high ridges.

Based on the above findings, it can be found that the sensitivity of the visual environment for the proposed Komati Solar PV and BESS Facility is confirmed to be **moderate** due to:

- High potential for solar glint and glare on users of the R542 and R34 arterial routes, as well as residents (static ground-based receptors) located on the outskirts of the town of Komati
- Town dwellings located within 1km away from the proposed sites
- No natural mountain tops and ridges were noted to be located within 1km from the nearest site. Main topographical features of any elevation noted within the immediate vicinity of the site were man-made elements of an industrial nature (i.e. mine dumps, slime dams, ash ponds, etc.)
- No PV panels are located on steep slopes, mountain tops or ridges
- Not located within a Renewable Energy Development Zone (REDZ)
- Low VAC of the receiving environment
- The already disturbed nature of the receiving environment (i.e. mining / industrial activities)

8.1.2.1 Potential Visual Exposure

The result of the viewshed analysis for the proposed Solar PV Energy Facility is shown on the map below (**Figure 8-5**). The viewshed analysis was undertaken from a representative number of vantage points within the development footprints (i.e. PV Site A, PV Site B and the BESS sites) at an offset of 5m above ground level. This was done in order to determine the general visual exposure (visibility) of the area under investigation, simulating the maximum height of the proposed structures (PV panels, inverters, BESS, etc.) associated with the proposed project.

Figure 8-5 also indicates proximity radii from the development footprints in order to show the viewing distance (scale of observation) of the facilities in relation to their surrounds.

The viewshed analysis includes the effect of vegetation cover and existing structures on the exposure of the proposed infrastructure.

The proposed Komati Solar PV and BESS Facility is expected to be visible for up to 6km from the development sites. The visual exposure is relatively scattered due to the undulating nature of the topography, with lower-lying land (e.g. along the Koringspruit and Olifants Rivers) shielded from the infrastructure, and only higher-lying terrain being exposed. It should be noted that the potential visual exposure will not occur in isolation, but rather in conjunction with the existing mining, power line and power station infrastructure in closer proximity to the sites.

The homesteads and roads expected to be visually influenced are listed below. The identification of these homesteads or farm dwellings are based on their locations as per the SA 1: 50 000 topographical maps . Should a homestead / residence / institution not be listed in terms of the SA 1: 50 000 topographical maps, then it is assumed that the impacts will be similar to the other identified residences within the same proximity radii. It should also be noted that this section of the report focusses only on the potential visual exposure at varying distances and it does not yet refer to visual impact significance or any correlation thereto.

The following is evident from the viewshed analyses:

- 0 – 1km
  - It is expected that the facility would be highly visible within this zone. A visually screened areas are scattered along the outskirts of the zone beyond the various higher mining and industrial features within this zone such as mine dumps and slime dams. The potential sensitive visual

receptors within this zone include the town of Komati where visual exposure is expected from the outlying edges of the built-up areas, observers travelling along the R542 and R35 arterial roads, as well as the secondary road that runs along the western boundary of both the sites (PV Site A and PV Site B). It is expected that the PV facility would be highly visible to observers travelling along these roads. There are a number of homesteads located within a 1km radius of PV Site A, namely Goedehoop 3 and Geluk 1.

- 1 – 3km
  - This zone predominantly falls within mining land, vacant farmland and open space, but does contain sections of visual exposure to the abovementioned roads, some unknown homesteads further south along the R35, as well as the Geluk 2 homestead located to the east of the Komati Power Station and development sites.
- 3 - 6km
  - Within a 3 – 6km radius, the visual exposure will be significantly reduced, especially in the southern portion of this zone. Residences of the following homestead may be visually exposed:
    - Bultfontein 2
    - Goedehoop 2
    - Koornfontein
    - Welverdiend 3
    - Broodsnyersplaas
    - Bultfontein 3
    - Five (5) unknown homesteads scattered throughout the zone
- > 6km
  - Beyond the 6km radius, the intensity of visual exposure is expected to be very low and highly unlikely due to the distance between the object (Solar PV and BESS Facility) and the observer, especially when taking into consideration the developed and industrial nature of the area in closer proximity to the proposed infrastructure.

In general terms, it is envisaged that the structures, where visible from shorter distances (e.g. less than 1km and potentially up to 3km), and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence, potentially resulting in a visual impact. This may include observers travelling along the R542 and R35 arterial roads, residents along the outskirts of the Komati residential area, and the homesteads mentioned above. It should once again be stressed that the visual exposure of the PV and BESS structures will be in conjunction with the existing visual clutter (power lines, power station and mining infrastructure) within the region.

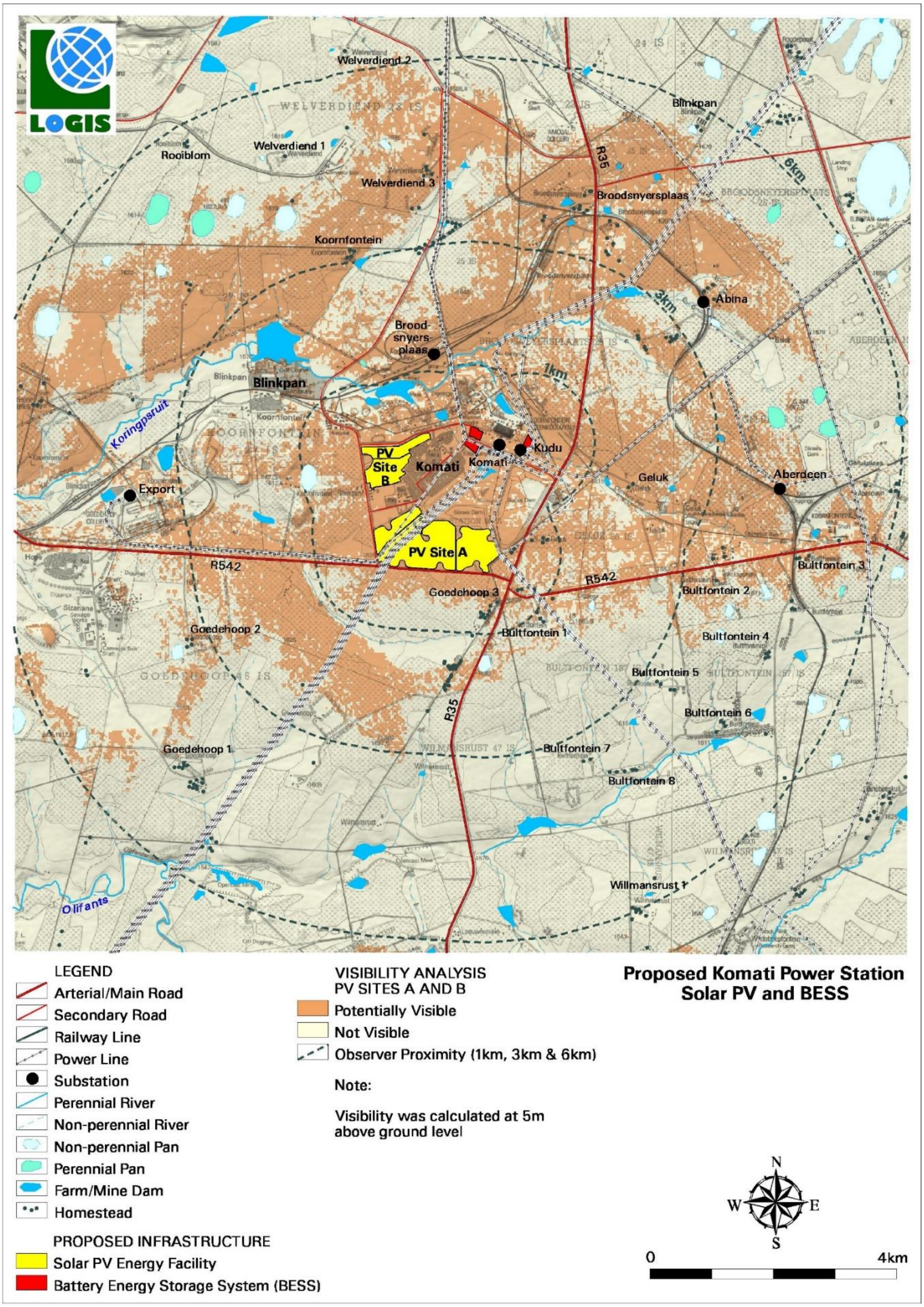


Figure 8-5: Potential visual exposure (visibility analysis) for Komati Solar PV and BESS Facility

8.1.2.2 Visual distance / observer proximity to the PV facility

The proximity radii are based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger energy facilities/technologies (e.g. more extensive infrastructure associated with power plants) and downwards for smaller plants (e.g. smaller infrastructure associated with power plants with less generating capacity). This methodology was developed in the absence of any known and/or accepted standards for South African solar energy facilities.

The principle of reduced impact over distance is applied in order to determine the core area of visual influence for these types of structures. It is envisaged that the nature of the structures and the predominantly rural and natural character of the study area would create a significant contrast that would make the facility visible and recognisable from greater distances.

The proximity radii for the proposed PV facility were created in order to indicate the scale and viewing distance of the facility and to determine the prominence of the structures in relation to their environment.

The proximity radii, based on the dimensions of the proposed development footprint are indicated on **Figure 8-5**, and include the following:

- 0 - 1km
  - Very short distance view where the PV facility would dominate the frame of vision and constitute a very high visual prominence.
- 1 – 3km
  - Short distance view where the structures would be easily and comfortably visible and constitute a high visual prominence.
- 3 - 6km
  - Medium to longer distance view where the facility would become part of the visual environment, but would still be visible and recognisable. This zone constitutes a moderate visual prominence.
- > 6km
  - Long distance view of the facility where the structures are not expected to be immediately visible and not easily recognisable. This zone constitutes a lower visual prominence for the facility.

The visual distance theory and the observer's proximity to the facility are closely related, and especially relevant, when considered from areas with a high viewer incidence and a potentially negative visual perception of the proposed facility.

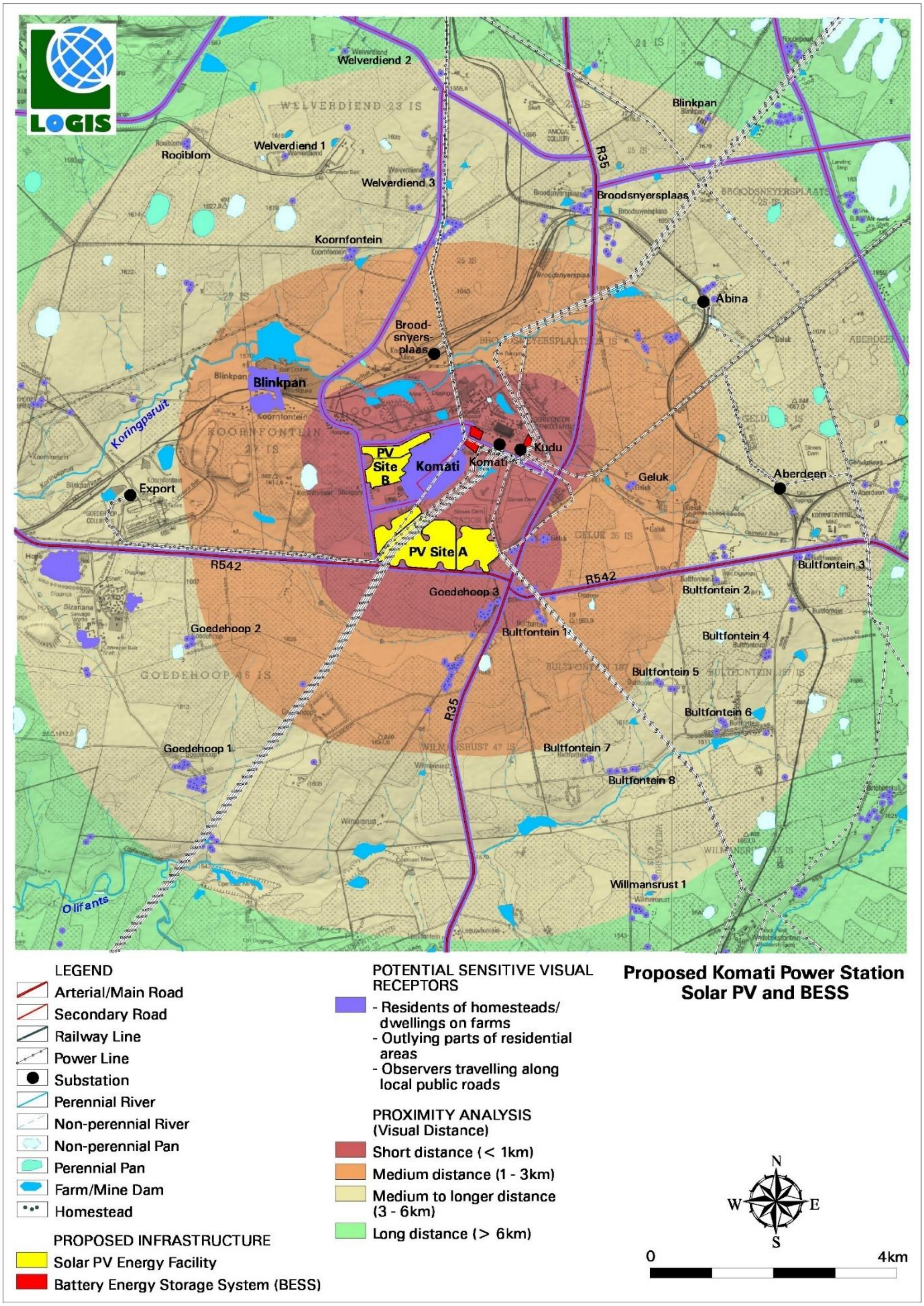


Figure 8-6: Proximity analysis and potential sensitive visual receptors

8.1.2.3 Viewer incidence / viewer perception

The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers or if the visual perception of the structure is favourable to all the observers, there would be no visual impact.

It is necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed Komati Solar PV and BESS Facility. It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer: regularity of sighting, cultural background, state of mind, purpose of sighting, etc. which would create a myriad of options.

Viewer incidence is calculated to be the highest along the public roads within the study area (i.e. R542, R34 and various secondary roads). Travellers using these roads may be negatively impacted upon by visual exposure to the facility. Additional sensitive visual receptors are located at the farm residences (homesteads) and town / villages (i.e. Komati and Blink pan) scattered throughout the study area. It is expected that the viewer’s perception, unless the observer is associated with (or supportive of) the PV facility, would generally be negative.

These potentially affected sensitive visual receptors are listed in Section 8.1.2.1. It is expected that these landowners may experience visual impacts ranging from moderate to high significance, depending on their proximity to the facility. Refer to **Figure 8-6** for the location of the potential sensitive visual receptors discussed above.

The author (at the time of the compilation of this report) is not aware of any objections raised against the proposed Komati Solar PV and BESS Facility.

8.1.2.4 Visual absorption capacity

Visual Absorption Capacity (VAC) is the capacity of the receiving environment to absorb the potential visual impact of the proposed development. VAC is primarily a function of the vegetation and will be high if the vegetation is tall, dense and continuous. Conversely, low growing sparse and patchy vegetation will have a low VAC. The VAC also generally increases with distance, where discernible detail in visual characteristics of both environment and development decreases.

The broader study areas land cover is primarily dryland agriculture and grassland which is defined as an area dominated by nearly continuous planted field or grasses often devoid of taller plants such as trees. Refer to **Figure 8-7**.

Figure 8-7: Grassland and agricultural fields devoid of large trees

It is clear that the natural vegetation within the study area has a low VAC. Where planted trees occur, the VAC is higher (see **Figure 8-8** below). This may be a common occurrence at homesteads and settlements, but does not apply as a rule. Similar high VAC may be found along maize fields, although that is strictly dependent on the time of the growing season. Within built-up areas (e.g. residential or industrial areas) the VAC is high due to the presence of built structures and visual clutter.

Figure 8-8: Example of where vegetation and trees have been planted around homesteads

Overall, the VAC of the receiving environment is moderate to high on the site itself and low in areas where transformation has occurred due to mining, agricultural activities or naturally occurring grasslands. In addition, the scale and form of the proposed PV structures mean that it is likely that the environment will visually absorb them in terms of texture, colour, form and light/shade characteristics. The PV structures should be absorbed by the visual clutter in the built up and industrial areas. Therefore, within this area the VAC will be taken into account.

Figure 8-9: Example of visual clutter in built up areas

Where homesteads and settlements occur, some more significant vegetation and trees may have been planted, which would contribute to the visual absorption capacity (i.e. shielding the observers from the infrastructure). As this is not a consistent occurrence, however, VAC will not be taken into account for any of the homesteads or settlements, thus assuming a worst-case scenario in the impact assessment.

8.1.2.5 Visual impact index

The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed Komati Solar PV and BESS Facility are displayed on **Figure 8-10**. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index. Values have been assigned for each potential visual impact per data category and merged in order to calculate the visual impact index.

The criteria (previously discussed in this report) which inform the visual impact index are:

- Visibility or visual exposure of the structures
- Observer proximity or visual distance from the structures
- The presence of sensitive visual receptors
- The perceived negative perception or objections to the structures (if applicable)
- The visual absorption capacity of the vegetation cover or built structures (if applicable)

An area with short distance visual exposure to the proposed infrastructure, a high viewer incidence and a potentially negative perception (i.e. a sensitive visual receptor) would therefore have a higher value (greater impact) on the index. This helps in focussing the attention to the critical areas of potential impact and determining the potential magnitude of the visual impact.

The index indicates that potentially sensitive visual receptors[7] within a 1km radius of the proposed facility may experience a very high visual impact. The magnitude of visual impact on sensitive visual receptors subsequently subsides with distance to; high within a 1–3km radius (where/if sensitive receptors are present) and moderate within a 3–6km radius (where/if sensitive recept°rs are present). Receptors beyond 6km are expected to have a low potential visual impact.

Likely areas of potential visual impact and potential sensitive visual receptors located within a 6km radius of the proposed Komati Solar PV and BESS are displayed on **Figure 8-11**.

Magnitude of the potential visual impact

The PV facility may have a visual impact of very high magnitude on the following identified observers within a 0-1km radius:

Observers travelling along the:

- R542 arterial road in the south (Site 1)
- R35 arterial road in the east (Site 2)
- Secondary road running along the western boundary of the PV sites (Site 3)

Residents of/visitors to:

- Komati outlying areas (Site 4)
- Goedehoop 3 (Site 5)
- Geluk 1 (Site 6)

The PV Facility may have a visual impact of high magnitude on the following identified observers 1 – 3km radius:

Residents of/visitors to:

- Two (2) unknown homesteads (Sites 7 and 8)
- Geluk 2 (Site 9)

The PV facility may have a visual impact of moderate magnitude impact on the following identified observers located between a 3 – 6km radius of the PV facility:

Residents of/visitors to:

- Bultfontein 2 (Site 10)
- Goedehoop 2 (Site 11)
- Four (4) unknown homesteads (Sites 12, 13, 15 and 18)
- Koornfontein (Site 14)
- Welverdiend 3 (Site 16)
- Broodsnyersplaas (Site 17)
- An unknown homestead near Abina (Site 19)

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[7] The names indicated on the map and listed below here are of the homestead or farm dwelling as indicated on the SA 1: 50 000 topographical maps and do not refer to the registered farm name. Should a homestead / residence / institution not be listed in terms of the SA 1: 50 000 topographical maps, then it is assumed that the impacts will be similar to the other identified residences within the same proximity radii.

- Bultfontein 3 (Site 20)

The PV facility may have a visual impact of low magnitude impact on observers located beyond the 6km radius of the PV facility.

Note: Where any of the above-mentioned homesteads are derelict or deserted, the visual impact will be non-existent, until such time as it is inhabited again.

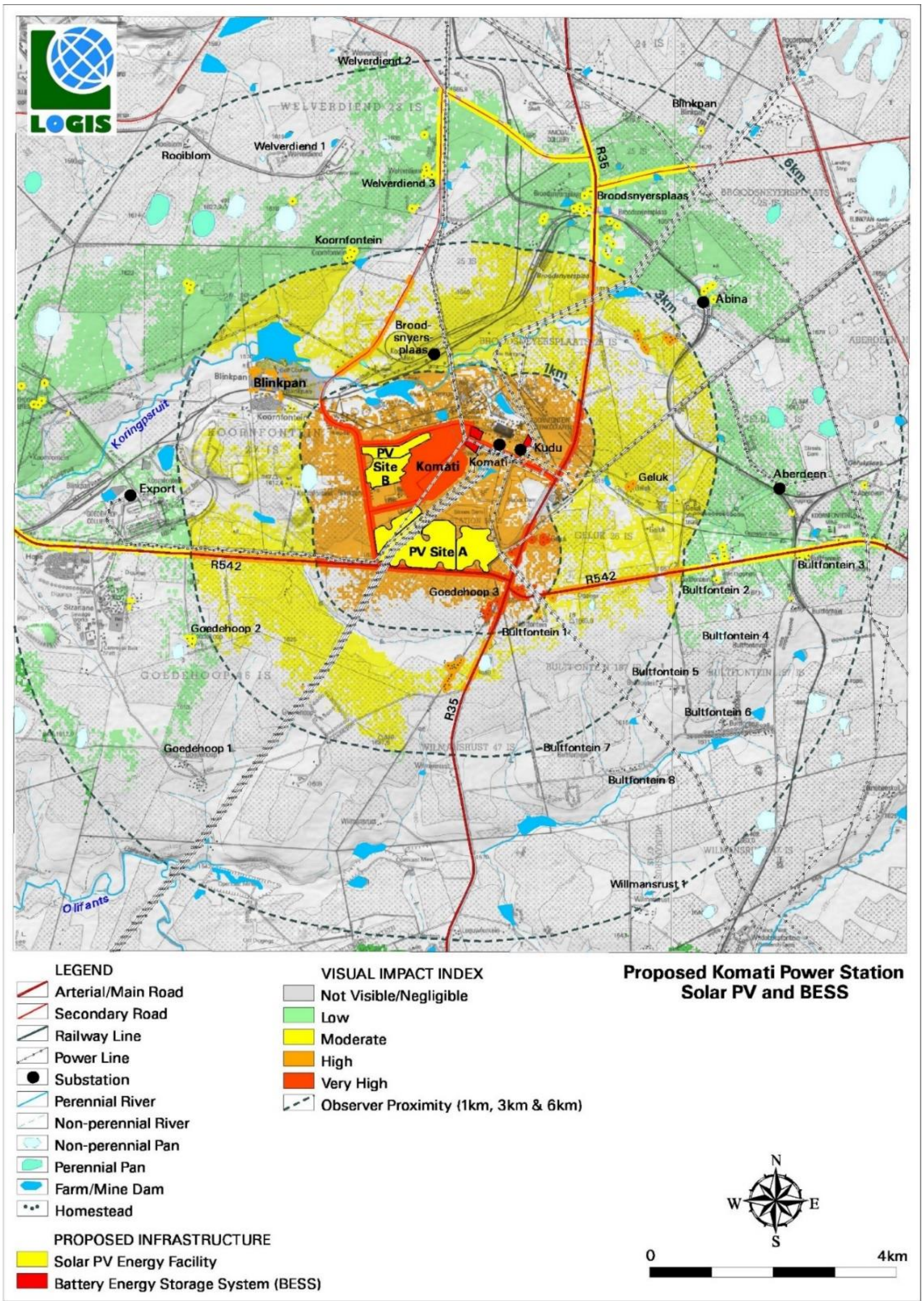

Figure 8-10: Visual impact index for the proposed Komati Solar PV and BESS Facility

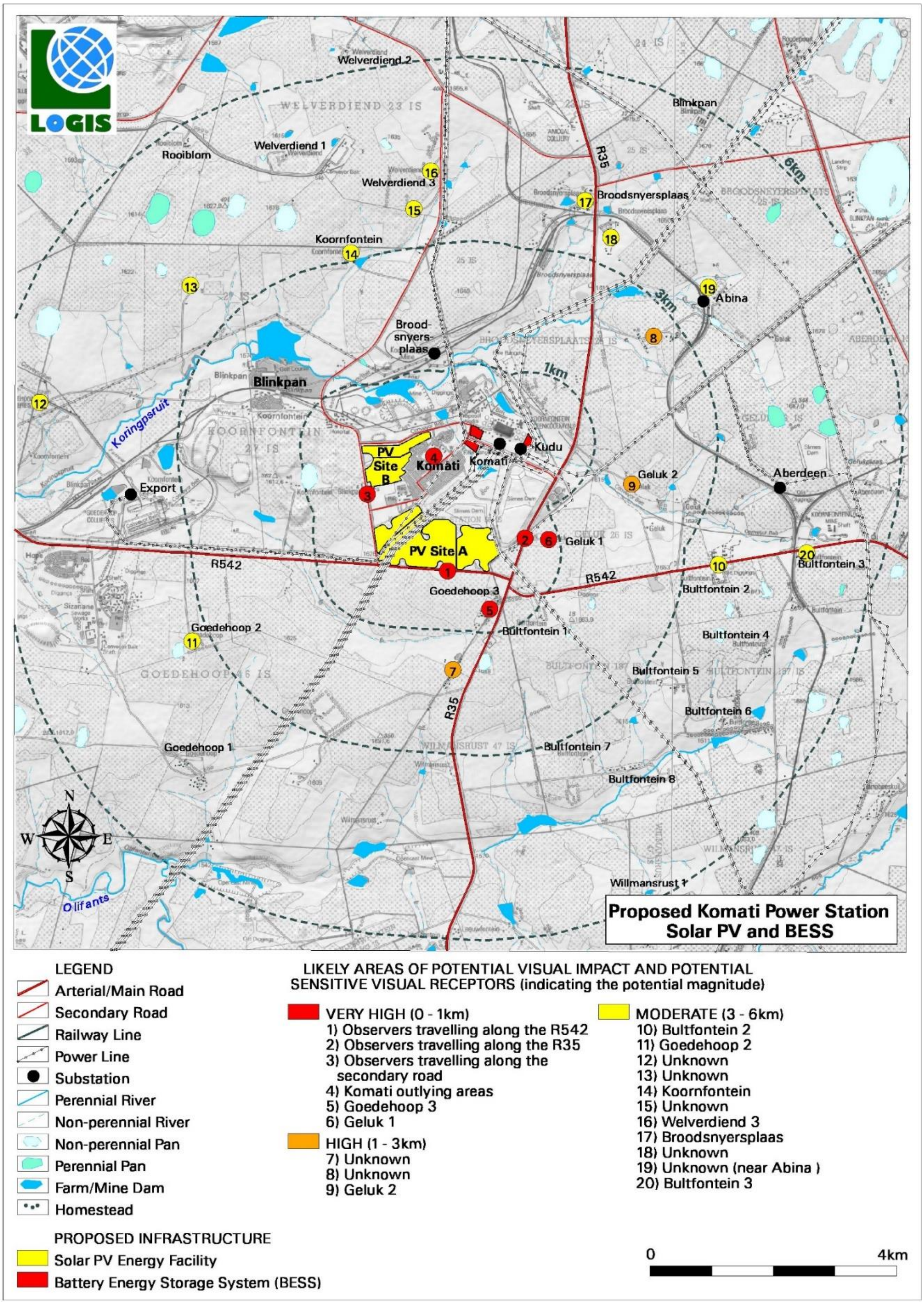

Figure 8-11: Visibility index illustrating the frequency of exposure of the proposed Komati Solar PV and BESS Facility

8.1.3 ARCHAEOLOGICAL AND CULTURAL HERITAGE IMPACT ASSESSMENT

The output of the DFFE Screening Tool for the Archaeological and Cultural Heritage Theme is illustrated in **Figure 8-12** and indicates that the site is classified as Low Sensitivity.

During the May 2023 field assessment, no sites, features or material of cultural heritage (archaeological and/or historical) origin or significance were identified in the study and proposed SEF development area. The planned SEF development and related infrastructure is located in already heavily disturbed areas and the likelihood of any cultural heritage sites or features being located here is very low. The often subterranean nature of archaeological and/historical sites and features should however always be taken into consideration and there is always a possibility of these occurring in an area earmarked for development. This could include unmarked or unknown graves or burials.

The desktop research and physical field-based assessment confirmed this low sensitivity and that there are no sensitive heritage features in the study and proposed development area.

Figure 8-12 - Map of Archaeological and Cultural Heritage Sensitivity

Source: DFFE Screening Report

8.1.4 PALAEONTOLOGY IMPACT ASSESSMENT

The output of the DFFE Screening Tool for the Palaeontology Theme is illustrated in **Figure 8-13** and indicates that the site is classified as Very High Sensitivity.

Fossils likely to be found are mostly plants such as '*Glossopteris flora*' of the Vryheid Formation. The aquatic reptile *Mesosaurus* and fossil fish may also occur with marine invertebrates, arthropods and insects. Trace fossils can also be present. During storms a great variety of leaves, fructifications and twigs accumulated and because they were sandwiched between thin films of mud, they were preserved to bear record of the wealth and the density of the vegetation around the pools. They make it possible to reconstruct the plant life in these areas and wherever they are found, they constitute most valuable palaeobotanical records (Plumstead 1963) and can be used in palaeoenvironmental reconstructions.

Details of the location and distribution of all significant fossil sites or key fossiliferous rock units are often difficult to be determined due to thick topsoil, subsoil, overburden and alluvium. Depth of the overburden may vary a lot. If fossils are found during construction and Phase 2 Palaeontological Mitigation will be required.

The Phase 1: Palaeontology Field Study agrees with the DFFE Screening Tool sensitivity (Very High) and there is a possibility that fossils may be recovered during the pre-construction and construction activities. All the land involved in the development was assessed and none of the property is unsuitable for development. The site is currently used as a power station so the land use will not change.

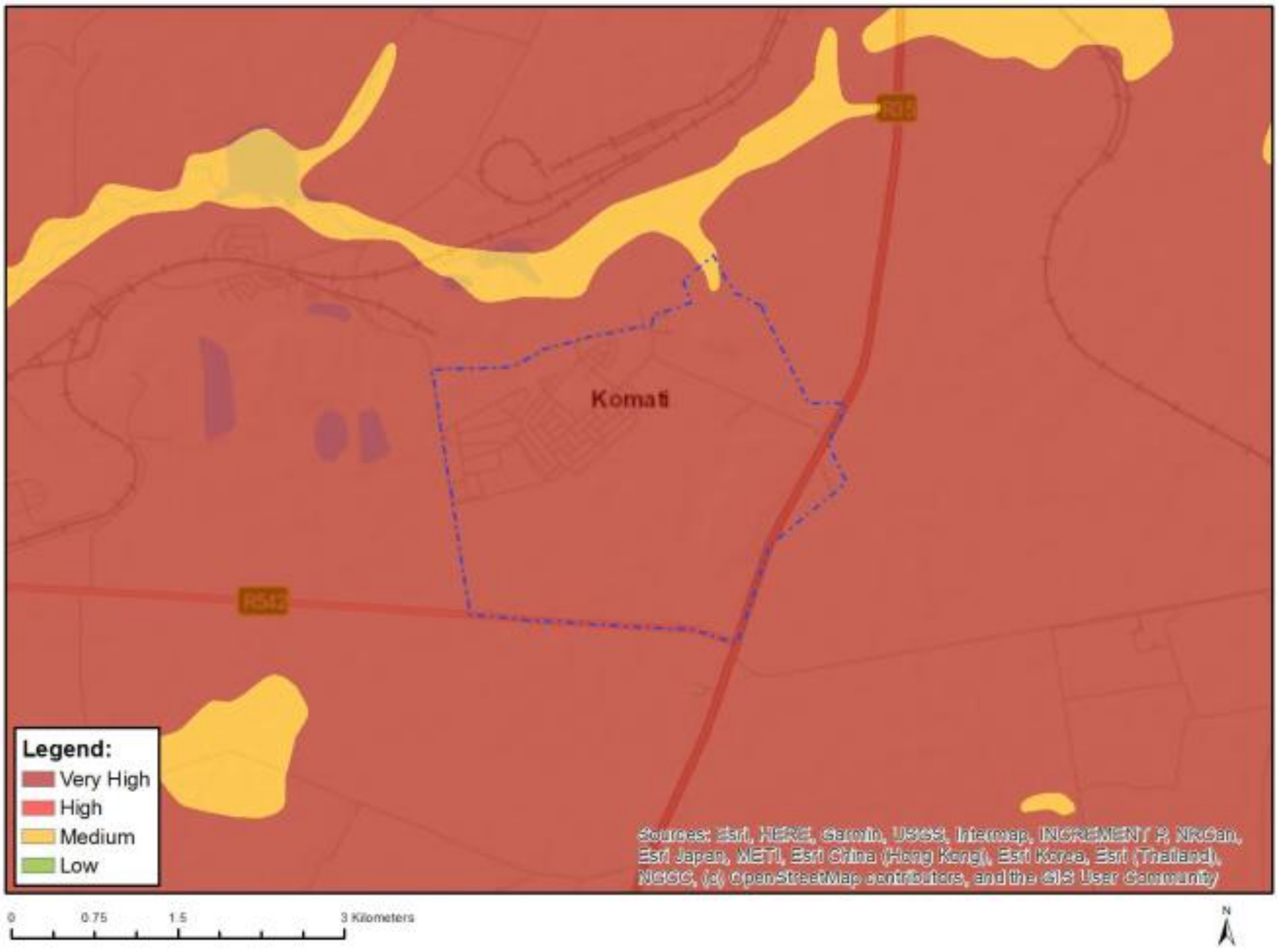

Figure 8-13 - Map of Palaeontology Sensitivity

Source: DFFE Screening Report

8.1.5 TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT

The output of the DFFE Screening Tool for the Terrestrial Biodiversity Theme is illustrated in **Figure 8-14** and indicates that the site is classified as Vey High Sensitivity due to its overlap with land mapped as 'Critical Biodiversity Area' (CBA) 2 by the Mpumalanga Biodiversity Sector Plan, 2019. According to the Mpumalanga Biodiversity Sector Plan (2019), land in the north-west corner of the LSA is categorised as CBA Optimal. This very high sensitivity rating, however, is only partly supported by the findings of this study. Most of the LSA is either modified or disturbed and therefore is not of very high sensitivity. Only the area of Mixed *Themeda triandra Grassland*, most of which is designated as CBA Optimal, is rated as having a High ecological importance.

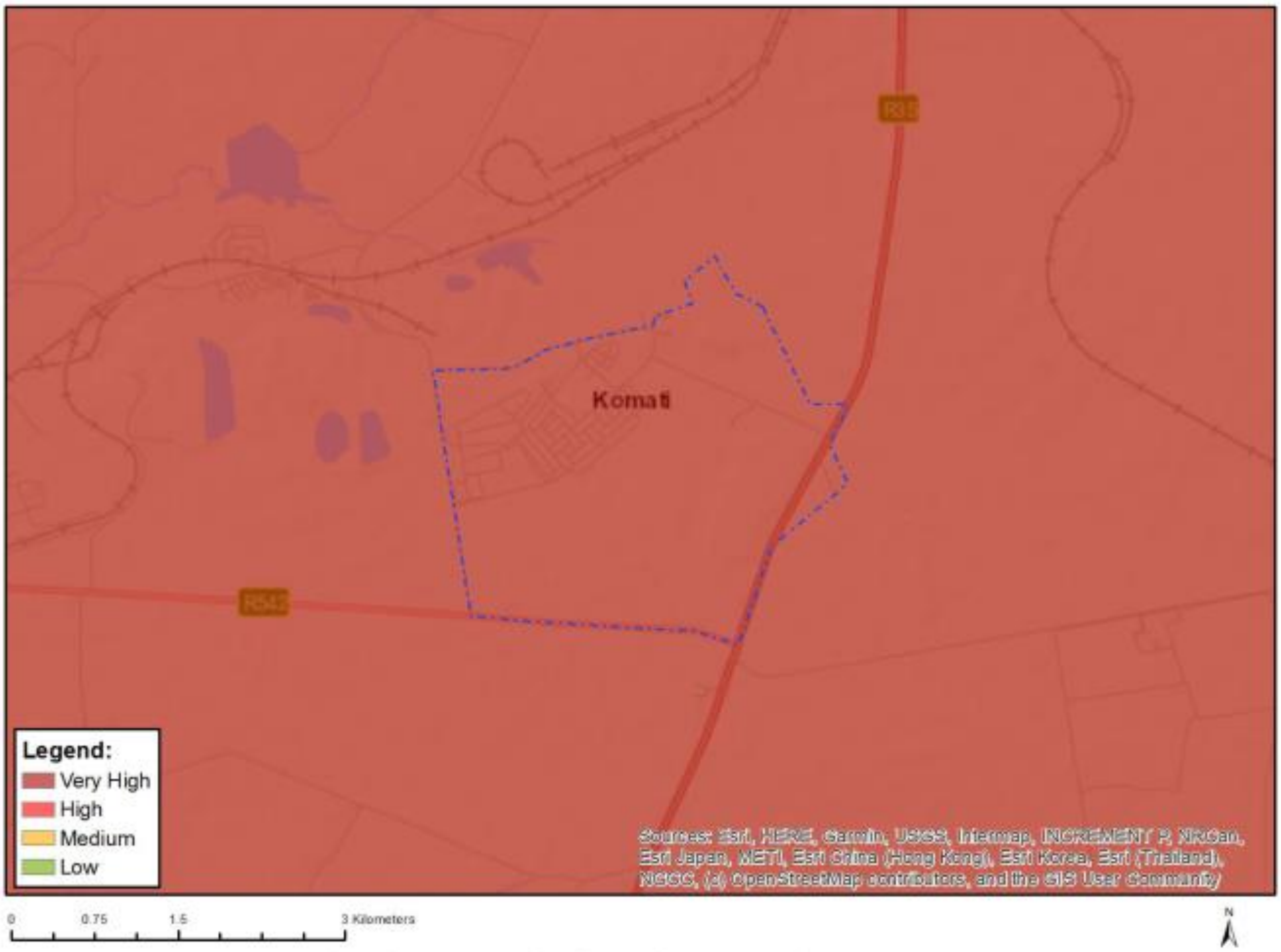

Figure 8-14 - Map of Terrestrial Biodiversity Sensitivity

Source: DFFE Screening Report

8.1.6 AQUATIC BIODIVERSITY IMPACT ASSESSMENT

The output of the DFFE Screening Tool for the Aquatic Biodiversity Theme is illustrated in **Figure 8-15** and indicates that the site is classified as Very High Sensitivity due to the presence of wetlands features in and around the study area. Based on the findings of the Aquatic study, the presence of wetland features on site was confirmed, however, these wetlands were considered to be in a largely modified PES state with low/marginal EIS function and WetEcoservices and are therefore rated to be in a 'Medium Sensitivity'. Although some areas of natural habitat have been mapped in the study area, no 'no-go' areas were mapped in the that relate to the aquatic biodiversity sensitivity.

Figure 8-15 - Map of Aquatic Biodiversity Sensitivity

Source: DFFE Screening Report

8.1.7 CIVIL AVIATION ASSESSMENT

The output of the DFFE Screening Tool for the Civil Aviation Theme is illustrated in **Figure 8-16** and indicates that the site is classified as Medium Sensitivity. The Screening Tool indicates that there is a civil aviation aerodrome within 8 km of the site. An airstrip, presumed to service the Komati Power Station was noted within the proposed development area of PV Site B (**Figure 8-17**).

Satellite imagery shows no obvious facilities (i.e. hangarage) for residential aircraft. Historical photos show that there has been no active use or maintenance of runways in the past 6 years (**Figure 8-18**). The aerodrome is thus considered unserviceable by general aviation. Therefore, the sensitivity is considered to be low.

The relevant Authorities (i.e. ATNS and SACAA) have been included on the project stakeholder database. As of the 1st of May 2021, ATNS has been appointed as the new Obstacle application Service Provider for Windfarms and later Solar Plants. Their responsibility would pertain to the assessments, maintenance, and all other related matters in respect to Windfarms and in due time Power Plant assessments.

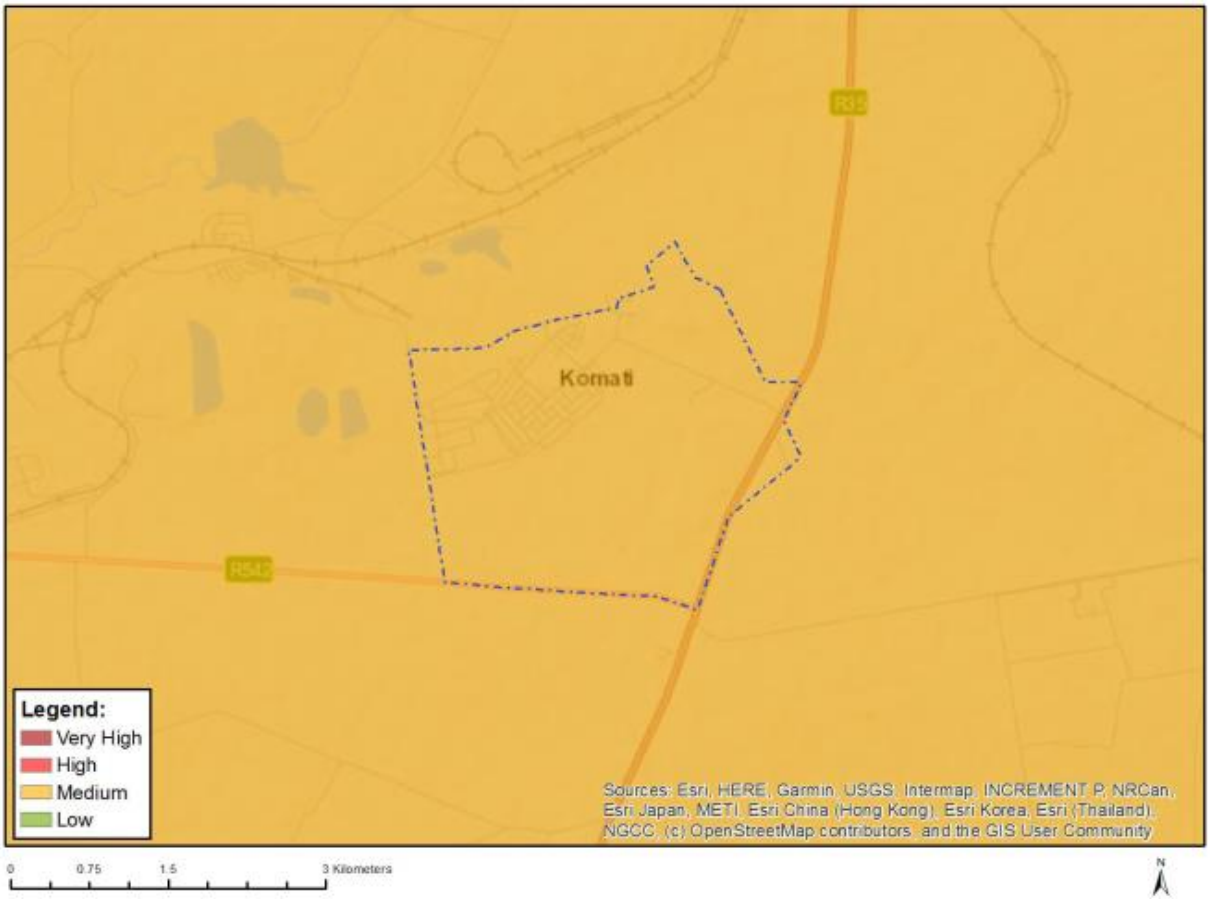

Figure 8-16 - Map of Civil Aviation Sensitivity

Source: DFFE Screening Report

Figure 8-17 - Airstrip noted within PV Site B

Source: LoGIS, 2023

Figure 8-18 – Satellite Imagery of Airstrip within PV Site B (left – 2003, Right - 2017)

Source: Google Earth, 2023

8.1.8 DEFENCE ASSESSMENT

The output of the DFFE Screening Tool for the Defence Theme is illustrated in **Figure 8-19** and indicates that the site is classified as Low Sensitivity. The defence theme is considered to be of low sensitivity and therefore a compliance statement is not required. However, the relevant stakeholders have been included on the project stakeholder database i.e. Department of Defence and no comment has been received to date.

Figure 8-19 - Map of Defence Sensitivity

Source: DFFE Screening Report

8.1.9 RFI ASSESSMENT

The output of the DFFE Screening Tool for the RFI Theme is illustrated in **Figure 8-20** and indicates that the site is classified as Medium Sensitivity. The proposed development area is not located within any Astronomy Advantage Area and is therefore considered to be of low sensitivity. The SAWS and relevant telecommunications stakeholders have been included on the project stakeholder database. No comment has been received to date.

Figure 8-20 - Map of RFI Sensitivity

Source: DFFE Screening Report

8.1.10 ANIMAL AND PLANT SPECIES ASSESSMENT

The output of the DFFE Screening Tool for the Animal Species Theme is illustrated **Figure 8-21** and indicates that the site is classified as High Sensitivity. The findings of this study indicate that the LSA is rated 'Medium Sensitivity' with respects to terrestrial animals. No 'no go' areas were identified with respects to terrestrial animals.

The output of the DFFE Screening Tool for the Plant Species Theme is illustrated in **Figure 8-22** and indicates that the site is classified as Medium Sensitivity. This rating is confirmed by the findings of this study. No 'no-go' areas were identified in the LSA.

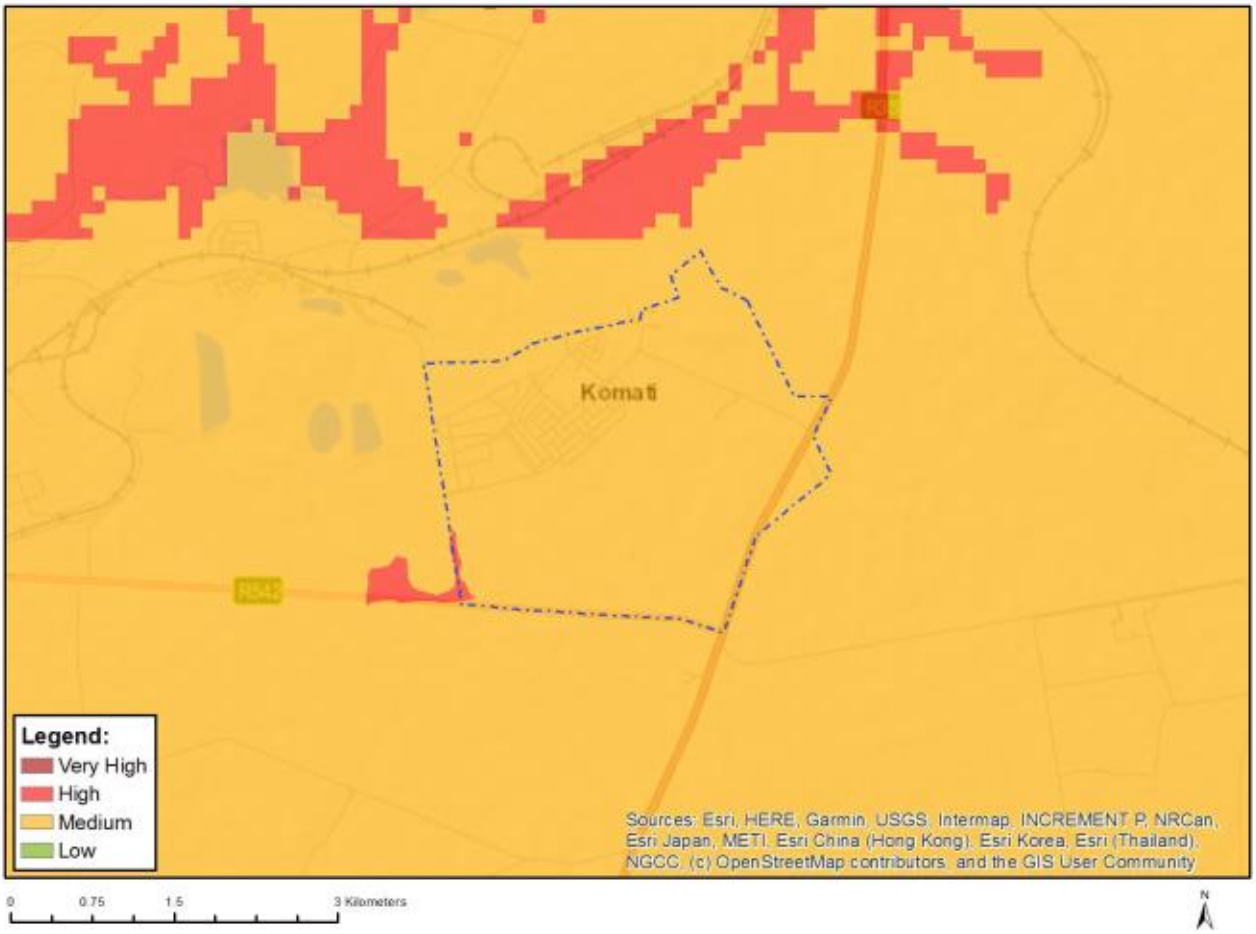

Figure 8-21 - Map of Animal Species Sensitivity

Source: DFFE Screening Report

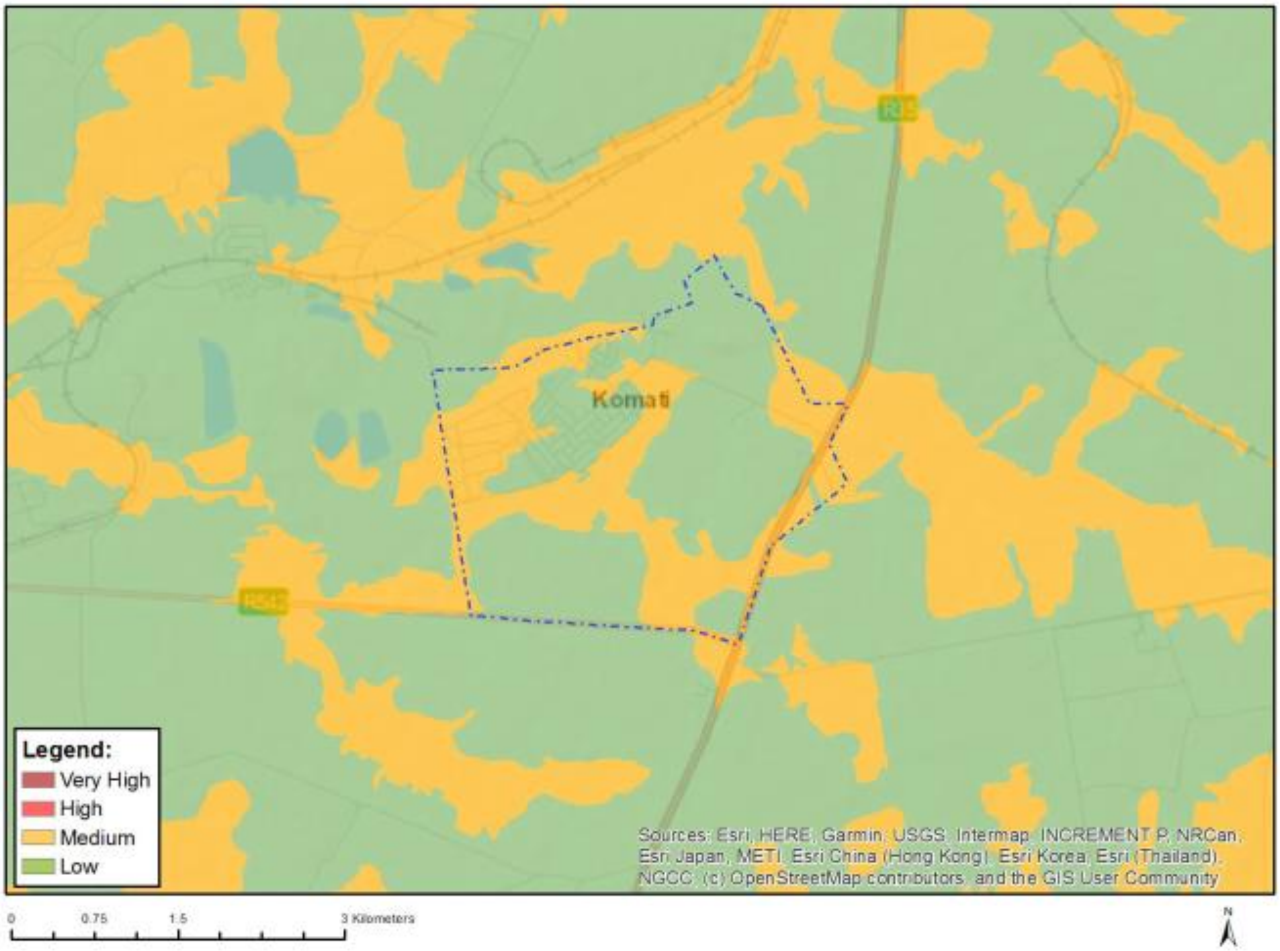

Figure 8-22 - Map of Plant Species Sensitivity

Source: DFFE Screening Report

This section presents summary comment on the ecological importance of identified habitat units in the study area, as per the SANBI (2020) protocol. It is informed by the combined findings of both the Terrestrial Animal Species Specialist Assessment and the Terrestrial Plant Species Specialist Assessment for the proposed Project. A map of ecological importance is shown in **Figure 8-23**, while a summary matrix is shown in **Table 8-4**.

The Cultivated Fields, Alien Tree Stands, and Transformed Areas with Disturbed or Landscaped Vegetation habitats units are either transformed or subject to high levels of ongoing anthropogenic disturbance and meet the definition of modified habitat, as per IFC PS6. I.e., anthropogenic activity has substantially modified primary ecological functioning and species composition. In line with the SANBI (2020) rating criteria, the biodiversity importance of Cultivated Fields, Alien Tree Stands, and Transformed Areas with Disturbed and Landscaped Vegetation is rated Very Low.

Mixed *Themeda triandra* Grassland and Mixed Moist Grassland are considered natural habitat, as per the IFC PS 6 definition. I.e., these areas are comprised of viable assemblages of indigenous species and retain their primary ecological functions. The ecological importance of Mixed *Themeda triandra* Grassland is rated high, while that of Mixed Moist Grassland is rated medium.

Table 8-4 - Ecological importance of habitat units identified in the local study area

Habitat Unit	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Ecological Importance
Cultivated Fields	Very Low	Very Low	Very Low	Low	Very Low
Alien Tree Stands	Very Low	Very Low	Very Low	Low	Very Low
Transformed Areas with Disturbed or Landscaped Vegetation	Very Low	Very Low	Very Low	Low	Very Low
Mixed *Themeda triandra* Grassland	High	High	High	Medium	High
Mixed Moist Grassland	High	Medium	Medium	Medium	Medium

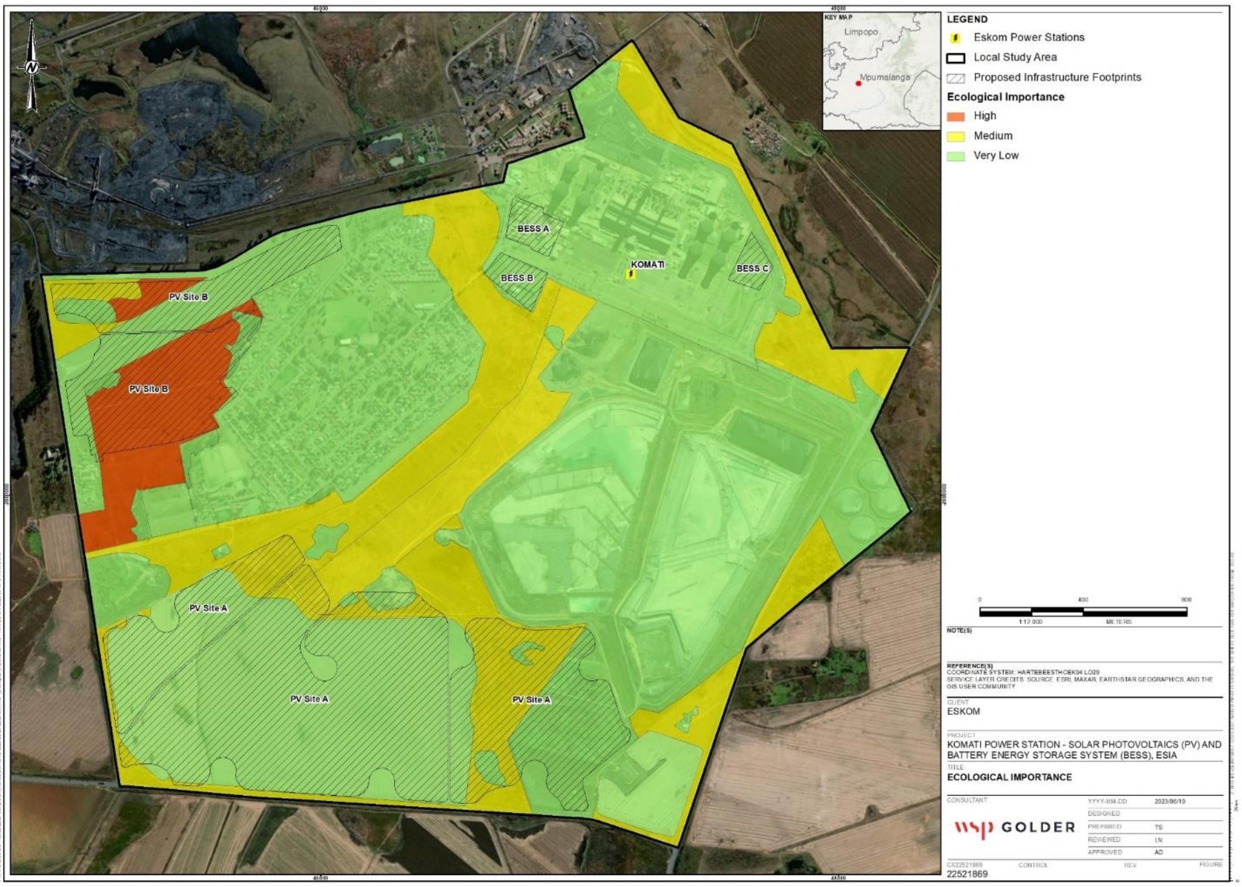

Figure 8-23 – Ecological importance of habitat units in the local study area

8.2 SENSITIVITY MAPPING

A preliminary consolidated environmental sensitivity map (**Figure 8-24)** has been compiled based on the sensitivities and buffers outlined in the following specialist studies:

- Air Quality Assessment:
  - Sensitive receptors within a 10 km radius of the proposed project
- Noise Assessment:
  - Sensitive receptors within a 5 km radius of the proposed project
- Visual Assessment:
  - High and Medium visual sensitive receptors
- Surface Water Assessment:
  - Rivers
- Terrestrial Plant and Animal Assessment:
  - CBAs
  - High Ecological Importance Areas
- Aquatic Biodiversity Assessment:
  - Wetlands

It must be noted that the sensitivity ranking does NOT specify No-Go areas. It is noted that there are no heritage sites or paleontological resources that have been identified to date at the project development site.

Figure 8-24 – Site layout overlain onto a Consolidated Sensitivity Map

9 ENVIRONMENTAL IMPACT ASSESSMENT

This Chapter identifies the perceived environmental and social effects associated with the proposed Project. The assessment methodology is outlined in **Section 3.4**. The issues identified stem from those aspects presented in **Section 7** of this document as well as the Project description provided in **Section 4**.

The impact assessment in this section encompasses the geographical, physical, biological, social, economic, heritage and cultural aspects in accordance with Appendix 1 of GNR 326, and considers the listed activities triggered as indicated in **Table 6-1**.

9.1 SURFACE WATER ASSESSMENT

9.1.1 CONSTRUCTION PHASE

Construction activities could result to erosion from de-vegetated areas, leading to runoff carrying a high silt load and contaminants such as fuel, hydraulic fluids, degreasers, chemicals, and cement. However, due to the gentle slope, sandy soil nature, and low rainfall with high evaporation in the area, limited runoff is expected except for exceptionally high rainfall events. Surface water impacts identified during the construction phase includes:

- Stormwater runoff (**Table 9-1**); and
- Erosion (**Table 9-2**).

Table 9-1 – Impact of stormwater runoff during the construction phase

Potential Impact: Stormwater Runoff	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	1	3	2	2	**20**	**Low**	(-)
With Mitigation	2	1	1	2	2	**12**	**Very Low**	(-)
Mitigation and Management Measures	▪ Construct pollution control systems such as bunded areas, and runoff control systems such as diversion berms and water collection areas such as the process water/evaporation dam first, before undertaking any other activities; ▪ Construct berms down-gradient of construction areas to collect dirty runoff. Allow silt to settle, examine for contamination with oil and/or hydraulic fluids. Remove contaminated material monthly for remediation or appropriate disposal in accordance with prevailing legislation. Clean silt can be used during re-vegetation of bare areas; ▪ Place drip trays under vehicles when parked; ▪ Service vehicles in a workshop, not in the field;							

	- If in-field refuelling is done from a tanker, it should be done in a designated dirty area and a spill kit and clean-up team must be available on site; - Spillages should be cleaned up immediately and contaminated soil must either be remediated in situ or disposed of at an appropriately licensed landfill site; - Potentially contaminating wastes (empty containers for paint, solvents, chemicals, etc.) and cement should be stored in bunded areas until removed by a reputable contractor for disposal at an appropriately licensed site; - Provision of adequate sanitation facilities in the form of chemical toilets that are serviced regularly; and - Providing environmental awareness training for workers on site.

Table 9-2 – Impact of erosion during the construction phase

Potential Impact: Erosion	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	2	2	3	2	4	36	Moderate	(-)
With Mitigation	2	1	1	2	2	12	Very Low	(-)
Mitigation and Management Measures	- For stockpiles and foundation excavations, it is recommended to place diversion berms or silt fences on the upslope and downslope, respectively. Any topsoil cleared for the development of the PV Plant footprints and hardstand areas should be stockpiled for the decommissioning and rehabilitation of the facility. If possible, the stockpiles should have gentle slopes of 1 in 5 or less to promote revegetation and limit erosion. The stockpile should be bunded until revegetation occurs. Although the gentle slopes require a larger surface area for the stockpile, this approach is considered the lower-impact option as it minimises erosion while disturbing a larger surface area.							

9.1.2 OPERATIONAL PHASE

Once operational, the 100 MW Solar Photovoltaics (PV) Energy Facility (SEF), 150 MW Battery Energy Storage System (BESS), and associated infrastructure installation will have a minor impact on water demand, which will be positive. However, during the operational phase, there is a possibility of increased spillage of fuels, lubricants, and other chemicals from the BESS. The installation and operation of the PV plants will result in the creation of relatively small impervious areas (e.g., buildings, roads, and the surfaces of the PV panels). These areas will not have a significant enough footprint to greatly affect the overall infiltration rate on-site. Vehicular movement between the solar panels may disturb the sandy soil surface, but it will not significantly reduce the infiltration rate due to the natural resistance of sandy soils to compaction.

Therefore, localised runoff from these small footprints, with sufficient spaces in for vehicular access for cleaning and maintenance, is unlikely to accumulate and cause erosion or migrate off-site.

Surface water impacts identified during the operational phase includes:

- Flooding (**Table 9-3**);
- Stormwater runoff (**Table 9-4**); and
- Erosion (**Table 9-5**).

Table 9-3 – Impact of flooding during the operational phase

Potential Impact: Flooding	**Magnitude**	**Extent**	**Reversibility**	**Duration**	**Probability**	**Significance**		**Character**
Without Mitigation	3	1	3	2	2	**18**	**Low**	(-)
With Mitigation	2	1	1	2	2	**12**	**Very Low**	(-)
Mitigation and Management Measures	▪ Remove settled silt from runoff control berms regularly, examine for contamination with oil and/or hydraulic fluids. Subject contaminated material to remediation or appropriate disposal in accordance with prevailing legislation. Clean silt can be used during re-vegetation of bare areas.							

Table 9-4 – Impact of stormwater runoff during the operational phase

Potential Impact: Stormwater runoff	**Magnitude**	**Extent**	**Reversibility**	**Duration**	**Probability**	**Significance**		**Character**
Without Mitigation	4	1	3	2	2	**20**	**Low**	(-)
With Mitigation	2	1	1	2	2	**12**	**Very Low**	(-)
Mitigation and Management Measures	▪ Place drip trays under vehicles when parked. ▪ Service vehicles in a workshop, not in the field. ▪ Spillages should be cleaned up immediately and contaminated soil must either be remediated in situ or disposed of at an appropriately licensed landfill site. ▪ Potentially contaminating wastes (empty containers for paint, solvents, chemicals, etc.) and cement should be stored in bunded areas until removed by a reputable contractor for disposal at an appropriately licensed site. ▪ Provide environmental awareness training for workers on site. ▪ Clean-up of spills as soon as they occur.							

	▪ Maintenance of any abstraction pumps to prevent spills. ▪ Maintenance of the BESS to ensure optimal functionality and prevent fire risks. ▪ Maintenance and quality control of firefighting equipment and systems. ▪ Mitigations for spillage or leakages will include bunded areas to store chemicals and/or fuel, containerisation of the BESS and cleaning up spills as soon as they occur.

Table 9-5 – Impact of erosion during the operational phase

Potential Impact: Erosion	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	2	2	3	2	4	36	Moderate	(-)
With Mitigation	2	1	1	2	2	12	Very Low	(-)
Mitigation and Management Measures	▪ Remove settled silt from runoff control berms regularly, examine for contamination with oil and/or hydraulic fluids. Subject contaminated material to remediation or appropriate disposal in accordance with prevailing legislation. Clean silt can be used during re-vegetation of bare areas.							

9.1.3 DECOMMISSIONING PHASE

The decommissioning phase will have a shorter duration compared to the construction and operational phases.

Surface water impacts identified during the decommissioning phase includes:

- Stormwater runoff (**Table 9-6**).

Table 9-6 – Impact of stormwater runoff during the decommissioning phase

Potential Impact: Stormwater runoff	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	1	3	2	2	20	Low	(-)
With Mitigation	2	1	1	2	2	12	Very Low	(-)
Mitigation and Management Measures	▪ Construct pollution control systems such as bunded areas, and runoff control systems such as diversion berms and water collection areas such as the process							

	water/evaporation dam first, before undertaking any other activities; - Construct berms down-gradient of construction areas to collect dirty runoff. Allow silt to settle, examine for contamination with oil and/or hydraulic fluids. Remove contaminated material monthly for remediation or appropriate disposal in accordance with prevailing legislation. Clean silt can be used during re-vegetation of bare areas; - Place drip trays under vehicles when parked; - Service vehicles in a workshop, not in the field; - If in-field refuelling is done from a tanker, it should be done in a designated dirty area and a spill kit and clean-up team must be available on site; - Spillages should be cleaned up immediately and contaminated soil must either be remediated in situ or disposed of at an appropriately licensed landfill site; - Potentially contaminating wastes (empty containers for paint, solvents, chemicals, etc.) and cement should be stored in bunded areas until removed by a reputable contractor for disposal at an appropriately licensed site; - Provision of adequate sanitation facilities in the form of chemical toilets that are serviced regularly; and - Provide environmental awareness training for workers on site.

9.2 GROUNDWATER ASSESSMENT

The main impacts considered are in terms of groundwater quality and quantity.

Quality impacts could result from:

- Hydrocarbons associated with heavy moving equipment during site preparation and construction.
- Site equipment including transformers, solar PV modules, inverters, excavators, graders, trucks, compacting equipment and construction material etc.
- Fuel storage areas (diesel and oil for example).
- Existing contaminated footprint where washing of the panels could result in an increased leaching of contamination to the groundwater.
- The following parameters were noted as needing to be considered for the new activity: arsenic, cadmium, chromium, iron, lead, mercury, nickel, selenium, manganese, and zinc from the ash and coal storage areas; polychlorinated biphenyls, polycyclic aromatic hydrocarbon, BTEX (benzene, toluene, ethyl benzene, xylene), and other petroleum hydrocarbons from oil storage and mechanical and electrical equipment; and copper, iron, nickel, chromium, and zinc from metal cleaning and cooling tower blowdown wastewaters

Quantity impacts could result from:

- Reduced recharge as solar panels and an increased compacted/hard standing footprint will reduce the extent that rainfall can infiltrate to ground and recharge the aquifer.
- Localised ad hoc artificial recharge from water used to wash the panels and/or footprint areas.

It is noted that there is no groundwater abstraction planned for this project.

The main receptors are community boreholes located in the surrounding farms and rivers both in terms of the aquatic ecology and as potential pathway of contaminated water downstream.

9.2.1 CONSTRUCTION PHASE

There are no groundwater quantity impacts identified during construction as water will not be obtained from the groundwater resource.

The aquifers within the proposed areas are limited and there are no groundwater users within the KPS boundary. A reduction in recharge will therefore have a limited impact on receptors in the area. However, groundwater is generally impacted (quality) by sources within the KPS, limiting the infiltration of rain through contaminated soils, particularly in the coal stock yard area which has been identified as a potential source, would reduce the leachate of contamination to the groundwater. This is therefore likely to result in a net positive benefit to the groundwater. The low k and low recharge will limit the migration of contamination to receptors.

Groundwater quality impacts during the construction phase includes:

- Hydrocarbon spills from moving equipment (**Table 9-7**);
- Leachate/spills from fuel storage areas (**Table 9-8**); and
- Contamination from spoil from excavated trenches which could leach to the groundwater (**Table 9-9**).

Table 9-7 – Impact of hydrocarbon spills from moving equipment during the construction phase

Potential Impact: Hydrocarbon Spills Decrease in groundwater quality	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	2	1	3	2	3	**24**	**Low**	(-)
With Mitigation	1	1	3	1	2	**12**	**Very Low**	(-)
Mitigation and Management Measures	▪ All equipment that has the potential to leach contamination to the environment should be stored on hard standing and in a bunded area (e.g., Fuel storage, soaps, greases, transformers etc.). ▪ Vehicles should be routinely inspected, and maintenance carried out to reduce likelihood of spillages. ▪ Transfer of fuels and parking of vehicles should be on hard standing. ▪ Spill kits should be used to clean up spills when they occur.							

Table 9-8 – Impact of leachate/spills from fuel storage areas during the construction phase

Potential Impact: Leachate/spills Decrease in groundwater quality	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	2	1	3	2	3	**24**	**Low**	(-)
With Mitigation	1	1	3	1	2	**12**	**Very Low**	(-)
Mitigation and Management Measures	▪ All equipment that has the potential to leach contamination to the environment should be stored on hard standing and in a bunded area (e.g., Fuel storage, soaps, greases, transformers etc.). ▪ Vehicles should be routinely inspected, and maintenance carried out to reduce likelihood of spillages. ▪ Transfer of fuels and parking of vehicles should be on hard standing. ▪ Spill kits should be used to clean up spills when they occur.							

Table 9-9 – Impact of spoil from excavated trenches may be contaminated and could leach to the groundwater during the decommissioning phase

Potential Impact: Spoil from excavated trenches Decrease in groundwater quality	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	2	1	3	2	3	**24**	**Low**	(-)
With Mitigation	1	1	3	1	2	**12**	**Very Low**	(-)
Mitigation and Management Measures	▪ Ensure appropriate management of excavations especially where these are required within areas proximal to residential dwellings of Komati. ▪ Spoil recovered from trenches in the areas where contamination has been identified should be assessed and the spoil disposed in an appropriate manner.							

9.2.2 OPERATIONAL PHASE

Groundwater impacts during the operational phase includes:

- Reduced recharge due to increase in hardstanding footprint (**Table 9-10**);
- Localised artificial recharge due to washing of solar panels (**Table 9-11**);
- Reduced leachate from contaminated soils (

- Table 9-12);
- Localised leachate from equipment (**Table 9-13**); and
- Localised increased leachate from contaminated soils due to following washing of solar panels (**Table 9-14**).

Table 9-10 – Impact to groundwater during operational phase

Potential Impact: Groundwater Reduced recharge due to increase in hardstanding footprint	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	3	1	3	4	3	**33**	**Moderate**	(-)
With Mitigation	2	1	3	4	2	**20**	**Low**	(-)
Mitigation and Management Measures	- All equipment that has the potential to leach contamination to the environment should be stored on hard standing and in a bunded area (e.g., Fuel storage, soaps, greases, transformers etc.). - Surface water controls to capture and contain wash water for re-use/management will reduce the impact to groundwater.							

Table 9-11 – Impact to groundwater and rivers during the operational phase

Potential Impact: Groundwater and rivers Localised artificial recharge due to washing of solar panels	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	2	1	3	4	3	**30**	**Low**	(-)
With Mitigation	1	1	3	1	2	**12**	**Very Low**	(-)
Mitigation and Management Measures	- Surface water controls to capture and contain wash water for re-use/management will reduce the impact to groundwater. - The potential for leachate from contaminated footprints where panels are washed is likely to be limited given the low k and low recharge. However, site monitoring to monitor existing plumes from historical operations should continue as required by the site WUL.							

Table 9-12 – Impact to groundwater during operational phase

Potential Impact: Groundwater Reduced leachate from contaminated soils	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	2	1	4	4	3	**33**	**Moderate**	(+)
With Mitigation	2	1	5	4	3	**36**	**Moderate**	(+)
Mitigation and Management Measures	▪ All equipment that has the potential to leach contamination to the environment should be stored on hard standing and in a bunded area (e.g., Fuel storage, soaps, greases, transformers etc.). ▪ Surface water controls to capture and contain wash water for re-use/management will reduce the impact to groundwater. ▪ The potential for leachate from contaminated footprints where panels are washed is likely to be limited given the low k and low recharge. However, site monitoring to monitor existing plumes from historical operations should continue as required by the site WUL.							

Table 9-13 – Impact to groundwater and rivers during operational phase

Potential Impact: Groundwater and Rivers Localised leachate from equipment	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	3	1	5	4	3	**39**	**Moderate**	(-)
With Mitigation	2	1	4	4	2	**22**	**Low**	(-)
Mitigation and Management Measures	▪ All equipment that has the potential to leach contamination to the environment should be stored on hard standing and in a bunded area (e.g., Fuel storage, soaps, greases, transformers etc.). ▪ Surface water controls to capture and contain wash water for re-use/management will reduce the impact to groundwater. ▪ The potential for leachate from contaminated footprints where panels are washed is likely to be limited given the low k and low recharge. However, site monitoring to monitor existing plumes from historical operations should continue as required by the site WUL.							

Table 9-14 – Impact to groundwater and rivers during operational phase

Potential Impact: Groundwater and rivers Localised increased leachate from contaminated soils due to following washing of solar panels	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	3	1	5	4	3	**39**	**Moderate**	(-)
With Mitigation	2	1	4	4	2	**22**	**Low**	(-)
Mitigation and Management Measures	▪ All equipment that has the potential to leach contamination to the environment should be stored on hard standing and in a bunded area (e.g., Fuel storage, soaps, greases, transformers etc.). ▪ Surface water controls to capture and contain wash water for re-use/management will reduce the impact to groundwater. ▪ The potential for leachate from contaminated footprints where panels are washed is likely to be limited given the low k and low recharge. However, site monitoring to monitor existing plumes from historical operations should continue as required by the site WUL.							

9.2.3 DECOMMISSIONING PHASE

Groundwater impacts during the operational phase includes:

- Hydrocarbon spills from moving equipment (**Table 9-15**); and
- Leachate from equipment no longer in use (**Table 9-16**).

Whilst footprint areas are considered contaminated in terms of Section 37(2) of the NEM: WA, it is WSP's considered opinion that that the demonstrated contamination specific to these areas "does not present an immediate risk, but that measures are required to address the monitoring and management of that risk". The areas in which concentrations were notably higher were however associated with the impacts from the Ashing area and around the coal stock yard where a remediation plan may be required. The PV and BESS areas are unlikely to require a specific remediation plan and monitoring, as is required by the existing WUL, should be sufficient. No further monitoring commitments are therefore recommended.

Table 9-15 – Impact of hydrocarbon spills from moving equipment during decommissioning phase

Potential Impact: Hydrocarbon Spills Decrease in groundwater quality	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	2	1	3	2	3	**24**	**Low**	(-)
With Mitigation	1	1	3	1	2	**12**	**Very Low**	(-)
Mitigation and Management Measures	▪ Vehicles should be routinely inspected, and maintenance carried out to reduce likelihood of spillages. ▪ Parking should be on hard standing. ▪ Spill kits should be used to clean up spills when they occur. ▪ Redundant equipment must be demolished and removed to an appropriate waste facility.							

Table 9-16 – Impact of leachate from equipment no longer in use during decommissioning phase

Potential Impact: Leachate from equipment no longer in use Decrease in groundwater quality	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	3	1	4	5	3	**39**	**Moderate**	(-)
With Mitigation	2	1	3	4	3	**30**	**Low**	(-)
Mitigation and Management Measures	▪ Vehicles should be routinely inspected, and maintenance carried out to reduce likelihood of spillages. ▪ Parking should be on hard standing. ▪ Spill kits should be used to clean up spills when they occur. ▪ Redundant equipment must be demolished and removed to an appropriate waste facility.							

9.3 SOILS AND AGRICULTURAL POTENTIAL ASSESSMENT

The greatest impacts to soil are typically felt during the site preparation and construction phase of development as a result of vehicular movement, the removal of vegetation within the development footprint and associated disturbances to soil, and access to the site. Site preparation is followed by earthworks required for establishment of structures, leading to stockpiling and exposure of loose soils, as well as movement of construction equipment and personnel within the project area. Based on the information available, the following potential negative impacts of the proposed development were considered and evaluated for the construction, operational and decommissioning phases and the cumulative impacts were assessed. It is understood that all infrastructure will be placed outside of the onsite wetland areas and that no cultivation is being undertaken at the site currently.

The proposed infrastructure will be placed in the existing footprint of the Komati Power Station, within which there are already built-up areas and mining areas.

9.3.1 CONSTRUCTION PHASE

Impacts to soil and agricultural potential during the construction phase includes:

- Loss of Soil (**Table 9-17**);
  - The stripping of soil, especially topsoil, ahead of the development of roads and infrastructure will lead to a loss of usable soil if not undertaken correctly. The soil horizons need to be separately stripped, stockpiled and reused to rehabilitate the disturbed footprint. The disturbed footprint is likely to be relatively small and will not result in a significant loss of soil and agricultural potential. Post construction rehabilitation in the form of shaping and grassing of disturbed areas should be undertaken in order to stabilise loose soil and reduce erosion losses.
  - Usable soil is also likely to be lost to compaction. The clay-rich soils identified on site (Shortlands, Valsrivier, Sepane) will be vulnerable to compaction and wet soils (Sepane) will be more vulnerable to compaction than the dry soils (Valsrivier, Shortlands). Soil compaction reduces the pore space available for air and water within soil, reducing soil arability and increasing the risk of soil erosion. Soil compaction cannot be fully mitigated against as compacted soil cannot regain its original structure.
- Erosion and Sedimentation (**Table 9-18**);
  - Soil stripping, clearing of vegetation, movement of vehicles and earthworks are very likely to result in increased loose material being exposed and consequent erosion. Some erosion will occur wherever soils are disturbed, especially if mitigation measures are not correctly put in place. The site soils are clay-rich (Valsrivier, Shortlands, Sepane) so are not very vulnerable to erosion. Soil erosion could lead to sedimentation of the nearby wetlands, and to the loss of valuable topsoil that is essential for rehabilitation purposes.
- Loss of Agricultural Land (**Table 9-19**);
  - There exists the potential for loss of agricultural land owing to direct occupation of the footprint of the energy facility infrastructure. The movement of vehicles and equipment is likely to result in compaction, disturbance and possible sterilization of soils and associated change in land capability. As mentioned, the site's clay-rich soils will be vulnerable to compaction which cannot be fully mitigated against as compacted soil cannot regain its original structure.
- Soil Contamination (**Table 9-20**).
  - Movement of vehicles and plant / equipment on site could result in leaks and spills of hazardous materials including hydrocarbons. Contaminated soil is expensive to rehabilitate and contamination entering the soils of the project area will infiltrate into the ground as well as migrate from site during rainfall events. The clay-rich soils identified on site will be vulnerable

to contamination as they are chemically active so will interact with the contaminants. All soils will be at risk of contamination especially during the construction phase.

Table 9-17 – Impact of loss of soil during the construction phase

Potential Impact: Loss of soil	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	1	3	4	5	60	Moderate	(-)
With Mitigation	3	1	3	4	2	22	Low	(-)
Mitigation and Management Measures	▪ Strip and stockpile all useable soil material. ▪ Soil stockpiles should be kept low (below 3m tall). ▪ Irrespective of where soil is stockpiled, it should be vegetated as soon as possible to protect against erosion, discourage weeds and maintain active soil microbes. ▪ Soils can be ripped to make them more suitable for cultivation post-decommissioning. ▪ Onsite vehicle routes must be limited on site by demarcating traffic areas and limiting vehicle access. ▪ Soils must only be stripped when they are dry. ▪ All stripping and stockpiling should be undertaken according to the guidelines below: • Demarcate the area to be stripped clearly, so that the contractor does not strip beyond the demarcated boundary. • The stripped soil should be relocated by truck along set removal paths. • The area to be stripped requires storm water management and the in-flow of water should be prevented with suitable structures. • Prepare the haul routes prior to stripping. • Stripping should not be undertaken in wet conditions.							

Table 9-18 – Impact of erosion and sedimentation during the construction phase

Potential Impact: Erosion and sedimentation	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	1	3	4	5	60	Moderate	(-)
With Mitigation	2	1	3	4	3	30	Low	(-)
Mitigation and Management Measures	▪ Limit earthworks and vehicle movement to demarcated paths and areas.							

	▪ Limit the duration of construction activities, especially those involving earthworks / excavations. ▪ Access roads associated with the development should have gradients or surface treatment to limit erosion, and road drainage systems should be accounted for. ▪ Existing roads should be used and regraded instead of creating new roads wherever possible. ▪ Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces and soil stockpiles should be re-vegetated or stabilised as soon as is practically possible. ▪ Phase-specific storm water management plans should be designed for the site and adhered to. ▪ During periods of strong winds, stockpiles that have not yet been vegetated should be covered with appropriate material

Table 9-19 – Impact of loss of agricultural land during the construction phase

Potential Impact: Loss of Agricultural Land	**Magnitude**	**Extent**	**Reversibility**	**Duration**	**Probability**	**Significance**		**Character**
Without Mitigation	4	1	3	4	5	**60**	**Moderate**	(-)
With Mitigation	2	1	3	4	5	**30**	**Low**	(-)
Mitigation and Management Measures	▪ Limiting vehicle routes on site by demarcating traffic areas. ▪ Limiting site vehicle access. ▪ Reuse of existing roads will prevent additional areas from becoming compacted. ▪ Stripping soils when they are dry. ▪ Compacted soils can be ripped to make them more suitable for cultivation.							

Table 9-20 – Impact of soil contamination during the construction phase

Potential Impact: Soil contamination	**Magnitude**	**Extent**	**Reversibility**	**Duration**	**Probability**	**Significance**		**Character**
Without Mitigation	4	2	3	5	5	**70**	**High**	(-)
With Mitigation	3	1	3	4	2	**22**	**Low**	(-)
Mitigation and Management Measures	▪ On-site vehicles should be well-maintained, ▪ Drip trays should be placed under parked vehicles;							

	■ On-site pollutants/hazardous materials should be contained in a bunded area and on an impermeable surface; ■ Ensure proper control of dangerous substances entering the site, and ■ Adequate disposal facilities must be provided.

9.3.2 OPERATIONAL PHASE

Impacts to soil and agricultural potential during the operational phase includes:

- Loss of Soil (**Table 9-21**);
- Erosion and Sedimentation (

- Table 9-22);
- Loss of Agricultural Land (**Table 9-23**);
- Soil Contamination (

- Table 9-24).

Table 9-21 – Impact of loss of soil during the operational phase

Potential Impact: Loss of soil	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	1	1	3	4	5	**45**	**Moderate**	(-)
With Mitigation	1	1	3	4	1	**9**	**Very Low**	(-)
Mitigation and Management Measures	■ Strip and stockpile all useable soil material. ■ Soil stockpiles should be kept low (below 3m tall). ■ Irrespective of where soil is stockpiled, it should be vegetated as soon as possible to protect against erosion, discourage weeds and maintain active soil microbes. ■ Soils can be ripped to make them more suitable for cultivation post-decommissioning. ■ Onsite vehicle routes must be limited on site by demarcating traffic areas and limiting vehicle access. ■ Soils must only be stripped when they are dry.							

Table 9-22 – Impact of erosion and sedimentation during the operational phase

Potential Impact: Erosion and sedimentation	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	2	1	3	4	5	50	Moderate	(-)
With Mitigation	1	1	3	4	2	18	Low	(-)
Mitigation and Management Measures	▪ Access roads associated with the development should have gradients or surface treatment to limit erosion, and road drainage systems should be accounted for. ▪ Existing roads should be used and regraded instead of creating new roads wherever possible. ▪ Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces and soil stockpiles should be re-vegetated or stabilised as soon as is practically possible. ▪ Phase-specific storm water management plans should be designed for the site and adhered to. ▪ During periods of strong winds, stockpiles that have not yet been vegetated should be covered with appropriate material							

Table 9-23 – Impact of loss of agricultural land during the operational phase

Potential Impact: Loss of Agricultural Land	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	2	1	3	4	5	50	Moderate	(-)
With Mitigation	2	1	3	4	3	30	Low	(-)
Mitigation and Management Measures	▪ Reuse of existing roads will prevent additional areas from becoming compacted. ▪ Stripping soils when they are dry. ▪ Compacted soils can be ripped to make them more suitable for cultivation.							

Table 9-24 – Impact of soil contamination during the operational phase

Potential Impact: Soil contamination	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	2	2	3	5	5	60	Moderate	(-)
With Mitigation	2	1	3	4	3	30	Low	(-)
Mitigation and Management Measures	▪ On-site vehicles should be well-maintained, ▪ Drip trays should be placed under parked vehicles; ▪ On-site pollutants/hazardous materials should be contained in a bunded area and on an impermeable surface; ▪ Ensure proper control of dangerous substances entering the site, and ▪ Adequate disposal facilities must be provided.							

9.3.3 DECOMMISSIONING PHASE

Impacts to soil and agricultural potential during the decommissioning phase includes:

- Loss of Soil (**Table 9-25**);
- Erosion and Sedimentation (**Table 9-26**);
- Loss of Agricultural Land (**Table 9-27**); and
- Soil Contamination (**Table 9-28**).

Table 9-25 – Impact of loss of soil during the decommissioning phase

Potential Impact: Loss of soil	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	1	1	3	4	3	27	Low	(-)
With Mitigation	1	1	3	4	1	9	Very Low	(-)
Mitigation and Management Measures	▪ Strip and stockpile all useable soil material. ▪ Soil stockpiles should be kept low (below 3m tall). ▪ Irrespective of where soil is stockpiled, it should be vegetated as soon as possible to protect against erosion, discourage weeds and maintain active soil microbes. ▪ Soils can be ripped to make them more suitable for cultivation post-decommissioning. ▪ Onsite vehicle routes must be limited on site by demarcating traffic areas and limiting vehicle access. ▪ Soils must only be stripped when they are dry.							

	▪ All stripping and stockpiling should be undertaken according to the guidelines below: • Demarcate the area to be stripped clearly, so that the contractor does not strip beyond the demarcated boundary. • The stripped soil should be relocated by truck along set removal paths. • The area to be stripped requires storm water management and the in-flow of water should be prevented with suitable structures. • Prepare the haul routes prior to stripping. • Stripping should not be undertaken in wet conditions.

Table 9-26 – Impact of erosion and sedimentation during the decommissioning phase

Potential Impact: Erosion and sedimentation	**Magnitude**	**Extent**	**Reversibility**	**Duration**	**Probability**	**Significance**		**Character**
Without Mitigation	3	1	3	4	5	**55**	**Moderate**	(-)
With Mitigation	2	1	3	4	2	**20**	**Low**	(-)

Mitigation and Management Measures	▪ Limit earthworks and vehicle movement to demarcated paths and areas. ▪ Limit the duration of construction activities, especially those involving earthworks / excavations. ▪ Access roads associated with the development should have gradients or surface treatment to limit erosion, and road drainage systems should be accounted for. ▪ Existing roads should be used and regraded instead of creating new roads wherever possible. ▪ Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces and soil stockpiles should be re-vegetated or stabilised as soon as is practically possible. ▪ Phase-specific storm water management plans should be designed for the site and adhered to. ▪ During periods of strong winds, stockpiles that have not yet been vegetated should be covered with appropriate material

Table 9-27 – Impact of loss of agricultural land during the decommissioning phase

Potential Impact: Loss of Agricultural Land	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	1	1	3	4	1	9	Very Low	(-)
With Mitigation	1	1	3	4	1	9	Very Low	(-)
Mitigation and Management Measures	▪ Limiting vehicle routes on site by demarcating traffic areas. ▪ Limiting site vehicle access. ▪ Reuse of existing roads will prevent additional areas from becoming compacted. ▪ Stripping soils when they are dry. ▪ Compacted soils can be ripped to make them more suitable for cultivation.							

Table 9-28 – Impact of soil contamination during the decommissioning phase

Potential Impact: Soil contamination	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	2	1	3	5	2	22	Low	(-)
With Mitigation	1	1	3	4	2	18	Low	(-)
Mitigation and Management Measures	▪ On-site vehicles should be well-maintained, ▪ Drip trays should be placed under parked vehicles; ▪ On-site pollutants/hazardous materials should be contained in a bunded area and on an impermeable surface; ▪ Ensure proper control of dangerous substances entering the site, and ▪ Adequate disposal facilities must be provided.							

9.4 TERRESTRIAL ANIMAL SPECIES IMPACT ASSESSMENT

9.4.1 CONSTRUCTION PHASE

9.4.1.1 Loss and Disturbance of Fauna Habitat

Habitat loss and disturbance refers to the removal or degradation of natural habitat. In terrestrial ecosystems, this primarily occurs through vegetation clearing and bulk earth works during construction.

- In total, the proposed layout of Project will result in the direct loss of 48.43 ha of natural habitat and 147.28 ha of modified habitat - refer to **Table 9-29**:
- The proposed PV Site A footprint mostly impacts modified habitat, specifically the Cultivated Fields and Transformed Areas with Disturbed or Landscaped Vegetation habitat units, with some Mixed Moist Grassland impacted;
- The proposed PV Site B footprint comprises a mixture of modified and natural habitats, with both Mixed *Themeda triandra* Grassland and Mixed Moist Grassland directly impacted;
- The BESS sites are all located on land designated under the Transformed Areas with Disturbed or Landscaped Vegetation habitat unit.

The loss of modified habitats is not considered an impact of concern with respects to fauna SCC. However, the loss natural habitat is an impact of concern, and has been assessed separately for the Mixed *Themeda triandra* Grassland and Mixed Moist Grassland habitat units.

Table 9-29 – Extent of habitat loss associated with proposed Project activities

Habitat Type	Habitat Units	Approx. Extent (Ha) of Loss
Modified Habitats	Cultivated Fields	92.75
	Alien Tree Stands	1.73
	Transformed Areas with Disturbed or Landscaped Vegetation	52.80
	Sub Total	147.28
Natural Habitats	Mixed *Themeda triandra* Grassland	21.48
	Mixed Moist Grassland	26.95
	Sub Total	48.43

Although localised disturbances are present in the Mixed *Themeda triandra* Grassland, in general, this habitat unit is considered a primary vegetation community and representative of Eastern Highveld Grassland vegetation type. It is rated as having a high ecological importance. This is consistent with the MBSP delineation of this portion of the LSA as CBA Optimal. Prior to mitigation, the loss of Mixed *Themeda triandra* Grassland habitat is considered an impact of very high magnitude, permanently affecting vegetation within and potentially adjacent to the development footprints (local). It is also considered to have a definite probability, resulting in a before impact rating of "very high" significance. With the application of standard mitigation, the impact magnitude can be reduced to high. Impact extent will be reduced to the site only, and duration will be long-term (i.e., project life), while probability will be reduced to probable. This results in an after-mitigation impact of "moderate" significance for the loss of Mixed *Themeda triandra* Grassland.

With respect to the Mixed Moist Grassland, this habitat unit is rated as having a medium ecological importance on account of various disturbances. Prior to mitigation this impact has a magnitude of high and will have a local extent. Duration will be permanent and it is definite that the impact will occur. This results in an impact significance of "high". With the implementation of standard mitigation measures, this impact can be reduced to a low magnitude, with a long-term duration. Spatial extent will be reduced to the site only and probability will decrease from definite to probable. After mitigation, the loss of Mixed Moist Grassland is rated to be of "low" significance.

Notwithstanding the reduction in impact significance resulting from the application of mitigation, there will still be a loss of natural habitat associated with the proposed Project. In light of this, in order to achieve the IFC PS6 requirement of 'no net loss' of natural habitat, a biodiversity offset will be required.

The impact to fauna habitat is indicated in **Table 9-44** and **Table 9-31** .

Table 9-30 – Impact to fauna habitat during the construction phase

Potential Impact: Fauna Habitat Loss and disturbance of natural habitat - Mixed *Themeda triandra* Grassland	**Magnitude**	**Extent**	**Reversibility**	**Duration**	**Probability**	**Significance**		**Character**
Without Mitigation	5	2	5	5	5	85	Very High	(-)
With Mitigation	4	1	3	4	3	**36**	**Moderate**	(-)
Mitigation and Management Measures	▪ As much of the proposed Project infrastructure as possible should be located on areas of modified habitat; ▪ All vegetation clearing for the Project should be restricted to the proposed Project footprints only, with no clearing permitted outside of these areas; ▪ The footprints to be cleared of vegetation should be clearly demarcated prior to construction to prevent unnecessary clearing outside of these areas. No heavy vehicles should travel beyond the marked works zone; ▪ Temporary facilities associated with construction, such as contractor site offices, portable toilets, storage and laydown areas, should be located on land that is currently transformed or developed; ▪ Removed topsoil should be stockpiled and used to rehabilitate all non-operational disturbed areas. ▪ A comprehensive rehabilitation/ landscaping protocol should be developed and implemented to stabilise and revegetate all non-operational sites that have been disturbed by construction. ▪ The loss of natural habitat, particularly CBA Optimal land, is an impact that cannot be fully mitigated through standard mitigation and rehabilitation measures. A biodiversity offset strategy should therefore be developed and implemented for the proposed Project.								

Table 9-31 – Impact to fauna habitat during the construction phase

Potential Impact: Fauna Habitat Loss and disturbance of natural habitat - Moist Mixed Grassland	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	2	3	5	5	70	High	(-)
With Mitigation	2	1	2	4	3	27	Low	(-)
Mitigation and Management Measures	▪ As much of the proposed Project infrastructure as possible should be located on areas of modified habitat; ▪ All vegetation clearing for the Project should be restricted to the proposed Project footprints only, with no clearing permitted outside of these areas; ▪ The footprints to be cleared of vegetation should be clearly demarcated prior to construction to prevent unnecessary clearing outside of these areas. No heavy vehicles should travel beyond the marked works zone; ▪ Temporary facilities associated with construction, such as contractor site offices, portable toilets, storage and laydown areas, should be located on land that is currently transformed or developed; ▪ Removed topsoil should be stockpiled and used to rehabilitate all non-operational disturbed areas. ▪ A comprehensive rehabilitation/ landscaping protocol should be developed and implemented to stabilise and revegetate all non-operational sites that have been disturbed by construction.								

9.4.1.2 Establishment and Spread of Alien Invasive Species

Habitat disturbances caused by vegetation clearing and earth works during construction can facilitate the establishment and spread of AIS. Alien plant infestations can spread exponentially, suppressing or replacing indigenous vegetation. This may compromise ecosystem functioning resulting in a loss of biodiversity.

Nineteen NEMBA listed AIS were recorded in the study area. Proposed Project activities will cause the physical disturbance of vegetation and soils, which will facilitate the spread of AIS.

Before mitigation, impact magnitude is high, while duration is long term and it has a high probability. The spatial extent of AIS spread is local. Prior to mitigation, the establishment and spread of AIS is rated an impact of “moderate” significance.

This impact is relatively easy to mitigate. With the implementation of active control during the construction phase, this impact can be reduced to a low magnitude, with a short-term duration. Spatial extent will be reduced to the site only and the probability of the impact occurring as predicted would be reduced to low. After mitigation, this impact is rated to be of “very low” significance.

The impact of the establishment and spread of alien invasive species is indicated in **Table 9-32**.

Table 9-32 – Impact of the establishment and spread of alien invasive species during the construction phase

Potential Impact: Establishment and spread of alien invasive species	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	2	1	4	4	44	Moderate	(-)
With Mitigation	2	1	1	2	2	12	Very Low	(-)
Mitigation and Management Measures	An AIS control and eradication plan must be developed for the Project that focuses on controlling and eradicating all AIS occurring throughout the LSA. The plan must include: • Identification of AIS management units • Prioritisation of sites and species requiring control; • Targets and indicators of success; • Scheduling of AIS control; • Species-specific control methods, using a combined approach of both chemical and mechanical control methods; and • Provision for follow-up treatments, as informed by regular AIS monitoring.							

9.4.1.3 Direct Mortality, Injuring and Disturbance of Fauna

Large and mobile fauna are likely to move off to avoid disturbances caused by construction activities. However, smaller and less mobile species may be trapped, injured and killed during vegetation clearing and earth works. Fauna that are particularly susceptible to direct mortality and disturbance include reptiles, amphibians and fossorial (burrowing) mammals. Other common causes of fauna death or injury include vehicle collisions along access roads, hunting and snaring by workers, and trapping of fauna in fences, excavations and trenches.

Before mitigation, impact magnitude is high, while duration is immediate and it has a high probability. The spatial extent will be local. Prior to mitigation, the mortality, injuring and disturbance of mammals is rated an impact of “moderate” significance.

After mitigation, which includes, inter alia, active supervision by an environmental control officer (ECO) at all times during the construction phase, this impact can be reduced to a low magnitude, with an immediate duration. The spatial extent will be reduced to the site and probability will also be reduced to low. After mitigation the killing, injuring and disturbance of fauna is rated of “very low” significance.

The impact of the direct mortality, injuring and disturbance of fauna is indicated in **Table 9-33**.

Table 9-33 – Impact of the direct mortality, injuring and disturbance of fauna during the construction phase

Potential Impact: Direct mortality, injuring and disturbance of fauna	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	2	5	1	4	48	Moderate	(-)
With Mitigation	2	1	3	1	2	14	Very Low	(-)
Mitigation and Management Measures	▪ An ECO should be on-site during vegetation clearing to monitor and manage any wildlife-human interactions. The ECO should be trained in inter alia, snake handling and basic fauna identification; ▪ Any fauna species trapped in construction areas, should be safely and correctly relocated to an adjacent area of natural habitat; ▪ A low-speed limit (recommended 20-40 km/h) should be enforced on site to reduce wildlife collisions; ▪ The handling, poisoning and killing of on-site fauna by workers and contractors must be strictly prohibited; ▪ The rules and regulations concerning all wildlife should be communicated to workers and contractors through on-site signage and awareness training (induction); ▪ An incidence register should be maintained throughout all phases of the Project detailing any wildlife mortalities/injuries caused by on-site activities. The register should be used to identify additional biodiversity management requirements; ▪ As required, active dust suppressions should be implemented on-site to limit dust-related disturbances to fauna.								

9.4.1.4 Loss of Fauna Species of Conservation Concern (SCC)

Several fauna SCC have historic distribution ranges that encompass the LSA, and thus potentially occur in areas of natural habitat. Habitat suitability assessments indicated that most of these SCC are unlikely to be present in the LSA, due inter alia, a lack of suitable habitat as a result of the fragmented and highly disturbed nature of most of the LSA. Based on anecdotal evidence, one Red List taxa was noted to be present in the LSA, namely the Serval. This adaptable species is able to tolerate a high degree of habitat disturbances (pers. obs.), and it is considered unlikely that habitat disruptions associated with the proposed Project will negatively impact the local Serval population. The probability of occurrence of the Maquassie Musk Shrew and African Marsh Rat was assessed to be possible. Both taxa favour moist grassland-type habitat, which is present in the LSA and will be impacted by proposed Project infrastructure. However, considering the already disturbed nature of this habitat unit in the LSA, it is unlikely that these areas constitute important life-cycle habitat for these taxa, and Project disturbances are thus unlikely to negatively affect Maquassie Musk Shrew and African Marsh Rat populations, if they are indeed present.

Before mitigation, impact magnitude is very high, while duration is permanent. It has a moderate probability of occurrence. The spatial extent of the impact is at the local scale. Prior to mitigation, this impact is rated of "moderate" significance. This impact can be reduced to a medium magnitude, and will remain of permanent duration. Spatial extent will be reduced to the site, but probability will be reduced to low. After mitigation this impact is rated to be of "low" significance.

The impact of the loss of fauna SCC is indicated in **Table 9-34**.

Table 9-34 – Impact of the loss of fauna SCC during the construction phase

Potential Impact: Loss of fauna species of conservation concern	**Magnitude**	**Extent**	**Reversibility**	**Duration**	**Probability**	**Significance**		**Character**
Without Mitigation	5	2	5	5	3	**51**	**Moderate**	(-)
With Mitigation	3	1	3	5	2	**24**	**Low**	(-)
Mitigation and Management Measures	▪ As much of the proposed Project infrastructure as possible should be located on areas of modified habitat; ▪ All vegetation clearing for the Project should be restricted to the proposed Project footprints only, with no clearing permitted outside of these areas; ▪ The footprints to be cleared of vegetation should be clearly demarcated prior to construction to prevent unnecessary clearing outside of these areas. No heavy vehicles should travel beyond the marked works zone; ▪ Temporary facilities associated with construction, such as contractor site offices, portable toilets, storage and laydown areas, should be located on land that is currently transformed or developed; ▪ Removed topsoil should be stockpiled and used to rehabilitate all non-operational disturbed areas. ▪ A comprehensive rehabilitation/ landscaping protocol should be developed and implemented to stabilise and revegetate all non-operational sites that have been disturbed by construction. ▪ The loss of natural habitat, particularly CBA Optimal land, is an impact that cannot be fully mitigated through standard mitigation and rehabilitation measures. A biodiversity offset strategy should therefore be developed and implemented for the proposed Project. ▪ An ECO should be on-site during vegetation clearing to monitor and manage any wildlife-human interactions. The ECO should be trained in inter alia, snake handling and basic fauna identification; ▪ Any fauna species trapped in construction areas, should be safely and correctly relocated to an adjacent area of natural habitat; ▪ A low-speed limit (recommended 20-40 km/h) should be enforced on site to reduce wildlife collisions;								

	▪ The handling, poisoning and killing of on-site fauna by workers and contractors must be strictly prohibited; ▪ The rules and regulations concerning all wildlife should be communicated to workers and contractors through on-site signage and awareness training (induction); ▪ An incidence register should be maintained throughout all phases of the Project detailing any wildlife mortalities/injuries caused by on-site activities. The register should be used to identify additional biodiversity management requirements; ▪ As required, active dust suppressions should be implemented on-site to limit dust-related disturbances to fauna.

9.4.2 OPERATIONAL PHASE

9.4.2.1 Establishment and Spread of Alien Invasive Species

The potential establishment and spread of AIS in the study area will continue to be an impact of concern during the operational phase.

Before mitigation, impact magnitude is high, while duration is long term and the impact has a high probability of occurring as predicted. The spatial extent of alien invasive species spread is local. Prior to mitigation, the establishment and spread of alien invasive species is rated an impact of "moderate" significance.

With the continued implementation of an active alien species control programme during the operational phase this impact can be reduced to a low magnitude, with a short-term duration. Spatial extent will be reduced to the site only and probability at low. After mitigation, this impact is rated to be of "very low" significance.

The impact of the establishment and spread of alien invasive species is indicated in **Table 9-35**.

Table 9-35 – Impact of the establishment and spread of alien invasive species during the operational phase

Potential Impact: Establishment and spread of alien invasive species	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	2	1	4	4	44	Moderate	(-)
With Mitigation	2	1	1	2	2	12	Very Low	(-)
Mitigation and Management Measures	▪ Active alien invasive species control should continue throughout the operational phase, as per the approved AIS control and eradication programme.							

9.4.3 DECOMMISSIONING PHASE

9.4.3.1 Establishment and Spread of Alien Invasive Species

As Project infrastructure is dismantled and removed from site during the decommissioning phase, the associated disturbances are likely to facilitate alien invasive species colonisation in, and immediately adjacent to, the study area.

Before mitigation, impact magnitude is high, while duration is long term and the impact has a high probability of occurring as predicted. The spatial extent of alien invasive species spread is local. Prior to mitigation, the establishment and spread of alien invasive species is rated an impact of "moderate" significance.

With the continued implementation of an active alien species control programme during decommissioning, this impact can be reduced to a low magnitude, with a short-term duration. Spatial extent will be reduced to the site only and the probability of the impact occurring would be low. After mitigation, this impact is rated to be of "very low" significance.

The impact of the establishment and spread of alien invasive species is indicated in **Table 9-36**.

Table 9-36 – Impact of the establishment and spread of alien invasive species during the operational phase

Potential Impact: Establishment and spread of alien invasive species	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	2	1	4	4	44	Moderate	(-)
With Mitigation	2	1	1	2	2	12	Very Low	(-)
Mitigation and Management Measures	▪ Active alien invasive species control should continue during the decommissioning phase and follow up control should be carried out for a five- year period following decommissioning.							

9.5 TERRESTRIAL PLANT SPECIES IMPACT ASSESSMENT

9.5.1 CONSTRUCTION PHASE

9.5.1.1 Loss and Disturbance of Flora Habitat

Habitat loss and disturbance refers to the removal or degradation of natural habitat. In terrestrial ecosystems, this primarily occurs through vegetation clearing and bulk earth works during construction.

In total, the proposed layout of Project will result in the direct loss of 48.43 ha of natural habitat and 147.28 ha of modified habitat - refer to **Table 9-37**:

- The proposed PV Site A footprint mostly impacts modified habitat, specifically the Cultivated Fields and Transformed Areas with Disturbed or Landscaped Vegetation habitat units, with some Mixed Moist Grassland impacted;
- The proposed PV Site B footprint comprises a mixture of modified and natural habitats, with both Mixed *Themeda triandra* Grassland and Mixed Moist Grassland directly impacted. A portion of the Mixed *Themeda triandra* Grassland is mapped as CBA Optimal;
- The BESS sites are all located on land designated under the Transformed Areas with Disturbed or Landscaped Vegetation habitat unit.

The loss of modified habitats is not considered an impact of concern. However, the loss natural habitat is an impact of concern, and has been assessed separately for the Mixed *Themeda triandra* Grassland and Mixed Moist Grassland habitat units.

Table 9-37 – Extent of habitat loss associated with proposed Project activities

Habitat Type	Habitat Units	Approx. Extent (Ha) of Loss
Modified Habitats	Cultivated Fields	92.75
	Alien Tree Stands	1.73
	Transformed Areas with Disturbed or Landscaped Vegetation	52.80
	Sub Total	147.28
Natural Habitats	Mixed Themeda triandra Grassland	21.48
	Mixed Moist Grassland	26.95
	Sub Total	48.43

Although localised disturbances are present in the Mixed *Themeda triandra* Grassland, in general, this habitat unit is considered a primary vegetation community, and is rated as having a high ecological importance. This is consistent with the MBSP delineation of this portion of the LSA as CBA Optimal. Prior to mitigation, the loss of Mixed *Themeda triandra* Grassland habitat is considered an impact of very high magnitude, permanently affecting vegetation within and potentially adjacent to the development footprints (local). It is also considered to have a definite probability, resulting in a before impact rating of "very high" significance. With the application of standard mitigation, the impact magnitude can be reduced to high. Impact extent will be reduced to the site only, and duration will be long-term (i.e., project life), while probability will be reduced to probable. This results in an after-mitigation impact of "moderate" significance for the loss of Mixed *Themeda triandra* Grassland.

With respect to the Mixed Moist Grassland, this habitat unit is rated as having a medium ecological importance on account of various disturbances. Prior to mitigation this impact has a magnitude of high and will have a local extent. Duration will be permanent and it is definite that the impact will occur. This results in an impact significance of "high". With the implementation of standard mitigation measures, this impact can be reduced to a medium magnitude, with a long-term duration. Spatial extent will be reduced to the site only and probability will decrease from definite to medium. After mitigation, the loss of Mixed Moist Grassland is rated to be of "low" significance.

Notwithstanding the reduction in impact significance resulting from the application of mitigation there will still be a loss of natural habitat, including land designated as CBA Optimal, associated with the proposed Project. In light of this, in order to achieve the IFC PS6 requirement of 'no net loss' of natural habitat, a biodiversity offset will be required.

The impact to flora habitat and species is indicated in **Table 9-38** and **Table 9-39** .

Table 9-38 – Impact to flora habitat and species during the construction phase

Potential Impact: Flora habitat and species Loss and disturbance of natural habitat - Mixed *Themeda triandra* Grassland	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	5	2	5	5	5	85	Very High	(-)
With Mitigation	4	1	3	4	4	48	Moderate	(-)
Mitigation and Management Measures	▪ As much of the proposed Project infrastructure as possible should be located on areas of modified habitat; ▪ All vegetation clearing for the Project should be restricted to the proposed Project footprints only, with no clearing permitted outside of these areas; ▪ The footprints to be cleared of vegetation should be clearly demarcated prior to construction to prevent unnecessary clearing outside of these areas. No heavy vehicles should travel beyond the marked works zone; ▪ Temporary facilities associated with construction, such as contractor site offices, portable toilets, storage and laydown areas, should be located on land that is currently transformed or developed; ▪ Removed topsoil should be stockpiled and used to rehabilitate all non-operational disturbed areas. ▪ A comprehensive rehabilitation/ landscaping protocol should be developed and implemented to stabilise and revegetate all non-operational sites that have been disturbed by construction. ▪ The loss of natural habitat, particularly CBA Optimal land, is an impact that cannot be fully mitigated through standard mitigation and rehabilitation measures. A biodiversity offset strategy should therefore be developed and implemented for the proposed Project.								

Table 9-39 – Impact to flora habitat and species during the construction phase

Potential Impact: Flora habitat and species Loss and disturbance of habitat - Moist Mixed Grassland	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	2	3	5	5	70	High	(-)
With Mitigation	3	1	2	4	3	30	Moderate	(-)
Mitigation and Management Measures	▪ As much of the proposed Project infrastructure as possible should be located on areas of modified habitat; ▪ All vegetation clearing for the Project should be restricted to the proposed Project footprints only, with no clearing permitted outside of these areas; ▪ The footprints to be cleared of vegetation should be clearly demarcated prior to construction to prevent unnecessary clearing outside of these areas. No heavy vehicles should travel beyond the marked works zone; ▪ Temporary facilities associated with construction, such as contractor site offices, portable toilets, storage and laydown areas, should be located on land that is currently transformed or developed; ▪ Removed topsoil should be stockpiled and used to rehabilitate all non-operational disturbed areas. ▪ A comprehensive rehabilitation/ landscaping protocol should be developed and implemented to stabilise and revegetate all non-operational sites that have been disturbed by construction. ▪ The loss of natural habitat, particularly CBA Optimal land, is an impact that cannot be fully mitigated through standard mitigation and rehabilitation measures. A biodiversity offset strategy should therefore be developed and implemented for the proposed Project.								

9.5.1.2 Establishment and Spread of Alien Invasive Species

Habitat disturbances caused by vegetation clearing and earth works during construction can facilitate the establishment and spread of AIS. Alien plant infestations can spread exponentially, suppressing or replacing indigenous vegetation. This may compromise ecosystem functioning resulting in a loss of biodiversity.

Nineteen NEMBA listed AIS were recorded in the study area. Proposed Project activities will cause the physical disturbance of vegetation and soils, which will facilitate the spread of AIS.

Before mitigation, impact magnitude is high, while duration is long term and it has a high probability. The spatial extent of AIS spread is local. Prior to mitigation, the establishment and spread of AIS is rated an impact of “moderate” significance.

This impact is relatively easy to mitigate. With the implementation of active control during the construction phase, this impact can be reduced to a low magnitude, with a short-term duration.

Spatial extent will be reduced to the site only and the probability of the impact occurring as predicted would be reduced to low. After mitigation, this impact is rated to be of "very low" significance.

The impact of the establishment and spread of alien invasive species is indicated in **Table 9-40**.

Table 9-40 – Impact of the establishment and spread of alien invasive species during the construction phase

Potential Impact: Establishment and spread of alien invasive species	**Magnitude**	**Extent**	**Reversibility**	**Duration**	**Probability**	**Significance**		**Character**
Without Mitigation	4	2	1	4	4	**44**	**Moderate**	(-)
With Mitigation	2	1	1	2	2	**12**	**Very Low**	(-)
Mitigation and Management Measures	▪ An AIS control and eradication plan must be developed for the Project that focuses on controlling and eradicating all AIS occurring throughout the LSA. The plan must include: • Identification of AIS management units • Prioritisation of sites and species requiring control; • Targets and indicators of success; • Scheduling of AIS control; • Species-specific control methods, using a combined approach of both chemical and mechanical control methods; and • Provision for follow-up treatments, as informed by regular AIS monitoring.							

9.5.1.3 Loss of Flora Species of Conservation Concern

Based on reviewed literature and datasets, several flora SCC are known from the region and potentially occur in patches of natural habitat in the study area. No Red List flora species were recorded in the study area during the field survey. However, the provincially protected *Eulophia ovalis var. ovalis* and *Orthochilus leontoglossus* were recorded within, or in close proximity to, the proposed PV Site B footprint and these and potentially other flora SCC may be impacted during vegetation clearing.

Before mitigation, impact magnitude is very high, while duration is permanent. It has a high probability of occurrence. The spatial extent of the impact is at the local scale. Prior to mitigation, this impact is rated of "high" significance.

With mitigation, which includes restricting vegetation clearing to the immediate development footprints and rescuing and relocating SCC occurring within the development footprints, this impact can be reduced to a medium magnitude, and will remain of permanent duration. Spatial extent will be maintained at the site only, but probability will be reduced to low. After mitigation this impact is rated to be of "low" significance.

The impact of the loss of flora SCC is indicated in **Table 9-41**.

Table 9-41 – Impact of the loss of flora SCC during the construction phase

Potential Impact: Loss of flora species of conservation concern	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	5	2	5	5	4	68	High	(-)
With Mitigation	3	1	3	5	2	24	Low	(-)
Mitigation and Management Measures	▪ Surveys of each development footprint should be conducted to identify and record the number of flora SCC that require rescue and relocation; ▪ Based on the findings of the SCC survey, application(s) for rescue and relocation permits should be submitted to the relevant authority. ▪ No vegetation clearing or rescue and relocation operations should be allowed until the correct permits have been obtained; and ▪ Rescued plants should be relocated to an adjacent area of similar natural habitat, and correctly cared for after relocation until such a time as out-planting has been deemed successful.							

9.5.2 OPERATIONAL PHASE

9.5.2.1 Establishment and Spread of Alien Invasive Species

The potential establishment and spread of AIS in the study area will continue to be an impact of concern during the operational phase.

Before mitigation, impact magnitude is high, while duration is long term and the impact has a high probability of occurring as predicted. The spatial extent of alien invasive species spread is local. Prior to mitigation, the establishment and spread of alien invasive species is rated an impact of “moderate” significance.

With the continued implementation of an active alien species control programme during the operational phase this impact can be reduced to a low magnitude, with a short-term duration. Spatial extent will be reduced to the site only and probability at low. After mitigation, this impact is rated to be of “very low” significance.

The impact of the establishment and spread of alien invasive species is indicated in **Table 9-42**.

Table 9-42 – Impact of the establishment and spread of alien invasive species during the operational phase

Potential Impact: Establishment and spread of alien invasive species	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	2	1	4	4	**44**	**Moderate**	(-)
With Mitigation	2	1	1	2	2	**12**	**Very Low**	(-)
Mitigation and Management Measures	▪ Active alien invasive species control should continue throughout the operational phase, as per the approved AIS control and eradication programme.							

9.5.3 DECOMMISSIONING PHASE

9.5.3.1 Establishment and Spread of Alien Invasive Species

As Project infrastructure is dismantled and removed from site during the decommissioning phase, the associated disturbances are likely to facilitate alien invasive species colonisation in, and immediately adjacent to, the study area.

Before mitigation, impact magnitude is high, while duration is long term and the impact has a high probability of occurring as predicted. The spatial extent of alien invasive species spread is local. Prior to mitigation, the establishment and spread of alien invasive species is rated an impact of "moderate" significance.

With the continued implementation of an active alien species control programme during decommissioning, this impact can be reduced to a low magnitude, with a short-term duration. Spatial extent will be reduced to the site only and the probability of the impact occurring would be low. After mitigation, this impact is rated to be of "very low" significance.

The impact of the establishment and spread of alien invasive species is indicated in **Table 9-43**.

Table 9-43 – Impact of the establishment and spread of alien invasive species during the decommissioning phase

Potential Impact: Establishment and spread of alien invasive species	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	2	1	4	4	44	Moderate	(-)
With Mitigation	2	1	1	2	2	12	Very Low	(-)
Mitigation and Management Measures	▪ Active alien invasive species control should continue during the decommissioning phase and follow up control should be carried out for a five- year period following decommissioning.							

9.6 AQUATIC BIODIVERSITY IMPACT ASSESSMENT

9.6.1 CONSTRUCTION PHASE

Construction phase impacts on aquatic (wetland and riparian systems) largely arise as a result of direct impacts on the receiving environment due to clearing of land within wetlands or their immediate catchments in advance of project development, and resultant loss of wetland habitat. The earthworks and activities involved during the construction phase of the Project can exert negative impacts on sensitive ecosystems including loss of wetland habitat, catchment landcover changes resulting in increased sediment entry to downstream systems, construction of wetland/riparian system crossings causing impoundments/barriers to movement for aquatic species, contamination of water bodies by construction materials / vehicles (hydrocarbons etc), increased potential of erosion due to surface runoff and soil disturbances and the establishment and spread of alien and invasive species (AIS).

Impacts envisaged during the construction phase are outlined in the sections below.

9.6.1.1 Loss Of Wetland Habitat

Site establishment and construction of the proposed project infrastructure, particularly PV Site A which overlaps with Seep 1, will lead to the permanent loss of wetland habitat within the project footprint. The significance of the direct loss of wetland habitat and disturbance of adjacent wetland habitats is **High** due to outright loss of wetland habitat at this site, as although site based in extent, the duration of the impact is permanent, and outright loss cannot be mitigated.

Assuming that the predicted wetland loss cannot be avoided through changes in site layout, the loss will remain as an impact of **High** significance post-mitigation. Additional measures will be required to address significant residual impacts i.e. compensate or offset the permanent loss of wetland habitat.

The impact of loss of wetland habitat it indicated in **Table 9-44**.

Table 9-44 – Impact of loss of wetland habitat during the construction phase

Potential Impact: Loss of wetland habitat	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	1	5	5	5	75	High	(-)
With Mitigation	N/A							
Mitigation and Management Measures	N/A							

9.6.1.2 Changes In Wetland Health/Functioning

Bulk earthworks involved in site development in the immediate catchment of wetlands can cause indirect impacts on wetland habitat through compaction/removal of recharge or interflow soils, as well as increased sediment deposition to downslope wetland ecosystems in stormwater runoff. If not carefully managed, this impact can result in a medium impact magnitude, having a local impact scale and lasting for the duration of the construction phase, resulting in a **Moderate** impact significance prior to mitigation.

With the implementation of recommended mitigation measures to address reduced wetland functioning, such as diffuse distribution of clean stormwater runoff around the PV and BESS foundations and road crossing to affected downslope wetland systems, the impact significance can be reduced to a L**ow** impact significance.

The impact of the changes in wetland health/functioning is indicated in **Table 9-45**.

Table 9-45 – Impact of the changes in wetland health/functioning during the construction phase

Potential Impact: Changes in wetland health/functioning	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	3	2	3	3	4	44	Moderate	(-)
With Mitigation	2	1	3	2	3	24	Low	(-)
Mitigation and Management Measures	▪ Areas of undisturbed, natural grassland and wetland habitat should be avoided to the extent possible. ▪ Areas of direct loss that cannot be avoided must be addressed via additional conservation actions/offsets as required. ▪ A loss/disturbance buffer zone of at least 100 m should be maintained between the maximum extent of							

	construction works and the outer boundary of wetlands and riparian zones. - To prevent loss of natural habitat in wetlands beyond the direct disturbance footprint, prior to any vegetation clearing, the development footprints should be clearly marked out with flagging tape/posts in the field. - Vegetation clearing should be restricted to the proposed project footprints only, with no clearing permitted outside of these areas. - The extent of disturbance should be limited by restricting all construction activities to the servitude as far as practically possible. - Locate all stockpiles, laydown areas and temporary construction infrastructure at least 50 m from the edge of delineated wetlands. - Wetland/river crossings should be constructed utilizing designs that ensure that hydrological integrity of the affected wetlands is preserved, and natural flow regimes are maintained (i.e. no impoundment upstream of crossings, or flow concentration downstream of crossings. - Ideally construction activities within wetlands should take place in winter (during the dry season). - Where summer construction is unavoidable, temporary diversions of the streams might be required. - Install erosion prevention measures prior to the onset of construction activities. Measures should include low berms on approach and departure slopes to crossings to prevent flow concentration, sediment barriers along the lower edge of bare soil areas, placement of hay bales around the within wetland construction areas, and re-vegetation of disturbed areas as soon as possible.

9.6.1.3 Contamination of Riparian Systems

Stripping of topsoil and civil works activities, resulting in a decrease in water quality due to erosion, sedimentation and the alteration in the distribution and quantity of surface water runoff, will have a medium impact magnitude with a local extent impact and a short-term impact duration. The impact significance prior to mitigation is **Moderate**, with the implementation of recommended mitigation measures, this impact can be reduced to a **Very Low** impact significance.

The impact of the contamination of riparian systems is indicated in **Table 9-46.**

Table 9-46 – Impact of the contamination of riparian systems during the construction phase

Potential Impact: Contamination of riparian systems	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	3	2	3	2	4	**40**	**Moderate**	(-)

With Mitigation	2	1	1	1	2	**10**	**Very Low**	(-)
Mitigation and Management Measures	▪ Diffuse distribution of clean stormwater runoff around the PV and BESS foundations and road crossing to affected downslope wetland systems ▪ To prevent loss of natural habitat in wetlands beyond the direct disturbance footprint, prior to any vegetation clearing, the development footprints should be clearly marked out with flagging tape/posts in the field. ▪ Vegetation clearing should be restricted to the proposed project footprints only, with no clearing permitted outside of these areas. ▪ The extent of disturbance should be limited by restricting all construction activities to the servitude as far as practically possible. ▪ Locate all stockpiles, laydown areas and temporary construction infrastructure at least 50 m from the edge of delineated wetlands. ▪ Wetland/river crossings should be constructed utilizing designs that ensure that hydrological integrity of the affected wetlands is preserved, and natural flow regimes are maintained (i.e. no impoundment upstream of crossings, or flow concentration downstream of crossings. ▪ Ideally construction activities within wetlands should take place in winter (during the dry season). ▪ Where summer construction is unavoidable, temporary diversions of the streams might be required. ▪ Install erosion prevention measures prior to the onset of construction activities. Measures should include low berms on approach and departure slopes to crossings to prevent flow concentration, sediment barriers along the lower edge of bare soil areas, placement of hay bales around the within wetland construction areas, and re-vegetation of disturbed areas as soon as possible.							

9.6.1.4 Soil Erosion

The removal of wetland vegetation for the construction of the proposed development could result in an increase of bare soil/surfaces in the study area which will lead to increased runoff, ultimately resulting in soil erosion. The impact on soil erosion is considered to have a medium magnitude, with local impact extent and a long-term impact duration, resulting in a **Moderate** impact significance pre mitigation. With mitigation, the impact can be reduced to a **Low** impact significance.

The impact of wetland soil erosion is indicated in **Table 9-47**.

Table 9-47 – Impact of wetland soil erosion during the construction phase

Potential Impact: Wetland soil erosion	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	3	1	3	4	4	44	Moderate	(-)
With Mitigation	2	1	3	2	3	24	Low	(-)
Mitigation and Management Measures	▪ To prevent loss of natural habitat in wetlands beyond the direct disturbance footprint, prior to any vegetation clearing, the development footprints should be clearly marked out with flagging tape/posts in the field. ▪ Vegetation clearing should be restricted to the proposed project footprints only, with no clearing permitted outside of these areas. ▪ The extent of disturbance should be limited by restricting all construction activities to the servitude as far as practically possible. ▪ Locate all stockpiles, laydown areas and temporary construction infrastructure at least 50 m from the edge of delineated wetlands. ▪ Wetland/river crossings should be constructed utilizing designs that ensure that hydrological integrity of the affected wetlands is preserved, and natural flow regimes are maintained (i.e. no impoundment upstream of crossings, or flow concentration downstream of crossings. ▪ Ideally construction activities within wetlands should take place in winter (during the dry season). ▪ Where summer construction is unavoidable, temporary diversions of the streams might be required. ▪ Install erosion prevention measures prior to the onset of construction activities. Measures should include low berms on approach and departure slopes to crossings to prevent flow concentration, sediment barriers along the lower edge of bare soil areas, placement of hay bales around the within wetland construction areas, and re-vegetation of disturbed areas as soon as possible.								

9.6.1.5 Establishment And Spread Of Alien Invasive Species (AIS)

Disturbances caused by vegetation clearing and earth works during construction will exacerbate the establishment and spread of alien invasive vegetation. Alien plant infestations can spread exponentially, suppressing, or replacing indigenous vegetation. This may result in a breakdown of ecosystem functioning and a loss of wetland biodiversity. Consequently, this impact is considered to have a medium impact severity, with a local impact extent and a long-term impact duration, resulting in a **Moderate** impact significance prior to mitigation. With the development of an auditable AIS Management Plan for the project, and the strict implementation of the recommended active control and monitoring measures throughout the construction phase, the impact significance can be reduced to a **Very Low**.

The impact of the spread of AIS is indicated in **Table 9-48**.

Table 9-48 – Impact of the spread of AIS during the construction phase

Potential Impact: Spread of AIS	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	3	2	3	4	4	**48**	**Moderate**	(-)
With Mitigation	2	1	1	2	2	**12**	**Very Low**	(-)
Mitigation and Management Measures	■ An alien and invasive species management plan should be developed for the Project, which includes details of strategies and procedures that must be implemented on site to control the spread of alien and invasive species. A combined approach using both chemical and mechanical control methods, with periodic follow-up treatments informed by regular monitoring, is recommended.							

9.6.2 OPERATIONAL PHASE

Operational phase impacts relate to the possible exacerbation of the construction-phase impacts, including soil erosion, surface water and soil contamination and ongoing risk of spread of the alien and invasive plant species that may have colonised new areas during the construction phase.

9.6.2.1 Spread of AIS

The potential establishment of alien invasive species in, and immediately adjacent to, wetlands in the vicinity of the proposed development footprint will continue to be an impact of concern during the operational phase. Without mitigation, the impact significance is considered Moderate impact.

With the development of an auditable AIS Management Plan for the project, and the strict implementation of the recommended active control and monitoring measures throughout the operational phase, the impact significance can be reduced to a Very Low impact.

The impact of the spread of AIS is indicated in **Table 9-54**.

Table 9-49 – Impact of the spread of AIS during the operational phase

Potential Impact: Spread of AIS	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	3	2	3	4	4	48	Moderate	(-)
With Mitigation	2	1	1	1	2	10	Very Low	(-)
Mitigation and Management Measures	▪ An alien and invasive species management plan should be developed for the Project, which includes details of strategies and procedures that must be implemented on site to control the spread of alien and invasive species. A combined approach using both chemical and mechanical control methods, with periodic follow-up treatments informed by regular monitoring, is recommended.							

9.6.2.2 Soil Erosion

The increased presence of hardened surfaces in the study area can exacerbate soil erosion, through increased and concentrated surface run off. This impact is assessed as having a medium impact magnitude, with a long-term impact duration and a high probability of occurrence. Without mitigation this impact will have a Moderate impact significance on wetland soils and with mitigation it can be reduced to a Low impact significance.

The impact of wetland soil erosion is indicated in **Table 9-50**.

Table 9-50 – Impact of wetland soil erosion during the operational phase

Potential Impact: Wetland soil erosion	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	3	1	3	4	5	55	Moderate	(-)
With Mitigation	2	1	3	1	3	21	Low	(-)
Mitigation and Management Measures	▪ To prevent loss of natural habitat in wetlands beyond the direct disturbance footprint, prior to any vegetation clearing, the development footprints should be clearly marked out with flagging tape/posts in the field. ▪ Wetland/river crossings should be constructed utilizing designs that ensure that hydrological integrity of the affected wetlands is preserved, and natural flow regimes are maintained (i.e. no impoundment upstream of							

	crossings, or flow concentration downstream of crossings.

9.6.2.3 Water Quality Deterioration and Contamination of Wetland Soils

Quarterly washing and maintenance of the PV panels could potentially have a negative impact on water quality and wetland soils, due to inputs of detergents, and possible erosion paths forming in the soils of adjacent wetland areas, should large amounts of water be discharged to the environment. This impact will have a medium impact magnitude with a long-term impact duration resulting in a Moderate impact significance prior to mitigations. With mitigation, the impact can be reduced to a Very Low impact significance.

The impact of water quality deterioration and contamination of wetland soils is indicated in **Table 9-50**.

Table 9-51 – Impact of water quality deterioration and contamination of wetland soils during the operational phase

Potential Impact: Water quality deterioration and contamination of wetland soils	**Magnitude**	**Extent**	**Reversibility**	**Duration**	**Probability**	**Significance**		**Character**
Without Mitigation	3	1	3	4	4	**44**	**Moderate**	(-)
With Mitigation	2	1	1	1	2	**10**	**Very Low**	(-)
Mitigation and Management Measures	▪ Wetland/river crossings should be constructed utilizing designs that ensure that hydrological integrity of the affected wetlands is preserved, and natural flow regimes are maintained (i.e. no impoundment upstream of crossings, or flow concentration downstream of crossings. ▪ Monitoring of wetland health to be conducted within one year of completion of construction, to measure any changes to the baseline status and ensure that recommended mitigation measures are sufficient to address any significant impacts. ▪ Follow up monitoring of wetland health PES/EIS every three years throughout the operating period.							

9.7 TRAFFIC ASSESSMENT

9.7.1 CONSTRUCTION PHASE

The impact of construction vehicles on roads and access roads during the construction phase is included in **Table 9-52**.

Table 9-52 – Impact of construction vehicles on roads and access roads during the construction phase

Potential Impact: Transportation Impact of construction vehicles on roads and access roads	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	1	1	3	2	4	**28**	**Low**	(-)
With Mitigation	1	1	3	2	4	**28**	**Low**	(-)
Mitigation and Management Measures	N/A							

9.7.2 OPERATIONAL PHASE

The impact of transportation activities during the operational phase is included in Table 9-53.

Table 9-53 – Impact of transportation activities during the operational phase

Potential Impact: Transportation Transportation activities during operations	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	1	1	1	4	4	**28**	**Low**	(-)
With Mitigation	1	1	1	4	4	**28**	**Low**	(-)
Mitigation and Management Measures	N/A							

9.7.3 DECOMMISSIONING PHASE

The impact of construction vehicles on roads and access roads during the decommissioning phase is included in **Table 9-52**.

Table 9-54 – Impact of transportation activities during the decommissioning phase

Potential Impact: Transportation Impact of construction vehicles on roads and access roads	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	1	1	1	4	4	**28**	**Low**	(-)
With Mitigation	1	1	1	4	4	**28**	**Low**	(-)
Mitigation and Management Measures	N/A							

9.8 VISUAL IMPACT ASSESSMENT

9.8.1 CONSTRUCTION PHASE

During the construction period it is expected that any visual impact of concern on sensitive visual receptors within the study area will be temporary and limited to a short-term period (2-5 years). The direct construction visual impacts of the proposed Komati Solar PV and BESS Facility includes the visual impact of construction on sensitive visual receptors in close proximity (within 1km) to the proposed PV facility as indicated in **Table 9-55**.

During the construction period, there will be an increase in heavy vehicles utilising the roads to the construction sites that may cause, at the very least, a visual nuisance to other road users and landowners in the area in close proximity (within 1km). Additionally, dust as a result of the construction activities and construction equipment (i.e. cranes), temporary laydown areas, construction camps, etc. may also be visible at the site, resulting in a visual impact occurring during construction.

A mitigating factor in this scenario is that observers travelling along the various roads (i.e. R542, R35, and secondary road) will only experience a visual impact for a brief period of time and it is expected the visual exposure of the PV facility structures will be in conjunction with the existing visual clutter (power lines, power station and mining infrastructure) within the region. This reduces the probability of this impact occurring.

Table 9-55 – Impact of visual effect on sensitive visual receptors in close proximity (within 1km) to the proposed PV facility during the construction phase

Potential Impact: Visual effect of construction activities on sensitive receptors Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed PV facility.	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	10	4	1	2	4	64	High	(-)
With Mitigation	6	4	1	2	3	36	Moderate	(-)
Mitigation and Management Measures	**Planning:** ▪ Retain and maintain natural vegetation in all areas outside of the development footprint, but within the project site. **Construction:** ▪ Ensure that vegetation is not unnecessarily removed during the construction period. ▪ Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) where possible. ▪ Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. ▪ Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily)							

	and then disposed of regularly at licensed waste facilities. ▪ Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent). ▪ Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts. ▪ Rehabilitate all disturbed areas immediately after the completion of construction works.

9.8.2 OPERATIONAL PHASE

Visual related impacts identified during the operational phase include:

- Visual impact on observers (residents at homesteads and visitors/tourists) in close proximity (i.e. within 1km) to the PV facility (**Table 9-56**);
- Visual impact on residents at homesteads within a 1 – 3km radius of the facility (**Table 9-57**);
- Visual impact on observers travelling along the roads and residents at homesteads within a 3 – 6km radius of the facility (**Table 9-58**);
- Visual impact on observers travelling along the roads, residents at homesteads and protected areas beyond the 6km radius of the facility (**Table 9-59**);
- Visual impact of lighting at night on sensitive visual receptors (**Table 9-60**);
- The visual impact of solar glint and glare as a visual distraction and possible road travel hazard (**Table 9-61**);
- The visual impact of solar glint and glare on residents of homesteads in closer proximity (within 1km) to the PV facility (**Table 9-62**);
- Visual impact of the ancillary infrastructure on observers in close proximity to the structures (**Table 9-63**); and
- Impact of sense of place during the operational phase (Indirect Impact) (**Table 9-64**).

A mitigating factor in this scenario is that observers travelling along the various roads (i.e. R542, R35, and various secondary roads) will only experience a visual impact for a brief period of time and it is expected the visual exposure of the PV facility structures will be in conjunction with the existing visual clutter (power lines, power station and mining infrastructure) within the region. This reduces the probability of this impact occurring.

Mitigation of this impact is possible and both specific measures as well as general “best practice” measures are recommended in order to reduce/mitigate the potential visual impact.

Table 9-56 – Impact of visual impact on observers (residents and visitors) in close proximity (within 1km) to the proposed PV facility during the operational phase

Potential Impact: Visual impact on observers (residents and visitors) Visual impact on observers (residents and visitors) in close proximity (within 1km) to the proposed PV facility.	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	10	4	1	4	4	72	High	(-)
With Mitigation	6	4	1	4	3	42	Moderate	(-)

Mitigation and Management Measures	**Planning:** ▪ Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site. ▪ Consult adjacent landowners (if present) in order to inform them of the development and to identify any (valid) visual impact concerns. **Operations:** ▪ Maintain the general appearance of the facility as a whole. ▪ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible. ▪ Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover.

Table 9-57 – Impact of visual effect of the proposed PV facility within 1- 3km radius during the operational phase

Potential Impact: Visual Impact Visual impact on residents at homesteads within a 1 – 3km radius of the facility.	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	8	3	1	4	3	**45**	**Moderate**	(-)
With Mitigation	6	3	1	4	2	**26**	**Low**	(-)
Mitigation and Management Measures	**Planning:** ▪ Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site. **Operations:** ▪ Maintain the general appearance of the facility as a whole. ▪ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible. ▪ Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover. **Residual Impact** ▪ The visual impact will be removed after decommissioning, provided the facility infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain							

Table 9-58 – Impact of visual effect of the proposed PV facility within 3- 6km radius during the operational phase

Potential Impact: Visual Impact Visual impact on residents at homesteads within a 3 – 6 km radius of the facility.	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	6	2	1	4	2	**24**	**Low**	(-)
With Mitigation	4	2	1	4	2	**20**	**Low**	(-)
Mitigation and Management Measures	**Planning:** ▪ Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site. **Operations:** ▪ Maintain the general appearance of the facility as a whole. ▪ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible. ▪ Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover. **Residual Impact** ▪ The visual impact will be removed after decommissioning, provided the facility infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.							

Table 9-59 – Impact of visual effect of the proposed PV facility within the greater area (beyond 6km radius) during the operational phase

Potential Impact: Visual Impact Visual impact on residents at homesteads within the greater area (beyond 6km radius).	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	1	1	4	2	**18**	**Low**	(-)
With Mitigation	4	1	1	4	1	**9**	**Very Low**	(-)
Mitigation and Management Measures	**Planning:** ▪ Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site. **Operations:** ▪ Maintain the general appearance of the facility as a whole.							

	▪ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible. ▪ Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover **Residual Impact** ▪ The visual impact will be removed after decommissioning, provided the PV infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain

Table 9-60 – Impact of operational, safety and security lighting of the facility at night during the operational phase

Potential Impact: Safety and security lighting of the facility Visual impact of lighting at night on sensitive visual receptors.	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	6	3	1	4	3	**39**	**Moderate**	(-)
With Mitigation	4	3	1	4	2	**22**	**Low**	(-)
Mitigation and Management Measures	**Planning & operation:** ▪ Shield the sources of light by physical barriers (walls, vegetation, or the structure itself). ▪ Limit mounting heights of lighting fixtures, or alternatively use foot-lights or bollard level lights. ▪ Make use of minimum lumen or wattage in fixtures. ▪ Make use of down-lighters, or shielded fixtures. ▪ Make use of Low-Pressure Sodium lighting or other types of low impact lighting. ▪ Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes. **Residual Impact** ▪ The visual impact will be removed after decommissioning, provided the PV infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain							

Table 9-61 – Impact of solar glint and glare as a visual distraction and possible air/road travel hazard during the operational phase

Potential Impact: Solar glint and glare The visual impact of solar glint and glare as a visual distraction and possible road travel hazard.	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	10	4	11	4	3	54	Moderate	(-)
With Mitigation	6	4		4	3	42	Moderate	(-)
Mitigation and Management Measures	**Planning & operation:** ▪ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint. ▪ Use anti-reflective panels and dull polishing on structures, where possible and industry standard. ▪ Adjust tilt angles of the panels if glint and glare issues become evident, where possible. ▪ If specific sensitive visual receptors are identified during operation, investigate screening at the receptor site, where possible. ▪ Recommended that a Glint and Glare Assessment be undertaken if the airstrip noted on PV Site B will be retained and used during the operational phase of the development. **Residual Impact** ▪ The visual impact will be removed after decommissioning, provided the PV infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain							

Table 9-62 – Impact of solar glint and glare on static ground-based receptors (residents of homesteads) in close proximity (within 1km) to the PV facility during the operational phase

Potential Impact: Solar glint and glare The visual impact of solar glint and glare on residents of homesteads in closer proximity (within 1km) to the PV facility	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	8	4	1	4	4	64	High	(-)
With Mitigation	6	4	1	4	3	42	Moderate	(-)
Mitigation and Management Measures	**Planning & operation:** ▪ Use anti-reflective panels and dull polishing on structures, where possible and industry standard.							

	▪ If specific sensitive visual receptors are identified during operation, investigate screening at the receptor site, where possible **Residual Impact** ▪ The visual impact will be removed after decommissioning, provided the PV infrastructure is removed. Failing this, the visual impact will remain

Table 9-63 – Impact of ancillary infrastructure during the operational phase

Potential Impact: Ancillary Infrastructure Visual impact of the ancillary infrastructure on observers in close proximity to the structures	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	4	1	4	2	**24**	**Low**	(-)
With Mitigation	4	4	1	4	2	**24**	**Low**	(-)
Mitigation and Management Measures	**Planning:** ▪ Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site. **Operations:** ▪ Maintain the general appearance of the facility as a whole. ▪ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible. ▪ Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover **Residual Impact** ▪ The visual impact will be removed after decommissioning, provided the PV infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain							

Table 9-64 – Impact of sense of place during the operational phase (Indirect Impact)

Potential Impact: Sense of Place The potential impact on the sense of place of the region	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	8	1	1	4	2	**26**	**Low**	(-)
With Mitigation	8	1	1	4	2	**26**	**Low**	(-)

Mitigation and Management Measures	**Planning:** ▪ Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site**.** **Operations:** ▪ Maintain the general appearance of the facility as a whole **Residual Impact** ▪ The visual impact will be removed after decommissioning, provided the PV infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain

9.8.3 DECOMISSIONING PHASE

During decommissioning there may be a noticeable increase in heavy vehicles utilising the roads to the site that may cause, at the very least, a visual nuisance to other road users and landowners in closer proximity (< 1km) to the decommissioning activities.

A mitigating factor in this scenario is that observers travelling along the various roads (i.e. R542, R35, and secondary road) will only experience a visual impact for a brief period of time and it is expected the visual exposure of the PV facility structures will be in conjunction with the existing visual clutter (power lines, power station and mining infrastructure) within the region. This reduces the probability of this impact occurring.

Visual related impacts identified during the operational phase include:

- Visual impact of decommissioning activities on sensitive visual receptors in close proximity (within 1km) to the proposed facility (**Table 9-65**).

Table 9-65 – Impact of visual intrusion of activities to remove infrastructure during the decommissioning phase

Potential Impact: Sensitive visual receptors Visual impact of construction activities on sensitive visual receptors in close proximity (within 1km) to the proposed facility..	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	8	4	1	1	4	**52**	**Moderate**	(-)
With Mitigation	6	4	1	1	3	**33**	**Moderate**	(-)
Mitigation and Management Measures	**Decommissioning:** ▪ Remove infrastructure not required for the post-decommissioning use of the site. ▪ Rehabilitate all areas as per the rehabilitation plan undertaken. Consult an ecologist regarding rehabilitation specifications. ▪ Monitor rehabilitated areas post-decommissioning and implement remedial actions as required **Residual impacts**:							

	▪ None, provided rehabilitation works are carried out as specified

9.9 ARCHAEOLOGICAL AND CULTURAL HERITAGE IMPACT ASSESSMENT

9.9.1 CONSTRUCTION PHASE

During the May 2023 field assessment, no sites, features or material of cultural heritage (archaeological and/or historical) origin or significance were identified in the study and proposed SEF development area.

The impact of the proposed development on the recorded and known cultural heritage sites in the area is therefore deemed as very low as indicated in **Table 9-66**. However, there is always a possibility of sites, features and material being missed as a result of various factors such as vegetation cover hampering visibility on the ground, as well as the often-subterranean nature of cultural heritage resources (including low stone-packed or unmarked graves). These factors need to be taken into consideration and it is therefore recommended that a Chance Finds Protocol be drafted and implemented for the proposed Eskom Komati SEF Development.

Once any cultural heritage sites are identified, there will be no significant further impacts on the local heritage. Therefore the impact assessment is only applicable to the construction phase. The operation and de-commissioning phases of the development will NOT impact the archaeological and cultural heritage of the site.

Table 9-66 – Impact to cultural heritage sites during the construction phase

Potential Impact: Impact to cultural heritage sites	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	2	1	5	5	1	**13**	**Very low**	(-)
With Mitigation	2	1	5	5	1	**13**	**Very low**	(-)
Mitigation and Management Measures	▪ Implement the Chance Finds Protocol							

9.10 PALAEONTOLOGY IMPACT ASSESSMENT

9.10.1 CONSTRUCTION PHASE

The development footprint is situated on the Vryheid Formation (Pv) of the Ecca Group, Karoo Supergroup with a Very High palaeontological sensitivity. The nature of the impact is the destruction of Fossil Heritage. Loss of fossil heritage will have a negative impact. The potential impact on fossil heritage resources that may be found within the project footprint is indicated in **Table 9-67**.

Details of the location and distribution of all significant fossil sites or key fossiliferous rock units are often difficult to be determined due to thick topsoil, subsoil, overburden and alluvium. Depth of the overburden may vary a lot.

The threats are:-

- Earth moving equipment/machinery (front end loaders, excavators, graders, dozers) during construction,
- The sealing-in or destruction of fossils by development, vehicle traffic, and human disturbance.

If any substantial new fossil sites are revealed during the Construction Phase of the developments they should be handled using the Chance Fossil Finds Protocol included in the EMPr. If no new fossils are found then no mitigation is required.

Table 9-67 – Impact of destruction of fossil heritage during the construction phase

Potential Impact: Destruction of fossil heritage	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	5	2	5	5	5	85	Very High	(-)
With Mitigation	1	2	3	5	3	33	Moderate	(-)
Mitigation and Management Measures	■ Implement the Chance Fossil Finds Protocol							

Once any new fossil finds have been collected there will be no significant further impacts on local palaeontological heritage. Therefore the impact assessment is only applicable to the construction phase. The operation and de-commissioning phases of the development will NOT impact the palaeontology.

9.11 SOCIAL IMPACT ASSESSMENT

9.11.1 CONSTRUCTION PHASE

The following social impacts have been identified for the construction phase:

- Economic;
- Employment;
- Noise;
- Dust; and
- Visual.

The impacts are discussed below.

Economic Impact

During the project’s construction phase, the Principal Engineer appointed by Eskom will require various goods and services. These requirements are likely to generate economic opportunities for local businesses. The construction workforce (sourced from outside the surrounding communities) is anticipated to use local accommodations (guest houses or rental options), adding to the local economy. Provided that a significant proportion of money derived from wages earned would likely be spent in the vicinity of the project area, it is expected to create substantial revenue flows within the surrounding communities. Acting as a catalyst for growth in the formal and secondary economy.

Additionally, workers sourced from the surrounding communities are foreseen to spend an even more significant proportion of their wages within the local communities, further adding to the flows of revenue, including the provision of transport by local service providers.

Positive economic impacts also result in the improvement of informal economies. Hawkers are expected to increase in and around the construction site, and an increase in sex work is to be expected. The significance of the economic impact during the construction phase is indicated in **Table 9-68**.

Table 9-68 – Economic impact during the construction phase

Potential Impact: Economic Impact	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	1	2	1	3	2	14	Very Low	(+)
With Mitigation	4	4	3	4	3	45	**Moderate**	(+)
Mitigation and Management Measures	▪ Communities near the Project should be given special consideration regarding the benefits arising from the Project, as they will be most affected. ▪ Principal Engineer should first preference appropriate subcontractors in the surrounding communities, followed by those in the municipal area and those outside the province. ▪ Resources required during construction should be sourced, preferably from local businesses. Accommodation needed for contractors should favour local guesthouses and hotels. ▪ Eskom should support development initiatives for communities in the Project area. ▪							

Employment

During construction, the contractor will require mostly highly-skilled workers and some low-skilled employees. Procurement o labour should largely favour the local community. The introduction of this Project can increase the employment rate and further allow skills development for the local community. The significance of the impact to employment during the construction phase is indicated in **Table 9-69**.

Table 9-69 – Impact of employment during the construction phase

Potential Impact: Employment	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	2	3	2	3	2	20	Low	(+)
With Mitigation	4	3	3	4	4	56	Moderate	(+)
Mitigation and Management Measures	▪ Recruitment policies must ensure preference for residents. Additionally, a monitoring system should be implemented to assess local employment levels. A local skills database should be developed and updated regularly to maximise the uptake of local labour.							

Noise

During construction, noise affects people differently; the new noise will come from the facilities. The site is located around residential areas. Road traffic, transportation of materials and equipment, and construction activity are expected to generate noise filtering into the nearby households. The significance of the impact of noise during the construction phase is indicated in **Table 9-70**.

Table 9-70 – Impact of noise during the construction phase

Potential Impact: Noise	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	2	2	2	2	2	16	Low	(-)
With Mitigation	1	2	2	1	2	12	Very Low	(-)
Mitigation and Management Measures	▪ Consulting with the community when planning construction activities to have the least intrusive impact, i.e. scheduling high-noise activities when they result in the least disturbance. Such as during the day. Information regarding construction activities should be provided to identified and nearby receptors likely to be affected. Such information includes: • Proposed working times. • Anticipated duration of activities. • Explanations of activities to take place and reasons for activities. • Contact details of a responsible person on site should complaints arise.							

Dust

The construction of facilities will result in traffic as resources are being transported due to increased heavy vehicle presence. Increased road traffic and cleared vegetation for site establishment and construction activities will increase the dust levels in the area. The significance of the impact of dust during the construction phase is indicated in **Table 9-71**.

Table 9-71 – Impact of dust during the construction phase

Potential Impact: Dust	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	2	3	3	1	4	36	Moderate	(-)
With Mitigation	2	3	2	3	2	20	Low	(-)
Mitigation and Management Measures	▪ Implement environmentally friendly dust suppression measures on unpaved road surfaces. ▪ A community awareness campaign to be implemented in the surrounding communities to sensitise community members to traffic safety risks and health and communicable disease awareness. ▪ Roads must be adequately maintained to prevent deterioration of road surfaces due to heavy vehicle traffic.							

Visual

During construction, there may be a noticeable increase in heavy vehicles utilising the roads to the development site that may cause, at the very least, a visual nuisance to other road users and landowners in the area. Additionally, laydown areas, construction equipment and construction camps will have a visual impact. The significance of the impact of visual during the construction phase is indicated in **Table 9-72**.

Table 9-72 – Impact of visual during the construction phase

Potential Impact: Visual	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	4	4	4	4	64	High	(-)
With Mitigation	3	3	3	3	4	48	Moderate	(-)
Mitigation and Management Measures	▪ Tree lines may be considered to shield the view of the facility.							

	▪ Ensure that vegetation cover adjacent to the development footprint (if present) is not unnecessarily removed during construction, where possible. ▪ Plan the placement of laydown areas and temporary construction equipment camps to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible. ▪ Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. ▪ Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and disposed of regularly at licensed waste facilities. ▪ Reduce and control construction dust using approved dust suppression techniques when required (i.e. whenever dust becomes apparent).

Population Influx

The project announcement could result in an influx of people seeking employment opportunities. However, as the project is to take up some of the existing Eskom workforce, the influx is expected to be low but should still be managed. The general labour is expected to be sourced from the surrounding communities, and installing the solar panels is expected to be undertaken mainly through skilled individuals.

The influx of labour could result in the development of informal dwellings and possibly informal settlements in the area. It is unlikely that all these people will be employed during construction, thus resulting in increased unemployment. The increased number of unemployed people may lead to increased social ills such as crime, alcohol abuse, gender-based violence, etc., increasing pressure on local resources, infrastructure and social services.

Construction activities can also take much longer than initially planned at the beginning of a project. This can result in extended stays away from home for the labourers, generally men, which may lead to increased prostitution. The significance of the impact of the population influx during the construction phase is indicated in **Table 9-73**.

Table 9-73 – Impact of population influx during the construction phase

Potential Impact: Population influx	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	3	3	2	3	3	33	Moderate	(-)
With Mitigation	2	2	1	2	2	14	Very Low	(-)
Mitigation and Management Measures	▪ A community awareness campaign to be implemented in the surrounding communities to sensitise community							

	members to traffic safety risks and communicable disease awareness. - As part of onboarding workers, training should be provided on preventing GBV SEA and SH. - Eskom will need to engage with communities using a dedicated community liaison officer and have an effective stakeholder engagement plan, including a grievance redress mechanism for communities to access and lodge complaints. - Local employment should be a priority for the construction contractor. Training programmes must be implemented to enable local participants in employment opportunities. - No recruitment should occur at the Project gate to prevent informal settlements around the Project site. - Increase security in the Project area should be provided to regulate access to the site and prevent informal settlements. - A detailed influx management plan should be developed.

9.11.2 OPERATIONAL PHASE

The following social impacts have been identified for the operational phase:

- Low Carbon Power Generation;
- Employment Opportunities;
- Visual; and
- Solar glint and Glare.

The impacts are discussed below.

Low Carbon Power Generation

The facility will produce no waste or emissions during the operational phase. South Africa's per capita greenhouse emissions are the highest in Africa (Jainb, 2017) thus, this project will aid in reducing the carbon footprint and emissions. The significance of the impact of low carbon generation during the operational phase is indicated in **Table 9-74**.

Table 9-74 – Impact of low carbon power generation during the operational phase

Potential Impact: Low Carbon Generation	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	1	2	3	4	2	20	Low	(+)
With Mitigation	4	3	3	4	4	56	Moderate	(+)
Mitigation and Management Measures	- Ensuring that the power generated from the proposed project provides for homes, farms and businesses in the surrounding communities.							

	▪ The proposed project should be used to encourage more renewable sources of energy that are more environmentally friendly to other municipalities and provinces across South Africa. ▪ Recording and publishing the economic benefit or development of the Komati Power Station PV facility to the regional and national economy to encourage more renewable energy sources for South Africa.

Employment Opportunities

The maintenance of the facility and the functioning of the facility will create long-term employment opportunities. It is assumed that unskilled labour will be sourced from the local community and skilled labour will be sourced as far as possible from the local welfare. The proposed project will aid in solving two of the leading challenges faced by most municipalities in the country, namely the need for electricity and the lack of adequate employment opportunities. The significance of the impact of employment opportunities during the operational phase is indicated in **Table 9-75**.

Table 9-75 – Impact of employment opportunities during the operational phase

Potential Impact: Employment Opportunities	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	3	4	3	5	2	30	Low	(+)
With Mitigation	4	4	4	5	4	68	High	(+)
Mitigation and Management Measures	▪ During the operational phase, locally employed individuals should receive training and undergo skills development programmes. ▪ Employees should be allowed the opportunity to participate in mentorship programmes to further their development.							

Visual

The potentially sensitive visual receptors are located within six kilometres of the proposed facility, meaning the visual impact will be high and moderate between three and six kilometres away. The existing visual clutter (power lines, power station and mining infrastructure) within the region will mitigate the visual impact for travelling observers around the project area. As a result, the site has already been changed from an agricultural setting to one of industry. The significance of the visual impact during the operational phase is indicated in **Table 9-76**.

Table 9-76 – Impact of visual during the operational phase

Potential Impact: Visual	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	4	4	4	4	64	High	(-)
With Mitigation	3	3	3	2	3	33	Moderate	(-)
Mitigation and Management Measures	▪ For the observers within one kilometre, no mitigation of this impact is possible (i.e. the structures will be visible regardless of mitigation measures). Still, general mitigation and management measures are recommended as best practices. ▪ It is recommended that vegetation cover (i.e., natural or cultivated) be maintained in all areas outside of the actual development footprint (but still within the project site), both during the construction and operation of the proposed facility. This will minimise the visual impact because of cleared areas and areas stripped of vegetation. ▪ Existing roads should be utilised wherever possible. New roads should be planned, taking due cognisance of the topography to limit cut and fill requirements. ▪ Construction/upgrade of roads should be appropriately undertaken, with adequate drainage structures in place to forego potential erosion problems. ▪ The use of motion sensing lighting should be investigated for use during the evening to lesion night time light pollution.							

Solar glint and glare

Glint and glare occur when the sun reflects off surfaces with specular (mirror-like) properties (i.e. glass windows, water bodies). Glint is generally of shorter duration and is described as “a momentary flash of bright light”, whilst glare is the reflection of bright light for a more extended period. Modern PV reflects less than 2% of the incoming light, especially when the faces face the sun directly. The significance of the impact of the solar glint and glare during the operational phase is indicated in **Table 9-77**.

Table 9-77 – Impact of solar glint and glare during the operational phase

Potential Impact: Solar glint and glare	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	4	4	4	4	64	High	(-)

With Mitigation	3	2	3	2	3	30	Low	(-)
Mitigation and Management Measures	▪ The use of sun-tracking arrays must be considered. ▪ Adjust tilt angles of the panels if glint and glare issues become evident on sensitive receptors, where possible. ▪ If specific sensitive visual receptors are identified during operation, investigate screening at the receptor site, where possible. ▪ Use anti-reflective panels and dull polishing on structures, where possible and apply the industry standard.							

9.11.3 DECOMMISSIONING PHASE

The following social impacts have been identified for the decommissioning phase:

- Loss of employment;
- Reduced community investment; and
- Associated infrastructure.

The impacts are discussed below.

Loss of employment

During this phase, the operational workforce will lose their jobs, and it may lead to adverse social consequences in the municipality and labour-sending areas such as:

- Increase or return the unemployment rate to previous levels within the project area.
- Financial hardship.
- Family tensions and breakdown.
- Alienation, shame and stigma.
- Crime.

The significance of the impact of the loss of employment during the decommissioning phase is indicated in **Table 9-78**.

Table 9-78 – Impact of loss of employment during the decommissioning phase

Potential Impact: Loss of employment	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	4	3	4	3	45	Moderate	(-)
With Mitigation	2	1	2	4	3	27	Low	(-)
Mitigation and Management Measures	▪ Timely and adequate consultation with employees dependent on the Project for employment. ▪ Assisting employees seeking alternative employment at other power plants or related facilities.							

	▪ Training and educating employees to equip them with skills that could benefit them in other industries.

Reduced community investment

There will be reduced local spending by Eskom and its staff and contractors. Consequently, local business revenue may be affected, and tax payments will decrease. The significance of the impact of reduced community investment during the decommissioning phase is indicated in **Table 9-79**.

Table 9-79 – Impact of reduced community investment during the decommissioning phase

Potential Impact: Reduced community investment	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	3	4	3	3	3	39	Moderate	(-)
With Mitigation	2	1	2	4	3	27	Low	(-)
Mitigation and Management Measures	▪ Engage local and regional government concerning the decommissioning phase. ▪ Develop alternative projects which can support the local economy.							

Associated Infrastructure

Structures used during construction and operation will be abandoned and might attract criminals. Maintenance of these structures might decrease after the Project operation, leading to hazards to the health and welfare of the community. The batteries/equipment may have reached the end-of-life and may leak. The significance of the impact of the associated infrastructure during the decommissioning phase is indicated in **Table 9-80**.

Table 9-80 – Impact of the associated infrastructure during the decommissioning phase

Potential Impact: Associated infrastructure	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	3	3	3	3	4	48	Moderate	(-)
With Mitigation	2	2	1	3	2	16	Low	(-)
Mitigation and Management Measures	▪ End-of-Life shutdown procedure must be undertaken, including a risk assessment of the activities involved. ▪ Where possible, re-purpose the solid-state batteries/containers and equipment with the associated environmental impact considered.							

	▪ Disposal according to local regulations and other directives such as the European Batteries Directive. ▪ End-of-life, which is affected by temperature and time, cycles etc., should be predefined, and monitoring should be in place to determine if it has been reached. ▪ Eskom shall develop exit strategies for all its community development initiatives.

9.12 RISK

The main risks to the environment, as a result of BESS installations, are fires and pollution arising from spillage of the liquid component of the cells by accident.. In terms of other environmental impacts such as the impact of the clearance of vegetation, the visual impact and increase traffic, these have been assessed within the respective specialist assessments (**Section 9**).

As has been noted above, there is a small volume of liquid within the cells (most of which is absorbed into the solid components of the battery) and this is sealed in a plastic housing at the cell level as well as at the module level and then these are housed in a container ensuring there are three levels of containment. This ensures that the risk of a spill of any liquid is unlikely to the extent that it does not warrant detailed assessment in the impact assessment phase and has been screened out.

Regarding the potential fire, the design of these battery systems will be undertaken in compliance with all the local and international standards that ensures that fire risk is minimal. The electrical nature of the facility is such that there is a risk of overheating of components that could lead to electrical fire. Due to the risk overheating batteries may have on human health (in terms of off-gassing) and implications for the performance of the batteries, the facility is carefully monitored to prevent this. Each container is equipped with a built-in fire detection and suppression system that in an unlikely event of a fire will supress the fire using an inert gas. The nature of the vegetation of the site is also such that the risk of the facility being exposed to a significant wildfire leading to the ignition of the facility is also remote (assuming the facility is kept free of combustible materials).

Each container is also spaced about 3m apart ensuring the chance of a fire spreading between two containers (which are made of metal and thus not easily flammable) is also minimal. These design measures, the HVAC systems and the continuous monitoring of the battery cells for heat/fire are such that the likelihood of a fire spreading in the facility following ignition is very remote.

When the battery cells reach end of life they will be returned to a battery provider for recycling or disposal in accordance with the legal practices. Currently there are no Lithium-Ion Battery Recycling facilities in South Africa but EWASA are lobbying for one (Dataweek, 2019). Due to the value of these materials making up the batteries it is unlikely they will end up in landfill, and more likely be recycled by a future bespoke facility in South Africa or exported for recycling. In terms of air emissions from the battery facility during operations, this is not considered to be an issue and does not pose a risk during operation to the environment or staff.

Based on the technology used and the safety mechanisms forming part of the design of the facility, the likelihood of the construction and/or operation of the battery storage facility causing a fire/spill is considered to be low and therefore the risk of having the battery facility on site is considered to be negligible.

10 CUMULATIVE IMPACT ASSESSMENT

Although the objective of the NEMA S&EIA process is to undertake an impact and risk assessment process, inclusive of cumulative impacts, which is essential to assessing and managing the environmental and social impacts of projects, it may be insufficient for identifying and managing the incremental impacts on areas or resources used or directly affected by a given development from other existing, planned, or reasonably defined developments at the time the risks and impacts are identified.

IFC PS 1 recognizes that, in some instances, cumulative effects need to be considered in the identification and management of environmental and social impacts and risks. For private sector management of cumulative impacts, IFC considers good practice to be two pronged:

- Effective application of and adherence to the mitigation hierarchy in environmental and social management of the specific contributions by the project to the expected cumulative impacts; and
- Best efforts to engage in, enhance, and/or contribute to a multi-stakeholder, collaborative approach to implementing management actions that are beyond the capacity of an individual project proponent.

Even though Performance Standard 1 does not expressly require, or put the sole onus on, private sector clients to undertake a cumulative impact assessment (CIA), in paragraph 11 it states that the impact and risk identification process "*will take into account the findings and conclusions of related and applicable plans, studies, or assessments prepared by relevant government authorities or other parties that are directly related to the project and its area of influence" including "master economic development plans, country or regional plans, feasibility studies, alternatives analyses, and cumulative, regional, sectoral, or strategic environmental assessments where relevant*."

Cumulative impacts are those that result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones. For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognized as important on the basis of scientific concerns and/or concerns of affected communities (IFC GPH).

Evaluation of potential cumulative impacts is an integral element of an impact assessment. In reference to the scope for an impact assessment, IFC's Performance Standards specify that "*Risks and impacts will be analysed in the context of the project's area of influence. This area of influence encompasses…areas potentially impacted by cumulative impacts from further planned development of the project, any existing project or condition, and other project-related developments that are realistically defined at the time the Social and Environmental Assessment is undertaken; and (iv) areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.*" (IFC 2006).

A cumulative impact assessment is the process of (a) analysing the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and natural environmental and social external drivers on the chosen Valued Environmental and Social Components (VECs) over time, and (b) proposing concrete measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible (IFC GPH).

Cumulative impacts with existing and planned facilities may occur during construction and operation of the proposed Komati Solar PV Facility. While one project may not have a significant negative impact on sensitive resources or receptors, the collective impact of the projects may increase the severity of the potential impacts.

Several renewable energy developments exist within the surrounding area which have submitted applications for environmental authorisation (some of which have been approved). It is important to note that the existence of an approved EA does not directly equate to actual development of the project.

The projects within 30 km of the proposed Komati Solar Facility are indicated in **Table 10-1** and **Figure 10-1**.

Table 10-1 - Renewable Energy Projects within 30km of the proposed Komati Solar PV and BESS facility

Project Title	DFFE Reference	Status
Proposed installation of a Solar photovoltaic power plant at ESKOM Duvha power station	14/12/16/3/3/2/759	Approved
Proposed Forzando North Coal Mine photovoltaic solar facility in Emalahleni Local Municipality, Mpumalanga Province	14/12/16/3/3/1/452	In process

Figure 10-1 - Renewable Energy Projects with 30km of the proposed Komati Solar PV and BESS Facility

The cumulative impact of the identified projects in **Table 10-1** have been evaluated by the specialists. The impacts are as discussed below.

10.1 SURFACE WATER

Since each panel in the proposed Komati Solar PV Facility is separate, there will be no accumulation of runoff, and the rainwater will be routed directly to the ground where it can infiltrate. In practical terms, there will be no significant increase in runoff. Furthermore, if the panels are constructed close to ground level, the runoff from individual panels will not increase the risk of erosion. Consequently, the catchment characteristics will effectively only experience minor changes (as opposed to a site with a large surface area of development), and thus it is not anticipated that the hydrology of the catchment will be significantly altered or pushed beyond an acceptable level of change.

From a hydrological perspective, considering the catchment size of the Komati Solar Facility, low rainfall and suggested mitigation measures, the proposed development will cause a **low negative cumulative impact**.

10.2 GROUNDWATER

Cumulative impacts are limited due to the low k and recharge. Monitoring and management as provided in the WUL should continue.

10.3 SOILS AND AGRICULTURAL POTENTIAL

The proposed Project infrastructure will be placed within the existing footprint of the Komati Power Station, within which there are already built-up areas and mining areas. While the renewables projects shown in **Figure 10-1** are more than 10km from the Project site and tend to have a limited footprint, the Goedehoop Colliery is directly next door to Komati and is an extensive coal mining operation. Although the proposed solar project is unlikely to contribute significantly to the impacts listed below when compared to its surroundings, there will be a cumulative impact of the proposed development

Table 10-2 – Cumulative impact of loss of soil

Potential Impact: Loss of soil	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	5	3	3	5	5	80	High	(-)
With Mitigation	3	3	3	4	4	52	Moderate	(-)

Table 10-3 – Cumulative impact of erosion and sedimentation

Potential Impact: Erosion and sedimentation	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	3	3	5	5	75	High	(-)
With Mitigation	2	3	3	4	5	60	Moderate	(-)

Table 10-4 – Cumulative impact of agricultural land

Potential Impact: Loss of Agricultural Land	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	3	3	5	5	75	High	(-)
With Mitigation	2	3	3	4	5	60	Moderate	(-)

Table 10-5 – Cumulative impact of soil contamination

Potential Impact: Soil contamination	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Without Mitigation	4	3	3	5	5	75	High	(-)
With Mitigation	2	3	3	4	5	60	Moderate	(-)

10.4 TERRESTRIAL ANIMAL SPECIES

The RSA is characterised by large areas of modified habitat, principally resulting from agriculture, but also increasingly mining. The progressive loss of natural grassland habitat in the RSA as a consequence of this Project and other development projects, is a cumulative loss of concern.

Cumulative habitat loss is rated an impact of very high magnitude, permanently affecting habitat within and adjacent to the development footprints (local). It is also considered to have a high probability, resulting in a before impact rating of "high" significance. With mitigation, the impact magnitude can be reduced to medium. Impact extent will be retained at local, and duration will be long-term (i.e., project life), while probability will be reduced to low probability. This results in an after-mitigation impact of "low" significance.

Table 10-6 – Terrestrial animal species cumulative impact

Potential Impact: Loss and disturbance of natural habitat	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Cumulative impact of the project together with other infrastructure (without mitigation)	5	2	5	5	4	68	High	(-)

10.5 TERRESTRIAL PLANT SPECIES

The RSA is characterised by large areas of modified habitat, principally resulting from agriculture, but also increasingly mining. The progressive loss of natural grassland habitat in the RSA as a consequence of this Project and other development projects, is a cumulative loss of concern.

Cumulative habitat loss is rated an impact of very high magnitude, permanently affecting habitat within and adjacent to the development footprints (local). It is also considered to have a high probability, resulting in a before impact rating of "high" significance. With mitigation, the impact magnitude can be reduced to medium. Impact extent will be retained at local, and duration will be long-term (i.e., project life), while probability will be reduced to low probability. This results in an after-mitigation impact of "low" significance.

Table 10-7 – Terrestrial plant species cumulative impact

Potential Impact: Loss and disturbance of natural habitat	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Cumulative impact of the project together with other infrastructure (without mitigation)	5	2	5	5	4	68	High	(-)

10.6 AQUATIC BIODIVERSITY

- The landscape within which the proposed infrastructure is located is almost completely modified and fragmented as a consequence of the existing surrounding land uses (i.e. power station, mining, agricultural practices, residential areas, and informal settlement).
- While the currently proposed project infrastructure largely avoids the loss of significant areas of natural habitat due to active avoidance of these areas as part of the ongoing planning process, vegetation clearing would result in loss of additional 24.5 ha of moderately/largely modified seep habitats (Seep 1), contributing to cumulative impacts in terms of direct loss of seep wetlands at the landscape level.

10.7 TRAFFIC

The two projects within a 30km radius from the Komati Power Station will have little to no cumulative impact due to their relative locations. Furthermore, each development is located in close proximity to a regional road that easily gives access to national road network and other regional roads. The traffic impact will not overlap and thus the cumulative impact will be insignificant.

10.8 VISUAL

The proposed Komati Solar PV and BESS Facility is located within an area where a limited number of other PV facilities have been authorized within 30km of the site, as seen in **Table 10-1** and **Figure 10-1**. There are no additional solar energy generation plants (or applications) within the study area itself and the closest approved application is the proposed installation of a solar photovoltaic power plant at the Eskom Duvha Power Station, some 18km north-west of the project site. Since both facilities identified above are located more than 15km away from the proposed Komati Solar PV and BESS Facility it is not expected that a cumulative visual impact of significance will be experienced by sensitive receptors within the region (within 30km).

Of note is that the proposed site is located within an area where a large network of power lines traverses the study area and congregate at the existing Komati Power Station, as well as in an area where mining and other industrial activities are already one of the dominant industries. It is generally acceptable, from a visual impact point of view, to place industrial infrastructure within existing industrial areas. Therefore, the existing visual disturbances brought about by the Komati Power Station and the various mines in close proximity of the proposed Komati Solar PV and BESS Facility to these, somewhat mitigates the visual impact of the structures and activities. Ironically this will also contribute to the potential cumulative visual impact of industrial infrastructure within the region. It is however still preferable to consolidate the proposed infrastructure in areas of existing visual disturbance, rather than to spread it over larger areas.

Considering the above, and the generally disturbed nature of the area surrounding the site itself, the potential cumulative visual impact is considered to be within acceptable limits.

Table 10-8 – Visual cumulative impact

Potential Impact: Visual quality of the landscape The potential cumulative visual impact of solar farms on the visual quality of the landscape	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Cumulative impact of the project together with other infrastructure (without mitigation)	8	2	1	4	2	**28**	**Low**	(-)

10.9 HERITAGE

With no sensitive cultural heritage resources existing in the Komati Power Station proposed SEF project area, the cumulative heritage impacts of these other projects will be non-existent. It does need to be mentioned that this statement in no way claims that there are no sites of cultural heritage origin or significance located at or in close proximity to these other project areas.

10.10 PALAEONTOLOGY

The cumulative impact will remain High until construction is finished. A similar project has been suggested for Duvha Power Station.

10.11 SOCIAL

With the country's need for stable electricity growing constantly, it is envisioned that similar renewable energy projects will be proposed in the surrounding area aiming to make use of the energy grid infrastructure at the Komati Power Station.

There are two similar projects located within 30 km of the proposed project, namely the proposed installation of a solar photovoltaic power plant at the Eskom Duvha Power Station and the proposed Forzando North Coal Mine photovoltaic solar facility.

The Duvha Power Station is located approximately 20 km from the proposed Komati site. Given the location of the Duvha solar facility, it is envisioned that the infrastructure associated with connecting the facility to the power grid will loop into the current infrastructure at the Duvha Power Station.

The impacts of this project on the Duvha community are likely similar to the ones discussed in this study for the Komati Solar Photovoltaic and Battery Energy Storage System project. The anticipated cumulative social impact is expected to be low.

The proposed Forzando North Coal Mine solar facility is to be located at one of two alternative locations which are approximately 15 km and 18 km away respectively. Alternative 1 is located between the Komati Power Station (which is approximately 15km away) and the Kriel and Matla Power Stations which are approximately 18 km and 23 km from the proposed project. It is assumed that the proposed project will connect to the national electricity grid at the Komati Power Station as it is closest.

The cumulative impact of these projects will be because of the powerlines lines looping into the Komati Power Station. Given the numerous powerlines currently emanating from the Power Station, the anticipated social impact of these projects is expected to be low.

Table 10-9 – Social cumulative impact

Potential Impact: Social	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character
Cumulative impact of the project together with other infrastructure (without mitigation)	2	2	2	4	2	**20**	**Low**	(-)

10.12 CUMULATIVE IMPACT SUMMARY

A summary of the identified cumulative impacts for the proposed Komati Solar PV Facility is indicated in **Table 10-10** below. All high level impacts have the potential to be reduced if mitigation measures are implemented.

Table 10-10 – Cumulative Impact Summary

Aspect	Impact Description	Impact Significance
Surface water	Hydrological perspective	Low
Soil and Agricultural Potential	Loss of soil	High
	Erosion and sedimentation	High
	Loss of Agricultural Land	High
	Soil contamination	High
Terrestrial Animal Species	Loss and disturbance of natural habitat	High
Terrestrial Plant Species	Loss and disturbance of natural habitat	High
Traffic	Cumulative traffic impact	No impact
Visual	Potential cumulative visual impact of solar farms on the visual quality of the landscape	Low
Heritage	Cumulative heritage impacts	No impact
Palaeontology	Cumulative palaeontological heritage	High
Social	Social cumulative impact	Low

11 ENVIRONMENTAL IMPACT STATEMENT

The essence of any impact assessment process is aimed at ensuring informed decision-making, environmental accountability, and to assist in achieving environmentally sound and sustainable development. In terms of NEMA, the commitment to sustainable development is evident in the provision that "development must be socially, environmentally, and economically sustainable…. and requires the consideration of all relevant factors…". NEMA also imposes a duty of care, which places an obligation on any person who has caused, is causing, or is likely to cause damage to the environment to take reasonable steps to prevent such damage. In terms of NEMA's preventative principle, potentially negative impacts on the environment and on people's environmental rights (in terms of the Constitution of the Republic of South Africa, Act No. 108 of 1996) should be anticipated and prevented, and where they cannot be prevented altogether, they must be minimised and remedied in terms of "reasonable measures".

In assessing the environmental feasibility of the proposed construction of the proposed Project, the requirements of all relevant legislation have been considered. The identification and development of appropriate mitigation measures that should be implemented to minimise potentially significant impacts associated with the project, has been informed by best practice principles, past experience, and the relevant legislation (where applicable).

The conclusions of this BA are the result of comprehensive assessments. These assessments were based on issues identified through the BA process and public participation undertaken to date. The BAR will be subject to public review, which will be undertaken according to the requirements of NEMA with every effort made to include representatives of all stakeholders within the process. The BAR will be updated and finalised taking into consideration all comments received during the public review period before being submitted to the CA for consideration.

11.1 IMPACT SUMMARY

A summary of the identified impacts and corresponding significance ratings for the proposed Komati Solar PV Facility is indicated in **Table 11-1** below. With the implementation of the mitigation measures prescribed by the specialists, the impacts are rated as Moderate to Very Low.

Table 11-1 – Impact Summary

Aspect	Impact Description	Phase	Character	Without Mitigation		With Mitigation	
Surface water	Stormwater Runoff	C	(-)	20	Low	12	Very Low
	Erosion	C	(-)	36	Moderate	12	Very Low
	Flooding	O	(-)	18	Low	12	Very Low
	Stormwater Runoff	O	(-)	20	Low	12	Very Low
	Erosion	O	(-)	36	Moderate	12	Very Low
	Stormwater Runoff	D	(-)	20	Low	12	Very Low

Aspect	Impact Description	Phase	Character	Without Mitigation		With Mitigation	
Groundwater	Hydrocarbon Spills	C	(-)	24	Low	12	Very Low
	Leachate/spills	C	(-)	24	Low	12	Very Low
	Spoil from excavated trenches	C	(-)	24	Low	12	Very Low
	Reduced recharge due to increase in hardstanding footprint	O	(-)	33	Moderate	20	Low
	Localised artificial recharge due to washing of solar panels	O	(-)	30	Low	12	Very Low
	Reduced leachate from contaminated soils	C	(+)	33	Moderate	36	Moderate
	Localised leachate from equipment	O	(-)	39	Moderate	22	Low
	Localised increased leachate from contaminated soils due to following washing of solar panels	O	(-)	39	Moderate	22	Low
	Hydrocarbon Spills	D	(-)	24	Low	12	Very Low
	Leachate from equipment no longer in use	D	(-)	39	Moderate	30	Low
Soils and Agricultural Potential	Loss of soil	C	(-)	60	Moderate	22	Low
	Erosion and sedimentation	C	(-)	60	Moderate	30	Low
	Loss of Agricultural Land	C	(-)	60	Moderate	30	Low
	Soil contamination	C	(-)	70	High	22	Low
	Loss of soil	O	(-)	45	Moderate	9	Very Low
	Erosion and sedimentation	O	(-)	50	Moderate	18	Low
	Loss of Agricultural Land	O	(-)	50	Moderate	30	Low
	Soil contamination	O	(-)	60	Moderate	30	Low

Aspect	Impact Description	Phase	Character	Without Mitigation		With Mitigation	
	Loss of soil	D	(-)	27	Low	9	Very Low
	Erosion and sedimentation	D	(-)	55	Moderate	20	Low
	Loss of Agricultural Land	D	(-)	9	Very Low	9	Very Low
	Soil contamination	D	(-)	22	Low	18	Low
Terrestrial Animal Species	Loss and disturbance of natural habitat - Mixed *Themeda triandra* Grassland	C	(-)	85	Very High	36	Moderate
	Loss and disturbance of natural habitat - Moist Mixed Grassland	C	(-)	70	High	27	Low
	Establishment and spread of alien invasive species	C	(-)	44	Moderate	12	Very Low
	Direct mortality, injuring and disturbance of fauna	C	(-)	48	Moderate	14	Very Low
	Loss of fauna species of conservation concern	C	(-)	51	Moderate	24	Low
	Establishment and spread of alien invasive species	O	(-)	44	Moderate	12	Very Low
	Establishment and spread of alien invasive species	D	(-)	44	Moderate	12	Very Low
Terrestrial Plant Species	Loss and disturbance of natural habitat - Mixed *Themeda triandra* Grassland	C	(-)	85	Very High	48	Moderate
	Loss and disturbance of natural habitat - Moist Mixed Grassland	C	(-)	70	High	30	Moderate
	Establishment and spread of alien invasive species	C	(-)	44	Moderate	12	Very Low
	Loss of flora SCC	C	(-)	68	High	24	Low

Aspect	Impact Description	Phase	Character	Without Mitigation		With Mitigation	
	Establishment and spread of alien invasive species	O	(-)	44	Moderate	12	Very Low
	Establishment and spread of alien invasive species	D	(-)	44	Moderate	12	Very Low
Aquatic Biodiversity	Loss of wetland habitat	C	(-)	75	High	N/A	
	Changes in wetland health/functioning	C	(-)	44	Moderate	24	Low
	Contamination of riparian systems	C	(-)	40	Moderate	10	Very Low
	Wetland soil erosion	C	(-)	44	Moderate	24	Low
	Spread of AIS	C	(-)	48	Moderate	12	Very Low
	Spread of AIS	O	(-)	48	Moderate	10	Very Low
	Wetland soil erosion	O	(-)	55	Moderate	21	Low
	Water quality deterioration and contamination of wetland soils	O	(-)	48	Moderate	10	Very Low
Traffic	Impact of construction vehicles on roads and access roads	C	(-)	28	Low	28	Low
	Transportation activities during operations	O	(-)	28	Low	28	Low
	Impact of construction vehicles on roads and access roads	D	(-)	28	Low	28	Low
Visual	Impact of visual effect on sensitive visual receptors in close proximity (within 1km)	C	(-)	64	High	36	Moderate
	Impact of visual impact on observers (residents and visitors) in close proximity (within 1km)	O	(-)	72	High	42	Moderate
	Impact of visual effect of the proposed PV facility within 1- 3km radius	O	(-)	45	Moderate	26	Low

Aspect	Impact Description	Phase	Character	Without Mitigation		With Mitigation	
	Impact of visual effect of the proposed PV facility within 3- 6km radius	O	(-)	24	Low	20	Low
	Impact of visual effect of the proposed PV facility within the greater area (beyond 6km radius)	O	(-)	18	Low	9	Very Low
	Impact of operational, safety and security lighting of the facility at night during the operational phase	O	(-)	39	Moderate	22	Low
	Impact of solar glint and glare as a visual distraction and possible air/road travel hazard	O	(-)	54	Moderate	42	Moderate
	Impact of solar glint and glare on static ground-based receptors (residents of homesteads) in close proximity (within 1km)	O	(-)	64	High	42	Moderate
	Impact of ancillary infrastructure during the operational phase	O	(-)	24	Low	24	Low
	Impact of sense of place during the operational phase (Indirect Impact)	O	(-)	26	Low	26	Low
	Visual impact of construction activities on sensitive visual receptors in close proximity (within 1km)	D	(-)	52	Moderate	33	Moderate
Heritage	Impact to known cultural heritage sites	C	(-)	12	Very Low	12	Very Low
Palaeontology	Destruction of fossil heritage	C	(-)	85	Very High	33	Moderate
Social	Economic Impact	C	(+)	14	Very Low	45	Moderate
	Employment	C	(+)	20	Low	56	Moderate
	Noise	C	(-)	16	Low	12	Very Low

Aspect	Impact Description	Phase	Character	Without Mitigation		With Mitigation	
	Dust	C	(-)	36	Moderate	20	Low
	Visual	C	(-)	64	High	48	Moderate
	Population influx	C	(-)	33	Moderate	14	Very Low
	Low Carbon Generation	O	(+)	20	Low	56	Moderate
	Employment Opportunities	O	(+)	30	Low	68	High
	Visual	O	(-)	64	High	33	Moderate
	Solar glint and glare	O	(-)	64	High	30	Low
	Loss of employment	D	(-)	45	Moderate	27	Low
	Reduced community investment	D	(-)	39	Moderate	27	Low
	Associated infrastructure	D	(-)	48	Moderate	16	Low

11.2 SPECIALIST CONCLUSIONS

11.2.1 SURFACE WATER

Based on these findings, it is recommended to authorize the proposed activity and all associated infrastructure, as it has been determined that the surface water impacts resulting from the activity are minimal and within an acceptable level of change. The summarized impacts are provided below:

- Level of change to runoff regime is minimal, i.e., frequency and magnitude of peak discharges from sub-catchments is not expected to be changed and baseflow is not expected to be impacted.
- As all the proposed infrastructure are located within the Komati Power Station's footprint, it is unlikely that their zone of influence will extend to the watercourses within the site footprint.
- It was found that no PV Solar and BESS sites are positioned within watercourses and therefore no risk of impact to the riverbeds or banks exists.
- The only constituent of concern that may pollute waterways is suspended solids from disturbed soils. These solids can be managed and allowed to settle out of surface runoff prior to release to the environment. Therefore, the resultant impact on surface water quality will be negligible.

In addition to the impacts being minimal, all impacts can be avoided, managed, and mitigated by implementing the Surface Water Management Plan (SWMP) presented in this report. To achieve this, all SWMP interventions should be included in the Environmental Management Program (EMPr).

Is it recommended that the SWMP be developed further during the Detailed Design by:

- Developing a stormwater layout and designs based on the above information and infrastructure layout plan;

- Sizing the culverts or drifts associated with the proposed road crossings such that they can handle at least the 1:20-year flood event, or a minimum of 600 mm diameter or height (for maintenance purposes);
- Developing conceptual designs into detailed designs with sufficient details to support construction; and
- The plan should be incorporated into an environmental specification for use during construction and incorporated into the operation environmental management of the site.

In conclusion:

- The proposed infrastructure is not at risk of flood damage.
- The proposed facility will have an intrinsically low impact on surface water resources;
- The potential stormwater impacts that do not exist can be managed in a practical and cost-effective way; and
- The plan is conceptual, because only a conceptual infrastructure layout was made available at the time of the study – that said, moderate to low rainfall and low flow gradients characteristic of the area suggest that details design should not vary considerably from the concepts presented in this report.

11.2.2 GROUNDWATER

The potential impacts from the PV and BESS activities are anticipated to be low to moderate and can be mitigated. A positive impact may be possible during operation where the activities could reduce the recharge through contaminated soils to groundwater.

Further monitoring requirements, other than the existing monitoring as provided by the WUL, has not been identified.

11.2.3 SOILS AND AGRICULTURAL POTENTIAL

Potential Project impacts in all phases include a loss of soil through stripping and compaction, erosion and consequent sedimentation, a loss of agricultural land and soil contamination. If the recommended mitigation measures are correctly implemented and appropriate monitoring is undertaken, all the potential impacts can be reduced to Low aside from the cumulative impacts.

It is recommended that infrastructure be sited away from the arable areas wherever possible and well away from the wetlands within the larger site.

11.2.4 TERRESTRIAL ANIMAL SPECIES

The LSA is centred on Komati Power Station and Komati residential village. Accordingly, large portions of the LSA are under built infrastructure or are highly modified. Natural habitat that is present, varies in condition and is confined to small fragmented patches of land that are typically bounded or enclosed by infrastructure, such as roads and fences. Connectivity with habitat patches across the broader landscape are thus considered poor.

Based on historic distribution ranges, several fauna SCC potentially occur in the landscape in which the LSA is located. However, because the LSA is mostly transformed, disturbed and fragmented, the site is not considered to constitute important life-cycle habitat for local populations of fauna SCC, with the results of habitat suitability assessments indicating that most SCC are unlikely to be present.

This notwithstanding, proposed Project activities are likely to have some impact on general fauna through direct habitat loss and disturbance, amongst other identified impacts. These impacts can be restricted to the proposed development footprints and/or successfully mitigated, through the correct application of the management and mitigation measures outlined in this report.

In accordance with the outcomes of the impact assessment and taking cognisance of the baseline conditions as presented in the report, as well as the impact management measures prescribed in the report, the proposed Project, is not deemed to present significant negative environmental issues or impacts, and it should thus be authorised.

11.2.5 TERRESTRIAL PLANT SPECIES

The LSA is centred on Komati Power Station and Komati residential village. Accordingly, large portions of the LSA are under built infrastructure or are highly modified. Natural habitat that is present, is confined to small patches of land that are typically bounded or enclosed by infrastructure, such as roads and fences.

The LSA is located in the Eastern Highveld Grassland vegetation type, which is currently listed as Endangered (NEMBA, 2021). According to the Mpumalanga Biodiversity Sector Plan (2019), land in the north-west corner of the LSA is categorised as CBA Optimal. This area overlaps with the proposed PV Site B development footprint and is characterised by the Mixed *Themeda triandra* Grassland habitat unit, which was rated as having High ecological importance on account of its relatively undisturbed nature and the presence/potential presence of flora SCC.

The loss of natural habitat, particularly land designated as CBA Optimal, through vegetation clearing, is an impact of concern that cannot be fully mitigated through standard mitigation options. In order for the proposed Project to meet the IFC PS6 financing requirement of 'no net loss' of natural habitat, it will therefore be necessary for a biodiversity offset strategy to be developed and implemented.

Apart from direct habitat loss and disturbance, several other direct- and indirect impacts have also been identified and assessed for significance. These impacts can be restricted to the proposed development footprints and/or successfully mitigated through the correct application of the management and mitigation measures outlined in this report.

In accordance with the outcomes of the impact assessment and taking cognisance of the baseline conditions as presented in the report, as well as the impact management measures prescribed in the report, the proposed Project, is not deemed to present significant negative environmental issues or impacts, and it should thus be authorised.

11.2.6 AQUATIC BIODIVERSITY

The proposed Project development intercepts two seepage wetlands (herein referred to as Seep 1 and Seep 2) and is located within a 500m buffer of a channelled valley bottom wetland to the north and a depression wetland to the south. The wetlands within the study area were found to be in Largely Modified state (PES D) with the exception of the depression wetland located outside of the project development boundary.

All wetlands in the study area were assessed as being of Low /Marginal EIS, with the exception of the channelled valley bottom wetland which was assessed as being of Moderate EIS. The moderate EIS of the channelled valley bottom was attributed to its hydrological functional importance as this wetland performs a role in landscape connectivity at the regional level, providing regulating and supporting benefits such as streamflow regulation and flood attenuation.

Although largely modified, the channelled valley bottom wetland and the seep wetland that cross the northern boundary of the site support biodiversity and deliver ecological services to an extent that enables them to be considered 'Natural habitat' as defined by the lender standards. Although some areas of natural habitat have been mapped in the study area, no 'no-go' areas were mapped in the that relate to the aquatic biodiversity sensitivity.

The Environmental Screening Tool rates the aquatic biodiversity theme as 'Very-High Sensitivity' based on the presence of wetland features in and around the study area. Based on the findings of this study, the presence of wetland features on site was confirmed, however, these wetlands were considered to be in a largely modified PES state with low/marginal EIS function and WetEcoservices and are therefore rated to be in a 'Medium Sensitivity'.

According to the diatom assessment, the diatom assemblages were generally comprised of species characteristic of fresh brackish, acidic water and eutrophic conditions. The pollution levels indicated that there were low levels of pollution present at the stie, while the presence of some taxa point to a slightly acidic condition. According to the ecological water quality, the site showed high conditions with low levels of organic pollution.

The proposed project infrastructure will be situated in close proximity to the existing power generation facilities and activities. All areas visited are currently experiencing some level of impact from the surrounding agricultural and industrial activities primarily through habitat transformation, and disturbance arising from power generation facilities and activities. The most significant drivers of change currently present in the study area include industrial operations (seepage from ash dam, increased water inflow from Eskom operations) impoundment of water at dams, road crossings, mining operations in the catchments, spread of alien invasive species as well as formal and informal settlements within the wetland's catchment.

Construction of the proposed Project will result in the direct loss of wetland habitat due to vegetation clearing within wetlands and in their catchment in advance of the project development. The earthworks and activities involved during the construction phase of the Project can exert negative impacts on sensitive ecosystems including loss of wetland habitat, catchment landcover changes resulting in increased sediment entry to downstream systems, construction of wetland/riparian system crossings causing impoundments/barriers to movement for aquatic species, contamination of water bodies by construction materials / vehicles (hydrocarbons etc), increased potential of erosion due to surface runoff and soil disturbances and the establishment and spread of alien and invasive species (AIS). Provided that recommended mitigation measures are not implemented some of these impacts such as the establishment and spread of AIS, soil erosion and surface water and soil contamination are likely to carry on into the operational phase.

The proposed Project development is considered to have a Moderate impact significance prior to mitigation, with the exception of the loss of wetland habitat impact, which is considered high and cannot be mitigated. Since lender standards require no net loss of natural habitat, a suitable offset that addresses the predicted loss of wetland habitat will need to be designed and implemented, in agreement with the relevant authorities – principally the Department of Water and Sanitation. With the implementation of recommended mitigation measures and monitoring measures, the significance of all other impacts can be reduced to Low or Very low.

11.2.7 TRAFFIC

The following conclusions were made:

- PV SEF with ancillary BESS, to generate a total of 150 MW of energy, are planned on Eskom-owned land parcels surrounding the existing Komati Power Station in Middelburg.
- In the TIA, the impact of the transportation activities of the proposed Komati SEF developments on the road network was investigated. The transportation activities include transportation activities during the construction phase, operational phase and the decommissioning phase of the project.
- The proposed developments are located on Eskom properties which are currently zoned for various land uses including mining and an airstrip. Permission for the applicable land use rights will have to be obtained from the relevant authorities through a town planning process. The proposed 150 MW PV facilities are to be spread over two sites known as PV Site A and PV Site B.
- Traffic counts were conducted, at the intersections shown in Annexure A, Figure A2 of **Appendix H.10** covering 12 hours on Wednesday, 1 June 2022.
- A growth rate of 2% per annum was applied to the 2022 background peak hour traffic volumes to estimate the future background volumes for the 2024, 2027 and 2047 horizon years.
- The expected number of person trips based on the employment opportunities for the developments are 1 285 during the construction and decommissioning phase as well as 150 person trips during the operational phase.
- Access to the proposed developments is proposed from Flamingo Street for PV Site A and from the current road that borders the airfield to the north, for PV Site B respectively.
- PTV Vistro software was used to conduct the capacity analysis for the intersections included in the study area.
- The existing road network is operating at acceptable levels of service with the existing geometry.
- The future traffic scenarios are also expected to operate at acceptable levels of service with the existing geometry.
- Other renewable energy projects within a 30 km radius of the Komati Power Station will have no significant cumulative impact because their traffic impact will not overlap.
- Due to the locality of the proposed developments, no formal public transport facilities are located in close approximation to the proposed development. It is not expected that public transport facilities will be required.
- The environmental impact of the transportation activities during the construction, operations and decommissioning phases of the proposed development, with a significance rating of N2, is expected to be low.

11.2.8 VISUAL

The VIA practitioner takes great care to ensure that all the spatial analyses and mapping is as accurate as possible. The intention is to quantify, using visibility analyses, proximity analyses and the identification of sensitive receptors and the potential visual impacts associated with the proposed Komati Solar PV and BESS Facility. These processes are deemed to be transparent and scientifically defensible when interrogated.

The construction and operation of the proposed Komati Solar PV and BESS Facility may have a visual impact on the study area, especially within a 1km radius (and potentially up to a radius of

3km) of the proposed facility. The visual impact will differ amongst places, depending on the distance from the facility. Overall, the significance of the visual impacts is expected to range from moderate to low, as a result of the already disturbed and developed nature of the receiving environment.

The proposed Komati Solar PV and BESS Facility is located within an area where a limited number of other PV facilities have been authorized within 30km of the site. There are no additional solar energy generation plants (or applications) within the study area itself and the closest approved application is the proposed installation of a solar photovoltaic power plant at the Eskom Duvha Power Station, some 18km north-west of the project site. Since both of the other identified PV facilities are located more than 15km away from the proposed Komati Solar PV and BESS Facility, it is not expected that a cumulative visual impact of significance will be experienced by sensitive receptors within the region (within 30km).

Of note is that the proposed site is located within an area where a large network of power lines traverses the study area and congregate at the existing Komati Power Station, as well as in an area where mining and other industrial activities are already one of the dominant industries. It is generally acceptable, from a visual impact point of view, to place industrial infrastructure within existing industrial areas. Therefore, the existing visual disturbances brought about by the Komati Power Station and the various mines in close proximity of the proposed Komati Solar PV and BESS Facility to these, somewhat mitigates the visual impact of the structures and activities. Ironically this will also contribute to the potential cumulative visual impact of industrial infrastructure within the region. It is however still preferable to consolidate the proposed infrastructure in areas of existing visual disturbance, rather than to spread it over larger areas. Considering the above, and the generally disturbed nature of the area surrounding the site itself, the potential cumulative visual impact is considered to be within acceptable limits.

According to the Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning (DEA&DP) Guideline for Involving Visual and Aesthetic Specialists in the EIA Process (Oberholzer, 2005), the criteria that determine whether or not a visual impact constitutes a potential fatal flaw are categorised as follows:

1. Non-compliance with Acts, Ordinances, By-laws and adopted policies relating to visual pollution, scenic routes, special areas or proclaimed heritage sites.
2. Non-compliance with conditions of existing Records of Decision.
3. Impacts that may be evaluated to be of high significance and that are considered by the majority of the stakeholders and decision-makers to be unacceptable.

In terms of the above and to the knowledge of the author the proposed development is compliant with all Acts, Ordinances, By-laws and adopted policies relating to visual pollution, scenic routes, special areas or proclaimed heritage sites, as well as, conditions of existing Records of Decisions (if any in place).

Since no objections have been reported from stakeholders or decision-makers within the region to the knowledge of the author, this assessment has adopted a risk averse approach by assuming that the perception of most (if not all) of the sensitive visual receptors, would be predominantly negative towards the development.

Therefore, with the information available to the specialist at the time of writing this report, it cannot be empirically determined that the statistical majority of objecting stakeholders were exceeded. If evidence to the contrary surfaces during the progression of the development application, the specialist reserves the right to revise the statement below.

One airstrip, presumed to service the Komati Power Station was noted within the proposed development area of PV Site B. It is therefore assumed that this airstrip will no longer be in use following the development of PV Site B. However, should this airstrip still intend to be used then it is recommended that that a Glint and Glare Assessment be undertaken and that the impacts as assessed be amended.

A number of mitigation measures have been proposed. Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed facility.

If mitigation is undertaken as recommended, it is concluded that the significance of most of the anticipated visual impacts will remain at or be managed to acceptable levels. As such, the Komati Solar PV and BESS Facility would be considered to be acceptable from a visual impact perspective and can therefore be authorised.

It should be noted that the results/deductions in this report are based solely from a visual perspective in relation to potential visual impacts and sensitive visual receptors and exclude any potential issues/comments/fatal flaws identified by other specialist studies

11.2.9 HERITAGE

APelser Archaeological Consulting (APAC) was appointed by WSP Group Africa (Pty) Ltd to conduct a Phase 1 Heritage Impact Assessment (HIA) for the Komati Solar Energy Facility (SEF). A Palaeontological Impact Assessment (PIA) forms part of the study and will be presented in a separate report. The Komati Power Station is situated about 37km from Middelburg, 43km from Bethal and 40km from Witbank, via Vandyksdrift in the Mpumalanga Province of South Africa.

It was evident from the desktop study that archaeological/historical sites and finds do occur in the larger geographical landscape within which the specific study area is located. It is always possible that open-air Stone Age sites could be found in the area, in the form of individual stone tools or small scatters of tools if present. The possibility of Iron Age sites in the area is highly unlikely, while the likelihood of recent historical sites and features being present in the area is also low. During a 2007 Heritage Survey for the Komati Power Station Ash Dam Extension (on the farm Komati Power Station 58IS, a subdivision of the original farm Koornfontein 27IS), no Stone Age, Iron Age or recent historical sites, features or material were identified in the area. During the May 2023 field assessment, no sites, features or material of cultural heritage (archaeological and/or historical) origin or significance were identified in the study and proposed SEF development area.

The impact of the proposed development on the recorded and known cultural heritage sites in the area is deemed as Neglible based on the Impact Assessment criteria used. However, there is always a possibility of sites, features and material being missed as a result of various factors such as vegetation cover hampering visibility on the ground, as well as the often-subterranean nature of cultural heritage resources (including low stone-packed or unmarked graves). These factors need to be taken into consideration and it is therefore recommended that a Chance Finds Protocol be drafted and implemented for the proposed Eskom Komati SEF Development.

Finally, from a Cultural Heritage point of view, it is recommended that the proposed Solar Energy Facility (SEF) and associated infrastructure as part of Eskom's repurposing program for the Komati Power Station be allowed to continue, taking into consideration the recommendations provide above.

11.2.10 PALAEONTOLOGY

All the land involved in the development was assessed and none of the property is unsuitable for development.

All information needed for the Phase 1 Palaeontological Impact Assessment and Field Study was provided by the Consultant. All technical information was provided by WSP Group Africa (Pty) Ltd.

Areas that would involve mitigation and may need a permit from the South African Heritage Resources Agency are discussed.

If any palaeontological material is exposed during clearing, digging, excavating, or drilling, SAHRA must be notified. All development activities must be stopped, a 30 m barrier constructed, and a palaeontologist should be called in to determine proper mitigation measures.

Condition in which development may proceed: It is further suggested that a Section 37(2) agreement of the Occupational, Health and Safety Act 85 of 1993 is signed with the relevant contractors to protect the environment (fossils) and adjacent areas as well as for safety and security reasons.

11.2.11 SOCIAL

The development of the proposed Komati Solar PV and BESS aligns with legislative and policy frameworks. The Project will create employment, training, and business opportunities during the construction and operation. The potential negative impacts of the construction and operation phases can be mitigated.

The proposed development will also represent an investment in clean, renewable energy infrastructure for the country which will go some way to offset the negative environmental and socio-economic impacts associated with coal-based fossil fuel energy generation. Renewable energy also addresses climate change and assists the country in meeting its climate change reduction goals.

Some unfavourable impacts have been rated as a high negative significant impact. Other construction, operation and decommissioning phase impacts have been rated as medium negative and medium positive impacts, respectively. If mitigation measures are implemented, it is anticipated that the consequence and probability of the negative impacts will be reduced. Given the above, it is strongly recommended that the mitigation measures described in the social assessment be incorporated into the proposed project's Environmental and Social Management Plan. Additionally, measures must be put in place to monitor and assess the implementation of these mitigation measures and take corrective action where necessary.

11.3 RECOMMENDATIONS

The following key aspects are recommended to be included as conditions of authorisation:

- The layouts submitted in the EIR are not final. The final layouts are to be submitted to the DFFE for approval prior to construction;
- The EMPr submitted in the EIR is not final. The final EMPr is to be submitted to the DFFE for approval prior to construction;

- The EMPr and EIR mitigation measures must be adhered to;
- Recommendations for the layout as provided by the relevant specialists must be implemented as far as possible;
- The final EMPr must form part of all contractual documents with contractors during construction and operational phases of the project. Furthermore, a dedicated Environmental Control Officer (ECO) must be appointed to ensure compliance to all EA conditions and EMPr commitments throughout the construction phase;
- A biodiversity offset strategy must be developed and implemented for the proposed Project.
- Applications for all relevant and required permits must be submitted prior to construction; and
- Where required, water use authorisation under NWA is to be obtained from the Department of Water and Sanitation prior to construction.

The following specialist recommendations have been made in respect of the project and have been included in the EMPr (**Appendix I**):

- Surface water:
  - Is it recommended that the SWMP be developed further during the Detailed Design by:
    - Developing a stormwater layout and designs based on the above information and infrastructure layout plan;
    - Sizing the culverts or drifts associated with the proposed road crossings such that they can handle at least the 1:20-year flood event, or a minimum of 600 mm diameter or height (for maintenance purposes);
    - Developing conceptual designs into detailed designs with sufficient details to support construction; and
    - The plan should be incorporated into an environmental specification for use during construction and incorporated into the operation environmental management of the site.
  - Monitoring and management are key to the success of a SWMP. The following are therefore included as a key aspect of SWMP.
    - Frequent inspections until the success of the design and any unexpected problems are resolved/confirmed and maintenance frequency is determined;
    - Review of the plan after a few years to improve, where possible, its practicality, cost-effectiveness or efficacy;
    - Alerts that do not rely on a full-time environmental management on site (which may not be feasible) including:
      - Automatic alert system for the wastewater conservancy tank (e.g., a float driven switch alert system);
      - Brief, annual refresher training on stormwater protection that should not take more than fifteen minutes for each staff member; and
      - Well placed signs that remind staff members or reporting of incident/issues, as soon as possible and reduce the likelihood that forgetfulness or confusion will prevent reporting.
- Groundwater:
  - The potential impacts from the PV and BESS activities are anticipated to be low to moderate and can be mitigated. A positive impact may be possible during operation where the activities could reduce the recharge through contaminated soils to groundwater.

- Further monitoring requirements, other than the existing monitoring as provided by the WUL, has not been identified.

- Soils and agricultural potential:
  - Should the project go ahead, the following aspects should be monitored visually by the ECO during the construction phase:
    - Ensure that all operations are restricted to the areas demarcated as construction areas and not move outside of those areas.
    - Ensure that the topsoil is stripped ahead of excavations.
    - Monitor the vegetative cover of the soil stockpiles.
    - Monitor signs of erosion and consequent sedimentation.
    - Monitor signs of contamination of soils, especially where vehicles and equipment are present.
    - Monitor rehabilitation progress at the locations where the infrastructure is situated.
  - It is recommended that infrastructure be sited away from the arable areas wherever possible and well away from the wetlands within the larger site.
- Terrestrial animal and plant species:
  - it is recommended that the following conditions be included in the EA:
    - A biodiversity offset strategy should be investigated and implemented for the loss of natural habitat, specifically CBA Optimal land, within the proposed development footprints.
- Aquatic biodiversity:
  - An alien and invasive species management plan should be developed for the Project, which includes details of strategies and procedures that must be implemented on site to control the spread of alien and invasive species. A combined approach using both chemical and mechanical control methods, with periodic follow-up treatments informed by regular monitoring, is recommended.
  - Specific provision for biodiversity conservation, including details of any required offsets, should be made in the project BMP/BAP, in alignment with the objectives of the MBSP (2011).
  - Inclusion of a practical framework and schedule, details of key performance indicators, and recommended monitoring protocols for the delivery of existing and currently recommended mitigation measures in the BMP is recommended.
- Traffic:
  - The proposed development should be considered favourably from a traffic engineering point of view by Steve Tshwete Local Municipality.
- Visual:
  - The VIA practitioner takes great care to ensure that all the spatial analyses and mapping is as accurate as possible. The intention is to quantify, using visibility analyses, proximity analyses and the identification of sensitive receptors and the potential visual impacts associated with the proposed Komati Solar PV and BESS Facility. These processes are deemed to be transparent and scientifically defensible when interrogated.

- The construction and operation of the proposed Komati Solar PV and BESS Facility may have a visual impact on the study area, especially within a 1km radius (and potentially up to a radius of 3km) of the proposed facility. The visual impact will differ amongst places, depending on the distance from the facility. Overall, the significance of the visual impacts is expected to range from moderate to low, as a result of the already disturbed and developed nature of the receiving environment.
- The proposed Komati Solar PV and BESS Facility is located within an area where a limited number of other PV facilities have been authorized within 30km of the site. There are no additional solar energy generation plants (or applications) within the study area itself and the closest approved application is the proposed installation of a solar photovoltaic power plant at the Eskom Duvha Power Station, some 18km north-west of the project site. Since both of the other identified PV facilities are located more than 15km away from the proposed Komati Solar PV and BESS Facility, it is not expected that a cumulative visual impact of significance will be experienced by sensitive receptors within the region (within 30km).
- Of note is that the proposed site is located within an area where a large network of power lines traverses the study area and congregate at the existing Komati Power Station, as well as in an area where mining and other industrial activities are already one of the dominant industries. It is generally acceptable, from a visual impact point of view, to place industrial infrastructure within existing industrial areas. Therefore, the existing visual disturbances brought about by the Komati Power Station and the various mines in close proximity of the proposed Komati Solar PV and BESS Facility to these, somewhat mitigates the visual impact of the structures and activities. Ironically this will also contribute to the potential cumulative visual impact of industrial infrastructure within the region. It is however still preferable to consolidate the proposed infrastructure in areas of existing visual disturbance, rather than to spread it over larger areas. Considering the above, and the generally disturbed nature of the area surrounding the site itself, the potential cumulative visual impact is considered to be within acceptable limits.
- According to the Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning (DEA&DP) Guideline for Involving Visual and Aesthetic Specialists in the EIA Process (Oberholzer, 2005), the criteria that determine whether or not a visual impact constitutes a potential fatal flaw are categorised as follows:
  - Non-compliance with Acts, Ordinances, By-laws and adopted policies relating to visual pollution, scenic routes, special areas or proclaimed heritage sites.
  - Non-compliance with conditions of existing Records of Decision.
  - Impacts that may be evaluated to be of high significance and that are considered by the majority of the stakeholders and decision-makers to be unacceptable.
- In terms of the above and to the knowledge of the author the proposed development is compliant with all Acts, Ordinances, By-laws and adopted policies relating to visual pollution, scenic routes, special areas or proclaimed heritage sites, as well as, conditions of existing Records of Decisions (if any in place).
- Since no objections have been reported from stakeholders or decision-makers within the region to the knowledge of the author, this assessment has adopted a risk averse approach by assuming that the perception of most (if not all) of the sensitive visual receptors, would be predominantly negative towards the development.

- Therefore, with the information available to the specialist at the time of writing this report, it cannot be empirically determined that the statistical majority of objecting stakeholders were exceeded. If evidence to the contrary surfaces during the progression of the development application, the specialist reserves the right to revise the statement below.
- One airstrip, presumed to service the Komati Power Station was noted within the proposed development area of PV Site B. It is therefore assumed that this airstrip will no longer be in use following the development of PV Site B. However, should this airstrip still intend to be used then it is recommended that that a Glint and Glare Assessment be undertaken and that the impacts as assessed be amended.
- A number of mitigation measures have been proposed. Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed facility.
- If mitigation is undertaken as recommended, it is concluded that the significance of most of the anticipated visual impacts will remain at or be managed to acceptable levels. As such, the Komati Solar PV and BESS Facility would be considered to be acceptable from a visual impact perspective and can therefore be authorised.
- It should be noted that the results/deductions in this report are based solely from a visual perspective in relation to potential visual impacts and sensitive visual receptors and exclude any potential issues/comments/fatal flaws identified by other specialist studies.

- Heritage:
  - A Chance Finds Protocol should be drafted and implemented for the proposed Eskom Komati SEF Development.
- Palaeontology:
  - If any palaeontological material is exposed during clearing, digging, excavating, or drilling, SAHRA must be notified. All development activities must be stopped, a 30 m barrier constructed, and a palaeontologist should be called in to determine proper mitigation measures.
  - Include a Chance Fossil Finds Protocol in the EMPr.
- Social:
  - The mitigation measures described in the social assessment must be incorporated into the proposed project's Environmental and Social Management Plan.
  - Additionally, measures must be put in place to monitor and assess the implementation of these mitigation measures and take corrective action where necessary.

11.4 IMPACT STATEMENT

The overall objective of the EIA is to provide sufficient information to enable informed decision-making by the authorities. This was undertaken through consideration of the proposed project components, identification of the aspects and sources of potential impacts and subsequent provision of mitigation measures.

It is the opinion of WSP that the information contained in this document (read in conjunction the final scoping report) is sufficient for the DFFE to make an informed decision for the environmental authorisation being applied for in respect of this project.

Mitigation measures have been developed where applicable for the above aspects and are presented within the EMPr (**Appendix I**). It is imperative that all impact mitigation recommendations contained in the EMPr, of which the environmental impact assessment took cognisance, are legally enforced.

Considering the findings of the respective studies, no fatal flaws were identified for the proposed Project. Should the avoidance and mitigation measures prescribed be implemented, the significance of the considered impacts for all negative aspects pertaining to the environmental aspects is expected to be low. It is thus the opinion of the EAP that the Project can proceed, and that all the prescribed mitigation measures and recommendations are considered by the issuing authority.

11.5 EA AUTHORISATION PERIOD

Appendix 1(3)(1)(q) of the NEMA EIA Regulations 2014, as amended requires “where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised” must be included in the BA Report.

The EA is required for a period of 10 years from the date of issuance of the EA to the end of the construction period (including rehabilitation), when the proposed activities applied for are completed. This is a reasonable period as it allows Eskom to conduct its internal processes which can only begin after issuance of the EA.

11.6 FINALISATION OF THE EMPR AND LAYOUT

It is important to note that the EMPr (**Appendix I**) and project layout included in this EIR are not final and although included in this EIR, these are not submitted for approval at this stage. Subsequent to the decision-making phase, if environmental authorisation is granted for the Komati Solar PV and BESS Facility, the EMPr will have to be amended to include measures as dictated by the final layout map and micro-siting, including the requirements of the EA. The amended EMPr and final layout subjected to micro-siting will be submitted to the DFFE for review and approval following detailed design.

12 CONCLUSION AND WAY FORWARD

This S&EIA process considered the biophysical location of the proposed development, as well as a feasibility assessment by the proponent, which inter alia served to identify site options that would be optimal for energy production and grid interconnection. The proposed project is to assist with the repurposing of the Komati Power Plant. The “no project” alternative would result in the entire power station being dismantled without creating new infrastructure and repurposing of the plant. Without implementing this project, the use of renewable options for power supply would be compromised in the future, potentially leading to significant negative impacts on environmental and social well-being.

Other socio-economic benefits would result from the proposed project, including the increase of energy supply, employment opportunities and local economic development.

The anticipated environmental and social impacts associated with the proposed Komati Solar PV and BESS have been identified and assessed by the various specialists. Based on the findings of the Specialists, the current layout avoids sensitivities as much as possible.

Based on the Specialist findings, a revised layout was developed to avoid sensitive features and

Based on the findings of the impact assessment and specialist studies, the proposed project is considered to have an overall Low to Moderate negative environmental impact and an overall Low to Moderate positive socio-economic impact, with the implementation of the relative mitigation measures. All of the specialists have recommended that the proposed project receive EA if the recommended mitigation measures are implemented.

In consideration of the findings of the S&EIA Process, as well as the national, provincial and local strategic requirements to support sustainable development whilst promoting socio-economic development, it is the opinion of the EAP that the proposed project will make a positive contribution towards socio-economic development, in addition to national benefits in terms of renewable energy generation. It is recommended that the project receive EA in terms of the EIA Regulations (as amended), provided that the outlined mitigation measures of this S&EIA process are implemented effectively.

This draft EIAR is available for public review from **05 July 2023** to **04 August 2023**.

All issues and comments submitted to WSP during the scoping phase have been incorporated in the CRR (**Appendix D** of the Draft EIR (i.e. SER)). The Final EIR will be submitted to the DFFE, as the competent authority

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