

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a Solar Photovoltaic (PV) Facility and associated infrastructure (Biesjesvlei PV1); Battery Energy Storage System and associated infrastructure (Biesjesvlei BESS 1); and 132 kV Overhead Power Line from the on-site substation to a proposed Main Transmission Substation and associated infrastructure (Biesjesvlei EGI 1); near Smithfield, within the Mohokare Local Municipality, Xhariep District Municipality, Free State.

September 2024

Prepared by:
Council for Scientific and
Industrial Research (CSIR)

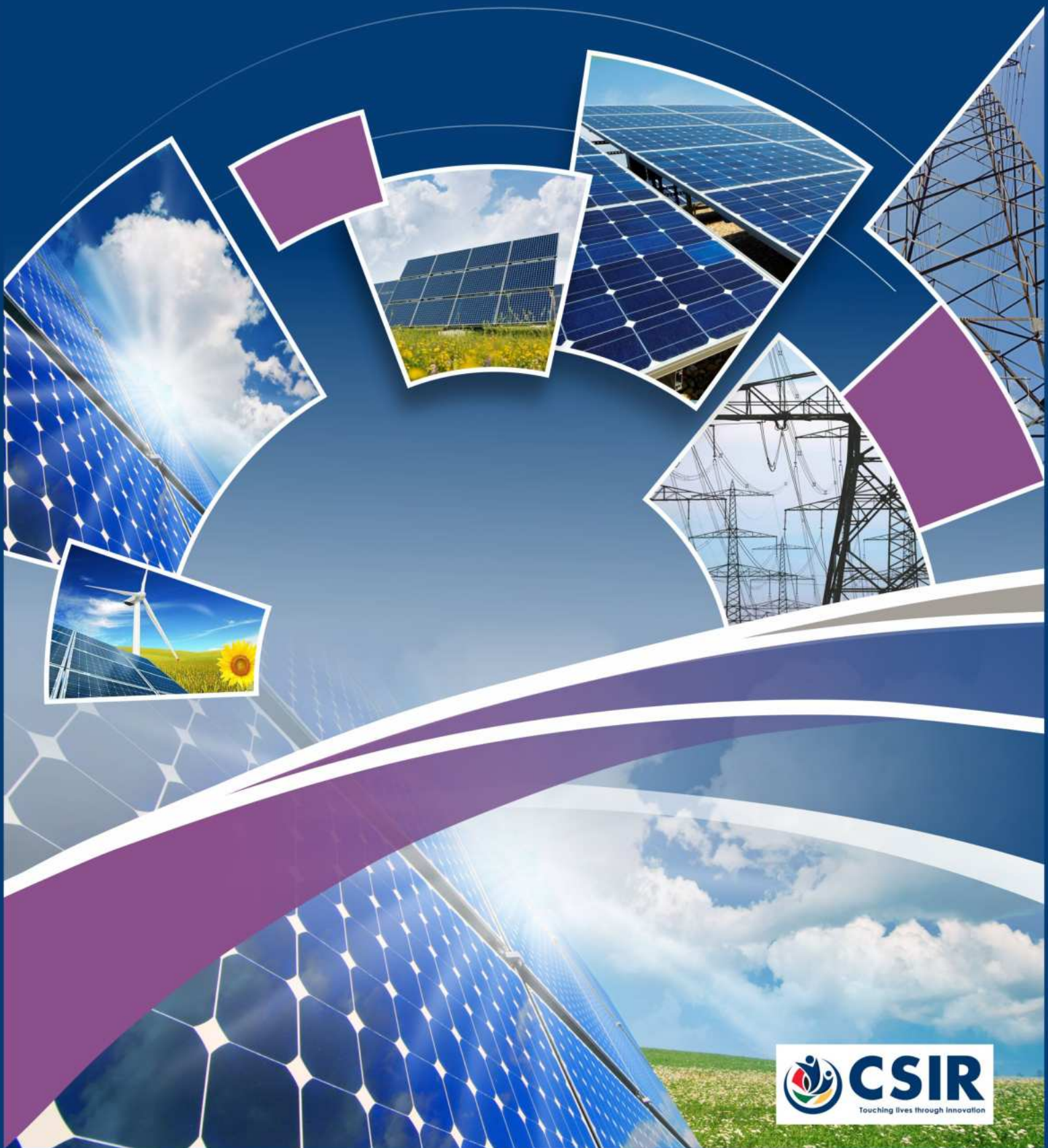


Prepared for:
Scatec Africa (Pty) Ltd and
Veroniva (Pty) Ltd

Scatec

veroniva
Renewable Energy Development

PART A: MAIN REPORT



SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT

for the

Proposed Development of a Solar Photovoltaic (PV) Facility and associated infrastructure (Biesjesvlei PV1); Battery Energy Storage System and associated infrastructure (Biesjesvlei BESS 1); and 132 kV Overhead Power Line from the on-site substation to a proposed Main Transmission Substation and associated infrastructure (Biesjesvlei EGI 1); near Smithfield, within the Mohokare Local Municipality, Xhariep District Municipality, Free State

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Prepared for:

Scatec Africa (Pty) Ltd and Veroniva (Pty) Ltd

Prepared by:

Council for Scientific and Industrial Research (CSIR)

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Report Details

Title:	Scoping and Environmental Impact Assessment for the Proposed Development of a Solar Photovoltaic (PV) Facility and associated infrastructure (Biesjesvlei PV1); Battery Energy Storage System and associated infrastructure (Biesjesvlei BESS 1); and 132 kV Overhead Power Line from the on-site substation to a proposed Main Transmission Substation and associated infrastructure (Biesjesvlei EGI 1); near Smithfield, within the Mohokare Local Municipality, Xhariep District Municipality, Free State: FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT.	
Purpose of this report:	The purpose of this Final EIA Report is to: ▪ Present the details of and the need for the proposed projects; ▪ Describe the affected environment at a sufficient level of detail to facilitate informed decision-making; ▪ Provide an overview of the EIA Process that has been followed, including public consultation; ▪ Provide an overview of the potential positive and negative impacts of the proposed projects on the environment; ▪ Provide recommendations to avoid or mitigate negative impacts and to enhance the positive benefits of the proposed projects; and ▪ Provide an Environmental Management Programme (EMPr) for the relevant phases of the projects. The Draft EIA Report was released to all Interested and/or Affected Parties (I&APs), Organs of State and relevant stakeholders for a 30-day review period, which extended from 2 August 2024 to 2 September 2024, excluding public holidays. All comments submitted during the 30-day review period have been incorporated and responded to in the Comments and Responses Report included as Appendix I.7 of this Final EIA Report, and addressed, as applicable and where relevant, in this Final EIA Report. This Final EIA Report has been submitted to the National Department of Forestry, Fisheries and the Environment (DFFE) for decision-making.	
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Formatting and Desktop Publishing:	Magdel van der Merwe, DTP Solutions	
Date:	September 2024	
DFFE Reference No:	▪ Biesjesvlei PV1: 14/12/16/3/3/2/2526 ▪ Biesjesvlei BESS 1: 14/12/16/3/3/2/2527 ▪ Biesjesvlei EGI 1: 14/12/16/3/3/2/2528	
To be cited as:	CSIR, 2024. Scoping and Environmental Impact Assessment for the Proposed Development of a Solar Photovoltaic (PV) Facility and associated infrastructure (Biesjesvlei PV1); Battery Energy Storage System and associated infrastructure (Biesjesvlei BESS 1); and 132 kV Overhead Power Line from the on-site substation to a proposed Main Transmission Substation and associated infrastructure (Biesjesvlei EGI 1); near Smithfield, within the Mohokare Local Municipality, Xhariep District Municipality, Free State. <u>Final Environmental Impact Assessment Report</u> . CSIR Report Number: CSIR/SPLA/SECO/ER/2024/0002/B	

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Key Changes made from the DRAFT EIA Report that was issued for I&AP, Stakeholder and Organ of State Review from 02 August 2024 to 02 September 2024

	Change made – Yes (denoted by ✓) or N/A (denoted by)																																				
	Chapters																				Appendices																
Key change description	Summary	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
The term “Draft EIA Report” has been updated to “Final EIA Report”, where applicable.	✓	✓	✓	✓	✓	✓															✓									✓	✓	✓	✓	✓	✓	✓	
Updated with additional information regarding the status and progress made on the EIA Process, the submission of the Amended Application for EA to the DFFE during the Draft EIA Report stage, as well as DFFE’s acknowledgment of receipt (Appendix I.5).	✓	✓	✓		✓																									✓							
Updated with details of the Public Participation Process undertaken, including status of comments received from key stakeholders. Added proof of placement of the newspaper advertisements (Appendix I.3), correspondence and proof of correspondence sent to stakeholders for the Draft EIA Report release (Appendix I.4); comments received from stakeholders during the 30-day review of the Draft EIA Report (Appendix I.6); and Comments and Responses Trail (Appendix I.7).	✓	✓	✓	✓	✓	✓				✓					✓						✓									✓							
Summary feedback on the comments raised during the 30-day review period on the Draft EIA Report (Chapter 4), and specifically Avifauna Assessment (Appendix E.4) and Traffic Impact Assessment (Appendix E.9).					✓																				✓												
Updated the database of I&APs, Stakeholders and Organs of State to reflect additions and updates to the database.																										✓											
Updated Chapter 14, EMPrs, and Appendix E.9 (Traffic Impact Assessment) with recommendations provided by Stakeholders during the 30-day comment period (i.e. SANRAL), where relevant.															✓										✓						✓	✓	✓	✓	✓	✓	
Updated the Chapter 9, Chapter 20, EMPrs and Appendix E.4 (Avifauna Assessment) with recommendations provided by Stakeholders during the 30-day comment period (i.e. VulPro), where relevant.										✓											✓				✓										✓		
Confirmation and clarity regarding the layouts provided (i.e. that they are the final layout maps, and the layouts are based on specialist recommendations).			✓	✓																	✓																
Updated sensitivity maps, feature maps and combined project specific layout and sensitivity maps to improve visualisation (i.e. removal of aerial background imagery and use of distinct colours), and clarity that the mapped sensitivities are inclusive of the features and buffers.				✓																	✓			✓													
Updated feature map to clarify buffers recommended by the specialists. New feature map provided to include layouts for Projects 1 to 10, features and buffers.				✓																				✓													
Clarity that only one BESS technology was assessed in the EIA Process and thus considered preferred (i.e. Lithium-Ion BESS).			✓			✓															✓																
Project Coordinates also added to Appendix D																								✓													
Feedback on the temporary Cape Vulture power line roost on the existing Eskom 400 kV Beta Delphi line (as per VulPro comments during the process) including the recommended 100 m buffer on CSIR sensitivity maps				✓																				✓													
Additional summary line on the cumulative impact statement																					✓																

Key change description	Change made – Yes (denoted by ✓) or N/A (denoted by)																																				
	Chapters																				Appendices																
	Summary	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Higher resolution maps included in the Visual Impact Assessment (Appendix E.5) and Appendix D (where relevant)																								✓	✓												
Palaeontology SSV (Appendix E.7) layout maps corrected to reflect updated area for PV1 as assessed during the Draft EIA Report Stage (i.e. same layouts used for Final EIA Report Stage)																									✓												

Note from the CSIR: If sections are not mentioned in the above table, this means that either there have been no changes or no major changes to these sections.

Executive Summary

INTRODUCTION AND PROJECT LOCALITY

Scatec Africa (Pty) Ltd (the project owner) with support from Veroniva (Pty) Ltd, are proposing to develop three Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Facilities, and associated Electricity Grid Infrastructure (EGI), near Smithfield within the Mohokare Local Municipality, Xhariep District Municipality, Free State (Figure A). The project is referred to as the “Biesjesvlei” Solar PV, BESS and EGI development.

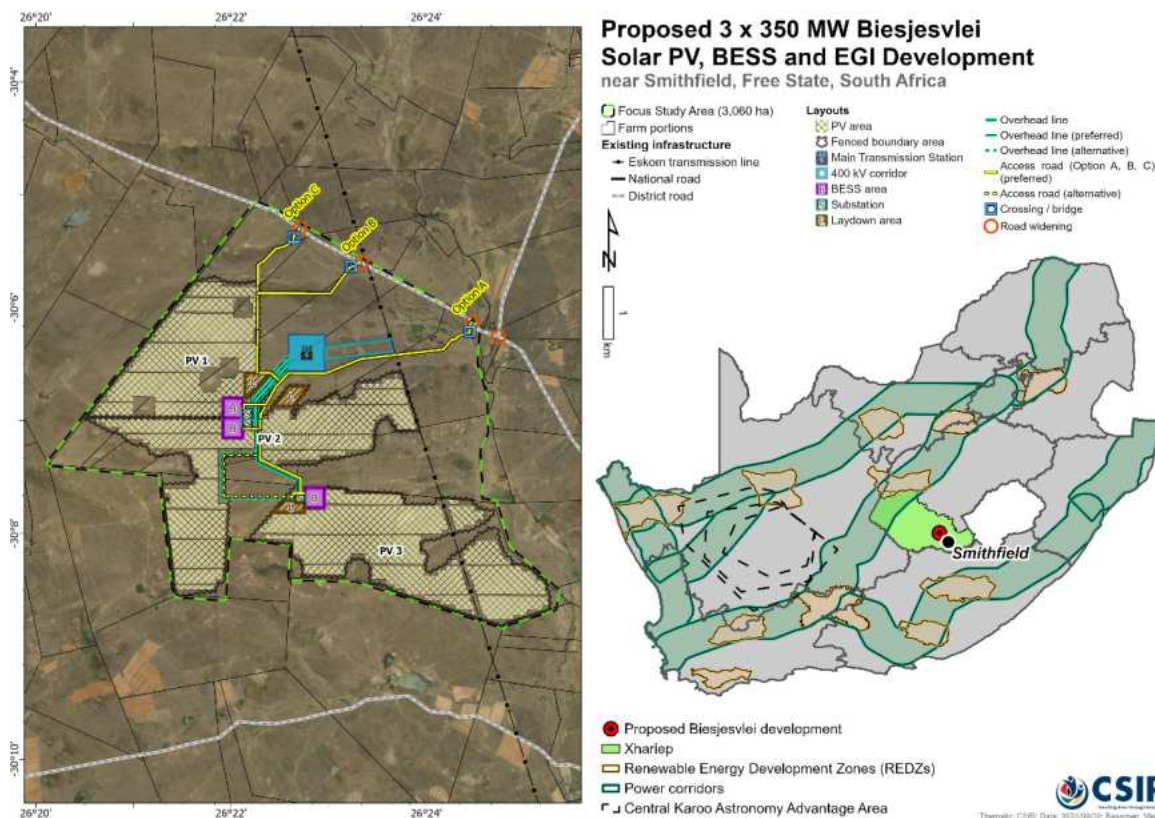


Figure A. Locality map for the proposed Biesjesvlei Solar PV1 to PV3; Biesjesvlei BESS 1 to 3; Biesjesvlei EGI 1 to 3; and Biesjesvlei MTS and LILO, near Smithfield in the Free State.

The proposed projects are not located within any of the Renewable Energy Development Zones (REDZs) that were gazetted in GN 114 on 16 February 2018; and GN 144 on 26 February 2021. The proposed projects are also not located within any of the Strategic Transmission Corridors that were gazetted in GN 113 on 16 February 2018; and GN 1637 on 24 December 2021.

The proposed projects will make use of PV solar technology to generate electricity from energy derived from the sun. Each solar PV facility will have a range of associated infrastructure and is proposed to connect to an existing 400 kV power line via dedicated 132 kV power lines, a proposed independent Main Transmission Substation (MTS) and a Loop-In-Loop-Out (LILO).

Each of the Solar PV Facilities would be its own project and would require its own, separate Environmental Authorisation (EA). The same applies to the BESS and EGI projects. Each project will have a specific Project Applicant. The following projects are being proposed (Figure B):

- **PROJECTS 1 TO 3:** The proposed development of three Solar PV Facilities and associated infrastructure (i.e. Biesjesvlei PV1 to Biesjesvlei PV3).
- **PROJECTS 4 TO 6:** The proposed development of three BESS and associated infrastructure (i.e. Biesjesvlei BESS 1 to Biesjesvlei BESS 3).
- **PROJECTS 7 to 9:** The proposed development of a 132 kV Overhead Power Line from each Biesjesvlei PV Facility to the proposed MTS, and associated infrastructure (i.e. Biesjesvlei EGI 1 to Biesjesvlei EGI 3).
- **PROJECT 10:** The proposed development of an independent 400/132kV MTS and a 400 kV LILO from the MTS to the existing Eskom power line, as well as associated infrastructure (i.e. Biesjesvlei MTS and LILO).

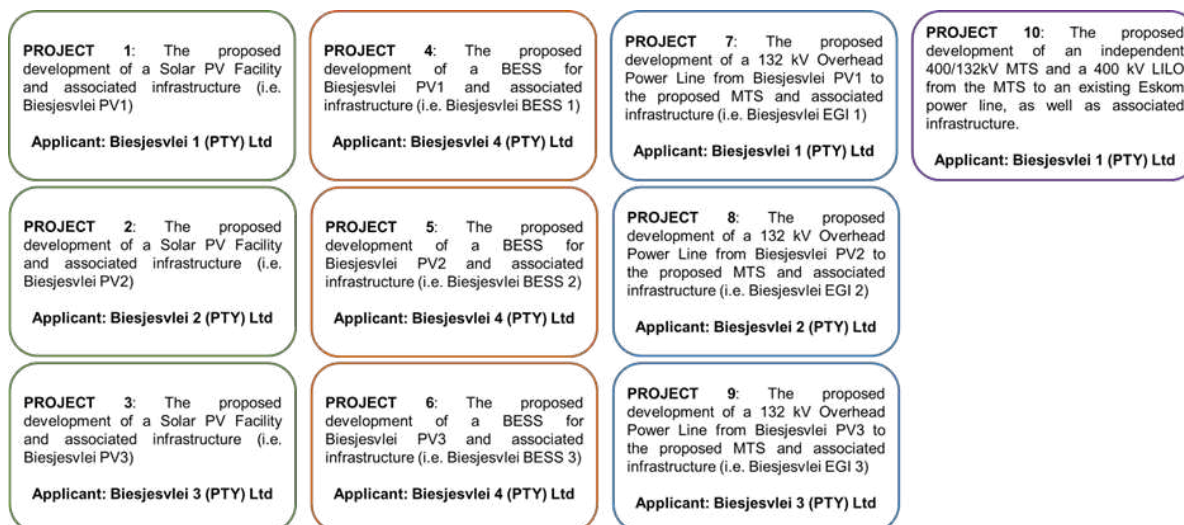


Figure B: Breakdown of the projects that comprise the Biesjesvlei Solar PV, BESS, EGI, MTS and LILO Development.

REPORT COMBINATION

A request to combine the Environmental Assessment reporting, for Projects 1 to 9, in terms of Regulation 11 of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations (as amended), and the issuing of multiple EAs in terms of Regulations 25 (1) and (2) was discussed with the National Department of Forestry, Fisheries and the Environment (DFFE) at the Pre-Application Meeting on 6 October 2023. A letter was submitted to the DFFE to request for the combination and issuing of multiple EAs in October 2023. The DFFE approved the request for combination and multiple EAs (should

they be granted) in a letter dated 1 November 2023, sent via email on 6 November 2023.

The report for Project 10 (Biesjesvlei MTS and LILO) is not included in the combined reporting because only one EA is required for this project. Hence, one standalone report has been compiled for Project 10.

The reporting structure indicated in Figure C has been used.

In summary, separate combined reports have been compiled for each PV Facility, BESS and EGI cluster (i.e. Projects 1 to 9) and a separate EIA Report has been compiled for the MTS and LILO (i.e. Project 10). Overall, four EIA Reports have been compiled for the proposed development, and it is proposed that 10 separate EAs will be issued (should they be granted).

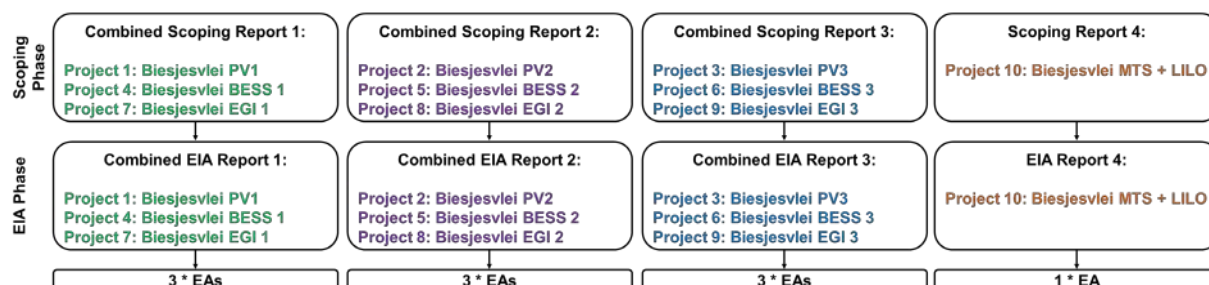


Figure C: Environmental Assessment Reporting Structure for the Biesjesvlei Solar PV, BESS, EGI, MTS and LILO Development.

This combined EIA Report only addresses Biesjesvlei PV1, Biesjesvlei BESS 1 and Biesjesvlei EGI 1 (i.e. Projects 1, 4 and 7, respectively).

Note: The information throughout this Executive Summary applies to each of the projects addressed in this report (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1)), unless where mentioned otherwise.

COMPETENT AUTHORITY AND APPLICANTS

The Competent Authority for the proposed projects is the DFFE, and the Project Applicants are as follows:

- Project 1: Biesjesvlei PV1 and associated infrastructure: Biesjesvlei 1 (Pty) Ltd;
- Project 4: Biesjesvlei BESS 1 and associated infrastructure: Biesjesvlei 4 (Pty) Ltd; and
- Project 7: Biesjesvlei EGI 1 and associated infrastructure: Biesjesvlei 1 (Pty) Ltd.

NEED FOR THE EIA AND APPROACH

The proposed projects trigger the need for an EA in terms of the 2014 NEMA EIA Regulations (as amended) published in GN R326, R327, R325 and R324 and further amended on 11 June 2021 in GN 517; and on 3 March 2022 in GN 1816. In terms of the 2014 NEMA EIA Regulations (as amended), a full Scoping and EIA Process is required for the proposed projects. Individually,

Project 1 (Biesjesvlei PV1) requires a Scoping and EIA Process; Project 4 (Biesjesvlei BESS 1) requires a BA Process; and Project 7 (Biesjesvlei EGI 1) requires a BA Process in terms of the 2014 NEMA EIA Regulations (as amended). However, the proposed projects (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1)) have collectively been subjected to a Scoping and EIA Process; and combined reporting has accordingly been approved by the DFFE (as noted above).

Chapter 4 of the EIA Report contains a detailed list of activities, which are triggered by each project and the various project components and thus forms part of this Scoping and EIA Process. Listed below are the key listed activities triggered per project (Table A).

Table A. Key Listed Activities Per Project

Project	Listing Notice, Listed Activity and Description
Project 1: Biesjesvlei PV1 and associated infrastructure	GN R325 (Listing Notice 2), Activity 1: The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facility or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure
Project 4: Biesjesvlei BESS 1 and associated infrastructure	GN R327 (Listing Notice 1), Activity 27: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.
Project 7: Biesjesvlei EGI 1 and associated infrastructure	GN R327 (Listing Notice 1), 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.

The purpose of the Scoping and EIA Process is to identify, assess and report on any potential impacts the proposed projects, if implemented, may have on the receiving environment. The Scoping and EIA therefore needs to show the Competent Authority and the Project Applicant what the consequences of their choices will be in terms of impacts on the biophysical and socio-economic environment and how such impacts can be, as far as possible, enhanced or mitigated and managed as the case may be.

PUBLIC PARTICIPATION PROCESS AND CURRENT EIA STAGE (I.E. FINAL EIA REPORT)

The Public Participation Process (PPP) for this Scoping and EIA Process has been undertaken in compliance with Chapter 6 of the 2014 NEMA EIA Regulations (as amended). An integrated PPP was undertaken for the proposed projects. The Draft Scoping Reports were made available to all Interested and/or Affected Parties (I&APs), Organs of State and relevant stakeholders for a 30-

day comment period in March 2024, and the Final Scoping Reports were submitted to the DFFE in April 2024, and thereafter accepted in May 2024.

The Draft EIA Reports were made available to all I&APs, Organs of State and relevant stakeholders for a 30-day review period, which extended from 2 August 2024 to 2 September 2024. The Draft EIA Reports were uploaded to the project website (i.e., <https://www.csir.co.za/environmental-impact-assessment>) and Google Drive for potential and registered I&APs to access it. Written notification of the commencement of the EIA Phase and the availability of the Draft EIA Reports for comment was sent to all stakeholders included on the project database via email, where email addresses were available. This notification was sent at the commencement of the 30-day review period on the Draft EIA Reports and included information on the proposed projects and notification of the availability of the reports. Various reminder emails were also sent to the stakeholders. Refer to Appendix I.4 of this Final EIA Report for correspondence sent to stakeholders for the release of the Draft EIA Reports and follow up/reminders. Copies of all written comments received during the 30-day review period on the Draft EIA Report have been included in Appendix I.6 of this Final EIA Report. These comments have also been incorporated and responded to into a detailed Comments and Responses Report, included in Appendix I.7 of this Final EIA Report, and addressed, as applicable and where relevant, in the Final EIA Report. The Final EIA Report (i.e., this report) has been submitted to the DFFE, in accordance with Regulation 23 of the 2014 NEMA EIA Regulations (as amended), for decision-making.

PROJECT EIA TEAM

In accordance with Regulation 12 (1) of the 2014 NEMA EIA Regulations (as amended), the Council for Scientific and Industrial Research (CSIR) was appointed by the Project Developer to undertake the required Scoping and EIA Process. The project team and the relevant specialists are indicated in Table B below. The term "N/A" in the table below indicates that the specialist study in question is not relevant to that specific project.

Table B. Project Team for the Scoping and EIA Process

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN	PROJECT 1 – PV1	PROJECT 4 – BESS 1	PROJECT 7 – EGI 1
<i>Environmental Management Services (CSIR)</i>					
Paul Lochner (<i>Registered EAP (2019/745)</i>)	CSIR	EAP, Technical Advisor and Quality Assurance	✓	✓	✓
Rohaida Abed (<i>Pr.Sci.Nat.; Registered EAP (2021/4067)</i>)	CSIR	EAP and Project Manager	✓	✓	✓
Helen Antonopoulos (<i>Cand.Sci.Nat.</i>)	CSIR	Project Officer	✓	✓	✓
Suvasha Ramcharan (<i>Cand.Sci.Nat.</i>)	CSIR	Project Officer	✓	✓	✓
Phindile Mthembu	CSIR	Project Officer	✓	✓	✓
Luanita Snyman van der Walt (<i>Pr.Sci.Nat.</i>)	CSIR	GIS Specialist	✓	✓	✓
Lizande Kellerman (<i>Pr.Sci.Nat.</i>)	CSIR	Public Participation Specialist	✓	✓	✓
<i>Specialists</i>					
Johann Lanz (<i>Pr.Sci.Nat.</i>)	Private	Agriculture and Soils Compliance Statement	✓	✓	✓

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN	PROJECT 1 – PV1	PROJECT 4 – BESS 1	PROJECT 7 – EGI 1
Corné Niemandt (<i>Pr.Sci.Nat.</i>) Samuel Laurence (<i>Pr.Sci.Nat.</i>)	Enviro-Insight cc	Terrestrial Biodiversity Assessment, Terrestrial Plant Species Compliance Statement, and Terrestrial Animal Species Compliance Statement	✓	✓	✓
Russell Tate (<i>Pr.Sci.Nat.</i>)	Tate Environmental Specialist Services (sub-contracted by Enviro-Insight)	Aquatic Biodiversity and Species Assessment	✓	✓	✓
Samuel Laurence (<i>Pr.Sci.Nat.</i>)	Enviro-Insight cc	Avifauna Impact Assessment	✓	✓	✓
Quinton Lawson (SACAP, 3686) Bernard Oberholzer (SACLAP, 87018)	QARC and BOLA	Visual Impact Assessment	✓	✓	✓
Dr Jayson Orton (APHP: Member 43; ASAPA CRM Section: Member 233)	ASHA Consulting (Pty) Ltd	Heritage Impact Assessment (Archaeology and Cultural Landscape)	✓	✓	✓
Dr John Almond (PSSA and APHP Member)	Natura Viva cc	Palaeontology	✓	✓	✓
Sue Reuther	SLR Consulting	Socio-Economic Impact Assessment	✓	✓	N/A
Annebet Krige (<i>Pr Eng</i>)	Sturgeon Consulting	Traffic Impact Assessment	✓	✓	N/A
Dale Barrow (<i>Pr.Sci.Nat.</i>) Hardy Luttig Louis Jonk (<i>Pr.Sci.Nat.</i>) Julian Conrad	GEOSS South Africa (PTY) Ltd	Geohydrology Assessment	✓	✓	N/A
Dale Barrow (<i>Pr.Sci.Nat.</i>) Hardy Luttig Louis Jonk (<i>Pr.Sci.Nat.</i>) Julian Conrad	GEOSS South Africa (PTY) Ltd	Geotechnical Letter of Professional Opinion	✓	✓	✓
Debbie Mitchell (<i>Pr Eng</i>)	Ishecon cc	Battery Storage High Level Safety, Health and Environment Risk Assessment	N/A	✓	N/A
Rohaida Abed (<i>Pr.Sci.Nat.</i> ; Registered EAP (2021/4067)) Lizande Kellerman (<i>Pr.Sci.Nat.</i>) Willan Adonis ¹	CSIR	Civil Aviation Site Sensitivity Verification	✓	✓	✓
Rohaida Abed (<i>Pr.Sci.Nat.</i> ; Registered EAP (2021/4067)) Lizande Kellerman (<i>Pr.Sci.Nat.</i>) Willan Adonis ²	CSIR	Defence Site Sensitivity Verification	✓	N/A	N/A

The specialist assessments comply with Appendix 6 of the 2014 NEMA EIA Regulations (as amended), or the Assessment Protocols published in GN 320 on March 2020; or the Assessment Protocols published in GN 1150 on October 2020. However, the BESS High Level Safety, Health and Environment Risk Assessment serves as a technical report and the aforementioned legislation will thus not be applicable.

STUDY AREA

The study area or preferred site for all the proposed Biesjesvlei Solar PV Facilities, BESS, 132 kV power lines, MTS and LILO and associated infrastructure (i.e., Projects 1 to 10) covers approximately 3 060 hectares (ha). These farm properties are listed in Table C, and they apply to all the projects addressed in this EIA Report.

¹ This staff member resigned from the CSIR at the end of December 2023.

² This staff member resigned from the CSIR at the end of December 2023.

Table C. Farm portions and SG codes for the Study Area

FARM PORTION	SG CODE
Farm Benoni 534	F03100000000053400000
Remaining Extent of Farm Biesjespoort 521	F03100000000052100000
Farm Biesjesvlei 372	F03100000000037200000
Farm Klein Badfontein 369	F03100000000036900000
Farm Modderkuil 396	F03100000000039600000
Farm Paalland 373	F03100000000037300000
Remaining Extent of Farm Pompoenfontein 118	F03100000000011800000
Portion 1 of Farm Pompoenfontein 118	F03100000000011800001
Farm Ronde Bult 408	F03100000000040800000
Farm Salpetervlei 756	F03100000000075600000
Portion 1 of Farm Schoemanskraal 34	F0310000000003400001

As part of the Scoping and EIA Process, the full extent of the study area was assessed by the specialists in order to identify environmental sensitivities and no-go areas. The preferred site serves as the study area for this Scoping and EIA Process. Therefore, the terms “site” and “study area” are used synonymously in the EIA Report.

PROJECT DESCRIPTION

A summary of the key components of the proposed Biesjesvlei PV1 (Project 1) and technical information is described in Table D below.

Table D. Summary of the components and associated infrastructure for Biesjesvlei PV1 (Project 1)

Component	Description
Solar Field	
Type of Technology	Solar Photovoltaic (PV) Technology
Generation Capacity (Maximum Installed)	Up to 350 MWdc
Total footprint that includes all associated infrastructure within the fenced off area of the PV facility (excluding access roads)	Maximum 450 ha
PV Panel Structure (with the following possible tracking and mounting systems): - Single Axis Tracking structures (aligned north-south); - Fixed Axis Tracking (aligned east-west); - Dual Axis Tracking (aligned east-west and north-south); - Fixed Tilt Mounting Structure; or - Bifacial Solar Modules.	<u>Height</u>: Approximately 10 m (maximum)
Building Infrastructure	
Offices	<u>Maximum height</u>: 7 m <u>Footprint</u>: 1000 m²
Operational and maintenance (O&M) control centre	<u>Maximum height</u>: 7 m <u>Footprint</u>: 500 m²
Warehouse / workshop	<u>Maximum height</u>: 7 m <u>Footprint</u>: 500 m²
Ablution facilities	<u>Maximum height</u>: 7 m <u>Footprint</u>: 50 m²
Converter / Inverter stations	<u>Height</u>: 2.5 m to 7 m (maximum) <u>Footprint</u>: 2500 m²
Guard Houses	<u>Height</u>: 3 m <u>Footprint</u>: 40 m²
On-site substation and/or switching station. This will include the section that will be maintained by the Independent Power Producer (IPP).	<u>Footprint of the IPP Substation</u>: Approximately 10 000 m² <u>Height</u>: 10 m

Component	Description
	▪ <u>Capacity</u>: 132 kV ▪ This section includes all the high voltage infrastructure leading up to the Point of Connection (i.e. the Project Applicant's section of the proposed on-site substation, which is also referred to the PV Facility IPP Substation).
Associated Infrastructure	
On-site medium voltage internal cables / power lines	▪ <u>Placement</u>: Underground or above ground ▪ <u>Capacity</u>: 33 kV ▪ <u>Depth (if underground)</u>: Maximum depth of 1.6 m ▪ <u>Height (if aboveground)</u>: Maximum height of 9 m
Underground low voltage cables or cable trays	▪ <u>Depth</u>: Maximum depth of 1.4 m
External Access Roads	▪ The study area can be accessed via various existing main roads and gravel roads. Specifically, three access route options have been considered: Access Route Option A, Option B and Option C, which are routed along the N6; S1262; and S119. Access Route Options A, B and C have different access points off the S119. Direct access to the proposed projects will be taken from the S119 along an existing farm access point, and thereafter new access roads will be developed within the study area, where they do not align with existing roads, or existing roads will be used where possible. Existing roads will be used as far as practically achievable. ▪ <u>New Access Roads</u>: Where new access roads are required within the study area, these will be 4 - 8 m wide. ▪ <u>Existing Access Roads</u>: Where existing roads are used within the study area, they may need to be upgraded, as described below. ▪ The Traffic Specialist has noted the following (additional detail is provided in Section 2.7 of Chapter 2 of this Final EIA Report): ○ The N6, S1262, and S119 are of a sufficient width to accommodate truck movement, however widening by more than 4 m or more than 6 m will be required at localised positions (i.e. intersections).

Component	Description
	Specifically, road widening by approximately 9 m will be required at the S1262 and S119 intersection. In addition, the N6 and S1262 intersection will need to be widened by approximately 2 m on the western side of the intersection and by approximately 2 m on the eastern side of the intersection. ○ Existing internal farm roads (local farm roads within the farm property boundaries) will need to be upgraded to accommodate the abnormal loads as required. This includes the following: ▪ Intersection S119 and Access Route Option A: Road widening by approximately 14 m (at the widest point) will be required. ▪ Intersection S119 and Access Route Option B: Road widening by approximately 7 m (at the widest point) will be required. ▪ Intersection S119 and Access Route Option C: Road widening by approximately 14 m (at the widest point) will be required. ▪ The existing bridge on the S119 will also need to be inspected by a Structural Engineer. ▪ The existing bridge on the existing internal farm road along Access Route Option A will need to be rebuilt/upgraded or realigned to minimise the turns that the abnormal loads need to navigate, if this access route is used for the proposed projects. ▪ A new bridge will need to be developed along Access Route Option B, if this option is used for the proposed projects. ▪ A new bridge will need to be developed along Access Route Option C, if this option is used for the proposed projects.
Internal roads	▪ <u>Details:</u> New internal gravel roads will need to be established within the fenced off area of the PV facility.

Component	Description
Fencing around the PV Facility Perimeter	▪ <u>Width</u>: Up to 4 m ▪ <u>Type</u>: Palisade or mesh or fully electrified ▪ <u>Security</u>: Access points will be managed and monitored by an appointed security service provider. ▪ <u>Height</u>: Between 2 - 3 m
Panel maintenance and cleaning area	▪ A dedicated panel maintenance and cleaning area will be required on site during the operational phase.
Storm water channels	▪ Details to be confirmed once the Engineering, Procurement and Construction (EPC) contractor has been selected and the design is finalised. Where necessary, a detailed storm water management plan would need to be developed.
Work area during the construction phase (i.e. laydown area)	▪ <u>Footprint</u>: Up to 13 ha.
Water Requirements	▪ Approximately 8 520 m³ to 12 000 m³ of water is estimated to be required per year for the construction phase. ▪ Approximately 10 000 m³ to 16 000 m³ of water is estimated to be required per year for the operational phase. ▪ Water requirements during the decommissioning phase are expected to be the same as the construction phase. ▪ Potential sources: Existing boreholes on site or from the Local Municipality via trucks.
Construction Period	▪ 12 – 24 months
Operational Period	▪ Once the commercial operation date is achieved, the proposed facility will generate electricity for a minimum period of 20 to 30 years.

A summary of the key components of the proposed Biesjesvlei BESS 1 (Project 4) and technical information is described in Table E below.

Table E. Summary of the components and associated infrastructure for Biesjesvlei BESS 1 (Project 4)

Component	Description
Battery Energy Storage System (BESS)	
BESS Area/Facility	▪ <u>Technology</u>: Lithium-Ion BESS ▪ <u>Estimated Capacity</u>: Maximum 1 200 MWh ▪ <u>Total Footprint</u>: Approximately 10 ha ▪ <u>Height</u>: Between 5 m and 10 m ▪ The BESS area will include the following sub-components: ○ BESS Units; ○ BESS Laydown Area; ○ BESS IPP Substation; ○ Laydown area for the BESS IPP Substation; ○ BESS Operational and Maintenance (O&M) Office, including Ablutions; ○ Access Roads; ○ Internal Roads; ○ MV cables between BESS Units; ○ Transformer at the BESS IPP Substation; ○ Internal cables; and ○ Overhead cables at the BESS IPP Substation; ○ Fencing and Security; and ○ Parking Area.
BESS Sub-Components (to be located within the 10 ha area of the overall BESS Facility)	
BESS Units	▪ This will include battery packs or containers, with an area of approximately 6 ha, and height up to 5 m.
BESS Laydown Area	▪ <u>Footprint</u>: Approximately 1.25 ha
BESS IPP Substation	▪ <u>Footprint</u>: Approximately 1 ha ▪ <u>Height</u>: Up to 15 m ▪ <u>Capacity</u>: 33 kV to 132 kV ▪ This will be maintained by the IPP.
Laydown Area for the BESS IPP Substation	▪ <u>Footprint</u>: Approximately 0.5 ha
BESS Operational and Maintenance (O&M) Office	▪ <u>Maximum height</u>: Up to 5 m ▪ <u>Footprint</u>: Approximately 0.5 ha

Component	Description
External Access Roads	▪ The BESS O&M Office will also include Ablution facilities. ▪ The study area can be accessed via various existing main roads and gravel roads. Specifically, three access route options have been considered: Access Route Option A, Option B and Option C, which are routed along the N6; S1262; and S119. Access Route Options A, B and C have different access points off the S119. Direct access to the proposed projects will be taken from the S119 along an existing farm access point, and thereafter new access roads will be developed within the study area, where they do not align with existing roads, or existing roads will be used where possible. Existing roads will be used as far as practically achievable. ▪ <u>New Access Roads</u>: Where new access roads are required within the study area, these will be 4 - 8 m wide. ▪ <u>Existing Access Roads</u>: Where existing roads are used within the study area, they may need to be upgraded, as described below. ▪ The Traffic Specialist has noted the following (additional detail is provided in Section 2.7 of Chapter 2 of this Final EIA Report): ○ The N6, S1262, and S119 are of a sufficient width to accommodate truck movement, however widening by more than 4 m or more than 6 m will be required at localised positions (i.e. intersections). Specifically, road widening by approximately 9 m will be required at the S1262 and S119 intersection. In addition, the N6 and S1262 intersection will need to be widened by approximately 2 m on the western side of the intersection and by approximately 2 m on the eastern side of the intersection. ○ Existing internal farm roads (local farm roads within the farm property boundaries) will need to be upgraded to accommodate the abnormal loads as required. This includes the following: ▪ Intersection S119 and Access Route Option A: Road widening

Component	Description
	by approximately 14 m (at the widest point) will be required. ▪ Intersection S119 and Access Route Option B: Road widening by approximately 7 m (at the widest point) will be required. ▪ Intersection S119 and Access Route Option C: Road widening by approximately 14 m (at the widest point) will be required. ▪ The existing bridge on the S119 will also need to be inspected by a Structural Engineer. ▪ The existing bridge on the existing internal farm road along Access Route Option A will need to be rebuilt/upgraded or realigned to minimise the turns that the abnormal loads need to navigate, if this access route is used for the proposed projects. ▪ A new bridge will need to be developed along Access Route Option B, if this option is used for the proposed projects. ▪ A new bridge will need to be developed along Access Route Option C, if this option is used for the proposed projects.
Internal Roads	▪ <u>Details</u>: New internal gravel roads will need to be established within the BESS facility area. ▪ <u>Width</u>: Up to 4 m
Medium Voltage (MV) cables between the BESS Units	▪ <u>Placement</u>: Buried/Ducted ▪ <u>Capacity</u>: Ranges from 1 kV up to 33 kV ▪ <u>Depth</u>: Up to 2 m
Transformer at the BESS IPP Substation	▪ <u>Capacity</u>: Ranges above 33 kV ▪ <u>Depth/Height</u>: Up to 2 m
Internal cables in the BESS facility	▪ <u>Placement</u>: Buried / ducted ▪ <u>Capacity</u>: Ranges from 1 kV up to 33 kV ▪ <u>Depth</u>: Up to 2 m

Component	Description
Overhead cables at the BESS IPP Substation	▪ <u>Placement</u>: Overhead ▪ <u>Capacity</u>: Ranges above 33 kV ▪ <u>Height</u>: Up to 12 m
Fencing of the BESS Facility and Security	▪ <u>Type</u>: Palisade or mesh or fully electrified ▪ <u>Height</u>: Up to 5 m ▪ <u>Security</u>: Access to the BESS Facility will be managed and monitored by an appointed security service provider.
Parking Area	▪ A parking area will be established at the BESS Facility for staff
Storm water channels	▪ Details to be confirmed once the Engineering, Procurement and Construction (EPC) contractor has been selected and the design is finalised. Where necessary, a detailed storm water management plan would need to be developed.
Water Requirements	▪ Approximately 350 m³ to 450 m³ of water is estimated to be required per year for the construction phase. ▪ Approximately 200 m³ to 300 m³ of water is estimated to be required per year for the operational phase. ▪ Water requirements during the decommissioning phase are expected to be the same as the construction phase. ▪ Potential sources: Existing boreholes on site or from the Local Municipality via trucks.
Construction Period	▪ 12 - 24 months
Operational Period	▪ Once the commercial operation date is achieved, the proposed BESS will store and dispatch electricity for a minimum period of 20 to 30 years.

A summary of the key components of the proposed Biesjesvlei EGI 1 (Project 7) and technical information is described in Table F below.

Table F. Summary of the components and associated infrastructure for Biesjesvlei EGI 1 (Project 7)

Component	Description
On-site substation and/or switching station. This will include the section that will be transferred from the Independent Power Producer (IPP) to Eskom.	▪ Footprint: Up to 10 000 m² ▪ Height: Up to 15 m ▪ Capacity: 132 kV ▪ The section includes all the high voltage infrastructure extending from the Point of Connection (i.e. Eskom's section of the proposed on-site substation, which is also referred to as the Switching Station).
132 kV Overhead Power Line	▪ The power line will be routed from the on-site substation to the proposed MTS. ▪ <u>Height</u>: Up to 37 m ▪ <u>Length</u>: Up to 2 km ▪ <u>Servitude</u>: 40 m wide ▪ <u>Pylon specifications</u>: ○ <u>Type</u>: Lattice structures or monopoles. ○ <u>Tower</u>: Self-supporting and Angle Strain. ○ <u>Foundation</u>: The size of the footprint area for the base of the tower foundation will range from 0.36 m² to 2.25 m². The minimum working area required around a structure position is 20 m x 20 m. ○ <u>Span Length</u>: 200 m – 300 m
Service Road	▪ <u>Details</u>: A new gravel service road will need to be established below the power line. ▪ <u>Width</u>: Up to 4 m
External Access Roads	▪ Refer to the detail provided in Section 2.7 of Chapter 2 of this Final EIA Report. Note that the Biesjesvlei EGI 1 project will be developed after the PV or BESS projects have commenced (should relevant approvals be granted), and as such will make use of access roads developed for the PV or BESS projects.

Component	Description
Storm water channels	▪ Details to be confirmed once the Engineering, Procurement and Construction (EPC) contractor has been selected and the design is finalised. Where necessary, a detailed storm water management plan would need to be developed.
Work area during the construction phase (i.e. laydown area)	▪ Footprint: 0.5 ha to 1 ha
Water Requirements	▪ Approximately 100 m³ of water is estimated to be required per year for the construction phase. ▪ Water requirements during the decommissioning phase are expected to be the same as the construction phase. ▪ Potential sources: Existing boreholes on site or from the Local Municipality via trucks.
Construction Period	▪ 6 - 24 months

SUMMARY OF IMPACT ASSESSMENT FINDINGS AND RECOMMENDED MANAGEMENT ACTIONS

Based on the detailed specialist assessments, various potential impacts have been identified. A summary of the **main impacts** identified is provided in Table G. Note that several mitigation measures have also been provided by the specialists, however only selected key measures are noted in the table below. The specialist assessments included in Appendix E of this EIA Report, and the summaries with Impact Assessment tables included in Chapters 6 to 17 of this EIA Report, contain all the detail. The recommended mitigation measures have also been included in the EMPs in Appendix J to Appendix O of this EIA Report.

Table G. Summary of Key Impacts that were identified and assessed during the EIA Phase as part of the Specialist Assessments, including key recommended mitigation measures

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
Appendix E.1 – Agriculture Compliance Statement	Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1; Project 4 – Biesjesvlei BESS 1; and Project 7 – Biesjesvlei EGI 1. <u>Negative Direct Impact:</u> Construction, Operation and Decommissioning Phases: - Loss of agricultural potential by occupation of land. There is only ever a single agricultural impact of any development, and it is a net change to the future agricultural production potential of land. It occurs as a result of different mechanisms, some of which decrease production potential and some of which increase it. In most developments, including the proposed Biesjesvlei projects, the decrease in production potential is primarily caused by the exclusion of agriculture from the footprint of the development. Soil erosion and degradation may also contribute to loss of agricultural production potential, but these can be managed so as not to cause impact. - However, the proposed power line has negligible agricultural impact, regardless of its route and design and the agricultural potential and sensitivity of the land it crosses.	Note: The information presented below applies to Project 1 – Biesjesvlei PV1 and Project 4 – Biesjesvlei BESS 1. Design Phase: - Design an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. Construction and Decommissioning Phases: - Implement an effective system of stormwater run-off control, where it is required (as specified above). - Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion. - Topsoil should only be stripped in areas that are excavated. Across most of the site, including construction laydown areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface. - If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface. Operational Phase: - Maintain the stormwater run-off control system. Monitor erosion and remedy the stormwater control system in the event of any erosion occurring. - Facilitate re-vegetation of denuded areas throughout the site.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
Appendix E.2: Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species Assessment	<u>Negative Direct Impacts:</u> Note: The information presented below applies to Project 1 – Biesjesvlei PV1 only. Construction Phase: • Fragmentation and loss of habitat and sensitive features. • Loss of protected species. • Introduction and spread of alien invasive species. • Increased erosion and soil compaction. • Littering and General Pollution. Operational Phase: • Increase in alien invasive species. • Loss of species composition and diversity. • Littering and General Pollution. Decommissioning Phase: • Alien invasive species management. • Loss of habitat. Note: The information presented below applies to Project 4 – Biesjesvlei BESS 1 only. Construction Phase: • Fragmentation and loss of habitat and sensitive features. • Loss of protected species. • Introduction and spread of alien invasive species. • Increased erosion and soil compaction. • Littering and General Pollution. Operational Phase: • Increase in alien invasive species. Decommissioning Phase: • Alien invasive species management. • Loss of habitat.	Note: The mitigation measures below apply equally to the Biesjesvlei PV1, Biesjesvlei BESS 1 and Biesjesvlei EGL 1 projects, except where a mitigation measure is specifically indicated as applying to a specific project only. Construction Phase: ▪ No development should take place within High and Very High sensitivity areas and/or buffer zones. Accordingly, the Koppies habitat should be avoided. The Watercourse habitat should be avoided as per the sensitivity map compiled for Terrestrial Biodiversity. In addition, refer to the Aquatic Biodiversity Assessment where the watercourse is delineated, mapped and suitable buffers recommended by the Aquatic Biodiversity specialist. ▪ No construction related activities, such as the site camp, storage of materials, temporary roads or ablation facilities may be located in the very high sensitivity areas including their buffers. ▪ Minimise impacts to surrounding natural areas by demarcating development footprint and clearly indicating no-go areas. ▪ Where the approved layout designs impact on provincially protected individuals, permit applications are required for either the relocation or destruction of provincially protected species (Free State Nature Conservation Ordinance (FSNCO) 8 of 1969). ▪ Alien invasive species establishment and spreading should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with such plants. ▪ Utilise existing access routes as far as possible. Confine the movement of vehicles to the access routes to and from the site and to the construction areas. ▪ Rehabilitate new vehicle tracks and areas where the soil has been compacted as soon as possible. ▪ Monitor the entire site for signs of erosion. ▪ Refer to mitigation measures relevant to watercourse crossings and development close to watercourses as recommended by the Aquatic Biodiversity Specialist. ▪ General good management actions in terms of spills, refuelling and waste management. These have been included in the Environmental Management Programme. ▪ Where the access road crosses the watercourse the necessary mitigation measures need to be in place to reduce any negative impacts on the feeding and breeding habitat as well as movement of <i>A. capensis</i> (African Clawless Otter) and <i>H. maculicollis</i> (Spotted-necked otter). Where required, the necessary rehabilitation must be done to restore habitat and ecosystem functioning for the species. Restoring riparian habitats and maintaining ecosystem services can align with the Working for Water Programme.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	Note: The information presented below applies to Project 7 – Biesjesvlei EGI 1 only. Construction Phase: - Fragmentation and loss of habitat and sensitive features. - Loss of protected species. - Introduction and spread of alien invasive species. - Increased erosion and soil compaction. - Littering and General Pollution. Operational Phase: - Increase in alien invasive species. - Loss of species composition and diversity. - Littering and General Pollution. Decommissioning Phase: - Alien invasive species management. - Loss of habitat. Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1; Project 4 – Biesjesvlei BESS 1; and Project 7 – Biesjesvlei EGI 1. Negative Cumulative Impacts: Construction Phase: Fragmentation and loss of habitat and sensitive features. Construction Phase: Loss of protected species. Construction, Operational and Decommissioning Phases: Increased alien invasive species.	- The riverbanks need to be stabilised during the construction phase (in terms of river crossing development). - Ideally, the bridge crossing should be constructed in the dry winter months (June to September) to reduce potential physical impacts on fauna, and to reduce sedimentation runoff in the watercourse which is less favourable for other species. However, since the construction phase has a tight window period (18-24 months) to finish construction and construction is dependent on heavy vehicles reaching the site, it might not necessarily be feasible to wait. Furthermore, once financial closure has been reached, the developer cannot wait to commence with the construction of the bridge. Biesjesvlei PV1: For PV panel installations, no bulldozing to take place for ground preparation. Only sites where PV panels are to be placed may be transformed, including making use of the existing roads and planned roads. There might still be bulldozing in other areas, like for roads, substation, and laydown area, therefore some transformation will occur for permanent infrastructure, but this is a small extent of the total development footprint. Operational Phase: Biesjesvlei PV1 and Biesjesvlei EGI 1: Implement appropriate rehabilitation measures to return the grassland to sustainable, productive use that was representative of the respective vegetation type prior to the commencement of construction. Biesjesvlei PV1 and Biesjesvlei EGI 1: General good management actions in terms of spills, refuelling and waste management. These have been included in the Environmental Management Programme. - Manage plants below the overhead power line based on continuous maintenance. - Follow an alien and invasive species control and monitoring plan. Decommissioning Phase: - The loss of vegetation is unavoidable within the approved layout development footprint, but sensitive areas must be avoided when dismantling of infrastructure. - Implement appropriate rehabilitation measures to return the grassland to sustainable, productive use that was representative of the respective vegetation type prior to the commencement of construction - Alien invasive management as per the construction and operational phase.

Specialist Assessment undertaken	<u>Key Impacts Identified</u>	Recommended Mitigation Measures
Appendix E.3: Aquatic Biodiversity and Species	Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1; Project 4 – Biesjesvlei BESS 1; and Project 7 – Biesjesvlei EGI 1.	Note: The mitigation measures below apply equally to the Biesjesvlei PV1, Biesjesvlei BESS 1 and Biesjesvlei EGI 1 projects.
	<u>Negative Direct Impacts:</u> Construction, Operational, Decommissioning Phases: - Habitat quality degradation. - Water quality degradation. - Aquatic habitat connectivity loss. <u>Negative Cumulative Impacts:</u> Construction, Operational, Decommissioning Phases: - Habitat quality degradation. - Water quality degradation. - Aquatic habitat connectivity loss.	Construction Phase: - Avoidance must be implemented i.e. the very high and high sensitivity areas identified, delineated and mapped by the Aquatic Specialist must be avoided by main infrastructure. - Culverts and road crossings are recommended to be designed based on the stream simulation culvert design process (United States Department of Agriculture (USDA), 2008). - Culverts should allow for the free movement of aquatic biota including fish such as <i>Enteromius sp.</i> - The placement of instream crossing infrastructure must not result in downstream erosion or upstream impoundment. - The implementation of bank rehabilitation actions must take place. - Where culverts are required, it is recommended that these are spread across the wetland units and not directed through single culverts. - Access routes into or adjacent to the wetlands must make use of existing road ways and crossings where possible. - Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be avoided. - Storm-water generated from roadways and denuded areas must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment. - Storm-water verges as well as other denuded areas must be grassed (re-vegetated) with local indigenous grasses to protect against erosion. - An inspection of the drainage channels must be completed within 3 months following the end of activities and within a month after the first rainfall event which exceeds 50mm. Should excessive sediment be transported down the channels it is recommended that sediment screens are implemented. - Sediment screens must be inspected, maintained and cleared every month or after significant rainfall (>150mm/24hrs). - An alien vegetation removal and management plan must be implemented along the verges of the roads and crossing points. - General storm-water management practices should be included in the design phase and implemented during the construction phase.

Specialist Assessment undertaken	<u>Key Impacts Identified</u>	Recommended Mitigation Measures
		▪ Watercourse monitoring should take place annually as part of the environmental management programme (EMPr). Operational Phase: ▪ The implementation of the buffer zones stipulated in the Aquatic Biodiversity and Species Assessment. ▪ Clean and dirty surface water separation and a storm-water management plan must be put into place via standard best practice methods. ▪ A clear storm-water management plan for hardened surfaces must be implemented. ▪ The revegetation of disturbed non-active cleared areas must take place within the first growing season between September and March following completion of the activity. ▪ The above must be audited within 3 months of completing the phase. ▪ No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. ▪ Monitoring of instream structures on an annual basis. Decommissioning Phase: ▪ All contractors and staff are to have undergone an induction / training on the location of sensitive No-Go areas and basic environmental awareness. ▪ Areas where decommissioning is to take place must be clearly demarcated. Any areas not demarcated must be avoided. ▪ Storm-water generated from roadways must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment. ▪ Storm-water verges as well as other denuded areas must be grassed (re-vegetated) with local indigenous grasses to protect against erosion. ▪ Any materials excavated must not be deposited in the wetlands or areas where it is prone to being washed downstream or impeding natural flow. ▪ Stockpiling or storage of materials and/or waste must be placed beyond the defined buffers in the Aquatic Biodiversity and Species Assessment for each respective activity. ▪ Disturbed areas must be re-vegetated after completion of the phase.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
Appendix E.4: Avifauna Assessment	<u>Negative Direct Impacts:</u> Note: The information presented below applies to Project 1 – Biesjesvlei PV1 only. Construction Phase: - Habitat destruction and loss (including foraging and breeding), and fragmentation due to displacement (avoidance of disturbance) due to infrastructure installation and associated dust effects. - Destruction or disturbance of bird roosts. - Disturbance due to noise such as machinery and construction activities. Operational Phase: - Disturbance due to noise such as, machinery movements and maintenance operations. - Loss of bird foraging habitat. - Attraction to the facility. - Chemical pollution spills. - Bird mortalities due to vehicle collisions, collisions with infrastructure and/or combustion. - Disruption of bird migratory pathways. Decommissioning Phase: - Disruption of bird migratory pathways during the decommissioning phase. - Habitat loss reclamation from rehabilitation activities (<i>positive impact</i>). Note: The information presented below applies to Project 4 – Biesjesvlei BESS 1 only. Construction Phase: - Habitat destruction and loss (including foraging and breeding), and fragmentation due to displacement (avoidance of disturbance) due to infrastructure installation and associated dust effects. - Destruction or disturbance of bird roosts. - Disturbance due to noise such as machinery and construction activities. Operational Phase: - Disturbance due to noise such as, machinery movements and maintenance operations. - Loss of bird foraging habitat. - Attraction to the facility. - Chemical pollution spills.	Note from the CSIR: Several mitigation measures have been identified in the assessment. The list below is only a summary of some of the recommendations. Note: The mitigation measures below apply to the Biesjesvlei PV1 project only. Construction Phase: - Avoid avifaunal specific highly sensitive areas and their associated buffers, such as the local drainage lines, impoundments, smaller watercourses, pans and rocky koppies. Avoidance mitigation to be applied to the positioning of the main infrastructure and supporting infrastructure. <i>Note that the panels have avoided the no-go areas identified by the avifauna specialists.</i> - Roads must utilise or upgrade existing farm roads as far as possible. All roads and crossings must be engineered not to impede surface or subsurface flow in any way. - All underground cables bisecting sensitive habitats must be placed below the subsurface flow of the ephemeral wetlands with the linear construction pits subjected to full rehabilitation in order to maintain normal subsurface flow. - For all panel infrastructure, commencement of construction should be restricted to the months of March, April, May, June, July, August, September, October (latest) to minimise destruction of the avifaunal habitats during their optimal conditions. Timing of any panel construction to not commence in November, December, January and February in order to avoid breeding periods of species within the sensitive drainage lines, wetlands and the general region. Operational Phase: - It is recommended that speed limits of 40 km/h within the project area be strictly enforced during the wet season (November to April). - In all areas where internal roads intersect with semi-natural or natural habitat, all new fences that are constructed (<i>if any</i>) must be set back at least (strictly) 75 m from the edge of every service road in order to allow for vulnerable species such as coursers, cranes and korhaans to obtain adequate height after being flushed by vehicle traffic. An alternative mitigation measure and where a 75 m buffer is not possible, new fences must be set back preferably 2 m and no more than 5 m (directly adjacent) from the edge of internal roads. - Buffers should be maintained around all habitats with a Site Ecological Importance (SEI) designated as High or above in accordance with the site sensitivity verification and delineations.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	Decommissioning Phase: - Disturbance of foraging and breeding behaviours of birds due to noise, dust and lighting. Note: The information presented below applies to Project 7 – Biesjesvlei EGI 1 only. Construction Phase: - Disturbance of foraging and breeding behaviours of birds due to noise, dust and lighting. - Loss of habitat due to clearing, trenching, alteration and exclusion from previously accessible habitats. Operational Phase: - Continued disturbance due to operational activities (use of vehicles, lights etc.). - Loss of habitat due to altered and excluded habitats and threat of fire. - Direct mortality from electrocution and collision with infrastructure (e.g. fences, overhead power lines). - Attraction to the facility exacerbating potential impacts. Decommissioning Phase: - Habitat loss reclamation from rehabilitation activities (<i>positive impact</i>). - Continued disturbance due to decommissioning activities (use of vehicles, lights etc.). - Removal of power lines to promote safe passage (lowering collision risk) through the site and avoiding attraction by birds perching and nesting (<i>positive impact</i>). Negative Cumulative Impacts: Construction and Operational Phases: - Construction and Operational Phases: Habitat loss due to a regional saturation of renewable energy facilities. - Operational Phase: Increased collision mortality due to higher regional densities of power lines.	- All habitat attractants should be eliminated so that avifaunal populations will not embed themselves within the infrastructure over time. This includes bird diverters, perch deterrents and the application of non-polarising white tape around and/or across panels to minimise reflection which can attract aquatic birds and insects (food) as panels mimic reflective surfaces of waterbodies. <u>Retrofitting of perch diverters will only be applied if mortality thresholds are breached within the Project Area of Influence (PAOI) (as per bird monitoring in the EMPr). Retrofitting on panels with non-polarising white tape will only be applicable if mortality thresholds are breached (as per the bird monitoring in the EMPr) and the Lake Effect indeed acts as an impact.</u> Decommissioning Phase: - Decommissioning of panels must not commence during the peak wet season months of November, December, January, and February. - Remove all infrastructure not originally present prior to the construction phase. - Rehabilitate all areas disturbed immediately after decommissioning activities and removal of infrastructure. Note: The mitigation measures below apply to the Biesjesvlei BESS 1 project only. Construction Phase: - Avoid avifaunal specific highly sensitive areas and their associated buffers, such as the local drainage lines, impoundments, smaller watercourses, pans and rocky koppies. Avoidance mitigation to be applied to the positioning of the main infrastructure and supporting infrastructure. <i>Note that the BESS has avoided the no-go areas identified by the avifauna specialists.</i> - Roads must utilise or upgrade existing farm roads as far as possible. All roads and crossings must be engineered not to impede surface or subsurface flow in any way. - For BESS infrastructure, commencement of construction should be restricted to the months of March, April, May, June, July, August, September, October (latest) to minimise destruction of the avifaunal habitats during their optimal conditions. Timing of any BESS construction to not commence in November, December, January and February in order to avoid breeding periods of species within the sensitive drainage lines, wetlands and the general region. Operational Phase: - Buffers should be maintained around all habitats with a SEI designated as High or above in accordance with the site sensitivity verification and delineations.

Specialist Assessment undertaken	<u>Key Impacts Identified</u>	Recommended Mitigation Measures
		▪ In the event of increased rodent activity, non-harmful pest control measures should be applied to control population numbers and limit the attractiveness of the project area for foraging. ▪ Application of strict chemical control procedures as per the recommendations provided in the EMPr. Decommissioning Phase: ▪ Intensive activities should be scheduled as far as practically possible between February-November (latest). Note that light activities such as normal vehicle use of the roads are not affected by this mitigation measure and these may proceed year-round. ▪ Minimise light pollution. ▪ Enforce a speed limit of 40 km/h on site. ▪ If necessary, apply dust-suppression measures (road wetting) to limit dust. Note: The information presented below applies to Project 7 – Biesjesvlei EGI 1 only. Construction Phase: ▪ Intensive activities should be scheduled as far as practically possible between February-November (latest). Note that light activities such as normal vehicle use of the roads are not affected by this mitigation measure and these may proceed year-round. ▪ Minimise light pollution and fit external lighting with downward facing hoods. ▪ Enforce a speed limit of 40 km/h on site. ▪ Limit the areas cleared for construction purposes (e.g. laydown areas). ▪ Rehabilitate all areas disturbed immediately after construction. ▪ Prioritise existing roads for access routes, where possible. Operational Phase: ▪ For power lines, attempts should be made to minimise the route length to the closest existing substation and that the route should be aligned with existing power lines/roads as far as possible. ▪ Additionally, the route should avoid wetland crossings or potentially be routed underground if this is not possible utilising strict wetland rehabilitation measures captured in the Avifauna Specialist Assessment. ▪ In all new raised power line crossings developed for the Biesjesvlei projects, install bird flight diverters to enhance visibility of lines. Install Eskom-approved bird flight diverters (flappers or coils) on new above-ground transmission lines and on any new guide-wires

Specialist Assessment undertaken	<u>Key Impacts Identified</u>	Recommended Mitigation Measures
		used to anchor infrastructure such as pylons, and/or new monopoles developed for the Biesjesvlei projects. - Design of new overhead electrical lines developed for the Biesjesvlei projects must take into account potential for electrocution by large species and pre-emptively avoid the likelihood of this by increasing distances between spans to avoid faecal "streamers" or large open wings creating a short. - Avoid siting lines in areas where birds concentrate. - Where possible, power lines of 132 kV or less should be buried underground. However, if mitigated as per the recommendations in the Avifauna Specialist Assessment, above ground lines are not considered a fatal flaw. - In order to reduce avian mortalities related to bird collisions or nests, perch guards should be installed on all new power line infrastructure developed for the Biesjesvlei projects (such as poles and platforms). - Light reflecting markers / bird flight diverters are a requirement to avoid collision by nocturnal species. Such markers / diverters need to be closely spaced (<15 m) on new overhead power lines and must glow in the dark or reflect light to make the transmission lines more visible at night. - Landowner cooperation will be required in order to ensure no livestock persists within the fenced off area of the projects, or no carcasses should persist within the 3060 ha study area. This is required in terms of removal of attractants for Species of Conservation Concern (SCC) such as vultures. - No water sources, such as concrete reservoirs or animal water troughs, should be located directly under any new proposed power line infrastructure for the Biesjesvlei projects. Any existing concrete reservoirs should either be covered or fitted with a mechanism to allow birds to escape if they become trapped in low-water scenarios. Decommissioning Phase: - Intensive activities should be scheduled as far as practically possible between February-November (latest). Note that light activities such as normal vehicle use of the roads are not affected by this mitigation measure and these may proceed year-round. - Minimise light pollution and fit external lighting with downward-facing hoods. - Enforce a speed limit of 40 km/h on site. - If necessary, apply dust-suppression measures (road wetting) to limit dust. - Remove all infrastructure (mainly pylons) not originally present prior to the construction phase. - Rehabilitate all areas disturbed immediately after decommissioning activities and removal of infrastructure.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
Appendix E.5: Visual Impact Assessment	<u>Negative Direct Impacts:</u> Note: The information presented below applies to Project 1 – Biesjesvlei PV1 only. Construction Phase: - Potential effect of dust and noise from trucks and construction machinery during the construction period, and the effect of this on nearby farmsteads and visitors to the area. - Potential visual effect of haul roads, access roads, stockpiles and construction camps in the visually exposed landscape. Operational Phase: - Potential visual intrusion of solar arrays and related infrastructure on receptors including glint and glare. - Potential visual impact of an industrial type of activity on the pastoral / rural character and sense of place of the area. Decommissioning Phase: - Potential visual effect of any remaining structures, platforms and disused roads on the landscape. Note: The information presented below applies to Project 4 – Biesjesvlei BESS 1 only. Construction Phase: - Potential effect of dust and noise from trucks and construction machinery during the construction period, and the effect of this on nearby farmsteads and visitors to the area. - Potential visual effect of haul roads, access roads, stockpiles and construction camps in the visually exposed landscape. Operational Phase: - Potential visual intrusion of the BESS and related infrastructure on receptors. - Potential visual impact of an industrial type of activity on the pastoral / rural character and sense of place of the area. Decommissioning Phase: - Potential visual effect of any remaining structures, platforms and disused roads on the landscape.	Note: The information presented below applies to Project 1 – Biesjesvlei PV1 only. Construction Phase: - Locate construction camps, batching plants and stockpiles in visually unobtrusive areas, away from public roads. - Implement EMPr with ECO during construction. Operational Phase: - Substation to be located in an unobtrusive low-lying area, away from public roads, where possible. - Muted natural colours and non-reflective finishes to be used for structures generally. - Internal access roads to be as narrow as possible, and existing roads or tracks used as far as possible. - Outdoor/ security lighting to be fitted with reflectors to obscure the light source, and to minimise light spillage. - Internal power lines (33 kV) to be located underground where possible. (In some cases, such as stream crossings, internal power lines may need to be above ground). - Outdoor signage to be discrete and commercial / billboard signage avoided. Decommissioning Phase: - Solar arrays and infrastructure to be removed and recycled. - Access roads no longer required to be ripped and regraded. - Exposed or disturbed areas to be revegetated to blend with the surroundings. Note: The information presented below applies to Project 4 – Biesjesvlei BESS 1 only. Construction Phase: - Locate construction camps and stockpiles in visually unobtrusive areas, away from public roads. - Implement EMPr with ECO during construction. Operational Phase: - BESS to be located in an unobtrusive low-lying area, away from public roads, where possible. - Muted natural colours and non-reflective finishes to be used for structures generally. - Access roads and internal roads to be as narrow as possible, and existing roads or tracks used as far as possible.

Specialist Assessment undertaken	<u>Key Impacts Identified</u>	Recommended Mitigation Measures
	Note: The information presented below applies to Project 7 – Biesjesvlei EGI 1 only. Construction Phase: - Potential effect of dust and noise from trucks and construction machinery during the construction period, and the effect of this on nearby farmsteads and visitors to the area. - Potential visual effect of haul roads, access roads, stockpiles and construction camps in the visually exposed landscape. Operational Phase: - Potential visual intrusion of the switching station and power line and related infrastructure on receptors. - Potential visual impact of an industrial type of activity on the pastoral / rural character and sense of place of the area. Decommissioning Phase: - Potential visual effect of any remaining structures, platforms and disused roads on the landscape. Negative Cumulative Impacts: Construction, Operational and Decommissioning Phases: - Potential combined visual effect of the proposed three Biesjesvlei Solar PV facilities, three Biesjesvlei BESS, three Biesjesvlei power lines and EGI, and Biesjesvlei MTS and LILO in the study area, and other developments in the 30 km radius (i.e. existing and proposed Eskom power lines and the proposed fibre optic cable) seen together during the construction, operational and decommissioning phases. No known other existing and proposed renewable energy facilities occur in the general area. Others are so far away as to have no combined visual significance.	- Outdoor/ security lighting to be fitted with reflectors to obscure the light source, and to minimise light spillage. - Outdoor signage to be discrete and commercial / billboard signage avoided. Decommissioning Phase: - BESS facilities to be removed and/or recycled. - Access roads no longer required to be ripped and regraded. - Exposed or disturbed areas to be revegetated to blend with the surroundings. Note: The information presented below applies to Project 7 – Biesjesvlei EGI 1 only. Construction Phase: - Locate construction camps and stockpiles in visually unobtrusive areas, away from public roads. - Implement EMPr with ECO during construction. Operational Phase: - EGI to be located along unobtrusive corridors away from public roads and farmsteads as far as practically possible. - Access or service roads to be as narrow as possible, and existing roads or tracks used as far as possible. - Use monopoles in preference to lattice pylons, where possible. - Outdoor/ security lighting to be fitted with reflectors to obscure the light source, and to minimise light spillage. Decommissioning Phase: - EGI facilities to be removed and/or recycled. - Access roads no longer required to be ripped and regraded. - Exposed or disturbed areas to be revegetated to blend with the surroundings.
Appendix E.6: Heritage Impact Assessment (Archaeology and Cultural Landscape)	Negative Direct and Cumulative Impacts: Note: The information presented below only applies to Project 1 – Biesjesvlei PV1. Construction Phase: - Damage or destruction of archaeological materials. - Damage or destruction of graves.	Note: The mitigation measures below apply equally to the Biesjesvlei PV1, Biesjesvlei BESS 1 and Biesjesvlei EGI 1 projects, except where a mitigation measure is specifically indicated as applying to a specific project only. Construction Phase: - Demarcate known heritage sites within 50 m of the project footprint as No-Go areas. - Fence known graves with a wire farm fence and gate at least 5 m from all visible graves. - Demarcate known graves within 50 m of the project footprint as No-Go areas.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	- Damage to built heritage resources. - Intrusion of the facility and equipment into the landscape. Operational Phase: - Intrusion of the facility into the landscape. Decommissioning Phase: - Intrusion of the facility and equipment into the landscape. Cumulative Impacts: - Impacts to archaeology, graves, buildings. - Intrusion of the facility and equipment into the landscape. Note: The information presented below only applies to Project 4 – Biesjesvlei BESS 1. Construction Phase: - Damage or destruction of archaeological materials. - Damage or destruction of graves. - Damage to built heritage resources. - Intrusion of the BESS and equipment into the landscape. Operational Phase: - Intrusion of the BESS into the landscape. Decommissioning Phase: - Intrusion of the BESS and equipment into the landscape. Cumulative Impacts: - Impacts to archaeology, graves, buildings. - Intrusion of the BESS and equipment into the landscape. Note: The information presented below only applies to Project 7 – Biesjesvlei EGI 1. Construction Phase: - Damage or destruction of archaeological materials.	- Report any chance finds to South African Heritage Resources Agency (SAHRA) and/or an archaeologist. In the case of graves, protect chance finds <i>in situ</i> and appoint an archaeologist to exhume under an approved permit. - Demarcate buildings as no-go areas. - Minimise the duration of the construction period. - Minimise cut-and-fill and landscape scarring in general. - Ensure effective rehabilitation of areas not needed during operation. Operational Phase: - Paint buildings in earthy tones (Note: This applies to the PV and EGI project but is only recommended, if feasible, for the BESS project). - Ensure that all maintenance vehicles stay within the authorised footprint. - Make use of lighting mitigation measures such as motion sensors and downlighting. Decommissioning Phase: - Minimise duration of decommissioning period - Ensure effective rehabilitation of all affected areas.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	- Damage or destruction of graves. - Damage to built heritage resources. - Intrusion of power line and equipment into the landscape. Operational Phase: - Intrusion of the power line into the landscape. Decommissioning Phase: - Intrusion of the power line and equipment into the landscape. Cumulative Impacts: - Impacts to archaeology, graves, buildings. - Intrusion of the power line and equipment into the landscape.	
Appendix E.7: Palaeontology Site Sensitivity Verification Report	Note: The information presented below applies equivalently to Projects 1 to 10 (i.e. Biesjesvlei PV1 to 3; Biesjesvlei BESS 1 to 3; Biesjesvlei EGI 1 to 3; and Biesjesvlei MTS and LILO). The study area has been confirmed as low to very low palaeo-sensitivity. Provided that the Chance Fossil Finds Protocol is incorporated into the EMPs and fully implemented during the construction phase, there are no objections on palaeontological heritage grounds to authorisation of the proposed projects. Pending the discovery of significant, previously unrecorded fossil sites during the construction phase (which can be handled using the Chance Fossil Finds Protocol), no further specialist palaeontological studies, reporting, monitoring or mitigation are considered necessary for the proposed projects. This approach was accepted and supported by the South African Heritage Resources Agency (SAHRA), as indicated in Appendix G.6 of this EIA Report. Furthermore, SAHRA issued final comments for the proposed projects confirming that the SAHRA Development Applications Unit (DAU) has no objections to the proposed development.	Note: The mitigation measure presented below applies equivalently to Projects 1 to 10 (i.e. Biesjesvlei PV1 to 3; Biesjesvlei BESS 1 to 3; Biesjesvlei EGI 1 to 3; and Biesjesvlei MTS and LILO). The Chance Fossil Finds Protocol has been incorporated into the project EMPs (Appendix J and Appendix O of this EIA Report).
Appendix E.8: Socio-Economic Assessment	Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1 and Project 4 – Biesjesvlei BESS 1, unless where mentioned otherwise. Construction Phase: Direct Impacts: - Capital investment (CapEx) contributing to the national, regional and local economy (<u>positive impact</u>). - Generation of employment, income and skills (<u>positive impact</u>).	Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1 and Project 4 – Biesjesvlei BESS 1, unless where mentioned otherwise. Note from the CSIR: Several mitigation and enhancement measures have been identified in the assessment. The list below is only a summary of some of the recommendations. Positive Impacts – Enhancement Measures:

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	Indirect Impacts: - Social disruption and change in social dynamics (<u>negative impact</u>). - Reduced quality of life and increased risks due to construction near residences (<u>negative impact</u>). Operational Phase: Direct Impacts: - Operational investment (OpEx) contributing to the national, regional and local economy (<u>positive impact</u>). - Generation of employment, income and skills (<u>positive impact</u>). - Increased community prosperity through contributions and income from the proposed projects (<u>positive impact</u>). Indirect Impacts: - Increased power generation reducing the probability of load shedding (<u>positive impact</u>) (Note: This impact is only applicable to the Biesjesvlei Solar PV project). Decommissioning Phase: Direct Impacts: - Reduced employment and funding (<u>negative impact</u>). Cumulative impacts: - Construction Phase: Stimulation of economic and employment growth (<u>positive impact</u>). - Operational Phase: Increased community prosperity through contributions and income from Independent Power Producers (IPPs) and operational spending (<u>positive impact</u>). - Operational Phase: Increased power generation reducing the probability of load shedding (Note: This impact is only applicable to the Biesjesvlei Solar PV project) (<u>positive impact</u>).	Construction Phase: - Source as many goods and services as far as possible from the local and regional economy (e.g. use local contractors and accommodation and equipment suppliers as far as possible and purchase perishable goods locally). - Provide suitable training to service providers, where possible and practicable. - Develop and implement a fair and transparent procurement policy. - Provide training to staff and service providers on how to position themselves for other employment opportunities once construction ends. - Consult with existing Independent Power Producer (IPP) projects that successfully procure from local Small, Micro and Medium Enterprises (SMMEs) to share learnings, where possible. - Maximise use of local skills and resources through preferential employment of locals where practicable. - Develop, communicate and implement a fair and transparent labour and recruitment policy. - Ensure diversity and gender equality in recruitment, as far as possible. Operational Phase: - Source as many goods and services as possible from the local and regional economy (e.g. use local contractors (where needed during the operational phase) and accommodation and equipment suppliers as far as possible and purchase perishable goods locally). - Provide suitable training to staff and service providers, where possible and practicable. - Develop and implement a fair and transparent procurement policy. - Provide ancillary training to workers on maximising the use of income and training to further future economic prospects, potentially through projects initiated as part of the social upliftment programme - Maximise use of local skills and resources through preferential employment of locals where practicable. - Develop and implement a fair and transparent labour and recruitment policy. - Ensure diversity and gender equality in recruitment, as far as possible. - Regularly engage with community stakeholders to develop meaningful strategies for community development. - Define vision for economic development in consultation with communities. - Ensure that funding requirements for each project are considered into the future so that projects are viable and sustainable.

Specialist Assessment undertaken	<u>Key Impacts Identified</u>	Recommended Mitigation Measures
		- Set clear goals for each project and phase out funding once these goals are achieved. - Consider auditing projects for several years after funding has ceased to ensure their benefits are sustained. Negative Impacts – Mitigation Measures: Construction Phase: - Liaise with nearby residents before and during construction to inform them of construction status and discuss safety management measures to reduce security risks. - Consider supporting projects that improve local services and infrastructure and/or deal with social problems or conflicts through the social upliftment programme, if the need arises. - Maintain a visible security presence on site. Decommissioning Phase: - Clearly communicate project duration to staff and communities. - Prolong the operational life of the project as much as possible. - Assist with recommendations and referrals where possible. - Assist with the sustainable administration of funds throughout the project lifetime.
Appendix E.9: Traffic Impact Assessment	Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1 and Project 4 – Biesjesvlei BESS 1, unless where mentioned otherwise. <u>Direct Negative Impacts</u> Construction and Decommissioning Phases: - Potential congestion and delays on the surrounding road network. - Potential impact on traffic safety and increase in accidents with other vehicles or animals. - Potential change in the quality of the surface condition of the roads. - Potential noise and dust pollution. Operational Phase: - The traffic generated during the operational phase are mainly related to the staff that will be transported to and from the sites and are not anticipated to have a significant traffic impact on the surrounding road network.	Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1 and Project 4 – Biesjesvlei BESS 1, unless where mentioned otherwise. Construction and Decommissioning Phases: - Stagger delivery trips and schedule trips, including staff trips outside of peak hours where possible. - Implement speed control by means of a stop and go system and speed limit road signage within the construction and decommissioning site. - Ensure all vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator. - Regular maintenance of the existing external gravel access roads that are used by and impacted on by the proposed projects (i.e. the relevant sections of the S1262 and S119 under the authority of the Free State Government) by the contractor during the construction phase. - Ensure private access roads (i.e. existing internal farm roads leading off the S119) that are used by and impacted on by the proposed developments are restored to original pre-construction road condition or upgraded to suitable standards as specified by the

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	<u>Cumulative Negative Impacts</u> Construction and Decommissioning Phases: - Potential congestion and delays on the surrounding road network. - Potential impact on traffic safety and increase in accidents with other vehicles or animals. - Potential change in the quality of the surface condition of the roads. - Potential noise and dust pollution.	civil engineer and regularly maintained during all phases of the projects, especially during the construction and decommissioning phases. Implement dust control on gravel roads within the construction and decommissioning site.
Appendix E.10: Geohydrology Assessment	Note: The information presented below applies to Project 1 – Biesjesvlei PV1. <u>Direct Negative Impacts:</u> Construction Phase: - Potential lowering of the groundwater level from construction requirements. - Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages. - Potential impact on groundwater quality as a result of foundation construction occurring below the water table. Operational Phase: - Potential lowering of the groundwater levels as a result of over-abstraction due to operational requirements. - Potential impact on groundwater quality as a result of using cleaning agents for solar panel cleaning. Decommissioning Phase: - Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages. - Potential lowering of the groundwater levels as a result of over-abstraction due to decommissioning requirements. Note: The information presented below applies to Project 4 – Biesjesvlei BESS 1. Construction Phase: - Potential lowering of the groundwater levels as a result of over-abstraction due to construction requirements.	Note: The mitigation measures presented below apply equivalently to Project 1 – Biesjesvlei PV1 and Project 4 – Biesjesvlei BESS 1, except where a mitigation measure is specifically indicated as applying to a specific project only. Construction and Decommissioning Phases: - Adhere to the borehole's safe yield and to monitor water levels and flow. - Boreholes must be correctly yield tested according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes). This includes a Step Test, Constant Discharge Test and recovery monitoring. - Vehicles must be regularly serviced and maintained to check and ensure there are no leakages. - Diesel fuel storage tanks, if required, should be above ground on an impermeable surface in a bunded area. - Vehicles and equipment should also be refuelled on an impermeable surface. A designated area should be established at the construction site camp for this purpose, if off-site refuelling is not possible. If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, and reported. - Barriers and liner to be successfully implemented to prevent chemical contamination of underground water during foundation construction. It is recommended that this is coupled with a groundwater monitoring program starting prior to the construction phase. Operational Phase: - Adhere to the borehole's safe yield, monitoring and yield testing as per the construction phase. Biesjesvlei PV1: Use environmentally safe cleaning agents that breakdown naturally and do not cause adverse effects.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	▪ Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages. ▪ Potential impact on groundwater quality as a result of foundation construction occurring below the water table. Operational Phase: ▪ Potential lowering of the groundwater levels as a result of over-abstraction due to operational requirements. ▪ Potential impact on groundwater quality as a result of potential spillage associated with the BESS. Decommissioning Phase: ▪ Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages. ▪ Potential lowering of the groundwater levels as a result of over-abstraction due to decommissioning requirements. <u>Cumulative Negative Impacts:</u> ▪ Potential lowering of the groundwater levels as a result of abstraction during the construction, operational and decommissioning phases for all three Biesjesvlei PV facilities and three BESS facilities. ▪ Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages from the construction and the decommissioning phases for all three Biesjesvlei PV facilities, and three BESS facilities. ▪ Potential impact on groundwater quality as a result of foundation construction occurring below the water table from the construction phase for all three Biesjesvlei PV facilities, and three BESS facilities. ▪ Potential impact on groundwater quality as a result of using cleaning agents for solar panel cleaning during the operational phase for all three Biesjesvlei PV facilities. ▪ Potential impact on groundwater quality as a result of potential spillage associated with the BESS.	▪ <u>Biesjesvlei BESS 1:</u> ○ Any waste products produced from the BESS should be removed and disposed of appropriately. ○ Wastewater produced by fire hydrants should not be allowed to runoff into the environment. ○ It is recommended that all BESS are placed a minimum of 50m from any borehole. ○ Ensure that the BESS is assembled in line with relevant product specifications and with the necessary measures to prevent potential contamination of the surrounding environment.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
Appendix E.11: Geotechnical Letter of Professional Opinion	Note: The information presented below applies equivalently to Projects 1 to 10 (i.e. Biesjesvlei PV1 to 3; Biesjesvlei BESS 1 to 3; Biesjesvlei EGI 1 to 3; and Biesjesvlei MTS and LILO). Direct Negative Impacts: Construction Phase: - Displacement of geologic materials. Construction, Operational and Decommissioning Phases: - Contamination of subsoils and loss of topsoil. Operational and Decommissioning Phases: - Increased unnatural hard surfaces yielding increased runoff, potentially increasing erosion.	Note: The information presented below applies equivalently to Projects 1 to 10 (i.e. Biesjesvlei PV1 to 3; Biesjesvlei BESS 1 to 3; Biesjesvlei EGI 1 to 3; and Biesjesvlei MTS and LILO), unless where a specific project is mentioned. Construction Phase: - Development of a stormwater management plan by a qualified professional before construction is recommended. Biesjesvlei PV Projects: Installation of suitable systems to redirect water away from areas designated for solar infrastructure. Ongoing monitoring of these systems during the initial construction phase to address erosion or sedimentation promptly. <i>This is applicable to the PV projects specifically.</i> - Immediate rehabilitation post-construction, optimising the conditions for vegetation regrowth. - Implementation of safeguards during refuelling to protect soil from spillages, ensuring swift and proper disposal if incidents occur. Operational Phase: - Similar to the construction phase, stormwater management planning by a qualified professional will be required. - Diversion of water away from road layers and erected structures, akin to the construction phase. - Replication of mitigation measures for spillages/leakages from the construction phase. Biesjesvlei BESS Projects: Proper designed structures and suitable containment to be implemented at the BESS to mitigate potential contamination of the surrounding environment, as recommended by the specialist undertaking the High Level Safety, Health and Environment (SHE) Risk Assessment for the BESS. <i>Note: This is applicable to the BESS projects specifically.</i> Biesjesvlei PV Projects: Close monitoring of solar panel maintenance, avoiding hazardous chemical use during cleaning. <i>Note: This is applicable to the PV projects specifically.</i> Decommissioning Phase: - Restoration of natural topography and land rehabilitation to near-natural state, including removal of foundations and hard surfaces, followed by proper backfilling. - Use of locally sourced materials for reinstating and backfilling to ensure uniformity. - Implementation of standard environmental management procedures for infrastructure. - Stringent measures to prevent pollution and contamination of the riparian zone, including well-maintained equipment and safeguards during refuelling operations.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
Appendix E.12: Battery Energy Storage System High Level Safety, Health and Environment (SHE) Risk Assessment	<u>Note: The information presented below only applies to Project 4 – Biesjesvlei BESS 1.</u> Various risks were identified in terms of safety, health and the environment due to the proposed BESS. The BESS High Level Safety, Health and Environment Risk Assessment identified risks, hazards, and consequences, such as, but not limited to: - Human Health - chronic exposure to toxic chemical or biological agents. Causes: Construction materials such as cement, paints, solvents, welding fumes, truck fumes etc. Consequences - Employee / contractor illness. - Human Health - exposure to noise. Causes: Drilling, piling, generators, air compressors. Consequences - Adverse impact on hearing of workers. Possible nuisance factor in nearby areas. - Human and Equipment Safety - exposure to fire radiation. Causes: Involvement in an external fire. Fire involving fuels used in construction vehicles or vehicles themselves (e.g., tyre fire). Fire due to uncontrolled welding or other hot-work. Consequences - Injuries due to radiation especially amongst first responders and bystanders. Fatalities unlikely from the heat radiation as not highly flammable nor massive fire. - Human and Equipment Safety - exposure to explosion over pressures. With solid state lithium containers, flammable gases generated by thermal run away reach explosive limits. Ignition on hot surfaces, static. Consequences - Potential fatalities amongst first responders. Damage to container, transport truck or other nearby items, e.g., other container in the port. - Human and Equipment Safety - exposure to explosion over pressures. Cause 1 - Transformer shorting / overheating / explosion. Cause 2 - Flammable gases generated by thermal run away reach explosive limits. Ignition on hot surfaces, static. Lithium Cobalt Oxide generates O₂ during decomposition – escalation. Consequences - Potential fatalities amongst first responders. Damage to container or other nearby items, e.g., other container.	<u>Note: The information presented below only applies to Project 4 – Biesjesvlei BESS 1.</u> - There are numerous different battery technologies but using one consistent battery technology system for the BESS installations associated with all the Biesjesvlei developments in the Smithfield area would allow for ease of training, maintenance, emergency response and could significantly reduce risks. - Where reasonably practicable, “state-of-the-art” battery technology should be used with all the necessary protective features, e.g., draining of cells during shutdown and standby-mode, full Battery Management System (BMS) with deviation monitoring and trips, leak detection systems. - Ensure that the technical and system suggestions for managing and reducing risks, as specified in the assessment, specifically in terms of preventative and mitigative measures are included in the design. - The overall design should be subject to a full Hazard and Operability Study (HAZOP) prior to finalisation of the design. - Prior to importing any solid-state battery containers into the country, the contractor should ensure that: - An Emergency Response Plan is in place that would be applicable for the full route from the ship to the site. This plan would include details of the most appropriate emergency response to fires both while the units are in transit and once they are installed and operating. - An End-of-Life plan is in place for the handling, repurposing or disposal of dysfunctional, severely damaged batteries, modules and containers. - The site layout and spacing between lithium solid-state containers should be such that it mitigates the risk of a fire or explosion event spreading from one container to another. - In order to limit the possibility of domino failures from the BESS onto transformers and to limit direct impacts of any fire or explosion on the substation, the BESS should be separated from the substation by at least 20 m, or greater if specified in local or International Standards. - In order to limit on-site risks, any office and maintenance buildings should be located at least 20 m, although preferably 50 m, from the BESS. - From a high-level SHE Risk Assessment perspective, where there is a choice of location that is further from public roads, water courses or isolated farmhouses/occupied developments, this would be preferred. Solid-state systems may experience fires that may result in toxic smoke and loss of containment of liquids or the use of large amounts of fire water which could be contaminated. One would not want

Specialist Assessment undertaken	<u>Key Impacts Identified</u>	Recommended Mitigation Measures
		these liquids to enter water courses nor the smoke to pass close to houses / public traffic. The current chosen location of the BESS meets these separation requirements, and the relevant specialists such as aquatic and geohydrology have provided inputs on setback distances. It is noted that there are no aquatic and geohydrological features in the BESS area. Finally, it is suggested once the BESS technology has been chosen and more details of the final design are available, the necessary updated Risk Assessments should be in place (prior to commencement, after EA and other necessary approvals are granted (should such be granted)).

SUMMARY OF THE KEY IMPACT ASSESSMENT FINDINGS

Based on the findings of the detailed specialist impact assessments, which are included in Appendix E of this EIA Report, the following is concluded for the proposed projects:

- **Biesjesvlei PV1**: With the implementation of mitigation measures, this project is considered to have an **overall Low to Very Low negative environmental impact, with some moderate negative environmental impacts for Terrestrial Biodiversity during the construction and operational phases; Aquatic Biodiversity during the construction and decommissioning phases, and Avifauna during the operational phase.** With the implementation of enhancement measures, this project is considered to have an **overall Moderate to Low positive socio-economic impact.** Refer to Table H.
- **Biesjesvlei BESS 1**: With the implementation of mitigation measures, this project is considered to have an **overall Low to Very Low negative environmental impact, with some moderate negative environmental impacts for Terrestrial Biodiversity during the construction phase; and Avifauna during the operational phase.** With the implementation of enhancement measures, this project is considered to have an **overall Moderate to Very Low positive socio-economic impact.** Refer to Table I.
- **Biesjesvlei EGI 1**: With the implementation of mitigation and enhancement measures, this project is considered to have an **overall Low to Very Low negative environmental impact, with some moderate negative environmental impacts Avifauna during operations.** Refer to Table J.

Based on Table K, the majority of the cumulative negative impacts were rated with a **Low or Very Low** post-mitigation impact significance for the **construction and decommissioning phases**, with the exception of Aquatic Biodiversity impacts, which were rated with a Moderate to Low post-mitigation impact significance; and Avifauna impacts, which were rated with a Moderate to Low post-mitigation impact significance for the construction phase (not identified for the decommissioning phase). A similar trend is applicable to the **operational phase**, with Visual impacts also being rated as **Moderate**. Socio-Economic cumulative impacts are rated as **Moderate** positive with the implementation of enhancement measures for the construction and operational phases.

Table H. Overall Impact Significance with the Implementation of Mitigation Measures for Direct Negative and Positive Impacts for Biesjesvlei PV1

Specialist Assessment	Construction Phase		Operational Phase		Decommissioning Phase	
DIRECT NEGATIVE IMPACTS						
Agriculture and Soils	Low		Low		Low	
Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species	Moderate	Low	Moderate	Low	Low	
Aquatic Biodiversity	Low	Moderate	Low		Low	Moderate

Specialist Assessment	Construction Phase		Operational Phase		Decommissioning Phase	
Avifauna	Low		Moderate	Low	Low	
Visual	Low		Low		Very Low	
Heritage (Archaeology and Cultural Landscape)	Low		Low		Low	
Palaeontology	Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable	
Socio-Economic	Low	Very Low	Not identified		Low	
Traffic	Low	Very Low	Insignificant		Low	Very Low
Geohydrology	Low	Very Low	Low	Very Low	Low	Very Low
Geotechnical	Low	Very Low	Low	Very Low	Low	Very Low
DIRECT POSITIVE IMPACTS						
Socio-Economic	Moderate		Low	Moderate	Insignificant and/or not identified and/or not applicable	
Avifauna	Not identified		Not identified		Moderate	

Table I. Overall Impact Significance with the Implementation of Mitigation Measures for Direct Negative and Positive Impacts for Biesjesvlei BESS 1

Specialist Assessment	Construction Phase		Operational Phase		Decommissioning Phase
DIRECT NEGATIVE IMPACTS					
Agriculture and Soils	Low		Low		Low
Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species	Moderate	Low	Low		Low
Aquatic Biodiversity	Low		Low		Low
Avifauna	Low		Moderate	Low	Low
Visual	Low		Low		Very Low
Heritage (Archaeology and Cultural Landscape)	Very Low		Very Low		Very Low
Palaeontology	Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable
Socio-Economic	Very Low		Not identified		Low

Specialist Assessment	Construction Phase		Operational Phase		Decommissioning Phase	
Traffic	Low	Very Low	Insignificant		Low	Very Low
Geohydrology	Very Low		Very Low		Very Low	
Geotechnical	Low	Very Low	Low	Very Low	Low	Very Low
DIRECT POSITIVE IMPACTS						
Socio-Economic	Low	Moderate	Very Low	Moderate	Insignificant and/or not identified and/or not applicable	

Table J. Overall Impact Significance with the Implementation of Mitigation Measures for Direct Negative and Positive Impacts for Biesjesvlei EGI 1

Specialist Assessment	Construction Phase		Operational Phase		Decommissioning Phase	
DIRECT NEGATIVE IMPACTS						
Agriculture and Soils	Low		Low		Low	
Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species	Low	Very Low	Low		Low	Very Low
Aquatic Biodiversity	Low		Low		Low	
Avifauna	Low		Moderate	Low	Low	
Visual	Low		Low		Very Low	
Heritage (Archaeology and Cultural Landscape)	Very Low		Very Low		Very Low	
Palaeontology	Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable	
Geotechnical	Low	Very Low	Low	Very Low	Low	Very Low
DIRECT POSITIVE IMPACTS						
Avifauna	Not identified		Not identified		Moderate	High

Table K. Overall Impact Significance with the Implementation of Mitigation Measures for Cumulative Negative and Positive Impacts

Specialist Assessment	Construction Phase		Operational Phase		Decommissioning Phase	
CUMULATIVE NEGATIVE IMPACTS						
Agriculture and Soils	Low		Low		Low	
Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species	Low		Low		Low	
Aquatic Biodiversity	Moderate	Low	Moderate	Low	Moderate	Low
Avifauna	Moderate	Low	Moderate	Low	Not identified	
Visual	Low		Moderate		Very Low	
Heritage (Archaeology and Cultural Landscape)	Low	Very Low	Low	Very Low	Low	Very Low
Palaeontology	Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable	
Traffic	Low	Very Low	Insignificant		Low	Very Low
Geohydrology	Low	Very Low	Low	Very Low	Low	Very Low
CUMULATIVE POSITIVE IMPACTS						
Socio-Economic	Moderate		Moderate		Not identified	

OVERALL ENVIRONMENTAL IMPACT ASSESSMENT AND REASONED OPINION FROM THE EAP

Note: The information in this section equally applies to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1), unless where mentioned otherwise.

The information presented above contributes to this overall environmental impact statement and reasoned opinion from the EAP as to whether the proposed projects should or should not be authorised, including any conditions that should be made in respect of the authorisation (should it be granted).

Based on the findings of the detailed specialist assessments and technical studies, which all recommend that the proposed projects can proceed and should be authorised by the DFFE, the proposed projects are considered to have an **overall Moderate to Very Low negative environmental impact, and an overall Moderate to Very Low positive socio-economic impact** (with the implementation of respective mitigation and enhancement measures). The proposed projects are considered to have an **overall Moderate to Very Low negative cumulative environmental impact, and an overall Moderate positive cumulative socio-economic impact** (with the implementation of respective mitigation and enhancement measures).

The proposed projects will take place within the development footprint on the preferred and approved project site, as contemplated in the accepted Final Scoping Report. The development footprint and buildable areas avoid the “no-go” sensitive features identified and mapped by the respective specialists, where relevant and applicable. The project layouts are final, avoid the “no-go” sensitivities for key infrastructure placement, and are based on the recommendations of the specialists. The specialists also confirmed that the project layouts are acceptable.

This EIA has considered the nature, scale and location of the development as well as the wise use of land. When considering the timing of this project, the IRP 2019 proposes to secure 17 800 MW of renewable energy capacity by 2030. As discussed in the preceding chapters of this EIA Report, it is the Project Applicant’s intention to bid this project in the future bidding rounds of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) and Battery Energy Storage Independent Power Producers Procurement Programme (BESIPPPP).

The proposed projects will be in line with and will be supportive of the objective of the MLM IDP in terms of creating more job opportunities. The proposed projects will assist in local job creation during the construction and operational phases (if approved by the DFFE). It should be noted that employment during the construction phase will be temporary.

Section 24 of the Constitutional Act states that *“everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that prevents pollution and ecological degradation; promotes conservation; and secures ecologically sustainable development and use of natural resources while promoting justifiable economic and social development”*. Based on this, this EIA was undertaken to ensure that these principles are met through the inclusion of appropriate management and mitigation measures, and monitoring requirements. These measures will be undertaken to promote conservation by avoiding the sensitive environmental features present on site and through appropriate monitoring and management plans (refer to the EMPs in Appendix J to Appendix O of this EIA Report).

The outcomes of these projects therefore succeed in meeting the environmental management objectives of protecting the ecologically sensitive areas and supporting sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development in the towns nearest to the project site. The findings of this EIA show that all natural resources will be used in a sustainable manner (i.e., this is a renewable energy, BESS and EGI project, and the majority of the negative site specific and cumulative environmental impacts are considered to be of low significance with mitigation measures implemented), while the benefits from the projects will promote justifiable economic and social development.

Taking into consideration the findings of the Scoping and EIA Process and given the national and provincial strategic requirements for infrastructure development, particularly from an electricity generation perspective, and based on the fact that the environmental sensitivity of the study area is low, medium, and high sensitivity, with some very high sensitivity areas, it is the opinion of the EAP, that the benefits of the projects outweigh the costs and that the projects will make a positive contribution to sustainable infrastructure development in the MLM, as well as the town of Smithfield.

Provided that the specified mitigation measures and management actions are applied effectively throughout, it is recommended that the proposed projects receive EA in terms of the 2014 NEMA EIA Regulations (as amended), promulgated under the NEMA.

It is understood that the information contained in this Final EIA Report and appendices is sufficient to make a decision in respect of the activities applied for.

It is recommended that the EAs (should they be granted) be **valid for a period of 10 years**. In addition, it is recommended that the EMPs compiled as part of this EIA Process, included in Appendix J to Appendix O of this EIA Report, be approved concurrently in the EAs (should they be granted). A detailed **final** layout of the PV Facility, BESS and EGI was identified during the EIA Phase, and included in Chapter 20 of the Final EIA Report, as well as Appendix D and the EMPs.



CHAPTER 1: Introduction

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1. INTRODUCTION

Scatec Africa (Pty) Ltd (the project owner) with support from Veroniva (Pty) Ltd, are proposing to develop three Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Facilities, and associated Electricity Grid Infrastructure (EGI), near Smithfield within the Mohokare Local Municipality, Xhariep District Municipality, Free State. The project is referred to as the “Biesjesvlei” Solar PV, BESS and EGI development.

The proposed projects will make use of PV solar technology to generate electricity from energy derived from the sun. Each solar PV facility will have a range of associated infrastructure and is proposed to connect to an existing 400 kV power line via dedicated 132 kV power lines, a proposed independent Main Transmission Substation (MTS) and a Loop-In-Loop-Out (LILO).

Each of the Solar PV Facilities would be its own project and would require its own, separate Environmental Authorisation (EA). The same applies to the BESS and EGI projects. Each project will have a specific Project Applicant. The following projects are being proposed (Figure 1.1):

- **PROJECTS 1 TO 3:** The proposed development of three Solar PV Facilities and associated infrastructure (i.e. Biesjesvlei PV1 to Biesjesvlei PV3).
- **PROJECTS 4 TO 6:** The proposed development of three BESS and associated infrastructure (i.e. Biesjesvlei BESS 1 to Biesjesvlei BESS 3).
- **PROJECTS 7 TO 9:** The proposed development of a 132 kV Overhead Power Line from each Biesjesvlei PV Facility to the proposed MTS, and associated infrastructure (i.e. Biesjesvlei EGI 1 to Biesjesvlei EGI 3).
- **PROJECT 10:** The proposed development of an independent 400/132kV MTS and a 400 kV LILO from the MTS to the existing Eskom power line, as well as associated infrastructure (i.e. Biesjesvlei MTS and LILO).

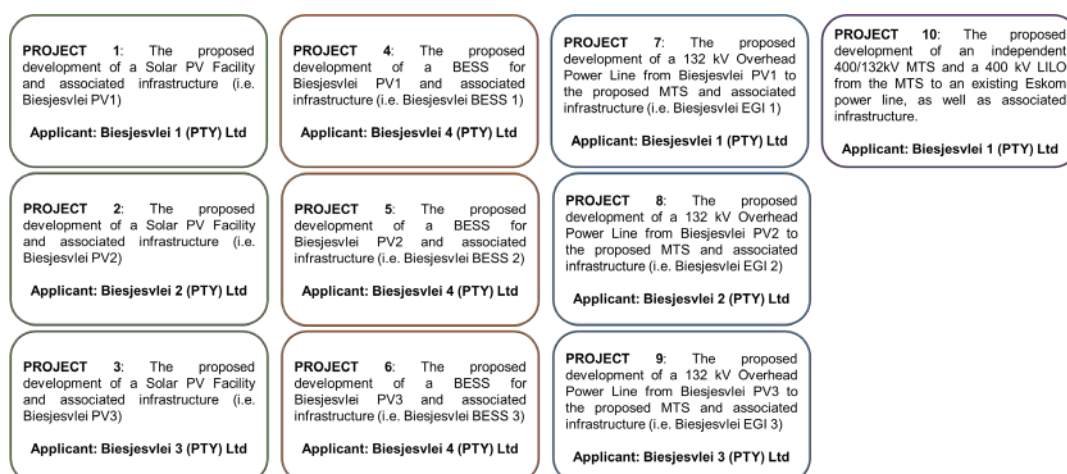


Figure 1.1: Breakdown of the projects that comprise the Biesjesvlei Solar PV, BESS, EGI, MTS and LILO Development.

1.1. Report Combination and Multiple EAs

A request to combine the Environmental Assessment reporting, for Projects 1 to 9, in terms of Regulation 11 of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations (as amended), and the issuing of multiple EAs in terms of Regulations 25 (1) and (2) was discussed with the Department of Forestry, Fisheries and the Environment (DFFE) at the Pre-Application Meeting on 6 October 2023. A letter was submitted to the DFFE via email on 11 October 2023 to motivate for the combination and issuing of multiple EAs. The DFFE approved the combination and multiple EA request in a letter dated 1 November 2023, sent via email on 6 November 2023. Refer to Appendix C.7 of this EIA Report for a copy of the DFFE approval of the report combination and multiple EAs (should they be granted).

As discussed at the Pre-Application Meeting on 6 October 2023, the report for Project 10 (Biesjesvlei MTS and LILO) is not included in the combined reporting because only one EA is required for this project. Hence, one standalone report has been compiled for Project 10.

The reporting structure indicated in Figure 1.2 has been used to undertake a consolidated assessment process and to ensure that the potential environmental impacts of each activity, in relation to the location at which they will take place, are considered. The combined reporting process reduces the administrative aspects on the Case Officer and reduces the number of reports that need to be reviewed by Interested and Affected Parties (I&APs), while still maintaining high levels of environmental rigour and clear reporting.

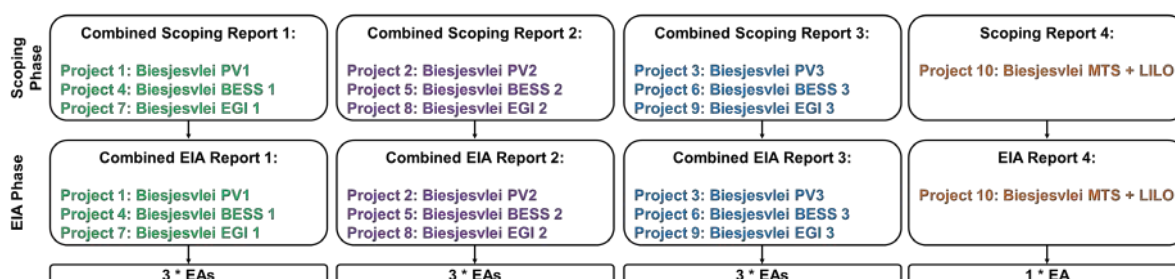


Figure 1.2: Environmental Assessment Reporting Structure for the Biesjesvlei Solar PV, BESS, EGI, MTS and LILO Development.

Therefore, separate combined reports have been compiled for each PV Facility, BESS and EGI cluster (i.e. Projects 1 to 9) and a separate EIA Report has been compiled for the MTS and LILO (i.e. Project 10). Overall, four EIA Reports have been compiled for the proposed development, as indicated in Figure 1.2 above, and it is proposed that 10 separate EAs will be issued (should they be granted).

In terms of the Public Participation Process (PPP), an integrated approach was followed for all 10 proposed projects. This forms an integral part of the Scoping and EIA Process and assists in identifying issues to be considered. Details on the PPP are included in Chapter 4 of this EIA Report.

This combined EIA Report only addresses **Biesjesvlei PV1, Biesjesvlei BESS 1 and Biesjesvlei EGI 1** (i.e. Projects 1, 4 and 7, respectively) (hereafter referred to as the “proposed projects”).

Note: The information throughout this chapter applies to each of the projects addressed in this report (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1)), unless where mentioned otherwise.

1.2. Chapter Overview

This chapter provides an introduction of the proposed projects, and includes the following:

- An overview of the proposed Solar PV Facility, BESS, EGI and associated infrastructure;
- Project Motivation;
- The legal requirements for an EIA;
- Information on the Project Owner, Project Developer and Project Applicant;
- The Competent Authority and EIA Project Team;
- Details and Expertise of the CSIR EIA Project Management Team;
- Need and Desirability;
- The objectives of the EIA Report; and
- Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (as amended).

Figure 1.3 provides a locality map of the proposed projects (Projects 1 to 10).

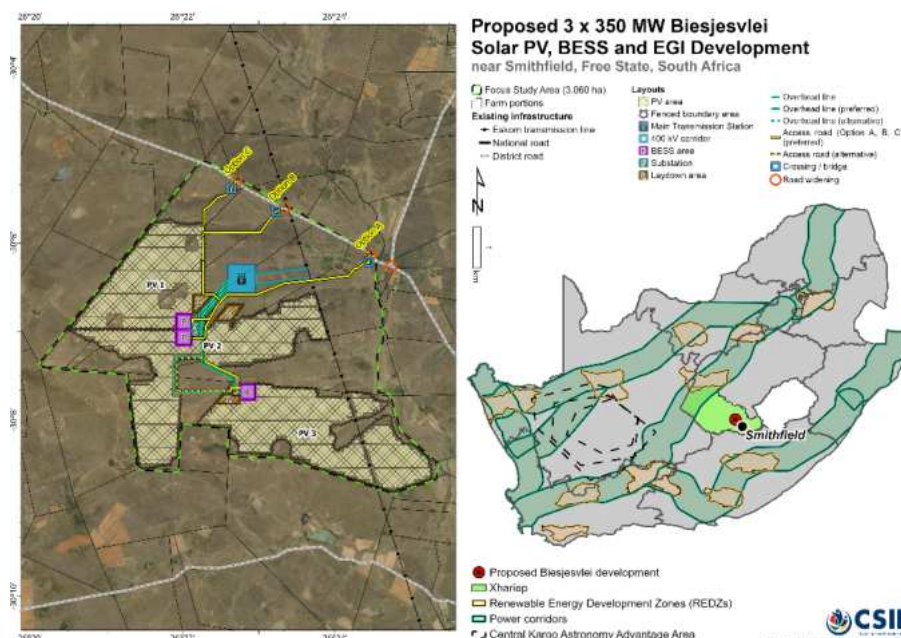


Figure 1.3: Locality map for the proposed Biesjesvlei Solar PV Facilities 1 to 3; Biesjesvlei BESS 1 to 3; Biesjesvlei EGI 1 to 3; and Biesjesvlei MTS and LILO, near Smithfield in the Free State.

1.3. Overview of the Proposed Projects

An overview of the key components of the proposed projects are described in this section. A detailed project description is provided in Chapter 2 of this EIA Report.

1.3.1. Biesjesvlei PV1 and associated infrastructure

The proposed Solar PV Facility will consist of the following key components:

- Solar field consisting of the PV array and panel mounting structures;
- Building infrastructure (such as Offices; Operational and maintenance (O&M) control centre; Warehouse / workshop; Ablution facilities; Converter / Inverter stations; and Guard Houses);
- PV Facility Independent Power Producer (IPP) Substation;
- On-site internal cables / power lines / cable trays;
- External access roads;
- Internal roads;
- Fencing;
- Panel maintenance and cleaning area;
- Storm water channels; and
- Laydown area.

The generation capacity for the PV facility is estimated at up to 350 Megawatts direct current (MWdc).

1.3.2. Biesjesvlei BESS 1 and associated infrastructure

A Lithium-Ion BESS is proposed, with a total BESS facility footprint of approximately 10 ha. The BESS will include the following sub-components:

- BESS units;
- BESS laydown area;
- BESS IPP Substation;
- Laydown area for the BESS IPP Substation;
- BESS O&M Office, including ablutions;
- External access roads;
- Internal roads;
- Internal cables;
- Stormwater infrastructure;
- Fencing and security; and
- Parking area.

1.3.3. Biesjesvlei EGI 1 and associated infrastructure

The proposed EGI will consist of the following key components:

- Switching station, which will be transferred from the IPP to Eskom following construction;
- 132 kV overhead power line from the proposed on-site substation to the MTS;
- Service road below the power line;
- Storm water channels; and
- Laydown area.

1.4. Project Motivation

The need for renewable energy is clear, in both a local and international context, with South Africa becoming an integral part of the global transition towards renewable sources of electricity generation. South Africa is one of the highest per capita producers of carbon emissions in the world. These emissions are largely a result of an energy-intensive economy and high dependence on coal-based electricity generation to meet more than 90% of its energy needs. Consequently, the South African government is committed to supplementing the existing generation capacity of thermal and nuclear power plants with renewable energy power generation, thus creating the framework that will lead to an increase in the supply of clean energy for the nation. The development of renewable energy is important for South Africa to reduce its overall environmental footprint from power generation (including externality costs), and thereby to steer the country on a pathway towards sustainability.

Commitment toward decarbonisation of the economy is clearly illustrated in South Africa's National Development Plan (NDP) Vision 2030 published in 2012. Chapters 4 and 5 of the NDP advocates for increased investment in an energy sector that is both economically inclusive and environmentally sustainable – with renewable energy at the core of enabling this transition. The plan identifies, as a priority, the production of sufficient energy to support industry at competitive prices, ensuring access for poor households, while reducing the carbon intensity of the economy.

In addition, due to the current constrained energy landscape and frequent loadshedding, the South African Government has articulated a plan to address the energy crisis. The President of South Africa delivered a speech on 25 July 2022 to inform the public of the plan towards achieving a reliable, affordable and sustainable energy supply (The Presidency, 2022¹). In addition, the Minister of Forestry, Fisheries and the Environment also held a stakeholder engagement session on 21 July 2022 during which she highlighted proposed mechanisms for streamlining environmental approvals for solar energy development in low and medium sensitivity areas throughout the country; as well as power line and substation development within low and medium sensitivity areas within the gazetted EGI corridors (DFFE, 2022²). Some of these mechanisms have already been gazetted for implementation (i.e. the EGI Standard published in Government Gazette (GG) 47095; GN 2313, dated 27 July 2022; Solar Exclusion Norm published in GG 50388;

¹ The Presidency (2022). *Address by President Cyril Ramaphosa on actions to address the electricity crisis, Union Buildings, Tshwane*. Accessed online: <https://www.thepresidency.gov.za/speeches/address-president-cyril-ramaphosa-actions-address-electricity-crisis%2C-union-buildings%2C-tshwane> [August 2022]

² DFFE (2022). *Minister Creecy announces improved environmental assessment processes for solar energy*. Accessed online: https://www.dffe.gov.za/creecy_environmentalassessmentprocesses_solarenergy [August 2022]

GN 4558, dated 27 March 2024; and Battery Storage Exclusion Norm published in GG 50387; GN 4557, dated 27 March 2024).

Furthermore, on 19 May 2023, the Minister of Forestry, Fisheries and the Environment delivered feedback on the DFFE's Budget Vote 2023/24 (Vote 32) at the Good Hope Chamber in Parliament (DFFE, 2023³). She reported that the DFFE IEA Directorate had a review project pipeline of 9 789 MW for renewable energy EA Applications. The Minister also reported that the DFFE had reduced decision-making timeframes for renewable energy EA applications from 107 days to 57 days, as best as possible (DFFE, 2023). The latter was also reiterated during the 2024/25 (Vote 32) DFFE's Budget Vote Speech (DFFE, 2024⁴).

Further, the Integrated Resource Plan (IRP) for South Africa for the period 2010 to 2030 (referred to as "IRP2010") was released by government in 2010, and an updated report was published in 2013, which proposed to secure 17 800 MW of renewable energy capacity by 2030 (including solar, wind and other energy sources). In August 2011, the Department of Energy (DoE) (previously operating as the Department of Mineral Resources and Energy (DMRE)⁵) launched the Renewable Energy Independent Power Producer Programme (REIPPPP) and invited potential IPPs to submit proposals for the financing, construction, operation and maintenance of the first 3 725 MW of onshore wind, solar thermal, PV, biomass, biogas, landfill gas or small hydropower projects. On 18 August 2015, an additional procurement target of 6 300 MW to be generated from renewable energy sources was added to the REIPPPP for the years 2021 - 2025, as published in GN 733, GG 39111. Of this, the additional target allocated for solar PV was 2 200 MW.

The IRP 2019⁶ was gazetted by the Minister of Mineral Resources and Energy, Gwede Mantashe, in October 2019. The update revised the energy forecast for South Africa to the year 2030. Provision has been made for new additional capacity by 2030 including in particular 14 400 MW of wind and 6 000 MW of solar PV. In terms of the REIPPPP, submitted proposals are then evaluated according to a Request for Proposal (RFP). The bidders whose responses rank the highest (according to stipulated criteria) generally have the greatest potential to be appointed as "Preferred Bidders" by the DMRE.

Bidding Window 5 was conducted during 2021 with an allocation of 2 600 MW for new wind and solar energy. The successful bidders were announced on 28 October 2021.

Bidding Window 6 was announced in April 2022 with an allocation of 4200 MW of renewable energy of which solar comprises 1000 MW. Six preferred bidders have been selected for Bidding Window 6 for solar PV projects.

³ DFFE (2023). Minister Barbara Creecy: Forestry, Fisheries and the Environment Dept Budget Vote 2023/24. Accessed online: <https://www.gov.za/speeches/minister-barbara-creecy-forestry-fisheries-and-environment-dept-budget-vote-202324-19-may> [November 2023]

⁴ DFFE (2024). Minister D George (Dr): 2024/25 Budget Vote Speech (Vote 32) for Forestry, Fisheries and the Environment. Accessed online: https://www.dffe.gov.za/speech/george_dffe2024.25budgetvote32 [July 2024]

⁵ Following the announcement of the National Executive of the 7th Administration, it is understood that the Ministries of Electricity and Energy will be merged; and that there will be a separate Ministry of Mineral and Petroleum Resources. For purposes of this EIA Report, the term DMRE has been retained for simplicity.

⁶ The IRP was updated in 2023 (2023 Draft IRP) and released for public comment in January 2024. It has not been gazetted for implementation yet.

Bidding Window 7 was announced in December 2023 and closed in August 2024. It aims to procure 5 000 MW (i.e. 3 200 MW from wind and 1 800 MW from Solar PV).

Should these proposed Biesjesvlei projects be acceptable and authorised, it is considered viable that long-term benefits for the community and society in the Smithfield area would be realised. The proposed projects will provide an opportunity for additional employment in an area where job creation is identified as a key priority. The proposed projects will make use of local labour as much as possible. It is difficult to specify the actual number of employment opportunities that will be created at this stage; however, estimates are provided below for each proposed project:

- For Project 1 – Biesjesvlei PV1 and associated infrastructure, it is envisaged that between 90 and 150 skilled and between 400 and 460 unskilled employment opportunities will be created during the construction phase. Approximately 20 skilled and 40 unskilled employment opportunities will be created during the operational phase over the lifespan of the proposed project.
- For Project 4 – Biesjesvlei BESS 1 and associated infrastructure, it is envisaged that between 10 and 20 skilled; and between 20 and 40 unskilled employment opportunities will be created during the construction phase. Between 1 and 35 skilled; and between 2 and 4 unskilled employment opportunities will be created during the operational phase over the lifespan of the proposed project.
- For Project 7 – Biesjesvlei EGI 1 and associated infrastructure, it is envisaged that between 10 and 20 skilled; and between 30 and 40 unskilled employment opportunities will be created during the construction phase. Between 1 and 3 skilled; and between 2 and 5 unskilled employment opportunities will be created during the operational phase over the lifespan of the proposed project.

It should be noted that the employment opportunities estimates are dependent on the final engineering design and the REIPPPP RFP provisions at that point in time.

The proposed projects are intended to address the current energy shortages in South Africa and assist in meeting the need for additional renewable energy generation capacity, as required by the IRP. The total generation capacity of the entire project (i.e. should all three Solar Facilities be authorised) would be in the order of up to 1 050 MWdc.

As a means of comparison, for 2023 the municipal area of Bloemfontein in the Free State had a total electricity load forecast of 507 MW, whilst the province itself had a peak load of 1 623 MW (Eskom, 2023⁷). The total provincial peak load forecast for the Free State is expected to increase to about 1 798 MW by 2032 (Eskom, 2023).

The proposed projects would also have international significance as they contribute to South Africa being able to meet some of its international obligations by aligning domestic policy with internationally agreed strategies and standards as set by the United Nations Framework

⁷ Eskom (2023). Transmission Development Plan (2023 – 2033). Accessed online: https://www.eskom.co.za/wp-content/uploads/2023/01/Transmission_Development_Plan_2023%E2%80%932032_Rev1.pdf [October 2023].

Convention on Climate Change (UNFCCC), the Paris Agreement on Climate Change, Kyoto Protocol, and United Nations Convention on Biological Diversity (UNCBD), all of which South Africa is a signatory to. Renewable energy is critical to South Africa as this source of energy is recognised as a major contributor to climate protection, has a much lower environmental impact significance, as well as advancing economic and social development.

The development of utility-scale solar PV is the least cost option for South Africa for new electricity generation. The shortage of electricity generation and continued load-shedding is a major constraint on economic recovery for South Africa. Consequently, the development of new solar PV such as proposed in the Biesjesvlei package of projects is urgently needed and will bring significant socio-economic benefits by contributing to national energy security.

It is intended that these projects will be bid into a future bidding program such as the REIPPPP and Battery Energy Storage Independent Power Producers Procurement Programme (BESIPPPP) (or another suitable tender process linked to the IRP). To submit a Bid in terms of the REIPPPP, the Project Applicants are required to have obtained EAs in terms of the 2014 NEMA EIA Regulations (as amended), as well as several additional authorisations or consents.

1.5. Legal Requirements for an EIA

Section 24(1) of the NEMA, states that *“In order to give effect to the general objectives of integrated environmental management laid down in this Chapter, the potential impact on the environment of listed activities must be considered, investigated, assessed and reported to the competent authority charged by this Act with granting the relevant EA”*. The reference to “listed activities” relates to the regulations promulgated in GN R982, R983, R984 and R985 in GG 38282, dated 4 December 2014, which came into effect on 8 December 2014. These were amended on 7 April 2017, specifically promulgated in GN R326, R327, R325 and R324 in GG 40772; and further amended on 11 June 2021 in GN 517; and on 3 March 2022 in GN 1816. GN R327 and GN R324 includes listed activities that trigger the need for a Basic Assessment (BA) Process, whereas GN R325 includes listed activities that trigger the need for a full Scoping and EIA Process. Additional detail is provided in Chapter 4 of this EIA Report.

Individually, Project 1 (Biesjesvlei PV1) requires a Scoping and EIA Process; Project 4 (Biesjesvlei BESS 1) requires a BA Process; and Project 7 (Biesjesvlei EGI 1) requires a BA Process in terms of the 2014 NEMA EIA Regulations (as amended). However, the proposed projects (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1)) have collectively been subjected to a Scoping and EIA Process; and combined reporting has accordingly been approved by the DFFE.

Furthermore, the proposed projects are not located within any of the Renewable Energy Development Zones (REDZs) that were gazetted in GN 114 on 16 February 2018; and GN 144 on 26 February 2021. The proposed projects are also not located within any of the Strategic Transmission Corridors that were gazetted in GN 113 on 16 February 2018; and GN 1637 on 24 December 2021.

Chapter 4 of this EIA Report contains a detailed list of activities contained in GN R327, R325, and R324, which may be triggered by each project and the various project components and thus forms part of this Scoping and EIA Process. Listed below are the key listed activities triggered per project (Table 1.1).

Table 1.1: Key Listed Activities Per Project

Project	Listing Notice, Listed Activity and Description
Project 1: Biesjesvlei PV1 and associated infrastructure	GN R325 (Listing Notice 2), Activity 1: The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facility or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure.
Project 4: Biesjesvlei BESS 1 and associated infrastructure	GN R327 (Listing Notice 1), Activity 27: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.
Project 7: Biesjesvlei EGI 1 and associated infrastructure	GN R327 (Listing Notice 1), 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.

1.6. Project Owner and Developer

Scatec Africa (Pty) Ltd and Veroniva (Pty) Ltd are committed to developing renewable energy in South Africa, and thus investing in the country.

Scatec (formerly Scatec Solar) was founded in 2001 and holds its headquarters in Norway. Scatec is focused on making renewable energy a sustainable and affordable source on a global scale. The company develops, builds, owns and operates a number of renewable energy plants internationally and within Africa. The company currently has over 20 power plants in operation providing an estimated total of 3 025 MW. These power plants include Hydro, Solar and Wind; and are located in Brazil, Czech Republic, Egypt, Honduras, Jordan, Laos, Malaysia, Mozambique, Philippines, Rwanda, South Africa, Uganda, Ukraine, and Vietnam.

Specifically linked to investment within South Africa, Scatec Africa (Pty) Ltd has been involved in the following major solar energy projects and has successfully constructed projects under the REIPPPP and Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP):

- **Upington:** This consists of three solar power plants totalling 258 MW, approximately 25 km outside of Upington. These plants are in operation. It was awarded preferred bidder status in the REIPPPP Bidding Window 4 in 2015. The projects started commercial operation in 2020. In 2023, Scatec sold its equity share in the project but continues to provide Operations & Maintenance and Asset Management services to the power plant.
- **Linde:** This includes a 40 MW solar plant located in the Northern Cape. This plant is in operation. It was commissioned in July 2014 and holds a 20-year Power Purchase Agreement

(PPA) with Eskom. It is considered to be the first of the large-scale PV plants in production from the Bidding Window 2 of the REIPPPP.

- **Dreunberg:** This includes a 75 MW solar plant located in the Eastern Cape. This plant is in operation. It was commissioned in December 2014 and was the second project won under Bidding Window 2 of the REIPPPP. The project holds a 20-year PPA with Eskom.
- **Kalkbult:** This includes a 75 MW solar plant located in the Northern Cape. This plant is in operation and is one of the largest solar plants in South Africa. It was commissioned in March 2014 and was the first project commissioned under Bidding Window 1 of the REIPPPP and the first project to be connected to the grid and operational in South Africa. The project holds a 20-year PPA with Eskom.
- **Kenhardt 1-3:** In 2021, Scatec was awarded preferred bidder status for the three Kenhardt Solar PV projects in the Northern Cape, under the RMIPPPP. The projects have been constructed and are currently in operation and have a total capacity of 540 MW. It also includes 1 140 MWh battery storage. The power is sold under a 20-year PPA with Eskom.
- **Grootfontein 1-3 (Bidding Window 5):** In October 2021, Scatec was awarded preferred bidder status on three solar projects totalling 273 MW. Construction commenced in Quarter 1 of 2024. The power produced will be sold under 20-year PPAs.

Veroniva (Pty) Ltd (hereafter referred to as Veroniva) was founded in 2012 and is a leading renewable energy developer specialising in developing large-scale renewable energy projects in Southern Africa. Veroniva has successfully developed (from site identification to fully permitted) projects of more than 1 400 MW. Specifically, Veroniva has developed 813 MW of peak solar PV capacity projects in South Africa, which have been awarded to IPPs under RMIPPPP and REIPPPP. This includes the Kenhardt 1-3 projects, as well as the Grootfontein 1-3 (Bidding Window 5) projects listed above being taken forward by Scatec.

1.7. Project Applicants

Each of the proposed projects will have a dedicated Project Applicant, as indicated in Table 1.2.

Table 1.2: Applicant Per Project

Project	Applicant
Project 1: Biesjesvlei PV1 and associated infrastructure	Biesjesvlei 1 (Pty) Ltd
Project 4: Biesjesvlei BESS 1 and associated infrastructure	Biesjesvlei 4 (Pty) Ltd
Project 7: Biesjesvlei EGI 1 and associated infrastructure	Biesjesvlei 1 (Pty) Ltd

1.8. Competent Authority

The 2014 NEMA EIA Regulations, as amended in GN 517 on 11 June 2021 states that the Competent Authority (CA) in respect of the listed activities *“is the CA in the province in which the activity is to be undertaken, unless: (a) it is an application for an activity contemplated in Section 24C(2) of the Act, in which case the CA is the Minister or an organ of state with delegated powers*

in terms of Section 42(1) of the Act; or (b) the application is a mining application in which case the CA is the Minister responsible for mineral resources”.

With relevance to the proposed projects, Section 24C (2) (a) (i) of NEMA states “(2) *the Minister must be identified as the competent authority in terms of subsection (1), unless otherwise agreed to in terms of section 24C (3), if the activity (a) has implications for international environmental commitments or relations, and where (i) it is identified by the Minister by notice in the Gazette*”.

The CA determination for each proposed project is discussed below.

1.8.1. Biesjesvlei PV1 and associated infrastructure

Related to the above, GN 779 states that, in terms of Sections 24C(1), 24C(2)(a)(i) and 24D of the NEMA, the Minister of Environmental Affairs (now Forestry, Fisheries and the Environment) is the CA for activities which are identified as activities in terms of Section 24(2)(a) of NEMA, which may not commence without an EA, and which relates to the IRP 2010 – 2030 and any updates thereto. The proposed project triggers various listed activities and thus requires EA. As noted above, the proposed project will be bid into a future bidding program of the REIPPPP. Therefore, based on the above, the National DFFE serves as the CA for the proposed Biesjesvlei PV1 project.

1.8.2. Biesjesvlei BESS 1 and associated infrastructure

Related to the above, GN 779 states that, in terms of Sections 24C(1), 24C(2)(a)(i) and 24D of the NEMA, the Minister of Environmental Affairs (now Forestry, Fisheries and the Environment) is the CA for activities which are identified as activities in terms of Section 24(2)(a) of NEMA, which may not commence without an EA, and which relates to the IRP 2010 – 2030 and any updates thereto. The proposed project triggers various listed activities and thus requires EA. The proposed project will be bid into a future bidding program of the BESIPPPP. In addition, energy storage is part of the IRP and the energy mix. Therefore, the National DFFE serves as the CA for the proposed Biesjesvlei BESS 1 project. This was confirmed with the DFFE at the Pre-Application Meeting on 6 October 2023. Refer to Appendix C.4 of this EIA Report for a copy of the Pre-Application Meeting Notes.

1.8.3. Biesjesvlei EGI 1 and associated infrastructure

The proposed project triggers various listed activities and thus requires EA. The EGI is part of the Solar PV Facility, and was assessed in a combined report, thus it constitutes all associated infrastructure that supports a generation facility to be bid into the REIPPPP. Therefore, the National DFFE serves as the CA for the proposed Biesjesvlei EGI 1 project. This was confirmed with the DFFE at the Pre-Application Meeting on 6 October 2023. Refer to Appendix C.4 of this EIA Report for a copy of the Pre-Application Meeting Notes.

1.9. EIA Project Team

In accordance with Regulation 12 (1) of the 2014 NEMA EIA Regulations (as amended), the Council for Scientific and Industrial Research (CSIR) Environmental Management Services (EMS) group has been appointed to undertake the required Environmental Assessment Processes in order to determine the potential biophysical, social and economic impacts associated with the proposed developments, and to identify how such negative impacts can be avoided, remedied, mitigated or managed; and how positive impacts can be enhanced.

The project team, which is involved in this Scoping and EIA Process, is listed in Table 1.3 below. This team includes several specialists who have extensive experience in conducting specialist studies for renewable energy, BESS and EGI projects in South Africa. The specialist studies relevant to the proposed Biesjesvlei PV1, Biesjesvlei BESS 1 and Biesjesvlei EGI 1 projects (i.e. Projects 1, 4 and 7, respectively) are also indicated in Table 1.3 below. The term “N/A” in the table below indicates that the specialist study in question is not relevant to that specific project. Chapter 4 also includes motivation for not undertaking certain studies identified by the Screening Tool.

Table 1.3: The EIA Project Team

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN	PROJECT 1 – PV1	PROJECT 4 – BESS 1	PROJECT 7 – EGI 1
Environmental Management Services (CSIR)					
Paul Lochner (<i>Registered EAP (2019/745)</i>)	CSIR	EAP, Technical Advisor and Quality Assurance	✓	✓	✓
Rohaida Abed (<i>Pr.Sci.Nat. and Registered EAP (2021/4067)</i>)	CSIR	EAP and Project Manager	✓	✓	✓
Helen Antonopoulos (<i>Cand.Sci.Nat.</i>)	CSIR	Project Officer	✓	✓	✓
Suvasha Ramcharan (<i>Cand.Sci.Nat.</i>)	CSIR	Project Officer	✓	✓	✓
Phindile Mthembu	CSIR	Project Officer	✓	✓	✓
Luanita Snyman van der Walt (<i>Pr.Sci.Nat.</i>)	CSIR	GIS Specialist	✓	✓	✓
Lizande Kellerman (<i>Pr.Sci.Nat.</i>)	CSIR	Public Participation Specialist	✓	✓	✓
Specialists					
Johann Lanz (<i>Pr.Sci.Nat.</i>)	Private	Agriculture and Soils Compliance Statement	✓	✓	✓
Corné Niemandt (<i>Pr.Sci.Nat.</i>) Samuel Laurence (<i>Pr.Sci.Nat.</i>)	Enviro-Insight cc	Terrestrial Biodiversity Assessment, Terrestrial Plant Species Compliance Statement, and Terrestrial Animal Species Compliance Statement	✓	✓	✓
Russell Tate (<i>Pr.Sci.Nat.</i>)	Tate Environmental Specialist Services (sub-contracted by Enviro-Insight)	Aquatic Biodiversity and Species Assessment	✓	✓	✓
Samuel Laurence (<i>Pr.Sci.Nat.</i>)	Enviro-Insight cc	Avifauna Impact Assessment	✓	✓	✓
Quinton Lawson (<i>SACAP, 3686</i>) Bernard Oberholzer (<i>SACLAP, 87018</i>)	QARC and BOLA	Visual Impact Assessment	✓	✓	✓

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN	PROJECT 1 – PV1	PROJECT 4 – BESS 1	PROJECT 7 – EGI 1
Dr Jayson Orton (<i>APHP: Member 43; ASAPA CRM Section: Member 233</i>)	ASHA Consulting (Pty) Ltd	Heritage Impact Assessment (Archaeology and Cultural Landscape)	✓	✓	✓
Dr John Almond (<i>PSSA and APHP Member</i>)	Natura Viva cc	Palaeontology	✓	✓	✓
Sue Reuther	SLR Consulting	Socio-Economic Impact Assessment	✓	✓	N/A
Annebet Krige (<i>Pr Eng</i>)	Sturgeon Consulting	Traffic Impact Assessment	✓	✓	N/A
Dale Barrow (<i>Pr.Sci.Nat.</i>) Hardy Luttig Louis Jonk (<i>Pr.Sci.Nat.</i>) Julian Conrad	GEOSS South Africa (PTY) Ltd	Geohydrology Assessment	✓	✓	N/A
Dale Barrow (<i>Pr.Sci.Nat.</i>) Hardy Luttig Louis Jonk (<i>Pr.Sci.Nat.</i>) Julian Conrad	GEOSS South Africa (PTY) Ltd	Geotechnical Letter of Professional Opinion	✓	✓	✓
Debbie Mitchell (<i>Pr Eng</i>)	Ishecon cc	Battery Storage High Level Safety, Health and Environment Risk Assessment	N/A	✓	N/A
Rohaida Abed (<i>Pr.Sci.Nat. and Registered EAP (2021/4067)</i>) Lizande Kellerman (<i>Pr.Sci.Nat.</i>) Willan Adonis ⁸	CSIR	Civil Aviation Site Sensitivity Verification	✓	✓	✓
Rohaida Abed (<i>Pr.Sci.Nat. and Registered EAP (2021/4067)</i>) Lizande Kellerman (<i>Pr.Sci.Nat.</i>) Willan Adonis ⁹	CSIR	Defence Site Sensitivity Verification	✓	N/A	N/A

1.10. Details and Expertise of the CSIR EIA Project Management Team

This section provides information on the expertise of the CSIR EIA Project Management Team and Environmental Assessment Practitioner (EAPs).

Paul Lochner (*Registered EAP; Technical Advisor and Quality Assurance*):

Paul Lochner is an EAP at the CSIR in Stellenbosch, with over 30 years of experience in a wide range of environmental assessment and management studies. Paul commenced work at CSIR in 1992, after completing a B.Sc. degree in Civil Engineering and a Masters in Environmental Science, both at the University of Cape Town. His initial work at focused on wetlands and estuarine management; environmental engineering in the coastal zone; and coastal zone management plans. Since 2008, Paul has been the leader and manager of the Environmental Management Services (EMS) group within CSIR that has been at the forefront of advancing environmental assessment in South Africa. This group currently consists of approximately 12 environmental scientists, planners and engineers, with offices in Stellenbosch, Cape Town and Durban. Paul's particular experience is in environmental planning and assessment for renewable energy, EGI, desalination, oil and gas, wetlands and coastal zone management, and industrial and port development. He has been closely involvement in the research and application of Strategic

⁸ This staff member resigned from the CSIR at the end of December 2023.

⁹ This staff member resigned from the CSIR at the end of December 2023.

Environmental Assessment (SEA) in South Africa, and also has wide experience in Environmental and Social Impact Assessment, Environmental Management Programmes (EMPrs) and Environmental Screening Studies. He has been the project leader for over 40 SEAs and EIAs. He also served as project leader for a suite of SEAs commissioned by the DFFE from 2014 to 2020. Paul is a Registered EAP (2019/745) with the Environmental Assessment Practitioners Association of South Africa (EAPASA).

Rohaida Abed (*Pr. Sci. Nat. and Registered EAP, Project Manager*):

Rohaida Abed is an EAP in the EMS group of the CSIR. She has 14 years of experience in the Environmental Management field, and has been involved in various transport infrastructure related projects as an Environmental Control Officer. She has also been involved in BAs and EIAs relating to renewable energy, port infrastructure and bulk liquid storage facilities in the capacity of Project Manager. She also worked on the SEA for Gas Pipeline and EGI Expansion from 2017 to 2019, which was commissioned by the National Departments of Environmental Affairs, Energy and Public Enterprises. She is a registered Professional Natural Scientist (400247/14) with the South African Council for Natural Scientific Professions (SACNASP), and a Registered EAP (2021/4067) with the EAPASA.

Helen Antonopoulos (Project Officer):

Helen Antonopoulos is an Environmental Scientist in the EMS group of the CSIR and holds BSc, BSc Honours, and MSc degrees in Environmental and Geographical Science from the University of Cape Town. She has compiled numerous EA applications, and BA, Scoping and EIA Reports for Wind and Solar Energy Facilities in the Western Cape, Northern Cape, and Free State. She currently serves as member of the National Executive Committee (NEC) of the International Association for Impact Assessment South Africa (IAIASa). Helen is a registered Candidate Natural Scientist (169440) with the SACNASP.

Suvasha Ramcharan (Project Officer):

Suvasha Ramcharan is an Environmental Scientist in the EMS group at the CSIR in Durban. Suvasha holds a BSc, BSc Honours, and MSc (*cum laude*) degrees in Environmental Science from the University of KwaZulu-Natal. She has compiled numerous EA Applications, Scoping and EIA Reports, BA Reports and EMPrs for renewable energy projects in the Eastern Cape, Western Cape, Northern Cape and Mpumalanga. Suvasha is a registered Candidate Natural Scientist (159219) with the SACNASP.

Phindile Mthembu (Project Officer):

Phindile holds a BSS and BSc Honours in Geography and Environmental Management from the University of KwaZulu-Natal, and a MSc in Geography from the University of KwaZulu-Natal. She has experience in reviewing BA, Scoping and EIA Reports for various projects for Provincial Government. She is an Environmental Consultant in training at the CSIR EMS group. At the CSIR, she has assisted in compiling BA, Scoping and EIA Reports for wind and solar energy facilities in various provinces. Her area of interests includes reviewing and conducting EIAs. She is also part of the project team for the Phase 3 Wind and Solar SEA.

1.11. Need and Desirability

A review of the need and desirability of the proposed projects is an important requirement of the EIA Process. Guidelines on Need and Desirability were published by the then Department of Environmental Affairs (DEA) [now operating as the DFFE] in 2017¹⁰. These guidelines list specific questions to determine need and desirability of proposed developments. This checklist is a useful tool in addressing specific questions relating to the need and desirability of a project and assists in explaining that need and desirability at the provincial and local context. Need and desirability answer the question of whether the activity is being proposed at the right time and in the right place.

Table 1.4 includes a list of questions based on the DFFE's Guideline to determine the need and desirability of the proposed projects. This table is informed by the outcomes of the Scoping and EIA Process, including the Specialist Studies / Inputs / Letter of Opinions completed in the EIA Phase. Note that Specialist Studies / Inputs / Letter of Opinions are included in Appendix E of this EIA Report, and where relevant, the findings of these studies have been integrated into this table.

It is important to reiterate that the information provided in Table 1.4 below applies to each of the projects addressed in this report (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1)), unless where mentioned otherwise.

¹⁰ DEA (2017), Guideline on Need and Desirability, Department of Environmental Affairs (DEA), Pretoria, South Africa. ISBN: 978-0-9802694-4-4.

Table 1.4: The Guideline on the Need and Desirability's list of questions to determine the "Need and Desirability" of the proposed projects.

NEED	
Question	Response
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?	
1.1. How were the following ecological integrity considerations taken into account?: 1.1.1. Threatened Ecosystems, 1.1.2. Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure, 1.1.3. Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs"), 1.1.4. Conservation targets, 1.1.5. Ecological drivers of the ecosystem, 1.1.6. Environmental Management Framework, 1.1.7. Spatial Development Framework, and 1.1.8. Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).	The ecological integrity considerations such as Threatened Ecosystems; sensitive ecosystems; Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs); and conservation targets have been taken into consideration through environmental screening. At the commencement of this Scoping and EIA Process, the study area was plotted on the National Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool to identify high-level environmental sensitivities, which include various relevant features relating to ecological integrity. The specialists considered these sensitivities and undertook Site Sensitivity Verifications (SSVs) within the study area, where required, in order to confirm or dispute the sensitivities identified by the Screening Tool. The specialists then formulated environmental feature and sensitivity maps for the study area. Thereafter, the Project Developer took such sensitivities, and other considerations, into account and formulated the Buildable Areas, which avoid the no-go areas identified by the specialists. The Buildable Areas were also used to inform the design of the layout. The layout has been further refined and/or detailed during the EIA Phase. The layout avoids the no-go areas identified by the specialists. In some areas, linear infrastructure such as access roads and power lines traverse these areas, which is permitted by the relevant specialists as adequate mitigation measures have been provided and incorporated into the relevant Environmental Management Programmes (EMPRs). The ecological sensitivities present within the study area have been addressed in detail in the following assessments in the EIA Phase: ▪ Terrestrial Biodiversity Assessment, and Terrestrial Plant and Animal Species Compliance Statement (Appendix E.2 of this EIA Report); ▪ Aquatic Biodiversity and Species Assessment (Appendix E.3 of this EIA Report); and ▪ Avifauna Assessment (Appendix E.4 of this EIA Report). During the EIA Phase, the specialists have identified mitigation measures which guide suitable development within these areas so that the ecological integrity is maintained.

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Question	Response
	As indicated in the Terrestrial Biodiversity Assessment (Appendix E.2 of this EIA Report), the study area is located in the Aliwal North Dry Grassland (Gh2) vegetation type, which is listed as <u>Least Threatened</u> under the <i>Revised National List of Threatened Terrestrial Ecosystems</i> (Government Gazette 47526, Government Notice 2747, 18 November 2022). The Terrestrial Biodiversity Assessment further notes that the vegetation type, though being affected by dryland crop cultivation, is not under sufficient development pressures to be considered a threatened ecosystem. Therefore, the proposed projects do not impact any Threatened Ecosystems. This study further notes that the Aliwal North Dry Grassland vegetation type has a conservation target of 24 %; and only a minor portion is statutorily conserved in the Caledon Nature Reserve, which lies more than 50 km of the study area for the proposed projects. The Terrestrial Biodiversity Assessment, Aquatic Biodiversity Assessment and Avifauna Assessment (Appendix E.2, Appendix E.3 and Appendix E.4 of this EIA Report, respectively) have considered sensitive ecosystems, such as wetlands, in detail and provided adequate mitigation measures to reduce the significance of potential impacts on these systems. In terms of CBAs and ESAs, a Screening Tool Report generated during the screening phase of the proposed projects, in November 2022, indicated that the study area only contained ESA 1 and 2. This was based on the 2015 Free State Province Biodiversity Plan (FSPBP). However, a more recent Screening Tool Report generated following specialist SSVs indicated that the study area contains CBA 1 and 2, as well as ESA 1 and 2. This is based on the 2019 FSPBP that was made available on the Screening Tool. Based on feedback received from the Free State Department of Small Business Development, Tourism and Environmental Affairs (DESTEA), the reason for the change from ESA to CBA was due to aquatic features. Refer to Appendix G.3 of this EIA Report for a copy of this DESTEA correspondence. Conservation planning data is generally at a coarse spatial resolution. As such, in order to effectively and accurately account for the habitat features which are responsible for the classification of the hexagons (planning units) under the FSPBP, the appointed Aquatic Biodiversity specialist delineated the wetland areas and identified buffer zones for the proposed projects. These areas confirmed the status provided in the conservation plan features but refined the extent (i.e. the specialist SSV has refined the exact locations of the CBA, as well as provided suitable buffer classifications). The proposed projects avoid the wetlands delineated

NEED	
Question	Response
	by the Aquatic Specialist. Access roads traverse these areas; however, this is acceptable as adequate mitigation has been recommended and included in the EMPs. The appointed Aquatic Biodiversity specialist and Terrestrial Biodiversity specialist explain that development on the terrestrial portions within the CBA hexagons is not considered a fatal flaw for the proposed projects. Note that the main infrastructure associated with Biesjesvlei Projects 1 to 10 are not located within any of the wetlands identified by the Aquatic Biodiversity specialist. In addition, all the Biesjesvlei projects, except for part of Biesjesvlei PV3 (Project 3) [which is the subject of a separate report], are not located within any of the terrestrial portions of the CBA hexagons identified in the 2019 FSPBP. For additional information, refer to the Specialist Assessments for Terrestrial Biodiversity and Species, and Aquatic Biodiversity and Species in Appendix E.2 and Appendix E.3 of this EIA Report, respectively. The Terrestrial Biodiversity SSV and Assessment identified the following sensitive areas: ▪ <u>Very High sensitivity</u>: Koppies and watercourse / wetlands; and ▪ <u>Medium sensitivity</u>: Grassland. The Aquatic Biodiversity SSV and Assessment identified the following sensitive areas: ▪ <u>Very high sensitivity</u>: Channelled Valley Bottom (CVB) wetlands and Unchanneled Valley Bottom (UVB) wetlands; and ▪ <u>High sensitivity</u>: Seep wetlands. The Avifauna SSV and Assessment identified the following sensitivities: ▪ <u>High sensitivity</u>: Drainage Line and Wetland Infusions and Isolated Small Rocky Ridges "Koppies"; ▪ <u>Medium sensitivity</u>: Grassland (Natural and Semi-natural); and ▪ <u>Low sensitivity</u>: Agricultural Fields and Fallow Fields. The sensitivity mapping is included in Chapter 3 and Chapter 20 of this EIA Report, as well as the relevant Specialist Studies / Inputs / Letter of Opinions in Appendix E of this EIA Report.

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Question	Response
	The sensitivities identified by the various specialists, as highlighted above, have been taken into consideration and the no-go areas identified by the specialists have been avoided in order to identify the Buildable Areas and project layouts. With regards to an Environmental Management Framework (EMF), research indicates that there is no gazetted EMF for the Xhariep District Municipality. This was also corroborated via the Screening Tool. The Spatial Development Framework Plan of the Mohokare Local Municipality has also been taken into consideration in this Scoping and EIA Process, as discussed in Chapter 3 of this EIA Report, as well as the Socio-Economic Assessment (Appendix E.8 of this EIA Report).
1.2. How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The ecological sensitivities present within the study area have been addressed in detail in the following assessments in the EIA Phase: ▪ Terrestrial Biodiversity Assessment, and Terrestrial Plant and Animal Species Compliance Statement; ▪ Aquatic Biodiversity and Species Assessment; and ▪ Avifauna Assessment. Refer to the response to Question 1.1 regarding the sensitivities identified in the Terrestrial Biodiversity and Plant and Animal Species, Aquatic Biodiversity and Species, and Avifauna Assessments. These specialists have identified aquatic, terrestrial and avifaunal sensitive areas within the study area that need to be avoided by the proposed development. The sensitivity mapping is included in Chapter 3 and Chapter 20 of this EIA Report, as well as the relevant Specialist Studies / Inputs / Letter of Opinions in Appendix E of this EIA Report. The sensitivities identified by the various specialists, as highlighted above, have been taken into consideration and the no-go areas have been avoided in order to identify the Buildable Areas and the project layouts. The Terrestrial Biodiversity Assessment includes the following potential impacts:

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Question	Response
	Construction Phase for Biesjesvlei PV1, Biesjesvlei BESS 1 and Biesjesvlei EGI 1: ▪ Habitat loss and fragmentation; ▪ Loss of protected species; ▪ Increased alien invasive species; ▪ Increased erosion and soil compaction; and ▪ Littering and general pollution. Operational Phase for Biesjesvlei PV1 and Biesjesvlei EGI 1: ▪ Increased alien invasive species; ▪ Loss of species composition and diversity; and ▪ Littering and general pollution. Operational Phase for Biesjesvlei BESS 1: ▪ Increased alien invasive species. Decommissioning Phase for Biesjesvlei PV1, Biesjesvlei BESS 1 and Biesjesvlei EGI 1: ▪ Loss of habitat; and ▪ Increased alien invasive species. Various mitigation measures have been identified to reduce the significance of or to manage the impacts. These measures are documented in the Specialist Assessment, and include, for example: ▪ No construction related activities, such as the site camp, storage of materials, temporary roads or ablution facilities may be located in the very high sensitivity areas including their buffers. ▪ No development should take place within High and Very High sensitivity areas and / or buffer zones. Accordingly, the Koppies habitat should be avoided. The Watercourse habitat should be avoided as per the sensitivity map compiled for Terrestrial Biodiversity.

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Question	Response
	In addition, the watercourse delineation, mapping and suitable buffers recommended by the Aquatic Biodiversity specialist needs to be considered. Where the approved layout designs impact on provincially protected individuals, permit applications are required for either the relocation or destruction of provincially protected species (Free State Nature Conservation Ordinance (FSNCO) 8 of 1969). Measures to avoid, remedy, mitigate and manage impacts have been identified in significant detail and have been included in the EMPs, which were compiled for the proposed projects during the EIA Phase. The EMPs are included in Appendix J to Appendix O of this EIA Report. In summary, the potential disturbance of ecosystems, and potential loss or protection of biological diversity have been identified as potential impacts in the Terrestrial Biodiversity Assessment. In addition, avoidance mechanisms have been adopted, whereby the highly sensitive ecological features have been avoided in the Buildable Areas and project layouts. In addition, mitigation measures have been provided to minimise and remedy the potential impacts. All the potential impacts have been assessed in the EIA Phase.
1.3. How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Various Specialist Studies and Inputs have been compiled and are included in Appendix E of this EIA Report. These studies have identified sensitivities within the study area that should be avoided, based on desktop assessments and field work, where needed. This has informed the identification of the Buildable Areas and the placement of the proposed infrastructure in the project layouts. Note that the project layouts have intentionally been designed to avoid and therefore remain well outside of environmentally sensitive areas identified during the EIA Phase. In addition, the relevant specialist assessments have identified various potential negative impacts that the proposed projects may result in, such as degradation to the biophysical environment and potential pollution. The associated mitigation measures have also been identified. Such potential impacts and mitigation measures are summarised in Chapters 6 to 17 of this EIA Report and included in the Specialist Studies in Appendix E of this EIA Report. Measures to avoid, remedy, mitigate or manage biophysical impacts have also been included in the EMPs (Appendix J to Appendix O of the EIA Report).
1.4. What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether; what measures	Low volumes of solid waste are estimated to be generated, as described below:

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Question	Response
were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	▪ Project 1 – Biesjesvlei PV1 and associated infrastructure: ○ <u>Construction Phase</u>: Approximately 12 - 15 m³ per month. ○ <u>Operational Phase</u>: Approximately 2.5 - 5 m³ per month. ▪ Project 4 – Biesjesvlei BESS 1 and associated infrastructure: ○ <u>Construction Phase</u>: Approximately 6 - 10 m³ per month. ○ <u>Operational Phase</u>: Approximately 2.5 – 5 m³ per month. ▪ Project 7 – Biesjesvlei EGI 1 and associated infrastructure: ○ <u>Construction Phase</u>: Approximately 12 - 15 m³ per month. ○ <u>Operational Phase</u>: Approximately 2.5 - 5 m³ per month. The following waste materials are expected during the construction phase for each respective project: ▪ Packaging material, such as the cardboard, plastic and wooden packaging and off-cuts; ▪ Hazardous waste from empty tins, oils, soil containing oil and diesel (in the event of spills), and chemicals; ▪ Building rubble, discarded bricks, wood and concrete; ▪ Domestic waste generated by personnel; and ▪ Vegetation waste generated from the clearing of vegetation. As indicated above, during the operational phase, the proposed projects will produce minor amounts of general solid waste (as a result of the offices or maintenance). Waste generated on site will be disposed of at a registered waste disposal facility. Refer to Chapter 2 (Project Description) of this EIA Report for further information regarding the proposed waste management. Measures to avoid, remedy, reduce, mitigate or manage waste have been included in the EMPs (Appendix J to Appendix O of the EIA Report).

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Question	Response
1.5. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	A Heritage Impact Assessment (HIA) has been undertaken in the EIA Phase to assess potential archaeological and cultural impacts resulting from the proposed projects. The following potential impacts have been identified from a heritage perspective: ▪ Project 1 – Biesjesvlei PV1 and associated infrastructure: ▪ Construction Phase: ○ Damage to or destruction of archaeological resources. ○ Damage to or destruction of graves. ○ Damage to or destruction of built heritage resources. ○ Intrusion of the PV facility and equipment into the cultural landscape. ▪ Operational Phase: ○ Intrusion of the PV facility into the cultural landscape. ▪ Decommissioning Phase: ○ Intrusion of the PV facility and equipment into the cultural landscape. ▪ Project 4 – Biesjesvlei BESS 1 and associated infrastructure: ▪ Construction Phase: ○ Damage to or destruction of archaeological resources. ○ Damage to or destruction of graves. ○ Damage to or destruction of built heritage resources. ○ Intrusion of the BESS and equipment into the cultural landscape. ▪ Operational Phase: ○ Intrusion of the BESS into the cultural landscape. ▪ Decommissioning Phase: ○ Intrusion of the BESS and equipment into the cultural landscape. ▪ Project 7 – Biesjesvlei EGI 1 and associated infrastructure: ▪ Construction Phase: ○ Damage to or destruction of archaeological resources. ○ Damage to or destruction of graves. ○ Damage to or destruction of built heritage resources. ○ Intrusion of the power line and equipment into the cultural landscape. ▪ Operational Phase:

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Question	Response
	○ Intrusion of the power line into the cultural landscape. ▪ Decommissioning Phase: ○ Intrusion of the power line and equipment into the cultural landscape. Refer to the HIA included in Appendix E.6 of this EIA Report for more information on the impacts listed above. The HIA is also summarised in Chapter 11 of the EIA Report. The HIA identified that with mitigation the above impacts are rated with a low significance for Biesjesvlei PV1; and very low significance for both Biesjesvlei BESS 1 and Biesjesvlei EGI 1. The Heritage Specialist also explains that the proposed projects will not have significant impacts on heritage resources due to the careful positioning of the footprints so as to avoid such resources. The HIA was sent to the South African Heritage Resources Agency (SAHRA) for comment during the 30-day comment period on the Draft EIA Report. SAHRA has provided comments, which are included in Appendix I.6 of this EIA Report, and responded to accordingly in the Comments and Responses Report (Appendix I.7 of this EIA Report). Overall, SAHRA confirmed that they have no objections to the proposed projects. A Palaeontology SSV Report has been completed and included in Appendix E.7 of this EIA Report. The SSV Report notes that the Screening Tool depicts a Medium to Very High palaeo-sensitivity for the study area. However, the specialist has recommended, based on a two-day palaeontological site visit, that the study area is of Low to Very Low palaeo-sensitivity. If any fossiliferous deposits are exposed by surface clearance or excavations during the construction phase, the Chance Fossils Finds Protocol should be fully implemented. The Chance Fossil Finds Protocol has been fully incorporated into the EMPs, which are included in Appendix J to Appendix O of the EIA Report, to ensure that it is fully implemented during the construction phase. The SSV confirms that there are no fatal flaws and no objections on palaeontological heritage grounds to the authorisation of the proposed projects. Pending the discovery of significant, previously unrecorded fossil sites in the Construction Phase (which can be handled using the Chance Fossil Finds Protocol), <u>no further specialist palaeontological studies, reporting, monitoring or mitigation are considered necessary for the proposed projects.</u> Therefore, no further assessment is necessary from a palaeontology perspective, as explained in Appendix E.7 of this EIA Report. SAHRA has also confirmed that this is acceptable. Proof of correspondence from SAHRA is included in Appendix G.6 of this EIA Report.

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Question	Response
	Also from a landscape perspective, a Visual Impact Assessment (VIA) was also undertaken during the EIA Phase to identify the important visual features and receptors within the surrounding landscape, particularly the features and characteristics contributing to scenic quality and how and to what degree the proposed projects will impact on these scenic values. The Visual specialists have indicated that the layout of the proposed projects has responded to the visual sensitivity mapping in the sense that all no-go areas have been avoided from a visual perspective. The VIA is included in Appendix E.5 of the EIA Report, as well as a summary provided in Chapter 10 of this EIA Report.
1.6. How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Measures to avoid, remedy, mitigate or manage impacts on non-renewable natural resources have been included in the EMPs (Appendix J to Appendix O of the EIA Report). However, the proposed Biesjesvlei projects are focused on the use of renewable natural resources (i.e. a Solar PV Facility, BESS and Electricity Grid Infrastructure (EGI)).
1.7. How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?	South Africa has heavily relied on coal as a source of electricity for decades. Due to the nature of coal as a non-renewable resource that causes major environmental degradation, there is a need to identify alternative resources that could promote sustainable energy as well as cleaner energy production mechanisms. The proposed Biesjesvlei PV, BESS and EGI project aims to harness the solar resources available in the area for the generation, storage, dispatching and transmission of electricity. The proposed projects are seen as a source of 'clean energy' and reduces the dependence on non-renewable sources.
1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)	The proposed projects are intended to form part of the Renewable Energy Independent Power Producer Programme (REIPPPP) and Battery Energy Storage Independent Power Producers Procurement Programme (BESIPPPP), and therefore aims to contribute to the energy mix of South Africa, in line with the Integrated Resource Plan (IRP). The need for renewable energy is clear, with South Africa becoming an integral part of the global transition towards renewable sources of electricity generation.
1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which	An assessment of the project alternatives including the site suitability for the proposed projects is included in Chapter 5 of this EIA Report. The proposed projects are a sustainable option for the area and the development footprints have avoided areas of very high environmental

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Question	Response
the resources should be used (i.e. what are the opportunity costs of using these resources of the proposed development alternative?) 1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?	sensitivity. Where impacts cannot be avoided, the footprint has been placed to minimise, mitigate or manage potential impacts to the receiving environment. In this regard, in some areas, linear infrastructure such as access roads and power lines traverse high sensitive areas, which is permitted by the relevant specialists as adequate mitigation measures have been provided and incorporated into the relevant EMPs. Furthermore, no fatal flaws were identified that could prevent the proposed projects from being realised, should such authorisation be granted. In addition, various Specialist Studies and Inputs have been compiled and are included in Appendix E of this EIA Report, as well as summarised in Chapters 6 to 17 of this EIA Report. These assessments have identified various potential negative impacts that the proposed projects may result in. The associated mitigation measures have also been identified in these studies and included in the EMPs, as relevant (Appendix J to Appendix O of this EIA Report). Furthermore, the Agriculture Compliance Statement (Appendix E.1 of this EIA Report) established that the proposed projects are acceptable because they can provide benefits to agriculture but lead to no loss of potential cropland and therefore minimal loss of future agricultural production potential.
1.8. How were a risk-averse and cautious approach applied in terms of ecological impacts? 1.8.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)? 1.8.2. What is the level of risk associated with the limits of current knowledge? 1.8.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	The approach adopted for this study was to assume the worst-case scenario will occur and then identify ways to mitigate or manage these impacts. In addition, the specialist assessments compiled during the EIA Phase have provided detailed feedback on applicable uncertainties, assumptions, and risks associated with limits of current knowledge. These are captured in Appendix E of this EIA Report and summarised in Chapters 6 to 17 of this EIA Report.
1.9. How will the ecological impacts resulting from this development impact on people's environmental right in terms following: 1.9.1. Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	A detailed Socio-Economic Impact Assessment has been undertaken during the EIA Phase to consider the impact of the proposed projects from a socio-economic perspective. The assessment is included in Appendix E.8 of this EIA Report, with a summary provided in Chapter 13 of the EIA Report. Note that Socio-Economic Impact Assessments only apply to the proposed Biesjesvlei PV and Biesjesvlei BESS projects. A socio-economic profile is included in Chapter 3 of this EIA Report.

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Question	Response
1.9.2. Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	The following impacts have been identified during the EIA Phase for the proposed Biesjesvlei PV and Biesjesvlei BESS projects: ▪ Construction Phase: ○ Capital investment contributing to the national, regional and local economy (<i>positive impact</i>); ○ Generation of employment, income and skills (<i>positive impact</i>); ○ Social disruption and change in social dynamics (<i>negative impact</i>); and ○ Reduced quality of life and increased risks due to construction near residences (<i>negative impact</i>). ▪ Operational Phase: ○ Operational investment contributing to the national, regional and local economy (<i>positive impact</i>); ○ Generation of employment, income, and skills (<i>positive impact</i>); ○ Increased community prosperity through contributions and income from the proposed projects (<i>positive impact</i>); and ○ Increased South African power generation reducing the probability of load shedding (<i>positive impact</i>). [Note that this impact only applies to the Biesjesvlei PV projects]. ▪ Decommissioning Phase: ○ Reduced employment and funding (<i>negative impact</i>). The Socio-Economic Assessment notes that the proposed projects will provide significant socio-economic benefits, related to economic growth, employment and financial contributions to the nearby communities. The study identifies various enhancement measures, which should be implemented to maximise the potential benefits. Such measures have been included in the EMPs as relevant (Appendix J to Appendix O of this EIA Report). The findings also indicate that the potential negative impacts associated with the construction phase are likely to be low to very low for the Biesjesvlei PV1 project with mitigation; and very low for the Biesjesvlei BESS 1 project. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. The Socio-Economic Assessment also notes that no third parties reside in the project area, and there is no use of natural resources on site by third parties, e.g. communities.

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Question	Response
	The proposed development represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated with a coal-based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. Thus, more secure power generation and generation of renewable power are the fundamental motivations underpinning the proposed projects. This subsequently contributes to improved service delivery and socio-economic development. Overall, the proposed development would not compromise on the environmental rights of general people. The study concluded that the establishment of the proposed projects is supported by the findings of the Socio-Economic Assessment. Aspects relating to the potential negative impact of the proposed development in terms of water quality, nuisance (noise, odour, etc.) and visual aesthetics are not strictly socio-economic issues but have been addressed in relevant specialist assessments, such as the VIA (Appendix E.5 of the EIA Report) and Geohydrology Assessment (Appendix E.10 of the EIA Report), and relevant management actions have also been included in the EMPs (Appendix J to Appendix O of this EIA Report). None of the potential impacts identified in the Geohydrology Assessment and VIA were rated as high or moderate significance with the implementation of mitigation measures.
1.10. Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	Linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area have been considered in this Scoping and EIA Process. Based on the findings of the specialists, there would be no unacceptable adverse impacts across the themes. The Socio-Economic Assessment (Appendix E.8 of this EIA Report) explains that there are two significant factors that motivate these projects i.e. more secure power generation (reducing the probability of load shedding and the many socio-economic costs of such outages) and generation of renewable power (contributing to the reduction of social and economic risks from climate change). The provision of renewable energy will result in an improvement in human well-being as well as livelihoods both locally and regionally. There are no harmful emissions associated with renewable energy as compared to other energy sources such as coal. A shift towards renewable energy would help reduce South

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Question	Response
	Africa's reliance on fossil fuels for energy, thus reducing carbon emissions. Therefore, renewable energy enhances human well-being. Refer to the Socio-Economic Assessment and BESS High Level Safety, Health and Environment Risk Assessment for additional information.
1.11. Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area?	The impacts on ecological integrity objectives of the area are considered in the following assessments: ▪ Terrestrial Biodiversity Assessment, and Terrestrial Plant and Animal Species Compliance Statement; ▪ Aquatic Biodiversity and Species Assessment; and ▪ Avifauna Assessment. Refer to the responses provided to Questions 1.1 to 1.10 regarding the sensitivities identified in these Specialist Assessments, as well as how they have been avoided in the layout determination, and the potential impacts identified on terrestrial biodiversity.
1.12. Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	Chapter 5 of this EIA Report includes a description of the alternatives. The no-go alternative has been assessed during the EIA Phase for all projects (Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1)). For Project 1 (Biesjesvlei PV1), with regards to technology options, these include tracker design options; however, these will not be weighed against each other in order to identify the preferred alternative at the end of the EIA Phase. Instead, the specialists have considered the various mounting systems, all systems have been included in the project description as they are acceptable, and thus recommended for approval in the EA (should it be granted). It is also important to note that the approach followed to identify the buildable areas was to use environmental and social constraints to avoid sensitive features, thus applying mitigation hierarchy thinking. This approach replaces the need to rank alternative sites and locations, as it leads to the selection of the least sensitive development footprint. All specialists have confirmed that the project layouts are acceptable and no-go areas have been avoided. As noted above, linear infrastructure is permitted to cross some of these areas as the specialists have provided adequate mitigation measures, which have been incorporated into the EMPs.

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Question	Response
	The proposed development would not result in unacceptable compromise in any of the environmental themes assessed. Further, the proposed development would contribute to the generation of renewable energy, which serves as an alternative to coal-based power.
1.13. Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Each specialist assessment has taken into consideration and assessed the potential cumulative impacts of these proposed projects. Refer to Appendix E of this EIA Report where the potential cumulative impacts are discussed for these projects, where relevant. These have also been summarised in Chapters 6 to 17 of this EIA Report, where applicable. Chapter 4 of this EIA Report contains a list of all other EGI projects within the 30 km radius that have been considered in the cumulative impact assessment. Note that no residual cumulative impacts of very high significance were rated by the specialists, and no fatal flaws are present.
2.1. What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	
2.1.1. The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area.	The proposed project is entirely located within the Mohokare Local Municipality (MLM) and the Xhariep District Municipality (XDM). The 2023/2024 Final Integrated Development Plan (IDP) lists the following objectives for the MLM (MLM, 2023¹¹; Pages 47-48): ▪ Good governance and administration; ▪ Municipal financial viability; ▪ Basic service delivery; ▪ Local economic development; and ▪ Ensuring that the municipality is kept safe and clean. The vision and mission of the MLM are listed below (MLM, 2023, Page 4): ▪ Vision: <i>"To be a community driven municipality that ensures sustainable quality service delivery applying principles of good governance"</i>

¹¹ Mohokare Local Municipality Final Integrated Development Plan (IDP) 2023 – 2024. 2023. Available: [https://www.mohokare.gov.za/documents/idp/FINAL%20IDP%20\(2023\).pdf](https://www.mohokare.gov.za/documents/idp/FINAL%20IDP%20(2023).pdf) [online] Accessed: November 2023

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Question	Response
	▪ Mission: “A performance-driven municipality that utilises its resources efficiently to respond to community needs”. The IDP recognises solar energy development as key opportunities in terms of local economic development (MLM, 2023). The development of the proposed projects will therefore also be in line with the mission and vision of the MLM in terms of sustainability and efficient use of resources. The MLM IDP states that unemployment is a challenge in the municipality, and that various local economic development programmes will be implemented to assist in addressing this challenge (MLM, 2023). Unemployment is also discussed as a challenge in the 2023/2024 Final IDP for the XDM (XDM, 2023¹²). In line with this, the proposed projects will create various job opportunities and economic spin offs during the construction and operational phases (if EA is granted by the DFFE). Refer to Section 1.4 of this chapter for feedback on estimated job creation opportunities for the proposed projects. Therefore, the proposed projects would help to address the need for increased electricity supply to the national grid while also providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area. This has been considered in the Socio-Economic Assessment (Appendix E.8 of this EIA Report) undertaken for the proposed projects, as described in the response to Question 1.9 above.
2.1.2. Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.)	This is not applicable as the proposed projects are located within a rural/agricultural area and the study area is zoned for agricultural use.
2.1.3. Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.)	The land within the study area is currently being used for livestock grazing and agriculture. Some areas are showing signs of overgrazing and trampling. Specifically, there are croplands (currently used for lucerne) in the north-eastern extent of the study area, which have been excluded from the Buildable Areas. The study area also contains various fence lines, gravel roads and tar roads. In addition, the existing Eskom Beta-Delphi 400 kV Overhead Power Line runs through the study area.

¹² Xhariep District Final Integrated Development Plan (IDP) 2023 – 2024. 2023. Available: <http://www.xhariep.fs.gov.za/wp-content/uploads/2023/07/FINAL-IDP-2023-24.pdf> [online] Accessed: November 2023.

NEED	
Question	Response
	An HIA was undertaken during the EIA Phase to assess potential archaeological and cultural impacts resulting from the proposed projects. Refer to the response to Question 1.5 for detailed feedback on the impacts identified on Archaeology and Cultural Heritage, as well as feedback on the palaeontology. An Agricultural Compliance Statement (Appendix E.1 of this EIA Report) was also completed during the EIA Phase. The Compliance Statement considered the impact of the proposed projects in terms of the land capability and agricultural potential. The proposed study area is identified as being of predominantly low and medium sensitivity for agricultural resources. The Compliance Statement further states that due to the fact that the proposed projects will not occupy scarce, viable cropland and that their negative impact is offset by economic and other benefits to farming, the overall negative agricultural impact of the development (loss of future agricultural production potential) is assessed as being of low significance and as acceptable. As noted, EMPs (i.e. Appendix J to Appendix O of this EIA Report) have been compiled for the proposed projects to ensure that all potential negative impacts identified are suitably managed and mitigated, and potential positive impacts are enhanced. The impact on the sense of place is difficult to predict and would potentially be ambiguous. This is due to the subjective nature of perceptions regarding the relative attraction or disturbance of the solar facilities, BESS and EGI in a rural/agricultural landscape. The visual impact and considerations were assessed as part of the Visual Impact Assessment undertaken during the EIA Phase. A Visual Impact Assessment is included in Appendix E.5 of this EIA Report, and a summary of the key findings and impacts are included in Chapter 10 of this EIA Report. The Visual Impact Assessment has provided more accurate mapping of landscape features at the detailed project scale, being a refinement of the Screening Tool Landscape Sensitivity Map (where relevant). The study notes that no significant landscape or scenic features would be affected by the proposed projects based on the layout and Buildable Areas. No fatal flaws have been identified from a sense of place perspective. Recommended mitigation measures have been included in the EMPs, as required and where relevant.

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Question	Response
	The sensitivity mapping is included in Chapter 3 and Chapter 20 of this EIA Report as well as the relevant Specialist Studies / Inputs / Letter of Opinions in Appendix E of this EIA Report. The sensitivities identified by the various specialists have been taken into consideration and the no-go areas have been avoided in order to identify the Buildable Areas and project layouts.
2.1.4. Municipal Economic Development Strategy ("LED Strategy").	In the 2023/2024 MLM Final IDP, LED is listed as Key Performance Area 5, and it is linked to the strategic objective of enhancement of the local economy of the municipality (MLM, 2023). The 2023/2024 MLM Final IDP states that the target is to develop the 5-year LED Strategy and have it approved by Council by June 2023 (MLM, 2023). At the time of compiling the Draft EIA Report, the 2007 – 2012 Integrated LED Plan was available online on the MLM website (MLM, 2007 ¹³). The 2014/2015 MLM LED Framework is also available and notes solar energy as a proposed development (MLM, 2017 ¹⁴). The 2023/2024 MLM Final IDP lists solar energy investment as an LED project for 2023/2024 (MLM, 2023).
2.2. Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	This has been addressed in the Socio-Economic Impact Assessment that has been completed in the EIA Phase and included in Appendix E.8 of the EIA Report. Note that the Socio-Economic Impact Assessments have been undertaken for the proposed Biesjesvlei PV and Biesjesvlei BESS projects only. The assessment considers the impact of the proposed Biesjesvlei PV and Biesjesvlei BESS projects from a socio-economic perspective. The Socio-Economic Assessment also includes detailed feedback on the local socio-economic environment for the MLM, including demographics, education, social characteristics and economy, and housing and services. It also includes similar feedback for the XDM, including regional context, demographics, economy, social characteristics, and regional role in the renewable energy sector. A socio-economic profile is included in Chapter 3 of this EIA Report. Refer to the response provided to Question 1.9 for a description of the socio-economic impacts identified during the EIA Phase for the proposed Biesjesvlei PV and Biesjesvlei BESS projects.
2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	The REIPPPP has contributed significantly towards meeting South Africa's Greenhouse Gas emission targets and, at the same time, supporting energy security, economic stability, and environmental sustainability. The establishment of renewable energy facilities, BESS and EGI,

¹³ Mohokare Local Municipality Integrated Local Economic Development Plan 2007 – 2012. 2007. Available: <https://www.mohokare.gov.za/documents/led/LED%20Plan%2015-11-06.pdf> [online] Accessed: November 2023.

¹⁴ Mohokare Local Municipality Integrated Local Economic Development Framework 2014 – 2015. 2017. Available: <https://www.mohokare.gov.za/documents/policies/2017/LED/Final%20LED%20Strategy%20with%20agriculture.pdf> [online] Accessed: July 2024.

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Question	Response
	such as the proposed projects, therefore, not only address the environmental issues associated with climate change and consumption of scarce water resources, but also creates significant socio-economic opportunities and benefits, specifically for historically disadvantaged, rural communities.
2.3. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	These needs and interests of the relevant communities have been addressed in the Socio-Economic Impact Assessment undertaken during the EIA Phase and included in Appendix E.8 of the EIA Report. Note that Socio-Economic Impact Assessments have been undertaken for the proposed Biesjesvlei PV and Biesjesvlei BESS projects only. Issues raised by Interested and Affected Parties (I&APs) to this effect are addressed in the relevant specialist assessments (i.e. summary of issues raised during the Scoping Phase, and adequate responses). A Comments and Responses Trail is also included in Appendix G.7 of this EIA Report, which includes all comments raised during the Scoping Phase, with responses provided by the EIA Project Team during Scoping. A Comments and Responses Trail is also included in Appendix I.2 of this EIA Report, which includes comments received between the submission of the Final Scoping Report for consideration and the release of the Draft EIA Report for a 30-day comment period. Comments raised during the EIA Phase to date have been addressed, where relevant, and comments raised during the 30-day review of the Draft EIA Report have been captured and responded to in Appendix I.7 of the Final EIA Report.
2.4. Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long term? Will the impact be socially and economically sustainable in the short- and long-term?	This has been addressed in the Socio-Economic Impact Assessment undertaken during the EIA Phase. Note that Socio-Economic Impact Assessments have been undertaken for the proposed Biesjesvlei PV and Biesjesvlei BESS projects only. The assessment considers the impact of the proposed Biesjesvlei PV and Biesjesvlei BESS projects from a socio-economic perspective. Refer to the response provided to Question 1.9 for a description of the socio-economic impacts identified during the EIA Phase for the proposed Biesjesvlei PV and Biesjesvlei BESS projects. This proposed development would, at a broad scale, assist in addressing climate change through the provision of renewable energy, and help to achieve the just energy transition from coal. From a positive socio-economic perspective, future generations would benefit from cleaner electricity and less reliance on coal, while current generations could get access to electricity, which is a crucial factor in the current energy crisis.

NEED	
Question	Response
	The negative impacts associated with the proposed Solar PV, BESS and EGI projects can be effectively mitigated (and with mitigations being maintained for the life of the project, as required) to acceptable levels whereby the sustainability of the systems within which the proposed development is placed would not be compromised. Also, the positive socio-economic impacts are anticipated to be long-term for the operational phase i.e., for the lifespan of the proposed projects.
2.5. In terms of location, describe how the placement of the proposed development will:	
2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other	Local employment opportunities will be provided as far as possible. Refer to Section 1.4 of this chapter for feedback on estimated job creation opportunities for the proposed projects. It should be noted that the employment opportunities provided are estimates and is dependent on the final engineering design and the REIPPPP and BESIPPPP Request for Proposal provisions at that point in time. In addition, employment during the construction phase will be temporary, whilst the employment opportunities during the operational phase will be long-term. Residential opportunities would not be created by the proposed development as it is not the goal of a renewable energy facility.
2.5.2. reduce the need for transport of people and goods	This is not applicable as the proposed projects are located within a remote rural/agricultural area and the study area is zoned for agricultural use. The proposed projects include Solar PV, BESS, EGI and associated infrastructure development. Nevertheless, traffic related impacts of the proposed projects have been addressed in the Traffic Impact Assessment. The assessment is included in Appendix E.9 of this EIA Report, with a summary provided in Chapter 14 of the EIA Report. Note that the Traffic Impact Assessments only apply to the proposed Biesjesvlei PV and Biesjesvlei BESS projects. The assessment concluded that the proposed projects have a low to very low significance for the construction and decommissioning phase, and an insignificant impact during operations.
2.5.3. result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport)	This is not applicable as the proposed projects are located within a remote rural/agricultural area and the study area is zoned for agricultural use. Refer to the response provided to Question 2.5.2.

NEED	
Question	Response
2.5.4. compliment other uses in the area	The land within the study area is currently being used for livestock grazing and agriculture. Some areas are showing signs of overgrazing and trampling. Specifically, there are croplands (currently used for lucerne) in the north-eastern extent of the study area, which have been excluded from the Buildable Areas. The Agricultural Compliance Statement (Appendix E.1 of this EIA Report) provides feedback on the potential impact of the proposed projects on agriculture. The proposed projects will have wider societal benefits of generating additional income and employment in the local economy. The compliance statement explains that at the farm level, the proposed development will provide a positive economic impact. This is likely to increase financial security and may improve farming operations and productivity on other parts of the farm or properties owned by the same farmer, through increased investment into farming. It will also potentially improve farm security. Based on the above, the proposed projects are understood to compliment other uses in the area.
2.5.5. be in line with the planning for the area	The 2023/2024 MLM Final IDP lists solar energy investment as an LED project for 2023/2024 (MLM, 2023). The development of the proposed projects is also in line with the mission and vision of the MLM in terms of sustainability and efficient use of resources, as well as in terms of job creation.
2.5.6. for urban related development, make use of the underutilised land available with the urban edge	This is not applicable as the proposed projects are located within a remote rural/agricultural area and the study area is zoned for agricultural use.
2.5.7. optimise the use of existing resources and infrastructure	The proposed Biesjesvlei PV projects are planned to connect to the existing Eskom Beta-Delphi 400 kV overhead power line via dedicated proposed 132 kV power lines, an independent proposed Main Transmission Substation (MTS) and Loop-In-Loop-Out (LILO). Therefore, existing infrastructure is being considered. The Biesjesvlei MTS and LILO are the subject of a separate Scoping and EIA Process (i.e. Project 10), and a separate EIA Report has been compiled accordingly.
2.5.8. opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement)	The proposed projects are renewable energy, BESS, EGI and associated infrastructure projects and are not related to bulk infrastructure expansion.
2.5.9. discourage "urban sprawl" and contribute to compaction/densification	This has been addressed in the Socio-Economic Impact Assessment undertaken during the EIA Phase (Appendix E.8 of the EIA Report). Note that Socio-Economic Impact Assessments have been undertaken for the proposed Biesjesvlei PV and Biesjesvlei BESS projects only.

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Question	Response
	The assessment considers impacts such as those associated with the presence of construction workers on local communities; and the impacts related to the potential influx of job seekers (i.e. social disruption and change in social dynamics).
2.5.10. contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs	This is not applicable as the proposed projects are located within a remote rural/agricultural area and the study area is zoned for agricultural use.
2.5.11. encourage environmentally sustainable land development practices and processes	The development of a renewable energy facility and associated infrastructure is a sustainable land development practice provided it is constructed and operated in an environmentally conscious manner.
2.5.12. take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.)	Refer to Chapter 5 of this EIA Report for a description of the process undertaken to identify the study area as the preferred site for the proposed projects.
2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential)	This has been addressed within the Socio-Economic Impact Assessment undertaken during the EIA Phase (included in Appendix E.8 of the EIA Report). Note that Socio-Economic Impact Assessments have been undertaken for the proposed Biesjesvlei PV and Biesjesvlei BESS projects only. Refer to the response provided to Question 1.9 for a description of the socio-economic impacts identified during the EIA Phase for the proposed Biesjesvlei PV and Biesjesvlei BESS projects. Specifically linked to this question, the assessment identified operational investment contributing to the national, regional and local economy as a positive impact, as well as the generation of employment, income, and skills, and increased community prosperity through contributions and income from the proposed projects.
2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area	An HIA was undertaken during the EIA Phase to assess potential archaeological and cultural impacts resulting from the proposed projects. Refer to the response to Question 1.5 for detailed feedback on the impacts identified on Archaeology and Cultural Heritage, as well as feedback on the palaeontology. The visual impact and considerations, including sense of place, has been assessed as part of the Visual Impact Assessment undertaken during the EIA Phase. A Visual Impact Assessment is included in Appendix E.5 of this EIA Report, and a summary of the key findings and impacts are included in Chapter 10 of this EIA Report. Refer to the response provided to Question 2.1.3 for additional feedback on the potential visual impacts.
2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	Chapter 4 of this EIA Report includes a list of other EGI / communication related projects within a 30 km radius that have received EA or are currently going through an Environmental

NEED	
Question	Response
	Assessment process, or in development. Note that no other renewable energy projects exist within the 30 km radius of the proposed projects. The cumulative impact assessment has been detailed in the EIA Phase, and no unacceptable cumulative impacts were identified during this process.
2.6. How were a risk-averse and cautious approach applied in terms of socio-economic impacts?	
2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	The approach adopted for this study was to assume the worst-case scenario will occur and then identify ways to mitigate or manage these impacts. In addition, the specialist assessments compiled during the EIA Phase have provided detailed feedback on applicable uncertainties, assumptions, and risks associated with limits of current knowledge. These are captured in Appendix E of this EIA Report and summarised in Chapters 6 to 17 of this EIA Report.
2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	
2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	
2.7. How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:	
2.7.1. Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	A detailed Socio-Economic Impact Assessment has been undertaken (Appendix E.8 of the EIA Report), and it considers the impact of the proposed projects from a socio-economic perspective. Note that Socio-Economic Impact Assessments have been undertaken for the proposed Biesjesvlei PV and Biesjesvlei BESS projects only. A socio-economic profile is included in Chapter 3 of this EIA Report. Refer to the response provided to Question 1.9 for a description of the socio-economic impacts identified during the EIA Phase for the proposed Biesjesvlei PV and Biesjesvlei BESS projects.
2.7.2. Positive impacts. What measures were taken to enhance positive impacts?	
2.8. Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	
2.9. What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	
2.10. What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons	
	In addition, measures to avoid, remedy, mitigate or manage negative socio-economic impacts and enhance positive socio-economic impacts have been included in the relevant EMPrs compiled for the proposed Biesjesvlei PV and Biesjesvlei BESS projects.
	Linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area, as well as how the potential socio-economic impacts will result in

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Question	Response
(who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	ecological impacts are considered as part of the relevant specialist assessments. Refer to the response provided to Question 1.12 above for additional information on the linkages and dependencies between human wellbeing, livelihoods, and ecosystem services considered.
2.11. What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	With regards to the best practicable environmental option, Chapter 5 of this EIA Report includes a description of alternatives. The proposed projects have significant socio-economic benefits at the local and regional scale which outweigh the potential negative socio-economic impacts. Therefore, essentially the proposed development would result in greater socio-economic benefit than the status quo on site. Refer to the response provided to Question 1.12 above for additional information on the alternatives.
2.12. What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	
2.13. What measures were taken to:	
2.13.1. ensure the participation of all interested and affected parties	The supporting documentation of the Public Participation Process (PPP) that was undertaken during the Scoping Phase is included as Appendix G of this EIA Report, and the PPP that was undertaken during the EIA Phase is described in Chapter 4 of this EIA Report, with supporting documentation included in Appendix I. The PPP aimed to comply with the 2014 NEMA EIA Regulations (as amended). An integrated PPP was followed for all 10 proposed projects. The Draft Scoping Report was released for a 30-day comment period, which extended from 8 March 2024 to 10 April 2024 (excluding public holidays), to all the relevant authorities, I&APs and stakeholders. Various methods were employed to notify potential I&APs of the proposed projects, namely, through newspaper advertisements, site notices boards, notification letters and communication via email, as well as text messages, and telephonic discussions, where possible. The Draft EIA Report was released for a 30-day comment period, which extended from 2 August 2024 to 2 September 2024 (excluding public holidays), to all the relevant authorities, I&APs and stakeholders. Similar PPP mechanisms were undertaken during the EIA Phase.
2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation	
2.13.3. ensure participation by vulnerable and disadvantaged persons	
2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means	The Scoping and EIA Process aims to take cognisance of all interests, needs, and values espoused by all I&APs. Opportunity for public participation has been provided to all I&APs throughout the Scoping and EIA Process in terms of the 2014 NEMA EIA Regulations (as amended).
2.13.5. ensure openness and transparency, and access to information in terms of the process	The supporting documentation of the PPP undertaken during the Scoping Phase is included in Appendix G of this EIA Report, and the PPP that is being undertaken during the EIA Phase is

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Question	Response
	described in Chapter 4 of this EIA Report, with supporting documentation included in Appendix I of this EIA Report. Refer to the responses provided to Questions 2.13.1 – 2.13.3 above.
2.13.6. ensure that the interests, needs and values of all interested and affected parties were taken into account and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge	The EIA Process has taken cognisance of relevant interests, needs and values adopted by I&APs.
2.13.7. ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein was promoted	Public participation of all I&APs has been promoted and opportunities for engagement have been provided during the EIA Process.
2.14. Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	This is addressed in the Socio-Economic Impact Assessment that is included Appendix E.8 of the EIA Report. Note that Socio-Economic Impact Assessments have been undertaken for the proposed Biesjesvlei PV and Biesjesvlei BESS projects only. Refer to the responses provided to Questions 1.9, 2.2 and 2.3.
2.15. What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	EMPRs were developed in the EIA Phase to address environmental, health and safety concerns. An Environmental Control Officer (ECO) will be appointed to monitor compliance with the EMPRs and EAs (should such authorisations be granted) during the construction and operational phases.
2.16. Describe how the development will impact on job creation in terms of, amongst other aspects:	
2.16.1. the number of temporary versus permanent jobs that will be created	This is addressed in the Socio-Economic Impact Assessment undertaken during the EIA Phase (Appendix E.8 of the EIA Report). Note that Socio-Economic Impact Assessments have been undertaken for the proposed Biesjesvlei PV and Biesjesvlei BESS projects only. Refer to the response provided to Question 1.9 for a description of the impacts identified during the EIA Phase from a socio-economic perspective for the proposed Biesjesvlei PV and Biesjesvlei BESS projects, and also the responses to Questions 2.1.1 and 2.5.1 for feedback on potential employment opportunities.
2.16.2. whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area)	
2.16.3. the distance from where labourers will have to travel	
2.16.4. the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits)	
2.16.5. the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	
2.17. What measures were taken to ensure:	
2.17.1. that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment	Various government departments have been listed as I&APs and were given the opportunity to comment on the Draft Scoping Report and Draft EIA Report during the respective 30-day public

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Question	Response
	participation periods. Appendix G.6 of this EIA Report includes copies of comments received during Scoping, and Appendix G.7 includes the Issues / Comments and Responses Trail for the Scoping Phase. For the EIA Phase, copies of comments received between the submission of the Final Scoping Report for consideration and the release of the Draft EIA Report for review are included in Appendix I.1 of this EIA Report and captured and responded to in the Comments and Responses Report included in Appendix I.2. Furthermore, comments received during the 30-day review of the Draft EIA Report are included in Appendix I.6 of this Final EIA Report, with an EIA Phase Comments and Responses Report in Appendix I.7.
2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	No conflicts of interests between organs of state were identified during the EIA Process.
2.18. What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	The proposed projects aim to adhere to the principles of environmental management in NEMA. Measures taken to ensure adherence to the principles of NEMA are essentially addressed through the management actions and monitoring recommendations included in the EMPs (Appendix J to Appendix O of this EIA Report). In addition, the outcomes of this Scoping and EIA Process and the associated conditions of the EAs (should they be received) serve to address this question.
2.19. Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	The proposed mitigation measures included in the EMPs were informed by the specialist assessments that were undertaken during the EIA Phase. This includes a detailed assessment of the environment as well as the impacts associated with the proposed projects. Detailed specialist assessments have all concluded that the projects can proceed, with no fatal flaws or unacceptable impacts identified as part of the proposed projects. Therefore, the mitigation measures are deemed to be realistic and practical. The EMPs are included in Appendix J to Appendix O of this EIA Report.
2.20. What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	The EMPs for the proposed projects (included in Appendix J to Appendix O of this EIA Report) will form part of the contractual agreement and must be adhered to by the contractors, construction workers and the Project Applicants. The EMPs include measures to ensure that the costs to potentially remedy pollution, environmental degradation and consequent adverse health effects will be paid for by those responsible for the relevant environmental impacts. The EMPs accordingly include measures to ensure that the costs to potentially prevent, control or minimise further pollution, environmental damage or adverse health effects will be paid for by those responsible for the relevant environmental impacts. Roles and responsibilities for the implementation of management actions and monitoring thereof are included in the EMPs.

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Question	Response
2.21. Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	Renewable energy development (including the BESS and associated infrastructure) is a suitable land use option for the site. The proposed projects would be robust in terms of economic viability and profitability while also being largely uninfluenced by climate change variables. The proposed projects would also provide the farm owners with additional income by way of lease agreements and will also contribute to local socio-economic upliftment through job creation and other socio-economic benefits described above. Chapter 5 of this EIA Report includes a description of the alternatives. Refer to the response provided to Question 1.12 above for additional information on the alternatives.
2.22. Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope, and nature of the project in relation to its location and other planned developments in the area?	The potential cumulative impacts resulting from the proposed projects can only be objectively determined at the end of the EIA Process. These have been assessed during the EIA Phase. Chapter 4 of this EIA Report contains a list of all other EGI / communication related projects within a 30 km radius that were considered in the cumulative impact assessment. The Socio-Economic Specialist Assessment (Appendix E.8 of the EIA Report) identified the following cumulative impacts: ▪ Stimulation of economic and employment growth during construction. The overall impact is considered to be of moderate (positive) significance. ▪ Increased community prosperity through contributions and income from IPPs during operation. The overall impact is considered to be of moderate (positive) significance. ▪ Increased power generation reducing the probability of load shedding during operation. This impact is positive.

1.12. Objectives and Structure of this EIA Report

This EIA Report was preceded by a comprehensive Scoping Process. During the Scoping Phase, the Scoping Report was made available to I&APs and stakeholders for a 30-day comment period, which extended from 8 March 2024 to 10 April 2024 (excluding public holidays). Issues raised in response to the Draft Scoping Report were captured in an Issues/Comments and Responses Trail. The Final Scoping Report was submitted to the DFFE in April 2024 for consideration (i.e. acceptance of the Final Scoping Report or refusal of EA) in line with Regulation 21 (1) of GN R326. The DFFE accepted the Final Scoping Report and Plan of Study for EIA in May 2024. Refer to Appendix H of this EIA Report for a copy of this acceptance letter. This acceptance marked the end of the Scoping Phase after which the EIA Process moved into the impact assessment and reporting phase.

For the purpose of completeness and continuity, the documentation associated with the Public Participation Process undertaken in the Scoping Phase, and comments received from I&APs during the Scoping Phase, are included in Appendix G of this EIA Report. The Issues/Comments and Responses Trail for the comments received during the review of the Draft Scoping Report are included in Appendix G.7 of this EIA Report. For background on the Scoping Process, the reader is referred to the Final Scoping Report (CSIR, 2024).

The EIA Phase of this Scoping and EIA Process is shaped by the findings of the Scoping Phase. The 2014 NEMA EIA Regulations (as amended) stipulates that the EIA Process must be undertaken in line with the approved Plan of Study for the EIA¹⁵, and that it must include a description of the potential environmental impacts, mitigation, and closure outcomes, as well as the residual risks of the proposed activity. In broad terms, the objectives of the EIA Process in terms of the 2014 NEMA EIA Regulations (as amended) are to:

- *“determine the policy and legislative context within which the activity is located and note how the proposed activity complies with and responds to the policy and legislative context;*
- *describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report;*
- *identify the location of the development footprint within the approved site as contemplated in the accepted scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;*
- *determine the nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and the degree to which these impacts (a) can be reversed; (b) may cause irreplaceable loss of resources, and (c) can be avoided, managed or mitigated;*

¹⁵ The Plan of Study for the EIA was detailed in Chapter 7 of the Final Scoping Report, which was accepted by the DFFE in May 2024.

- *identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment;*
- *identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity;*
- *identify suitable measures to avoid, manage or mitigate identified impacts; and*
- *identify residual risks that need to be managed and monitored”.*

In terms of legal requirements, a crucial objective of the EIA Report is to satisfy the requirements of Appendix 3 of the 2014 NEMA EIA Regulations (as amended). This section regulates and prescribes the content of the EIA Report and specifies the type of supporting information that must accompany the submission of the EIA Report to the Competent Authority. An overview of where the requirements of Appendix 3 of the 2014 NEMA EIA Regulations (as amended) are addressed in this EIA Report is presented in Table 1.5 below.

Furthermore, this process has been designed to satisfy the requirements of Regulations 41, 42, 43 and 44 of the 2014 NEMA EIA Regulations (as amended) relating to the PPP and, specifically, the registration of and submissions from potential and registered I&APs.

As noted above, the Draft EIA Report was made available to registered I&APs, Organs of State and key relevant stakeholders for a 30-day comment period, which extended from 2 August 2024 to 2 September 2024 (excluding public holidays). All comments received during the 30-day comment period on the Draft EIA Report have been incorporated into the Comments and Responses Report (Appendix I.7 of this Final EIA Report), and addressed, as applicable and where relevant, in the Final EIA Report. The Comments and Responses Report is included with the Final EIA Report that has been submitted to the DFFE for decision-making (i.e. approval or refusal of EA) in line with Regulation 24 of GN R326.

In terms of the structure of this EIA Report, Part A includes the Executive Summary, and Chapters 1 to 20. Chapter 1 (i.e. this chapter) introduces the projects and Scoping and EIA Process; Chapter 2 provides the description of the proposed projects; Chapter 3 describes the regional and affected environment including site sensitivity; Chapter 4 details the PPP followed, as well as the applicable legislative context, and Chapter 5 describes the alternatives considered. Chapters 6 to 19 of this EIA Report include summaries of the Specialist Studies / Inputs / Letters of Opinions, which provide, where relevant, the terms of reference, scope of work, list of potential impacts, impact assessment and overall key findings. Chapter 20 provides the conclusion and recommendations of the Scoping and EIA Process.

Part B of the EIA Report includes the following supporting documentation,

- Appendix A: Curriculum Vitae of the EAP;
- Appendix B: Declaration of Independence of the EAP;
- Appendix C: Pre-Application Consultation with the Competent Authority;
- Appendix D: Maps;
- Appendix E: Specialist Studies and Inputs;
- Appendix F: Database of I&APs;
- Appendix G: Public Participation for the Scoping Phase;

- Appendix H: DFFE Acceptance of the Final Scoping Report;
- Appendix I: Public Participation for the EIA Phase;
- Appendix J to Appendix O: EMPs; and
- Appendix P: Additional Information.

As required in Regulation 23 (4) of the 2014 NEMA EIA Regulations (as amended), the EMPs that are required as part of the EIA Process are provided in Appendix J to Appendix O of this EIA Report. The EMP for the Solar PV and associated infrastructure (Appendix J of this EIA Report) and the EMP for the BESS and associated infrastructure (Appendix L of this EIA Report) have been structured to comply with the requirements outlined in Appendix 4 of the 2014 NEMA EIA Regulations (as amended). The EMPs for the PV Facility IPP Substation (Appendix K of this EIA Report), the BESS IPP Substation (Appendix M of this EIA Report), and the switching station (Appendix N of this EIA Report) complies with the Generic EMP for substations published in GN 435 in March 2019. The EMP for the 132 kV power line (Appendix O of this EIA Report) complies with the Generic EMP for power lines published in GN 435 in March 2019.

Table 1.5: Compliance with Appendix 3 of the 2014 NEMA EIA Regulations (as amended)¹⁶

Section of the EIA Regulations	<u>Requirements for an Environmental Impact Assessment Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982, as amended in GN R326)</u>	Chapter / Appendix
Appendix 3 - (3) (1) (a)	Details of - i. the EAP who prepared the report; and ii. the expertise of the EAP, including a curriculum vitae;	Chapter 1, Appendix A and Appendix B
Appendix 3 - (3) (1) (b)	The location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including - i. the 21-digit Surveyor General code of each cadastral land parcel; ii. where available, the physical address and farm name; iii. where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Chapter 1, Chapter 2, Chapter 3, Chapter 20, and Appendix D
Appendix 3 - (3) (1) (c)	A plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is - i. a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or ii. on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Chapter 1, Chapter 2, Chapter 3, Chapter 20, and Appendix D
Appendix 3 - (3) (1) (d)	A description of the scope of the proposed activity, including – i. all listed and specified activities triggered and being applied for; ii. a description of the associated structures and infrastructure related to the development;	Chapter 2 and Chapter 4
Appendix 3 - (3) (1) (e)	A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	Chapter 4 and Appendix E
Appendix 3 - (3) (1) (f)	A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Chapter 1 and Chapter 5
Appendix 3 – (3) (1) (g)	A motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Chapter 5
Appendix 3 – (3) (1) (h)	A full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including - i. details of all the alternatives considered;	Refer to Chapter 5 of this EIA Report for a full description of the requirements of Appendix 3

¹⁶ Note that this table is applicable to the proposed Biesjesvlei PV 1, Biesjesvlei BESS 1 and Biesjesvlei EGI 1 projects.

Section of the EIA Regulations	<u>Requirements for an Environmental Impact Assessment Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982, as amended in GN R326)</u>	Chapter / Appendix
	ii. details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; iii. a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; iv. the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; v. the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified 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; vi. the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks; vii. positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; viii. the possible mitigation measures that could be applied and level of residual risk; ix. if no alternative development footprints for the activity were investigated, the motivation for not considering such; and x. a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	– (3) (1) (h) and how these have been addressed in the Scoping and EIA Process. The various requirements are addressed in Chapter 4, Chapter 5, Chapters 6 to 17, Appendix E, Appendix G and Appendix I of this EIA Report. A summary of the comments raised during the 30-day review period on the Draft EIA Report is included in Chapter 4 of this EIA Report.
Appendix 3 - (3) (1) (i)	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including – i. a description of all environmental issues and risks that were identified during the environmental impact assessment process; and i. 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;	Throughout Chapters 6 – 19 and Appendix E
Appendix 3 – (3) (1) (j)	An assessment of each identified potentially significant impact and risk, including (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be mitigated;	Throughout Chapters 6 – 15 and Appendix E
Appendix 3 – (3) (1) (k)	Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	Throughout Chapters 6 – 15 and Chapter 20
Appendix 3 – (3) (1) (l)	An environmental impact statement which contains: i. a summary of the key findings of the environmental impact assessment; ii. a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and	Chapters 6 to 19, Chapter 20, Appendix E, and Appendix J to Appendix O

Section of the EIA Regulations	<u>Requirements for an Environmental Impact Assessment Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982, as amended in GN R326)</u>	Chapter / Appendix
	iii. a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
Appendix 3 – (3) (1) (m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMP as well as for inclusion as conditions of authorisation;	Chapters 6 to 17, Chapter 20 and Appendix J to Appendix O
Appendix 3 – (3) (1) (n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Chapters 5 to 19, Chapter 20 and Appendix J to Appendix O
Appendix 3 – (3) (1) (o)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Chapters 6 to 17 and Chapter 20
Appendix 3 – (3) (1) (p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Chapters 6 to 17 and Chapter 20
Appendix 3 – (3) (1) (q)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Chapter 20
Appendix 3 – (3) (1) (r)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	Not Applicable as the proposed projects do have operational aspects. Refer to Appendix I.2 and Appendix I.7 of this EIA Report for a response regarding this.
Appendix 3 - (3) (1) (s)	An undertaking under oath or affirmation by the EAP in relation to - ii. the correctness of the information provided in the reports; iii. the inclusion of comments and inputs from stakeholders and interested and affected parties; iv. the inclusion of inputs and recommendations from the specialist reports where relevant; and v. any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	Appendix B
Appendix 3 – (3) (1) (u)	An indication of any deviation from the approved scoping report, including the plan of study, including - i. any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and ii. a motivation for the deviation;	Not applicable
Appendix 3 - (3) (1) (v)	Any specific information that may be required by the competent authority; and	Information requested by the DFFE during comment periods, and acceptance of the Final Scoping Report have been addressed throughout the report, as relevant
Appendix 3 - (3) (1) (w)	Any other matters required in terms of section 24(4)(a) and (b) of the Act.	Throughout the report
Appendix 3 - (3) (2)	Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to an environmental impact assessment report the requirements as indicated in such notice will apply.	Not applicable in terms of the actual EIA Report, but various gazetted assessment and reporting protocols have been complied with for relevant specialist assessments. Refer to Chapter 4, Chapters 6 to 19, and Chapter 20, and Appendix E of this EIA Report.



CHAPTER 2: Project Description

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2. PROJECT DESCRIPTION

This chapter provides an overview of the conceptual project design and technology for the following proposed projects that are addressed in this report:

- **PROJECT 1:** The proposed development of a Solar Photovoltaic (PV) Facility and associated infrastructure (i.e. Biesjesvlei PV1).
- **PROJECT 4:** The proposed development of a Battery Energy Storage System (BESS) and associated infrastructure for Biesjesvlei PV1 (Biesjesvlei BESS 1).
- **PROJECT 7:** The proposed development of a 132 kV Overhead Power Line from the on-site substation to the proposed Main Transmission Substation (MTS) and associated infrastructure (Biesjesvlei EGI 1).

The purpose of this chapter is to present sufficient project information on the proposed projects to inform the Scoping and Environmental Impact Assessment (EIA) Process in terms of design parameters applicable to the projects.

2.1 Definition of Project Study Area

The **study area** or **preferred site** for all the proposed Biesjesvlei Solar PV Facilities, BESS, 132 kV power lines, MTS and Loop-In-Loop-Out (LILO) and associated infrastructure (i.e. Projects 1 to 10) covers approximately 3 060 hectares (ha). These farm properties are listed in Table 2.1, and they apply to all the projects addressed in this EIA Report (i.e. Project 1, Project 4 and Project 7, as listed above and explained in Chapter 1). The full extent of the study area has been assessed by the specialists in order to identify environmental sensitivities and no-go areas. The preferred site serves as the study area for this Scoping and EIA Process. Therefore, the terms “site” and “study area” are used synonymously in this report.

Table 2.1: Farm Properties forming the study area

FARM PORTION	SG CODE
Farm Benoni 534	F03100000000053400000
Remaining Extent of Farm Biesjespoort 521	F03100000000052100000
Farm Biesjesvlei 372	F03100000000037200000
Farm Klein Badfontein 369	F03100000000036900000
Farm Modderkuil 396	F03100000000039600000
Farm Paalland 373	F03100000000037300000
Remaining Extent of Farm Pompoenfontein 118	F03100000000011800000
Portion 1 of Farm Pompoenfontein 118	F03100000000011800001
Farm Ronde Bult 408	F03100000000040800000
Farm Salpetervlei 756	F03100000000075600000
Portion 1 of Farm Schoemanskraal 34	F0310000000003400001

At the commencement of this Scoping and EIA Process, the study area was plotted on the National Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool to identify high-level environmental sensitivities. The specialists considered these sensitivities and undertook Site Sensitivity Verifications (SSVs) within the study area, where required, in order to confirm or dispute the sensitivities identified by the Screening Tool. The specialists then formulated environmental feature and sensitivity maps for the study area. Thereafter, the Project Developer took such sensitivities, and other considerations, into account and formulated the **Buildable Areas**, which avoid the no-go areas identified by the specialists. The Buildable Areas were also used to inform the design of the layout. The preliminary layout proposed at the Scoping Phase was further refined and detailed during the EIA Phase. The layout maps presented at the EIA Phase are final and deemed acceptable by the specialists.

Figure 2.1 provides an indication of the affected farm portions and the adjacent farm portions for the entire study area.

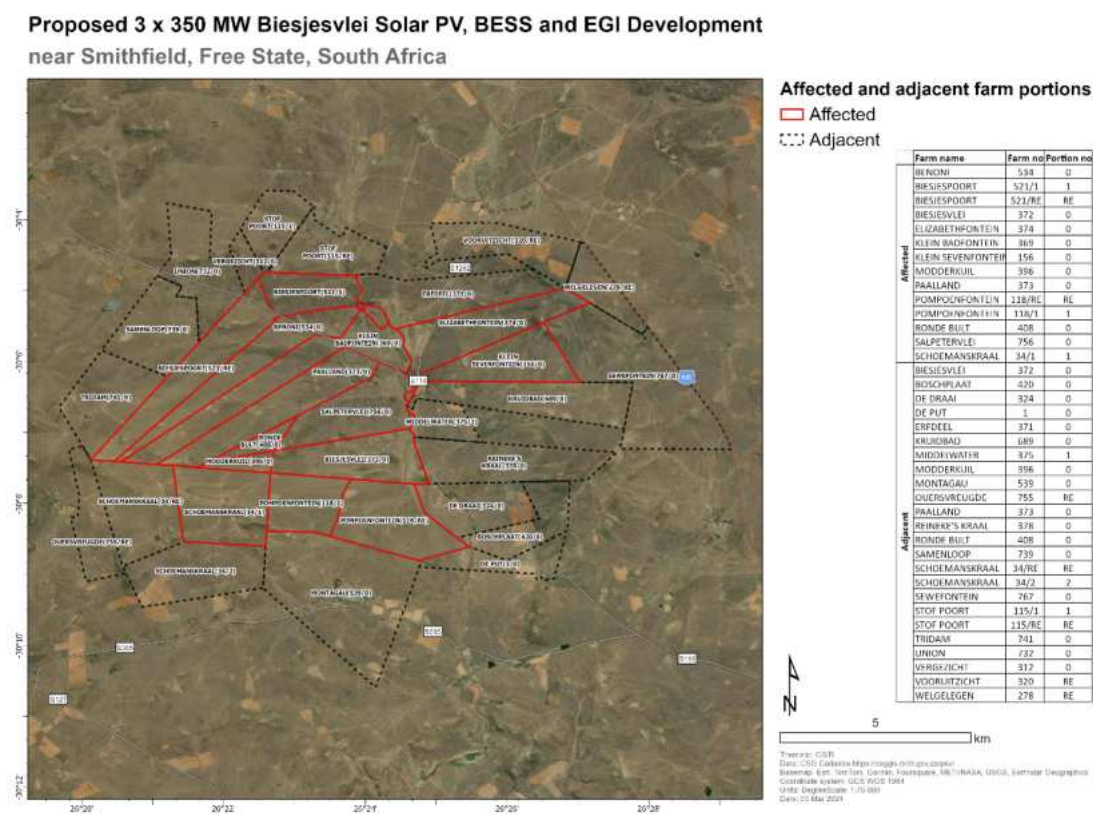


Figure 2.1: Affected and Adjacent Farm Portions for the study area

2.2 Project Locality

Appendix 3 of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (as amended) states that an EIA Report must provide the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including the 21-digit Surveyor General code of each cadastral land parcel; where available, the physical address and farm name; or the coordinates of the boundary of the property or properties if the aforementioned is not available. Appendix 3 of the 2014 NEMA EIA Regulations (as amended) also states that an EIA Report must include a plan which locates the proposed activity or activities applied for at an appropriate scale or, if it is a linear activity, then a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken.

In line with the above, refer to Chapter 1 for a locality map of the proposed projects and associated infrastructure. Refer to Appendix D of this EIA Report for additional maps, including final layout maps, feature maps for the study area, sensitivity maps for the study area and projects, and final combined layout and sensitivity maps. These maps are also included in Chapter 3 and Chapter 20 of this EIA Report, as well as the EMPs, where relevant.

The proposed projects and associated infrastructure will occur on the farm portions listed in Table 2.2 to Table 2.4 below, which also specifies the corresponding 21-digit Surveyor General code for each affected farm portion. The properties to be affected by the development of the proposed projects will be leased from the property owners by the Project Applicant for the life span of the proposed projects.

2.2.1 Project 1 – Biesjesvlei PV1 and associated infrastructure

Table 2.2 details the affected farm portions for Project 1 (Biesjesvlei PV1 and associated infrastructure).

Table 2.2: Affected Farm Properties for Project 1 (Biesjesvlei PV1 and associated infrastructure)

Farm Portion	21-digit Surveyor General code
PV Facility and associated infrastructure within the fenced off area	
Remaining Extent of Farm Biesjespoort 521	F03100000000052100000
Farm Benoni 534	F03100000000053400000
Farm Klein Badfontein 369	F03100000000036900000
Farm Paalland 373	F03100000000037300000
Access Road Option A	
Farm Salpetervlei 756	F03100000000075600000
Farm Paalland 373	F03100000000037300000
Access Road Option B	
Farm Benoni 534	F03100000000053400000
Farm Klein Badfontein 369	F03100000000036900000
Farm Paalland 373	F03100000000037300000

Farm Portion	21-digit Surveyor General code
Access Road Option C	
Remaining Extent of Farm Biesjespoort 521	F03100000000052100000
Farm Benoni 534	F03100000000053400000
Farm Klein Badfontein 369	F03100000000036900000
Farm Paalland 373	F03100000000037300000
Widening of Existing Road Intersections	
Farm Benoni 534	F03100000000053400000
Remaining Extent of Farm Biesjespoort 521	F03100000000052100000
Portion 1 of Farm Biesjespoort 521	F03100000000052100001
Remaining Extent of Farm Elizabethfontein 374	F03100000000037400000
Farm Klein Badfontein 369	F03100000000036900000
Farm Salpetervlei 756	F03100000000075600000
Remaining Extent of Klein Sevenfontein 156	F03100000000015600000

2.2.2 Project 4 – Biesjesvlei BESS 1 and associated infrastructure

Table 2.3 details the affected farm portions for Project 4 (Biesjesvlei BESS 1 and associated infrastructure).

Table 2.3: Affected Farm Properties for Project 4 (Biesjesvlei BESS 1 and associated infrastructure)

Farm Portion	21-digit Surveyor General code
BESS and associated infrastructure	
Farm Klein Badfontein 369	F03100000000036900000
Farm Paalland 373	F03100000000037300000
Access Road Option A	
Farm Salpetervlei 756	F03100000000075600000
Farm Paalland 373	F03100000000037300000
Access Road Option B	
Farm Benoni 534	F03100000000053400000
Farm Klein Badfontein 369	F03100000000036900000
Farm Paalland 373	F03100000000037300000
Access Road Option C	
Remaining Extent of Farm Biesjespoort 521	F03100000000052100000
Farm Benoni 534	F03100000000053400000
Farm Klein Badfontein 369	F03100000000036900000
Farm Paalland 373	F03100000000037300000
Widening of Existing Road Intersections	
Farm Benoni 534	F03100000000053400000

Farm Portion	21-digit Surveyor General code
Remaining Extent of Farm Biesjespoort 521	F03100000000052100000
Portion 1 of Farm Biesjespoort 521	F03100000000052100001
Remaining Extent of Farm Elizabethfontein 374	F03100000000037400000
Farm Klein Badfontein 369	F03100000000036900000
Farm Salpetervlei 756	F03100000000075600000
Remaining Extent of Klein Sevenfontein 156	F03100000000015600000

2.2.3 Project 7 – Biesjesvlei EGI 1 and associated infrastructure

Table 2.4 details the affected farm portions for Project 7 (Biesjesvlei EGI 1 and associated infrastructure).

Table 2.4: Affected Farm Properties for Project 7 (Biesjesvlei EGI 1 and associated infrastructure)

Farm Portion	21-digit Surveyor General code
132 kV Overhead Power Line, EGI Corridor and Service Road below the 132 kV Overhead Power Line	
Farm Klein Badfontein 369	F03100000000036900000
Farm Paalland 373	F03100000000037300000
Eskom's Section of the On-Site Substation (Switching Station)	
Farm Paalland 373	F03100000000037300000

2.3 Project Co-ordinates

The co-ordinates of the estimated corner points and start-middle-end points of the proposed projects are detailed in Tables 2.5 to Table 2.7. These co-ordinates have also been included in Appendix D of this EIA Report.

2.3.1 Project 1 – Biesjesvlei PV1 and associated infrastructure

Table 2.5 details the co-ordinates of key infrastructure for Project 1 (Biesjesvlei PV1 and associated infrastructure).

Table 2.5: Co-ordinates for Project 1 (Biesjesvlei PV1 and associated infrastructure)

Co-ordinate Point	Decimal Degrees		Degrees, Minutes, Seconds	
	Latitude (Y)	Longitude (X)	Latitude (S)	Longitude (E)
PV Facility and associated infrastructure within the fenced off area				
Corner Point 1	-30.09643127	26.37131284	30° 05' 47.15256480" S	26° 22' 16.72621320" E
Corner Point 2	-30.09624747	26.36034155	30° 05' 46.49089560" S	26° 21' 37.22958000" E
Corner Point 3	-30.11593092	26.34221394	30° 06' 57.35132280" S	26° 20' 31.97019840" E
Corner Point 4	-30.11626085	26.36529505	30° 06' 58.53907440" S	26° 21' 55.06216200" E
Corner Point 5	-30.11616582	26.37177709	30° 06' 58.19694480" S	26° 22' 18.39752040" E
Corner Point 6	-30.1107082	26.37485423	30° 06' 38.54952000" S	26° 22' 29.47524240" E
PV Facility IPP Substation				
Corner Point 1	-30.11492353	26.36867709	30° 06' 53.72469720" S	26° 22' 07.23751713" E
Corner Point 2	-30.114931	26.37023404	30° 06' 53.75160359" S	26° 22' 12.84253580" E
Corner Point 3	-30.11632925	26.37022517	30° 06' 58.78531799" S	26° 22' 12.81060340" E
Corner Point 4	-30.11632176	26.3686682	30° 06' 58.75833733" S	26° 22' 07.20550808" E
Access Road Option A				
Start-Point	-30.10215751	26.40774589	30° 06' 07.76702867" S	26° 24' 27.88519696" E
Mid-Point	-30.10967631	26.38279884	30° 06' 34.83470520" S	26° 22' 58.07583840" E
End-Point	-30.11492441	26.36886392	30° 06' 53.72786520" S	26° 22' 07.91011920" E
Access Road Option B				
Start-Point	-30.09332796	26.3885668	30° 05' 35.98065095" S	26° 23' 18.84049168" E
Mid-Point	-30.10404815	26.37116602	30° 06' 14.57332301" S	26° 22' 16.19768272" E
End-Point	-30.11492441	26.36886392	30° 06' 53.72786520" S	26° 22' 07.91011920" E
Access Road Option C				
Start-Point	-30.08834041	26.37831337	30° 05' 18.02546520" S	26° 22' 41.92812120" E
Mid-Point	-30.10079365	26.37118663	30° 06' 02.85712442" S	26° 22' 16.27186086" E
End-Point	-30.11492441	26.36886392	30° 06' 53.72786520" S	26° 22' 07.91011920" E

Co-ordinate Point	Decimal Degrees		Degrees, Minutes, Seconds	
	Latitude (Y)	Longitude (X)	Latitude (S)	Longitude (E)
Widening of Existing Road Intersections				
Mid-Point (S1262/S119 intersection)	-30.10423498	26.4123598	30° 06' 15.24592316" S	026° 24' 44.49527212" E
Mid-Point (S119/Option A)	-30.10220739	26.40774196	30° 06' 07.94659649" S	026° 24' 27.87105360" E
Mid-Point (S119/Option B)	-30.09339592	26.38873086	30° 05' 36.22530598" S	026° 23' 19.43109165" E
Mid-Point (S119/Option C)	-30.08839031	26.37833609	30° 05' 18.20510587" S	026° 22' 42.00993312" E

2.3.2 Project 4 – Biesjesvlei BESS 1 and associated infrastructure

Table 2.6 details the co-ordinates of key infrastructure for Project 4 (Biesjesvlei BESS 1 and associated infrastructure).

Table 2.6: Co-ordinates for Project 4 (Biesjesvlei BESS 1 and associated infrastructure)

Co-ordinate Point	Decimal Degrees		Degrees, Minutes, Seconds	
	Latitude (Y)	Longitude (X)	Latitude (S)	Longitude (E)
BESS and associated infrastructure				
Corner Point 1	-30.11332809	26.3653138	30° 06' 47.98111320" S	26° 21' 55.12966200" E
Corner Point 2	-30.11334434	26.36868713	30° 06' 48.03963840" S	26° 22' 07.27367160" E
Corner Point 3	-30.11632176	26.3686682	30° 06' 58.75833733" S	26° 22' 07.20550808" E
Corner Point 4	-30.11626031	26.36529505	30° 06' 58.53711849" S	26° 21' 55.06217450" E
Access Road Option A				
Start-Point	-30.10215751	26.40774589	30° 06' 07.76702867" S	26° 24' 27.88519696" E
Mid-Point	-30.10967631	26.38279884	30° 06' 34.83470520" S	26° 22' 58.07583840" E
End-Point	-30.11428066	26.36868118	30° 06' 51.41037600" S	26° 22' 07.25223720" E
Access Road Option B				
Start-Point	-30.09332796	26.3885668	30° 05' 35.98065095" S	26° 23' 18.84049168" E
Mid-Point	-30.10404815	26.37116602	30° 06' 14.57332301" S	26° 22' 16.19768272" E
End-Point	-30.11428066	26.36868118	30° 06' 51.41037600" S	26° 22' 07.25223720" E
Access Road Option C				
Start-Point	-30.08834041	26.37831337	30° 05' 18.02546520" S	26° 22' 41.92812120" E
Mid-Point	-30.10079365	26.37118663	30° 06' 02.85712442" S	26° 22' 16.27186086" E
End-Point	-30.11428066	26.36868118	30° 06' 51.41037600" S	26° 22' 07.25223720" E
Widening of Existing Road Intersections				

Co-ordinate Point	Decimal Degrees		Degrees, Minutes, Seconds	
	Latitude (Y)	Longitude (X)	Latitude (S)	Longitude (E)
Mid-Point (S1262/S119 intersection)	-30.10423498	26.4123598	30° 06' 15.24592316" S	026° 24' 44.49527212" E
Mid-Point (S119/Option A)	-30.10220739	26.40774196	30° 06' 07.94659649" S	026° 24' 27.87105360" E
Mid-Point (S119/Option B)	-30.09339592	26.38873086	30° 05' 36.22530598" S	026° 23' 19.43109165" E
Mid-Point (S119/Option C)	-30.08839031	26.37833609	30° 05' 18.20510587" S	026° 22' 42.00993312" E

2.3.3 Project 7 – Biesjesvlei EGI 1 and associated infrastructure

Table 2.7 details the co-ordinates of key infrastructure for Project 7 (Biesjesvlei EGI 1 and associated infrastructure).

Table 2.7: Co-ordinates for Project 7 (Biesjesvlei EGI 1 and associated infrastructure)

Co-ordinate Point	Decimal Degrees		Degrees, Minutes, Seconds	
	Latitude (Y)	Longitude (X)	Latitude (S)	Longitude (E)
132 kV Overhead Power Line and Service Road below the 132 kV Overhead Power Line				
Start-Point	-30.11492951	26.36992265	30° 06' 53.74622880" S	26° 22' 11.72153280" E
Mid-Point	-30.11088086	26.37257052	30° 06' 39.17108191" S	26° 22' 21.25387914" E
End-Point	-30.10714096	26.37647774	30° 06' 25.70745960" S	26° 22' 35.31987840" E
Eskom's Section of the On-Site Substation (Switching Station)				
Corner Point 1	-30.11492353	26.36867709	30° 06' 53.72469720" S	26° 22' 07.23751713" E
Corner Point 2	-30.114931	26.37023404	30° 06' 53.75160359" S	26° 22' 12.84253580" E
Corner Point 3	-30.11632925	26.37022517	30° 06' 58.78531799" S	26° 22' 12.81060340" E
Corner Point 4	-30.11632176	26.3686682	30° 06' 58.75833733" S	26° 22' 07.20550808" E

2.4 Key components of Project 1 (Biesjesvlei PV1 and associated infrastructure)

The proposed project will consist of the key components listed below in Table 2.8. A summary of the key components of the proposed Biesjesvlei PV1 and associated infrastructure (Project 1) and technical information is described in this section.

Table 2.8: Description of the components of Biesjesvlei PV1 and Associated Infrastructure

Component	Description
Solar Field	
Type of Technology	Solar Photovoltaic (PV) Technology
Generation Capacity (Maximum Installed)	Up to 350 MWdc
Total footprint that includes all associated infrastructure within the fenced off area of the PV facility (excluding access roads)	Maximum 450 ha
PV Panel Structure (with the following possible tracking and mounting systems): - Single Axis Tracking structures (aligned north-south); - Fixed Axis Tracking (aligned east-west); - Dual Axis Tracking (aligned east-west and north-south); - Fixed Tilt Mounting Structure; or - Bifacial Solar Modules.	<u>Height</u>: Approximately 10 m (maximum)
Building Infrastructure	
Offices	<u>Maximum height</u>: 7 m <u>Footprint</u>: 1000 m²
Operational and maintenance (O&M) control centre	<u>Maximum height</u>: 7 m <u>Footprint</u>: 500 m²
Warehouse / workshop	<u>Maximum height</u>: 7 m <u>Footprint</u>: 500 m²
Ablution facilities	<u>Maximum height</u>: 7 m <u>Footprint</u>: 50 m²
Converter / Inverter stations	<u>Height</u>: 2.5 m to 7 m (maximum) <u>Footprint</u>: 2500 m²
Guard Houses	<u>Height</u>: 3 m <u>Footprint</u>: 40 m²
On-site substation and/or switching station. This will include the section that will be	<u>Footprint of the IPP Substation</u>: Approximately 10 000 m²

Component	Description
maintained by the Independent Power Producer (IPP).	▪ <u>Height</u>: 10 m ▪ <u>Capacity</u>: 132 kV ▪ This section includes all the high voltage infrastructure leading up to the Point of Connection (i.e. the Project Applicant's section of the proposed on-site substation, which is also referred to the PV Facility IPP Substation).
Associated Infrastructure	
On-site medium voltage internal cables / power lines	▪ <u>Placement</u>: Underground or above ground ▪ <u>Capacity</u>: 33 kV ▪ <u>Depth (if underground)</u>: Maximum depth of 1.6 m ▪ <u>Height (if aboveground)</u>: Maximum height of 9 m
Underground low voltage cables or cable trays	▪ <u>Depth</u>: Maximum depth of 1.4 m
External Access Roads	▪ The study area can be accessed via various existing main roads and gravel roads. Specifically, three access route options have been considered: Access Route Option A, Option B and Option C, which are routed along the N6; S1262; and S119. Access Route Options A, B and C have different access points off the S119. Direct access to the proposed projects will be taken from the S119 along an existing farm access point, and thereafter new access roads will be developed within the study area, where they do not align with existing roads, or existing roads will be used where possible. Existing roads will be used as far as practically achievable. ▪ <u>New Access Roads</u>: Where new access roads are required within the study area, these will be 4 - 8 m wide. ▪ <u>Existing Access Roads</u>: Where existing roads are used within the study area, they may need to be upgraded, as described below. ▪ The Traffic Specialist has noted the following (additional detail is provided in Section 2.7 of this report): ○ The N6, S1262, and S119 are of a sufficient width to accommodate truck

Component	Description
	movement, however widening by more than 4 m or more than 6 m will be required at localised positions (i.e. intersections). Specifically, road widening by approximately 9 m will be required at the S1262 and S119 intersection. In addition, the N6 and S1262 intersection will need to be widened by approximately 2 m on the western side of the intersection and by approximately 2 m on the eastern side of the intersection. ○ Existing internal farm roads (local farm roads within the farm property boundaries) will need to be upgraded to accommodate the abnormal loads as required. This includes the following: ▪ Intersection S119 and Access Route Option A: Road widening by approximately 14 m (at the widest point) will be required. ▪ Intersection S119 and Access Route Option B: Road widening by approximately 7 m (at the widest point) will be required. ▪ Intersection S119 and Access Route Option C: Road widening by approximately 14 m (at the widest point) will be required. ▪ The existing bridge on the S119 will also need to be inspected by a Structural Engineer. ▪ The existing bridge on the existing internal farm road along Access Route Option A will need to be rebuilt/upgraded or realigned to minimise the turns that the abnormal loads need to navigate, if this access route is used for the proposed projects. ▪ A new bridge will need to be developed along Access Route Option B, if this option is used for the proposed projects. ▪ A new bridge will need to be developed along Access Route

Component	Description
	Option C, if this option is used for the proposed projects.
Internal roads	▪ <u>Details</u>: New internal gravel roads will need to be established within the fenced off area of the PV facility. ▪ <u>Width</u>: Up to 4 m
Fencing around the PV Facility Perimeter	▪ <u>Type</u>: Palisade or mesh or fully electrified ▪ <u>Security</u>: Access points will be managed and monitored by an appointed security service provider. ▪ <u>Height</u>: Between 2 - 3 m
Panel maintenance and cleaning area	▪ A dedicated panel maintenance and cleaning area will be required on site during the operational phase.
Storm water channels	▪ Details to be confirmed once the Engineering, Procurement and Construction (EPC) contractor has been selected and the design is finalised. Where necessary, a detailed storm water management plan would need to be developed.
Work area during the construction phase (i.e. laydown area)	▪ <u>Footprint</u>: Up to 13 ha.
Water Requirements	▪ Approximately 8 520 m³ to 12 000 m³ of water is estimated to be required per year for the construction phase. ▪ Approximately 10 000 m³ to 16 000 m³ of water is estimated to be required per year for the operational phase. ▪ Water requirements during the decommissioning phase are expected to be the same as the construction phase. ▪ Potential sources: Existing boreholes on site or from the Local Municipality via trucks.
Construction Period	▪ 12 – 24 months
Operational Period	▪ Once the commercial operation date is achieved, the proposed facility will generate electricity for a minimum period of 20 to 30 years.

A description of the key components of the proposed project is described below.

2.4.1 Solar PV Facilities – Solar Field

The Solar Field will consist of the solar arrays (panels) and building infrastructure.

The total footprint that includes all associated infrastructure within the fenced off area of the PV facility i.e. including the solar field, foundations, buildings and associated infrastructure but excluding access roads leading to the fenced off area, for the proposed project is a maximum of **450 ha**.

A final site layout map is included in Chapter 20 and Appendix D of this report, as well as the EMPrs.

The smallest unit of a PV installation is a cell. A number of cells form a module, and several modules cumulatively form the arrays (Figure 2.2). An example of a Solar PV Facility is provided in Figure 2.3.

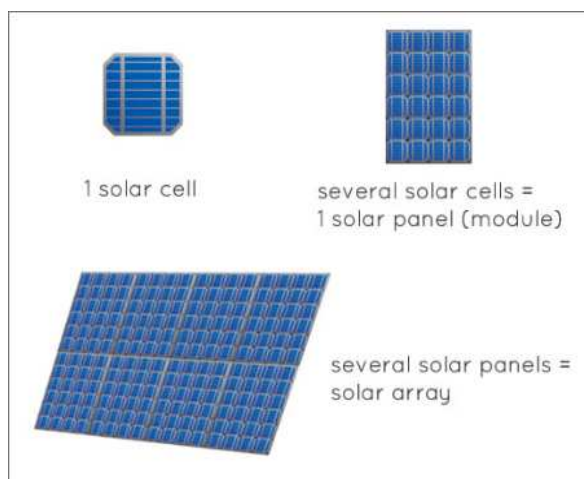


Figure 2.2: Components of the Proposed PV Installation

Modules are arranged into strings that form the solar field and are installed on racks which are made of aluminium and galvanised steel. Foundations will be drilled and concreted into the ground. The entire structure will have a maximum height of approximately 10 m (measured from the ground). This system may be fixed, or may track the movement of the sun, either by adopting Single Axis Tracking (aligned north-south), Fixed Axis Tracking (aligned east-west), Dual Axis Tracking (aligned east-west and north-south), Fixed Tilt Mounting Structures, or Bifacial Solar Modules. Bifacial panels can be up to 20 - 40 % more effective since it also utilises solar radiation reflected from the surfaces onto the rear side of the panels. The tracker design will be confirmed during the detailed engineering phase. All tracker design options have been considered in this Scoping and EIA Process, and all have been proposed for inclusion in the Environmental Authorisation (EA) (should it be granted).



Figure 2.3: Example of PV Technology (Department of Environment, Forestry and Fisheries (DEFF), 2019¹).

2.4.2 Infrastructure within the PV Facility

2.4.2.1 Converters/Inverters, Low Voltage Cables and Trays, and Medium Voltage Cables/Power Lines

The solar arrays are typically connected to each other in strings, which are in turn connected to inverters that convert DC to AC. Each converter/inverter station is expected to range from approximately 2.5 m to 7 m in height, with a footprint of approximately 2 500 m².

The strings will be connected to the converter/inverter stations by low voltage underground (internal) DC cables (to a maximum depth of 1.4 m) or cable trays. Power from the converter/inverter stations will be collected in medium voltage transformers through underground (internal) AC cables, cable trays or AC cables which will be below ground or pole-mounted depending on voltage level and site conditions.

The converter/inverter stations will in turn be connected to the proposed on-site substation, via medium voltage (33 kV) internal underground cables or above ground power lines. It is highly unlikely that above ground 33 kV power lines will be utilised due to the shading created to the PV Facility from the overhead lines. However, if overhead 33 kV power lines are considered as an option, it will be approximately 9 m high utilising a standard monopole design. It is more likely that the 33 kV internal cables will be underground to a maximum depth of 1.6 m.

¹ Department of Environment Forestry and Fisheries, 2019. Phase 2 Strategic Environmental Assessment for wind and solar PV energy in South Africa. CSIR Report Number: CSIR/SPLA/SECO/ER/2019/0085 Stellenbosch, Western Cape.

2.4.2.2 On-site Substation

The proposed project will also include an on-site substation and/or switching station, which will include the following two sections:

- The section that will be maintained by the Independent Power Producer (IPP). This includes all the high voltage infrastructure leading up to the Point of Connection (i.e. the Project Applicant's section of the proposed on-site substation, which is also referred to as the **PV Facility IPP Substation**). This is covered in Project 1.
- The section that will be transferred from the IPP to Eskom. This includes all the high voltage infrastructure extending from the Point of Connection (i.e. Eskom's section of the proposed on-site substation, also referred to as the **Switching Station**). This is covered in Project 7 and discussed in Section 2.6 of this chapter.

There will be a metering point between the above two sections to indicate the ownership level between the IPP and Eskom.

The PV Facility IPP Substation will extend 10 m in height, with a maximum footprint of 10 000 m², and a capacity stepping up from 33 kV to 132 kV. There is also the requirement for the installation of a lightning mast within the substation yard, which will not be higher than 21 m.

As noted in Chapter 1 of this EIA Report, the electrical connection to the national grid via the proposed independent MTS and LILO is the subject of a separate Scoping and EIA Process, and thus discussed in a separate EIA Report (i.e. Project 10).

2.4.2.3 Internal Roads

Internal roads will also be constructed within the footprint of the PV facility. The internal roads will be composed of gravel and extend up to 4 m wide. A perimeter road will also be constructed along the boundary of the proposed PV plant, which will extend approximately 2.5 m wide.

2.4.2.4 Panel Maintenance and Cleaning Area

During the operational phase, the accumulation of dust on solar panels generally negatively influences the productivity of solar facilities. As such the panels require regular cleaning. It is proposed that panel cleaning will take place quarterly as part of a maintenance schedule; however, this may be revised should the site and weather conditions warrant more frequent cleaning. Cleaning may also be required after events that generate significant dust. A dedicated panel maintenance and cleaning area will be required on site during the operational phase. Water that emanates from the cleaning process will be free from harmful detergents or will comprise of approved biodegradable substances.

2.4.2.5 Storm water

The following design principles are proposed to manage storm water overland flow and mitigate erosion:

- The area where the solar panels will be installed will not be fully cleared of vegetation. The vegetation will only be trimmed using manual mechanisms (not chemical treatment), and the panels will be installed on steel supporting structures above the height of the vegetation;
- The internal roads within the PV facility are proposed to be constructed level with the natural ground level to prevent channelization of the surface water. This will also prevent concentrated surface runoff erosion;
- For scattered small ridges that have localized steeper gradients it is proposed that localized storm water cut-off channels be implemented above the areas only when evidence of erosion is observed at the natural state (prior to construction);
- Run-off needs to be managed and controlled to the natural riverbed with suitable lining and gabion structures; and
- At loading areas and building structures, allowance will be made to minimize any erosion that might occur. This can be achieved by placing vegetated grass blocks on the verges of these hardened areas to limit flow velocity and to assist with the recharge of the water table.

Therefore, the existing rainfall and storm water runoff characteristics will not be changed with the construction should the proposed design principles be implemented. The solar panels will not replace the vegetated area and thus storm water runoff is not expected to increase due to the proposed PV development.

Storm water infrastructure will be constructed on site to ensure that storm water run-off from the site is appropriately managed. Such infrastructure will include various channels (e.g. concrete lined trapezoidal channels) and pipe culverts. Refer to Appendix D of this EIA Report for a map illustrating this infrastructure. The storm water infrastructure will have a minimum width of 0.5 m and minimum length of 1250 m. In addition, the peak throughput of the storm water infrastructure will be higher than 120 litres per second. The relevant listed activity in terms of the 2014 NEMA EIA Regulations (as amended) has been retained in the Application for EA for Biesjesvlei PV1. Refer to Chapter 4 of this EIA Report for additional information.

Water from these channels is unlikely to contain any chemicals or hazardous substances and will be released into the surrounding environment based on the natural drainage contours.

Details of storm water management are to be confirmed once the Engineering, Procurement and Construction (EPC) contractor has been selected and the design is finalised. Where necessary, a detailed Storm Water Management Plan would need to be developed during the detailed design phase (post EA, should such authorisation be granted) and to be implemented during all phases of the project. Recommendations for the management of storm water have been included in a Storm Water Management Plan in the Environmental Management Programmes (EMPRs) for the proposed projects, as relevant (included in Appendix J and Appendix K of this EIA Report).

2.4.2.6 Auxiliary Building Infrastructure

The solar field will require the auxiliary building infrastructure described in Table 2.9, which also includes the height and footprint details.

Table 2.9: Building Infrastructure for Project 1 (Biesjesvlei PV1 and associated infrastructure)

Building Structure	Height	Footprint
Offices	7 m (Maximum)	1 000 m ²
Operational and maintenance (O&M) control centre	7 m (Maximum)	500 m ²
Warehouse/workshop	7 m (Maximum)	500 m ²
Ablution facilities	7 m (Maximum)	50 m ²
Converter/inverter stations	2.5 m to 7 m (Maximum)	2 500 m ²
Guard Houses	3 m	40 m ²
On-site substation building	10 m	Within the 10 000 m ² IPP substation area

A laydown area with a maximum footprint of 13 ha will also be constructed.

2.4.2.7 Additional Infrastructure

The Project Applicant may establish a concrete batching plant on site (within the laydown area) for purposes of the construction phase. Only a limited amount of water (within the overall water usage estimates described in this chapter) will be utilised during construction for the batching of concrete. Details of the concrete batching plant will be confirmed during detailed design as the development progresses.

For various reasons such as security, public protection and lawful requirements, the proposed built infrastructure and the entire PV facility will be secured via the installation of appropriate fencing. The PV facility fencing type could be palisade or mesh or fully electrified, with an estimated height of 2 to 3 m. Access points will be managed and monitored by an appointed security service provider. Fencing will also be required around the O&M control centre and on-site substation.

2.5 Key components of Project 4 (Biesjesvlei BESS 1 and associated infrastructure)

The proposed project will consist of the key components listed below in Table 2.10. A summary of the key components of the proposed Biesjesvlei BESS 1 and associated infrastructure (Project 4) and technical information is described in this section.

Table 2.10: Description of the components of Biesjesvlei BESS 1 and Associated Infrastructure

Component	Description
Battery Energy Storage System (BESS)	
BESS Area/Facility	▪ <u>Technology</u>: Lithium-Ion BESS ▪ <u>Estimated Capacity</u>: Maximum 1 200 MWh ▪ <u>Total Footprint</u>: Approximately 10 ha ▪ <u>Height</u>: Between 5 m and 10 m ▪ The BESS area will include the following sub-components: ○ BESS Units; ○ BESS Laydown Area; ○ BESS IPP Substation; ○ Laydown area for the BESS IPP Substation; ○ BESS Operational and Maintenance (O&M) Office, including Ablutions; ○ Access Roads; ○ Internal Roads; ○ MV cables between BESS Units; ○ Transformer at the BESS IPP Substation; ○ Internal cables; and ○ Overhead cables at the BESS IPP Substation; ○ Fencing and Security; and ○ Parking Area.
BESS Sub-Components <i>(to be located within the 10 ha area of the overall BESS Facility)</i>	
BESS Units	▪ This will include battery packs or containers, with an area of approximately 6 ha, and height up to 5 m.
BESS Laydown Area	▪ <u>Footprint</u>: Approximately 1.25 ha
BESS IPP Substation	▪ <u>Footprint</u>: Approximately 1 ha ▪ <u>Height</u>: Up to 15 m ▪ <u>Capacity</u>: 33 kV to 132 kV

Component	Description
Laydown Area for the BESS IPP Substation	- This will be maintained by the IPP. <u>Footprint</u>: Approximately 0.5 ha
BESS Operational and Maintenance (O&M) Office	<u>Maximum height</u>: Up to 5 m <u>Footprint</u>: Approximately 0.5 ha - The BESS O&M Office will also include Ablution facilities.
External Access Roads	- The study area can be accessed via various existing main roads and gravel roads. Specifically, three access route options have been considered: Access Route Option A, Option B and Option C, which are routed along the N6; S1262; and S119. Access Route Options A, B and C have different access points off the S119. Direct access to the proposed projects will be taken from the S119 along an existing farm access point, and thereafter new access roads will be developed within the study area, where they do not align with existing roads, or existing roads will be used where possible. Existing roads will be used as far as practically achievable. <u>New Access Roads</u>: Where new access roads are required within the study area, these will be 4 - 8 m wide. <u>Existing Access Roads</u>: Where existing roads are used within the study area, they may need to be upgraded, as described below. - The Traffic Specialist has noted the following (additional detail is provided in Section 2.7 of this report): - The N6, S1262, and S119 are of a sufficient width to accommodate truck movement, however widening by more than 4 m or more than 6 m will be required at localised positions (i.e. intersections). Specifically, road widening by approximately 9 m will be required at the S1262 and S119 intersection. In addition, the N6 and S1262 intersection will need to be widened by approximately 2 m on the western side of the intersection and by approximately 2 m on the eastern side of the intersection.

Component	Description
	○ Existing internal farm roads (local farm roads within the farm property boundaries) will need to be upgraded to accommodate the abnormal loads as required. This includes the following: ▪ Intersection S119 and Access Route Option A: Road widening by approximately 14 m (at the widest point) will be required. ▪ Intersection S119 and Access Route Option B: Road widening by approximately 7 m (at the widest point) will be required. ▪ Intersection S119 and Access Route Option C: Road widening by approximately 14 m (at the widest point) will be required. ▪ The existing bridge on the S119 will also need to be inspected by a Structural Engineer. ▪ The existing bridge on the existing internal farm road along Access Route Option A will need to be rebuilt/upgraded or realigned to minimise the turns that the abnormal loads need to navigate, if this access route is used for the proposed projects. ▪ A new bridge will need to be developed along Access Route Option B, if this option is used for the proposed projects. ▪ A new bridge will need to be developed along Access Route Option C, if this option is used for the proposed projects.
Internal Roads	▪ <u>Details</u>: New internal gravel roads will need to be established within the BESS facility area. ▪ <u>Width</u>: Up to 4 m
Medium Voltage (MV) cables between the BESS Units	▪ <u>Placement</u>: Buried/Ducted ▪ <u>Capacity</u>: Ranges from 1 kV up to 33 kV ▪ <u>Depth</u>: Up to 2 m

Component	Description
Transformer at the BESS IPP Substation	▪ <u>Capacity</u>: Ranges above 33 kV ▪ <u>Depth/Height</u>: Up to 2 m
Internal cables in the BESS facility	▪ <u>Placement</u>: Buried / ducted ▪ <u>Capacity</u>: Ranges from 1 kV up to 33 kV ▪ <u>Depth</u>: Up to 2 m
Overhead cables at the BESS IPP Substation	▪ <u>Placement</u>: Overhead ▪ <u>Capacity</u>: Ranges above 33 kV ▪ <u>Height</u>: Up to 12 m
Fencing of the BESS Facility and Security	▪ <u>Type</u>: Palisade or mesh or fully electrified ▪ <u>Height</u>: Up to 5 m ▪ <u>Security</u>: Access to the BESS Facility will be managed and monitored by an appointed security service provider.
Parking Area	▪ A parking area will be established at the BESS Facility for staff
Storm water channels	▪ Details to be confirmed once the Engineering, Procurement and Construction (EPC) contractor has been selected and the design is finalised. Where necessary, a detailed storm water management plan would need to be developed.
Water Requirements	▪ Approximately 350 m³ to 450 m³ of water is estimated to be required per year for the construction phase. ▪ Approximately 200 m³ to 300 m³ of water is estimated to be required per year for the operational phase. ▪ Water requirements during the decommissioning phase are expected to be the same as the construction phase. ▪ Potential sources: Existing boreholes on site or from the Local Municipality via trucks.
Construction Period	▪ 12 - 24 months
Operational Period	▪ Once the commercial operation date is achieved, the proposed BESS will store and dispatch electricity for a minimum period of 20 to 30 years.

A description of the key components of the proposed project is described below.

2.5.1 BESS Facility

The proposed BESS Facility will cover a total area of approximately 10 ha and will include various sub-components as discussed above in Table 2.10, and schematically indicated in Figure 2.4 below.

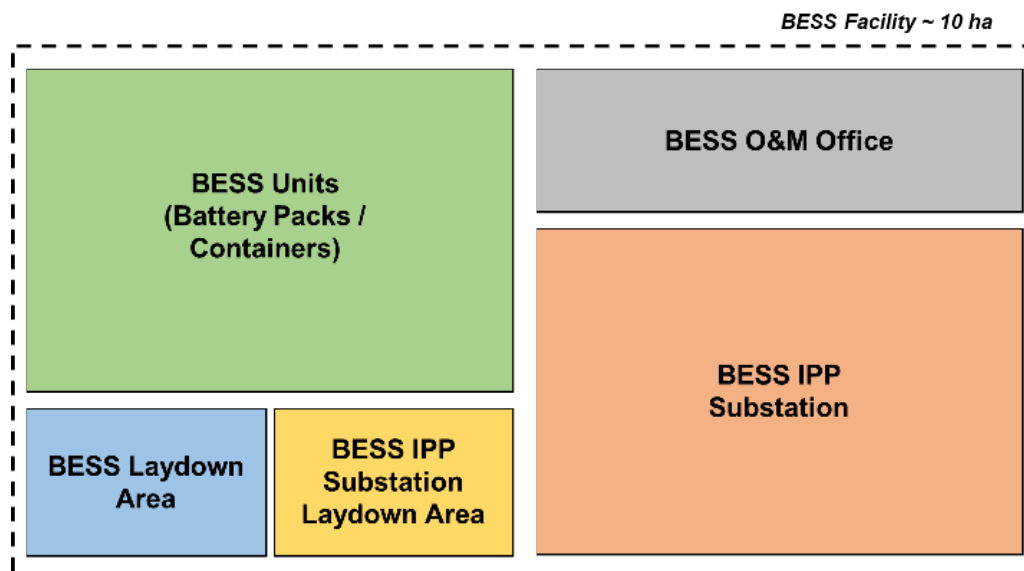


Figure 2.4: Schematic Overview (not to scale) of the Biesjesvlei BESS 1 and associated infrastructure.

The BESS will extend between 5 m and 10 m in height. There is also the requirement for the installation of a lightning mast within the BESS area, which will not be higher than 21 m.

Battery storage offers a wide range of advantages to South Africa including electricity supply reliability and quality improvement. The main purpose of the BESS is to mitigate intermittency of solar PV energy by storing and dispatching of electricity when needed i.e. to contribute to the grid 24 hours/day, during peak demand at night or during power outages. In essence, this technology allows renewable energy to enter the completely independent power generation market.

The BESS technology type will be **Lithium-Ion** with an estimated maximum capacity of 1 200 MWh. To provide an example, Figure 2.5 is an illustration of a 25 MW / 50 MWh Lithium-Ion battery located at the 60 MW Gannawarra Solar Farm in Australia.

During the 30-day review period on the Draft EIA Report, the DFFE provided a comment explaining that a preferred technology for the BESS must be selected and specified in the Final EIA Report. It must be reiterated that only one technology i.e. Solid State Lithium-Ion BESS was assessed as part of this Scoping and EIA Process since the inception and no other technologies were assessed. This was explained in the Scoping Reports, as well as the Draft EIA Report.



Figure 2.5: Example of PV Technology with Lithium Ion BESS (ARENAWIRE, 2018²)

Lithium-Ion batteries are solid state, sealed systems. They are usually pre-assembled off site and delivered to site for placement as per specifications of the supplier. The supplier of the BESS will be confirmed during the detailed design. The BESS system consists of multiple battery cells that are assembled together to form modules. A module may consist of several cells working in conjunction. Each cell contains a positive electrode, a negative electrode and an electrolyte. The negative electrode for a lithium-ion cell is typically carbon. The positive electrode can be lithium iron phosphate or a lithium metal oxide. The electrolyte is usually a lithium salt dissolved in an organic solvent (CSIR, 2015³).

It is proposed that the Lithium-Ion BESS would be housed in containers, with associated operational, safety and control infrastructure. The BESS will be a sealed unit and will remain sealed during operations.

Based on various discussions with the DFFE on previous occasions, it has been confirmed that Lithium-Ion BESS is not classified as containers or structures for the development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good. In addition, it was also confirmed based on discussions with the DFFE that BESS is not classified as a facility for the generation, transmission or distribution of electricity. Hence, listed activities pertaining to these aspects in the 2014 NEMA EIA Regulations (as amended) do not apply.

A BESS High-Level Safety, Health and Environment (SHE) Risk Assessment has been undertaken in the EIA Phase to address the risks associated with the proposed BESS development. Refer to Appendix E.12 of the EIA Report for the BESS SHE Risk Assessment.

² Arenawire (2018). Solar battery storage in Victoria charging up for summer. <https://arena.gov.au/blog/solar-battery-storage-in-victoria-charging-up-for-summer/> [online]. Accessed November 2021.

³ CSIR, 2015. Final Environmental Impact Assessment Report for the proposed construction of Gemsbok Solar PV2 75 MW Solar PV facility on the Remaining Extent of Portion 3 of the Farm Gemsbok Bult 120, Kenhardt, Northern Cape. CSIR Report Number: CSIR/CAS/EMS/ER/2014/0010/B.

2.5.2 BESS Facility Sub-Components

2.5.2.1 BESS Units and BESS Laydown Area

The containers or battery packs will cover an area of approximately 6 ha within the BESS facility area, and height of up to 5 m.

The BESS facility area will also include a dedicated BESS laydown area, which will cover a footprint of approximately 1.25 ha.

2.5.2.2 BESS IPP Substation and BESS IPP Substation Laydown Area

The Biesjesvlei BESS 1 project will also include a dedicated BESS IPP substation at the BESS facility. The BESS IPP substation will be maintained by the IPP, and will extend up to 15 m in height, with an approximate footprint of 1 ha, and a capacity stepping up from 33 kV to 132 kV.

A laydown area for the BESS IPP Substation will also be constructed, which will cover a footprint of approximately 0.5 ha.

There will be a metering point between the BESS IPP Substation and the Switching Station to indicate the ownership level between the IPP and Eskom. Additional information on the Switching Station is provided in Section 2.6 of this chapter (relating to Project 7).

2.5.2.3 Operational and Maintenance (O&M) Office

The BESS will have a dedicated O&M office, including ablution facilities, within the BESS facility area. The BESS O&M office will extend up to 5 m in height and will cover an area of approximately 0.5 ha.

2.5.2.4 Internal Roads

Internal roads will also be constructed within the footprint of the BESS facility. The internal roads are expected to be composed of gravel and will extend up to 4 m wide.

2.5.2.5 Cables

The BESS facility will include the following dedicated cables:

- Medium Voltage (MV) cables between the BESS Units. The capacity will range from 1 kV up to 33 kV.
- Internal cables in the BESS facility. The capacity will range from 1 kV up to 33 kV.
- Transformer at the BESS IPP Substation. The capacity will range above 33 kV.
- Overhead cables at the BESS IPP Substation (which are inherent to the substation). The capacity will range above 33 kV.

2.5.2.6 Fencing, Security, and Parking Area

The BESS facility will be secured via the installation of appropriate fencing, which could be palisade or mesh or fully electrified, with an estimated height of up to 5 m. Access to the BESS facility will be managed and monitored by an appointed security service provider.

A parking area will also be established at the BESS facility for staff.

2.5.2.7 Storm water

The following design principles are proposed to manage storm water overland flow and mitigate erosion for the development of the BESS facility:

- The internal roads within the BESS facility are proposed to be constructed level with the natural ground level to prevent channelization of the surface water. This will also prevent concentrated surface runoff erosion;
- For scattered small ridges that have localized steeper gradients it is proposed that localized storm water cut-off channels be implemented above the areas only when evidence of erosion is observed at the natural state (prior to construction);
- Run-off needs to be managed and controlled to the natural riverbed with suitable lining and gabion structures; and
- At building structures, allowance will be made to minimize any erosion that might occur. This can be achieved by placing vegetated grass blocks on the verges of these hardened areas to limit flow velocity and to assist with the recharge of the water table.

Storm water infrastructure, such as channels and culverts, will be constructed on site to ensure that storm water run-off from the site is appropriately managed. Such infrastructure falls below the threshold of the relevant listed activity in terms of the 2014 NEMA EIA Regulations (as amended) for Biesjesvlei BESS 1, and as such was removed from the original Application for EA for Biesjesvlei BESS 1 at the Draft EIA Report stage, during which an Amended Application for EA was submitted. Refer to Chapter 4 of this EIA Report for additional information.

Water from these channels is unlikely to contain any chemicals or hazardous substances and will be released into the surrounding environment based on the natural drainage contours.

Details of storm water management are to be confirmed once the EPC contractor has been selected and the design is finalised. Where necessary, a detailed Storm Water Management Plan would need to be developed during the detailed design phase (post EA, should such authorisation be granted) and to be implemented during all phases of the project. Recommendations for the management of storm water have been included in a Storm Water Management Plan in the EMPs for the proposed projects, as relevant (included in Appendix L and Appendix M of this EIA Report).

2.6 Key components of Project 7 (Biesjesvlei EGI 1 and associated infrastructure)

The proposed project will consist of the key components listed below in Table 2.11. A summary of the key components of the proposed Biesjesvlei EGI 1 and associated infrastructure (Project 7) and technical information is described in this section.

Table 2.11: Description of the components of Biesjesvlei EGI 1 and Associated Infrastructure

Component	Description
On-site substation and/or switching station. This will include the section that will be transferred from the Independent Power Producer (IPP) to Eskom.	▪ Footprint: Up to 10 000 m² ▪ Height: Up to 15 m ▪ Capacity: 132 kV ▪ The section includes all the high voltage infrastructure extending from the Point of Connection (i.e. Eskom's section of the proposed on-site substation, which is also referred to as the Switching Station).
132 kV Overhead Power Line	▪ The power line will be routed from the on-site substation to the proposed MTS. ▪ <u>Height</u>: Up to 37 m ▪ <u>Length</u>: Up to 2 km ▪ <u>Servitude</u>: 40 m wide ▪ <u>Pylon specifications</u>: ○ <u>Type</u>: Lattice structures or monopoles. ○ <u>Tower</u>: Self-supporting and Angle Strain. ○ <u>Foundation</u>: The size of the footprint area for the base of the tower foundation will range from 0.36 m² to 2.25 m². The minimum working area required around a structure position is 20 m x 20 m. ○ <u>Span Length</u>: 200 m – 300 m
Service Road	▪ <u>Details</u>: A new gravel service road will need to be established below the power line. ▪ <u>Width</u>: Up to 4 m

Component	Description
External Access Roads	Refer to the detail provided in Section 2.7 of this chapter. Note that the Biesjesvlei EGI 1 project will be developed after the PV or BESS projects have commenced (should relevant approvals be granted), and as such will make use of access roads developed for the PV or BESS projects.
Storm water channels	Details to be confirmed once the Engineering, Procurement and Construction (EPC) contractor has been selected and the design is finalised. Where necessary, a detailed storm water management plan would need to be developed.
Work area during the construction phase (i.e. laydown area)	Footprint: 0.5 ha to 1 ha
Water Requirements	- Approximately 100 m³ of water is estimated to be required per year for the construction phase. - Water requirements during the decommissioning phase are expected to be the same as the construction phase. - Potential sources: Existing boreholes on site or from the Local Municipality via trucks.
Construction Period	6 - 24 months

Figure 2.6 provides a schematic overview of Projects 1, 4, 7 and 10 and how they link to each other.

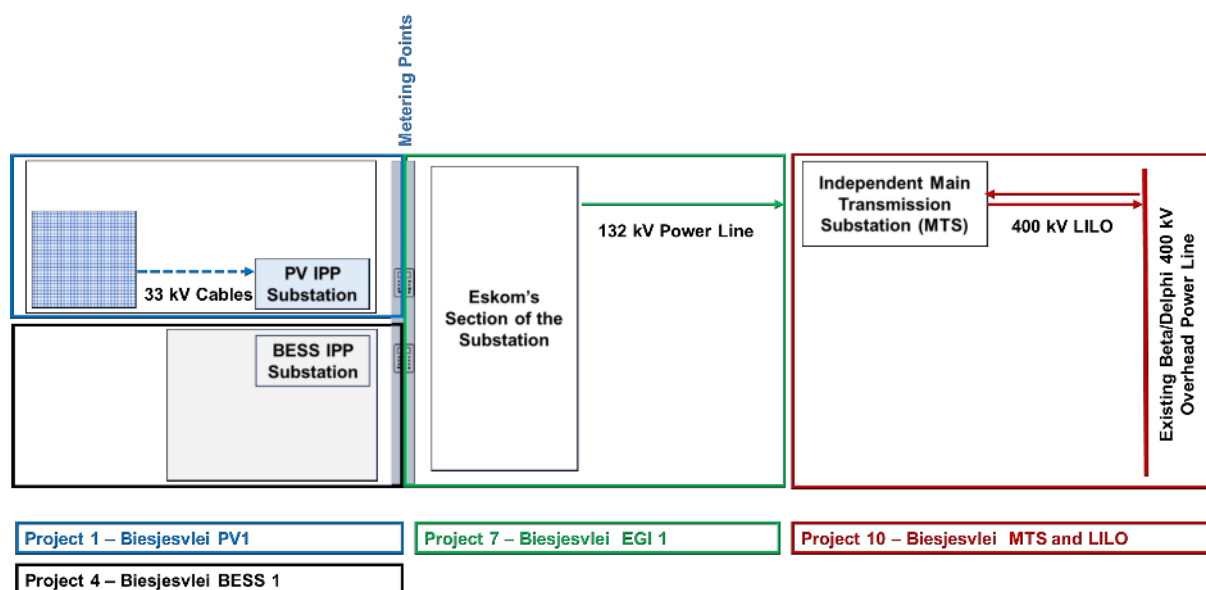


Figure 2.6: Schematic Overview (not to scale) of Projects 1, 4, 7 and 10.

A description of the key components of the proposed project is described below.

2.6.1 On-site Substation

The proposed project will also include an on-site substation and/or switching station, which will include two sections, namely: the PV Facility IPP Substation (described in Section 2.4.2.2 of this chapter as part of Project 1); and the **Switching Station**, which forms part of Project 7 (Biesjesvlei EGI 1 and associated infrastructure). This includes all the high voltage infrastructure extending from the Point of Connection (i.e. Eskom's section of the proposed on-site substation). This section will be transferred from the IPP to Eskom at the Commercial Operational Date (COD). At this point, the EA (should it be granted), will be officially transferred to Eskom via a Part 1 EA Amendment Process.

There will be a metering point between the above two sections to indicate the ownership level and contractual boundaries between the IPP and Eskom.

The Switching Station, or Eskom's section of the proposed on-site substation, will include various connecting bays and yards. At a minimum, it will include a dedicated bay for the connection of the BESS facility and a dedicated bay for the connection of the PV facility.

The Switching Station will extend up to 15 m in height, with a maximum footprint of 10 000 m², and a capacity stepping up from 33 kV to 132 kV. There is also the requirement for the installation of a lightning mast within the substation yard, which will not be higher than 21 m.

2.6.2 Power Lines to the Proposed MTS

A dedicated overhead 132 kV power line will be constructed to connect the proposed Solar PV facility to the proposed MTS. As indicated above, the proposed MTS is the subject of a separate Scoping and EIA Process (i.e. Project 10).

The overhead 132 kV power line will connect the on-site substation to the proposed MTS. The power line will extend up to approximately 37 m in height, and up to 2 km in length. The servitude for the 132 kV power line will be approximately 40 m wide (i.e. approximately 20 m on either side of the power line). The entire servitude will not be cleared of vegetation. Vegetation clearance within the servitude will be undertaken in compliance with relevant standards and specifications.

The line will consist of either lattice structures or monopoles, with self-supporting and angle strain towers. The span lengths are estimated to range between 200 m and 300 m. The size of the footprint area for the base of the tower foundation will range from 0.36 m² to 2.25 m². The minimum working area required around a structure position is 20 m x 20 m. Exact specifications will be confirmed during the detailed design phase.

Underground power lines are not feasible because of technical losses involved with large lengths of underground cables and high costs. Maintenance is also easier on aboveground power lines in comparison to underground cables, the latter of which would result in more disruption.

A corridor for the 132 kV power line has been indicated on the layout maps in Chapter 20 and Appendix D of this EIA Report, as well as the EMPs. However, a corridor has not been focused on for the power lines because the power line falls within the 3060 ha study area, which has been assessed by the specialists entirely. The power line route has been finalised in the EIA Phase. Should the power line route need to change post EA (should EA be granted), it is understood that such can be undertaken via a non-substantive EA amendment, provided that the power line is routed within the assessed 3060 ha area and avoids all no-go areas identified by the specialists.

2.6.3 Service Road

A service road will also be constructed below the power line for maintenance purposes. The service road is expected to be composed of gravel and will extend up to 4 m wide.

2.6.4 Storm water

Storm water infrastructure, such as channels and culverts, will be constructed on site to ensure that storm water run-off from the site is appropriately managed. Such infrastructure falls below the threshold of the relevant listed activity in terms of the 2014 NEMA EIA Regulations (as amended) for Biesjesvlei EGI 1, and as such was removed from the original Application for EA for Biesjesvlei EGI 1 at the Draft EIA Report stage, during which an Amended Application for EA was submitted. Refer to Chapter 4 of this EIA Report for additional information.

Water from these channels is unlikely to contain any chemicals or hazardous substances and will be released into the surrounding environment based on the natural drainage contours.

Details of storm water management are to be confirmed once the EPC contractor has been selected and the design is finalised. Where necessary, a detailed Storm Water Management Plan would need to be developed during the detailed design phase (post EA, should such authorisation be granted) and to be implemented during all phases of the project. Recommendations for the management of storm water have been discussed in the EMPs for the proposed projects, as relevant (included in Appendix N and Appendix O of this EIA Report).

2.7 External Access Roads

A Traffic Impact Assessment was completed in the EIA Phase for the proposed PV and BESS projects specifically, in order to determine potential traffic and transport related impacts. EGI projects do not require Traffic Impact Assessments according to the Screening Tool, and the expected traffic generation for EGI projects are anticipated to be less than the PV projects. However, the findings of the Traffic Impact Assessment have informed the EGI projects, as relevant. As such, the information below applies to each of the projects addressed in this report (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1)), unless where mentioned otherwise.

The information presented below is based on the Traffic Impact Assessment undertaken by Sturgeon Consulting (2024⁴), included in Appendix E.9 of this EIA Report.

The proposed project study area can be accessed via various existing main roads and gravel roads (Table 2.12). The potential access routes are discussed below and illustrated in Figure 2.7:

- **Access Route Option A, Option B and Option C:**
 - Along the N6; S1262; and S119.

The Applicant is seeking authorisation of all three road options listed above so that any one of them can be used at the time of construction, depending on feasibility analysis and detailed design. Note that all options have been considered by the specialists, and no fatal flaws have been identified. Corresponding recommendations have been included in the EMPs as relevant. It is important to note that these options are not alternatives that are ranked against each other. They are different routes that all need authorisation as discussed above. The relevant listed activities for the different routes were included in the Amended Application for EA at the Draft EIA Report phase.

Access Route Options A, B and C have different access points off the S119. Direct access to the proposed projects will be taken from the S119 along an existing farm access point, and thereafter new access roads will be developed within the study area, where they do not align with existing roads, or existing roads will be used where possible. Where new access roads are required within the study area, these will have a width ranging between 4 m and 8 m. Where existing roads are used within the study area, they may need to be upgraded or widened.

Table 2.12: Existing Access Road Specifications

Road Name	Road Authority	Road Width	Road Reserve Width	Gravel / Surfaced
N6	SANRAL	Between ± 8.0 m and ± 10.0 m	Between ± 25.0 m and ± 30.0 m	Surfaced
S1262	Free State Provincial Government	Between ± 6.0 m and ± 8.0 m	Between ± 20.0 m and ± 25.0 m	Gravel
S119	Free State Provincial Government	± 6.0 m	Statutory road reserve width of 25 m	Gravel

The main existing access point from the closest surfaced road is the intersection of the N6 and S1262, located approximately 17.9 km north-west of Smithfield. This access point will provide the most direct access from a surfaced road. Figure 2.8 provides an image of the S1262 taken along the gravel portion of the road.

⁴ Sturgeon Consulting (2024). Traffic Impact Assessment for Biesjesvlei PV1 and Biesjesvlei BESS 1. Prepared for the Scoping and Environmental Impact Assessment (EIA) for the Biesjesvlei Development.

**Proposed 3 x 350 MW Biesjesvlei Solar PV, BESS and EGI Development
near Smithfield, Free State, South Africa**

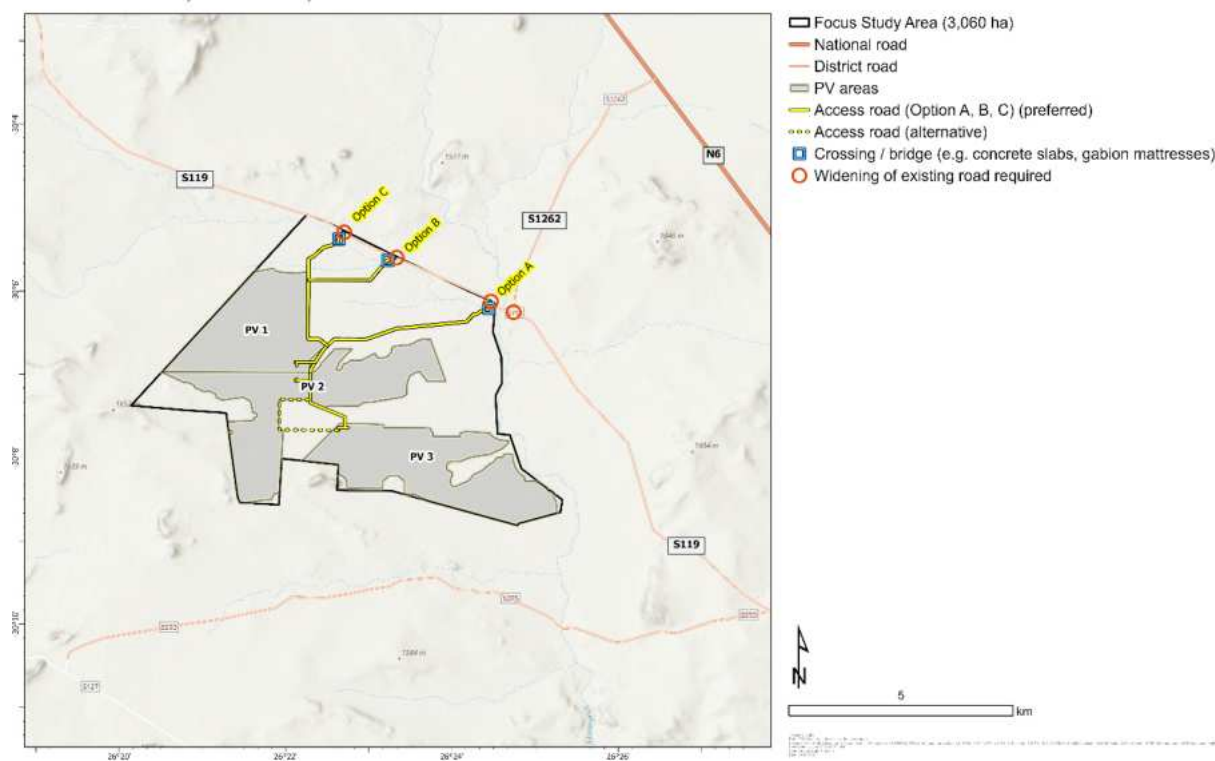


Figure 2.7: Access Routes to the study area.



Figure 2.8: Photo of the S1262 taken along the gravel portion of the road (Source: Sturgeon Consulting, 2024).

As indicated above, these existing roads in the vicinity of the study area may need to be upgraded for the proposed Biesjesvlei projects. The Traffic Specialist has noted the following based on preliminary investigations:

- The N6, S1262, and S119 are of a sufficient width to accommodate truck movement, however widening by more than 4 m or more than 6 m may be required at localised positions. Specifically, road widening will be required at the S1262 and S119 intersection, and the N6 and S1262 intersection. Additional information is provided below.
- Existing internal farm roads (local farm roads within the farm property boundaries) will need to be upgraded to accommodate the abnormal loads as required. The upgrading includes the following (additional information is provided below):
 - Road widening at the S119 and Access Route Option A intersection.
 - Road widening at the S119 and Access Route Option B intersection.
 - Road widening at the S119 and Access Route Option C intersection.
 - The existing bridge on the S119 (indicated in Figure 2.9) will need to be inspected by a Structural Engineer. If it is assumed, as a worst case that the Structural Engineer finds the existing bridge unsuitable, then the bridge will need to be upgraded. Based on preliminary vehicle tracking, the Traffic Specialist noted that widening is not expected along the S119 bridge, however strengthening and potentially new culverts may be required.
 - If Access Route Option A is used for the proposed projects, then the existing bridge on the existing internal farm road along Access Route Option A (indicated in Figure 2.9) will most likely need to be rebuilt/upgraded or realigned to minimise the turns that the abnormal loads need to navigate.
 - A new bridge will need to be developed along Access Route Option B, if this option is used for the proposed projects.
 - A new bridge will need to be developed along Access Route Option C, if this option is used for the proposed projects.



Figure 2.9: Map indicating the relevant cement bridges (Source: Google Earth, 2023).

▪ Preliminary Vehicle Tracking Analysis

To accommodate the turning movements of abnormal vehicles, the Traffic Specialist undertook a preliminary vehicle tracking analysis along the Access Route Options to determine areas where the existing road will need to be widened / lengthened. Additional detail is provided in Table 2.13.

Table 2.13: Preliminary Vehicle Track Analysis and Extent of Widening Required

Intersection Location	Extent of Widening Required	Vehicle Tracking Analysis
S1262 and S119	Approximately 9 m	

Intersection Location	Extent of Widening Required	Vehicle Tracking Analysis
S119 and Access Route Option A	Approximately 14 m	
S119 and Access Route Option B	Approximately 7 m	
S119 and Access Route Option C	Approximately 14 m	
N6 and S1262	Approximately 2 m on the western side of the intersection, and approximately 2 m on the eastern side of the intersection	

Based on the above, the following is concluded based on the preliminary wheel tracking analysis of the abnormal load vehicles (Table 2.13):

- **Access Route Options A, B and C:** No road will need to be lengthened by more than 1 kilometre. However, road widening exceeding 4 m and 6 m will be required at the following intersections. No other widening or lengthening of roads will be required along these routes, except at the following access points to the study area:
 - **Intersection S1262 and S119:** Road widening exceeding 6 m will be required at the **S1262 and S119 intersection** (approximately 9 m at the widest point).
 - **Intersection S119 and Access Route Option A:** Road widening exceeding 6 m will be required at the **S119 and Access Route Option A intersection** (approximately 14 m at the widest point).
 - **Intersection S119 and Access Route Option B:** Road widening exceeding 6 m will be required at the **S119 and Access Route Option B intersection** (approximately 7 m at the widest point).
 - **Intersection S119 and Access Route Option C:** Road widening exceeding 6 m will be required at the **S119 and Access Route Option C intersection** (approximately 14 m at the widest point).
- **Bridges and River Crossings**

Access Route Option A, Option B and Option C will result in drainage line / wetland crossings. Additional detail is provided below:

- **Existing Bridge at Access Route Option A** - There is an existing cement bridge along Access Route Option A (as shown in Figure 2.9). Should Access Route Option A be used for the proposed projects, then the existing bridge will need to be upgraded and/or widened; and an area to the south of the existing bridge (approximately 2 170 m²) would need to be cleared to accommodate the truck turning movements. The existing bridge is measured as approximately 3 m wide. The bridge will need to be widened to approximately 5.5 m to accommodate the abnormal vehicles; however, the total width of the structure depends on elevation. For assessment purposes, the following is assumed: concrete slab of approximately 5.5 m wide, and 3 m on either side for gabion mattresses (assume a total width of approximately 11 to 12 m).
- **Construct a new bridge along Access Route Option B:** Should Access Route Option B be used for the proposed project; the proposed bridge will have to have a minimum width of 10 m to accommodate the trucks traveling to/from the site. For assessment purposes, the following is assumed: concrete slab of approximately 10 m wide, and 3 m on either side for gabion mattresses (assume a total width of approximately 16 to 17 m).

- **Construct a new bridge along Access Route Option C:** Should Access Route Option C be used for the proposed projects; the proposed bridge will have to have a minimum width of 5.5 m to accommodate the trucks traveling to/from the site. For assessment purposes, the following is assumed: concrete slab of approximately 5.5 m wide, and 3 m on either side for gabion mattresses (assume a total width of approximately 11 to 12 m).

The specialists have considered the above crossings, and no fatal flaws have been identified. The corresponding mitigation measures recommended by the specialists have been included in the EMPs in this regard.

▪ **Haulage of Imported Materials**

All components fabricated in foreign countries will need to be imported into South Africa via one of the ports. The closest port to the proposed development is the Port of East London, which would result in a route from the port northwards via the N6 to the access point to the study area.

Another option will be the route from the Port of Ngqura, which follows the N2 from the port and then turns north onto the N10 to Cradock thereafter proceeds north onto the R390 to Bethulie then turns east onto the R701 to Smithfield. From Smithfield, the N6 can be taken north up to the access point to the study area.

The last option will be the route from the Port of Durban, which follows the N3 from the port to Harrismith and then turns west onto the N5 to Winburg. From Winburg, the N1 can be taken through Bloemfontein and then the N6 up to the access point to the study area.

2.8 Service Provision

The Project Developer has attempted to consult with the Mohokare Local Municipality in order to confirm the supply of services (in terms of water usage, sewage removal, solid waste removal, and electricity requirements) for the proposed projects. The municipality was also consulted during the Scoping and EIA Process, during the 30-day public review period on the Draft Scoping Report and during the 30-day public review period on the Draft EIA Report in order to seek comments on the proposed projects. However, no comments were received from the municipality. Refer to Appendix G.4 and Appendix I.4 of this EIA Report for a copy of the follow up and proof of correspondence sent to the municipality during the Scoping Phase and EIA Phase, respectively. It is also important to note that municipal representatives (i.e. from the Xhariep District Municipality and Mohokare Local Municipality) were interviewed as part of the Socio-Economic Assessment undertaken for the PV and BESS projects. The Project Developer will continue to seek feedback from the municipality during the relevant phases of the project.

Should the local municipality not have adequate capacity available for the handling of waste, provision of water and sewage handling provisions; then the Project Applicant will make use of private contractors to ensure that these services are provided. An outline of the services that will be required are discussed below. Project specific information has been clearly indicated.

2.8.1 Water Usage

The proposed projects will require water during the construction, operational and decommissioning phases. The estimated volumes of water required, intended use, and location of water storage tanks per project is described in Table 2.14.

Table 2.14: Estimated volumes of water required, intended use and location of storage per project.

Project	Construction Phase	Operational Phase	Decommissioning Phase
Project 1 – Biesjesvlei PV1 and associated infrastructure	Volume: Approximately 8 520 m³ to 12 000 m³ per year Intended Use: Human consumption and construction activities. Storage of Water: Water will be stored in storage tanks on site in the vicinity of the O&M Control Centre at the PV Facility. It is anticipated that there will be 20 x 10 000 litre tanks on site to store the water during this phase.	Volume: Approximately 10 000 m³ to 16 000 m³ per year Intended Use: Panel washing process, human consumption, and other activities. Storage of Water: Water will be stored in storage tanks on site in the vicinity of the O&M Control Centre at the PV Facility. It is anticipated that there will be 20 x 10 000 litre tanks on site to store the water during this phase.	Volume: Approximately 8 520 m³ to 12 000 m³ per year Intended Use: Human consumption and decommissioning activities. Storage of Water: Water will be stored in storage tanks on site in the vicinity of the O&M Control Centre at the PV Facility. It is anticipated that there will be 20 x 10 000 litre tanks on site to store the water during this phase.
Project 4 – Biesjesvlei BESS 1 and associated infrastructure	Volume: Approximately 350 m³ to 450 m³ per year Intended Use: Human consumption and construction activities. Storage of Water: Water will be stored in storage tanks on site in the vicinity of the O&M Control Centre at the BESS. It is anticipated that there will be 20 x 10 000 litre tanks on site to store the water during this phase.	Volume: Approximately 200 m³ to 300 m³ per year Intended Use: Human consumption and other activities. Storage of Water: Water will be stored in storage tanks on site in the vicinity of the O&M Control Centre at the BESS. It is anticipated that there will be 20 x 10 000 litre tanks on site to store the water during this phase.	Volume: Approximately 350 m³ to 450 m³ per year Intended Use: Human consumption and decommissioning activities. Storage of Water: Water will be stored in storage tanks on site in the vicinity of the O&M Control Centre at the BESS. It is anticipated that there will be 20 x 10 000 litre tanks on site to store the water during this phase.
Project 7 – Biesjesvlei EGI 1 and associated infrastructure	Volume: Approximately 100 m³ per year Intended Use: Human consumption and construction activities. Storage of Water: Water will be stored in storage tanks on site in the vicinity of the substation. It is anticipated that there will be 20 x 10 000 litre	Not applicable	Volume: Approximately 100 m³ per year Intended Use: Human consumption and decommissioning activities. Storage of Water: Water will be stored in storage tanks on site in the vicinity of the substation. It is anticipated that there will be 20 x 10 000 litre

Project	Construction Phase	Operational Phase	Decommissioning Phase
	tanks on site to store the water during this phase.		tanks on site to store the water during this phase.

The information below applies to each of the projects addressed in this report (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1)), unless where mentioned otherwise.

Water required for human consumption and other construction, operational and decommissioning phase activities should be potable water from a reputable source and should conform to South African National Standards (SANS) quality standards. If potable water is not available from an existing municipal infrastructure system, it will therefore need to be sourced and imported and safely stored on site.

Specifically for Project 1 (Biesjesvlei PV1), the water needed for panel washing during the operational phase does not need to meet the same quality standards as that required for potable water, however the water should be tested to ensure that it does not negatively impact on the mechanical equipment.

The EMPr includes recommendations for water conservation techniques during the construction, operational and decommissioning phases. The staff would also be encouraged to use water sparingly during all phases.

Water required for the construction, operational and decommissioning phases will either be sourced from the following sources (in order of priority and likelihood):

- **Existing boreholes on site to source groundwater.** A Geohydrology Assessment was commissioned as part of this Scoping and EIA Process. The Geohydrology Assessment included a hydrocensus and analysis of the chemistry results in terms of the SANS 241-1: 2015 and the Department of Water Affairs and Forestry (DWAf) (1998) Standards. The Geohydrology Assessment explained that overall groundwater is deemed acceptable for use in (1) domestic use such as washing of dishes and toilet flushing, (2) washing of solar panels, (3) general construction and concrete batching, and (4) as potable water if treatment requirements are adhered to. These treatment options include reverse osmosis and thermal distillation in cases where water quality does not meet requirements as stipulated by DWAf (1998), SANS 241-1, and SABS (2006). Additional detail is provided in the Geohydrology Assessment (Appendix E.10 of this EIA Report). Water pipelines were initially planned to be constructed to transfer groundwater from existing boreholes to site. However, this is no longer being considered, and instead the groundwater will be transported by trucks from the boreholes to the site.
- **The Mohokare Local Municipality.** Specific arrangements will be agreed with the local municipality in a Service Level Agreement (SLA). The water will be trucked to site, and such impacts have been considered in the Traffic Impact Assessment (Appendix E.9 of this EIA Report).

Both the above water sources have been considered in this Scoping and EIA Process. However, these are not alternatives, as both water sources need to be available should one not realise post-EA (should such authorisation be granted). Therefore, both the water sources are recommended for inclusion in the EA (should such authorisation be granted).

2.8.2 Sewage or Liquid Effluent

The proposed projects will require sewage services during the construction, operational and decommissioning phases. Low volumes of sewage or liquid effluent are estimated to be generated, as described in Table 2.15 per project.

Table 2.15: Estimated Volumes of Sewage / Liquid Effluent Generation per project

Project	Construction Phase	Operational Phase
Project 1 – Biesjesvlei PV1 and associated infrastructure	Approximately 55 m ³ to 65 m ³ per month	Approximately 3 m ³ to 5 m ³ per month
Project 4 – Biesjesvlei BESS 1 and associated infrastructure	Approximately 55 m ³ to 65 m ³ per month	Approximately 3 m ³ to 5 m ³ per month
Project 7 – Biesjesvlei EGI 1 and associated infrastructure	Approximately 55 m ³ to 65 m ³ per month	Not applicable

The information below applies to each of the projects addressed in this report (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1)), unless where mentioned otherwise.

Liquid effluent will be limited to the ablution facilities during the construction and operational phases. Portable sanitation facilities (i.e. chemical toilets) will be used during the construction phase for each respective project. These will be regularly serviced and emptied by a suitable and registered (private) contractor on a regular basis. Permanent ablution facilities may be installed during the operational phase for Project 1 (Biesjesvlei PV1) and Project 4 (Biesjesvlei BESS 1). The effluent will be stored on site in watertight concrete structures (conservancy tanks) and thereafter transported to and disposed of at the Local Municipal sewerage treatment works or similar facility by a registered service provider. Due to the remote locality of the project sites, sewage cannot be disposed in the municipal waterborne sewage system.

2.8.3 Solid Waste Generation

The quantity of waste generated will depend on the length of the construction phase. Low volumes of solid waste are estimated to be generated, as described in Table 2.16 per project.

Table 2.16: Estimated Volumes of Solid Waste Generation per project

Project	Construction Phase	Operational Phase
Project 1 – Biesjesvlei PV1 and associated infrastructure	Approximately 12 m ³ to 15 m ³ per month	Approximately 2.5 m ³ to 5 m ³ per month
Project 4 – Biesjesvlei BESS 1 and associated infrastructure	Approximately 6 m ³ to 10 m ³ per month	Approximately 2.5 m ³ to 5 m ³ per month
Project 7 – Biesjesvlei EGI 1 and associated infrastructure	Approximately 12 m ³ to 15 m ³ per month	Approximately 2.5 m ³ to 5 m ³ per month

The information below applies to each of the projects addressed in this report (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1)), unless where mentioned otherwise.

The following waste materials are expected during the construction phase for each respective project:

- Packaging material, such as the cardboard, plastic and wooden packaging and off-cuts;
- Hazardous waste from empty tins, oils, soil containing oil and diesel (in the event of spills), and chemicals;
- Building rubble, discarded bricks, wood and concrete;
- Domestic waste generated by personnel; and
- Vegetation waste generated from the clearing of vegetation.

Solid waste will be managed via the EMPr during all project phases. The EMPs (Appendix J to O of this EIA Report), incorporate waste management principles. During the construction phase, general solid waste will be collected and temporarily stockpiled in skips in a designated area on site and thereafter removed, emptied into trucks, and disposed at a registered waste disposal facility on a regular or monthly basis by an approved waste disposal Contractor (i.e. a suitable Contractor) or the municipality.

In addition, specifically in relation to Project 1 (Biesjesvlei PV1), a skip will be placed on site for placement of any damaged or broken PV panels (i.e. those not returned to the supplier). A specialist waste management company will be commissioned to manage and dispose of this waste.

Any hazardous waste (such as contaminated soil as a result of spillages) will be temporarily stockpiled in a designated area on site (i.e. placed in leak-proof storage skips), and thereafter removed off site by a suitable service provider for safe disposal at a registered hazardous waste disposal facility.

Waste disposal slips and waybills will be obtained for the collection and disposal of the general and hazardous waste. These disposal slips (i.e. safe disposal certificates) will be kept on file for auditing purposes as proof of disposal. The waste disposal facility selected will be suitable and able to receive the specified waste stream (i.e. hazardous waste will only be disposed of at a registered/licenced waste disposal facility). The details of the disposal facility will be finalised during the contracting process, prior to the commencement of construction. Where possible, recycling and re-use of material will be encouraged. Waste management is further discussed in the EMPs (included in Appendix J to Appendix O of this EIA Report).

During the operational phase after construction, minor amounts of general waste (as a result of the offices or maintenance) will be generated.

2.8.4 Electricity Requirements

In terms of electricity supply, the developer will make use of generators on site during the construction, operational and decommissioning phases of each respective project (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1)). The operational electrical requirements would be nominal.

2.9 Socio-Economic

It should be noted that the employment opportunity specifications provided in this report are estimates and is dependent on the final engineering design and the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) or Battery Energy Storage Independent Power Producers Procurement Programme (BESIPPPP) Request for Proposal provisions, or similar programme requirements, at that point in time.

It is difficult to specify the actual number of employment opportunities that will be created at this stage; however, estimates are indicated in Table 2.17 per project.

Table 2.17: Total Estimated Employment Opportunities per project

Project	Construction Phase	Operational Phase
Project 1 – Biesjesvlei PV1 and associated infrastructure	Skilled: Between 90 and 150 Unskilled: Between 400 and 460 The above is for the entire 12 - 24 month construction phase.	Skilled: Approximately 20 Unskilled: Approximately 40 The unskilled jobs will be linked to services such as panel cleaning, maintenance and security. The above is for the 20 to 30 year lifespan of the proposed PV facility.
Project 4 – Biesjesvlei BESS 1 and associated infrastructure	Skilled: Between 10 and 20 Unskilled: Between 20 and 40 The above is for the entire 12 - 24 month construction phase.	Skilled: Between 1 and 35 Unskilled: Between 2 and 4 The unskilled jobs will be linked to services such as maintenance and security.

Project	Construction Phase	Operational Phase
		The above is for the lifespan of the proposed BESS facility.
Project 7 – Biesjesvlei EGI 1 and associated infrastructure	▪ Skilled: Between 10 and 20 ▪ Unskilled: Between 30 and 40 The above is for the entire 6 – 24 month construction phase.	▪ Skilled: Between 1 and 3 ▪ Unskilled: Between 2 and 5

During the construction phase, employees will most likely be housed in local nearby towns and villages. Typically, the EPC contractor will be responsible for the provision of transport of construction personnel to and from the site.

2.9.1 Socio-Economic Investment and Development

The information below applies to each of the projects addressed in this report (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1)), unless where mentioned otherwise.

The Applicant will ultimately own each respective project, if successful, and will compile an Economic Development Plan which will be compliant with REIPPPP / BESIPPPP requirements (or similar process) and will *inter alia* set out to achieve the following:

- Create a local community trust or similar (as required by REIPPPP) which has an equity share in the project life to benefit historically disadvantaged communities;
- Initiate a skills development and training strategy to facilitate future employment from the local community;
- Give preference to local suppliers for the construction of the proposed projects; and
- Support local community upliftment projects and entrepreneurship through socio-economic and enterprise development initiatives.

2.10 Overview of the Project Development Cycle

The information below applies to each of the projects addressed in this report (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1)), unless where mentioned otherwise.

This section provides an outline of the main activities that are proposed during each phase of the proposed projects. The projects can be divided into the following main phases:

- Detailed Planning and Design Phase;
- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

Each activity undertaken as part of the above phases may have environmental impacts and, where applicable, has been assessed in the relevant specialist studies as part of the EIA Phase. The specialist studies are included in Appendix E of this EIA Report.

2.10.1 Planning and Design Phase

The project layout, including the exact placement of building infrastructure and the proposed internal road network was finalised in the EIA Phase. The project layout was informed by the findings of the specialist assessments. The specialists have commented on the final project layout, and confirmed that the layout is acceptable, there are no fatal flaws and that all no-go areas have been avoided by the main infrastructure, and that linear infrastructure such as access roads and power lines are permitted to traverse very high and high sensitivity areas as adequate mitigation measures have been recommended. The final layout maps are included in Chapter 20 and Appendix D of this EIA Report, as well as the EMPs.

2.10.2 Construction Phase

The construction phase will take place subsequent to the issuing of the EA (should such authorisation be granted) and if a successful bid in terms of the REIPPPP, BESIPPP or a similar tender process is issued, and once a power purchase agreement (PPA) is signed with a suitable energy off-taker.

The duration of the construction phase for each project is described below:

- **Project 1 (Biesjesvlei PV1):** 12 to 24 months;
- **Project 4 (Biesjesvlei BESS 1):** 12 to 24 months; and
- **Project 7 (Biesjesvlei EGI 1):** 6 to 24 months.

The main activities that will form part of the construction phase are:

- Removal of vegetation, where necessary, within the approved development footprint to facilitate the construction and/or establishment of infrastructure. Note that for Project 1 (Biesjesvlei PV1), the vegetation is planned to be trimmed manually (not with the use of chemicals) within the PV array area (and not removed completely);
- Excavations for infrastructure and associated infrastructure;
- Establishment of a laydown area for equipment;
- Stockpiling of topsoil and cleared vegetation, where necessary (except for the PV array for Project 1 (Biesjesvlei PV1));
- Creation of employment opportunities;
- Transportation of material and equipment to site, and personnel to and from the site; and
- Construction of the infrastructure, structures and buildings.

All efforts will be made to ensure that construction work will be undertaken in compliance with local, provincial and national legislation, local and international best practice, as well as the EMP that has been compiled and included in Appendix J to Appendix O of the EIA Report. An independent

Environmental Control Officer (ECO) will be appointed during the construction phase and will monitor compliance with the recommendations and conditions of the EMPr and EA, respectively.

2.10.3 Operational Phase

The following activities will occur during the operational phase of each project:

- **Project 1 (Biesjesvlei PV1):**
 - The generation of electricity from the proposed solar facility; and
 - Maintenance of the solar field and associated infrastructure.
- **Project 4 (Biesjesvlei BESS 1):**
 - The storage and dispatching of electricity; and
 - Maintenance of the BESS and associated infrastructure.
- **Project 7 (Biesjesvlei EGI 1):**
 - The transmission of electricity generated by the proposed solar facility; and
 - Maintenance of the EGI and associated infrastructure.

During the life span of the proposed projects, on-going maintenance will be required on a scheduled basis to ensure the continued optimal functioning of the infrastructure. In general, maintenance on the structures will involve visual inspection, and only equipment that fails will be replaced in a manner similar to that of construction activities. The EMPr includes the requirement for method statements to be compiled prior to the operational phase to describe the manner in which maintenance will be undertaken to ensure environmental impacts are minimised.

2.10.4 Decommissioning Phase

At the end of the operational phase, the proposed projects may be decommissioned or may be redesigned and refitted so as to operate for a longer period. The main aim of decommissioning is to return the land to its original, pre-construction condition. Should the unlikely need for decommissioning arise i.e. if the proposed infrastructure becomes outdated or the land needs to be used for other purposes, the decommissioning procedures will be undertaken in line with an approved EMPr and relevant legislation at the time, and the site will be rehabilitated and returned to its pre-construction state.

2.11 Schematic Overview of the Biesjesvlei Development

Figure 2.10 provides a **schematic** overview (not to scale) of the proposed Biesjesvlei Solar PV, BESS, and EGI development, including the MTS and LILO which are separately addressed as Project 10.

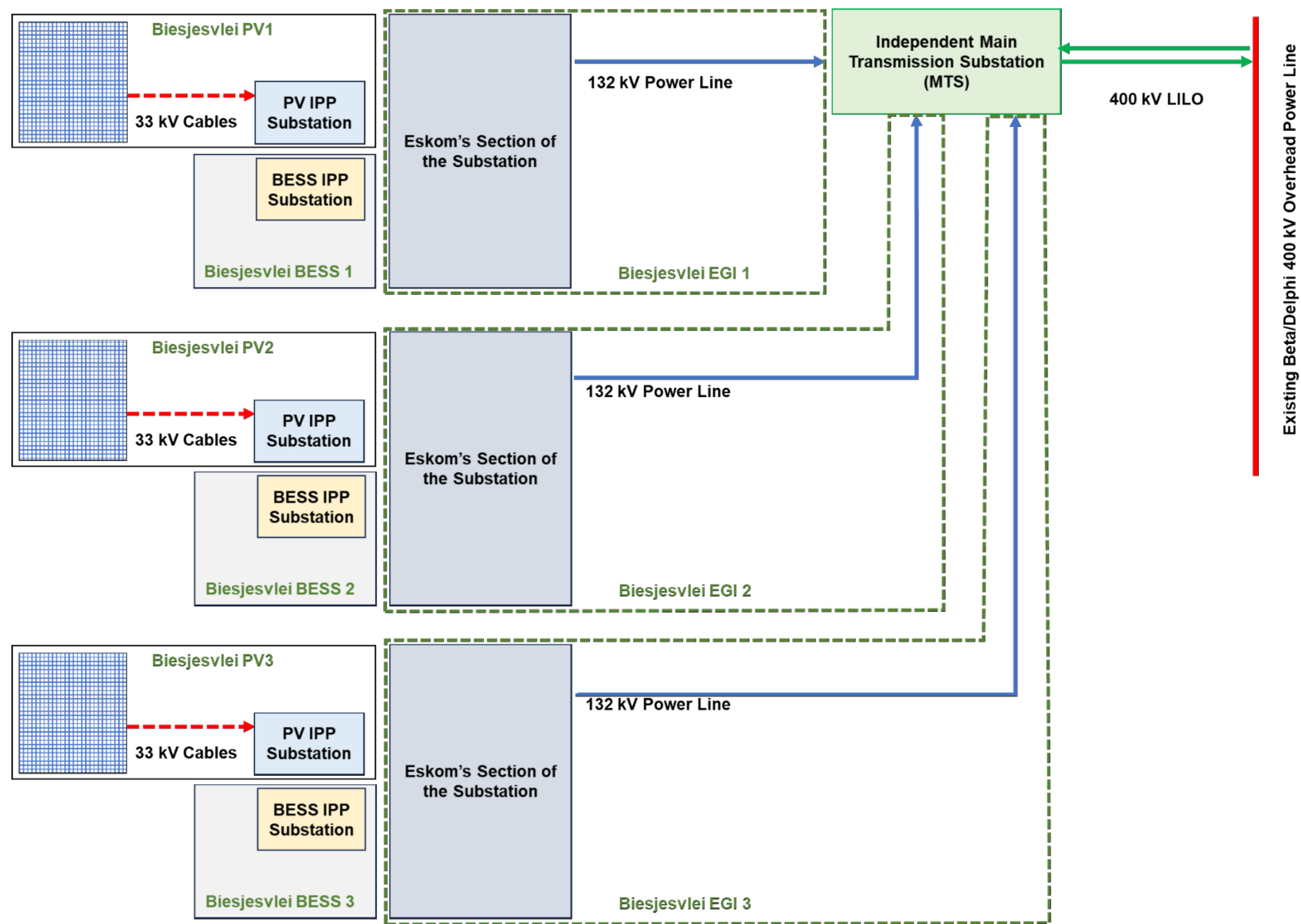


Figure 2.10: Schematic Overview (not to scale) of the Biesjesvlei Solar PV, BESS and EGI development.



CHAPTER 3:

Description of the Affected Environment

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3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

This chapter provides a broad overview of the affected environment for the following proposed projects that are addressed in this report:

- **PROJECT 1:** The proposed development of a Solar Photovoltaic (PV) Facility and associated infrastructure (i.e., Biesjesvlei PV1).
- **PROJECT 4:** The proposed development of a Battery Energy Storage System (BESS) and associated infrastructure for Biesjesvlei PV1 (Biesjesvlei BESS 1).
- **PROJECT 7:** The proposed development of a 132 kV Overhead Power Line from the on-site substation to the proposed Main Transmission Substation (MTS) and associated infrastructure (Biesjesvlei EGI 1).

Note: The information throughout this chapter applies to each of the projects addressed in this report (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1)), unless where mentioned otherwise.

The receiving environment is understood to include biophysical, socio-economic, and heritage aspects, which could be affected by the proposed projects or which in turn might impact on the proposed projects.

This information was used to inform the identification of potential issues and impacts of the proposed projects on the environment and vice versa. The information presented within this chapter was sourced from *inter alia*:

- Specialist Studies and Inputs (where relevant) and Site Sensitivity Verifications (SSVs) from the specialists that form part of the project team (which are included in Appendix E of this EIA Report);
- Feedback from the National Department of Forestry, Fisheries and the Environment (DFFE) National Web-based Environmental Screening Tool (hereafter referred to as the Screening Tool), where applicable;
- Review of *inter alia* information sources available on the South African National Biodiversity Institute (SANBI) Biodiversity Geographical Information System (BGIS), Agricultural Geo-Referenced Information System (AGIS), Endangered Wildlife Trust (EWT) Threatened Species No-Go Map;
- Free State Community Survey 2016 Provincial Profile and Statistics South Africa Census data;
- Xhariep District Municipality (XDM) Integrated Development Plan (IDP);
- Mohokare Local Municipality (MLM) IDP;
- MLM Draft Spatial Development Framework (SDF); and
- MLM Integrated Local Economic Development Plan.

It is important to note that this chapter intends to provide a broad overview of the affected environment. Detailed descriptions of the preferred project footprints within the preferred site (i.e., the study area) that are focused on significant environmental aspects of the proposed projects are

provided in the relevant specialist assessments and inputs that were completed for the Environmental Impact Assessment (EIA) Phase. Refer to Appendix E of this EIA Report for the Specialist Studies and Inputs.

3.1 Background, Study Area, and Development Footprints

As indicated in Chapter 1 of this EIA Report, the proposed projects form part of a cluster of 10 projects (i.e., three Solar PV facilities, three BESS, three 132 kV Overhead Power Lines and one independent MTS and Loop-In-Loop-Out (LILO) and associated infrastructure). The study area or preferred site for all the proposed Biesjesvlei projects and associated infrastructure (i.e., Projects 1 to 10) covers approximately 3 060 hectares (ha). These farm properties are listed in Chapter 2 of this EIA Report.

As part of the Scoping and EIA Process, the full extent of the study area was assessed by the specialists in order to identify environmental sensitivities and no-go areas. The preferred site serves as the study area for this Scoping and EIA Process. Therefore, the terms “site” and “study area” are used synonymously in this report. Refer to Chapter 2 and Chapter 5 of this EIA Report for feedback on the process followed to assess the study area and identify the buildable areas, as well as the layout and development footprints for the proposed projects.

The proposed projects are located within the MLM and XDM. Chapter 1 of this EIA Report provides a locality map of the study area.

3.2 Biophysical Environment

3.2.1 Climate and Climate Change

3.2.1.1 General Context

The study area falls within the Grassland Biome, which is situated in the broad surrounds of Aliwal North, running in an east-west direction along the northern foothills of the Stormberg Plateau, extending northwards up the Caledon River Valley in the Free State to around Wepener and De Wetsdorp.

More specifically, according to the Köppen-Geiger climate classification method, the study area is classified as “BSk”, which is indicative of a cold, steppe, semi-arid climate characterised by cold winters and hot, dry summers (Figure 3.1). The region is characteristic of summer rainfall with most of the rainfall occurring during December to March (Figure 3.2) and a mean annual precipitation of 34.45 mm¹. Figure 3.3, displaying the mean annual precipitation for the Smithfield area for the period 2010 to 2023, indicates that in 2011, Smithfield had the highest mean annual precipitation of greater than 150 mm. The Smithfield area also has average high temperatures varying from 15°C in June and July to 29°C in December and January, and average low temperatures varying from 2°C in June and July to 16°C in January with the highest average temperatures occurring

¹ Weather and Climate Online. Available at: Smithfield, Free State, ZA Climate Zone, Monthly Averages, Historical Weather Data (weatherandclimate.com) [online]. Accessed: February 2024.

from December to February (Figure 3.4). In addition, the Smithfield area is characteristic of gusty winds prevailing for most of the year, with the average gust falling within the 15 to 30 kmph range (Figure 3.5).

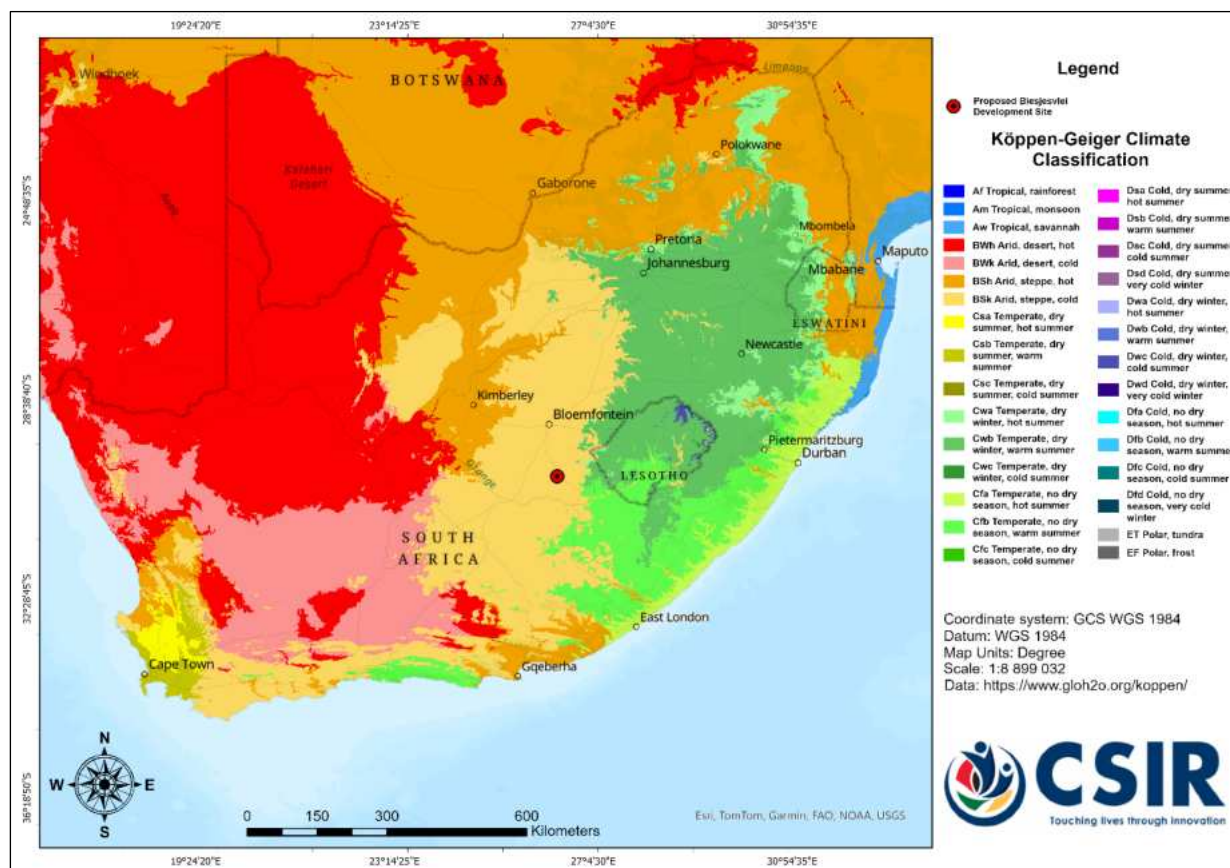


Figure 3.1: Köppen-Geiger Climate Classification of South Africa, including the study area (Source: Köppen-Geiger Climate Classification²).

² Beck, H.E., T.R. McVicar, N. Vergopolan, A. Berg, N.J. Lutsko, A. Dufour, Z. Zeng, X. Jiang, A.I.J.M. van Dijk, D.G., 2023. Miralles High-resolution (1 km) Köppen-Geiger maps for 1901–2099 based on constrained CMIP6 projections. *Scientific Data*, 10, 724, doi:10.1038/s41597-023-02549-6 (2023). Available at: <https://www.gloh2o.org/koppen/> [online]. Accessed: December 2023.

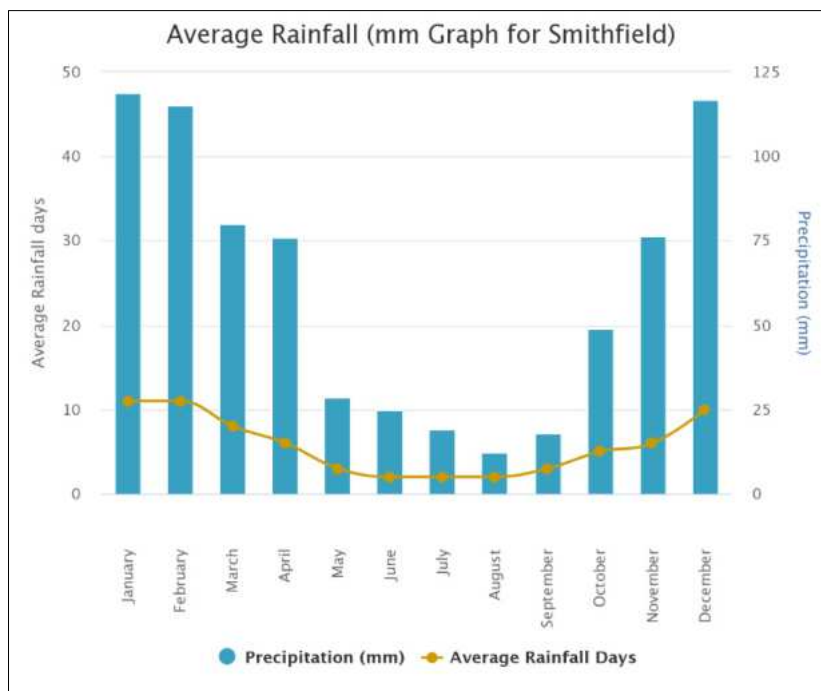


Figure 3.2: The average monthly distribution of rainfall within the Smithfield area, including the study area (Source: World Weather Online, 2023³).

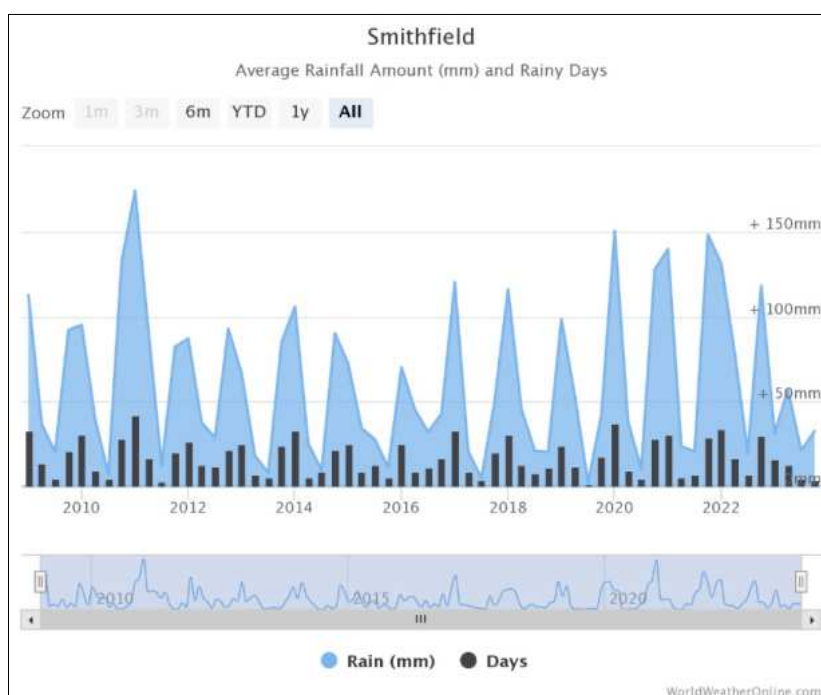


Figure 3.3: The average annual rainfall within the Smithfield area, including the study area or the period 2010 – 2023 (Source: World Weather Online, 2023³).

³ World Weather Online. 2023. Smithfield Annual Weather Averages. Available at: <https://www.worldweatheronline.com/smithfield-weather-averages/free-state/za.aspx> [online]. Accessed: December 2023.

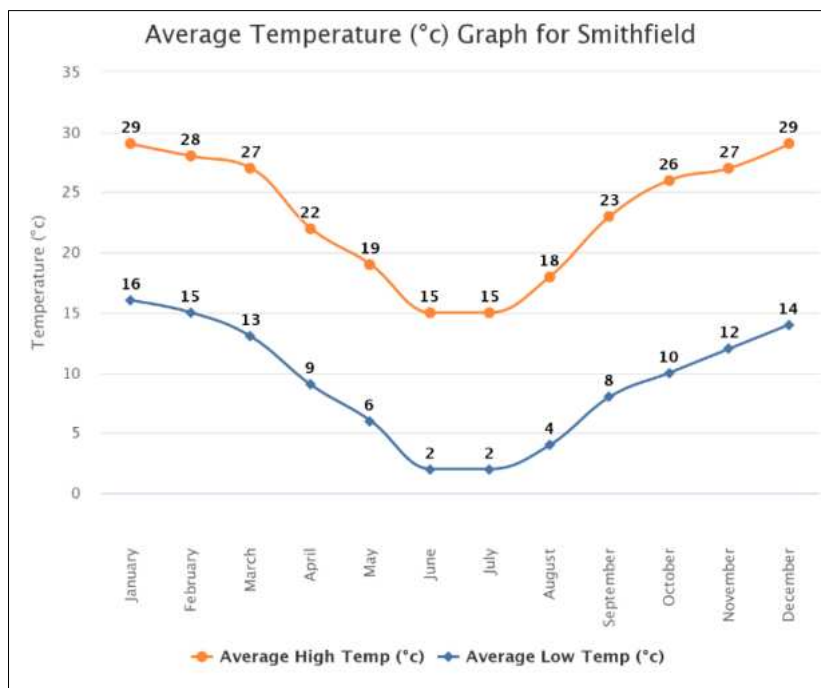


Figure 3.4: The average monthly maximum and minimum temperature for the Smithfield area, including the study area (Source: World Weather Online, 2023³).

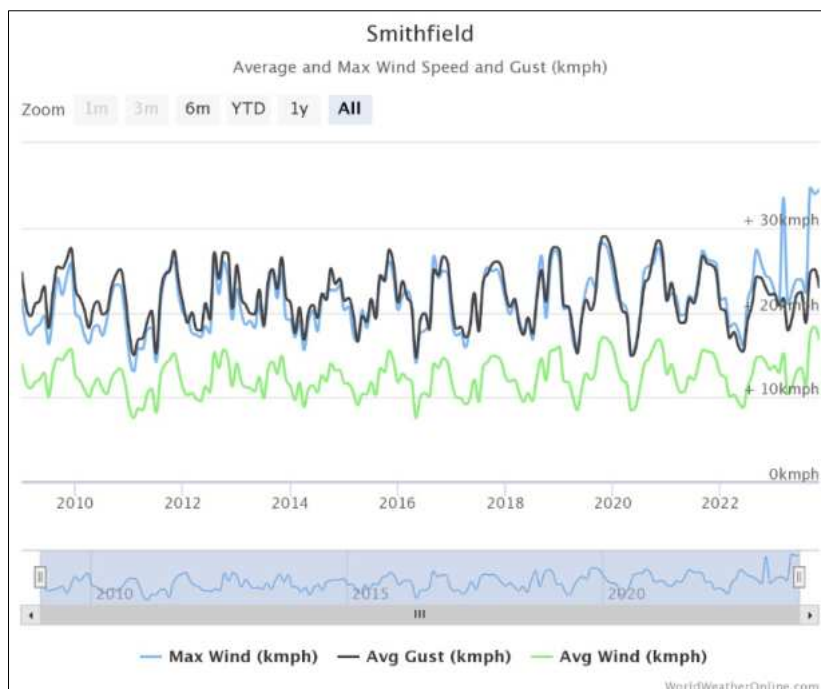


Figure 3.5: The average and maximum annual wind speeds and gusts for the Smithfield area, including the study area for the period 2010 – 2023 (Source: World Weather Online, 2023³).

3.2.1.2 Climate Change

Projected climate change data indicates that by 2050 the Free State Province and the XDM in particular, is expected to be affected by higher annual average temperatures, increasing rainfall variability, increasing storm and flood events and changing biomes⁴.

The higher temperatures will be associated with an increase in evaporation rates and an increase in the intensity of droughts. This will likely cause agricultural outputs to reduce, thereby adversely affecting food security. The XDM is currently experiencing water scarcity and issues with water quality and the drought periods coupled with reduced runoff, increased evaporation and temperatures and an increase in floods due to climate change, is expected to adversely impact the water supply and quality. Furthermore, the increase in temperatures anticipated with climate change may result in increased fire frequencies. Invasive alien plants are often highly flammable and with their large volumes, are likely to fuel more frequent fires. The combination of more frequent and intense fires will have severe impacts on the region. The changing climate is also projected to result in the shifting of bioregions across the country. It is anticipated that the warmer temperatures being experienced in the XDM could likely result in the Savanna biome replacing the Grassland and Nama Karoo biomes, in turn causing a significant loss in Grassland and Nama Karoo related species (XDM, 2022⁵). Climate change is thus one of the biggest risks facing the MLM; therefore, the MLM should prioritise efforts to reduce greenhouse gas emissions to mitigate the effects of climate change (MLM, 2023⁶).

The Green Book provides detailed projections for future climate change in South Africa. The information captured below has been summarised from the Green Book (Engelbrecht et al., 2019⁷). The projections used in the Green Book are for the following two climate change mitigation scenarios: Representative Concentration Pathways (RCP) 8.5 – where low mitigation is implemented; and RCP 4.5 – where high mitigation is implemented.

- **Fire Likelihood** - The likelihood of wildfires occurring in the interface between developed land and fire-prone vegetation in Smithfield is regarded as rare in terms of current hydro-meteorological trends. In terms of the projected number of fire danger days under an RCP 8.5 low mitigation (worst case) scenario, the study area varies from about 20 to 39. Smithfield is at a very low risk of increases in wildfires by the year 2050.
- **Flood Hazard** – The region of the MLM mainly includes a medium flooding hazard currently. There is largely a slight decrease and moderate decrease in extreme rainfall days projected for the year 2050. Smithfield is at a very low risk of increase in urban flooding under an RCP 8.5 low mitigation (worst case) scenario (projected change for 2050).

⁴ <https://letsrespondtoolkit.org/municipalities/free-state/xhariep/>

⁵ Xhariep District Municipality, 2022. Xhariep District Municipality Integrated Development Plan First Draft 2022-2027. Available at: <http://www.dspace.fs.gov.za/xmlui/bitstream/handle/123456789/182/Xhariep%20DM.pdf?sequence=1>. Accessed December 2023.

⁶ Mohokare Local Municipality, 2023. Mohokare Local Municipality Final Integrated Development Plan 2023-2024. Available at: [https://www.mohokare.gov.za/documents/idp/FINAL%20IDP%20\(2023\).pdf](https://www.mohokare.gov.za/documents/idp/FINAL%20IDP%20(2023).pdf). Accessed December 2023.

⁷ Engelbrecht, F., Le Roux, A., Arnold, K. and Malherbe, J. 2019. *Green Book. Detailed projections of future climate change over South Africa*. Pretoria: CSIR. Available at: <https://pta-gis-2-web1.csir.co.za/portal/apps/GBCascade/index.html?appid=b161b2f892194ed5938374fe2192e537>. Accessed December 2023.

- **Drought** – In terms of the projected change in drought tendencies for the period of 1995 to 2024 relative to the 1986-2005 baseline period, Smithfield ranges from 0 to > 0 (less frequent than the observed baseline). In terms of the projected change in drought tendencies for the period of 2035–2064 relative to the 1986–2005 baseline period, there is an increase in drought tendencies per 10 years within the study area (ranging from 0 to -0.2) (more frequent than the observed baseline). Smithfield is at a very low risk of increases in drought tendencies by the year 2050.

3.2.2 Topography and Landscape

The information described below is based on the SSVs and Specialist Studies provided by the Visual and Palaeontology Specialists, which are included in Appendix E.5 and Appendix E.7, respectively, of this EIA Report.

The study area lies within undulating, flat to gently hilly terrain of the eastern Upper Karoo region, with low, sandstone-capped, dolerite-intruded koppies (1602, 1654 m amsl) situated on or just outside the southern margins of area while most of the project itself lies between 1480 to 1580 m amsl. These koppies are the main scenic features in the area and provide topographic relief in the expansive gently rolling landscape. The elevation ranges from 1500 to 1600 m in the local area.

3.2.3 Geology and Soils

The information described below is based on the SSVs and Specialist Studies / Letter of Opinions provided by the Terrestrial Biodiversity, Palaeontology, Geohydrology and Geotechnical Specialists, which are included in Appendix E.2, E.7, E.10 and E.11 of this EIA Report, respectively.

The main geology of the study area is listed in Table 3.1, and an extract from the 1:250 000 geology map 3026 Aliwal North (Council for Geoscience, Pretoria) overlain by the study area is shown in Figure 3.6.

The majority of the study area is underlain by fluvial sediments of the Tarkastad Subgroup (Upper Beaufort Group, Karoo Supergroup) of Early Triassic age. The flat lying to gently dipping Tarkastad Subgroup sedimentary bedrocks in Smithfield are intruded by a dense network of dykes and small sills of fine-grained dolerite of the Early Jurassic Karoo Dolerite Suite. Prominent, rubbly-weathering dolerite bodies are seen along the banks of the Skulpspruit, as low ridges in the grassy vlaktes as well as intruding the Katberg koppies along or close to the southern margins of the project area. The adjacent Katberg sandstones have been secondarily mineralised and baked to quartzite during dolerite intrusion. Small, laminated to thin-bedded, quartzitic xenoliths of channel sandstone occur within the larger dolerite bodies.

Table 3.1: Geological formations within the study area listed in order of relative age (GEOSS, 2024⁸).

Symbol	Formation/Subgroup	Group	Lithology
~ / Q-a	Quaternary Deposit		Alluvium / Terrace gravel
Jd	Jurassic Intrusion		Dolerite
Trb	Burgersdorp	Beaufort	Red and greenish-grey mudstone, subordinate sandstone

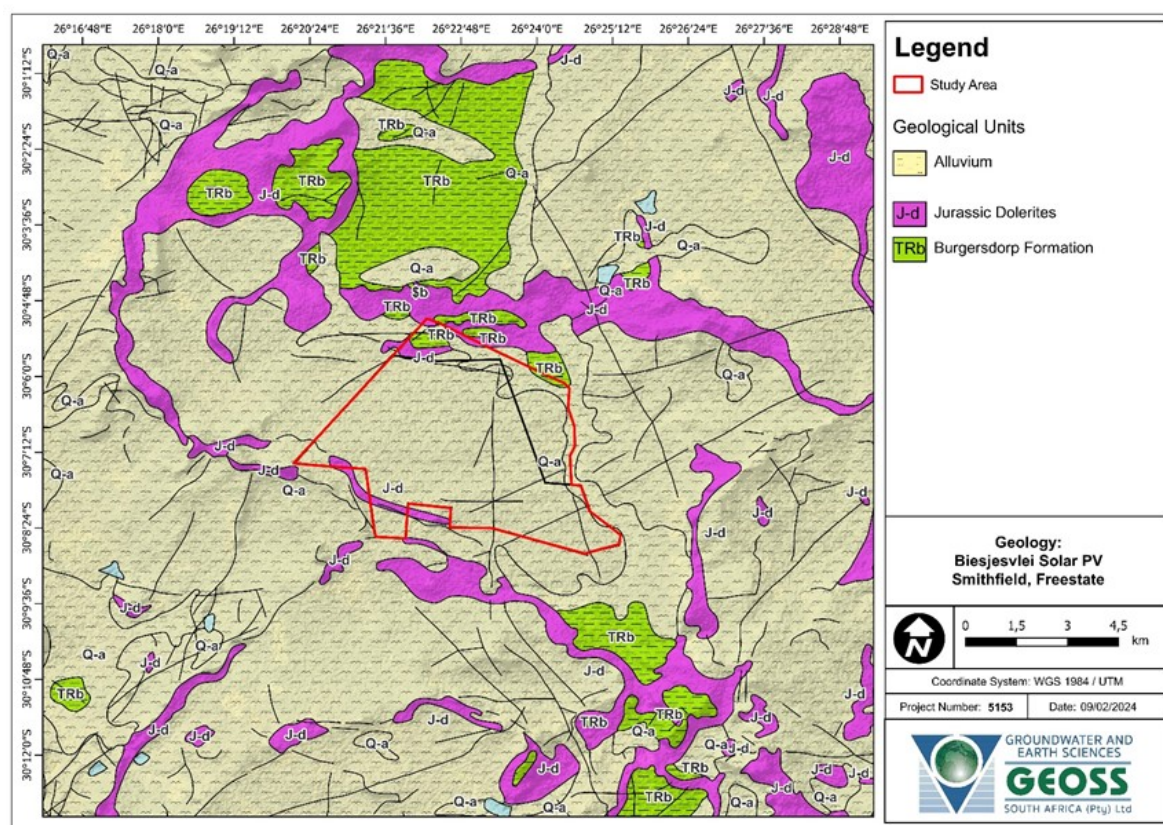


Figure 3.6: Geological setting for the proposed project and associated infrastructure (Source: Council for Geoscience, 1997, Map: 1:250 000 scale Aliwal North 3026 in GEOSS, 2024).

Most of the project area comprises thick, silty to sandy to sparsely gravelly alluvial soils, dotted with large, domical termitaria. Sparse, downwasted (eluvial) gravels occur at surface and within the upper soil. A white surface efflorescence of salts (likely nitrates or salpeter) has developed locally along the Skulpspruit, such as near Farm Salpetervlei 756. Hillslopes are mainly covered with poorly sorted colluvial gravels dominated by clasts of sandstone, dolerite, and occasional blocks of calcrete glaebule breccio-conglomerate downwasted from the base of channel sandstone units.

⁸ GEOSS (2024). Geotechnical Letter of Opinion for the proposed Biesjesvlei PV, Biesjesvlei BESS and Biesjesvlei EGI development (Projects 1 to 10). Appendix E.11 of the EIA Report.

3.2.4 Agriculture and Land Capability

The information described below is based on the SSV and Compliance Statement provided by the Agricultural Specialist (Lanz, 2024⁹), which is included in Appendix E.1 of this EIA Report.

3.2.4.1 General Context

The Screening Tool classifies agricultural sensitivity according to two independent criteria, from two independent data sets – the land capability rating on the land capability data set and whether the land is used for cropland or not on the field crop boundary data set. All cropland is classified as either high or very high sensitivity, based on the logic that if it is under crop production, it is indeed suitable for it, irrespective of its land capability rating.

Land capability is defined as the combination of soil, climate, and terrain suitability factors for supporting rain-fed agricultural production. In 2017, the then Department of Agriculture, Forestry and Fisheries (DAFF) released updated and refined land capability mapping across the whole of South Africa. This has greatly improved the accuracy of the land capability rating for any particular piece of land anywhere in the country. The new land capability mapping divides land capability into 15 different categories with 1 being the lowest and 15 being the highest. This land capability data is used by the Screening Tool. The higher land capability classes (≥ 8 to 15) are likely to be suitable as arable land for the production of cultivated crops, while the lower classes (< 8) are only likely to be suitable as non-arable grazing land.

3.2.4.2 Screening Tool Descriptions and Site Sensitivity Verification

The information presented in the sections below is project specific.

▪ Project 1 - Biesjesvlei PV1

A map of the study area and project footprint for the Biesjesvlei PV1 (Project 1) in relation to the Agricultural Sensitivity provided by the Screening Tool is shown in Figure 3.7. The Screening Tool classified the study area as ranging from low to high agricultural sensitivity with the high sensitivity rating being due to some of the land being classified as cropland. However, the dataset used by the Screening Tool is outdated and all land across the footprint is no longer used as cropland. Therefore, this land within the footprint should neither be classified as cropland, nor should it be allocated a high agricultural sensitivity. Since none of the land within the study area is classified as cropland, the agricultural sensitivity is therefore purely a function of land capability. The land capability of the site is classified as ranging from 5 to 7 which is confirmed based on the assessment of the cropping potential of the site. The small-scale differences in the modelled land capability across the site are not very accurate or significant at this scale and are more a function of how the data is generated by modelling, than actual meaningful differences in agricultural potential on the ground. Values of 3 to 5 translate to a low agricultural sensitivity and values of 6 to 7 translate to a medium agricultural sensitivity, although there is little real difference between low and medium agricultural sensitivity on the ground. There is no scarcity of such agricultural land in South Africa and its conservation for agricultural production is therefore not a priority.

⁹ Lanz, J. (2024). Agriculture SSV and Compliance Statement for the proposed Biesjesvlei PV, Biesjesvlei BESS and Biesjesvlei EGI development (Report 1). Appendix E.1 of the EIA Report.

The agricultural sensitivity, as identified by the Screening Tool, is disputed by the Agriculture SSV (Appendix E.1 of the EIA Report). The motivation for disputing the sensitivity is predominantly that some of the land has been incorrectly classified as cropland. The cropping potential of the site is limited by the climate and soil constraints. The climate is classified as arid, and therefore of limited land capability. The land capability value is in keeping with the climate limitations that make the site totally unsuitable for crop production. Furthermore, soils are limited by shallow depth and limited drainage and moisture availability is insufficient for viable rain-fed cropping. Although such cropping may have been done on the site in the past, such production is no longer economically viable, and the agricultural potential of the site is limited to being suitable for grazing only. It should be noted that cropping potential changes with a changing agricultural economy over time. Poorer lands that may have been cropped with economic viability in the past, are abandoned as cropland because they become too marginal for viable crop production in a more challenging agricultural economy, with increased input costs.

The SSV verified that the entire study area is of less than high agricultural sensitivity with a land capability value of 5 to 7. Therefore, the high sensitivity rating by the Screening Tool is disputed and the entire footprint is confirmed as ranging from low to medium agricultural sensitivity. There are no differences between low and medium agricultural sensitivity.



Figure 3.7: Agricultural sensitivity of the study area and project footprint for the PV facility and associated infrastructure overlaid on agricultural sensitivity based on the Screening Tool (Source: Screening Tool, 2024).

▪ Project 4 - Biesjesvlei BESS 1

A map of the study area and project footprint for the proposed BESS project in relation to the Agricultural Sensitivity provided by the Screening Tool is shown in Figure 3.8.

The same agricultural sensitivity as discussed above for Project 1 above applies to Biesjesvlei BESS 1 (Project 4). It is confirmed as low to medium sensitivity, with no practical difference between low and medium.

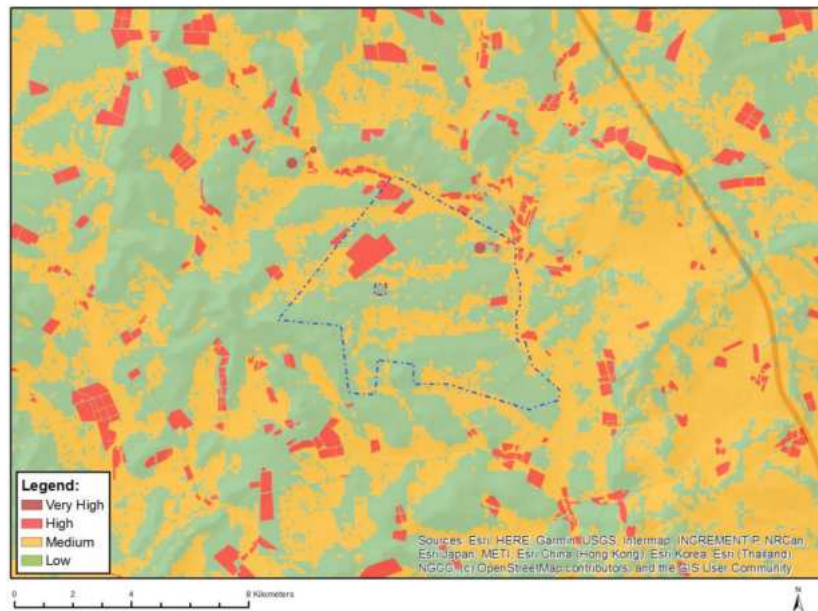
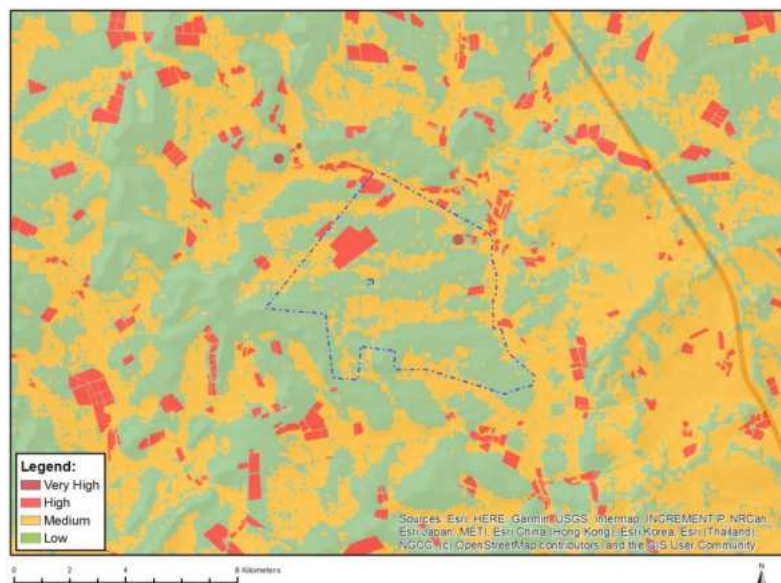


Figure 3.8: Agricultural sensitivity of the study area and project footprint for the BESS and associated infrastructure overlaid on agricultural sensitivity based on the Screening Tool (Source: Screening Tool, 2024).

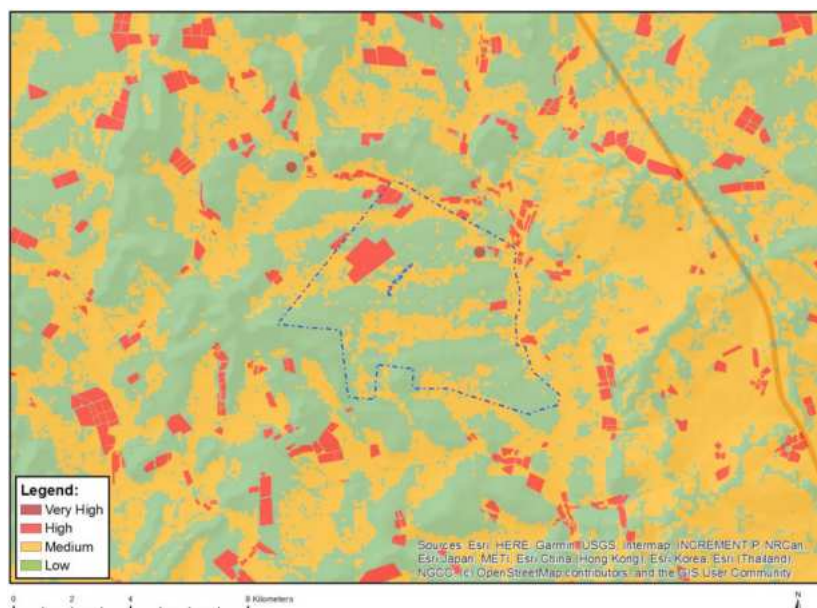
▪ Project 7 - Biesjesvlei EGI 1

A map of the study area and project footprint for the proposed EGI project in relation to the Agricultural Sensitivity provided by the Screening Tool is shown in Figure 3.9.

The same agricultural sensitivity as discussed above for Project 1 above applies to Project 7. It is confirmed as low to medium sensitivity, with no practical difference between low and medium.



(A)



(B)

Figure 3.9: Agricultural sensitivity of the study area and project footprint for the (A) switching station and (B) power line and associated infrastructure overlaid on agricultural sensitivity based on the Screening Tool (Source: Screening Tool, 2024).

3.2.5 Geohydrology

Note: The information presented in this section applies only to Project 4 (Biesjesvlei BESS 1).

A Geohydrology Assessment was commissioned and was aimed at determining the potential for groundwater to be used for construction, operational and decommissioning purposes, as well as the risks to nearby groundwater users. The Geohydrology Assessment was completed for the EIA Phase and is included in Appendix E.10 of this EIA Report. A summary of this chapter is also provided in Chapter 15 of this EIA Report. A site visit was carried out by the specialists in September 2023 to conduct a hydrocensus to obtain further groundwater use information. The hydrocensus identified various existing boreholes within the study area (most of them being wind pumps; and the water mainly being used for domestic use and livestock watering). Recommendations for placement of the BESS in relation to these boreholes has been provided by the specialist, as discussed in Section 3.7 of this chapter.

3.2.5.1 Screening Tool Descriptions and Site Sensitivity Verification

There are no dedicated Geohydrology or Groundwater related themes on the National DFFE Web-based Environmental Screening Tool; therefore, the verification of environmental sensitivity of the proposed project area as identified by the Screening Tool is not applicable. Therefore, no SSV report is required.

3.2.6 Strategic Water Source Areas

Strategic Water Source Areas (SWSAs) are defined as “areas of land that either: (a) supply a disproportionate (i.e., relatively large) quantity of mean annual surface water runoff in relation to their size and so are considered nationally important; or (b) have high groundwater recharge and where the groundwater forms a nationally important resource; or (c) areas that meet both criteria (a) and (b)” (Le Maitre *et al.*, 2018:1 in Department of Environment, Forestry and Fisheries (DEFF) [now operating as the DFFE], 2019: Page 60¹⁰).

Thirty-seven groundwater SWSAs have been identified in South Africa and are considered to be strategically important at a national level for water and economic security. The total area for groundwater SWSAs extends approximately 104 000 km² and covers approximately 9% of the land surface of South Africa (Le Maitre *et al.*, 2018, in DEFF, 2019: Page 61). They also include transboundary Water Source Areas that extend into Lesotho and Swaziland.

The study area for the proposed projects is located more than 80 km south of the Bloemfontein Region Groundwater SWSA; therefore, the proposed projects will not impact this area.

¹⁰ Department of Environment, Forestry and Fisheries (DEFF), 2019. Strategic Environmental Assessment for the Development of a Phased Gas Pipeline Network in South Africa. CSIR Report Number: CSIR/SPLA/EMS/ER/2019/0077/B. ISBN Number: ISBN 978-0-7988-5649-2. Stellenbosch and Durban.

3.2.7 Aquatic Biodiversity

The information described below is based on the Aquatic Biodiversity and Species Specialist Assessment and SSV provided by the Aquatic Specialist (Tate Environmental Specialist Services, 2024¹¹), which is included in Appendix E.3 of this EIA Report.

A Desktop analysis, using existing datasets and the latest Google Earth satellite imagery, to identify aquatic features on site; a desktop survey to consider the best information available in order to provide a better evaluation of all conditions present within the study area as well as an on-site inspection to evaluate the aquatic biodiversity of the study area were all used to inform the SSV.

3.2.7.1 General Context

The study area is located in the Upper Orange River basin within the Orange River Water Management Area (WMA), within the D24H quaternary catchment. The primary drainage associated with the study area includes non-perennial and perennial watercourses which flow into the D24H-04686 Sub Quaternary Reach (SQR) of the Skulpspruit River system. The general flow of the Skulpspruit River system is southwards towards the Gariep system. The elevation of the study area is predominantly flat, with gentle ridges located in the west of the screening area or area of interest (Aoi). Furthermore, the study area consists of rural land use with livestock farming of sheep and cattle, and isolated irrigated and non-irrigated cultivation. Considering the rural setting of the Aoi, impacts relating to agricultural activities were noted to occur in the project area.

3.2.7.2 Screening Tool Descriptions and Site Sensitivity Verification

The Screening Tool Report Aquatic Biodiversity Sensitivity Map was of very high sensitivity for the study area and footprints of the proposed projects, with the very high sensitivity linked to a Freshwater Ecosystem Priority Area (FEPA) sub-catchment and rivers (Figures 3.12, 3.14, and 3.16)

Following the site inspection and based on local on-site conditions, the Aquatic Specialist undertook more detailed sensitivity mapping (at the project scale) for the proposed projects.

Three wetland hydrogeomorphic (HGM) types were present within the established Aoi of the proposed projects. The HGM types consist of Channelled Valley Bottom (CVB), Unchanneled Valley Bottom (UVB) and seep wetland units. It is important to note that the riverine component of the study forms the central channels of HGM1 and HGM2. These wetland habitats are separated into 17 HGM units. The watercourse delineations are provided in Figure 3.10. It is important to note that not all HGM units in the Aoi are expected to be impacted and further assessment of these units was not required. The watercourse units to be included in the detailed assessment are presented in Figure 3.11.

¹¹ Tate Environmental Specialist Services (2024). Aquatic Biodiversity and Species Assessment for the proposed Biesjesvlei PV, Biesjesvlei BESS and Biesjesvlei EGI development (Report 1). Appendix E.3 of the EIA Report.

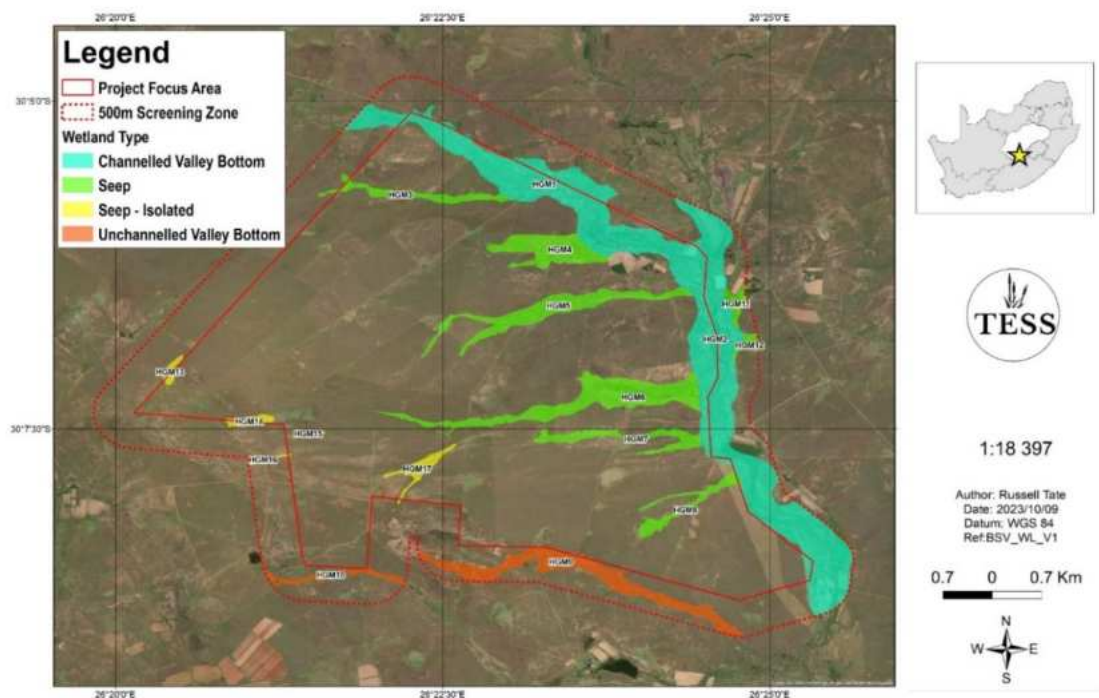


Figure 3.10: Watercourse delineation in the Area of Influence (AoI) (Tate Environmental Specialist Services, 2024).

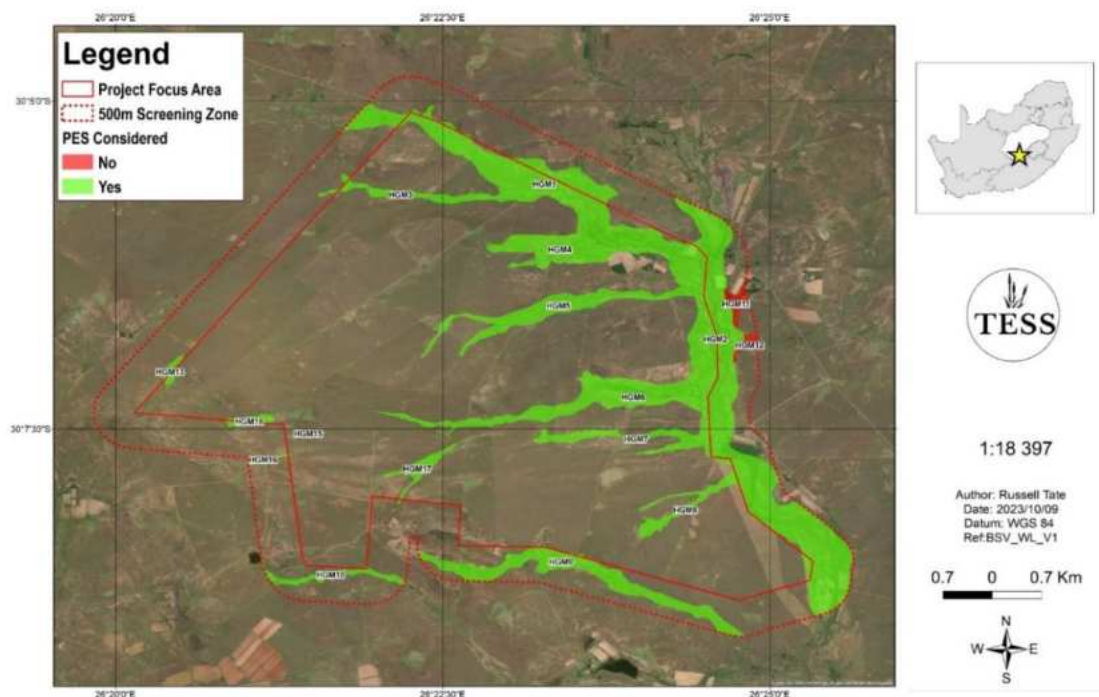


Figure 3.11: Watercourses considered in the Present Ecological Status assessment (Tate Environmental Specialist Services, 2024).

A summary of the primary sensitive habitat considerations is provided in Table 3.2 below.

Table 3.2: Summary information of sensitive features associated with the proposed projects.

Feature	Sensitivity	Buffer	Notes
CVB Wetland	Very High	19 m	- These areas must be excluded from development activities. - Any direct impacts to these systems must be minimised. - It is recommended that a single access route over the main CVB wetlands is constructed. - No more than one crossing is recommended.
UVB Wetland	Very High	19 m	- These systems must be avoided. - Only existing crossings structures can be utilised. Where these are to be utilised, they must be upgraded with suitable culverts.
Seep Wetlands	High	19 m	- These areas must be excluded from development activities. - Although these systems are less sensitive it is recommended that crossing permanently wet areas is restricted. - Where access routes are required to cross over seep wetlands, these must make use of multiple culverts.

It is noted that the proposed projects will take place within the regulated areas within 500 m from the delineated wetland areas. Furthermore, there are proposed watercourses crossings to be constructed. Watercourses within the Aol are sensitive and important habitats and must be avoided. In order to ensure the preservation of these systems, a 19 m buffer zone must be applied (as indicated in Table 3.2 above). Direct unavoidable impacts to sensitive habitats due to road crossing requirements of the proposed development are expected; therefore, it is recommended that appropriate culvert options are investigated and implemented. These must consider habitat connectivity and should not result in hydraulic impact to downstream or upslope environments.

The results of the buffer analysis are mapped in Figure 4.27 of the Aquatic Biodiversity and Species Assessment (Appendix E.3 of this Final EIA Report). The sensitivity maps compiled by the CSIR for the projects are inclusive of the features and associated buffers i.e. buffering is already included in the mapped sensitivities. Additional information is provided in Figure 3.49, Figure 3.50, Figure 3.51, and Figure 3.52 of this Chapter.

The aquatic features within the study area have been delineated at a finer scale and refined as compared to the Screening Tool / Free State Province Biodiversity Plan (FSPBP) and assigned Very High sensitivity (CVB and UVB Wetlands) and High sensitivity (Seep Wetlands). At a finer scale, the outcomes of the Aquatic Biodiversity SSV confirmed the very high sensitivity rating for the rivers allocated on the Screening Tool, and thereby verified the desktop information.

Figure 3.12 below presents the information from the Screening Tool for the Aquatic Biodiversity Theme as it relates to the study area and the proposed PV footprint (i.e., the proposed fenced off area of the facility, within the study area).

[illegible]

Figure 3.12: Aquatic Biodiversity Sensitivity of the study area and footprint for the proposed PV facility based on the Screening Tool (Source: Screening Tool, 2024).

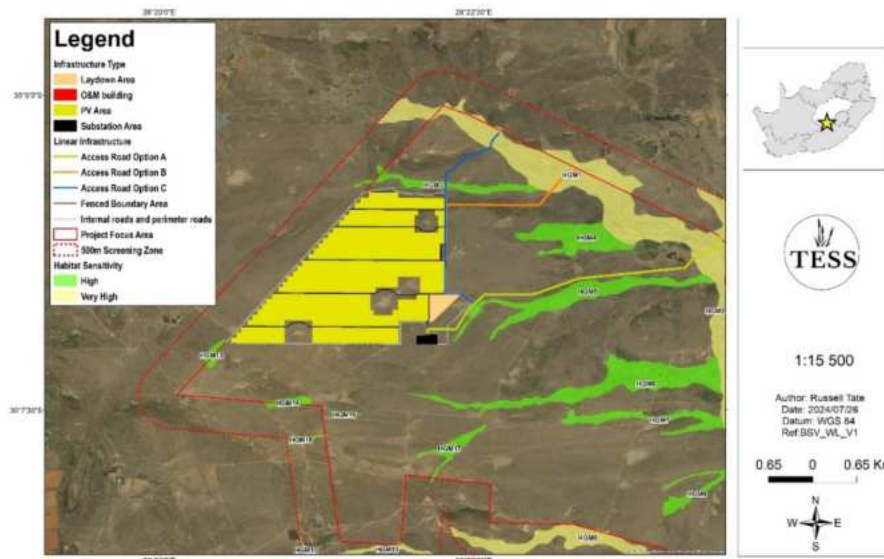


Figure 3.13: Layout and sensitivity map for the Aol and proposed PV facility. On this map, seep wetlands shown in green are assigned High sensitivity; and Channelled Valley Bottom (CVB) and Unchannelled Valley Bottom (UVB) wetlands shown in yellow are assigned Very High sensitivity (Tate Environmental Specialist Services, 2024).

▪ Project 4 - Biesjesvlei BESS 1

Figure 3.14 below presents the information from the Screening Tool for the Aquatic Biodiversity Theme as it relates to the study area and the proposed BESS footprint.

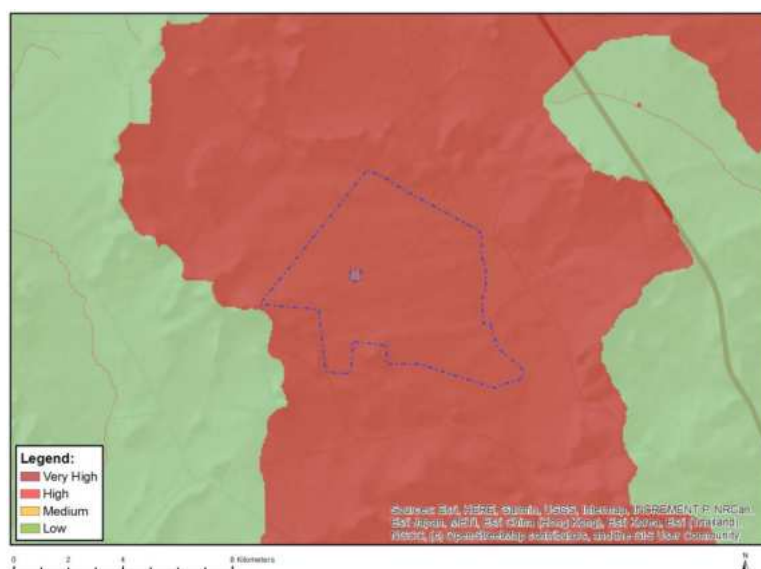


Figure 3.14: Aquatic Biodiversity Sensitivity of the study area and footprint for the proposed BESS based on the Screening Tool (Source: Screening Tool, 2024).

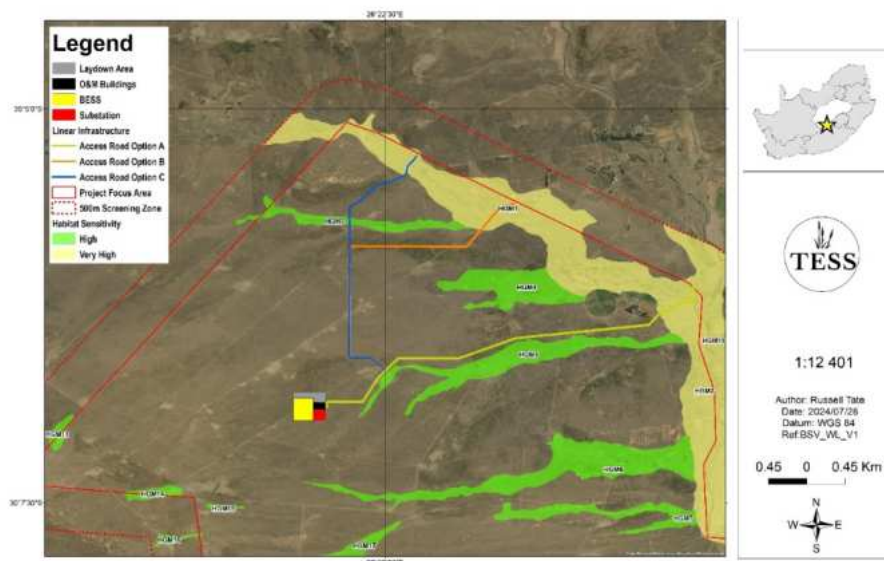


Figure 3.15: Layout and sensitivity map for the Aol and the proposed BESS. On this map, seep wetlands shown in green are assigned High sensitivity and Channelled Valley Bottom (CVB) wetlands shown in yellow are assigned Very High sensitivity (Tate Environmental Specialist Services, 2024).

Overall, the Biesjesvlei BESS 1 (Project 4) is confirmed to be high sensitivity due to the association of the project and presence of sensitive wetland habitats (Figure 3.15). However, the footprint of the main infrastructure of Biesjesvlei BESS 1 does not intersect with any of the delineated Very High and High sensitivity wetlands i.e. these features are avoided. Only the main access road traverses the Very High sensitivity areas, however this is not considered a fatal flaw, as adequate mitigation has been recommended (as highlighted in Table 3.2) in the Aquatic Biodiversity and Specialist Assessment (Appendix E.3 of this EIA Report).

▪ Project 7 - Biesjesvlei EGI 1

Figure 3.16 below presents the information from the Screening Tool for the Aquatic Biodiversity Theme as it relates to the study area and the proposed switching station footprint and the proposed power line footprint forming the EGI, respectively.

Overall, the Biesjesvlei EGI 1 (Project 7) is confirmed to be high sensitivity due to the association of the project and presence of sensitive wetland habitats (Figure 3.17). However, the footprint of Biesjesvlei EGI 1 does not intersect with any of the delineated Very High and High sensitivity wetlands i.e., these features are avoided.



Figure 3.16: Aquatic Biodiversity Sensitivity of the study area and footprint for the proposed switching station (image on the left) and power line (image on the right) forming the EGI based on the Screening Tool (Source: Screening Tool, 2024).



Figure 3.17: Layout and sensitivity map for the Aol and the proposed switching station and power line forming the EGI. On this map, seep wetlands shown in green are assigned High sensitivity (Tate Environmental Specialist Services, 2024).

3.2.8 Terrestrial Biodiversity

The information described below is based on the Terrestrial Biodiversity and Species Report and SSV provided by the Terrestrial Specialist (Enviro-Insight, 2024a¹²), which is included in Appendix E.2 of this EIA Report.

A Desktop analysis, using existing datasets and the latest Google Earth satellite imagery, to identify habitats on site; a desktop survey to consider the best information available in order to provide a better evaluation of all conditions present within the study area as well as an on-site inspection to evaluate the terrestrial biodiversity and sensitive flora and fauna aspects of the study area were all used to inform the SSV.

A site visit was undertaken in November 2022 (wet season) by the Terrestrial Specialist where the Terrestrial Biodiversity and sensitive flora and fauna aspects of the survey area were evaluated. During the field surveys performed, the habitats were evaluated on foot, and a series of georeferenced photographs were taken of the habitat attributes. The field surveys focused on identifying dominant flora species, main habitat types as well as the actual and potential presence of Species of Conservation Concern (SCC) (either classified as Threatened by the International Union for Conservation of Nature (IUCN) (2023), protected by the National Environmental Management: Biodiversity Act (NEMBA) (Act 10 of 2004, as amended) or other legislation applicable provincially or nationally).

3.2.8.1 Regional Vegetation

The study area falls within the Grassland Biome, and within the Aliwal North Dry Grassland (Gh2) [Least Concern / Least Threatened] vegetation type (Mucina and Rutherford, 2006, as amended¹³) (Figure 3.18). From a Terrestrial Biodiversity perspective, this vegetation type is an important system for grassland associated animals, as it supports provincially protected species and has the potential to support endemic species, and it serves as important areas for the conservation of avifauna.

¹² Enviro-Insight (2024a). Terrestrial Biodiversity and Species Report for the proposed Biesjesvlei PV, Biesjesvlei BESS and Biesjesvlei EGI development (Report 1). Appendix E.2 of the EIA Report.

¹³ Mucina, L. and Rutherford, M.C. (Eds.) 2010. The vegetation of South Africa, Lesotho and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria.

Proposed 3 x 350 MW Biesjesvlei Solar PV, BESS and EGI Development near Smithfield, Free State, South Africa

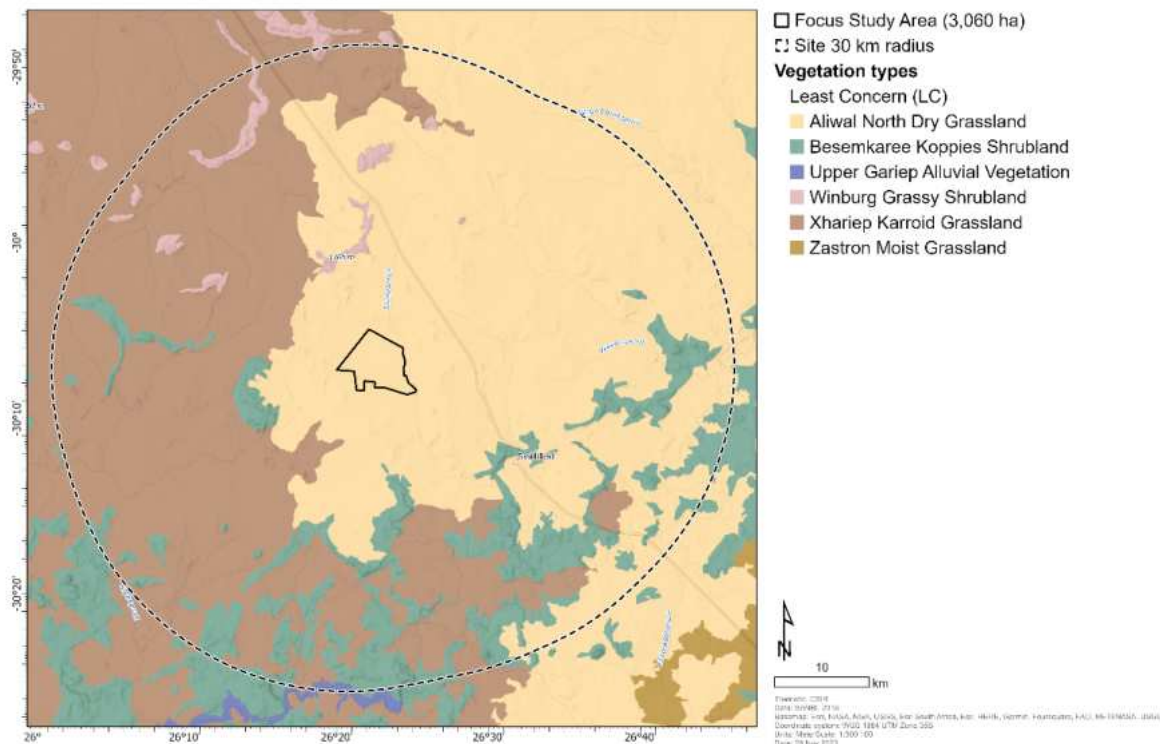


Figure 3.18: The study area in relation to the vegetation types.

3.2.8.2 Biodiversity Conservation Planning

Critically Endangered and Threatened Ecosystems

Based on the SSV and findings of the Terrestrial Biodiversity Assessment, there are no Critically Endangered, Threatened and/or Vulnerable Ecosystems present within the study area of the proposed projects. Refer to Appendix E.2 of this EIA Report for the Terrestrial Biodiversity and Species Assessment for additional information.

Critical Biodiversity Areas and Ecological Support Areas

Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) are indicated in terms of the FSPBP Technical Report and CBA Map. This was developed by the Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA) by using a Systematic Conservation Planning approach.

CBAs are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. The primary purpose of CBAs is to inform land-use planning in order to promote sustainable development and protection of important natural habitat and landscapes.

In terms of CBAs and ESAs, a Screening Tool Report generated during the screening phase of the proposed projects, in November 2022, indicated that the study area only contained ESA 1 and 2. This was based on the 2015 FSPBP, as indicated in Figure 3.19 below.

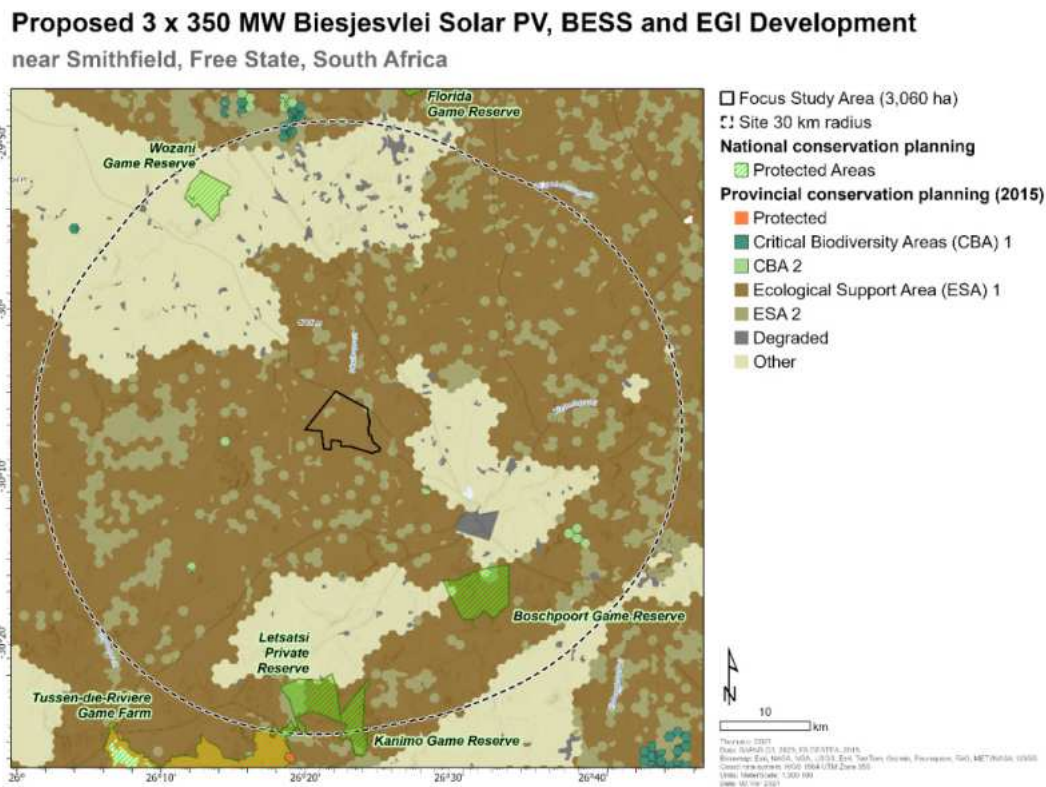


Figure 3.19: Provincial Conservation Planning within the study area based on the 2015 FSPBP, and National Conservation Planning in terms of the South African Protected Areas Database (SAPAD; Quarter 1, 2024).

However, a more recent Screening Tool Report generated in late 2023 indicated that the study area contains CBA 1 and 2, as well as ESA 1 and 2. This is based on the 2019 FSPBP (Figure 3.20) that was made available to the public via the Screening Tool in late 2023, after the Terrestrial Biodiversity specialist SSV and fieldwork.

Proposed 3 x 350 MW Biesjesvlei Solar PV, BESS and EGI Development near Smithfield, Free State, South Africa

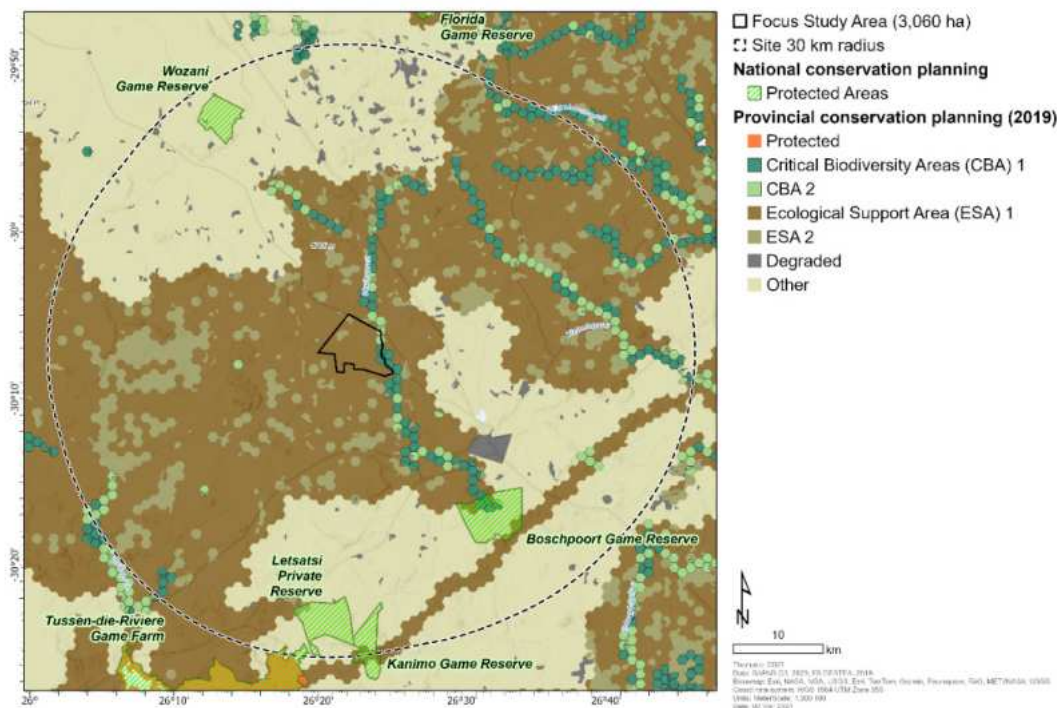


Figure 3.20: Provincial Conservation Planning within the study area based on the 2019 FSPBP, and National Conservation Planning in terms of the South African Protected Areas Database (SAPAD; Quarter 1, 2024).

Based on feedback received from the Free State DESTEA, the reason for the change from ESA to CBA was due to aquatic features. Refer to Appendix G.3 of this EIA Report for a copy of this Free State DESTEA correspondence.

Conservation planning data is generally at a coarse spatial resolution. As such, in order to effectively and accurately account for the habitat features which are responsible for the classification of the hexagons (planning units) under the FSPBP, the appointed Aquatic Biodiversity specialist delineated the wetland areas and identified buffer zones for the proposed projects. These areas confirmed the status provided in the conservation plan features but refined the extent (i.e. the specialist SSV has refined the exact locations of the CBA, as well as provided suitable buffer classifications). As indicated above, the proposed projects avoid the wetlands delineated by the Aquatic Specialist. Access roads (and power lines (in the case of Biesjesvlei PV3 (Project 3), which is the subject of a separate report)) traverse these areas; however, this is acceptable as adequate mitigation has been recommended in the relevant specialist studies.

The appointed Aquatic Biodiversity specialist and Terrestrial Biodiversity specialist explain that development on the terrestrial portions within the CBA hexagons would not be considered a fatal flaw for the proposed projects. **Note that the main infrastructure associated with Biesjesvlei Projects 1 to 10 are not located within any of the wetlands identified by the Aquatic Biodiversity specialist.**

In addition, all the Biesjesvlei projects, except for part of Biesjesvlei PV3 (Project 3) [which is the subject of a separate report], are not located within any of the terrestrial portions of the CBA hexagons identified in the 2019 FSPBP. For additional information, refer to the Specialist Reports (including the SSVs) for Terrestrial Biodiversity and Species, and Aquatic Biodiversity and Species in Appendix E.2 and Appendix E.3 of this EIA Report, respectively.

It is also understood that both the 2015 and 2019 FSPBP are not formally adopted by the Free State DESTEA. Refer to Appendix G.3 of this EIA Report for correspondence with the Free State DESTEA. This was also confirmed with the Free State DESTEA in July 2024 (as captured in Appendix I.1 of this EIA Report).

Protected Areas

According to the South African National Protected Areas Database (SAPAD), Quarter 1 (2024), the study area does not include any formally Protected Areas (Figure 3.19 and Figure 3.20), as defined by the National Environmental Management: Protected Areas Act (Act 57 of 2003) (NEM:PAA). The closest formally Protected Area is the Boschpoort Game Reserve, which is located approximately 16 km to the southeast of the study area. The Letsatsi Private Reserve is located approximately 25 km to the southwest of the study area and the Kanimo Game Reserve, which is adjacent to the Letsatsi Private Reserve, is located approximately 27 km south of the study area. The Wozani Game Reserve is situated more than 23 km to the northwest of the study area. The Tussen die Riviere Game Farm is situated more than 30 km away from the study area.

Conservation Areas

According to the South African Conservation Areas Database (SACAD), Quarter 1 (2024), the study area does not include any Conservation Areas.

National Protected Area Expansion Strategy (NPAES) Focus Areas

The National Protected Area Expansion Strategy (NPAES) focus areas for land-based protected area expansion are large, intact and unfragmented areas of high importance for biodiversity representation and ecological persistence, suitable for the creation or expansion of large, Protected Areas. The focus areas are representative of 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. There are no NPAES focus areas within the study area.

3.2.8.3 Terrestrial Animal Species (Excluding Avifauna)

3.2.8.3.1 Screening Tool Descriptions and Site Sensitivity Verification

The Screening Tool Report Animal Species Sensitivity Map is considered to be of high and medium sensitivity for the entire study area and footprints of the proposed projects with the high sensitivity linked to the potential occurrence of Ludwig's Bustard (Globally and Regionally Endangered) which is discussed in the Avifauna SSV in Section 3.2.9 below; and the medium sensitivity linked to the potential occurrence of the mammal Spotted-necked otter (Figure 3.21).

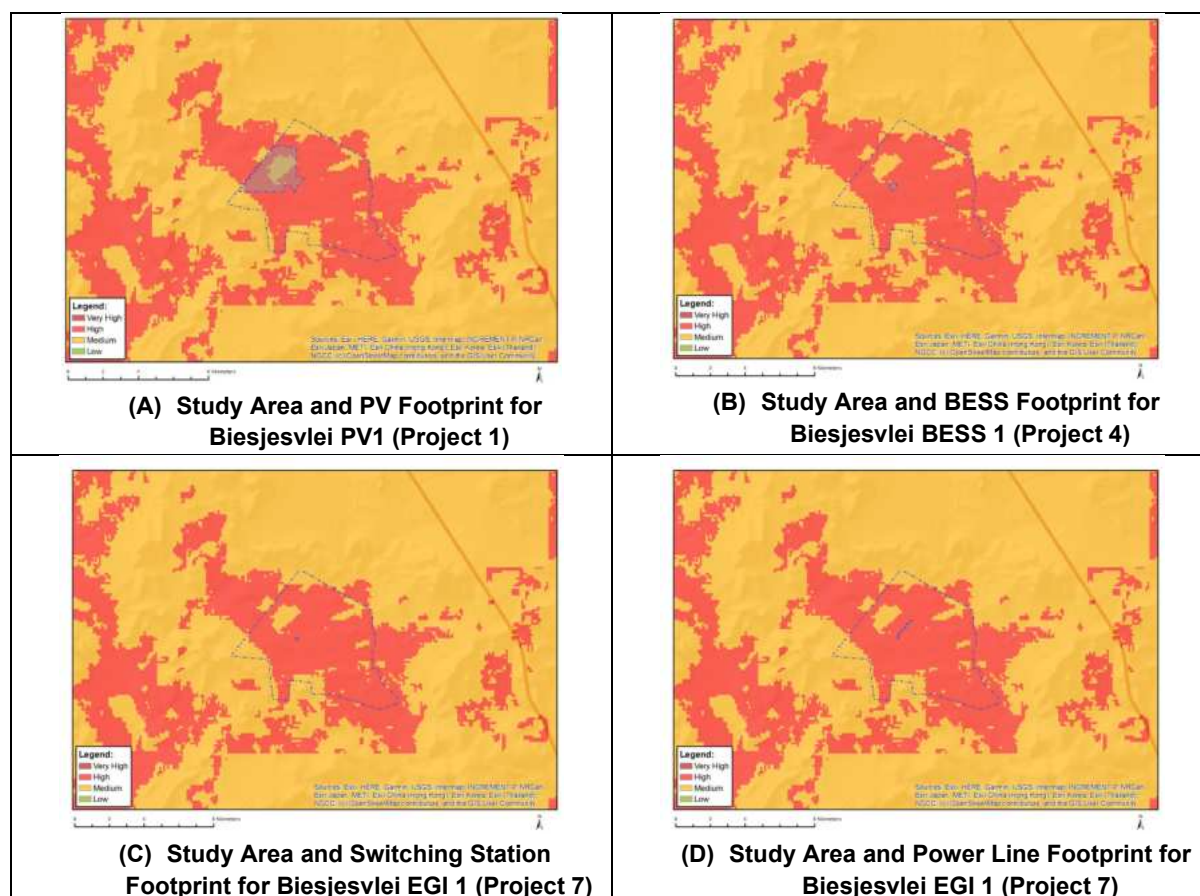


Figure 3.21: Animal Species Sensitivity of the study area and project footprints based on the Screening Tool (Source: Screening Tool, 2024).

The terrestrial animal species recorded in the study area by the Terrestrial Biodiversity specialist during the site inspection along with an indication of their status is provided in Table 3.3 below, as also indicated in Appendix E.2 of this EIA Report.

Table 3.3: Animal species recorded within the study area and their status (extracted from Enviro-Insight, 2024a).

Species	Status
<i>Hystrix africaeaustralis</i> (Cape Porcupine)	Least Concern
<i>Dasypeltis scabra</i> (Egg-eating Snake)	Least Concern
<i>Parabuthus planicauda</i> (Drab Thicktail Scorpion)	Least Concern
<i>Homopus femoralis</i> (Karoo Tortoise)	Least Concern and Provincially Protected
<i>Ictonyx striatus</i> (Zorilla / Striped Polecat)	Least Concern
<i>Otocyon megalotis</i> ssp. <i>Megalotis</i> (Southern Bat-eared Fox)	Least Concern and Provincially Protected
<i>Stigmochelys pardalis</i> (Leopard Tortoise)	Least Concern and Provincially Protected
<i>Proteles cristata</i> (Aardwolf)	Least Concern and Provincially Protected
<i>Antidorcas marsupialis</i> (Springbok)	Least Concern and Provincially Protected
<i>Amietia poyntoni</i> (Poynton's River Frog)	Least Concern
<i>Varanus albigularis</i> ssp. <i>Albigularis</i> (White-throated Monitor)	Least Concern
<i>Aonyx capensis</i> (African Clawless Otter) [New record for the area approximately 6.7 km away from the study area]	Near Threatened

Based on the SSV, the medium sensitivity rating as classified by the Screening Tool for terrestrial animal species (excluding birds) is confirmed, and the study area is confirmed as medium sensitivity due to suitable habitat for the Spotted-necked otter. This species is listed as Vulnerable and inhabits freshwater habitats where water is not silt-laden and rich in small fish. Adequate riparian vegetation such as long grass, reeds, or bushes, is also essential to provide cover. The species was not recorded during the site visit, but suitable habitat does exist. Since the watercourse is excluded from development and well buffered, the habitat for the species is protected. However, since the access road will cross the watercourse, the necessary mitigation measures need to be in place to reduce any negative impacts on the feeding, breeding, and movement of the species. Such mitigation is recommended in the Terrestrial Biodiversity and Species Specialist Report (Appendix E.2 of the EIA Report).

Based on the above, the following is collectively and identically concluded for **Biesjesvlei PV1, BESS 1 and EGI 1 (Projects 1, 4 and 7, respectively)** for Terrestrial Animal Species:

- The **medium sensitivity** for the **Animal Species** Theme on the DFFE Screening Tool is confirmed.

3.2.8.4 Terrestrial Plant Species

3.2.8.4.1 Screening Tool Descriptions and Site Sensitivity Verification

The Screening Tool Report Plant Species Sensitivity Map is considered to be of low sensitivity for the entire study area and footprints of the proposed projects (Figure 3.22).

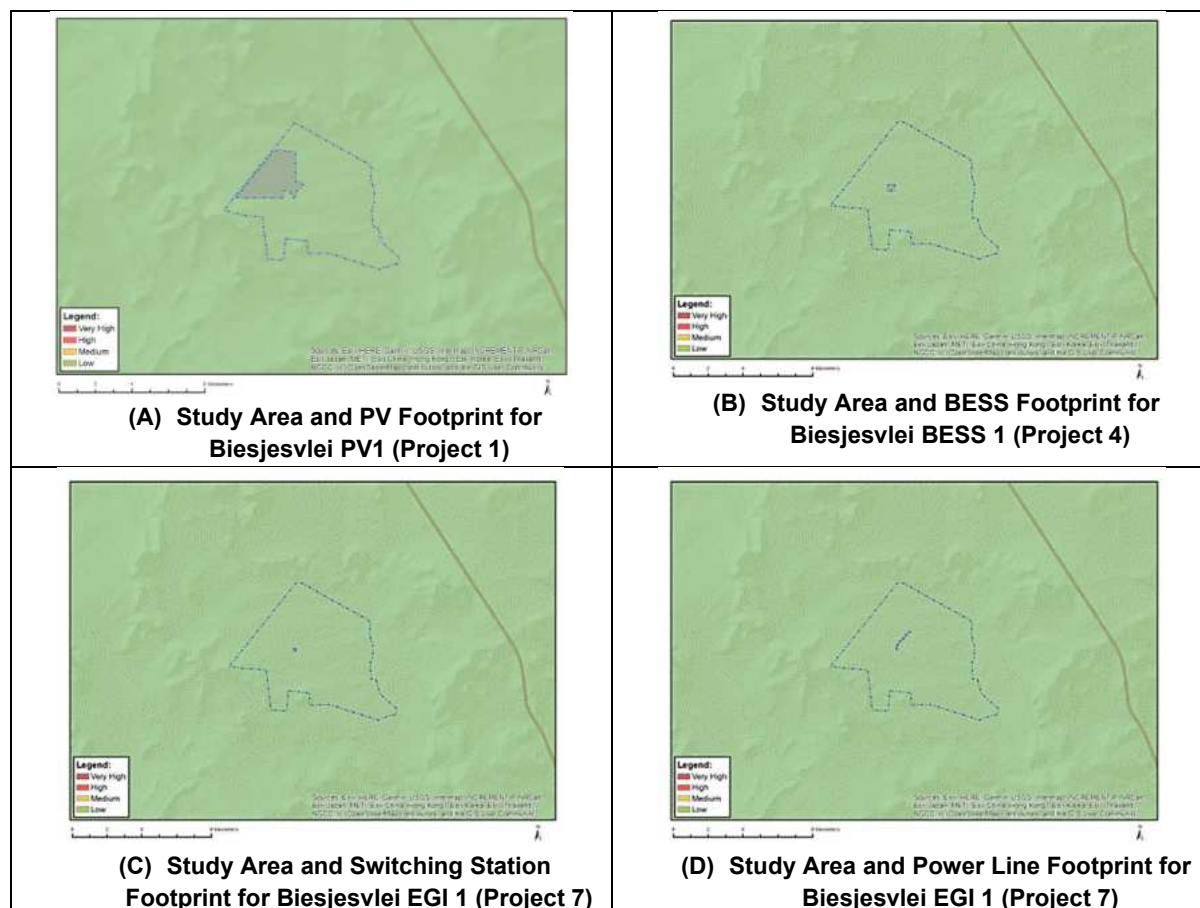


Figure 3.22: Plant Species Sensitivity of the study area and project footprints based on the Screening Tool (Source: Screening Tool, 2024).

The study area was surveyed to find any sensitive plant species, focusing on areas of suitable habitat. No SCC were found on site; however, some provincially protected species were found (i.e. *Ammocharis coranica*; *Crinum bulbispermum*; *Helichrysum rugulosum*; *Gethyllis transkarooica*; *Jamesbrittenia aurantiaca*).

Based on the SSV and desktop work including iNaturalist, the Screening Tool low sensitivity rating for terrestrial plant species is agreed with as there is no suitable habitat for plant SCC. There are no areas that need to be avoided by the proposed development from a terrestrial plant species perspective.

Based on the above, the following is collectively and identically concluded for **Biesjesvlei PV1, BESS 1 and EGI 1 (Projects 1, 4 and 7, respectively)** for Terrestrial Plant Species:

- The **low sensitivity** for the **Terrestrial Plant Species** Theme on the DFFE Screening Tool is agreed with for the entire study area and project footprints.

3.2.8.5 Terrestrial Biodiversity

3.2.8.5.1 Screening Tool Descriptions and Site Sensitivity Verification

The Screening Tool Terrestrial Biodiversity Sensitivity Map indicates very high sensitivity for the entire study area and footprints of the proposed projects (Figure 3.23). The very high sensitivity for the study area is linked to the potential occurrence of a CBA 1, CBA 2, ESA 1, ESA 2, and FEPA sub-catchment. Specifically, based on the Screening Tool, the very high sensitivity for the proposed PV facility (Project 1) is linked to the potential occurrence of an ESA 1, ESA 2, and FEPA sub-catchment. The very high sensitivities for the proposed BESS (Project 4) and proposed EGI (Project 7) are both linked to the potential occurrence of an ESA 1 and FEPA sub-catchment.

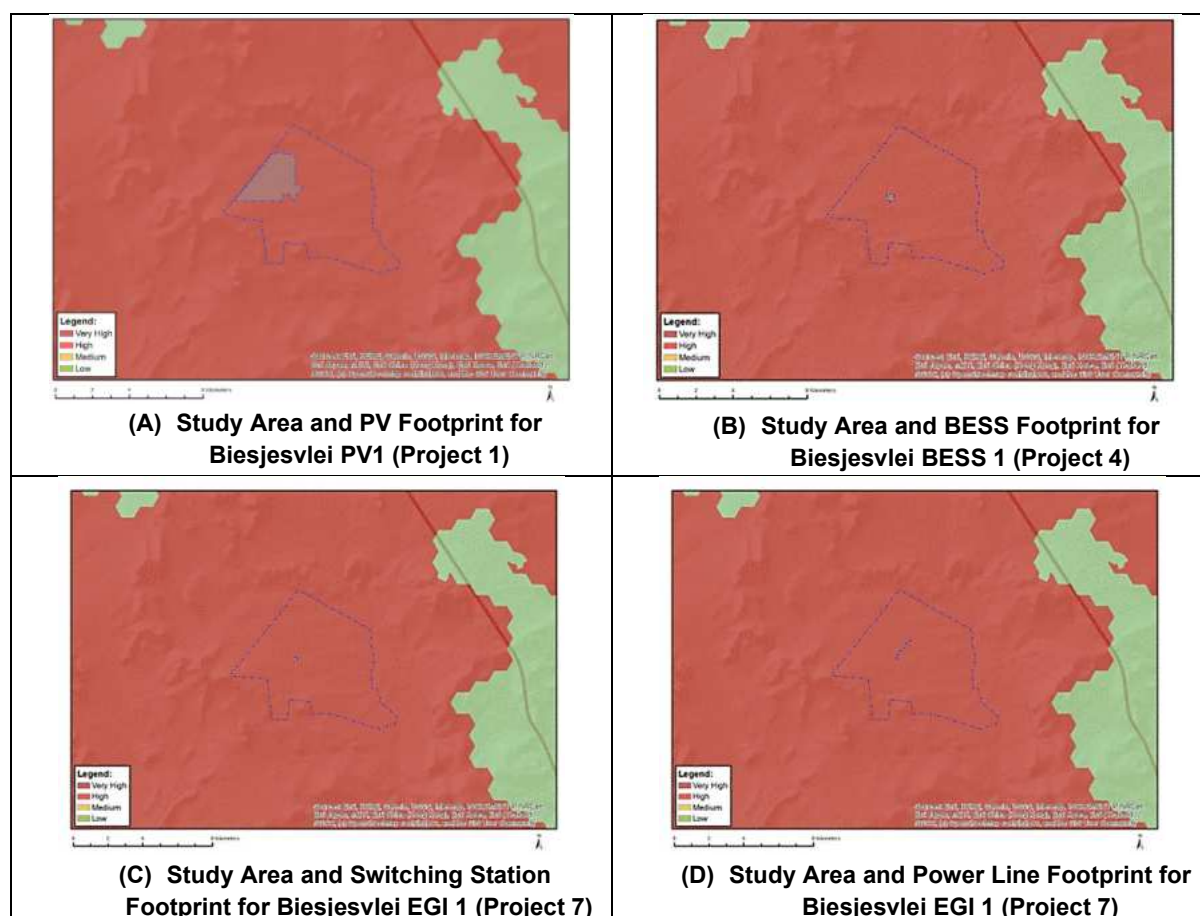


Figure 3.23: Terrestrial Biodiversity Sensitivity of the study area and project footprints based on the Screening Tool (Source: Screening Tool, 2024).

Three main habitats (i.e. Grassland, Koppies, and Watercourse (including Wetlands)) were identified within the study area based on species composition and structure following the desktop review and field-based assessments done by the specialists. In addition, agricultural fields (including fallow fields) were also identified. These are indicated in Figure 3.24 (inclusive of buffers) and described in Table 3.4.

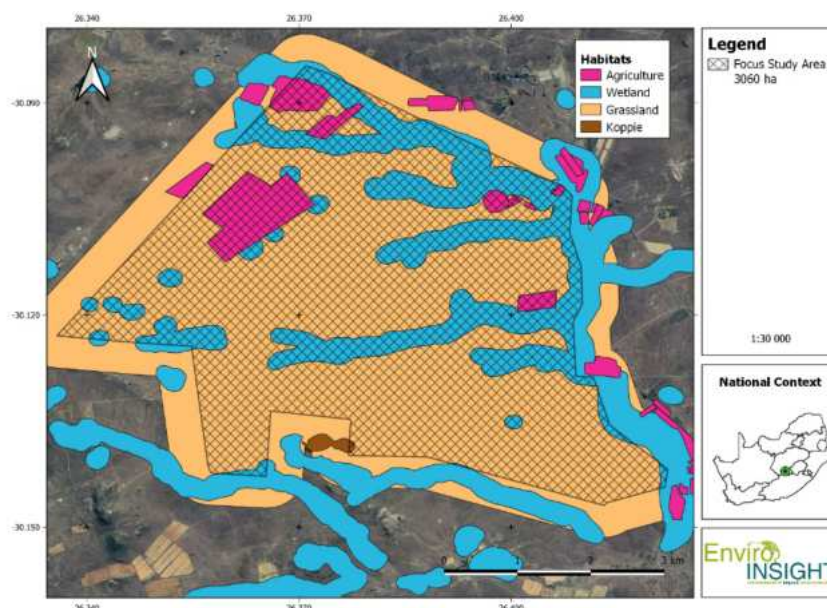


Figure 3.24: Habitat delineation for the study area (Source: Enviro-Insight, 2024a).

Table 3.4: Description of the main habitats found within the Study Area (extracted from Enviro-Insight, 2024a).

Habitats	Description
Grassland	The Grassland habitat is characteristic of open grassland with patches of dwarf karroid shrubs closer to the rock outcrops capped with dolerite. In areas closer to drainage lines and rivers, species composition and structure change as the soil becomes more saturated.  Typical Grassland habitat which are dominated by grasses.

Habitats	Description
Koppie	The Koppie is a single dolerite rock outcrop located to the south of the study area. The lower layer is dominated by dwarf small-leaved shrubs and, especially in precipitation-rich years, also by abundant grasses, while the upper layer is dominated by tall shrubs.  Koppie habitat located on the south-western section of the study area.
Watercourse / wetlands	The Watercourse habitat consists of drainage lines, some of which are smaller and drains into the main river. The vegetation layer is not well-defined and is made up of woody cover in some areas but is mostly dominated by graminoids and herbaceous species. The Watercourse habitat acts as a landscape corridor for the movement of many fauna species, including small mammals such as hares. It also performs important ecosystem functions such as regulating water runoff and creating suitable conditions important for the survival of many fauna species including foraging and breeding habitat.  Watercourse habitat throughout the study area.

Following the site inspection and based on local site conditions, the specialists undertook more detailed sensitivity mapping (at the project scale) for the proposed projects. The findings are provided in Table 3.5 below and indicated in Figure 3.25, Figure 3.26, and Figure 3.27. The sensitivity maps compiled by the Terrestrial Biodiversity specialist below and those compiled by the CSIR for the projects are inclusive of the features and associated buffers i.e. buffering is already included in the mapped sensitivities.

Table 3.5: Terrestrial Biodiversity sensitivities (Enviro-Insight, 2024a).

Habitat	Sensitivity	Buffer
Grassland	Medium (after all sensitive areas have been avoided and no transformation takes place for PV panels)	None
Watercourse / wetlands	Very High*	As explained by the Terrestrial Biodiversity specialist*
Koppies	Very High*	20 m

* Refer to the relevant notes in the Terrestrial Biodiversity and Species Report (Appendix E.2 of this EIA Report).

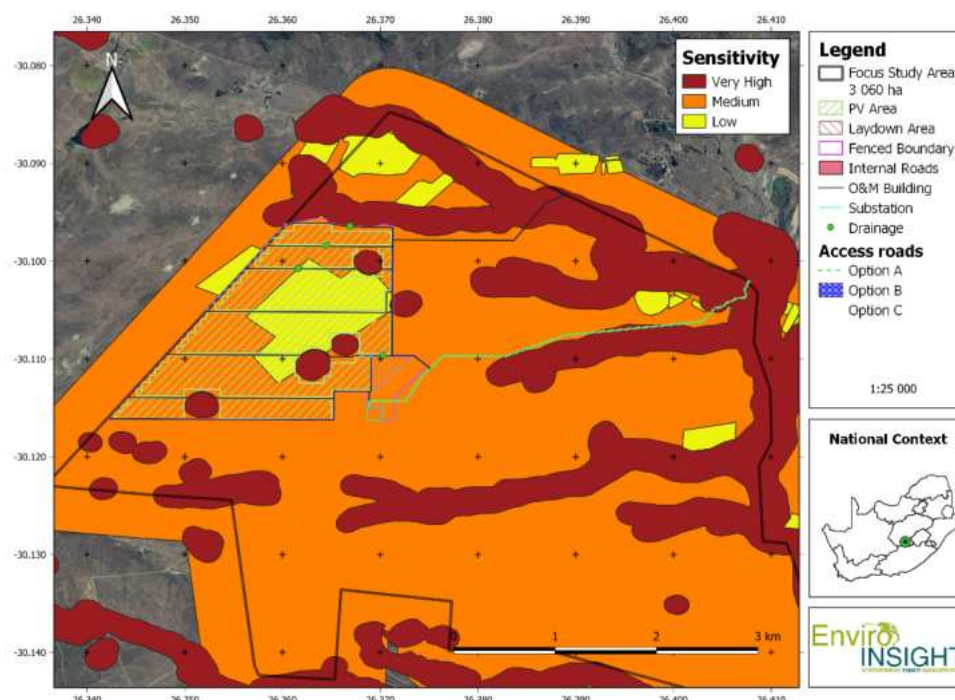


Figure 3.25: Terrestrial Biodiversity sensitivity and layout map for the study area and footprint for the proposed PV facility (Source: Enviro-Insight, 2024a).

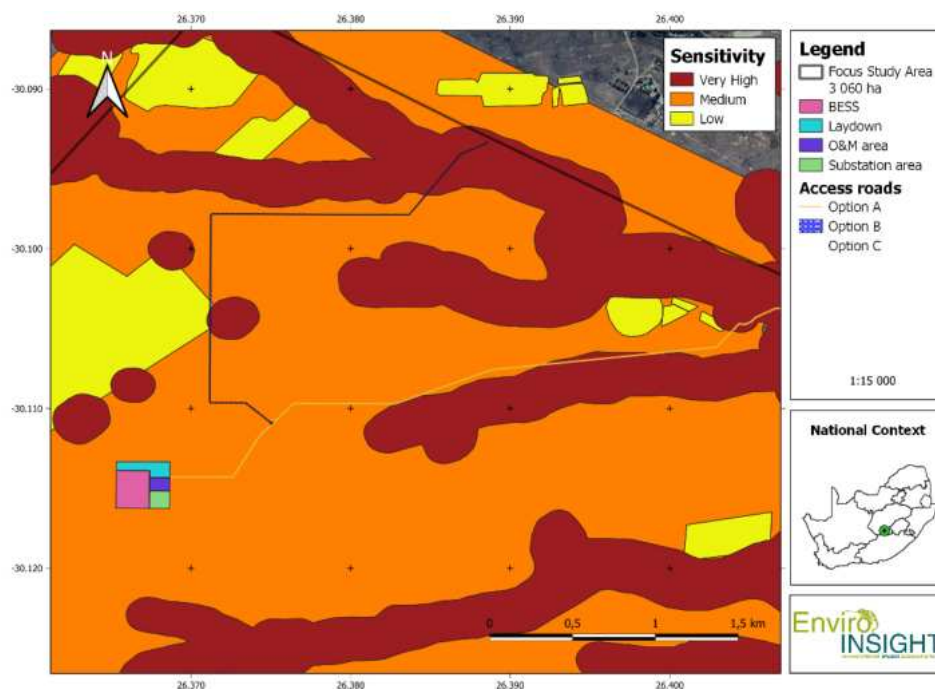


Figure 3.26: Terrestrial Biodiversity sensitivity and layout map for the study area and footprint for the proposed BESS (Source: Enviro-Insight, 2024a).



Figure 3.27: Terrestrial Biodiversity sensitivity and layout map for the study area and footprint for the proposed EGI (Source: Enviro-Insight, 2024a).

Based on the above, the following is collectively and identically concluded for **Biesjesvlei PV1, BESS 1 and EGI 1 (Projects 1, 4 and 7, respectively)** for Terrestrial Biodiversity:

- The SSV did not confirm the very high sensitivity for Terrestrial Biodiversity as per the Screening Tool Report. The CBA and ESA classification is based on aquatic features. The aquatic specialist has refined the exact locations of the CBA, as well as provided suitable buffer classifications. In this regard, development on the terrestrial portions within the CBA hexagon would not be considered a fatal flaw for the proposed projects.
- The ESA 1 and ESA 2 Very High sensitivity is disputed and is not considered Very High sensitivity from a Terrestrial Biodiversity perspective, but they do provide important ecosystem services which needs to be protected. The ESA 1 and ESA 2 can be regarded as high and medium sensitivity from a Terrestrial Biodiversity perspective.
- The Watercourse habitat is considered to be very high sensitivity from a terrestrial biodiversity perspective.
- The Koppie habitat is considered very high sensitivity from a terrestrial biodiversity perspective and must be buffered by at least 20 m.
- The Grassland habitat is considered medium sensitivity from a terrestrial biodiversity perspective after mitigation has been applied and no transformation of the grasslands take place.
- Evidence is provided by means of detailed feature and sensitivity mapping as illustrated in Figures 3.25 to 3.27.
- Based on the above, the study area is confirmed not to be Low sensitivity.

3.2.9 Avifauna

The information described below is based on the Avifauna Assessment and SSV provided by the Avifauna Specialist (Enviro-Insight, 2024b¹⁴), which is included in Appendix E.4 of this EIA Report.

3.2.9.1 General Context

The following were used to inform the Avifauna SSV:

- A Desktop analysis, using existing datasets and the latest Google Earth satellite imagery, to establish how the proposed projects interact with important terrestrial biodiversity and avifaunal specific receptors;
- A desktop survey to consider the best information available in order to provide a better evaluation of all conditions present within the study area; and
- An on-site inspection to identify site characteristics found within the study area such as habitats, important bird species and site sensitivities including sensitive habitats with their associated sensitive bird species and observation of nests of sensitive bird species.

¹⁴ Enviro-Insight (2024b). Avifauna Assessment for the proposed Biesjesvlei PV, Biesjesvlei BESS and Biesjesvlei EGI development (Report 1). Appendix E.4 of the EIA Report.

The pre-construction avifaunal monitoring programme was undertaken as a Regime 2 assessment (Jenkins et al. 2017¹⁵), which consisted of three surveys (November 2022, February 2023, and April 2023).

The following existing impacts to avifauna were observed during the site visit within the study area:

- Burning regimes – Fires, controlled or otherwise, may influence the habitat ecology including bird nesting and foraging habitat (ground dwelling species).
- Livestock grazing – The overall survey area is primarily comprised of livestock grazing areas with some areas showing signs of overgrazing and trampling. Fenced habitats ultimately showed ecologically manipulated ecology which may be beneficial or detrimental to local avifaunal populations, species dependent.
- Existing pylons and power lines – A large existing pylon servitude exists within the study area (i.e. Eskom 400 kV Beta – Delphi Line).
- Linear infrastructure - The study area is fragmented by a multitude of linear structures which present restrictive and hazard barriers to avifauna. These include fencing, sand roads and tar roads.

3.2.9.2 Screening Tool Descriptions and Site Sensitivity Verification

From an avifaunal perspective, the Screening Tool Report Animal Species Sensitivity Map is high sensitivity for the footprints of the proposed projects linked to the potential occurrence of Ludwig's Bustard (Globally and Regionally Endangered) (Figures 3.21).

Figure 3.28 provides an overall habitat delineation for the study area from an avifaunal perspective following the SSV, which is also described in Table 3.6. These include agricultural fields, fallow fields, grassland, wetlands, and the koppie. Although Blue Korhaan frequented areas have been delineated in the map, the areas fall predominantly within the grassland habitat, and show where the species were observed most frequently. It is therefore not a separate habitat, but rather a visual illustration of where the Blue Korhaan fall into the habitats in the study area. For this reason, specific reference to Blue Korhaan frequented areas has not been made in the habitat descriptions below beyond the grassland description (Enviro-Insight, 2024b).

¹⁵ Jenkins, A.R., Ralston-Paton, S. and Smit-Robinson, H.A. (2017). Birds & Solar Energy. Best Practice Guidelines: Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa.

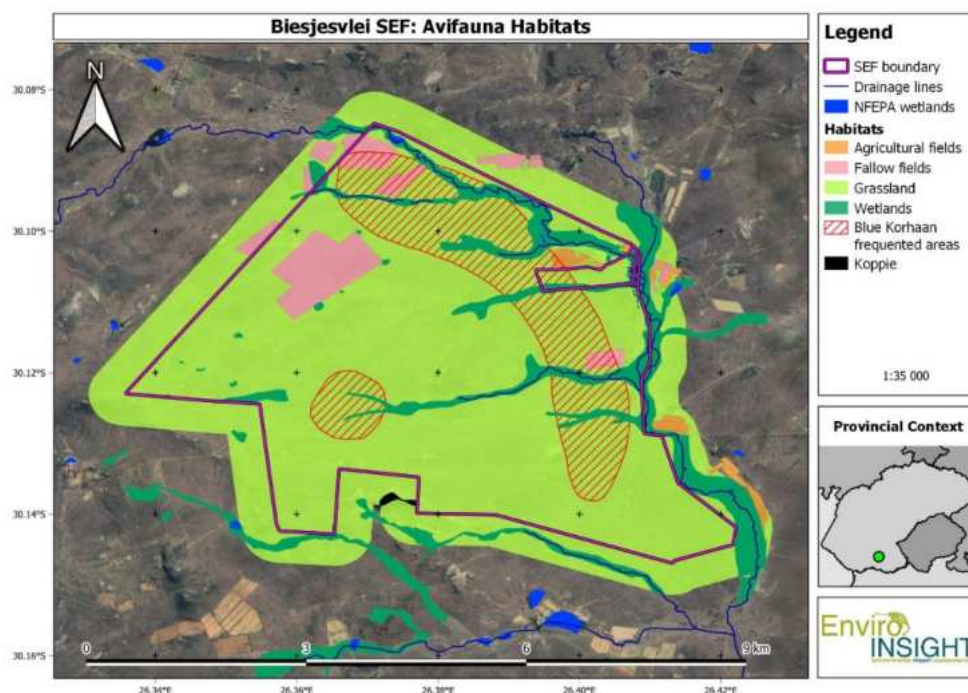


Figure 3.28: Avifauna Habitat Delineation for the Study Area (Source: Enviro Insight, 2024b).

Table 3.6: Delineated Habitats within the Study Area (extracted from Enviro Insight, 2024b).

Habitats	Description
Grassland (Natural and Semi-natural)	The open grassland supports a mix of grassland, wetland and drought-tolerant grass species. An example photograph is shown below. This habitat supports many priority avifauna species expected within the study area such as large terrestrial bird species (Northern Black Korhaan and Blue Korhaan), raptor species such as Black-winged Kite, Cape Vultures (foraging) and Black-chested Snake Eagle, as well as Secretarybird. The natural grasslands act as foraging habitat for diurnal birds of prey. It also provides potential hunting habitat for all Secretarybirds which hunt prey common in these habitats. The Grassland (Natural and Semi-natural) vegetation provides potential nesting habitat for bird species such as small Raptors, Larks, Pipits, Cisticola's and Korhaan and possibly including hunting/foraging habitat for species such as Black Storks, Ludwig's Bustards, Blue Korhaans, Lanner Falcon, Secretarybird and other larger raptors.  Open Grassland

Habitats	Description
Drainage Line and Wetland Infusions	The drainage lines throughout the Project Area of Influence (PAOI) were primarily herbaceous and very wet (almost year-round) with structural differences to the surrounding open grasslands. As expected, these habitats provided significantly different survey results during the wet season, with greater potential for the presence of priority species. In some localised locations, standing water persisted within these habitats during the drier season. Example photographs are shown below. The drainage lines and accompanying grassland vegetation are linear dispersal corridors for terrestrial and wetland associated bird species. A significantly high species density (as well as a unique composition) was observed in this habitat and therefore, these systems are assigned high avifaunal importance. The drainage lines act as important flight corridors for water associates, passerines and raptors between foraging and roosting sites. Blue Korhaan and Black Storks utilise the habitat on the upslopes of drainage lines for foraging. See the Grassland description above for potential nesting habitat and hunting/foraging habitat created by the drainage lines for specific bird species.  Wetland Infusions in Open Grassland  Drainage Lines
Isolated Small Rocky Ridges "Koppies"	The small rocky ridges found in and around the study area differ in size and height, but do not form extensive ridge systems and often form near isolated small "koppies" as is typical of the habitat type (Mucina & Rutherford, 2006¹⁶). A photographic example is shown below.

¹⁶ Mucina, L. & Rutherford, M.C. (eds). (2006, as amended). *The Vegetation of South Africa, Lesotho and Swaziland*. South African National Biodiversity Institute, Pretoria.

Habitats	Description
	Although, no nests were found within the “koppies”, these areas are of high sensitivity as they provide great habitat for different fauna and flora species found within the study area. The Koppies are vital in the landscape, primarily due to their corridor potential and associated breeding habitat. These areas also support scattered large thorn bushes which could be ideal nesting habitat for raptor species such as Secretarybird. Avifaunal species depend on an interconnected system of ridge features and based on seasonality and prevailing climatic conditions, it is anticipated that these systems experience a frequent turnover of species over time (seasonally and long term). They often provide essential breeding habitat, foraging habitat and refuge resources for avifaunal species including large, bodied SCC such as Blue Korhaans, Ludwig’s Bustards and Secretarybirds. The koppies especially provide significant foraging habitat for Verreaux’s Eagle.  Rocky ridges "koppies".
Agricultural Fields and Fallow Lands	The Agricultural Fields and Fallow Lands are mostly disturbed grassland supporting a mix of Increaser Species. This habitat is the second most dominant type for the study area and is considered to be of low sensitivity, although some priority species forage extensively over these habitats. A photographic example is shown below.  Fallow/Agricultural Lands

Following the site inspection and based on local site conditions, the specialists undertook more detailed sensitivity mapping (at the project scale) for the proposed projects which included calculating the Site Ecological Importance (SEI) based on the Species Environmental Assessment Guideline (SANBI, 2020¹⁷). The habitats present in the study area are classified as Low, Medium, or High. Habitats classified as Medium and High SEI will require buffering, minimisation, and restoration mitigation.

¹⁷ South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 3.1. 2022.

Avifaunal importance relates to species diversity, endemism and the presence of topographical features or primary habitat units with the intrinsic ability to sustain avifaunal assemblages, their food supply as well as SCC. It is clear that throughout the study area, most of the habitats are variable in their ability to support a high diversity of general avifaunal species, Red-Listed species and SCC, such as Verreaux's Eagle, Lanner Falcon, Blue Crane, Secretarybird, Ludwig's Bustard, Black Stork, Cape Vulture, Blue Korhaan and Lesser Kestrel. There are some unique geographical or topographical features that are classified as a "No-Go" area with respect to avifauna. Due to the low diversity yet high density of the abovementioned, Red-Listed species recorded during the surveys (including regionally and globally listed Endangered and Vulnerable birds), the region as a whole is considered to be an area of Low, Medium or High avifaunal importance. Therefore, activities should be managed in a holistic manner at a policy level, prioritising avoidance, and minimisation, as well as monitoring of avifaunal SCC.

Based on the above, the following avifauna sensitivities have been identified within the study area (Table 3.7 and Figure 3.29). Figure 3.29 shows the sensitive areas mapped by the avifauna specialist. The sensitivity maps compiled by the Avifauna specialist below and those compiled by the CSIR for the projects are inclusive of the features and associated buffers i.e. buffering is already included in the mapped sensitivities. Additional information is provided in Figure 3.49, Figure 3.50, Figure 3.51, and Figure 3.52 of this Chapter.

Table 3.7: Avifauna sensitivities (extracted from Enviro-Insight, 2024b).

Habitat	SEI	Sensitivity	Buffer
Grassland (Natural and Semi-natural)	Medium	Medium	Not applicable
Drainage Line and Wetland Infusions	High	High	100 m (i.e. 50 m on either side)
Isolated Small Rocky Ridges "Koppies"	High	High	150 m
Agricultural Fields and Fallow Fields	Low	Low	Not applicable
Blue Korhaan Frequented Areas	Medium	Medium	Not applicable

Overall, the 3 060-ha study area is confirmed to be low to high sensitivity (Figure 3.29), and the findings of the Screening Tool are agreed with.

VulPro submitted comments during the 30-day comment periods on the Draft Scoping Reports and Draft EIA Reports, regarding the presence of a temporary Cape Vulture power line roost on existing transmission and distribution power line infrastructure within the study area (i.e. at an existing pylon on the Eskom Beta Delphi 400 kV Transmission Power Line), in the vicinity of the proposed Biesjesvlei LILO tie-in. The tracking data and input from VulPro for the period from mid-February 2020 to May 2024 conveys that five (5) different tracked Cape Vultures have chosen on five (5) different occasions to roost overnight at this existing pylon on the Eskom Beta Delphi 400 kV power line. A 100 m buffer around this pylon (as recommended by the avifauna specialist) is indicated in the integrated sensitivity mapping by the CSIR in this Final EIA Report. Refer to Figure 3.49, Figure 3.50, Figure 3.51, and Figure 3.52 of this Chapter for such maps, as well as project specific maps in Chapter 20 of this EIA Report, and the relevant EMPs (Appendix J to O). Maps are also included in Appendix D of this Final EIA Report. Note that this 100 m buffer only applies to the Biesjesvlei MTS and LILO (Project 10),

which is the subject of a separate report. This pylon is more than 100 m from the closest proposed Biesjesvlei LILO point for the project.

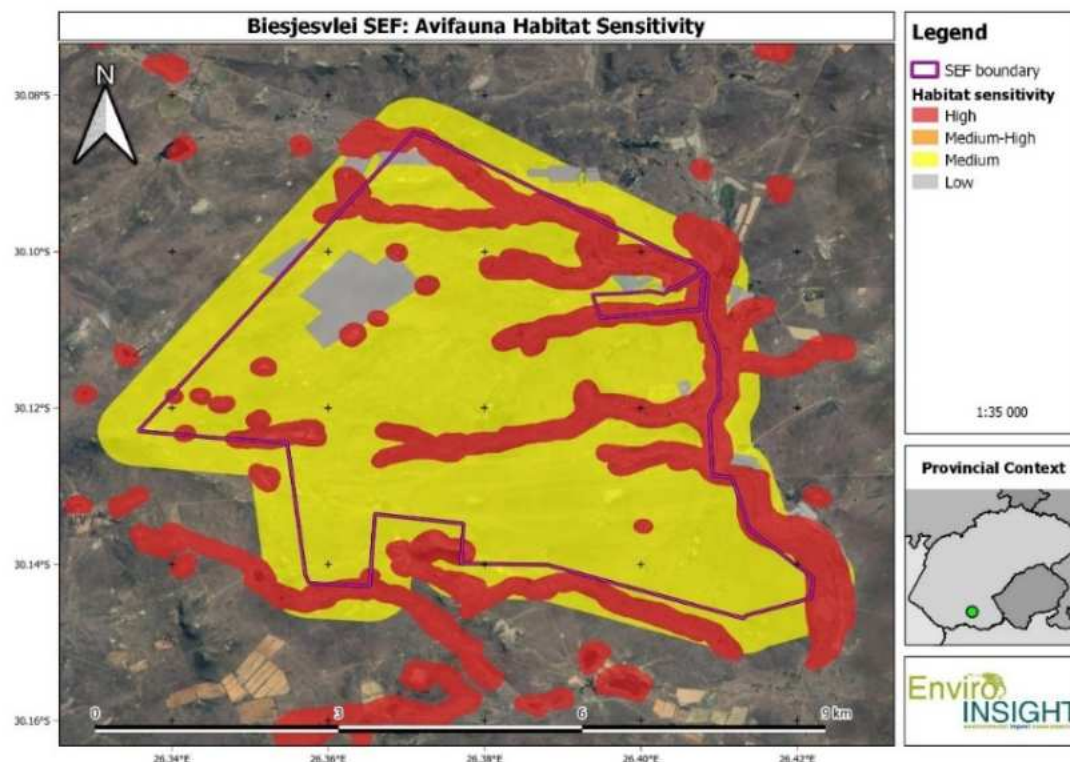


Figure 3.29: Avifauna sensitivity and layout map for the study area (Source: Enviro-Insight, 2024b).

The information presented in the sections below is project specific.

▪ Project 1 - Biesjesvlei PV1

The avifauna sensitivity and layout map for the proposed PV project is shown in Figure 3.30.

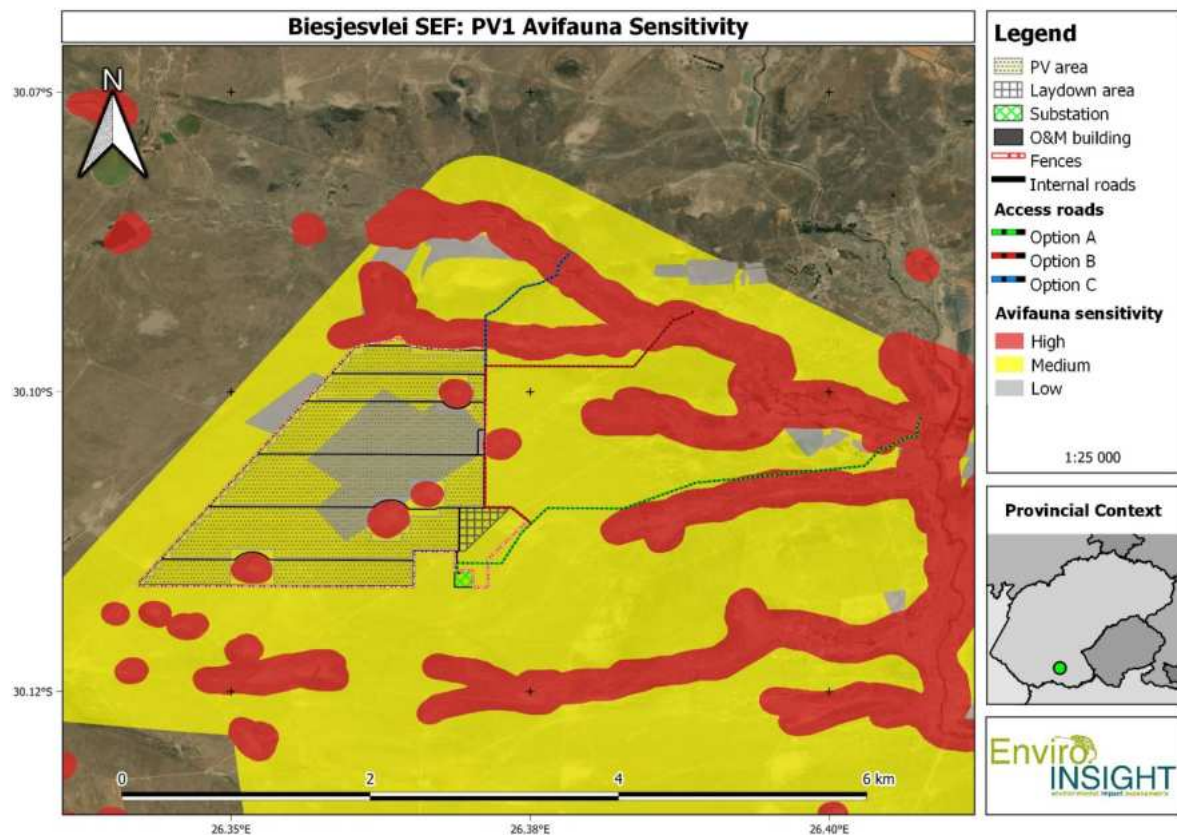


Figure 3.30: Avifauna sensitivity and layout map for Biesjesvlei PV1 (Project 1) (Source: Enviro-Insight, 2024b).

The following is concluded for the Avifauna SSV for the proposed PV project:

- Overall, the footprint of **Biesjesvlei PV1 (Project 1)** is confirmed to be Medium sensitivity due to Grassland habitat, High sensitivity due to Drainage line/Wetland habitat associated with the access road (which is not a fatal flaw), and Low sensitivity due to Agricultural Fields and Fallow Lands (Figure 3.30).

Project 4 - Biesjesvlei BESS 1

The avifauna sensitivity and layout map for the proposed BESS project is shown in Figure 3.31.

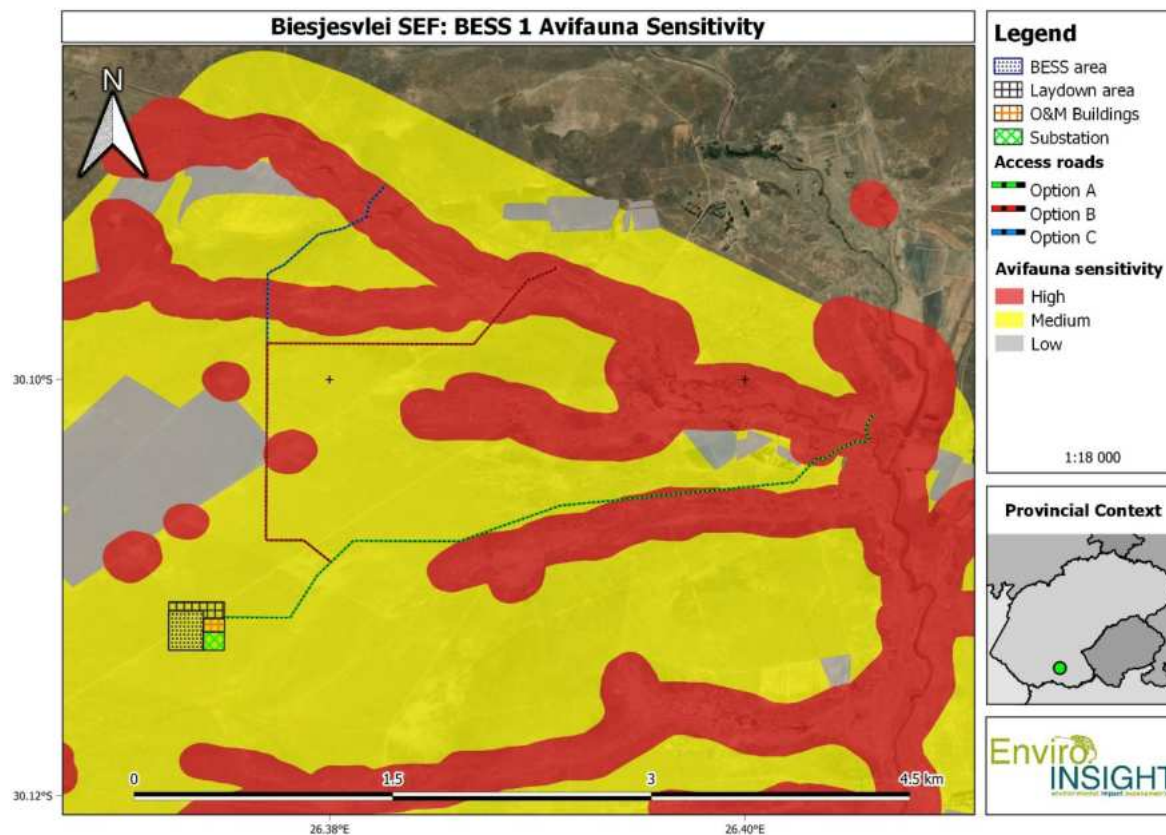


Figure 3.31: Avifauna sensitivity and layout map for Biesjesvlei BESS 1 (Project 4) (Source: Enviro-Insight, 2024b).

The following is concluded for the Avifauna SSV for the proposed BESS project:

- Overall, the footprint of **Biesjesvlei BESS 1 (Project 4)** is confirmed to be Medium sensitivity due to Grassland habitat and High sensitivity due to Drainage line/Wetland habitat associated with the access road (which is not a fatal flaw) (Figure 3.31).

▪ **Project 7 - Biesjesvlei EGI 1**

The avifauna sensitivity and layout map for the proposed EGI project is shown in Figure 3.32.

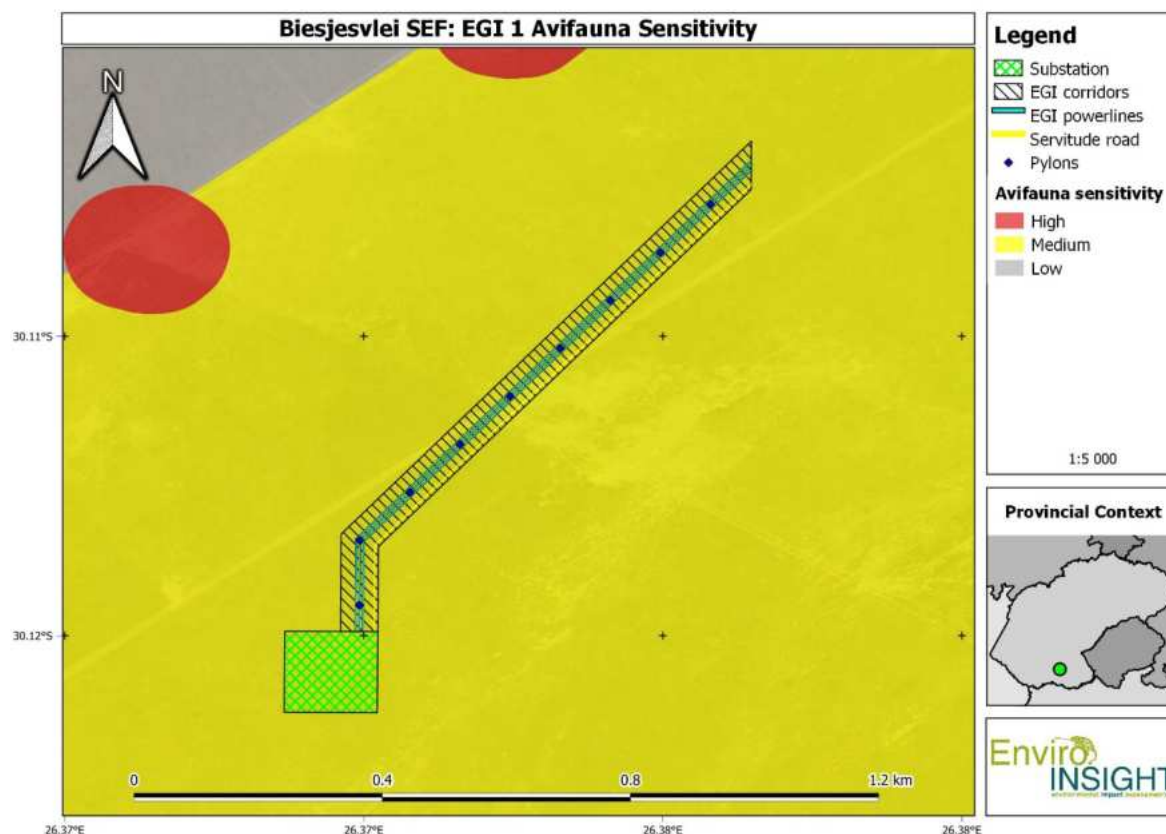


Figure 3.32: Avifauna sensitivity and layout map for Biesjesvlei EGI 1 (Project 7) (Source: Enviro-Insight, 2024b).

The following is concluded for the Avifauna SSV for the proposed EGI project:

- Overall, the footprint of **Biesjesvlei EGI 1 (Project 7)** is confirmed to be Medium sensitivity due to Grassland habitat (Figure 3.32).

3.2.10 Visual Aspects and Sensitive Receptors

The information described below is based on the Visual Impact Assessment and SSV provided by the Visual Specialist (Oberholzer and Lawson, 2024¹⁸), which is included in Appendix E.5 of this EIA Report.

3.2.10.1 General Context

The visual assessment provides information on landscape, terrain, and vegetation, as well as other aspects such as land use and sensitive receptors. The SSV was undertaken using the following means:

- Desktop analysis, using 1:50 000 topographic series maps and Google Earth satellite imagery;
- On-site inspection; and
- Reference to various databases, including the SAPAD.

The site inspection indicated that the study area has a pleasing rural farming character within a natural setting typical of the Free State with its broad horizons, plains and koppies. The trees characteristically include avenues of Lombardy poplars, valley cottonwoods, gums, pines, cypresses and weeping willow. An existing Eskom power line (Beta - Delphi) traverses the eastern portion of the proposed study area, which can be seen as an existing visual distraction.

3.2.10.2 Screening Tool Descriptions and Site Sensitivity Verification

The Screening Tool Report indicated the following sensitivities for the Landscape Solar Theme for the entire study area:

- Very High sensitivity: Mountain tops and high ridges;
- Very High sensitivity: Slope more than 1:4;
- Very High sensitivity: Within 250 m of a river;
- High sensitivity: Slope between 1:4 and 1:10;
- High sensitivity: Within 500 m of a river; and
- Medium sensitivity: Within 1000 m of a wetland.

The information presented in the sections below is project specific.

▪ Project 1 - Biesjesvlei PV1

The Screening Tool Report map for the Landscape Solar Theme for the proposed solar PV project is shown in Figure 3.33. The footprint is largely low sensitivity, with only the southwestern extent slightly encroaching on reported mountain tops and ridges.

¹⁸ Oberholzer, B. and Lawson, Q. (2024). Visual Impact Assessment for the proposed Biesjesvlei PV, Biesjesvlei BESS and Biesjesvlei EGI development (Report 1). Appendix E.5 of the EIA Report.

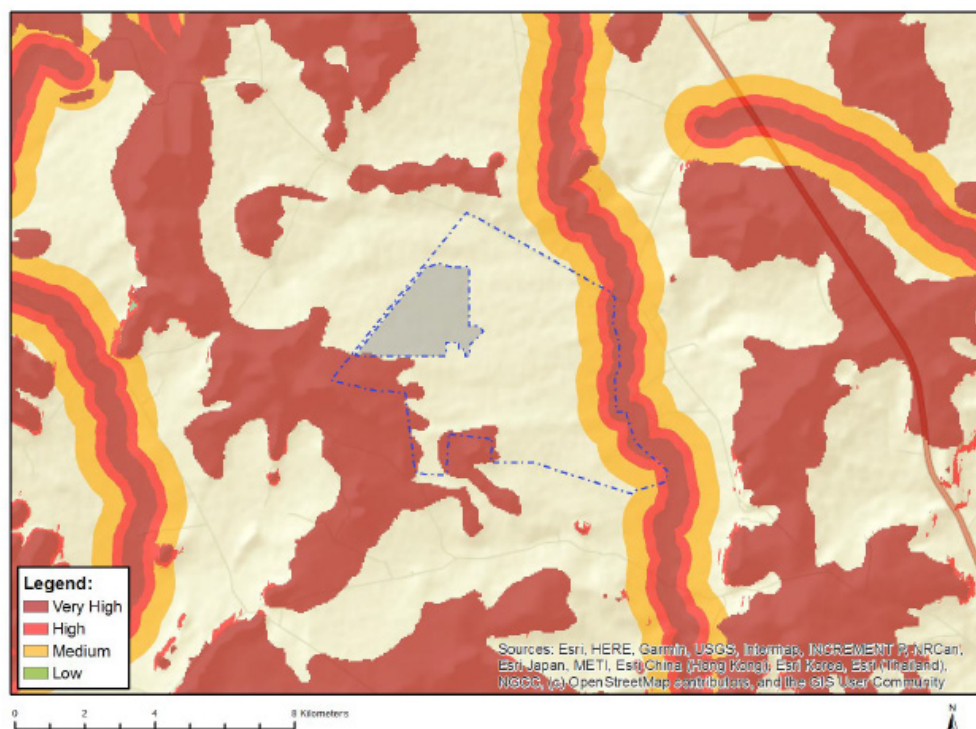


Figure 3.33: Potential Landscape (Solar) Combined Sensitivity of the study area and footprint of Biesjesvlei PV1 (Project 1) based on the Screening Tool (Source: Screening Tool, 2024).

The Screening Tool findings were refined based on more detailed project-scale mapping of landscape features. A more accurate map of landscape features along with the application of the recommended visual sensitivity buffers, has been prepared following more detailed visual sensitivity mapping (at the local project scale) undertaken by the specialists, taking into account detailed viewshed mapping and local site conditions (Figure 3.34).

According to Oberholzer and Lawson (2024), the viewshed, or zone of visual influence, potentially extends for some 5 km but is partly restricted by the koppies to the south and west, where parts of the surrounding area are in a view shadow.

Scenic resources and sensitive receptors within the study area have been categorised into no-go (very high), high, medium, and low visual sensitivity zones, for the proposed solar PV facility (Biesjesvlei PV1), as indicated in Table 3.9 below (based on the categories in Table 3.8). The buffers in Table 3.9 are based on those for landscape resources in the National Wind and Solar SEA (Lawson and Oberholzer, 2014¹⁹). The visual sensitivity mapping categories are spatially indicated in Figure 3.34.

No significant landscape or scenic features would be affected by the currently proposed Biesjesvlei PV1 (Project 1). The proposed solar PV borders on a local district road with only “medium” visual sensitivity. The nearest group of farmsteads, Kleinbadfontein (Benoni), and Biesjespoort are

¹⁹ Lawson, Q. and Oberholzer, B. 2014. National Wind and Solar PV SEA Specialist Report: Landscape Assessment, with CSIR for Department of Environmental Affairs.

owned/occupied by landowners that are part of the project, and Erfdeel is in a low-lying dip surrounded by trees and would not be visually affected. The proposed solar PV project would be well outside the buffers for these farmsteads. Overall, the footprint of Biesjesvlei PV1 is confirmed to be low sensitivity, with some medium sensitivity in the north.

Table 3.8: Visual Sensitivity Categories (extracted from Oberholzer and Lawson, 2024).

No Go	Areas or features considered of such sensitivity or importance that any adverse effects upon them may be regarded as a fatal flaw.
High	Development to be limited and remain within acceptable limits of change determined by the specialist and comply with restrictions or mitigation measures identified by the specialist.
Medium	Areas considered to be developable, but to remain within acceptable limits of change as determined by the specialist and comply with restrictions or mitigation measures identified by the specialist.
Low	Low sensitivity areas that are considered to be developable. However, specialists may still wish to define acceptable limits of change where necessary.

Table 3.9: Visual Sensitivity Mapping Categories for the Proposed PV facility (extracted from Oberholzer and Lawson, 2024).

Scenic Resources	Very high sensitivity (No-go)	High visual sensitivity	Medium visual sensitivity	Low visual sensitivity
Topographic features	Feature	Within 250 m	-	-
Steep slopes	Slopes > 1:4	Slopes > 1:10	-	-
Drainage courses	Within 50 m	Within 100 m	-	-
Cultural landscapes/ cropland	within 250 m	within 500 m	-	-
Protected Landscapes / Sensitive Receptors				
Farmsteads outside site	within 500 m	within 1 km	within 2 km	-
Farmsteads inside site	within 250 m	within 500 m	-	-
Main district roads	within 100 m	within 250 m	within 500 m	-
Minor district roads	within 50 m	within 100 m	within 250 m	-

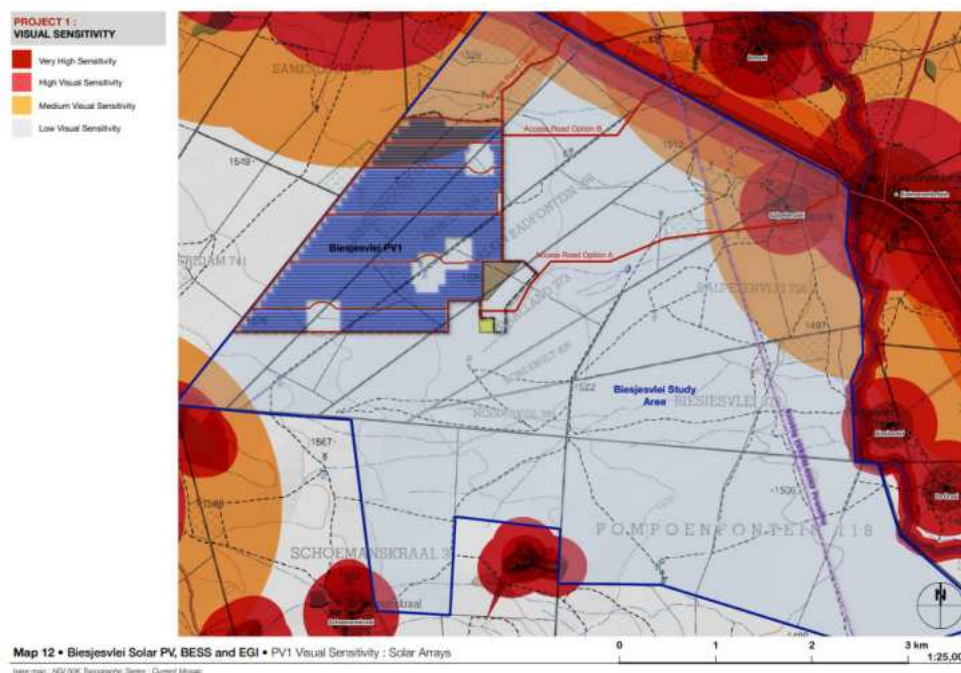


Figure 3.34: Map of sensitive receptors and their associated visual sensitivity buffers for the proposed PV facility and associated infrastructure following the SSV and detailed mapping (Source: Oberholzer and Lawson, 2024).

▪ Project 4 - Biesjesvlei BESS 1

The Screening Tool does not include a Landscape Theme Sensitivity map for the proposed BESS project. Following the site inspection and based on detailed viewshed mapping and local site conditions, the specialists undertook detailed visual sensitivity mapping (at the project scale) for the proposed Biesjesvlei BESS 1 (Project 4).

Scenic resources and sensitive receptors within the study area have been categorised into no-go (very high), high, medium, and low visual sensitivity zones, for the proposed BESS facility (Biesjesvlei BESS 1), as indicated in Table 3.10 (based on the categories in Table 3.8). The visual sensitivity mapping categories are spatially indicated in Figure 3.35.

No significant landscape or scenic features would be affected by the currently proposed Biesjesvlei BESS 1 (Project 4). The proposed BESS is well outside the buffers of farmsteads and district roads. Overall, the footprint of Biesjesvlei BESS 1 is confirmed to be low sensitivity.

Table 3.10: Visual Sensitivity Mapping Categories for the Proposed BESS Facility
(extracted from Oberholzer and Lawson, 2024).

Scenic Resources	Very high sensitivity (No-go)	High visual sensitivity	Medium visual sensitivity	Low visual sensitivity
Topographic features	Within 50 m	Within 100 m	-	-
Steep slopes	Slopes > 1:4	Slopes > 1:10	-	-
Drainage courses	Within 50 m	Within 100 m	-	-
Cultural landscapes/ cropland	Refer to HIA	-	-	-
Protected Landscapes / Sensitive Receptors				
Farmsteads outside site	within 250 m	within 500 m	within 1 km	-
Farmsteads inside site	within 150 m	within 250 m	within 500 m	-
Main district roads	within 100 m	within 200 m	within 300 m	-
Minor district roads	within 30 m	within 60 m	within 100 m	-

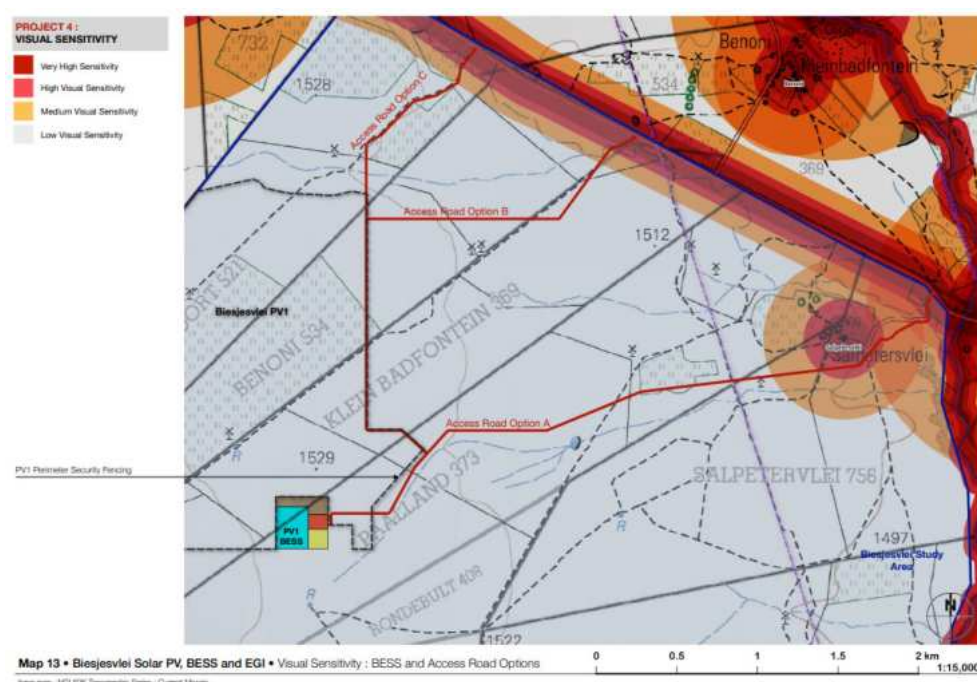


Figure 3.35: Map of sensitive receptors and their associated visual sensitivity buffers for the proposed BESS and associated infrastructure following the SSV and detailed mapping
(Source: Oberholzer and Lawson, 2024).

▪ Project 7 - Biesjesvlei EGI 1

The Screening Tool does not include a Landscape Theme Sensitivity map for the proposed EGI project. Following the site inspection and based on detailed viewshed mapping and local site conditions, the specialists undertook detailed visual sensitivity mapping (at the project scale) for the proposed Biesjesvlei EGI 1 (Project 7).

Scenic resources and sensitive receptors within the study area have been categorised into no-go (very high), high, medium, and low visual sensitivity zones, for the proposed EGI (Biesjesvlei EGI 1), as indicated in Table 3.11 (based on the categories in Table 3.8). The visual sensitivity mapping categories are spatially indicated in Figure 3.36.

No significant landscape or scenic features would be affected by the currently proposed Biesjesvlei EGI 1 (Project 7). The proposed switching station and EGI are well outside the buffers of farmsteads and district roads. Overall, the footprint of Biesjesvlei EGI 1 is confirmed to be low sensitivity.

Table 3.11: Visual Sensitivity Mapping Categories for the Proposed Switching Station and EGI (extracted from Oberholzer and Lawson, 2024).

Scenic Resources	Very high sensitivity (No-go)	High visual sensitivity	Medium visual sensitivity	Low visual sensitivity
Topographic features	Feature	Within 100 m	-	-
Steep slopes	-	Slopes > 1:4	-	-
Drainage courses	Feature	Within 50 m	-	-
Cultural landscapes/ cropland	Refer to HIA	-	-	-
Protected Landscapes / Sensitive Receptors				
Farmsteads outside site	within 200 m	within 400 m	within 800 m	-
Farmsteads inside site	within 100 m	within 200 m	within 400 m	-
Main district roads	within 100 m	within 150 m	within 250 m	-
Minor district roads	within 50 m	within 100 m	within 150 m	-

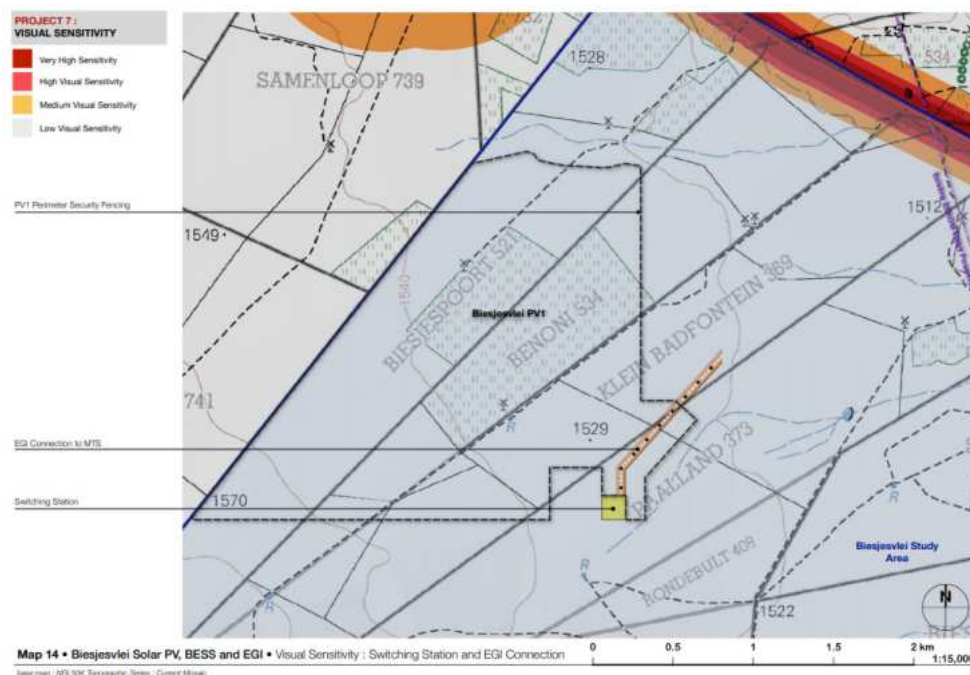


Figure 3.36: Map of sensitive receptors and their associated visual sensitivity buffers for the proposed switching station and power line and associated infrastructure following the SSV and detailed mapping (Source: Oberholzer and Lawson, 2024).

3.2.11 Heritage: Archaeology and Cultural Landscape

A detailed description of the archaeological features and cultural landscape within the study area is provided in the Heritage Impact Assessment (Archaeology and Cultural Landscape), that was completed in the EIA Phase, and included in Appendix E.6 of the EIA Report. A summary of the key findings of Heritage Impact Assessment is also included in Chapter 11 of the EIA Report.

The information described below is based on the Heritage Impact Assessment and SSV provided by the Heritage Specialist (ASHA Consulting, 2024²⁰), which are included in Appendix E.6 of this EIA Report.

3.2.11.1 General Context

Initial work was carried out using satellite aerial photography in combination with the specialist's accumulated knowledge of the local landscape. This was used to determine whether any obviously sensitive areas were present and that needed to be targeted during the survey. The subsequent fieldwork undertaken in November 2022 and October 2023 served to ground truth the study area, including areas identified as potentially sensitive. Due to limitations during the original survey (large parts of the site were flooded), a return visit was made to check a few more areas and fill in gaps in the survey coverage. Desktop research using maps, historical aerial photography, published literature and commercial reports was also used to inform on the heritage context of the area.

A number of heritage resources were identified within the study area. Table 3.12 lists those heritage resources recorded by the specialist during the survey that have been allocated a **very high** and **high** sensitivity. Refer to the Heritage Impact Assessment in Appendix E.6 of this EIA Report for a full version of this table, including all heritage resources identified.

Table 3.12: List of heritage resources recorded during the survey with a very high and high sensitivity (extracted from ASHA Consulting, 2024).

Waypoint	Location	Description	Significance Grade	Sensitivity	Avoided by Project Layout?
318	S30 08 02.6 E26 26 40.8	A tiny rock shelter occurs under the lower end of a boulder on a sandstone ridge. There are a few hornfels artefacts in and around the shelter but there are many more on the talus slope. Also one CCS flake. Two upper grindstone/hammerstones occur in the right side of the shelter (facing in) and a lightly used lower grindstone (face up) lies on the floor on the left side. Above the lower grindstone is a small red-painted, left-facing eland torso. There is some stone walling around the dripline of the shelter.	High IIIB	Very high	Avoided
319	S30 07 58.0 E26 26 47.7	Artefact scatter on the talus slope in front of a rock wall with a slight overhang. Nothing under the overhang but quite extensive low-moderate density scatter on the talus. Includes a side-endscraper, an endscraper and a sidescraper. There are a few weathered and patinated artefacts and also a dolerite hammerstone.	Medium GPA	High	Avoided
320	S30 07 56.9 E26 26 49.1	Stone walling on the crest of the sandstone ridge has been used to make a small enclosure about 5 m across between boulders and also extending from it is another wall about 17 m long extending	High IIIB	Very high	Avoided

²⁰ ASHA Consulting (2024). Heritage Impact Assessment for the proposed Biesjesvlei PV, Biesjesvlei BESS and Biesjesvlei EGI development (Report 1). Appendix E.6 of the EIA Report.

Waypoint	Location	Description	Significance Grade	Sensitivity	Avoided by Project Layout?
		towards the northeast (historical). There is a dense artefact scatter (LSA) to the east of the enclosure.			
324	S30 07 37.0 E26 26 43.1	A 4 m diameter circular stone-walled structure occupies the entire summit of a small dolerite koppie. There is a narrow entrance in the southern side. The walling is about 0.5 m high at most. The site is almost certainly defensive and offers a good view across the plains to the north. It may well relate to the Anglo-Boer War. No historical artefacts were seen in or around it but one weathered and patinated hornfels flake was inside the structure.	High IIIB	Very high	Avoided
325	S30 07 32.0 E26 24 48.4	Biesjesvlei Farmstead. The main house and surrounding outbuildings could not be accessed due to perimeter security and visibility was highly limited by large numbers of mature trees. Nevertheless, there were indications that historic structures are present. Outside the security fence was a barn that is largely of stone but there are multiple phases of building work. The oldest is a dressed stone wall made with mud mortar. This is along the base of part of the barn and also a wall that protrudes towards the north. Then there is a dressed stone wall with older, gritty grey cement. This also forms part of the lower section of walling. Above these is dressed stonework with modern cement. Above that is modern red brick and cement with a new metal roof. Some labourers' cottages to the east are modern. 1957 aerial photograph appears to show the main house and one outbuilding to its southeast.	High ---	Very high	Avoided
326	S30 06 17.1 E26 24 54.3	A stone kraal that looks to be in good condition and measures about 28 m by 20 m. Not visited, recorded from the road and aerial photography.	High IIIB	Very high	Avoided
327	S30 06 16.1 E26 24 49.2	In this area there are a number of ruins, and it is evident that this was quite a large farm complex that has been abandoned and fallen apart. The topographic map indicates its name as Kleinsevenfontein. Most buildings are of stone, but a brick house lies on the high ground. At least two stone kraals are present over and above that at waypoint 326. The grade is for precautionary reasons, since there may very well be graves in the area.	High IIIA	Very high	Avoided
328	S30 06 26.0 E26 24 56.3	A stone-walled ruin of indeterminate function. Not visited, recorded from the road and aerial photography.	Medium GPA	High	Avoided
329	S30 09 02.0 E26 26 30.8	The De Put and Boomplaas farmsteads appear as one spatially, but with widely spaced buildings. Not visited, recorded from the road and aerial photography. There is a stone-walled graveyard close to the road and several 19 th century houses are visible further away. More than 2 km from the edge of the study area.	High ---	Very high	Avoided
334	S30 08 22.1 E26 23 17.5	Stone-walled kraal with four rooms. Some are not kraal enclosures but rather other farm-related rooms built onto the kraal. The whole structure measures 25 m north-south by 22 m west-east.	Medium GPA	High	Avoided
342	S30 06 16.9 E26 24 06.5	An early 20 th century farmhouse, called Salpetersvlei, with most of its joinery and most internal walls removed. Some door openings have been bricked closed. It has unique gables with red-painted plaster detailing that are similar to typical 1920s-1930s gables but the house also has bay windows characteristic of the Victorian period. The front door is still present and there is a toilet at the back. The rear bay window has been broken down and a vehicle entrance inserted. The house is now used as a shed. The walls show a coarse, brownish cement mix in between the bricks and a finer, greyer cement plaster on the outside indicating less cement used within the walls to reduce costs. The roof is corrugated iron.	Medium ---	High	Avoided
343	S30 06 11.7 E26 23 59.4	Two ruined houses and a small, rectangular cement reservoir that lies mostly above ground. The ruins are of stones, bricks and mud but some cement plaster has been used for repairs in a few places.	Medium GPA	High	Avoided

Waypoint	Location	Description	Significance Grade	Sensitivity	Avoided by Project Layout?
		Some walls are almost entirely gone while others are better preserved. There is a full height muurkas in one wall.			
345	S30 06 17.9 E26 24 03.7	A set of nine graves aligned east-west. They are all covered with stone slabs, but some are quite small stones. Most have small standing headstones but only one is a formal carved stone indicating dates of birth and death as 1824 and 1891 respectively on its west-facing side.	High IIIA	Very high	Avoided
348	S30 09 19.4 E26 23 38.1	The Montagu farm complex. It includes an early 20 th century house (owner said it was built in 1918) and a stone barn built with mud mortar between the stones and some cement just inserted on the outside part of the joints.	High ---	Very high	Avoided
355	S30 08 16.1 E26 22 16.3	A dense scatter of LSA hornfels artefacts located in the saddle between a tiny rocky koppie and a large rocky hill. The scatter includes cores, flakes, bladelets and scrapers.	Medium GPA	High	Avoided
356	S30 05 15.5 E26 22 41.6	A stone-walled kraal at the base of a hill. Not visited but recorded from the road.	Medium GPA	High	Avoided
031	S30 07 56.1 E26 26 48.1	Rock shelter ±2m high and 5m wide. Two finger-painted rock art images in dark red pigment. The first is a horizontal line across a small step; the other is circular. The circular one is faded on the bottom half. There were 3 broken flakes in the shelter.	Medium GPA	High	Avoided
032	S30 08 24.2 E26 23 11.1	Low stone enclosure that is partially collapsed and measures about 4 m by 3 m. Southeast wall is mostly intact and there is an opening to the east. There was some old rusty barbed wire inside but no other associated artefacts.	Medium GPA	High	Avoided
1634	S30 07 27.4 E26 23 17.5	A stone-walled kraal measuring about 12 m north to south by 7 m west to east and with a 3 m by 4 m enclosure attached to the southern end of the eastern side.	Medium GPA	High	Avoided
1635	S30 07 26.0 E26 23 16.7	A small, overgrown stone feature that might be about 2 m or 3 m across. Its shape could not be determined due to the grass and bush cover.	Medium GPA	High	Avoided
1636	S30 07 26.1 E26 23 16.5	An overgrown stone feature of indeterminate function. The main part of it is L-shaped but there might be other walling as well.	Medium GPA	High	Avoided
1637	S30 07 25.7 E26 23 16.7	This seems as though it might have been a stone-walled house. It measures 6 m north to south and 4 m west to east. No further details could be gleaned from the remaining stones. There may be an ash and rubbish dump in the area, but nothing was visible in the long grass.	Medium GPA	High	Avoided
1638	S30 07 25.3 E26 23 16.5	A small, overgrown stone feature that might be about 2 m across. Its shape could not be determined due to the grass and bush cover.	Medium GPA	High	Avoided
1643	S30 06 18.4 E26 23 56.4	A small cemetery with presumably three graves. One grave has a formal marble headstone with a date of death of 1925. The other two graves are just sandstone grave surrounds with hollows in the middle. It is unclear whether these are actually graves or else were prepared for children and never used, or even were used but then their fills collapsed.	Very high IIIA	Very high	Avoided
D1	S30 08 35.4 E26 21 16.5	Historical farm complex that appears to be derelict today. It was not visited. The image below dates from 1973.	Medium GPA	High	Avoided
D2	S30 07 51.9 E26 25 08.0	De Draai farmstead, still occupied. Not visited. Assumed to be of high cultural significance. House is probably early 20 th century. 1957 aerial photography seems to show the same features as today at the farmstead but the labourers' cottage to the southwest (D3) are not readily visible.	High ---	Very high	Avoided
D3	S30 07 57.5 E26 25 01.4	Three labourers' cottages but the southeastern one is obviously modern. Not visited and assumed to be of at least medium significance.	Medium ---	High	Avoided

3.2.11.2 Screening Tool Descriptions and Site Sensitivity Verification

Note that separate Screening Tool Reports were generated for the study area for each project. However, the maps for the Archaeological and Cultural Heritage Theme in the separate Screening Tool Reports were identical in terms of sensitivity for the study area and footprints.

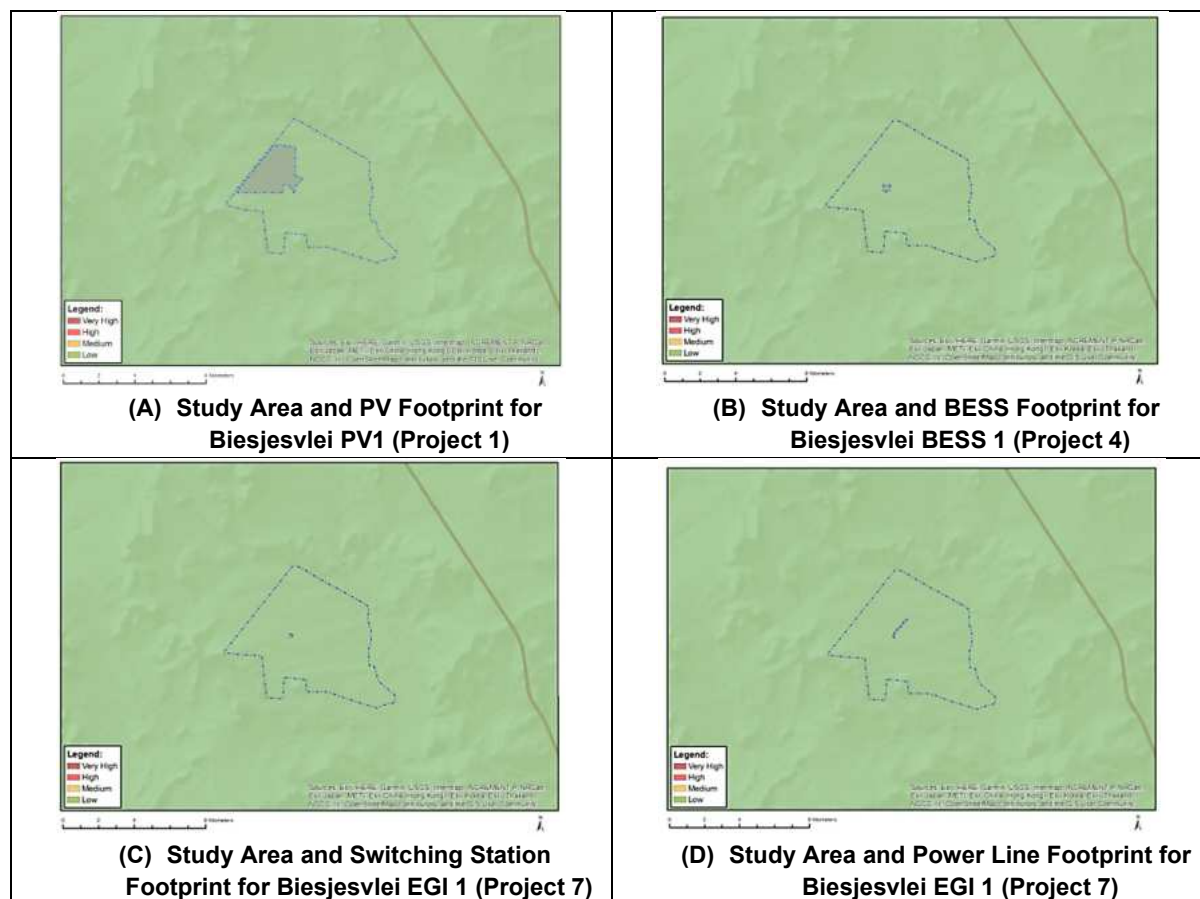


Figure 3.37: Archaeology and Cultural Heritage Sensitivity of the study area and project footprints based on the Screening Tool (Source: Screening Tool, 2024).

Based on the Screening Tool (Figure 3.37), the entire study area is low sensitivity for the Archaeological and Cultural Heritage Theme.

The site visit by the specialist showed that the majority of the wider study area is of low sensitivity, but several small pockets (where heritage resources were found) were considered to be of medium to very high sensitivity. The heritage specialist thus notes that although higher sensitivity areas are missing from the Screening Tool sensitivity map which is therefore disputed, the land included in the project footprints is indeed of low sensitivity as reflected by the Screening Tool. Refer to Figure 3.38, 3.39 and 3.40 below for a spatial distribution of these higher sensitivity areas for the proposed PV facility, BESS, and EGI, respectively.

The information presented in the sections below is project specific.

Project 1 - Biesjesvlei PV1

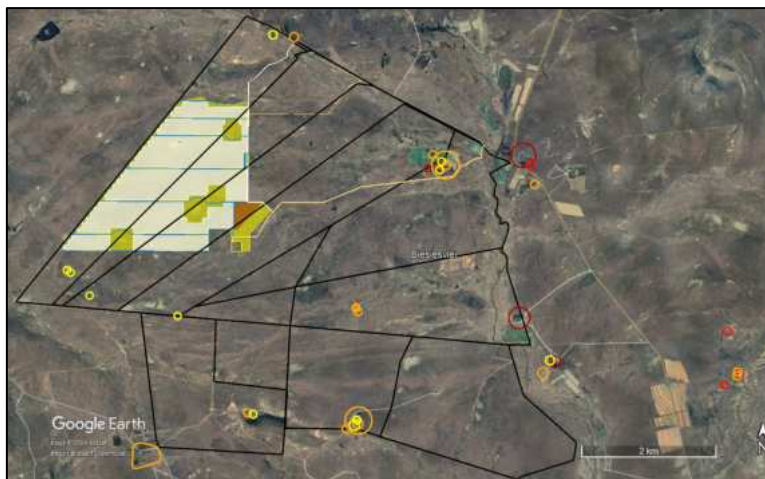


Figure 3.38: Map showing the locations of all heritage resources recorded in the study area and footprint for the proposed PV facility where Dark red = Grade IIIA/very high cultural significance – Very High sensitivity, Red = Grade IIIB/high cultural significance – Very High sensitivity, Orange = Grade GPA/medium cultural significance – High sensitivity, Yellow = Grade GPB/low cultural significance – Medium sensitivity. (Source: ASHA Consulting, 2024).

Project 4 - Biesjesvlei BESS 1

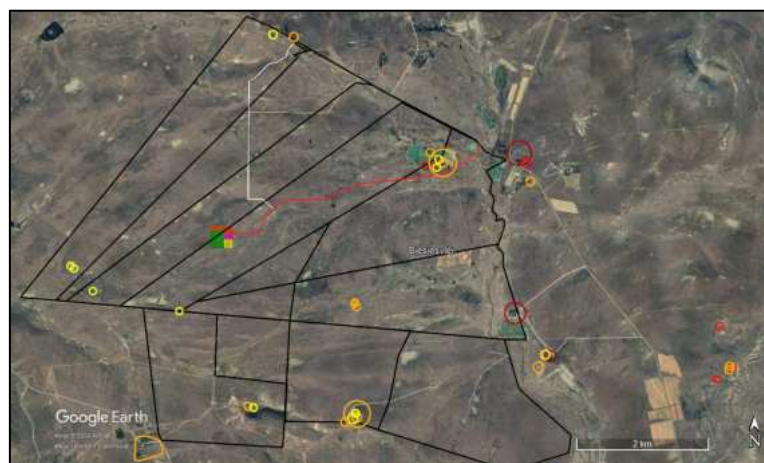


Figure 3.39: Map showing the locations of all heritage resources recorded in the study area and footprint for the proposed BESS where Dark red = Grade IIIA/very high cultural significance – Very High sensitivity, Red = Grade IIIB/high cultural significance – Very High sensitivity, Orange = Grade GPA/medium cultural significance – High sensitivity, Yellow = Grade GPB/low cultural significance – Medium sensitivity. Note that the project access road through the cultural landscape buffer in the northeast is of no concern. The buffer is for the construction of above ground infrastructure (Source: ASHA Consulting, 2024).

▪ **Project 7 - Biesjesvlei EGI 1**

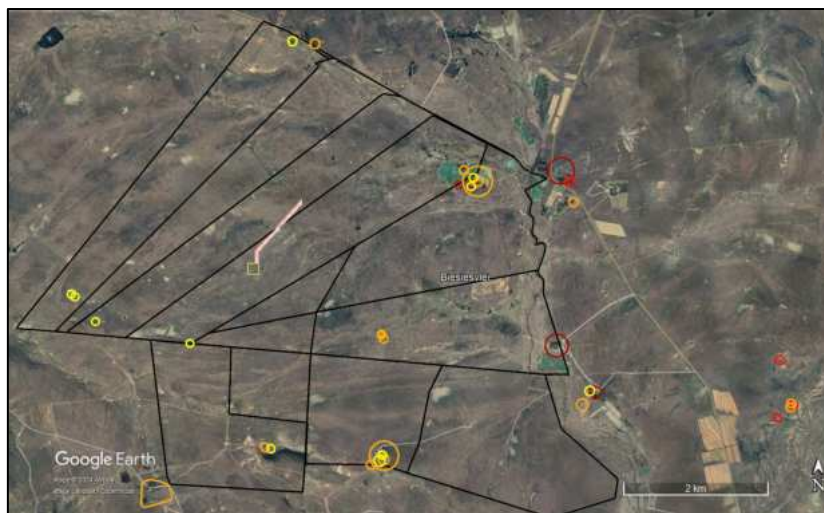


Figure 3.40: Map showing the locations of all heritage resources recorded in the study area and footprint for the proposed EGI where Dark red = Grade IIIA/very high cultural significance – Very High sensitivity, Red = Grade IIIB/high cultural significance – Very High sensitivity, Orange = Grade GPA/medium cultural significance – High sensitivity, Yellow = Grade GPB/low cultural significance – Medium sensitivity. (Source: ASHA Consulting, 2024).

3.2.12 Palaeontology

The information described below is based on the SSV provided by the Palaeontologist (Almond, 2024²¹), which is included in Appendix E.7 of this EIA Report. One combined SSV was compiled for Projects 1 to 10. Therefore, the information presented below, applies equally to all the projects forming part of the Biesjesvlei development.

The study area largely comprises undulating, grassy terrain with a few low ridges and koppies of sandstone and dolerite along or outside its margins, particularly towards the south. The area is underlain at depth by fluvial sediments of the Katberg Formation or equivalents (i.e., Tarkastad Subgroup / Upper Beaufort Group, Karoo Supergroup) which are characterised by fossil biotas of the *Lystrosaurus declivis* Assemblage Zone of Early Triassic age. However, within the study area, these Triassic bedrocks are very rarely seen and are locally baked by dolerite intrusions which may have compromised fossil preservation. Very limited Katberg sandstone exposures occur along the course of the Skulpspruit but no fossils have been recorded within them.

The great majority of the study area is mantled by alluvium, soils and thin surface gravels of Quaternary age which are largely or entirely unfossiliferous. A few occurrences of disarticulated, subfossil mammalian bones and teeth plus rarer freshwater crabs and mussel shells are recorded within alluvial sediments exposed along the banks of the Skulpspruit. These subfossils are of limited scientific interest, of widespread occurrence and almost all lie outside the study area itself;

²¹ Almond, J. (2024). Palaeontology SSV for the proposed Biesjesvlei PV, Biesjesvlei BESS and Biesjesvlei EGI development (Report 1). Appendix E.7 of the EIA Report.

According to the Screening Tool, the study area ranges from Medium to Very High palaeontological sensitivity (Figure 3.41).



Therefore, the study area is of Low to Very Low palaeosensitivity.

3.3 Socio-Economic Environment

The available data used to compile the socio-economic baseline for the MLM, XDM, and Smithfield area, although not exhaustive, is interpreted in terms of professional opinion and is indicative of generally accepted trends within the Free State Province and the broader South Africa.

The information described below is based on CSIR's review of Census data sourced from Statistics South Africa, as well as, where relevant, the Socio-Economic Assessment (SLR Consulting, 2024²²), as well as a review of various planning documents such as IDPs and SDFs that were available at the time of compiling the Scoping Reports and Draft EIA Reports.

3.3.1 Regional Context – Xhariep District Municipality

The XDM is situated in the southern portion of the Free State and is the largest district in the province. The XDM covers an area of 34 250 km² and is made up of three local municipalities which include Letsemeng, Kopanong, and Mohokare.

3.3.1.1 Demographics and Economic Profile

According to the Statistics South Africa (StatsSA) Provincial Profile Free State Community Survey of 2016 (StatsSA, 2016²³), the XDM had a population of 121 945 in 2011 (Table 3.13), which subsequently increased to 125 884 in 2016 (StatsSA, 2016). Of the XDM's total population in 2016, the largest (63.8%) age category was the working age group (15-59 years), followed by the 0-14 age category (26.2%) with the smallest age category (9.7%) being 60 years and over (StatsSA, 2016). In terms of race groups, Black Africans made up 76.2% of the population in the XDM, followed by Coloureds (14%), Whites (9.7%), and Indians/Asians (0.1%) (StatsSA, 2016). The main languages spoken in 2016 was Sesotho (39.7%) followed by Afrikaans (38.4%), isiXhosa (16.4%), Setswana (3.6%) and English (1.2%) (StatsSA, 2016).

Table 3.13: Total population of the XDM, MLM, Free State, and National for the period 2011 – 2016 (Sources: StatsSA 2016).

Region →	XDM	MLM	Free State	National Total	MLM as a % of the DM	MLM as a % of the province	MLM as a % of national
Year ↓							
2011	121 945	34 146	2 745 590	51 770 561	28%	1.24%	0.066%
2016	125 884	35 840	2 834 714	55 653 653	28.47%	1.26%	0.064%

²² SLR Consulting (2024). Socio-Economic Specialist Report for the proposed Biesjesvlei PV and Biesjesvlei BESS.

²³ Statistics South Africa Community Survey (2016). Provincial Profile: Free State Community Survey 2016. Report 03-01-12. [online]. Available at: <https://cs2016.statssa.gov.za/wp-content/uploads/2018/07/FreeState.pdf>. Accessed: December 2023.

With a Gross Domestic Product (GDP) of R 7.86 billion in 2017 (up from R 3.68 billion in 2007), the XDM contributed 3.36% to the Free State Province GDP of R 234 billion in 2017 (XDM IDP, 2022²⁴). The Community Services sector was the largest economic sector in 2017 within the XDM, at R 2.2 billion of the total Gross Value Added (GVA) (XDM IDP, 2022). The agricultural sector (primary) was the second largest economic sector in the XDM, accounting for 16% of the GVA in 2017, followed by the mining sector (primary) with 13.2% of the GVA in 2017 (XDM IDP, 2022).

3.3.1.2 Social Characteristics

Unemployment and inequality remain a challenge within the XDM (XDM IDP, 2022). The district had an unemployment rate of 35.3% in 2019 (XDM, 2019²⁵) which was higher than South Africa's national unemployment rate of 29.1% in Quarter 4 of 2019 (StatsSA, 2019²⁶). The district also experiences an average increase of 4.23% in the number of unemployed people annually and the working age population has been decreasing at an average annual rate of -0.56% since 2009 (StatsSA, 2019).

Based on the 2011 Census data, the majority of households in the XDM (26%) earned an average income of up to R19 600 per annum, whereas 11% of households in the XDM had no income and 5% of households earned an average income of up to R4 800 per annum (StatsSA, 2011a²⁷). The average annual income earned by households in the XDM was R 61 390 which is lower than the average annual income earned by household in the Free State (R75 315) (StatsSA, 2011a). The COVID-19 pandemic likely impacted income levels and increased the number of households in the XDM that live close to or below the poverty line.

According to the XDM (2019), 83.2% of households in the XDM lived in formal dwellings in 2019, whereas 10.1% of these households lived in informal dwellings. Approximately 3.8% of the households lived in back yard dwellings, which is slightly lower than the average of 5.9% for the Free State and 1% of the households were living in a townhouse which is slightly higher than the average for the Free State and South Africa.

²⁴ Xhariep District Municipality (2022). Xhariep District Municipality Integrated Development Plan 2022. Available at: <http://www.dspace.fs.gov.za/xmlui/bitstream/handle/123456789/182/Xhariep%20DM.pdf?sequence=1&isAllowed=y>. [online]. Accessed: December 2023.

²⁵ Xhariep District Municipality (2019). Xhariep District Municipality Profile and Analysis District Development Model. [online]. Available at: https://www.cogta.gov.za/cgta_2016/wp-content/uploads/2023/11/District_Profile_Xhariep.pdf. Accessed: December 2023.

²⁶ Statistics South Africa (2019). Quarterly Labour Force Survey Quarter 4:2019. Statistical release P0211. [online]. Available at: <https://www.statssa.gov.za/publications/P0211/P02114thQuarter2019.pdf>. Accessed: December 2023.

²⁷ Statistics South Africa (2011a). Statistics South Africa Provincial Profile: Free State Census 2011. Report No. 03-01-73. [online]. Available at: <https://www.statssa.gov.za/publications/Report-03-01-73/Report-03-01-732011.pdf>. Accessed: December 2023.

3.3.2 Local Context – Mohokare Local Municipality

The MLM is the southernmost Local Municipality within the XDM making up 23.2% or 8 785 km² of its geographical area (MLM SDF, 2023²⁸). The MLM derives its name from Sesotho meaning “Caledon River”, which runs through the municipality. The MLM comprises three towns, i.e., Rouxville, Smithfield, and Zastron with Zastron being the administrative seat of the MLM (MLM SDF, 2023²⁹). Table 3.14 provides an overview of various key statistics for the MLM.

Table 3.14: Key statistics for the MLM for 2016, 2011, and 2001 (StatsSA, 2011b³⁰; MLM IDP, 2023³¹; StatsSA, 2024³²).

KEY STATISTICS	YEAR			
	2001	2011	2016	2022
Total population	36 321	34 146	35 840	36 968
Young (0-14)	31.7%	32.2%	29%	27.7%
Working Age (15-64)	61.4%	61.4%	63.9%	65.2%
Elderly (65+)	5.7%	6.4%	7.1%	7.1%
Dependency ratio	59.8%	62.9	No data	53.4
Gender ratio	104.8	91.5	No data	91.1
Growth rate	0.05%	-0.62%	1.06%	No data
Population density	No data	4 persons/km ²	No data	No data
Unemployment rate	35.9%	31.4%	No data	No data
Youth unemployment rate	47.5%	40%	No data	No data
No schooling aged 20+	25.2%	11%	6.2%*	10.1%
Higher education aged 20+	5.2%	6.1%	4.1%*	8.5%
Matric aged 20+	12.4%	17.9%	19%*	30.3%
Number of households	9 403	10 793	12 387	10 546
Number of Agricultural households	No data	2 423	No data	No data
Average household size	3.5	3.1	2.9	3.5
Female headed households	38.4%	41.9%	44.8%	No data
Formal dwellings	77.9%	86.6%	93.6%	92.3%
Housing owned/paying off	53%	44.3%	52.9%	No data
Flush toilet connected to sewerage	54.4%	70.5%	88.7%	86.6%

²⁸ Mohokare Local Municipality (2023). Mohokare Local Municipality Draft Spatial Development Framework 2023/2024. Available at: [https://www.mohokare.gov.za/documents/townplan/Mohokare%20%20SDF%202023%20-%202024\(1\).pdf](https://www.mohokare.gov.za/documents/townplan/Mohokare%20%20SDF%202023%20-%202024(1).pdf) [online]. Accessed: January 2024.

²⁹ Mohokare Local Municipality (2023). Mohokare Local Municipality Draft Spatial Development Framework 2023/2024. Available at: [https://www.mohokare.gov.za/documents/townplan/Mohokare%20%20SDF%202023%20-%202024\(1\).pdf](https://www.mohokare.gov.za/documents/townplan/Mohokare%20%20SDF%202023%20-%202024(1).pdf) [online]. Accessed: January 2024.

³⁰ StatsSA, 2011b, Mohokare. Available at: https://www.statssa.gov.za/?page_id=993&id=mohokare-municipality [online]. Accessed January 2024.

³¹ Mohokare Local Municipality (2023). Mohokare Local Municipality Final Integrated Development Plan 2023/2024. Available at: [https://www.mohokare.gov.za/documents/idp/FINAL%20IDP%20\(2023\).pdf](https://www.mohokare.gov.za/documents/idp/FINAL%20IDP%20(2023).pdf) [online]. Accessed January 2024.

³² StatsSA. 2024. Census 2022: Stats by Location: Mohokare. Available at: <https://census.statssa.gov.za/#/province/4/2> [online]. Accessed March 2024.

KEY STATISTICS	YEAR			
	2001	2011	2016	2022
Weekly refuse removal	60.5%	63%	75.4%	65.4%
Piped water inside dwelling	17%	37.2%	91.9%	32.2%
Electricity for lighting	72.9%	89.7%	92.4%	93%

* Distribution of population aged 5 years and older by level of education

3.3.2.1 Demographics and Economic Profile

The population of the MLM in 2016 was 35 840, thereby accounting for the smallest share (6%) in the district (StatsSA 2016). In 2022, the population of the MLM increased to 36 968, but still being ranked the smallest population size in the XDM (StatsSA, 2024). Approximately 29% of the population was under the age of 15, approximately 63.9% were between the ages of 15 and 64, and approximately 7.1% were 65 years and older in 2016 (MLM IDP, 2023) (Table 3.14). Based on the 2022 Census, the population distribution changed slightly per age group, with 27.7% being in the young age (0-14); 65.2% being in the working age (15-64); and 7.1% being in the elderly age (65+) (Figure 3.42) (StatsSA, 2024). The MLM therefore has a relatively large young population. This creates challenges in terms of creating employment opportunities.

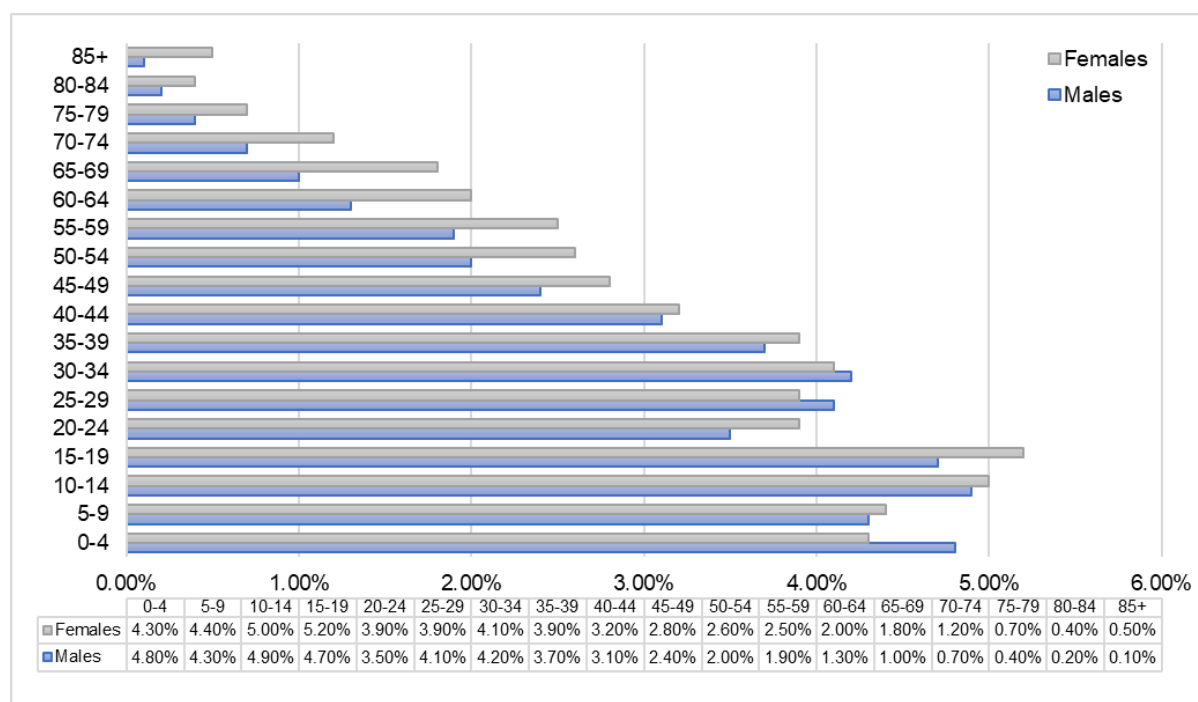


Figure 3.42: Gender and age distributions within the MLM (Redrawn based on StatsSA, 2024).

In terms of race groups, Black Africans made up about 90.8% of the population, followed by Whites (6.5%), Coloureds (2.3%) and Indians/Asians (0.3%) in 2011 (StatsSA, 2011b). In 2011, the main first language spoken in the MLM was Sesotho (63%), followed by IsiXhosa (23.1%) and Afrikaans (8.8%). In 2022, the distribution consisted of 89.7% (Black Africans); 1.9% (Coloureds); 0.3% (Indians/Asians); and 8.0% (Whites) (StatsSA, 2024).

The MLM contributed 28.25% to the XDM GDP in 2017 (XDM IDP, 2022). This is the lowest GDP contribution to the XDM when compared to the remaining two regions within the district. Additionally, the MLM had the highest average annual economic growth at 3.54% between 2007 and 2017 when compared to the remaining regions within the district (XDM IDP, 2022).

3.3.2.2 Education

In terms of the highest education level for all ages in 2011, approximately 4.3% had no schooling, 47.2% had some Primary education, 7.4% completed Primary School, 32.3% had some Secondary education, 6.7% completed Secondary education, and 0.6% had Higher education (StatsSA, 2011b). In terms of highest levels of education (20+ years age group) in 2022, 10.1% had no schooling; 13.0% had some primary education; 5.9% completed primary education; 31.5% had some secondary education; 30.3% completed Grade 12; and 8.5% had Higher education (StatsSA, 2024). The relatively poor education levels in the MLM pose a potential challenge for economic development.

3.3.2.3 Employment and Income

According to the 2011 Census, the MLM had an unemployment rate of 31.4% (StatsSA, 2011b). The figures of the 2011 Census indicate that the majority of the population are not economically active (approximately 8200 people) (Figure 3.43). The unemployment rate for the MLM was lower than the official unemployment rate for the Free State Province (33%) but higher than the unemployment rate for the XDM (27%) for 2011 (StatsSA, 2011c³³). This reflects the limited employment opportunities in the area, which in turn are reflected in the low income and high poverty levels. However, the COVID-19 pandemic is likely to have resulted in an increase in unemployment rates in the MLM. Recent figures released by StatsSA also indicate that South Africa's unemployment rate is in the region of 32%. The youth unemployment rates are closer to 50%.

³³ Statistics South Africa (2011c). Statistics South Africa Census 2011 Municipal Report: Free State. Report No. 03-01-52. [online]. Available at: https://www.statssa.gov.za/census/census_2011/census_products/FS_Municipal_Report.pdf. Accessed: January 2024.

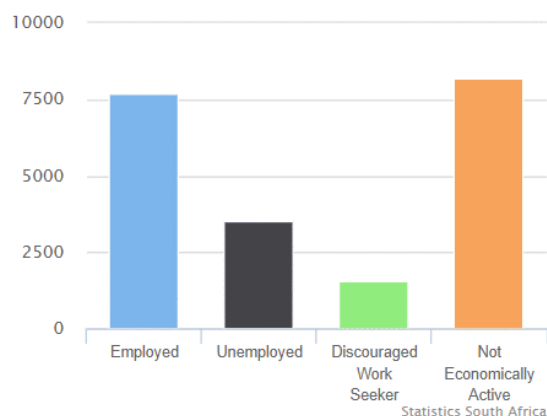


Figure 3.43: Employment status (ages 15 – 64) within the MLM (StatsSA, 2011b).

Based on the data from the 2011 Census, 11% of the population of the MLM had no formal income, 6.1% earned less than R4 800, 10.2% earned between R4 801 and R9 600 per annum, 26.8% earned between R9601 and R19 600 per annum, 21.9% earned between R19 601 and R38 200 per annum, 9.9% earned between R38 201 and R76 400 per annum, 7.2% earned between R76 401 and R153 800 per annum, 4.3% earned between R153 801 and R307 600 per annum, 1.8% earned between R307 601 and R614 400 per annum, 0.5% earned between R614 401 and R 1 228 800 per annum, and 0.2% earned between R 1 228 801 and R 2 457 600 per annum and R 2 457 601 + per annum, respectively (StatsSA, 2011b) (Figure 3.44). According to the Integrated Local Economic Development Plan 2007-2012 for the MLM (MLM, 2015)³⁴, in 2004, Zastron had the highest percentage of people living in poverty (75.2%), followed by Smithfield (68.4%) and Rouxville (49.6%). These figures are considerably higher than the percentage of people living in poverty for the Free State (55%) (Integrated Local Economic Development Plan 2007-2012 for the MLM, 2015). The low-income levels reflect the limited employment opportunities in the area and dependence on the agricultural sector. This is also reflected in the high unemployment rates.

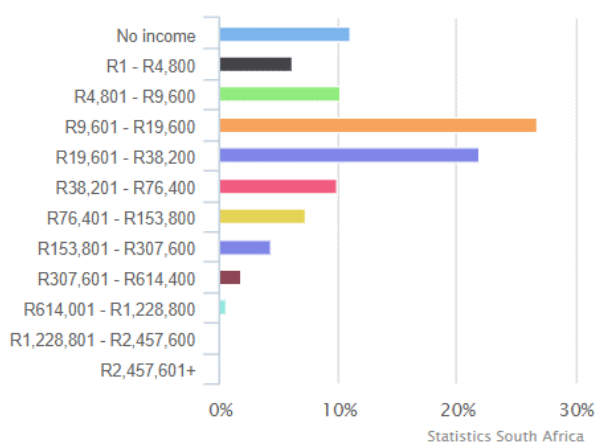


Figure 3.44: Average household income within the MLM (StatsSA, 2011b).

³⁴ Mohokare Local Municipality (2015). Integrated Local Economic Development Plan 2007-2012: Mohokare Local Municipality. [online]. Available at: <https://www.mohokare.gov.za/documents/led/LED%20Plan%2015-11-06.pdf>. Accessed: January 2024.

Household income levels in the MLM are likely to have been impacted by the COVID-19 pandemic. The number of households in the MLM and XDM that live close to or below the poverty line is likely to have increased over the last three years. This, coupled with the high dependency ratio for the MLM, is a major cause of concern for the area. The low-income levels are a major concern given that an increasing number of individuals and households are likely to be dependent on social grants. The low-income levels also result in reduced spending in the local economy and less tax and rates revenue for the MLM. This in turn impacts on the ability of the MLM to maintain and provide services.

The dependency ratio is the ratio of non-economically active dependents (usually people younger than 15 or older than 64) to the working age population group (15 - 64). The dependency ratios for the MLM, XDM, Free State, and national in 2011 was 62.9%, 59%, 52.9%, and 52.7% (StatsSA, 2011b). In 2022, the dependency ratio was reported at 53.4%. The higher dependency ratio of the MLM reflects the limited employment opportunities in the area and represent a significant risk to the district and local municipality. The high dependency ratio also highlights the importance to maximising local employment opportunities and the key role played by training and skills development programmes.

3.3.2.4 Health and Community Services

The XDM is served by four District Hospitals situated in the towns of Jagersfontein (Diamond District Hospital), Zastron (Embekweni District Hospital), Smithfield (Stoffel Coetzee District Hospital) and Trompsburg (Albert Nzula District Hospital) as well as 17 primary healthcare facilities. Healthcare services within the XDM are primarily provided by clinics and mobile clinics with 23 fixed clinics and 18 weekly mobile clinics offered in three municipalities within the XDM (XDM, 2019). Two of the XDM's District Hospitals fall within the MLM, namely, the Embekweni District Hospital in Zastron and the Stoffel Coetzee District Hospital in Smithfield. The MLM also has three fixed clinics, one weekly mobile clinic and six ambulances; however, there are no community health centres within the MLM (MLM, 2023).

In terms of education the XDM has 70 public schools with no private or independent schools. In addition, the XDM was the only District in the province without a college of its own; however, the Motheo Technical Vocational Education and Training (TVET) College has a satellite campus located in the town of Zastron within the MLM (XDM, 2019). The MLM has a total of 12 existing public schools of which six are primary schools, four are secondary schools and two are combined schools, as well as six libraries (MLM, 2023).

3.3.2.5 Municipal Services

Access to basic services generally increased across the MLM from 2001 to 2016. In 2016, the majority of households had access to electricity for lighting (92.4%), piped municipal water supply inside dwelling/yard (91.9%), flush toilets connected to sewerage (88.7%), and refuse removal (75.4%) (Figure 3.45) (MLM IDP, 2023). The MLM had a significant improvement in the supply of piped water to households between 2011 and 2016, with an increase from 37.2% of households having access to piped water in 2011 to 91.9% of households having access to piped water in 2016 as depicted in Figure 3.45 below. In 2022, access to electricity for lighting increased to 93%, piped municipal water supply decreased significantly to 32.2% flush toilets connected to sewerage decreased slightly to 86.6%, and refuse removal decreased to 65.4% (StatsSA, 2024).

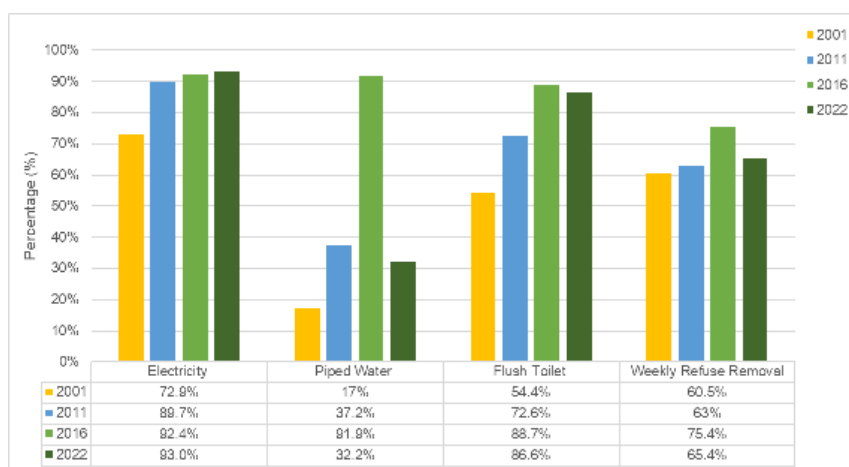


Figure 3.45: Percentage of households with access to basic services within the MLM (Redrawn based on StatsSA, 2011b; MLM IDP, 2023; and StatsSA, 2024).

3.3.3 Study Area Context

The proposed projects are located approximately 15 km northwest of Smithfield within the MLM and XDM. Smithfield was founded in 1848 and is the third oldest town in the Free State Province. The N6 National Road between Smithfield and Reddersburg traverses the area and connects Smithfield to Rouxville. The main agricultural activity within the study area and surrounds is open-range merino sheep farming, along with cattle, horses and limited cropland.

The towns of Zastron and Rouxville are located approximately 71 km and 38 km to the east and southeast of Smithfield, respectively. The East London railway line (from Bethlehem to Aliwal North) runs through Zastron and Rouxville.

The study area is situated within the headwaters of the Orange River which runs along the southern boundary of the MLM and forms the border with the Eastern Cape. The Caledon Nature Reserve is located approximately 54 km to the northeast of Smithfield and the Tussen die Riviere Game Farm is located approximately 63 km to the southwest of Smithfield. Refer to Section 3.2.8 of this chapter which explains that there are no protected areas within the study area.

3.4 Eco-Tourism Activities

There are no known nature reserves, guest farms or tourist facilities in the immediate area of the study area (Oberholzer and Lawson, 2024). However, guest facilities in the surrounding areas includes those in Smithfield, located approximately 12 km to the south-east of the study area; at the Welgeval Farm Stay, located approximately 12 km north of the study area; and the Letsatsi Game Lodge, located approximately 25 km to the south of the study area (SLR Consulting, 2024). It is understood that an accommodation facility is also present on the Farm Vooruitzicht, approximately 3 km away from the N6, towards the north-east of the proposed projects (approximately 5 km away), outside of the study area. The Visual Impact Assessment (Appendix E.5 of this EIA Report) notes that the potential visibility of the proposed projects from the Vooruitzicht farmstead is very low, and that the visibility is screened by werf trees. In addition, Smithfield is regarded as the tourism centre of the MLM with the tourism potential of Smithfield and surrounds being linked to the tourism activities associated with the Smithfield Dam and Golf Course as well as Smithfield's resource and heritage tourism potential (MLM, 2023).

3.5 Civil Aviation

The Screening Tool has indicated that the entire study area is of low sensitivity as it relates to Civil Aviation (Figure 3.46). The low sensitivity was verified during a site visit undertaken in December 2023, whereby no civil aviation features or installations were found within the study area and the development footprints of the proposed projects. A Civil Aviation SSV is included in Appendix E.13 of this EIA Report.

Figure 3.47 indicates the location of the civil aviation features, which informed the SSV. The Landfontein Aerodrome is located approximately 28 km south of the study area, on private land that was inaccessible during the site visit. The Landfontein Aerodrome will not be impacted on by the proposed projects due to its distance from the study area, the height of the proposed project infrastructure, as well as other existing high voltage power lines (extending to 40 m high) in the study area.



Figure 3.46: Civil Aviation (solar PV) sensitivity of the study area based on the Screening Tool (Source: Screening Tool, 2023).

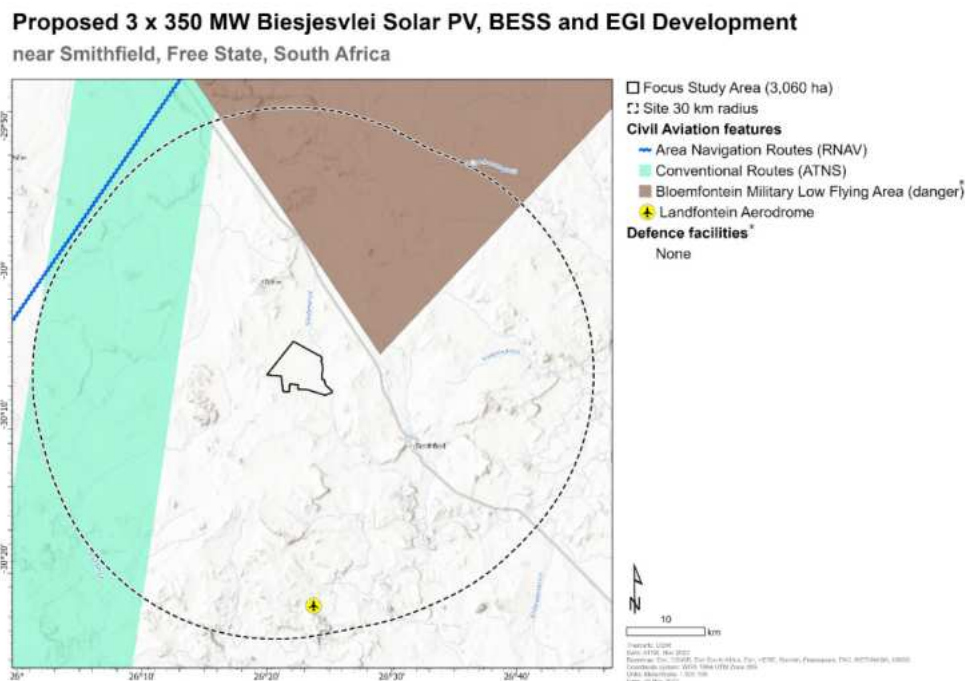


Figure 3.47: Civil Aviation and Defence features relative to the proposed project study area based on the site visit and existing databases.

3.6 Defence

The Screening Tool has indicated that the entire study area is of low sensitivity as it relates to Defence (Figure 3.48). The low sensitivity (as it relates to defence installations) was verified during a site visit undertaken in December 2023, whereby no defence features or installations were found within the study area and development footprints of the proposed projects. A Defence SSV is included in Appendix E.14 of this EIA Report.

Note that Figure 3.48 in Section 3.5 above indicates the location of the Bloemfontein Military Low Flying Area which falls within the 30 km radius of the proposed projects. However, it is important to note that this military low flying area is located 10 km away from the study area. Based on its location, the height of the proposed project infrastructure, as well as other existing high voltage power lines (extending to 40 m high) in the study area, this military low flying area will not be impacted on by the proposed projects.



Figure 3.48: Defence sensitivity of the study area based on the Screening Tool (Source: Screening Tool, 2024).

3.7 Environmental Sensitivity Mapping

Based on the environmental sensitivities identified and verified by the relevant specialists on site (included in the Specialist Assessments and Inputs in Appendix E of this EIA Report), an overall combined environmental features map (Figure 3.49) and overall combined environmental sensitivity map (Figure 3.50) was compiled for the study area for the proposed projects. These maps are based on the worst-case buffers identified in Table 3.15.

The layouts for Projects 1 to 10 have been overlain onto the feature map (Figure 3.51) and sensitivity map (Figure 3.52) to show how they relate to the environmental features and sensitivities (which are mapped with their associated buffers), and how they have been avoided. Project specific maps are included in Chapter 20 of this EIA Report, as well as the relevant Specialist Studies and Inputs (included in Appendix E of this EIA Report) and EMPs (Appendix J to O of this EIA Report). Refer to Appendix D of this EIA Report for additional maps relative to the proposed projects.

The sensitivity map indicates that the inherent environmental sensitivity of the study area for the proposed projects are generally low, medium, and high sensitivity, with some very high sensitivity areas. However, as indicated in Figure 3.52, all no-go areas have been avoided by the key infrastructure associated with the proposed projects. As noted in Table 3.15 below, the specialists explain that linear infrastructure can traverse areas of high and very high sensitivity as adequate mitigation measures have been recommended. The study area is suited for the proposed development based on the understanding that measures have been taken to firstly avoid the

sensitive features as best as possible, and all aspects to manage or mitigate potential impacts have been identified in the EIA Phase.

During the 30-day comment period on the Draft EIA Report, the DFFE Integrated EA Directorate recommended that the sensitivity maps (developed by the CSIR) should not be depicted with background satellite aerial imagery, or that contrasting or distinct colours should be used to distinguish between the map features and the background imagery. In this regard, the feature and sensitivity maps for the study area, as well as the combined layout and sensitivity maps (i.e. project layouts overlain with sensitivities identified) have been updated in this Final EIA Report to improve visualisation.

Furthermore, the DFFE Integrated EA Directorate also commented that buffer zones recommended by the specialists and environmental features should be illustrated on the maps. It is important to note that the sensitivity maps provided in the Draft EIA Report and this Final EIA Report show all identified features and their associated buffers (i.e. the sensitivities mapped are inclusive of the features and their buffers). Clarification is provided in the updated maps below. In addition, Figure 3.51 is a new map showing all features, inclusive of buffers, and the layouts for Projects 1 to 10.

Table 3.15 provides a summary of the environmental sensitivities identified by the relevant specialists.

Table 3.15: Key Environmental Features and Sensitivities identified by relevant Specialists.

Specialist Theme	Sensitivity Description
Agriculture	Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1; Project 4 – Biesjesvlei BESS 1; and Project 7 – Biesjesvlei EGI 1. - The entire study area is confirmed as less than high agricultural sensitivity with a land capability value of 5 to 7. - There are no areas that need to be avoided from an agricultural perspective. - The layout has no relevance to agricultural impact in this case. Croplands towards the north of the study area were purposely avoided by the layout.
Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species	Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1; Project 4 – Biesjesvlei BESS 1; and Project 7 – Biesjesvlei EGI 1. Very High Sensitivity: - The <u>Watercourse habitat</u> is considered as Very High sensitivity and development within these areas must be avoided, with the exception of the expansion of river crossings / access roads, where required, considering the option of lowest impact. It is necessary for linear infrastructure, including power lines and roads (bridge crossings), to traverse watercourses, with mitigation measures adopted. The impacts and avoidance measures have been identified in the EIA Phase (as included in Appendix E.2 of this EIA Report). These Very High sensitivity areas demarcated by the Terrestrial Biodiversity specialist are a no-go for PV panels and BESS placement. - The <u>Koppies habitat</u> is considered Very High sensitivity and must be avoided by development. A 20 m buffer is applicable. Medium Sensitivity: - The <u>Grassland habitat</u> is considered as medium sensitivity, after all sensitive areas above have been avoided and no transformation takes place for PV panels. Some transformation will occur for permanent infrastructure, but this is a small extent of the total development footprint. Additional information is provided below: - Where aquatic buffers overlap grasslands, these need to be considered and excluded from development. - Transformation of the grassland is not supported, but based on the construction methodology which indicates no bulldozing and stripping of topsoil, the PV panels could be considered for development within these regions. There might still be bulldozing in other areas of the proposed projects, like for roads, substation, BESS and laydown area.
Aquatic Biodiversity	Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1; Project 4 – Biesjesvlei BESS 1; and Project 7 – Biesjesvlei EGI 1. Very High Sensitivity: These include the delineated <u>Channelled Valley Bottom (CVB) wetlands</u> with a 19 m buffer zone applied. These areas must be excluded from development activities. Any direct impacts to these systems must be minimised. However, there will be direct unavoidable impacts to these sensitive habitats due to road crossing requirements. It is recommended that appropriate culvert options are investigated and implemented. It is recommended that a single access route over the main CVB wetlands is constructed. No more than one crossing is recommended.

Specialist Theme	Sensitivity Description
	- These include the delineated <u>Unchanneled Valley Bottom (UVB) wetlands</u> with a 19 m buffer zone. These systems must be avoided. Only existing crossings structures can be utilised in these areas. Where these are to be utilised, they must be upgraded with suitable culverts. High Sensitivity: - These include the delineated <u>seep wetlands</u> with a 19 m buffer zone applied. These areas must be excluded from development activities. Although these systems are less sensitive it is recommended that crossing permanently wet areas is restricted. Where access routes are required to cross over seep wetlands, these must make use of multiple culverts. <u>Note:</u> The layouts for the proposed projects avoid the above sensitive areas, however only the main access road traverses the Very High sensitivity areas, however the specialist has noted this is not a no-go or fatal flaw, as adequate mitigation has been recommended.
Avifauna	<u>Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1; Project 4 – Biesjesvlei BESS 1; and Project 7 – Biesjesvlei EGI 1.</u> High Sensitivity: <u>Drainage line and wetland infusions habitat</u> are considered as High sensitivity. A 100 m buffer was applied to these areas (i.e. the sensitivities mapped in the specialist study and EIA Report already include the requisite buffer). These areas must be excluded from development activities. <u>Isolated small rocky ridges “koppies” habitat</u> are considered as High sensitivity with respect to avifauna owing to their corridor potential, associated breeding habitat, foraging habitat and forage and refuge resources for avifaunal species. A 150 m buffer was applied to these areas (i.e. the sensitivities mapped in the specialist study and EIA Report already include the requisite buffer). These areas must be excluded from development activities. <u>The temporary Cape Vulture power line roost on the pylon of the existing Eskom Beta Delphi line (as identified by VulPro) is also depicted on the CSIR feature and sensitivity maps with a 100 m buffer.</u> Medium Sensitivity: <u>Natural and semi-natural grasslands habitat</u> are considered as medium sensitivity with respect to avifauna owing to their potential to provide nesting habitat and possible hunting/foraging habitat. This is not a no-go area. No buffer is recommended. Low Sensitivity: <u>Agricultural fields and fallow fields habitat</u> are considered as low sensitivity with respect to avifauna. <u>Note:</u> The layouts for the proposed projects avoid the above sensitive areas, however only the main access road traverses the high sensitivity areas, however the specialist has noted this is not a no-go or fatal flaw, as adequate mitigation has been recommended.

Specialist Theme	Sensitivity Description		
Visual	Project 1 – Biesjesvlei PV1	Project 4 – Biesjesvlei BESS 1	Project 7 – Biesjesvlei EGI 1
	The following features are assigned Very High sensitivity (i.e. no-go) and need to be avoided for the proposed solar PV facility: <u>Scenic Resources:</u> - Topographic features: Feature. - Steep slopes: Slopes > 1:4. - Drainage courses: Within 50 m. - Cultural landscapes/cropland: Within 250 m. <u>Protected Landscapes / Sensitive Receptors:</u> - Farmsteads outside site: Within 500 m. - Farmsteads inside site: Within 250 m. - Main District roads: Within 100 m. - Minor District roads: Within 50 m. The above no-go areas do not need to be applied for access roads. <u>Note:</u> The layouts for the proposed projects avoid the above sensitive areas.	The following features are assigned Very High sensitivity (i.e. no-go) and need to be avoided for the proposed BESS: <u>Scenic Resources:</u> - Topographic features: Within 50 m. - Steep slopes: Slopes > 1:4. - Drainage courses: Within 50 m. - Cultural landscapes/cropland: Refer to HIA. <u>Protected Landscapes / Sensitive Receptors:</u> - Farmsteads outside site: Within 250 m. - Farmsteads inside site: Within 150 m. - Main District roads: Within 100 m. - Minor District roads: Within 30 m. The above no-go areas do not need to be applied for access roads. <u>Note:</u> The layouts for the proposed projects avoid the above sensitive areas.	The following features are assigned Very High sensitivity (i.e. no-go) and need to be avoided for the proposed EGI: <u>Scenic Resources:</u> - Topographic features: Feature. - Drainage courses: Feature. - Cultural landscapes/cropland: Refer to HIA. <u>Protected Landscapes / Sensitive Receptors:</u> - Farmsteads outside site: Within 200 m. - Farmsteads inside site: Within 100 m. - Main District roads: Within 100 m. - Minor District roads: Within 50 m. The above no-go areas do not need to be applied for access roads. <u>Note:</u> The layouts for the proposed projects avoid the above sensitive areas.
Heritage (Archaeology and Cultural Heritage)	<u>Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1; Project 4 – Biesjesvlei BESS 1; and Project 7 – Biesjesvlei EGI 1.</u> - The following sensitivities were mapped within the study area with relevant buffers: - Dark red = Grade IIIA/very high cultural significance – Very High sensitivity. - Red = Grade IIIB/high cultural significance – Very High sensitivity. - Orange = Grade GPA/medium cultural significance – High sensitivity. - Yellow = Grade GPB/low cultural significance – Medium sensitivity. - The Very High and High sensitivity heritage finds are no-go areas and must be avoided from development. <u>Note:</u> The majority of the site is of low sensitivity but several small pockets (where heritage resources were found) were considered to be of medium to very high sensitivity. All of the sensitivities identified on site have been avoided by the proposed projects. However, the project access road traverses		

Specialist Theme	Sensitivity Description
	through the cultural landscape buffer in the northeast portion of the study area. However, it is important to note that this is of no concern as this cultural landscape buffer is for the construction of above ground infrastructure.
Palaeontology	<u>Note: The information presented below applies equivalently to Projects 1 to 10.</u> There are no areas that need to be avoided from a palaeontological perspective. The site visit undertaken by the specialist concluded that the site is of low to very low palaeosensitivity. No fossils were recorded within the proposed project footprints. Fossil sites were recorded along or just outside the eastern edge of the study area. One fossil site lies >20m away from the project footprint and is protected within a riverine ecological buffer zone for key infrastructure placement. If the site lies within 20m of the finally approved project footprint, it should be sampled under a Fossil Collection Permit from the South African Heritage Resources Agency (SAHRA). This is not a fatal flaw for the development.
Socio-Economic Assessment	<u>Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1 and Project 4 – Biesjesvlei BESS 1.</u> Not applicable. There are no sensitivities of this nature that can be mapped and that would influence the layout of the proposed projects.
Traffic	<u>Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1; and Project 4 – Biesjesvlei BESS 1.</u> Not applicable. There are no sensitivities of this nature that can be mapped and that would influence the layout of the proposed projects.
High-level Safety, Health, and Environment (SHE) Risk Assessment for the BESS	<u>Note: The information presented below only applies to Project 4 – Biesjesvlei BESS 1.</u> - Ideally, the BESS should be placed at least 50 m away from known boreholes, and 100 m away from major surface water features, such as major rivers and wetlands. - Due to the possibility of noxious smoke from potential fires, the lithium-ion BESS should be located over 500 m from isolated farmhouses that are occupied. If this is not possible, advice of mitigative measures should be provided to the farm occupants.
Geohydrology	<u>Note: The information presented below only applies to Project 4 – Biesjesvlei BESS 1.</u> It is recommended that all BESS are placed a minimum of 50 m from any borehole (including existing confirmed boreholes and historic boreholes).
Geotechnical	<u>Note: The information presented below applies equivalently to Projects 1 to 10.</u> It must be noted that there are no areas within the study area that should be avoided from a geotechnical sensitivity perspective. However, areas of moderate to steep topography would likely render development financially unfeasible.
Civil Aviation	No sensitive civil aviation features have been identified within the study area.
Defence	No sensitive defence features have been identified within the study area.

Proposed 3 x 350 MW Biesjesvlei Solar PV, BESS and EGI Development
near Smithfield, Free State, South Africa

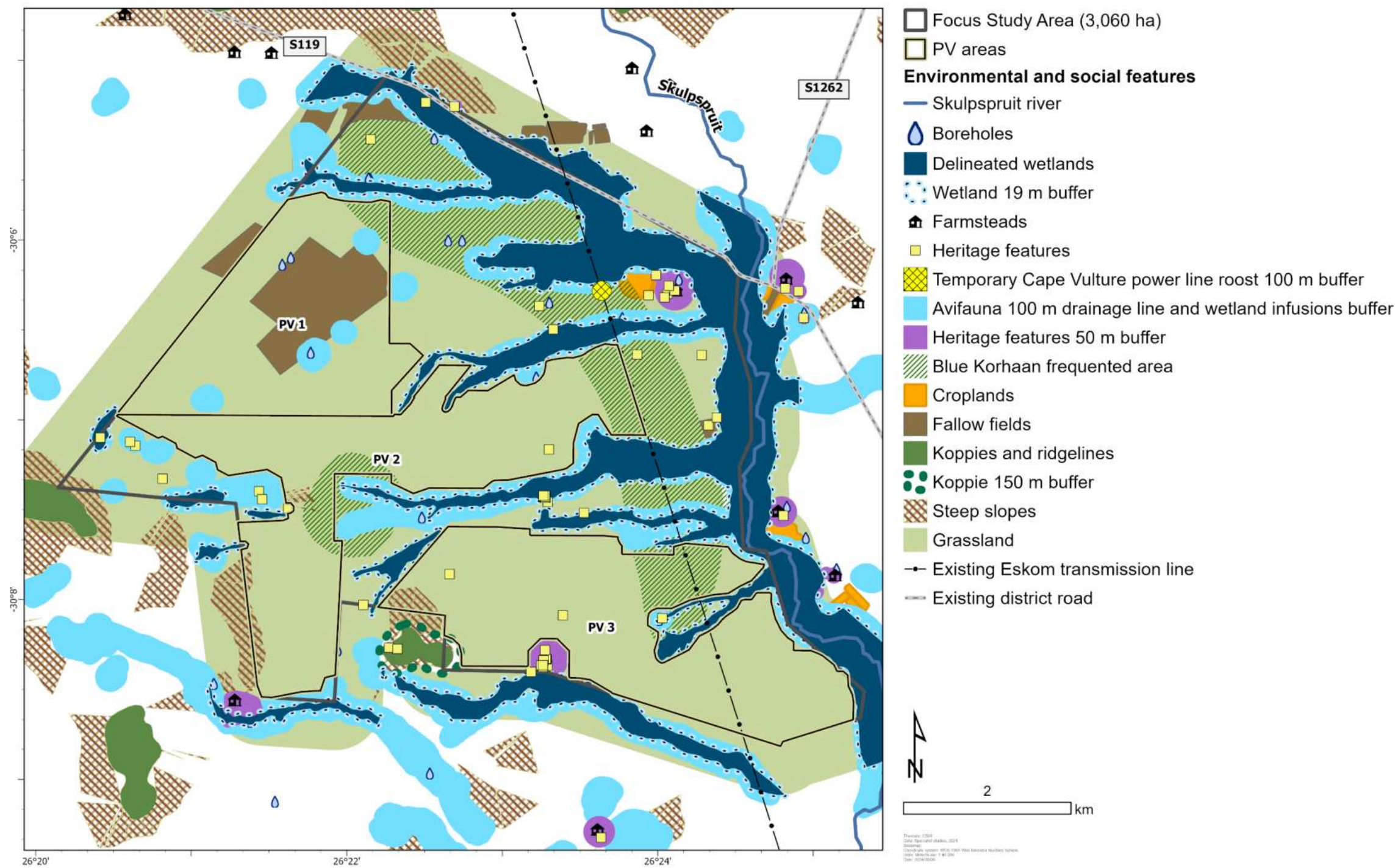


Figure 3.49: Combined environmental feature map for the study area.

Proposed 3 x 350 MW Biesjesvlei Solar PV, BESS and EGI Development
near Smithfield, Free State, South Africa

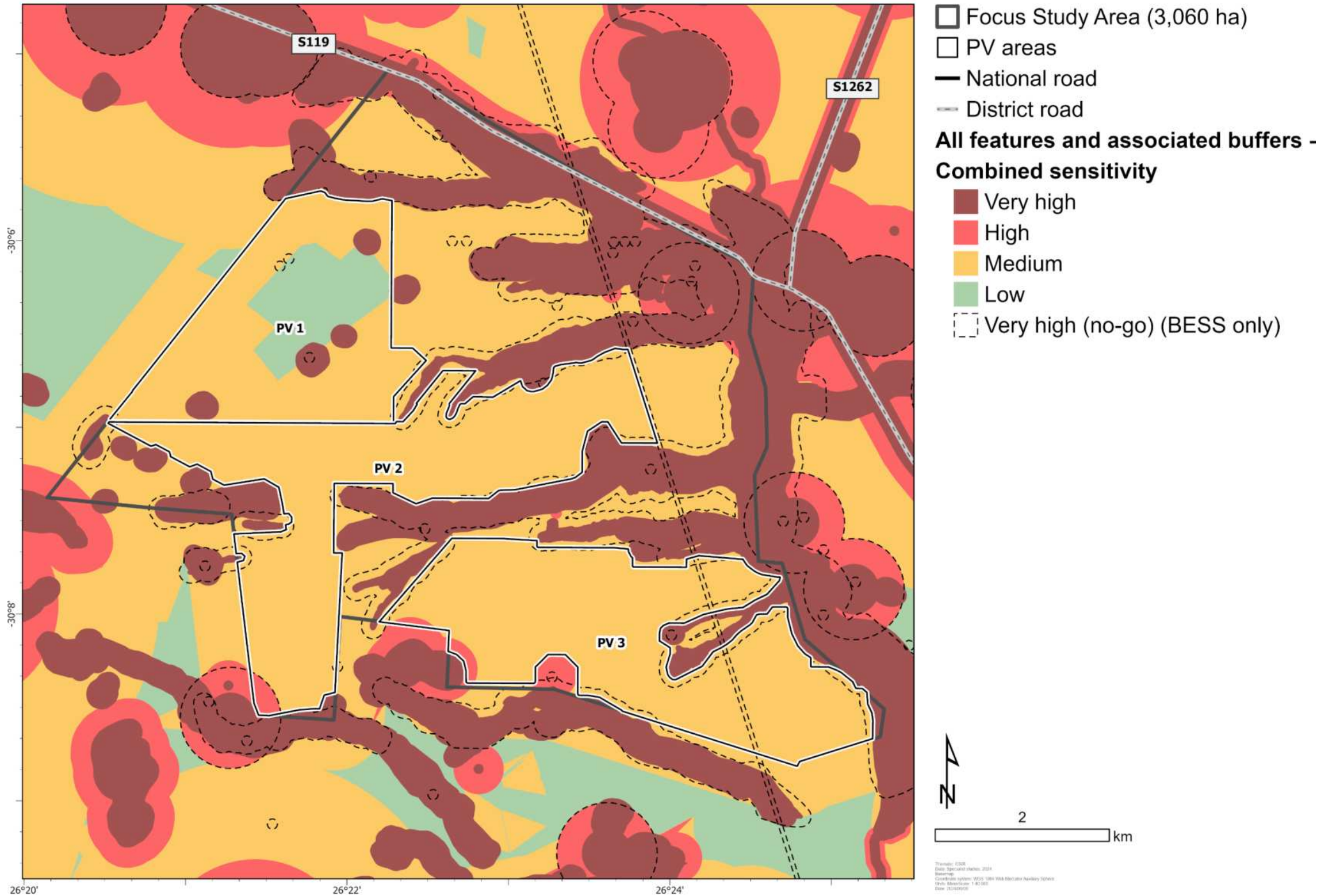
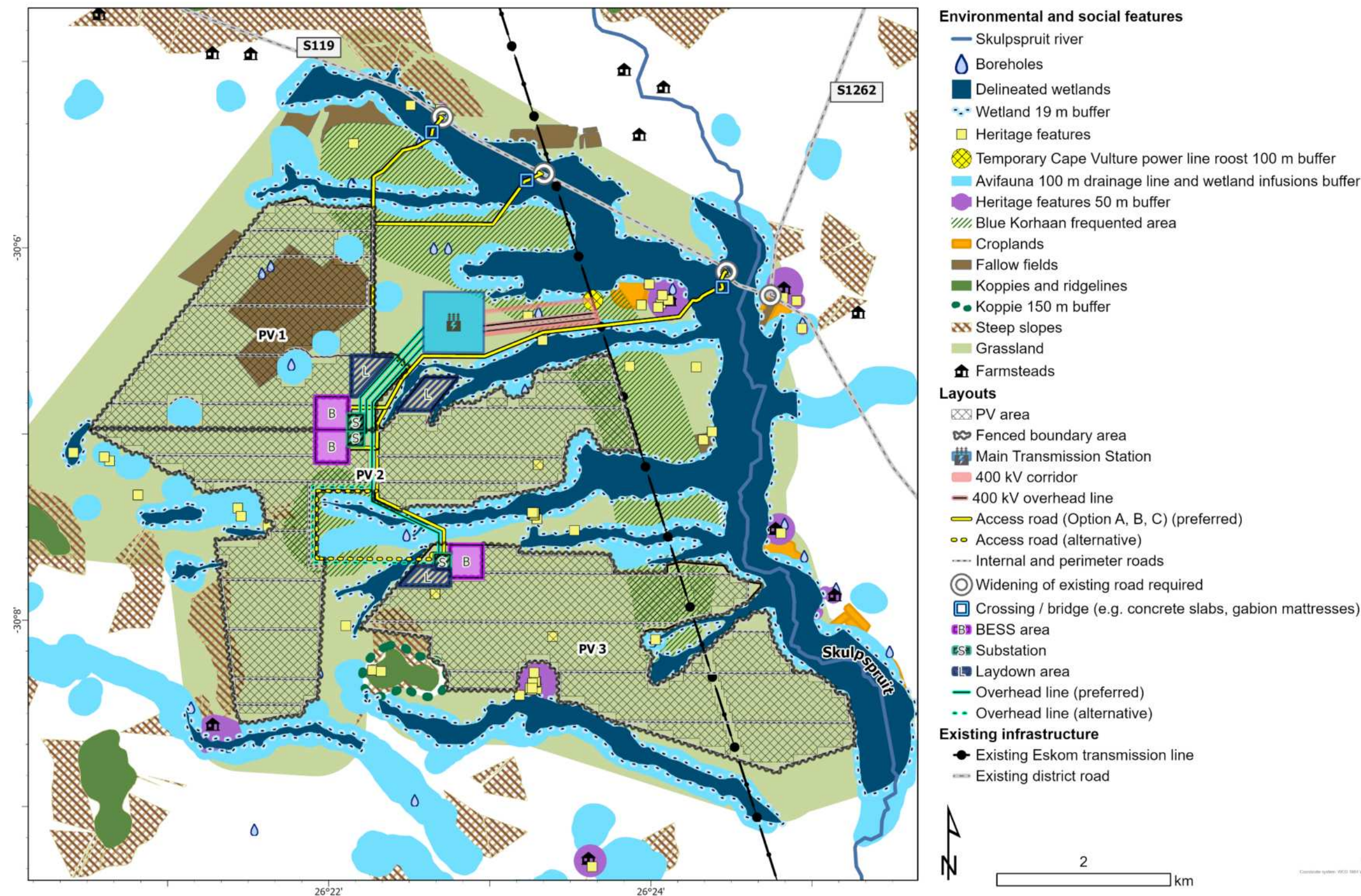
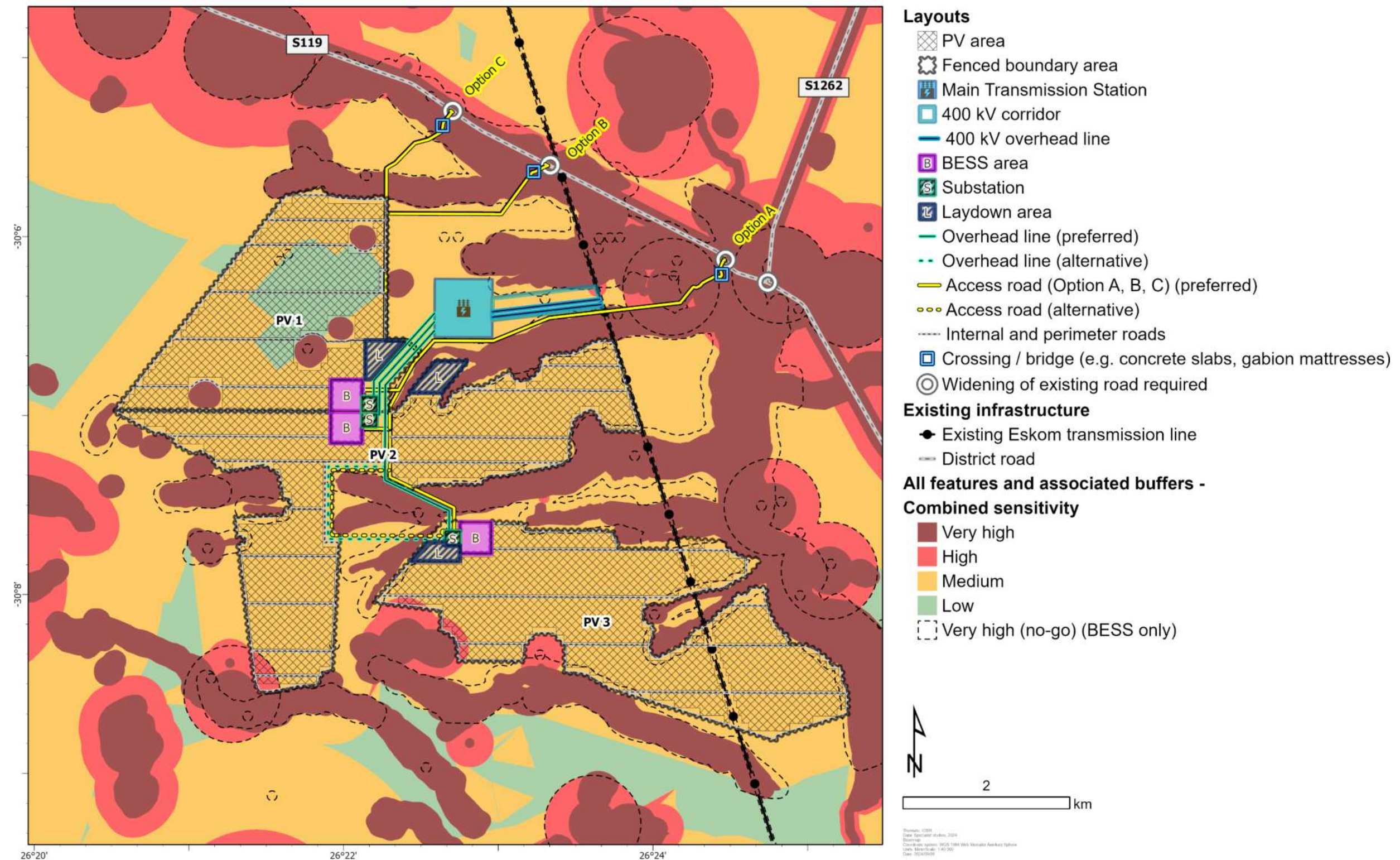


Figure 3.50: Combined environmental sensitivity map for the study area.

Proposed 3 x 350 MW Biesjesvlei Solar PV, BESS and EGI Development near Smithfield, Free State, South Africa



Proposed 3 x 350 MW Biesjesvlei Solar PV, BESS and EGI Development near Smithfield, Free State, South Africa





CHAPTER 4:

Approach to EIA Process and Public Participation

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4. APPROACH TO THE EIA PROCESS AND PUBLIC PARTICIPATION

This chapter gives particular attention to the legal context and guidelines that apply to this Environmental Impact Assessment (EIA) for the following proposed projects that are addressed in this report, as well as the steps in the Public Participation Process (PPP) of the EIA Phase of the process¹, in accordance with Regulations 41, 42, 43 and 44 of Government Notice (GN) R326 of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (as amended), and the schedule for the EIA Process:

- **PROJECT 1:** The proposed development of a Solar Photovoltaic (PV) Facility and associated infrastructure (i.e. Biesjesvlei PV1).
- **PROJECT 4:** The proposed development of a Battery Energy Storage System (BESS) and associated infrastructure for Biesjesvlei PV1 (Biesjesvlei BESS 1).
- **PROJECT 7:** The proposed development of a 132 kV Overhead Power Line from the on-site substation to the proposed Main Transmission Substation (MTS) and associated infrastructure (Biesjesvlei EGI 1).

The information presented throughout this chapter equally applies to each of the projects addressed in this report (i.e. **Project 1 (Biesjesvlei PV1)**, **Project 4 (Biesjesvlei BESS 1)** and **Project 7 (Biesjesvlei EGI 1)**), unless where mentioned otherwise.

The EIA Phase is shaped by the findings of the Scoping Process. For information from the Scoping Phase, including the approach to stakeholder engagement, identification of issues, overview of relevant legislation, and key principles and guidelines that provide the context for this EIA Process, refer to the Final Scoping Report (FSR) (CSIR, 2024²).

4.1 Purpose of EIA and Requirements of the EIA Regulations

As captured in Section 2 of Appendix 3 of the 2014 NEMA EIA Regulations (as amended), which specifies the content requirements for EIA Reports, “*the purpose of the EIA Phase 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 development footprint on the approved site as contemplated in the accepted scoping report;*

¹ Note that an integrated PPP is being undertaken for all the Biesjesvlei Projects, hence in some cases this is referred to as “proposed projects”.

² CSIR, 2024. Scoping and Environmental Impact Assessment for the Proposed Development of a Solar Photovoltaic (PV) Facility and associated infrastructure (Biesjesvlei PV1); Battery Energy Storage System and associated infrastructure (Biesjesvlei BESS 1); and 132 kV Overhead Power Line from the on-site substation to a proposed Main Transmission Substation and associated infrastructure (Biesjesvlei EGI 1); near Smithfield, within the Mohokare Local Municipality, Xhariep District Municipality, Free State. Final Scoping Report. CSIR Report Number: CSIR/SPLA/SECO/ER/2024/0002/B.

- *Identify the location of the development footprint within the approved site as contemplated in the accepted scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;*
- *Determine the:*
 - *nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and*
 - *degree to which these impacts: (aa) can be reversed; (bb) may cause irreplaceable loss of resources, and (cc) can be avoided, managed or mitigated;*
- *Identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment;*
- *Identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity;*
- *Identify suitable measures to avoid, manage or mitigate identified impacts; and*
- *Identify residual risks that need to be managed and monitored."*

The EIA Phase consists of three parallel and overlapping processes:

- Central assessment process through which inputs are integrated and presented in an EIA Report that is submitted for comment to the National Department of Forestry, Fisheries and the Environment (DFFE) and other commenting authorities; and thereafter submitted to the DFFE for decision-making;
- Undertaking of a PPP whereby findings of the EIA Phase are communicated and discussed with Interested and Affected Parties (I&APs) and responses are documented; and
- Undertaking of specialist assessments that provide additional information or assessments required to address the issues raised in the Scoping Phase.

The EIA process is a planning, design and decision-making tool used to demonstrate to the responsible authority, the DFFE, and the Project Applicant, what the consequences of their choices will be in biophysical, social, and economic terms. As such it identifies potential impacts (negative and positive) that the project may have on the environment. The EIA makes recommendations to mitigate negative impacts and enhance positive impacts associated with the proposed projects.

4.2 Legislation, Policies and Guidelines Pertinent to this EIA

The scope and content of this EIA Report has been informed by the main legislation, policies, guidelines and information series documents described in this section. Additional information on applicable legislation is provided in the Specialist Studies and Inputs included in Appendix E of this EIA Report.

4.2.1 National Legislation

4.2.1.1 The Constitution of the Republic of South Africa (Act 108 of 1996)

The Constitution, which is the supreme law of the Republic of South Africa, provides the legal framework for legislation regulating environmental management in general, against the backdrop of the fundamental human rights. Section 24 of the Constitution states that:

- *“Everyone has the right:*
 - *to an environment that is not harmful to their health or well-being; and*
 - *to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that –*
 - *prevent pollution and ecological degradation;*
 - *promote conservation; and*
 - *secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”*

Section 24 of the Bill of Rights therefore guarantees the people of South Africa the right to an environment that is not detrimental to human health or well-being, and specifically imposes a duty on the State to promulgate legislation and take other steps that ensure that the right is upheld and that, among other things, ecological degradation and pollution are prevented.

In support of the above rights, the environmental management objectives of the proposed projects are to protect ecologically sensitive areas and support sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development in the towns nearest to the study area³.

4.2.1.2 NEMA and EIA Regulations

Chapter 1, Section 2 of the NEMA sets out several principles to give guidance to developers, private landowners, members of the public and authorities. The proclamation of the NEMA gives expression to an overarching environmental law. Various mechanisms, such as cooperative environmental governance, compliance and non-compliance, enforcement, and regulating government and business impacts on the environment, underpin NEMA. NEMA, as the primary environmental legislation, is complemented by many sectoral laws governing marine living resources, mining, forestry, biodiversity, protected areas, pollution, air quality, waste and integrated coastal management. Principle number 3 determines that a development must be socially, environmentally and economically sustainable. Principle Number 4(a) states that all relevant factors must be considered, *inter alia* i) that the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied; ii) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied; vi) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised; and viii) that negative impacts on the environment and on

³ The preferred site for the proposed projects (i.e. Projects 1 to 10) comprises a combined footprint of 3 060 ha, which serves as the study area for this Scoping and EIA Process. Therefore, the terms “site” and “study area” are used synonymously in the report. The Buildable Areas and “development footprint” fall within the preferred site (or study area).

peoples' environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

Section 24 (1) of the NEMA, as amended states that *"In order to give effect to the general objectives of integrated environmental management laid down in this Chapter, the potential impact on the environment of listed activities must be considered, investigated, assessed and reported to the Competent Authority charged by this Act with granting the relevant Environmental Authorisation"*. The reference to "listed activities" in Section 24 (1) of NEMA relates to the regulations promulgated in GN R982, R983, R984 and R985 in Government Gazette (GG) 38282, dated 4 December 2014, which came into effect on 8 December 2014. These were amended in GN R326, R327, R325 and R324 in GG 40772, dated 7 April 2017. GN R326 contains the regulations for the Environmental Assessment Process. GN R327 and GN R324 includes listed activities that trigger the need for a Basic Assessment (BA) Process, whereas GN R325 includes listed activities that trigger the need for a full Scoping and EIA Process.

The 2014 NEMA EIA Regulations (as amended) were further amended as follows:

- GG 41766, GN 706 on 13 July 2018;
- GG 43358, GN 599 on 29 May 2020;
- GG 44701, GN 517 on 11 June 2021; and
- GG 45999, GN 1816 on 3 March 2022.

Based on the transitional arrangements, these amendments (where they have been commenced with) apply to the proposed projects as the Applications for Environmental Authorisation (EA) were not submitted before the above amendments took effect (where relevant). The relevant amendments have been taken into consideration in this Scoping and EIA Process.

In terms of the NEMA and the 2014 NEMA EIA Regulations (as amended), a Scoping and EIA Process is required for the proposed development of the Biesjesvlei Solar PV Facilities and associated infrastructure. Refer to Section 4.3 of this chapter for additional information on the 2014 NEMA EIA Regulations (as amended).

4.2.1.3 GN 960 (published 5 July 2019)

GN 960 was published on 5 July 2019 and came into effect for compulsory use of the National Web Based Environmental Screening Tool (hereafter referred to as the Screening Tool) from 4 October 2019. The notice outlines the requirement to submit a report generated by the Screening Tool, in terms of Section 24(5)(h) of the NEMA and Regulation 16(1)(b)(v) of the 2014 NEMA EIA Regulations (as amended), when submitting an Application for EA in terms of Regulations 19 and 21 of the 2014 NEMA EIA Regulations (as amended). As such, the proposed projects were run through the Screening Tool, and the associated reports generated and attached to the original Applications for EA, which were submitted to the DFFE with the Draft Scoping Reports on 8 March 2024. An updated Screening Tool Report was generated at the Draft EIA Report stage, based on the updated EIA Phase layout where required i.e. where the fenced off footprint of the key infrastructure had changed since Scoping. This was only applicable to Biesjesvlei PV1. In addition, the findings of the Screening Tool Reports are discussed in the Site Sensitivity Verification (SSV) Reports, where relevant, which are included in the Specialist Studies and Inputs in Appendix E of

this EIA Report, as well as Chapters 3 and 4 of this EIA Report. The Screening Tool Reports are also included in Appendix P of this report.

4.2.1.4 GN 320 (published 20 March 2020)

GN 320 prescribes the general requirements for undertaking SSVs and protocols for the assessment and minimum report content requirements for identified environmental impacts for environmental themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA, when applying for EA. The protocols were enforced within a period of 50 days of publication of the notice i.e. on 9 May 2020.

The Specialist Assessments undertaken as part of this Scoping and EIA Process have complied with GN 320, where applicable, specifically Agriculture, Terrestrial Biodiversity, and Aquatic Biodiversity. Some of the remaining specialist assessments have complied with Appendix 6 of the 2014 NEMA EIA Regulations (as amended), and where relevant, Part A of GN 320 which contains SSV requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed. This specifically applies to the Visual; Heritage (Archaeology and Cultural Heritage); Palaeontology; Socio-Economic; Traffic; and Geohydrology studies. However, in some instances there are no themes on the Screening Tool that relate to some of these studies and as such sensitivities cannot be verified against the Screening Tool. More information in this regard is included in the Specialist Studies and Inputs in Appendix E of this EIA Report, which also address the aspect of SSVs, where relevant and applicable.

Some of the specialist assessments comply with the Assessment Protocols published in GN R1150 on 30 October 2020, specifically Terrestrial Biodiversity and Species, Aquatic Biodiversity and Species, and Avifauna (as described below).

The BESS High Level Safety, Health and Environment Risk Assessment (included in Appendix E.12 of this EIA Report) serves as a technical report, and the aforementioned legislation is thus not applicable. In addition, the Geotechnical Letter of Opinion (included in Appendix E.11 of this EIA Report) serves as a professional opinion regarding the development of the proposed projects from a geotechnical perspective and therefore does not comply with the aforementioned legislation, as discussed in Section 4.4.3 of this chapter.

The SSVs for Civil Aviation and Defence also comply with GN 320. Additional detail on Civil Aviation and Defence is included in Appendix E.13 and Appendix E.14 of this EIA Report, respectively.

4.2.1.5 GN 1150 (published on 30 October 2020)

GN 1150 prescribes procedures and protocols in respect of specific environmental themes for the assessment of, as well as the minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the NEMA, when applying for EA. GN 1150 includes a protocol for the specialist assessment and minimum report content requirements for environmental impacts on a) terrestrial animal species and b) terrestrial plant species. The requirements of these protocols apply from the date of publication (i.e. from 30 October 2020), except where the Project Applicant provides proof to the Competent Authority that the specialist assessment affected by these protocols had been commissioned prior to the date of publication of

these protocols in the GG, in which case Appendix 6 of the 2014 NEMA EIA Regulations (as amended) will apply to such applications. This exception does not apply to the Biesjesvlei projects, as the specialist assessments and compliance statements were commissioned after the date of publication of GN 1150 dated 30 October 2020.

The Terrestrial Biodiversity and Species Assessment that has been undertaken as part of this Scoping and EIA Process was commissioned following the publication date of the Species Protocols. Therefore, the Terrestrial Animal and Plant Species components have been undertaken in compliance with GN 1150. One combined report has been compiled for Terrestrial Biodiversity, Terrestrial Animal Species and Terrestrial Plant Species. The Specialist Assessment, including the findings of the SSV, for Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species is included in Appendix E.2 of this EIA Report. Similarly, the Avifauna Assessment also complies with GN 1150 and relevant Birdlife South Africa Guidelines, and a copy of the Specialist Assessment, including the findings of the SSV, is included in Appendix E.4 of this EIA Report. **It must be re-iterated that the Terrestrial Plant and Animal Species Compliance Statements and Avifauna Assessment Reports have complied with GN 1150 (dated 30 October 2020). Additional detail is provided in the respective specialist reports in the aforementioned appendices.**

GN 1150 was amended in July 2023, in GN 3717, to also remove reference to “terrestrial” species and to capture other amendments regarding Compliance Statements. The Terrestrial Biodiversity and Species Assessment and the Avifauna Assessment were commissioned in November 2022 and completed site work by April 2023, before GN 3717 was gazetted in July 2023. Therefore, GN 3717 does not apply to these specific assessments (i.e. Terrestrial Plant and Animal Species Compliance Statements; and Avifauna). The Aquatic Biodiversity and Species Assessment considered the GN 3717 amendments, however no aquatic Species of Conservation Concern (SCC) were found during the SSV therefore GN 3717 is not applicable to the Aquatic Biodiversity and Species Assessment. The Specialist Assessment, including the findings of the SSV, for Aquatic Biodiversity and Species is included in Appendix E.3 of this EIA Report. One combined report has been compiled for Aquatic Biodiversity and Species.

4.2.1.6 Solar Exclusion Norm

The DFFE published the Solar Exclusion Norm for the exclusion of the development and expansion of Solar PV Facilities from the requirement to obtain an EA in GG 50388, GN 4558 on 27 March 2024. **This was adopted after the Application Forms for EA for the proposed projects were submitted to the DFFE.** As such, based on the transitional arrangements captured in Clause 11.1 of the Norm, the Applications for EA can continue based on the requirements of the 2014 NEMA EIA Regulations (as amended). Therefore, the Solar Exclusion Norm does not apply to the proposed projects, unless the current Applications are withdrawn, should the provisions of the Norm be met.

4.2.1.7 National Environmental Management: Biodiversity Act (Act 10 of 2004)

The National Environmental Management: Biodiversity Act (Act 10 of 2004, as amended) (NEMBA) provides for “the management and conservation of South Africa’s biodiversity within the framework of the NEMA, the protection of species and ecosystems that warrant national protection, and the use of indigenous biological resources in a sustainable manner, amongst other provisions”. The

Act states that the state is the custodian of South Africa's biological diversity and is committed to respect, protect, promote and fulfil the constitutional rights of its citizens.

Overall, the NEMBA focuses on the protection of national biodiversity through the regulation of activities that may affect biodiversity including habitat disturbance, culture of and trade in organisms, both exotic and indigenous. Lists of threatened ecosystems (Sections 52 (1) (a)), threatened and protected species (Sections 56 (1)), and alien invasive organisms (Section 97 (1)) have been published and maintained in terms of NEMBA.

Chapter 1 sets out the objectives of the Act, and they are aligned with the objectives of the Convention on Biological Diversity, which are the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of the benefits of the use of genetic resources. The Act also gives effect to CITES, the Ramsar Convention, and the Bonn Convention on Migratory Species of Wild Animals. The State is endowed with the trusteeship of biodiversity and has the responsibility to manage, conserve and sustain the biodiversity of South Africa.

This Act therefore serves to control the disturbance and land utilisation within certain habitats, as well as the planting and control of certain exotic species. Effective disturbance and removal of threatened or protected species encountered on or around the sites, will require specific permission from the applicable authorities.

Furthermore, NEMBA states that the loss of biodiversity through habitat loss, degradation or fragmentation must be avoided, minimised or remedied. The loss of biodiversity includes *inter alia* the loss of endangered, threatened or protected plant and animal species.

4.2.1.7.1 Threatened Ecosystems

GG 34809, GN 1002, published on 9 December 2011 in terms of Section 52 (1) (a) of the NEMBA, provides a list of threatened terrestrial ecosystems categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) and Protected.

However, a revised national list of ecosystems that are threatened and in need of protection was published in GG 47526, GN 2747 on 18 November 2022 in terms of Section 52 (1) (a) of NEMBA. The revised list includes threatened terrestrial ecosystem types that are classed as CR, EN and VU.

The list of threatened ecosystems includes threatened ecosystems based on vegetation types present within these ecosystems. Should a project fall within a listed vegetation type or ecosystem that is listed, actions in terms of NEMBA are triggered. In addition, Listing Notice 3 (GN R324) of the 2014 NEMA EIA Regulations (as amended) includes Listed Activity 12, for the clearance of an area of 300 m² or more of indigenous vegetation in the Free State, specifically within any CR or EN ecosystem listed in terms of Section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as CR in the National Spatial Biodiversity Assessment 2004.

Based on the findings of the Terrestrial Biodiversity and Species Assessment (Appendix E.2 of this EIA Report), according to Mucina & Rutherford (2006, as amended⁴), the study area is located in the Aliwal North Dry Grassland (Gh2) vegetation type, which is listed as **Least Threatened** under the Revised List of Threatened Terrestrial Ecosystems (GG 47526, GN 2747, November 2022). Therefore, the above GN and Activity 12 (b) (i) of Listing Notice 3 do not apply to the proposed projects.

4.2.1.7.2 Threatened and Protected Species

The 2007 Threatened or Protected Species Regulations of the NEMBA declares species of high conservation value, national importance or that are considered threatened and in need of protection. Furthermore, the regulations provide for the prohibition of specific restricted activities involving specific listed threatened or protected species.

The list of CR, EN, VU or Protected species was published in GG 29657, GN R151 on 23 February 2007 in terms of Section 56 (1) of the NEMBA. The list was further amended in GG 30568, GN R1187 on 14 December 2007, as well as in GG 43386, GN R627 of 3 June 2020. Should a project include threatened and protected species that are listed, actions in terms of NEMBA are triggered.

Refer to Chapter 3 of this EIA Report for a list of the animal species recorded on and surrounding the study area.

The Terrestrial Biodiversity Specialist confirmed that no animal SCC were recorded, however the potential presence of *Hydrictis maculicollis* in the watercourse should be taken into consideration, in order to reduce impacts and/or appropriate rehabilitation of the species' habitat.

Almost all fauna species recorded in the study area are Least Concern, but are provincially protected in terms of the Free State Nature Conservation Ordinance (FSNCO) 8 of 1969.

This has been detailed in the Terrestrial Animal Species Compliance Statement included in the Terrestrial Biodiversity and Species Assessment (Appendix E.2 of this EIA Report).

4.2.1.7.3 Alien and Invasive Species

Chapter 5 of NEMBA (Sections 73 to 75) regulates activities involving invasive species, and lists duty of care as follows:

- the landowner/land user must take steps to control and eradicate the invasive species and prevent their spread, which includes targeting offspring, propagating material and regrowth, in order to prevent the production of offspring, formation of seed, regeneration or re-establishment;
- take all required steps to prevent or minimise harm to biodiversity; and
- ensure that actions taken to control/eradicate invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.

⁴ Mucina, L. and Rutherford, M.C. (Eds.) (2006). The vegetation of South Africa, Lesotho and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria.

The Alien and Invasive Species Regulations, published in 2014 and amended in 2020, in terms of the NEMBA provides for the protection of biodiversity through the control and eradication of listed alien and invasive species categorised as follows:

- Category 1a Listed Invasive Species – must be combatted or eradicated;
- Category 1b Listed Invasive Species – must be controlled or 'contained' in accordance with the requirements of an Invasive Species Management Programme;
- Category 2 Listed Invasive Species – require a permit to carry out a restricted activity e.g. cultivation within an area;
- Category 3 Listed Invasive Species – species that are less-transforming invasive species, but introduction, trade or transportation should be limited. Category 3 plant species are automatically Category 1b species where located within riparian and wetland areas;
- Exempted Alien Species – species that are not regulated; and
- Prohibited Alien Species – species for which a permit for restricted activities (e.g. inter alia hunting, gathering, breeding, cultivating, trading, transporting) may not be issued.

The Alien and Invasive Species List was published in terms of sections 66(1), 67(1), 70(1)(a), 71(3) and 71A of the NEMBA in GG 40166, GN 864 on 29 July 2016.

In terms of alien invasives, the Terrestrial Biodiversity specialist has noted the presence of alien *Eucalyptus sideroxylon* (Black Ironbark) trees and *Opuntia* species (prickly pear cactus) in the study area.

4.2.1.8 The National Heritage Resources Act (Act 25 of 1999)

The National Heritage Resources Act (Act 25 of 1999) (NHRA) introduces an integrated and interactive system for the management of national heritage, archaeological and palaeontological resources (which include landscapes and natural features of cultural significance).

Parts of sections 35(4), 36(3) (a) and 38(1) of the NHRA apply to the proposed projects:

Archaeology, palaeontology and meteorites:

Section 35 (4) – No person may, without a permit issued by the responsible heritage resources authority:

- a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
- b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
- c) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

Burial grounds and graves:

Section 36 (3) (a) - No person may, without a permit issued by South African Heritage Resources Agency (SAHRA) or a provincial heritage resources authority:

- a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

- b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
- c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

Heritage resources management:

38 (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorized as:

- a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- b) the construction of a bridge or similar structure exceeding 50 m in length;
- c) any development or other activity which will change the character of the site –
 - (i) exceeding 5 000 m² in extent, or
 - (ii) involving three or more erven or subdivisions thereof; or
 - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
 - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA, or a provincial resources authority;
- d) the re-zoning of a site exceeding 10 000 m² in extent; or
- e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, 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.

While landscapes with cultural significance do not have a dedicated Section in the NHRA, they are protected under the definition of the National Estate (Section 3). Section 3(2)(c) and (d) list “historical settlements and townscape” and “landscapes and natural features of cultural significance” as part of the National Estate. Furthermore, Section 3(3) describes the reasons a place or object may have cultural heritage value. Section 38 (2a) of the NHRA states that if there is reason to believe that heritage resources will be affected then an impact assessment report must be submitted.

A Heritage Impact Assessment (including Archaeology and Cultural Landscape) has been completed during the EIA Phase in accordance with GN 320 (Part A) and Appendix 6 of the 2014 NEMA EIA Regulations (as amended). This specialist study and SSV are included in Appendix E.6 of the EIA Report. Refer to Chapters 3 and 11 of this EIA Report for additional information regarding heritage.

In terms of Palaeontology, an SSV Report (in terms of Part A of GN 320) was compiled during the Scoping Phase. Based on a site visit undertaken by the Palaeontologist, it is concluded that the study area is of Low to Very Low palaeo-sensitivity. Provided that the recommended Chance Fossil Finds Protocol is incorporated into the Environmental Management Programme (EMPr) and fully implemented during the construction phase, there are no objections on palaeontological heritage grounds to authorisation of the proposed Solar PV Facility, BESS, Electricity Grid Infrastructure (EGI) and associated infrastructure. Pending the discovery of significant, previously unrecorded fossil sites in the construction phase (which can be handled using a Chance Fossil Finds Protocol),

the specialist has confirmed that **no further specialist palaeontological studies, reporting, monitoring or mitigation are considered necessary for the proposed projects**. Refer to Appendix E.7 of this EIA Report for the Palaeontology SSV and Chapter 12 of this EIA Report which provides a summary of the key findings and additional information in this regard.

The Free State Heritage Resources Authority and the SAHRA are required to provide comment on the proposed projects. To this end and to facilitate comment from the relevant heritage authorities, the Draft Scoping Reports were uploaded to the South African Heritage Resources Information System (SAHRIS) on 8 March 2024 at the commencement of the 30-day review period.

SAHRA provided an interim comment for each proposed project as separate EAs are being requested with combined reports for Projects 1 to 9 and a single report for Project 10. The following Case Numbers were assigned:

- Project 1 (Biesjesvlei PV1): 21906;
- Project 2 (Biesjesvlei PV2): 21907;
- Project 3 (Biesjesvlei PV3): 21908;
- Project 4 (Biesjesvlei BESS 1): 21909;
- Project 5 (Biesjesvlei BESS 2): 21910;
- Project 6 (Biesjesvlei BESS 3): 21911;
- Project 7 (Biesjesvlei EGI 1): 21913;
- Project 8 (Biesjesvlei EGI 2): 21915;
- Project 9 (Biesjesvlei EGI 3): 21916; and
- Project 10 (Biesjesvlei MTS and LILO): 21917.

Issues / comments raised by the SAHRA during the 30-day review of the Draft Scoping Reports are included in Appendix G.6 of this EIA Report. Copies of the comments received from SAHRA during the 30-day review period are captured and responded to as part of the Scoping Phase Issues and Responses Trail in Appendix G.7 of the EIA Report.

SAHRA confirmed that the approach followed for Palaeontology (described above) is acceptable. Therefore, the same Palaeontology SSV has been included in the EIA Phase (with only an update made to the maps to indicate the final project layouts). Refer to Appendix G.6 of this EIA Report for a copy of this comment.

The HIA and Palaeontology SSV Report, along with relevant chapters of the EIA Report were uploaded to SAHRIS at the commencement of the 30-day review period on the Draft EIA Report. Comments received from SAHRA during the EIA Phase are included in Appendix I.6 of this EIA Report and captured and responded to in the EIA Phase Comments and Responses Report, which is included in Appendix I.7 of this EIA Report. The final comments issued by SAHRA did not warrant any updates to the Final EIA Report or EMPs. The relevant information required by SAHRA was already included in the draft documents and retained in the final documents.

The proposed project may require a permit in terms of the NHRA prior to any fossils or artefacts being removed by professional palaeontologists and archaeologists. If archaeological mitigation is needed, then the appointed archaeologist will need to contact SAHRA and/or the Free State Heritage Resources Authority in order to confirm requirements to conduct the work. The permit

application must be carried out well in advance of construction to ensure that there is enough time for the authorities to approve the mitigation work before construction commences. Should professional palaeontological mitigation be necessary during the construction phase, the palaeontologist concerned will need to apply for a Fossil Collection Permit. Palaeontological collection should comply with international best practice. All fossil material collected must be deposited, together with key collection data, in an approved depository (museum / university). Palaeontological mitigation work including the ensuing Fossil Collection reports should comply with the minimum standards specified by SAHRA (2013).

4.2.1.9 National Forests Act (Act 84 of 1998)

The National Forests Act (Act 84 of 1998, as amended) (NFA) allows for the protection of certain tree species. The Minister has the power to declare a particular tree to be a protected tree. The most recent list of protected tree species was published in March 2024 in GN 4496. In terms of Section 15(1) of the NFA, no person may cut, disturb, damage or destroy any protected tree; or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. The DFFE is authorised to issue licences for any removal, cutting, disturbance, damage to or destruction of any protected trees. Therefore, the removal of any protected tree species listed within the NFA will require a tree removal permit, which can be obtained from the DFFE.

Where the proposed projects impact on any of the protected species, a permit for the removal will be required during the pre-construction phase, should EA be granted.

The Terrestrial Biodiversity Specialist confirmed that no plant SCC were found on site; and that there are no protected trees, threatened, near threatened or rare species that occur in or close to the proposed development area. Refer to the Terrestrial Plant Species Compliance Statement included in Appendix E.2 of this EIA Report for additional information.

In addition, protection of natural forests through gazetted lists of Natural Forests in terms of Sections 7 (2) of the NFA must also be highlighted. In terms of section 7(1) of the NFA, no person may cut, disturb, damage or destroy any indigenous tree in, or remove or receive any such tree from a natural forest except in terms of (a) a license issued under subsection (4) or section 23 of the NFA; or (b) an exemption from the provisions of subsection (4) of the NFA published by the Minister in the Gazette.

4.2.1.10 Conservation of Agricultural Resources Act (Act 43 of 1983)

The objectives of the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) are to provide for the conservation of the natural agricultural resources of South Africa by the:

- maintenance of the production potential of land;
- combating and prevention of erosion and weakening or destruction of the water sources; and
- protection of the vegetation and the combating of weeds and invader plants.

The CARA states that no land user shall utilise the vegetation of wetlands (a watercourse or pans) in a manner that will cause its deterioration or damage. This includes cultivation, overgrazing, diverting water run-off and other developments that damage the water resource. The CARA includes regulations on alien invasive plants. According to the amended regulations (GN R280 of March 2001), declared weeds and invader plants are divided into three categories:

- Category 1 may not be grown and must be eradicated and controlled,
- Category 2 may only be grown in an area demarcated for commercial cultivation purposes and for which a permit has been issued, and must be controlled, and
- Category 3 plants may no longer be planted, and existing plants may remain as long as their spread is prevented, except within the flood line of watercourses and wetlands. It is the legal duty of the land user or landowner to control invasive alien plants occurring on the land under their control.

Invasive alien species likely to occur on site is discussed in the Terrestrial Biodiversity and Species Assessment. Alien plant species will be managed in line with the EMPs, which are included in Appendix J to Appendix O of this EIA Report.

The Agriculture Specialist has indicated that rehabilitation after disturbance to agricultural land is managed by the CARA. A consent in terms of CARA is required for the cultivation of virgin land. Cultivation is defined in CARA as “any act by means of which the topsoil is disturbed mechanically”. The purpose of this consent for the cultivation of virgin land is to ensure that only land that is suitable as arable land is cultivated. Therefore, despite the above definition of cultivation, disturbance to the topsoil that results from the construction of infrastructure does not constitute cultivation as it is understood in CARA. This has been corroborated by the Directorate: Land and Soil Management of the National Department of Agriculture, Land Reform and Rural Development (DALRRD⁵). The construction and operation of the proposed Solar PV Facility, BESS and EGI will therefore not require consent from the DALRRD in terms of this provision of CARA. Refer to the Agriculture Compliance Statement included in Appendix E.1 of this EIA Report for additional information in this regard.

4.2.1.11 Subdivision of Agricultural Land Act (Act 70 of 1970)

The Agriculture Specialist has indicated that two approvals from the DALRRD are required if a proposed development is located on agriculturally zoned land.

The first approval is a No Objection Letter for the change in land use. This letter is one of the requirements for receiving municipal rezoning. This application requires a motivation backed by good evidence that the proposed development is acceptable in terms of its impact on the agricultural production potential of the development site, and the Agricultural Compliance Statement will suffice in this regard. Such an application is being submitted for the proposed projects by the Applicant.

⁵ Following the announcement of the National Executive of the 7th Administration, it is understood that the Ministry of Agriculture will be separated from the Ministry of Land Reform and Rural Development. For purposes of this EIA Report, the term DALRRD has been retained for simplicity.

The second required approval is a consent for long-term lease in terms of the Subdivision of Agricultural Land Act (Act 70 of 1970) (SALA). If the DALRRD approval for the proposed projects has already been obtained in the form of the No Objection Letter, then SALA approval is likely to be readily forthcoming. Note that SALA approval is not required if the lease is over the entire farm portion. In the case of the proposed projects, the total property of the following farms will be leased (hence SALA approval is not required for these properties):

- Portion 1 of Farm Schoemanskraal 34;
- Farm Ronde Bult 408;
- Farm Modderkuil 396;
- Remaining Extent of Farm Pompoenfontein 118; and
- Portion 1 of Farm Pompoenfontein 118.

However, portions of the following farm portions would also be leased for the proposed projects, in which case SALA approval would be required:

- Farm Benoni 534;
- Remaining Extent of Farm Biesjespoort 521;
- Farm Biesjesvlei 372;
- Farm Klein Badfontein 369;
- Farm Paalland 373; and
- Farm Salpetervlei 756.

SALA approval can only be applied for once the Municipal Rezoning Certificate and EA have been obtained. This is being dealt with by the Project Developer (outside of the EIA Process).

Refer to the Agriculture Compliance Statement included in Appendix E.1 of this EIA Report for additional information in this regard.

4.2.1.12 National Water Act (Act 36 of 1998)

One of the important objectives of the National Water Act (Act 36 of 1998) (NWA) is to ensure the protection of the aquatic ecosystems of South Africa's water resources. Section 21 of this Act identifies certain land uses, infrastructural developments, water supply/demand and waste disposal as 'water uses' that require authorisation (licensing) by the Department of Water and Sanitation (DWS). Chapter 4 (Part 1) of the NWA sets out general principles for the regulation of water use. Water use is defined broadly in the NWA, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering the bed, banks, course or characteristics of a watercourse, removing water found underground for certain purposes, and recreation. In general, a water use must be licensed unless it is listed in Schedule I, is an existing lawful use, is permissible under a General Authorisation (GA), or if a responsible authority waives the need for a licence. The Minister may limit the amount of water which a responsible authority may allocate. In making regulations the Minister may differentiate between different water resources, classes of water resources and geographical areas.

All water users who are using water for agriculture: aquaculture, agriculture: irrigation, agriculture: watering livestock, industrial, mining, power generation, recreation, urban and water supply service must register their water use. This covers the use of surface- and groundwater.

Section 21 of the NWA lists the following water uses that need to be licensed:

- a) taking water from a water resource;
- b) storing water;
- c) impeding or diverting the flow of water in a watercourse;
- d) engaging in a stream flow reduction activity contemplated in section 36;
- e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- g) disposing of waste in a manner which may detrimentally impact on a water resource;
- h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- i) altering the bed, banks, course or characteristics of a watercourse;
- j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- k) using water for recreational purposes.

Any activities that take place within the outer edge of the 1 in 100 year flood line and /or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; within a watercourse; within 100 m of the edge of a watercourse; or within 500 m of a delineated wetland boundary, will require a water use authorisation in terms of Section 21 (c) and Section 21 (i) of the NWA.

The GA for Section 21 (c) and (i) water uses as defined under the NWA were revised in 2016 (GN R509) and further revised in December 2023 (GN R4167). Determining if a Water Use Authorisation is required for these water uses is associated with the risk of degrading the ecological status of a watercourse. A low risk of impact could be authorised in terms of a GA.

The Aquatic Specialist has noted that the proposed projects fall within the legislated 500 m regulated area of a watercourse as per the following definition: *Regulated area of a watercourse for Section 21 (c) or (i) of the Act water uses in terms of the Notice means: (c) A 500m radius around the delineated boundary (extent) of any wetland (including pans).* Considering that the proposed projects will also include construction and formalisation of watercourse crossings, the requirement for a GA or Water Use License is likely triggered. Confirmation of the level of water use authorisation has been confirmed in the EIA Phase in the Aquatic Biodiversity and Species Assessment (Appendix E.3 of this EIA Report). The specialist confirmed that a GA will be required. Refer to the Aquatic Biodiversity and Species Assessment for additional information.

The NWA also provides for measures to prevent, control and remedy the pollution of surface and groundwater sources. The study area is located mainly within quaternary catchment D24H and forms part of the Upper Orange Water Management Area in the Free State. The groundwater GA for the catchment is 75 m³/ha/a (published on 2 September 2016, in GG 40243, GN 538 (i.e.

Revision of GA for the taking and storing of water)). The allowable abstraction under the GA is capped at 40 000 m³/a per affected farm portion. If groundwater will be used for the proposed projects, and if more than this is required for the proposed projects, or to source all the water from a single property, then an integrated Water Use Licence Application would be required to meet the demands of the construction, operational and decommissioning periods. However, if the proposed projects are planned appropriately with regards to groundwater use, all the water can be obtained from groundwater, with the use being Generally Authorised. Registration of the usage in terms of the GA with the DWS would be required. This will be undertaken post EA. Additional information has been provided in the Geohydrology Assessment (Appendix E.10 of this EIA Report).

The Geohydrology Specialist has indicated that the water requirements for the Biesjesvlei PV1 and Biesjesvlei BESS 1 projects can be met by abstraction from the existing borehole HBH19 under a GA. As long as the total abstraction volume remains within the prescribed volume as defined under the GA, water abstracted from HBH19 could potentially be utilised on other farm portions. Additional restrictions may apply dependent on the GA granted.

Should groundwater be used as a water source for the proposed projects, then it is planned to be transported by trucks from the boreholes to the site. It was intended to construct water pipelines to transfer groundwater from existing boreholes to the project areas, however this is no longer anticipated. In addition, groundwater may also need to be stored on site in suitable containers or reservoir tanks during the construction, operational and decommissioning phases. Such storage may trigger the need for a Water Use Authorisation. According to the Revision of GA for the taking of and storing of water published in terms of the NWA, a total of 2000 m³/a can be stored on each property in an open container under the regional GA as long as it is not in a water course. If this is exceeded, then a Water Use Licence would be needed. Therefore, for the proposed projects, it is proposed that a total of 2000 m³/a will be stored at the facility on the affected property in an open container.

In addition, the disposal of sewage from the developed site is likely to be stored in conservancy tanks for removal and treatment at the nearby wastewater treatment works of the local authority. This low volume would be within the GA for Section 21 (g) water use activities.

In terms of GAs or Water Use Licences needed for the proposed projects, these will be undertaken post EA (should such authorisation be granted), as there are various factors to consider, such as confirmation of the selected water source in terms of the various options available; and the fact that the proposed projects still need to be subjected to the competitive Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). Note that precedent has been set in the sense that EAs for renewable energy, BESS and EGI projects have been granted positively and are not contingent on the application for Water Use Licence or GA. Nevertheless, the relevant applications will be made by the Applicant, post EA once relevant investigations have been completed. A query was sent to the DWS to confirm this approach. The DWS confirmed that this is acceptable, and that Applications for GAs or Water Use Licences can be submitted and applied for post EA (should such authorisation be granted). Refer to Appendix I.1 of this EIA Report for a copy of this correspondence.

During the Scoping Phase, follow up emails were sent to the DWS on various occasions, including personalised reminder emails, in order to seek comments during the 30-day comment period for

the Draft Scoping Reports. Refer to Appendix G.4 of this EIA Report for the proof of follow up correspondence sent during the Scoping Phase. Comments were received from the DWS, as captured in Appendix G.6 of this EIA Report and responded to in the Scoping Phase Issues and Responses Trail in Appendix G.7 of this EIA Report.

The DWS Free State Provincial Operations - PROTO CMA: Licensing Unit and DWS Free State Provincial Head Office have provided comment on the Draft EIA Report. Such comments are included in Appendix I.6 of this EIA Report; and captured and responded to in the Comments and Responses Trail in Appendix I.7 of this EIA Report.

4.2.1.13 Water Services Act (Act 108 of 1997)

Water will be required during the construction, operational and decommissioning phases of the proposed projects. Potable water is only to be utilised for human consumption purposes, whereas greywater is to be used for earthworks, dust suppression, etc. Water will be sourced from the following potential sources: Existing boreholes on site or the Mohokare Local Municipality. Compliance with the Water Services Act (Act 108 of 1997) will be undertaken during the relevant phase of the proposed projects, in consultation with the local and district municipalities.

4.2.1.14 Hazardous Substances Act (Act 15 of 1973)

During the proposed projects, fuel and diesel will be utilised to power vehicles, generators and equipment. In addition, potential spills of hazardous materials could occur during the relevant phases. Such management actions have been recommended in the EMPs, which are included in Appendix J to Appendix O of this EIA Report.

4.2.1.15 National Environmental Management: Waste Act (Act 59 of 2008, as amended) (NEM:WA)

The National Environmental Management: Waste Act (Act 59 of 2008, as amended) (NEM:WA) was published with one of the main objectives to reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development. Section 19 of the NEM:WA allows the Minister to publish a List of Waste Management Activities that have, or are likely to have, a detrimental effect on the environment published. Such a list specifies the waste management activities that will require a Waste Management Licence.

The List of Waste Management Activities was originally published in GN 921 on 29 November 2013, and thereafter amended in GN 332 on 2 May 2014; GN 633 on 24 July 2015; GN 1094 on 11 October 2017; and GN 1757 on 11 February 2022. The List of Waste Management Activities include Categories A, B and C. If any waste management activities listed in Category A are triggered by a development, a BA process must be undertaken in terms of the 2014 NEMA EIA Regulations (as amended), as part of the Waste Management Licence application. Waste management activities in Category B will, however, require a full Scoping and EIA Process in terms of the 2014 NEMA EIA Regulations (as amended), as part of the Waste Management Licence application. If any of the waste management activities in Category C are triggered, then the relevant Norms and Standards must be followed.

Based on a review of the project description, the proposed projects will **not** trigger the need for a Waste Management Licence. However, general and hazardous waste will be generated during the construction, operational and decommissioning phases, which will require proper management. Such management actions have been recommended in the EMPs, which are included in Appendix J to Appendix O of this EIA Report.

4.2.1.16 National Environmental Management: Air Quality Act (Act 39 of 2004)

The National Environmental Management: Air Quality Act (Act 39 of 2004, as amended) (NEM: AQA) was published in 2004 and came into full effect on 31 March 2010, when the Atmospheric Pollution Prevention Act (Act 45 of 1965) (APPA) was repealed. The NEM: AQA was published with the overall objective to:

- *“reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development;*
- *provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto”.*

The list of activities which result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage was published under GN 248, GG 33064 dated 31 March 2010 and thereafter amended in GN 893, GG 37054 dated 22 November 2013. The list of activities was further amended in GN 551, GG 38863 dated 12 June 2015; GN 1207, GG 42013 dated 31 October 2018; GN 687, GG 42472 dated 22 May 2019; and GN 421, GG 43174 dated 27 March 2020.

Section 22 of the NEM: AQA deals with the consequences of listing, and it states that “no person may without a provisional atmospheric emission licence, or an atmospheric emission licence conduct an activity (a) listed on the national list anywhere in the Republic; or (b) listed on the list applicable in a province anywhere in that province”. Therefore, a Provisional Atmospheric Emissions Licence (AEL) and/or AEL is required for any plant or proposed development that triggers a listed activity.

Based on a review of the project description, the proposed projects will **not** trigger the need for an AEL. However, the proposed stockpiling activities, including earthworks, may result in the unsettling of, and temporary exposure to, dust. Appropriate dust control methods will need to be applied. Such management actions have been recommended in the EMPs, which are included in Appendix J to Appendix O of this EIA Report.

4.2.1.17 Astronomy Geographic Advantage (Act 21 of 2007)

The Astronomy Geographic Advantage (AGA) Act (Act 21 of 2007) aims to provide for the preservation and protection of areas within the Republic that are uniquely suited for optical and radio astronomy; to provide for intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas; and to provide for matters connected

therewith. The purpose of the AGA Act is to preserve the geographic advantage areas that attract investment in astronomy. The AGA Act also notes that declared astronomy advantage areas are to be protected and properly maintained in terms of Radio Frequency Interference (RFI). The AGA Act is administered by the Department of Higher Education, Science and Technology (previously the Department of Science and Technology).

According to the CSIR Wind and Solar Phase 2 Strategic Environmental Assessment (SEA) (Department of Environment, Forestry and Fisheries (DEFF), 2019: Part 3, Page 2⁶), the majority of the mid-frequency dish array of the Square Kilometre Array (SKA) will be constructed in the core which is located in the Northern Cape; with dish antennas being located in the spiral arms. The South African component of the SKA will consist of approximately 3 000 receptors comprising dish antennas, each with a diameter of 15 m, and radio receptors known as dense aperture-arrays. The outer stations in the spiral arms will extend beyond the borders of South Africa and at least 3 000 km from the core area. About 80% of the receptors, including a dense core and up to 5 spiral arms, will be located in the Karoo Central Astronomy Advantage Area (KCAAA) (DEFF, 2019²: Part 3, Page 2).

The KCAAA, which is located between Brandvlei, Van Wyksvlei, Carnarvon and Williston in the Northern Cape Province, was officially declared in 2014 by the Minister of Science and Technology in terms of the AGA Act for the purposes of protection RFI and Electromagnetic Interference (EMI). The declaration of the KCAAA ensures the long-term viability of the area to be used for astronomical installations (DEFF, 2019²: Part 3, Page 2).

PV installations are known to have unintentional radiated emissions from electrical and electronic equipment that have the potential to interfere with the SKA Radio Telescope project in the Northern Cape. This can result in interference to celestial observations and/or data loss. Such interference is typically referred to as RFI (DEFF, 2019²: Part 3, Page 2).

The proposed project study area is not located within the KCAAA, and therefore not expected to have any significant impacts on the SKA. Refer to the locality map provided in Chapter 1 of this EIA Report for additional information in this regard.

The South African Radio Astronomy Observatory (SARAO) / SKA Office have been pre-identified as a key stakeholder and therefore included on the project database of I&APs since inception of this Scoping and EIA Process (as shown in Appendix F of this EIA Report). Veroniva has also communicated with the SARAO in order to request a letter confirming the risk of interference to the nearest SKA radio telescope by the proposed projects, and to determine if the SARAO has any objection to the proposed projects. The SARAO confirmed that the proposed projects are located outside of the Northern Cape Province and in particular outside of the declared Astronomy Advantage Areas. SARAO further confirmed that the relevant regulations promulgated in terms of the AGA Act would not apply and the proposed projects are low risk to the SKA telescope. Refer to Appendix P of this EIA Report for a copy of this correspondence.

⁶ Department of Environment, Forestry and Fisheries (DEFF), 2019. Phase 2 Strategic Environmental Assessment for wind and solar PV energy in South Africa. CSIR Report Number: CSIR/SPLA/SECO/ER/2019/0085 Stellenbosch, Western Cape.

4.2.1.18 Development Facilitation Act (Act 67 of 1995)

The Development Facilitation Act (Act 67 of 1995) (DFA) sets out a number of key planning principles which have a bearing on assessing proposed developments in light of the national planning requirements. The planning principles most applicable to the study area include:

- Promoting the integration of the social, economic, institutional and physical aspects of land development;
- Promoting integrated land development in rural and urban areas in support of each other;
- Promoting the availability of residential and employment opportunities in close proximity to or integrated with each other;
- Optimising the use of existing resources including such resources relating to agriculture, land, minerals, bulk infrastructure, roads, transportation and social facilities;
- Contributing to the correction of the historically distorted spatial patterns of settlement in the Republic and to the optimum use of existing infrastructure in excess of current needs;
- Promoting the establishment of viable communities; and
- Promoting sustained protection of the environment.

4.2.1.19 Other Applicable Legislation

Other applicable national legislation that may apply to the proposed projects include:

- Advertising on Roads and Ribbons Act (Act 21 of 1940);
- Electricity Act (Act 41 of 1987), as amended;
- Electricity Regulations Amendments (August 2009);
- Promotion of Administrative Justice Act (Act 2 of 2000);
- Civil Aviation Act (Act 13 of 2009) and Civil Aviation Regulations (CAR) of 1997;
- Civil Aviation Authority Act (Act 40 of 1998);
- White Paper on Renewable Energy (2003);
- Integrated Resource Plan for South Africa (2019);
- Occupational Health and Safety Act (Act 85 of 1993), as amended by Occupational Health and Safety Amendment (Act 181 of 1993)⁷;
- Road Safety Act (Act 93 of 1996);
- Fencing Act (Act 31 of 1963);
- National Environmental Management: Protected Areas Act (NEM:PA) (Act 57 of 2003); and
- National Road Traffic Act (Act 93 of 1996).

4.2.2 Provincial Legislation

4.2.2.1 Free State Nature Conservation Ordinance, 1969 (Act No. 8 of 1969)

This Act aims at improving sustainability in terms of balancing natural resource usage and protection or conservation thereof. It includes eight schedules, respectively:

- Schedule 1 – Protected Game;

⁷ The proposed Battery Energy Storage System (BESS) must be designed, operated, maintained and decommissioned according to the requirements of Occupational Health and Safety Act (Act 85 of 1993).

- Schedule 2 – Ordinary Game;
- Schedule 3 – Specified Wild Animals;
- Schedule 4 – Exotic Animals to which the Provisions of Section 19 (1) (b) apply;
- Schedule 5 – Aquatic Plants;
- Schedule 6 – Protected Plants;
- Schedule 7 – Ordinances Repealed; and
- Schedule 8 – Hunting at Night.

With regards to protected plants, the ordinance includes a list of protected flora. Relocation permits will be required from the Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA) under the Ordinance, should the final development footprint of the proposed projects necessitate the removal or relocation of protected plant species. Additional information has been provided in the Terrestrial Biodiversity and Species Assessment (Appendix E.2 of this EIA Report).

The Free State DESTEA, serving as the provincial authority for issuing of the relevant permits, has been pre-identified as a key stakeholder and is included on the project database (as shown in Appendix F of this EIA Report). Efforts were made to seek comments from the Free State DESTEA on the Draft Scoping Reports. Comments received from the Free State DESTEA are included in Appendix G.6 of this EIA Report and responded to in Appendix G.7 (Scoping Phase Issues and Responses Trail).

Efforts were also made to seek comments from the Free State DESTEA on the Draft EIA Reports. Comments received from the Free State DESTEA during the EIA Phase are included in Appendix I.6 of this EIA Report and responded to in Appendix I.7 (EIA Phase Comments and Responses Trail).

4.2.2.2 Free State Nature Conservation Bill, 2007

This bill provides for the conservation of fauna and flora and the hunting of animals causing damage and for matters incidental thereto. This includes lists of protected fauna and protected flora. Refer to the section above on the Free State Nature Conservation Ordinance for an overview of permit requirements.

4.2.3 District and Local Planning Legislation

4.2.3.1 Environmental Management Framework

Research indicates that there is no gazetted Environmental Management Framework (EMF) for the Xhariep District Municipality. The Screening Tool also notes that no intersections with EMF areas have been found.

4.2.3.2 Xhariep District Municipality Integrated Development Plan (IDP)

The Xhariep District Municipality (XDM) Integrated Development Plan (IDP) 2023 – 2024 notes the following strategic goals for the municipality (XDM, 2023⁸, Page 90):

⁸ Xhariep District Final Integrated Development Plan (IDP) 2023 – 2024. 2023. Available: <http://www.xhariep.fs.gov.za/wp-content/uploads/2023/07/FINAL-IDP-2023-24.pdf>. [online] Accessed: November 2023.

- *“Provision of sustainable and accessible basis services to all;*
- *Provide a safe, healthy environment;*
- *Promote economic growth and job creation;*
- *Promote good governance, organisational development and financial sustainability”.*

The proposed projects are in line with the XDM IDP because it will enable the XDM to achieve environmental sustainability. Furthermore, the proposed projects are aligned with one of the objectives of the IDP in that it will encourage local economic growth through increased investment and employment opportunities. The proposed projects will create job opportunities and economic spin offs during the construction and operational phases (if EA is granted by the DFFE).

4.2.3.3 Guidelines, Frameworks and Protocols

The following guidelines, frameworks and protocols are applicable to the proposed projects:

- Guidelines published in terms of the NEMA EIA Regulations, in particular:
 - Guideline on Alternatives (DEA, 2014);
 - Guideline on Transitional Arrangements (Department of Environmental Affairs and Development Planning (DEA&DP), 2013);
 - Guideline on Alternatives (DEA&DP, 2013);
 - Guideline on Public Participation (DEA, 2012; DEA&DP, 2013; DEA, 2017);
 - National Noise Control Regulations (GN R154 of 1992) and SANS 10103:2008;
 - Guideline on Need and Desirability (DEA&DP, 2013; DEA, 2017);
- Information Document on Generic Terms of Reference for Environmental Assessment Practitioners (EAPs) and Project Schedules (March 2013);
- Integrated Environmental Management Information Series (Booklets 0 to 23) (Department of Environmental Affairs and Tourism (DEAT), 2002 – 2005);
- Guidelines for Involving Specialists in the EIA Processes Series (DEA&DP; CSIR and Tony Barbour, 2005 – 2007);
- BirdLife South Africa (BLSA) 2017 Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa;
- Species Environmental Assessment 2020 Guideline: Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for EIAs in South Africa. South African National Biodiversity Institute (SANBI);
- United Nations Framework Convention on Climate Change (1997); and
- Kyoto Protocol (which South Africa acceded to in 2002).

4.2.4 International Finance Corporation Performance Standards

In order to promote responsible environmental stewardship and socially responsible development, the proposed projects will as far as practical, incorporate the environmental and social policies of the International Finance Corporation (IFC). These policies provide a frame of reference for lending institutions to review environmental and social risks of projects, particularly those undertaken in developing countries.

Through the Equator Principles, the IFC's standards are now recognised as international best practice in project finance. The IFC screening process categorises projects into A, B or C in order to indicate relative degrees of environmental and social risk. The categories are:

- *Category A* - Projects expected to have significant adverse social and/or environmental impacts that are diverse, irreversible, or unprecedented;
- *Category B* - Projects expected to have limited adverse social and/or environmental impacts that can be readily addressed through mitigation measures; and
- *Category C* - Projects expected to have minimal or no adverse impacts, including certain financial intermediary projects.

Accordingly, projects such as the proposed Biesjesvlei Solar PV, BESS and EGI developments are categorised as Category B projects. The EIA Process for Category B projects examines the project's potential negative and positive environmental impacts. As required for Category B projects, a Scoping and EIA Process was commissioned.

Other Acts, standards and/or guidelines are reviewed in more detail as part of the specialist studies that have been conducted in the EIA Phase.

4.3 Legal Context for this EIA

In terms of the NEMA and the 2014 NEMA EIA Regulations (as amended), a full Scoping and EIA Process is required for the proposed projects.

Note that the proposed projects are not located within any of the 11 Renewable Energy Development Zones (REDZs) gazetted in GN 114 on 16 February 2018 and GN 144 on 26 February 2021. In addition, the proposed projects are not located within any of the Strategic Transmission Corridors that were gazetted in GN 113 on 16 February 2018 and GN 1637 on 24 December 2021. Therefore, a full Scoping and EIA Process was undertaken for the proposed projects.

All the listed activities forming part of this proposed development and therefore requiring EA were included in the original Application Forms for EA, which were prepared and submitted to the DFFE with the Draft Scoping Report. However, during the 30-day review period on the Draft Scoping Reports, various comments were raised by the DFFE Chief Directorate: Integrated Environmental Authorisations on the specifications of the project description and how they relate to the applicable listed activities. Based on these comments, the applicability of certain listed activities was updated and as such Amended Application Forms for EA were submitted to the DFFE together with the Draft EIA Report for comment. A summary is provided below describing the main updates that were made to the listed activities at the Draft EIA Report stage.

The following must be considered in terms of listed activities:

- The Free State DESTEA has confirmed, in writing, that the 2015 and 2019 Free State Province Biodiversity Plans (FSPBP) have not been formally adopted by the Free State DESTEA and will therefore not trigger activities listed under Listing Notice 3. Furthermore, the Free State DESTEA has confirmed that no bioregional plans exist for the province. A copy of this correspondence is included in Appendix G.3 of this EIA Report. This was again confirmed with the Free State DESTEA via email in July 2024, whereby the DESTEA confirmed that the 2015 and 2019 FSPBP have still not been formally adopted and that there are no bioregional plans for the province. A copy of this correspondence is included in Appendix I.1 of this EIA Report. Therefore, it is understood that the following listed activities in Listing Notice 3 are not applicable to the proposed projects in relation to Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) or ecosystem service areas identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans:
 - Activity 4 (b) (i) (ee);
 - Activity 12 (b) (ii);
 - Activity 14 (ii) (a) and (c); (b), (i) (ff);
 - Activity 18 (b) (i) (ee); and
 - Activity 23 (ii) (a) (c) (b) (i) (ee).

During the Scoping Phase, the DFFE Biodiversity and Conservation Branch: Directorate: Biodiversity Mainstreaming and EIA provided comments during the 30-day review period on the Draft Scoping Report and confirmed that they do not have any objections to the Draft Scoping Report and Plan of Study for EIA. The Free State DESTEA Environmental

Management Department also provided comments on the Draft Scoping Report and confirmed that in general the Draft Scoping Report is accepted by the Department. Refer to Appendix G.6 of this EIA Report for copies of this correspondence from the DFFE and the Free State DESTEA. Furthermore, these comments were included in the Scoping Phase Issues and Responses Trail in Appendix G.7 of this EIA Report.

During the EIA Phase, the DFFE Biodiversity and Conservation Branch: Directorate: Biodiversity Mainstreaming and EIA provided comments on the Draft EIA Reports, which have been responded to accordingly by the EIA team and relevant specialists. The Free State DESTEA Environmental Management Department also provided comments on the Draft EIA Reports explaining that the Draft EIA Reports are accepted by the Department. Refer to Appendix I.6 of this EIA Report for copies of this correspondence from the DFFE and the Free State DESTEA. Furthermore, these comments are included in the Comments and Responses Trail in Appendix I.7 of this EIA Report.

Refer to the Terrestrial Biodiversity and Species Assessment (Appendix E.2 of this EIA Report) and the Aquatic Biodiversity and Species Assessment (Appendix E.3 of this EIA Report) for additional information regarding CBAs and ESAs.

- **Overall certainty needed on the description of the applicability of the listed activities:** The description of the applicability of the listed activities was updated, where possible, at the Draft EIA Report stage to ensure that it is more specific and to describe how the listed activities applied for are linked to the project description.
- **Removal of certain listed activities that are no longer applicable due to design progression:** Based on the progression of layouts and more certainty available during the EIA Phase, the following listed activities were removed from the EA Application Forms and projects at the Draft EIA Report stage:
 - Activity 14 of Listing Notice 1 (*for 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*) has been removed for Biesjesvlei PV1 and Biesjesvlei BESS 1 because the capacities of 80 m³ but less than 500 m³ are not expected during the construction phase. Less than 80 m³ of dangerous goods are expected during the construction phase.
 - Activity 9 of Listing Notice 1 (*for the development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water - (i) with an internal diameter of 0.36 metres or more; or (ii) with a peak throughput of 120 litres per second or more*) has been removed for Biesjesvlei BESS 1 and Biesjesvlei EGI 1 because stormwater infrastructure will not exceed the specified thresholds for these projects.
 - For Biesjesvlei EGI 1, the following listed activities are no longer applicable because they are applied for under the relevant PV and BESS projects:
 - Activity 48 (i) [(a) and (c)] of Listing Notice 1 *for the expansion of (i) infrastructure or structures where the physical footprint is expanded by 100*

- square metres or more; where such expansion occurs - (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.*
- Activity 56 (i) of Listing Notice 1 *for the widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (i) where the existing reserve is wider than 13.5 metres.*
 - Activity 18 (b) (i) (hh) of Listing Notice 3 *for the widening of a road by more than four meters, or the lengthening of a road by more than one kilometre in (b) the Free State; (i) outside urban areas; and in (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.*
- **Inclusion of certain listed activities that are applicable due to design progression:** Based on the progression of layouts and more certainty available during the EIA Phase, the following listed activities were included in the EA Application Forms and projects at the Draft EIA Report stage:
- For Biesjesvlei PV1 and Biesjesvlei BESS 1, Activity 24 (ii) of Listing Notice 1 *(for the development of a road (ii) with a reserve wider than 13.5 metres, or where no reserve exists where the road is wider than 8 metres)*, has been included because new culverts, bridges or crossing structures will be required along Access Route Option A, Access Route Option B and Access Route Option C. The structure will have a minimum width of 11 to 12 m.
 - For Biesjesvlei PV1 and Biesjesvlei BESS 1, Activity 10 (b) (i) (hh) of Listing Notice 3 *(for 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; in (b) the Free State; (i) outside urban areas; and in (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland)*, has been included as these reduced capacities of dangerous goods are relevant during the construction phase.

The list of listed activities triggered by Biesjesvlei PV1 (Project 1), Biesjesvlei BESS 1 (Project 4), and Biesjesvlei EGI 1 (Project 7) are respectively indicated in Table 4.1, Table 4.2 and Table 4.3. All updates made to the listed activities at the Draft EIA Report stage were carried through to the Amended Applications for EA which were submitted to the DFFE with the Draft EIA Report for comment. No further amendments were required based on comments received during the 30-day review period on the Draft EIA Report. Therefore, no Amended Applications for EA were required or submitted with the Final EIA Report.

Table 4.1: Listed Activities in GN R327, GN R325, and GN R324 that will be triggered by the proposed Biesjesvlei PV1 and associated infrastructure (Project 1)

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
Listing Notice 1, GN R327		
Activity 9 (i) and (ii)	The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water: (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where: (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.	The proposed project will include the development of stormwater infrastructure that will exceed 1 km in length with an internal diameter of more than 0.36 m and a throughput of more than 120 litres/second. The stormwater infrastructure will have a minimum width of 0.5 m and minimum length of 1250 m. In addition, the peak throughput of the stormwater infrastructure will be higher than 120 litres per second. The proposed project will take place outside of an urban area. It will be constructed on various affected farm portions, north-west of the town of Smithfield, in the Mohokare Local Municipality and Xhariep District Municipality, in the Free State Province.
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; excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is: (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.	The proposed project will entail the construction of an Independent Power Producer (IPP) Substation at the PV Facility, which will be maintained by the IPP. This will include all the high voltage infrastructure leading up to the Point of Connection (i.e. the Project Applicant's section of the proposed on-site substation, which is also referred to the PV Facility IPP Substation). The PV Facility IPP Substation will have a capacity stepping up from 33 kV to 132 kV. This constitutes facilities for the distribution and transmission of electricity. The proposed project will take place outside of an urban area. It will be constructed on various affected farm portions, north-west of the town of Smithfield, in the Mohokare Local Municipality and Xhariep District Municipality, in the Free State Province.
Activity 12 (ii) [(a) and (c)]	The development of:	The proposed project will entail the construction of various infrastructure and structures (such as, but not limited to, the solar field, on-site substation, laydown area, internal roads (i.e. new roads within the fenced off area of the PV Facility),

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
	(ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs: (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding: (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of commencement of the development and where indigenous vegetation will not be cleared.	new access roads (new roads leading to the PV Facility within the study area, where existing roads are not followed), and various ancillary infrastructure such as Operation and Maintenance (O&M) control centre, offices, warehouse/workshop, bathrooms/ablutions, inverters, guard house, etc.). Where existing or new access roads cross drainage features, new culverts, bridges or crossing structures will also be required. Such infrastructure across the drainage features will have a minimum footprint of 150 m². These infrastructure and structures will exceed a footprint of 100 m² and some occur within small drainage features, watercourses, and wetlands, and within 32 m of these aquatic features, which have been delineated by the aquatic specialist. The proposed project will take place outside of an urban area. It will be constructed on various affected farm portions, north-west of the town of Smithfield, in the Mohokare Local Municipality and Xhariep District Municipality, in the Free State Province.
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; but excluding where such infilling, depositing, dredging, excavation, removal or moving- a) will occur behind a development setback; b) is for maintenance purposes undertaken in accordance with a maintenance management plan;	The proposed project will entail the excavation, removal and moving of more than 10 m³ of soil, sand, pebbles or rock from nearby small drainage features, watercourses, and wetlands. The proposed project will also entail the infilling of more than 10 m³ of material into the nearby aquatic features. The aquatic features have been delineated by the aquatic specialist. This will occur as a result of development of the proposed Solar PV Facility and associated infrastructure, including the development of access roads and internal roads, and drainage line crossings.

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
	c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.	
Activity 24 (ii)	The development of a road- (ii) with a reserve wider than 13.5 metres, or where no reserve exists where the road is wider than 8 metres; but excluding a road- (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.	Where existing or new access roads cross drainage features, new culverts, bridges or crossing structures will also be required along Access Route Option A, Access Route Option B and Access Route Option C. The concrete slab of the bridge / structure will be a minimum of 5.5 m and will have approximately 3 m wide gabion mattresses on either side. Hence the structure will have a minimum width of 11 to 12 m.
Activity 28 (ii)	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	The proposed project will take place outside of an urban area. It will be constructed on various affected farm portions, north-west of the town of Smithfield, in the Mohokare Local Municipality and Xhariep District Municipality, in the Free State Province. The land within the study area is currently being used for livestock grazing and agriculture. The proposed Solar PV Facility, which is considered a commercial/industrial development, will have a footprint in excess of 1 ha (maximum footprint of the fenced off area approximately 450 ha). The proposed project will also entail the construction of various infrastructure and structures (such as, but not limited to, the solar field, on-site substation, laydown area, internal roads (i.e. new roads within the fenced off area of the PV Facility), new access roads (new roads leading to the PV Facility within the study area, where existing roads are not followed), and various ancillary infrastructure such as Operation and Maintenance (O&M) control centre, offices, warehouse/workshop, bathrooms/ablutions, inverters, guard house, etc.). This will constitute infrastructure with a physical footprint of more than 1 ha.

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
Activity 48 (i) [(a) and (c)]	The expansion of: (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; where such expansion occurs - (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding- (aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 23 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such expansion occurs within an urban area; or (ee) where such expansion occurs within existing roads, road reserves or railway line reserves.	The proposed project study area can be accessed via various existing main roads and gravel roads. Specifically, three access route options have been considered: Access Route Option A, Option B and Option C, which are routed along the N6; S1262; and S119. Access Route Options A, B and C have different access points off the S119. Direct access to the proposed project will be taken from the S119 along an existing farm access point, and thereafter new access roads will be developed within the study area, where they do not align with existing roads, or existing roads will be used where possible. Existing roads will be used as far as practically achievable. The Traffic Specialist has noted that the N6, S1262, and S119 roads leading to the study area are of a sufficient width to accommodate truck movement, however widening will be required at localised positions (i.e. intersections). Such widening is discussed below: ▪ Intersection S1262 and S119: Road widening by approximately 9 m (at the widest point) (approximately 400 m²) will be required at this intersection. ▪ Intersection S119 and Access Route Option A: Road widening by approximately 14 m (at the widest point) (approximately 800 m²) will be required at this intersection. ▪ Intersection S119 and Access Route Option B: Road widening by approximately 7 m (at the widest point) (approximately 200 m²) will be required at this intersection. ▪ Intersection S119 and Access Route Option C: Road widening by approximately 14 m (at the widest point) (approximately 450 m²) will be required at this intersection. Therefore, the intersection widening is regarded as expansion of infrastructure by more than 100 m². In addition, the existing cement bridge along Access Route Option A is approximately 3 m wide. The bridge structure will need to be widened to

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
		approximately 15 m (including gabion structures), which is regarded as expansion of infrastructure by more than 100 m². The intersection widening and bridge widening will occur within small drainage features, watercourses, and wetlands, and within 32 m of these aquatic features, which have been delineated by the aquatic specialist.
Activity 56 (i)	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre - (i) where the existing reserve is wider than 13,5 meters; excluding where widening or lengthening occur inside urban areas.	The proposed project study area can be accessed via various existing main roads and gravel roads. Specifically, three access route options have been considered: Access Route Option A, Option B and Option C, which are routed along the N6; S1262; and S119. Access Route Options A, B and C have different access points off the S119. Direct access to the proposed project will be taken from the S119 along an existing farm access point, and thereafter new access roads will be developed within the study area, where they do not align with existing roads, or existing roads will be used where possible. Existing roads will be used as far as practically achievable. The Traffic Specialist has noted that the N6, S1262, and S119 roads leading to the study area are of a sufficient width to accommodate truck movement, however widening will be required at localised positions (i.e. intersections). Such widening is discussed below: ▪ Intersection S1262 and S119: Road widening by approximately 9 m (at the widest point) (approximately 400 m²) will be required at this intersection. The road widening will exceed 6 m in this regard. ▪ Intersection S119 and Access Route Option A: Road widening by approximately 14 m (at the widest point) (approximately 800 m²) will be required at this intersection. The road widening will exceed 6 m in this regard. ▪ Intersection S119 and Access Route Option B: Road widening by approximately 7 m (at the widest point) (approximately 200 m²) will be required at this intersection. The road widening will exceed 6 m in this regard.

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
		▪ Intersection S119 and Access Route Option C: Road widening by approximately 14 m (at the widest point) (approximately 450 m²) will be required at this intersection. The road widening will exceed 6 m in this regard. In addition, the existing cement bridge along Access Route Option A is approximately 3 m wide. The bridge structure will need to be widened to approximately 15 m (including gabion structures), which is regarded as road widening by more than 6 m. No road will need to be lengthened by more than 1 km at these access routes.
Listing Notice 2, GN R325		
Activity 1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs: (a) within an urban area; or (b) on existing infrastructure.	The proposed project is a Solar PV Facility (i.e., facility for the generation of electricity from a renewable resource) with a capacity of up to 350 MWdc (more than 20 MW). The proposed project will take place outside of an urban area. It will be constructed on various affected farm portions, north-west of the town of Smithfield, in the Mohokare Local Municipality and Xhariep District Municipality, in the Free State Province.
Activity 15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for: (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed Solar PV Facility and associated infrastructure will have a footprint in excess of 20 ha (maximum footprint of the fenced off area approximately 450 ha). As a result, more than 20 ha of indigenous vegetation will be removed for the construction of the proposed Solar PV Facility and its associated infrastructure. According to Mucina & Rutherford (2006, as amended), the study area and proposed project falls within Aliwal North Dry Grassland (Gh2) vegetation type.
Listing Notice 3, GN R324		
Activity 10 (b) (i) (hh)	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage	The construction and operational phases of the proposed Solar PV Facility will require dangerous goods such as chemicals, fuels, oils, lubricants and solvents.

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
	occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres b. Free State i. outside urban areas hh. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.	Therefore, infrastructure for the storage and handling of dangerous goods of 30 m³ or more but not exceeding 80 m³ is proposed. Dangerous goods will be stored on site within designated areas such as laydown areas. The laydown area is located within 100 m of small drainage features, watercourses, and wetlands, which have been delineated by the aquatic specialist.
Activity 12 (b) (iv)	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. b. Free State iv. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.	The proposed Solar PV Facility and associated infrastructure will have an estimated footprint in excess of one hectare and will take place in the Free State. The proposed project will entail the construction of various infrastructure and structures (such as, but not limited to, the solar field, on-site substation, laydown area, internal roads (i.e. new roads within the fenced off area of the PV Facility), new access roads (new roads leading to the PV Facility within the study area, where existing roads are not followed), and various ancillary infrastructure such as Operation and Maintenance (O&M) control centre, offices, warehouse/workshop, bathrooms/ablutions, inverters, guard house, etc.). Where existing or new access roads cross drainage features, new culverts, bridges or crossing structures will also be required. Some of these infrastructure and structures will occur within small drainage features, watercourses, and wetlands, and within 100 m of these aquatic features, which have been delineated by the aquatic specialist. As a result, more than 300 m² of indigenous vegetation will be removed from these areas for the construction of the proposed Solar PV Facility and associated infrastructure.
Activity 18 (b) (i) (hh)	The widening of a road by more than four meters, or the lengthening of a road by more than one kilometre: b. Free State i. Outside urban areas:	The proposed project will take place on various affected farm portions, outside of an urban area, north-west of the town of Smithfield, in the Mohokare Local Municipality and Xhariep District Municipality, in the Free State Province. The proposed project study area can be accessed via various existing main roads and gravel roads. Specifically, three access route options have been considered: Access Route Option A, Option B and Option C, which are routed

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
	(hh) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland;	along the N6; S1262; and S119. Access Route Options A, B and C have different access points off the S119. Direct access to the proposed project will be taken from the S119 along an existing farm access point, and thereafter new access roads will be developed within the study area, where they do not align with existing roads, or existing roads will be used where possible. Existing roads will be used as far as practically achievable. The Traffic Specialist has noted that the N6, S1262, and S119 roads leading to the study area are of a sufficient width to accommodate truck movement, however widening will be required at localised positions (i.e. intersections). Such widening is discussed below: ▪ Intersection S1262 and S119: Road widening by approximately 9 m (at the widest point) (approximately 400 m²) will be required at this intersection. The road widening will exceed 4 m in this regard. ▪ Intersection S119 and Access Route Option A: Road widening by approximately 14 m (at the widest point) (approximately 800 m²) will be required at this intersection. The road widening will exceed 4 m in this regard. ▪ Intersection S119 and Access Route Option B: Road widening by approximately 7 m (at the widest point) (approximately 200 m²) will be required at this intersection. The road widening will exceed 4 m in this regard. ▪ Intersection S119 and Access Route Option C: Road widening by approximately 14 m (at the widest point) (approximately 450 m²) will be required at this intersection. The road widening will exceed 4 m in this regard. In addition, the existing cement bridge along Access Route Option A is approximately 3 m wide. The bridge structure will need to be widened to approximately 15 m (including gabion structures), which is regarded as road widening by more than 4 m.

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
		No road will need to be lengthened by more than 1 km at these access routes. The intersection widening and bridge widening will occur within small drainage features, watercourses, and wetlands, and within 100 m of these aquatic features, which have been delineated by the aquatic specialist.

Table 4.2: Listed Activities in GN R327, GN R325, and GN R324 that will be triggered by the proposed Biesjesvlei BESS 1 and associated infrastructure (Project 4)

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
Listing Notice 1, GN R327		
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; excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is — (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.	The proposed project will entail the construction of an Independent Power Producer (IPP) Substation for the Battery Energy Storage System (BESS), which will be maintained by the IPP. This is referred to as the BESS IPP Substation, which will have a capacity stepping up from 33 kV to 132 kV. This constitutes facilities for the distribution and transmission of electricity. The proposed project will take place outside of an urban area. It will be constructed on various affected farm portions, north-west of the town of Smithfield, in the Mohokare Local Municipality and Xhariep District Municipality, in the Free State Province.
Activity 12 (ii) [(a) and (c)]	The development of: (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs: (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding:	The proposed project will entail the construction of various infrastructure and structures (such as, but not limited to, the BESS facility; units; laydown area; BESS IPP Substation; laydown area for the BESS IPP Substation; BESS Operational and Maintenance (O&M) Office, including Ablutions; access roads; internal roads; various MV to HV cables; fencing and security; and parking area etc.). Where existing or new access roads cross drainage features, new culverts, bridges or crossing structures will also be required. Such infrastructure across the drainage features will have a minimum footprint of 150 m². The total footprint of the BESS facility extends approximately 10 ha, within which the various infrastructure and structures will be constructed. These infrastructure and structures will exceed a footprint of 100 m² and some occur within small

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
	(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of commencement of the development and where indigenous vegetation will not be cleared.	drainage features, watercourses, and wetlands, and within 32 m of these aquatic features, which have been delineated by the aquatic specialist. The proposed project will take place outside of an urban area. It will be constructed on various affected farm portions, north-west of the town of Smithfield, in the Mohokare Local Municipality and Xhariep District Municipality, in the Free State Province.
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; but excluding where such infilling, depositing, dredging, excavation, removal or moving- a) will occur behind a development setback; b) is for maintenance purposes undertaken in accordance with a maintenance management plan; c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.	The proposed project will entail the excavation, removal and moving of more than 10 m³ of soil, sand, pebbles or rock from nearby small drainage features, watercourses, and wetlands. The proposed project will also entail the infilling of more than 10 m³ of material into the nearby aquatic features. The aquatic features have been delineated by the aquatic specialist. This will occur as a result of development of the proposed BESS facility and associated infrastructure, including the development of access roads and internal roads, and drainage line crossings.
Activity 24 (ii)	The development of a road- (ii) with a reserve wider than 13.5 metres, or where no reserve exists where the road is wider than 8 metres;	Where existing or new access roads cross drainage features, new culverts, bridges or crossing structures will also be required along Access Route Option A, Access Route Option B and Access Route Option C. The concrete slab of the

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
	but excluding a road- (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.	bridge / structure will be a minimum of 5.5 m and will have approximately 3 m wide gabion mattresses on either side. Hence the structure will have a minimum width of 11 to 12 m.
Activity 27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed BESS facility, which will contain various sub-components and associated infrastructure, will have a footprint in excess of 1 ha but less than 20 ha (i.e. total footprint of approximately 10 ha). As a result, approximately 10 ha of indigenous vegetation will be removed for the construction of the proposed BESS facility and associated infrastructure. According to Mucina & Rutherford (2006, as amended), the study area and proposed project falls within Aliwal North Dry Grassland (Gh2) vegetation type.
Activity 28 (ii)	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (iii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	The proposed project will take place outside of an urban area. It will be constructed on various affected farm portions, north-west of the town of Smithfield, in the Mohokare Local Municipality and Xhariep District Municipality, in the Free State Province. The land within the study area is currently being used for livestock grazing and agriculture. The proposed BESS facility, which is considered a commercial/industrial development, will have a footprint in excess of 1 ha (total footprint of approximately 10 ha). The proposed project will also entail the construction of various infrastructure and structures (such as the BESS facility; units; laydown area; BESS IPP Substation; laydown area for the BESS IPP Substation; BESS Operational and Maintenance (O&M) Office, including Ablutions; access roads; internal roads; various MV to HV cables; fencing and security; and parking area etc.). This will constitute infrastructure with a physical footprint of more than 1 ha.
Activity 48 (i) [(a) and (c)]	The expansion of: (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more;	The proposed project study area can be accessed via various existing main roads and gravel roads. Specifically, three access route options have been considered: Access Route Option A, Option B and Option C, which are routed

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
	where such expansion occurs - (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding- (aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 23 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such expansion occurs within an urban area; or (ee) where such expansion occurs within existing roads, road reserves or railway line reserves.	along the N6; S1262; and S119. Access Route Options A, B and C have different access points off the S119. Direct access to the proposed project will be taken from the S119 along an existing farm access point, and thereafter new access roads will be developed within the study area, where they do not align with existing roads, or existing roads will be used where possible. Existing roads will be used as far as practically achievable. The Traffic Specialist has noted that the N6, S1262, and S119 roads leading to the study area are of a sufficient width to accommodate truck movement, however widening will be required at localised positions (i.e. intersections). Such widening is discussed below: ▪ <u>Intersection S1262 and S119:</u> Road widening by approximately 9 m (at the widest point) (approximately 400 m²) will be required at this intersection. ▪ <u>Intersection S119 and Access Route Option A:</u> Road widening by approximately 14 m (at the widest point) (approximately 800 m²) will be required at this intersection. ▪ <u>Intersection S119 and Access Route Option B:</u> Road widening by approximately 7 m (at the widest point) (approximately 200 m²) will be required at this intersection. ▪ <u>Intersection S119 and Access Route Option C:</u> Road widening by approximately 14 m (at the widest point) (approximately 450 m²) will be required at this intersection. Therefore, the intersection widening is regarded as expansion of infrastructure by more than 100 m². In addition, the existing cement bridge along Access Route Option A is approximately 3 m wide. The bridge structure will need to be widened to approximately 15 m (including gabion structures), which is regarded as expansion of infrastructure by more than 100 m².

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
		The intersection widening and bridge widening will occur within small drainage features, watercourses, and wetlands, and within 32 m of these aquatic features, which have been delineated by the aquatic specialist.
Activity 56 (i)	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre - (i) where the existing reserve is wider than 13,5 meters; excluding where widening or lengthening occur inside urban areas.	The proposed project study area can be accessed via various existing main roads and gravel roads. Specifically, three access route options have been considered: Access Route Option A, Option B and Option C, which are routed along the N6; S1262; and S119. Access Route Options A, B and C have different access points off the S119. Direct access to the proposed project will be taken from the S119 along an existing farm access point, and thereafter new access roads will be developed within the study area, where they do not align with existing roads, or existing roads will be used where possible. Existing roads will be used as far as practically achievable. The Traffic Specialist has noted that the N6, S1262, and S119 roads leading to the study area are of a sufficient width to accommodate truck movement, however widening will be required at localised positions (i.e. intersections). Such widening is discussed below: ▪ Intersection S1262 and S119: Road widening by approximately 9 m (at the widest point) (approximately 400 m²) will be required at this intersection. The road widening will exceed 6 m in this regard. ▪ Intersection S119 and Access Route Option A: Road widening by approximately 14 m (at the widest point) (approximately 800 m²) will be required at this intersection. The road widening will exceed 6 m in this regard. ▪ Intersection S119 and Access Route Option B: Road widening by approximately 7 m (at the widest point) (approximately 200 m²) will be required at this intersection. The road widening will exceed 6 m in this regard. ▪ Intersection S119 and Access Route Option C: Road widening by approximately 14 m (at the widest point) (approximately 450 m²) will be

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
		required at this intersection. The road widening will exceed 6 m in this regard. In addition, the existing cement bridge along Access Route Option A is approximately 3 m wide. The bridge structure will need to be widened to approximately 15 m (including gabion structures), which is regarded as road widening by more than 6 m. No road will need to be lengthened by more than 1 km at these access routes.
Listing Notice 3, GN R324		
Activity 10 (b) (i) (hh)	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 b. Free State i. outside urban areas hh. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.	The construction and operational phases of the proposed BESS Facility will require dangerous goods such as chemicals, fuels, oils, lubricants and solvents for general activities. This does not apply to the actual BESS Facility, as a solid state BESS is proposed. Therefore, infrastructure for the storage and handling of dangerous goods of 30 m³ or more but not exceeding 80 m³ is proposed. Dangerous goods will be stored on site within designated areas such as laydown areas. The laydown area is located within 100 m of small drainage features, watercourses, and wetlands, which have been delineated by the aquatic specialist.
Activity 12 (b) (iv)	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. b. Free State iv. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.	The proposed BESS facility and associated infrastructure will have an estimated footprint of approximately 10 ha and will take place in the Free State. The proposed project will entail the construction of various infrastructure and structures (such as, but not limited to, the BESS facility; units; laydown area; BESS IPP Substation; laydown area for the BESS IPP Substation; BESS Operational and Maintenance (O&M) Office, including Ablutions; access roads; internal roads; various MV to HV cables; fencing and security; and parking area etc.). Where existing or new access roads cross drainage features, new culverts, bridges or crossing structures will also be required. Some of these infrastructure and structures will occur within small drainage features, watercourses, and wetlands, and within 100 m of these aquatic features, which have been delineated by the aquatic specialist.

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
		As a result, more than 300 m ² of indigenous vegetation will be removed from these areas for the construction of the proposed BESS facility and associated infrastructure.
Activity 18 (b) (i) (hh)	The widening of a road by more than four meters, or the lengthening of a road by more than one kilometre: b. Free State i. Outside urban areas; (hh) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland;	The proposed project will take place on various affected farm portions, outside of an urban area, north-west of the town of Smithfield, in the Mohokare Local Municipality and Xhariep District Municipality, in the Free State Province. The proposed project study area can be accessed via various existing main roads and gravel roads. Specifically, three access route options have been considered: Access Route Option A, Option B and Option C, which are routed along the N6; S1262; and S119. Access Route Options A, B and C have different access points off the S119. Direct access to the proposed project will be taken from the S119 along an existing farm access point, and thereafter new access roads will be developed within the study area, where they do not align with existing roads, or existing roads will be used where possible. Existing roads will be used as far as practically achievable. The Traffic Specialist has noted that the N6, S1262, and S119 roads leading to the study area are of a sufficient width to accommodate truck movement, however widening will be required at localised positions (i.e. intersections). Such widening is discussed below: ▪ <u>Intersection S1262 and S119:</u> Road widening by approximately 9 m (at the widest point) (approximately 400 m²) will be required at this intersection. The road widening will exceed 4 m in this regard. ▪ <u>Intersection S119 and Access Route Option A:</u> Road widening by approximately 14 m (at the widest point) (approximately 800 m²) will be required at this intersection. The road widening will exceed 4 m in this regard. ▪ <u>Intersection S119 and Access Route Option B:</u> Road widening by approximately 7 m (at the widest point) (approximately 200 m²) will be

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
		required at this intersection. The road widening will exceed 4 m in this regard. ▪ <u>Intersection S119 and Access Route Option C:</u> Road widening by approximately 14 m (at the widest point) (approximately 450 m²) will be required at this intersection. The road widening will exceed 4 m in this regard. In addition, the existing cement bridge along Access Route Option A is approximately 3 m wide. The bridge structure will need to be widened to approximately 15 m (including gabion structures), which is regarded as road widening by more than 4 m. No road will need to be lengthened by more than 1 km at these access routes. The intersection widening and bridge widening will occur within small drainage features, watercourses, and wetlands, and within 100 m of these aquatic features, which have been delineated by the aquatic specialist.

Table 4.3: Listed Activities in GN R327, GN R325, and GN R324 that will be triggered by the proposed Biesjesvlei EGI 1 and associated infrastructure (Project 7)

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
Listing Notice 1, GN R327		
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; excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is: (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.	The proposed project will entail the construction of a 132 kV switching station. This will include all the high voltage infrastructure extending from the Point of Connection (i.e. Eskom's section of the proposed on-site substation). This section will be transferred from the IPP to Eskom at the Commercial Operational Date. The Switching Station will include various connecting bays and yards. At a minimum, it will include a dedicated bay for the connection of the BESS facility and a dedicated bay for the connection of the PV facility. A dedicated overhead 132 kV power line will also be constructed to connect the proposed Solar PV Facility to the proposed Main Transmission Substation (MTS). The above constitutes facilities for the distribution and transmission of electricity. The proposed project will take place outside of an urban area. It will be constructed on various affected farm portions, north-west of the town of Smithfield, in the Mohokare Local Municipality and Xhariep District Municipality, in the Free State Province.
Activity 12 (ii) [(a) and (c)]	The development of: (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs: (a) within a watercourse;	The proposed project will entail the construction of various infrastructure and structures (such as, but not limited to, the switching station, 132 kV power line, service road below the power line, and laydown area etc.). The footprint of the switching station covers approximately 10 000 m². These infrastructure and structures will exceed a footprint of 100 m² and some occur within small drainage features, watercourses, and wetlands, and within 32 m of these aquatic features, which have been delineated by the aquatic specialist.

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
	(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding: (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of commencement of the development and where indigenous vegetation will not be cleared.	The proposed project will take place outside of an urban area. It will be constructed on various affected farm portions, north-west of the town of Smithfield, in the Mohokare Local Municipality and Xhariep District Municipality, in the Free State Province.
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; but excluding where such infilling, depositing, dredging, excavation, removal or moving- a) will occur behind a development setback; b) is for maintenance purposes undertaken in accordance with a maintenance management plan; c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or	The proposed project will entail the excavation, removal and moving of more than 10 m³ of soil, sand, pebbles or rock from nearby small drainage features, watercourses, and wetlands. The proposed project will also entail the infilling of more than 10 m³ of material into the nearby aquatic features. The aquatic features have been delineated by the aquatic specialist. This will occur as a result of development of the proposed switching station, power line and associated infrastructure, including the development of service roads and drainage line crossings.

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
	e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.	
Activity 27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed switching station will have a footprint of approximately 10 000 m ² . As a result, approximately 1 ha of indigenous vegetation will be removed for the construction of the proposed switching station and associated infrastructure. According to Mucina & Rutherford (2006, as amended), the study area and proposed project falls within Aliwal North Dry Grassland (Gh2) vegetation type.
Activity 28 (ii)	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (iv) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	The proposed project will take place outside of an urban area. It will be constructed on various affected farm portions, north-west of the town of Smithfield, in the Mohokare Local Municipality and Xhariep District Municipality, in the Free State Province. The land within the study area is currently being used for livestock grazing and agriculture. The proposed EGI, which is considered a commercial/industrial development, will have a footprint in excess of 1 ha (switching station footprint of approximately 10 000 m ² , as well as service roads). This will constitute infrastructure with a physical footprint of more than 1 ha.
Listing Notice 3, GN R324		
Activity 12 (b) (iv)	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. b. Free State iv. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.	The proposed switching station will have an estimated footprint of up to 1 ha and will take place in the Free State. The proposed project will entail the construction of various EGI (such as the switching station, 132 kV power line, service road etc.). Where service roads cross drainage features, new culverts, bridges or crossing structures will also be required. Some of these infrastructure and structures will occur within small drainage features, watercourses, and wetlands, and within 100 m of these aquatic features, which have been delineated by the aquatic specialist. As a result, more than 300 m ² of indigenous vegetation will be removed from these areas for the construction of the proposed EGI.

4.4 Screening Tool

This section provides a description of the Screening Tool requirements in terms of recommended specialist assessments and assigned sensitivity ratings.

4.4.1 Specialist Assessments Identified by the Screening Tool

Based on the selected classification, the Screening Tool provides a list of specialist assessments that should be undertaken as part of the Scoping and EIA Process, as well as identifies the sensitivities on site that need to be verified by either the EAP or the specialists, where relevant, as noted in the Assessment Protocols of 20 March 2020 (GN 320) and 30 October 2020 (GN 1150). The classifications that apply to the proposed projects are listed below in Table 4.4.

Table 4.4: List of Screening Tool Classifications

Project	Classification on Screening Tool
PROJECT 1: The proposed development of a Solar Photovoltaic (PV) Facility and associated infrastructure (i.e. Biesjesvlei PV1)	- Utilities Infrastructure; Electricity; Generation; Renewable; Solar; PV - Utilities Infrastructure; Electricity; Distribution and Transmission; Substation⁹
PROJECT 4: The proposed development of a Battery Energy Storage System (BESS) and associated infrastructure for Biesjesvlei PV1 (Biesjesvlei BESS 1)	- Transformation of land; Indigenous vegetation - Utilities Infrastructure; Electricity; Distribution and Transmission; Substation¹⁰
PROJECT 7: The proposed development of a 132 kV Overhead Power Line from the on-site substation to the proposed Main Transmission Substation (MTS) and associated infrastructure (Biesjesvlei EGI 1)	- Utilities Infrastructure; Electricity; Distribution and Transmission; Substation - Utilities Infrastructure; Electricity; Distribution and Transmission; Power Line

Table 4.5 provides the list of Specialist Assessments identified by the Screening Tool for inclusion in the Scoping and EIA Process for Project 1 (Biesjesvlei PV1).

Table 4.6 provides the list of Specialist Assessments identified by the Screening Tool for inclusion in the Scoping and EIA Process for Project 4 (Biesjesvlei BESS 1).

Table 4.7 provides the list of Specialist Assessments identified by the Screening Tool for inclusion in the Scoping and EIA Process for Project 7 (Biesjesvlei EGI 1).

The Screening Tool Report notes that it is the responsibility of the EAP to confirm this list and to motivate in the Scoping and EIA Reports, the reason for not including any of the identified specialist assessments, where relevant.

⁹ One Screening Tool Report was generated for the substation and discussed as part of Project 7 in the relevant specialist SSVs and specialist reports.

¹⁰ Note that the Screening Tool Report maps for the proposed substation associated with the BESS are the same as the Screening Tool Report maps generated for transformation of land. Hence it is only reported on once in the relevant specialist SSVs and specialist reports.

As discussed at the Pre-Application Meeting held on 6 October 2023, the EAP has recommended that certain studies are not required. Refer to the discussion below.

Table 4.5: List of Specialist Assessments identified by the Screening Tool for the proposed Biesjesvlei PV1 (Project 1)

Specialist Assessment Required by the Screening Tool	Applicable to PV and/or Substation based on Screening Tool List?	Study undertaken in Scoping and EIA Process?	Sensitivity allocated on the Screening Tool [Study Area]	Verified Sensitivity by the Specialist/EAP [Study Area] ¹¹	Type of Assessment undertaken in Scoping and EIA Process or Motivation/Feedback for not undertaking the recommended study	Appendix of EIA Report for Specialist Report (including SSV)
1 Agricultural Impact Assessment	PV and Substation	Yes	Very High, High, and mainly Medium and Low	Medium and Low	Protocol GN 320: Part B: Agriculture (Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Agricultural Resources by Onshore Wind and/or Solar PV Energy Generation Facilities where the Electricity Output is 20 MW or more): Compliance Statement	Appendix E.1
2 Landscape/Visual Impact Assessment	PV only	Yes	Very High, High, and mainly Medium and Low	Mainly Low and Medium (with minor areas of High and Very High)	Protocol GN 320: Part A: Site Sensitivity Verification; and Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment	Appendix E.5
3 Archaeological and Cultural Heritage Impact Assessment	PV and Substation	Yes	Low	Low (with small pockets of Medium to Very High)	Protocol GN 320: Part A: Site Sensitivity Verification; and Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment	Appendix E.6
4 Palaeontology Impact Assessment	PV and Substation	Yes (Site Sensitivity Verification only)	Medium and Very High	Low and Very Low	Protocol GN 320: Part A: Site Sensitivity Verification; and Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Motivation for no further study requirements and no Impact Assessment	Appendix E.7
5 Terrestrial Biodiversity Impact Assessment	PV and Substation	Yes	Very High	Low, Medium, and Very High	Protocol GN 320: Part B: Biodiversity (Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Terrestrial Biodiversity): Impact Assessment	Appendix E.2

¹¹ The sensitivity is described for the study area. However, the footprints avoid all no-go areas. Refer to Appendix E for additional information.

Specialist Assessment Required by the Screening Tool	Applicable to PV and/or Substation based on Screening Tool List?	Study undertaken in Scoping and EIA Process?	Sensitivity allocated on the Screening Tool [Study Area]	Verified Sensitivity by the Specialist/EAP [Study Area] ¹¹	Type of Assessment undertaken in Scoping and EIA Process or Motivation/Feedback for not undertaking the recommended study	Appendix of EIA Report for Specialist Report (including SSV)
					Note that the reporting for Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species are combined in one report.	
6	Aquatic Biodiversity Impact Assessment	PV and Substation	Yes	Very High	Very High and High Protocol GN 320: Part B: Biodiversity (Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Aquatic Biodiversity): Impact Assessment Note that the reporting for Aquatic Biodiversity and Species are combined in one report.	Appendix E.3
7	Civil Aviation Assessment	PV only	Yes (Site Sensitivity Verification only)	Low	Low Protocol GN 320: Part B: Civil Aviation (Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Civil Aviation Installations): Site Sensitivity Verification	Appendix E.13
8	Defence Assessment	PV only	Yes (Site Sensitivity Verification only)	Low	Low Protocol GN 320: Part B: Defence (Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Defence Installations): Site Sensitivity Verification	Appendix E.14
9	Radio Frequency Interference (RFI) Assessment	PV only	No	Low	Low The Screening Tool indicates that the proposed project area is of low sensitivity in terms of RFI with regards to Solar PV developments. This is agreed with as the proposed projects are located outside of the KCAAA and thus not expected to impact significantly on the SKA. Therefore, it is proposed not to undertake an RFI Assessment. Refer to additional information in Section 4.4.4 below.	Not applicable
10	Geotechnical Assessment	PV and Substation	Yes (Letter of Professional Opinion)	Not Applicable	Not Applicable Letter of Professional Opinion Refer to additional information in Section 4.4.3 below.	Appendix E.11

Specialist Assessment Required by the Screening Tool		Applicable to PV and/or Substation based on Screening Tool List?	Study undertaken in Scoping and EIA Process?	Sensitivity allocated on the Screening Tool [Study Area]	Verified Sensitivity by the Specialist/EAP [Study Area] ¹¹	Type of Assessment undertaken in Scoping and EIA Process or Motivation/Feedback for not undertaking the recommended study	Appendix of EIA Report for Specialist Report (including SSV)
						There are no themes on the Screening Tool that currently relate to Geotechnical features that could be verified on site. Hence Part A of GN 320 (Site Sensitivity Verification) is not applicable in this regard.	
11	Socio-Economic Assessment	PV only	Yes	Not Applicable	Not Applicable	Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment There are no themes on the Screening Tool that currently relate to Socio-Economic features that could be verified on site. Hence Part A of GN 320 (Site Sensitivity Verification) is not applicable in this regard.	Appendix E.8
12	Plant Species Assessment	PV and Substation	Yes	Low	Low	Protocol GN 1150: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Plant Species. This applies to Terrestrial species in this regard: Compliance Statement Note that the reporting for Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species are combined in one report.	Appendix E.2
13	Animal Species Assessment	PV and Substation	Yes	High (Birds) and Medium (Mammals)	Medium for Mammals (Birds are assessed separately as discussed below)	Protocol GN 1150: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Animal Species. This applies to Terrestrial species in this regard: Compliance Statement Note that the reporting for Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species are combined in one report.	Appendix E.2

Table 4.6: List of Specialist Assessments identified by the Screening Tool for the proposed Biesjesvlei BESS 1 (Project 4)

Specialist Assessment Required by the Screening Tool		Applicable to BESS and/or Substation based on Screening Tool List?	Study undertaken in Scoping and EIA Process?	Sensitivity allocated on the Screening Tool [Study Area]	Verified Sensitivity by the Specialist/EAP [Study Area] ¹²	Type of Assessment undertaken in Scoping and EIA Process or Motivation/Feedback for not undertaking the recommended study	Appendix of EIA Report for Specialist Report (including SSV)
1	Agricultural Impact Assessment	Substation only	Yes	Very High, High, and mainly Medium and Low	Medium and Low	Protocol GN 320: Part B: Agriculture (Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Agricultural Resources): Compliance Statement	Appendix E.1
2	Landscape/Visual Impact Assessment	BESS only	Yes	Not allocated. No theme for this methodology.	Mainly Low and Medium	Protocol GN 320: Part A: Site Sensitivity Verification; and Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment	Appendix E.5
3	Archaeological and Cultural Heritage Impact Assessment	BESS and Substation	Yes	Low	Low (with small pockets of Medium to Very High)	Protocol GN 320: Part A: Site Sensitivity Verification; and Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment	Appendix E.6
4	Palaeontology Impact Assessment	BESS and Substation	Yes (Site Sensitivity Verification only)	Medium and Very High	Low and Very Low	Protocol GN 320: Part A: Site Sensitivity Verification; and Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Motivation for no further study requirements and no Impact Assessment	Appendix E.7
5	Terrestrial Biodiversity Impact Assessment	BESS and Substation	Yes	Very High	Low, Medium, and Very High	Protocol GN 320: Part B: Biodiversity (Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Terrestrial Biodiversity): Impact Assessment Note that the reporting for Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species are combined in one report.	Appendix E.2
6	Aquatic Biodiversity Impact Assessment	BESS and Substation	Yes	Very High	Very High and High	Protocol GN 320: Part B: Biodiversity (Protocol for the Specialist Assessment and Minimum Report Content Requirements of	Appendix E.3

¹² The sensitivity is described for the study area. However, the footprints avoid all no-go areas. Refer to Appendix E for additional information.

Specialist Assessment Required by the Screening Tool		Applicable to BESS and/or Substation based on Screening Tool List?	Study undertaken in Scoping and EIA Process?	Sensitivity allocated on the Screening Tool [Study Area]	Verified Sensitivity by the Specialist/EAP [Study Area] ¹²	Type of Assessment undertaken in Scoping and EIA Process or Motivation/Feedback for not undertaking the recommended study	Appendix of EIA Report for Specialist Report (including SSV)
						Environmental Impacts on Aquatic Biodiversity): Impact Assessment Note that the reporting for Aquatic Biodiversity and Species are combined in one report.	
7	Geotechnical Assessment	Substation only	Yes (Letter of Professional Opinion)	Not Applicable	Not Applicable	Letter of Professional Opinion Refer to additional information in Section 4.4.3 below. There are no themes on the Screening Tool that currently relate to Geotechnical features that could be verified on site. Hence Part A of GN 320 (Site Sensitivity Verification) is not applicable in this regard.	Appendix E.11
8	Socio-Economic Assessment	BESS only	Yes	Not Applicable	Not Applicable	Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment There are no themes on the Screening Tool that currently relate to Socio-Economic features that could be verified on site. Hence Part A of GN 320 (Site Sensitivity Verification) is not applicable in this regard.	Appendix E.8
9	Plant Species Assessment	BESS and Substation	Yes	Low	Low	Protocol GN 1150: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Plant Species. This applies to Terrestrial species in this regard: Compliance Statement Note that the reporting for Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species are combined in one report.	Appendix E.2
10	Animal Species Assessment	BESS and Substation	Yes	High (Birds) and Medium (Mammals)	Medium for Mammals (Birds are assessed separately as	Protocol GN 1150: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Animal Species. This applies to Terrestrial species in this regard: Compliance Statement	Appendix E.2

Specialist Assessment Required by the Screening Tool	Applicable to BESS and/or Substation based on Screening Tool List?	Study undertaken in Scoping and EIA Process?	Sensitivity allocated on the Screening Tool [Study Area]	Verified Sensitivity by the Specialist/EAP [Study Area] ¹²	Type of Assessment undertaken in Scoping and EIA Process or Motivation/Feedback for not undertaking the recommended study	Appendix of EIA Report for Specialist Report (including SSV)
				discussed below)	Note that the reporting for Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species are combined in one report.	

Table 4.7: List of Specialist Assessments identified by the Screening Tool for the proposed Biesjesvlei EGI 1 (Project 7)

Specialist Assessment Required by the Screening Tool	Applicable to Power Line and/or Substation based on Screening Tool List?	Study undertaken in Scoping and EIA Process?	Sensitivity allocated on the Screening Tool [Study Area]	Verified Sensitivity by the Specialist/EAP [Study Area] ¹³	Type of Assessment undertaken in Scoping and EIA Process or Motivation/Feedback for not undertaking the recommended study	Appendix of EIA Report for Specialist Report (including SSV)
1 Agricultural Impact Assessment	Power Line and Substation	Yes	Very High, High, and mainly Medium and Low	Medium and Low	Protocol GN 320: Part B: Agriculture (Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Agricultural Resources): Compliance Statement	Appendix E.1
2 Landscape/Visual Impact Assessment	Power Line only	Yes	Not allocated. No theme for this methodology.	Mainly Low and Medium	Protocol GN 320: Part A: Site Sensitivity Verification; and Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment	Appendix E.5
3 Archaeological and Cultural Heritage Impact Assessment	Power Line and Substation	Yes	Low	Low (with small pockets of Medium to Very High)	Protocol GN 320: Part A: Site Sensitivity Verification; and Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment	Appendix E.6
4 Palaeontology Impact Assessment	Power Line and Substation	Yes (Site Sensitivity Verification only)	Medium and Very High	Low and Very Low	Protocol GN 320: Part A: Site Sensitivity Verification; and Appendix 6 of the 2014 NEMA EIA Regulations (as amended):	Appendix E.7

¹³ The sensitivity is described for the study area. However, the footprints avoid all no-go areas. Refer to Appendix E for additional information.

Specialist Assessment Required by the Screening Tool	Applicable to Power Line and/or Substation based on Screening Tool List?	Study undertaken in Scoping and EIA Process?	Sensitivity allocated on the Screening Tool [Study Area]	Verified Sensitivity by the Specialist/EAP [Study Area] ¹³	Type of Assessment undertaken in Scoping and EIA Process or Motivation/Feedback for not undertaking the recommended study	Appendix of EIA Report for Specialist Report (including SSV)
					Motivation for no further study requirements and no Impact Assessment	
5	Terrestrial Biodiversity Impact Assessment	Power Line and Substation	Yes	Very High	Low, Medium, and Very High Protocol GN 320: Part B: Biodiversity (Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Terrestrial Biodiversity): Impact Assessment Note that the reporting for Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species are combined in one report.	Appendix E.2
6	Aquatic Biodiversity Impact Assessment	Power Line and Substation	Yes	Very High	Very High and High Protocol GN 320: Part B: Biodiversity (Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Aquatic Biodiversity): Impact Assessment Note that the reporting for Aquatic Biodiversity and Species are combined in one report.	Appendix E.3
7	Avian Impact Assessment	Power Line only	Yes	Not allocated. No theme for this methodology.	High, High-Medium, Medium and Low Protocol GN 1150: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Animal Species: Impact Assessment	Appendix E.4
8	Civil Aviation Assessment	Power Line only	Yes (Site Sensitivity Verification only)	Low	Low Protocol GN 320: Part B: Civil Aviation (Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Civil Aviation Installations): Site Sensitivity Verification	Appendix E.13
9	Radio Frequency Interference (RFI) Assessment	Power Line only	No	Not allocated. No theme for this methodology.	Low The proposed projects are located outside of the KCAAA and thus not expected to impact significantly on the SKA. Therefore, it is	Not applicable

Specialist Assessment Required by the Screening Tool		Applicable to Power Line and/or Substation based on Screening Tool List?	Study undertaken in Scoping and EIA Process?	Sensitivity allocated on the Screening Tool [Study Area]	Verified Sensitivity by the Specialist/EAP [Study Area] ¹³	Type of Assessment undertaken in Scoping and EIA Process or Motivation/Feedback for not undertaking the recommended study	Appendix of EIA Report for Specialist Report (including SSV)
						proposed not to undertake an RFI Assessment. Refer to additional information in Section 4.4.4 below.	
10	Geotechnical Assessment	Power Line and Substation	Yes (Letter of Professional Opinion)	Not Applicable	Not Applicable	Letter of Professional Opinion Refer to additional information in Section 4.4.3 below. There are no themes on the Screening Tool that currently relate to Geotechnical features that could be verified on site. Hence Part A of GN 320 (Site Sensitivity Verification) is not applicable in this regard.	Appendix E.11
11	Plant Species Assessment	Power Line and Substation	Yes	Low	Low	Protocol GN 1150: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Plant Species. This applies to Terrestrial species in this regard: Compliance Statement Note that the reporting for Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species are combined in one report.	Appendix E.2
12	Animal Species Assessment	Power Line and Substation	Yes	High (Birds) and Medium (Mammals)	Medium for Mammals (Birds are assessed separately as discussed above)	Protocol GN 1150: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Animal Species. This applies to Terrestrial species in this regard: Compliance Statement Note that the reporting for Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species are combined in one report.	Appendix E.2

4.4.2 Additional Specialist Assessments

It must be noted that the Screening Tool did not identify the need for the following specialist assessments for the respective projects, however these studies have been commissioned as part of the Scoping and EIA Process to ensure that all potential impacts resulting from the proposed projects are considered as best as possible. Refer to Table 4.8 for additional information.

Table 4.8: List of Additional Specialist Assessments undertaken

Study undertaken in Scoping and EIA Process	Relevant to Specific Project?	Type of Assessment undertaken in Scoping and EIA Process	Appendix of EIA Report for the Specialist Assessment (including SSV)
Avifauna Impact Assessment	- Project 1 – Biesjesvlei PV1 - Project 4 – Biesjesvlei BESS 1 - Project 7 – Biesjesvlei EGI 1. Note that the Screening Tool does require this study for power line developments. However, this study will also address the substation and associated infrastructure.	Protocol GN 1150: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Animal Species. This applies to Terrestrial species in this regard: Impact Assessment	Appendix E.4
Traffic Impact Assessment	- Project 1 – Biesjesvlei PV1 - Project 4 – Biesjesvlei BESS 1	Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment There are no themes on the Screening Tool that currently relate to traffic features that could be verified on site. Hence Part A of GN 320 (Site Sensitivity Verification) is not applicable in this regard.	Appendix E.9
BESS High Level Safety, Health and Environment Risk Assessment	Project 4 – Biesjesvlei BESS 1	This is a technical report and does not need to fulfil the requirements of the 2014 NEMA EIA Regulations (as amended).	Appendix E.12
Geohydrology Impact Assessment	- Project 1 – Biesjesvlei PV1 - Project 4 – Biesjesvlei BESS 1	Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment There are no themes on the Screening Tool that currently relate to geohydrology features that could be verified on site. Hence Part A of GN 320 (Site Sensitivity Verification) is not applicable in this regard.	Appendix E.10

4.4.3 Geotechnical Letter of Opinion

It was agreed with the DFFE at the Pre-Application Meeting held on 6 October 2023 that a full Geotechnical Assessment in compliance with Appendix 6 of the 2014 NEMA EIA Regulations (as amended) does not need to be undertaken for the proposed projects. Instead, it was agreed with the DFFE at the meeting, that a letter of opinion from a relevant geotechnical specialist would suffice. The letter of opinion is aimed at confirming the specialist's opinion towards the development being authorised, as well as confirming that there are no fatal flaws from a geotechnical perspective. Refer to Appendix C.4 of this EIA Report for a copy of the Pre-Application Meeting Notes. Refer to Appendix E.11 of this EIA Report for a copy of the Geotechnical Letter of Opinion. It is important to also note that the FSR was accepted on this basis i.e. with the Letter of Opinion and no concerns were raised regarding this. Refer to Appendix H of this EIA Report for a copy of the DFFE correspondence confirming acceptance of the FSR.

4.4.4 RFI Assessment

The Screening Tool identified the need for an RFI Assessment for the solar PV project and power line project (i.e. Projects 1 and 7, respectively). However, an RFI Assessment is not being undertaken as part of the Scoping and EIA Process because the proposed projects do not fall within the KCAAA and SKA regions, nor is it located within the Northern Cape, and thus it is not expected to have a significant impact on the SKA. Refer to the locality map provided in Chapter 1 of this EIA Report for additional information. Furthermore, the Screening Tool identifies that the study area is low sensitivity for the RFI theme (for Solar PV). This sensitivity is agreed with and not disputed. Based on this, the EAP is of the opinion that an RFI Assessment is not warranted.

This motivation for exclusion was acknowledged and agreed to by the DFFE during the Pre-Application Meeting on 6 October 2023. Refer to Appendix C.4 of this EIA Report for a copy of the Pre-Application Meeting Notes. It is important to also note that the FSR was accepted on this basis i.e. with the motivation not to undertake this study as part of the Scoping and EIA Process and no concerns were raised regarding this. Refer to Appendix H of this EIA Report for a copy of the DFFE correspondence confirming acceptance of the FSR.

The SARAO was also contacted during the Pre-Application Phase to confirm the risk of interference of the proposed projects to the nearest SKA radio telescope; and to determine if SARAO has any objection to the proposed development. SARAO confirmed that the proposed projects are low risk to the SKA. This further supports the motivation for not undertaking an RFI Assessment. The SARAO correspondence is included in Appendix P of this EIA Report. Refer to Section 4.2.1.17 of this chapter for additional information.

4.4.5 Summary of Specialist Assessments being undertaken

Table 4.9 provides an overall summary of all the specialist assessments and inputs that were undertaken for the proposed projects, including feedback on the level of assessment based on the SSVs undertaken by the specialists or EAP, where relevant.

Table 4.9: Summary of Specialist Assessments undertaken

Specialist Assessment undertaken		Required by Screening Tool or Additional?	Relevant to Specific Project?	Level of Assessment during the EIA Phase	Appendix of EIA Report for Specialist Assessment (including SSV)	Reporting Structure for the EIA Phase
1	Agriculture	- Screening Tool for Solar PV, Power Line and Substations - Additional for BESS	- Project 1 – Biesjesvlei PV1 - Project 4 – Biesjesvlei BESS 1 - Project 7 – Biesjesvlei EGI 1	Compliance Statement	Appendix E.1	1 * Report to address Projects 1, 4 and 7
2	Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species	Screening Tool	- Project 1 – Biesjesvlei PV1 - Project 4 – Biesjesvlei BESS 1 - Project 7 – Biesjesvlei EGI 1	- Terrestrial Biodiversity: Impact Assessment - Terrestrial Plant Species: Compliance Statement - Terrestrial Animal Species: Compliance Statement	Appendix E.2	1 * Report to address Projects 1, 4 and 7 (with Compliance Statements as appendices where relevant)
3	Aquatic Biodiversity and Species	Screening Tool	- Project 1 – Biesjesvlei PV1 - Project 4 – Biesjesvlei BESS 1 - Project 7 – Biesjesvlei EGI 1	Aquatic Biodiversity and Species: Impact Assessment	Appendix E.3	1 * Report to address Projects 1, 4 and 7
4	Avifauna	- Screening Tool for Power Line - Additional for Solar PV, BESS, and EGI (Substations)	- Project 1 – Biesjesvlei PV1 - Project 4 – Biesjesvlei BESS 1 - Project 7 – Biesjesvlei EGI 1	Impact Assessment	Appendix E.4	1 * Report to address Projects 1, 4 and 7
5	Visual	- Screening Tool for Solar PV, Power Line and BESS - Additional for EGI (Substations)	- Project 1 – Biesjesvlei PV1 - Project 4 – Biesjesvlei BESS 1 - Project 7 – Biesjesvlei EGI 1	Impact Assessment	Appendix E.5	1 * Report to address Projects 1, 4 and 7
6	Heritage (Archaeology and Cultural Heritage)	Screening Tool	- Project 1 – Biesjesvlei PV1 - Project 4 – Biesjesvlei BESS 1 - Project 7 – Biesjesvlei EGI 1	Impact Assessment	Appendix E.6	1 * Report to address Projects 1, 4 and 7
7	Palaeontology	Screening Tool	Projects 1 to 10 – Biesjesvlei PV1-3; BESS 1-3; EGI 1-3 MTS, and LILO	Site Sensitivity Verification and motivation for no further Palaeontology Impact Assessment	Appendix E.7	1 * Report to address Projects 1 to 10

	Specialist Assessment undertaken	Required by Screening Tool or Additional?	Relevant to Specific Project?	Level of Assessment during the EIA Phase	Appendix of EIA Report for Specialist Assessment (including SSV)	Reporting Structure for the EIA Phase
8	Socio-Economic	Screening Tool for Solar PV and BESS	- Project 1 – Biesjesvlei PV1 - Project 4 – Biesjesvlei BESS 1	Impact Assessment	Appendix E.8	1 * Report to address Projects 1 and 4
9	Traffic	Additional for Solar PV and BESS	- Project 1 – Biesjesvlei PV1 - Project 4 – Biesjesvlei BESS 1	Impact Assessment	Appendix E.9	1 * Report to address Projects 1 and 4
10	Geohydrology	Additional for Solar PV and BESS	- Project 1 – Biesjesvlei PV1 - Project 4 – Biesjesvlei BESS 1	Impact Assessment	Appendix E.10	1 * Report to address Projects 1 and 4
11	Geotechnical Letter of Opinion	- Screening Tool for Solar PV, Power Line and Substations - Additional for BESS	Projects 1 to 10 – Biesjesvlei PV1-3; BESS 1-3; EGI 1-3 MTS, and LILO	Letter of Opinion	Appendix E.11	1 * Report to address Projects 1 to 10
12	BESS High Level Risk Assessment	Additional for BESS	Project 4 – Biesjesvlei BESS 1	Technical Study	Appendix E.12	1 * Report to address Project 4
13	Civil Aviation	- Screening Tool for Solar PV and Power Line - Additional for BESS and EGI (Substations)	- Project 1 – Biesjesvlei PV1 - Project 4 – Biesjesvlei BESS 1 - Project 7 – Biesjesvlei EGI 1	Site Sensitivity Verification	Appendix E.13	1 * Report to address Projects 1, 4 and 7
14	Defence	Screening Tool for Solar PV	Project 1 – Biesjesvlei PV1	Site Sensitivity Verification	Appendix E.14	1 * Report to address Project 1

4.5 Overview of Approach to Preparing the EIA Report and EMPr

The EIA Reports have been compiled in line with the requirements of Appendix 3 of the 2014 NEMA EIA Regulations (as amended). Refer to Chapter 1 of this EIA Report for feedback on how these requirements have been met.

The specialist studies / inputs / technical studies / letters of opinion have been undertaken based on compliance with relevant legislation and based on the Terms of Reference indicated in Section 4.10 of this chapter, as well as Chapters 6 to 19 of this EIA Report, where relevant. The results of the specialist studies / inputs / technical studies / letters of opinion and other relevant project information, as well as research undertaken for the proposed projects have been integrated into the EIA Reports.

As indicated in Chapter 1 of this EIA Report, combined reporting has been approved by the DFFE for Projects 1 to 9. Project 10 is subjected to separate reporting. Overall, four separate EIA Reports have been compiled. The Draft EIA Reports were released for a 30-day I&AP and authority comment period, which extended from 2 August 2024 to 2 September 2024 (excluding public holidays). I&APs registered on the project database were notified in writing of the release of the Draft EIA Reports for comment.

Comments raised through written correspondence (emails and letters) have been captured in a Comments and Responses Report that is included in Appendix I.7 of this Final EIA Report that has been submitted to the DFFE for decision-making. Refer to Section 4.6 of this chapter for additional information regarding this process.

The EIA Reports include EMPrs (Appendix J to Appendix O) which have been prepared in compliance with the relevant regulations. The content of an EMPr must either contain the information set out in Appendix 4 of the 2014 NEMA EIA Regulations (as amended) or must be a Generic EMPr relevant to an application as identified and gazetted by the Minister in a GN. As part of the 2016 EGI SEA, a Generic EMPr was compiled for the development and expansion of (a) overhead electricity transmission and distribution infrastructure; and (b) substation infrastructure for the transmission and distribution of electricity. On 2 March 2018, these two Generic EMPrs were gazetted in GG 41473, GN 162 and GN 163, for public comment for a period of 45 days. On 22 March 2019, these two Generic EMPrs were gazetted for implementation, in GG 42323, GN 435.

The following EMPrs have been compiled for the proposed projects and comply with the following legislation noted in Table 4.10.

Table 4.10: EMPrs compiled in the EIA Phase

Projects	Environmental Management Programmes
PROJECT 1: The proposed development of a Solar Photovoltaic (PV) Facility and associated infrastructure (i.e. Biesjesvlei PV1).	- EMPr for the PV Facility (Appendix 4 of the 2014 NEMA EIA Regulations (as amended)). This is included in Appendix J of the EIA Report. - Generic EMPr for the PV Facility IPP Substation (GG 42323, GN 435, Generic EMPr for Substations). This is included in Appendix K of the EIA Report.
PROJECT 4: The proposed development of a Battery Energy Storage System (BESS) and associated infrastructure for Biesjesvlei PV1 (Biesjesvlei BESS 1).	- EMPr for the BESS (Appendix 4 of the 2014 NEMA EIA Regulations (as amended)). This is included in Appendix L of the EIA Report. - Generic EMPr for the BESS IPP Substation (GG 42323, GN 435, Generic EMPr for Substations). This is included in Appendix M of the EIA Report.
PROJECT 7: The proposed development of a 132 kV Overhead Power Line from the on-site substation to the proposed Main Transmission Substation (MTS) and associated infrastructure (Biesjesvlei EGI 1).	- Generic EMPr for the Switching Station (GG 42323, GN 435, Generic EMPr for Substations). This is included in Appendix N of the EIA Report. - Generic EMPr for the 132 kV Overhead Power Line (GG 42323, GN 435, Generic EMPr for Power Lines). This is included in Appendix O of the EIA Report.

The EMPrs compiled for these proposed projects therefore separately comply with Appendix 4 of the 2014 NEMA EIA Regulations (as amended) for the proposed Solar PV facility and associated infrastructure, and BESS facility and associated infrastructure; the requirements of the gazetted EMPr for substation infrastructure (Gazette 42323, GN 435) for the PV Facility Independent Power Producer (IPP) Substation, BESS IPP Substation, and Switching Station (as Activity 11 of Listing Notice 1 is included in these applications); as well as the requirements of the gazetted EMPr for overhead power line infrastructure (Gazette 42323, GN 435) for the 132 kV overhead power line (as Activity 11 of Listing Notice 1 is included in these applications).

The EMPrs are based broadly on the environmental management philosophy presented in the ISO 14001 standard, which embodies an approach of continual improvement. Actions in the EMPr have been drawn primarily from the impact management actions in the specialist assessments for the construction and operational phases of the projects. If the project components are decommissioned or re-developed this will need to be done in accordance with the relevant environmental standards and clean-up/remediation requirements applicable at the time. However, general management actions for the decommissioning phase have been provided.

4.6 Public Participation Process

4.6.1 Introduction to the PPP

This section provides an overview of the tasks that have been undertaken in the EIA Phase, with a particular emphasis on providing a clear record of the PPP that has been followed. An integrated PPP was undertaken for all the Biesjesvlei Solar PV, BESS, EGI, MTS and Loop-In-Loop-Out (LILO) projects (Projects 1 to 10), as confirmed with the DFFE during the Pre-Application Meeting on 6 October 2023. The information presented in Section 4.6 of this chapter applies to all 10 projects.

The integrated PPP for the proposed projects ensured that all public participation documents (such as newspaper advertisements, site notices, notification letters, emails etc.) served to notify I&APs, Stakeholders and Organs of State of the joint availability of reports for the abovementioned projects and provided I&APs with an opportunity to comment on the reports. This approach was undertaken due to the proximity of the sites (i.e. the proposed projects will take place within the same geographical area) and that proposed projects entail the same type of activity (i.e. generation of energy using a renewable source (i.e. Solar PV); storing and dispatching of electricity (BESS); and transmission and distribution of electricity via power lines and the MTS.

The PPP was driven by a stakeholder engagement process that included inputs from authorities, I&APs, technical specialists and the Project Developer. Guideline 4 on “*Public Participation in support of the EIA Regulations*” published by the former Department of Environmental Affairs and Tourism (DEAT) in May 2006, states that public participation is one of the most important aspects of the Environmental Assessment Process. This stems from the requirement that people have a right to be informed about potential decisions that may affect them and that they must be afforded an opportunity to influence those decisions. Effective public participation also improves the ability of the Competent Authority to make informed decisions and results in improved decision-making as the view of all parties are considered.

An effective PPP could therefore result in stakeholders working together to produce better decisions than if they had worked independently. The DEAT guideline states the following in terms of PPP:

- *“Provides an opportunity for I&APs, EAPs and the Competent Authority to obtain clear, accurate and understandable information about the environmental impacts of the proposed activity or implications of a decision;*
 - *Provides I&APs with an opportunity to voice their support, concern and question regarding the project, application or decision;*
 - *Enables an applicant to incorporate the needs, preferences and values of affected parties into its application;*
 - *Provides opportunities for clearing up misunderstanding about technical issues, resolving disputes and reconciling conflicting interests;*
 - *Is an important aspect of securing transparency and accountability in decision-making; and*
 - *Contributes toward maintaining a health, vibrant democracy.”*

To the above, one can add the following universally recognised principles for public participation:

- Inclusive consultation that enables all sectors of society to participate in the consultation and assessment processes;
- Provision of accurate and easily accessible information in a language that is clear and sufficiently non-technical for I&APs to understand, and that is sufficient to enable meaningful participation;
- Active empowerment of grassroots people to understand concepts and information with a view to active and meaningful participation;
- Use of a variety of methods for information dissemination in order to improve accessibility, for example, by way of discussion, documents, meetings, workshops, focus group discussions, and the printed and broadcast media;
- Affording I&APs sufficient time to study material, to exchange information, and to make contributions at various stages during the assessment process;
- Provision of opportunities for I&APs to provide their inputs via a range of methods, for example, via briefing sessions, public meetings, written submissions or direct contact with members of the EIA team; and
- Public participation is a process and vehicle to provide sufficient and accessible information to I&APs in an objective manner to assist I&APs to identify issues of concern, to identify alternatives, to suggest opportunities to reduce potentially negative or enhance potentially positive impacts, and to verify that issues and/or inputs have been captured and addressed during the assessment process.

At the outset it is important to highlight two key aspects of public participation:

- There are practical and financial limitations to the involvement of all individuals within a PPP. Hence, the PPP aims to generate issues that are representative of societal sectors, not each individual and has been designed to be inclusive of a broad range of sectors relevant to the proposed projects; and
- The PPP aims to raise a diversity of perspectives and was not designed to force consensus amongst I&APs. Indeed, diversity of opinion rather than consensus building is likely to enrich ultimate decision-making. Therefore, where possible, the PPP aims to obtain an indication of trade-offs that all stakeholders (i.e. I&APs, technical specialists, the authorities and the development proponent) are willing to accept with regard to the ecological sustainability, social equity and economic growth associated with the projects.

The Department of Environmental Affairs (2017) Public Participation guideline in terms of the NEMA EIA Regulations was also considered throughout this Scoping and EIA Process.

It is important to note that proof of PPP undertaken during the **Scoping Phase** is captured in Appendix G of this EIA Report. The following appendices are relevant:

- Appendix G.1: Copies of the content of and proof of placement of the site notice boards;
- Appendix G.2: Copies of the content of and proof of placement of the newspaper advertisements for the release of the Draft Scoping Reports;
- Appendix G.3: Correspondence with the Free State DESTEA prior to the release of the Draft Scoping Reports;

- Appendix G.4: Correspondence and proof of correspondence sent to stakeholders for the release of the Draft Scoping Reports;
- Appendix G.5: Proof of submission of the Draft Scoping Reports and original Application Forms to the DFFE;
- Appendix G.6: Comments received from stakeholders prior to and during the 30-day review of the Draft Scoping Reports;
- Appendix G.7: **[Scoping Phase]** Comments and Responses Trail for comments received prior to and during the 30-day review of the Draft Scoping Reports;
- Appendix G.8: Proof of submission of the FSRs to the DFFE for consideration;
- Appendix G.9: Correspondence and proof of correspondence sent to stakeholders for the notification of the submission of the FSRs to the DFFE for consideration;
- Appendix G.10: Correspondence and proof of correspondence sent to stakeholders for the notification of the acceptance of the FSRs by the DFFE; and
- Appendix H: DFFE FSR Acceptance Letter.

Proof of PPP undertaken during the **EIA Phase** is captured in Appendix I of this EIA Report. The EIA Phase PPP is discussed below.

The key steps in the PPP for this Scoping and EIA Process are described below and also illustrated in Figure 4.1. This approach is structured in line with the requirements of Chapter 6 (PPP) of the 2014 NEMA EIA Regulations (as amended, i.e. GN R326), as described below. Various mechanisms have been undertaken to provide notice to all potential and registered I&APs of the proposed projects, as described below.

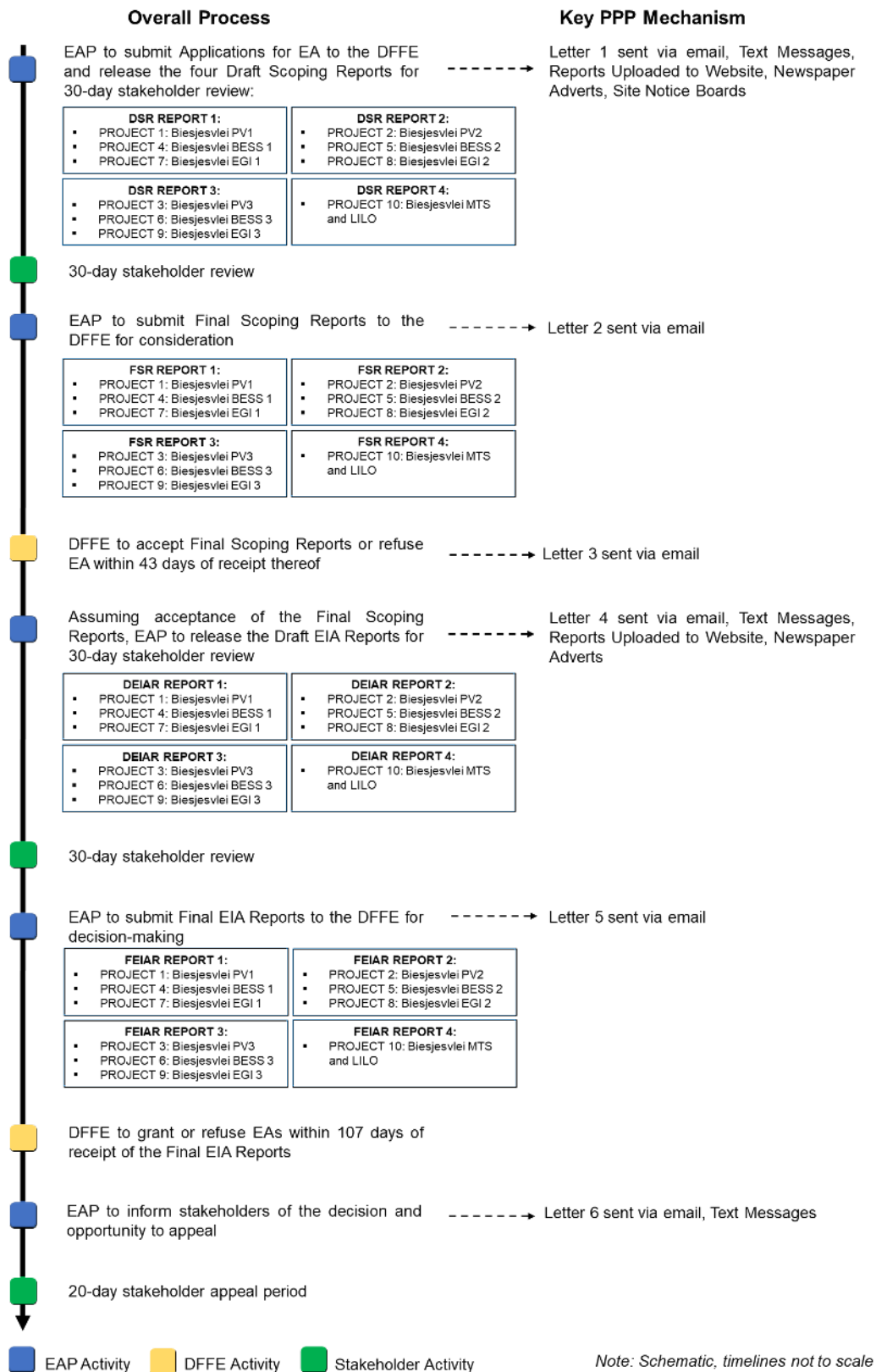


Figure 4.1: Overview of the Scoping and EIA Process and PPP.

4.6.2 Pre-Application Consultation with the DFFE

4.6.2.1 Pre-Application Meeting with the DFFE

A request for a Pre-Application Meeting was submitted to the DFFE on 12 September 2023 after which the EAP received a response from the DFFE on 18 September 2023 (Reference Number: 2023-09-0012). The Pre-Application Meeting was scheduled for and took place on 6 October 2023. The Pre-Application Meeting was undertaken in order to discuss and agree on various aspects prior to release of the Draft Scoping Report for a 30-day review period. The following points were discussed with the DFFE:

- Description of the proposed projects;
- Discussion on the specialist assessments to be undertaken; and those that will be motivated against being undertaken;
- Discussion on the approach towards the Environmental Assessment and Specialist Assessment reporting, including a request for combination of the projects, in terms of Regulation 11 of the 2014 NEMA EIA Regulations (as amended), and the issuing of multiple (i.e., 10) EAs (should they be granted) in terms of Regulations 25 (1) and (2) of the 2014 NEMA EIA Regulations (as amended);
- Discussion of the proposed Public Participation Process that will be undertaken for all 10 projects; and
- Discussion of the proposed schedule and overall process for the EIA Processes.

Refer to Appendix C.1 of this EIA Report for the proof of submission of the Pre-Application Meeting Request Form to the DFFE; Appendix C.2 for DFFE's acknowledgement of the Pre-Application Meeting Request Form; Appendix C.3 for a copy of the presentation delivered at the Pre-Application Meeting; Appendix C.4 for a copy of the Pre-Application Meeting Notes; Appendix C.5 for the submission of the Pre-Application Meeting Notes to the DFFE; and Appendix C.6 for a copy of correspondence from the DFFE with approval of the Pre-Application Meeting Notes. The Pre-Application Meeting Notes were submitted to the DFFE via email on 11 October 2023 and approved by the DFFE on 24 October 2023.

4.6.2.2 Request for Report Combination and Multiple EAs

As noted above and in Chapter 1 of this EIA Report, a request for report combination and multiple EA approach was also discussed with the DFFE during the Pre-Application Meeting, which was formally submitted to the DFFE in a letter dated 11 October 2023. On 6 November 2023, the DFFE accepted the approach for combination of the Scoping, EIA and Specialist Reports for Projects 1 to 9, and the issuance of multiple EAs for the proposed projects (should they be granted). A copy of this acceptance letter from the DFFE is included in Appendix C.7 of this EIA Report.

Project 10 (Biesjesvlei MTS and LILO) is being treated as a single report and an agreement in terms of Section 24 C (3) (b) of NEMA was obtained by the DFFE to agree with the Free State DESTEA that the DFFE can serve as the Competent Authority for this specific project (i.e. Project 10). Refer to Appendix C.8 of the **separate** EIA Report for **Project 10** (Biesjesvlei MTS and LILO) for a copy of this agreement.

4.6.3 Landowner Written Consent

Regulation 39 (1) of the 2014 NEMA EIA Regulations (as amended) states that *“if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land”*.

Regulation 39 (2) of the 2014 NEMA EIA Regulations (as amended) further states that *“sub-regulation (1) does not apply in respect of: (a) linear activities; (b) activities constituting, or activities directly related to prospecting or exploration of a mineral and petroleum resource or extraction and primary processing of a mineral or petroleum resource; and (c) strategic integrated projects as contemplated in the Infrastructure Development Act, 2014”*.

The proposed projects include several non-linear activities for which landowner consent is required for the affected properties listed in Chapter 2 of this EIA Report.

There have been no changes to the legislation regarding the above, therefore written consent was obtained from the respective landowners of the affected farm portions on which the non-linear infrastructure is proposed to be located. The written consent was included as an appendix to the original Applications for EA, which were submitted to the DFFE, together with the Draft Scoping Report for comment on 8 March 2024. As noted in Section 4.3 of this chapter, Amended Applications for EA were required at the Draft EIA Report stage due to updated descriptions of the applicability of the relevant listed activities. The DFFE Landowner Consent Forms also require the list of listed activities. Therefore, updated landowner consent forms were sought and attached the Amended Applications for EA, which were submitted to the DFFE together with the Draft EIA Report on 2 August 2024.

4.6.4 Determination of Appropriate Consultation Measures, and I&AP Identification, Registration and the Creation of an Electronic Database

In order to accommodate the varying needs of I&APs and develop their capacity to participate in the process, information sharing forms an integral and ongoing component of the EIA Process to ensure effective public participation.

In line with Regulation 42 of the 2014 NEMA EIA Regulations (as amended) and prior to the commencement of the Scoping and EIA Processes, an initial database of I&APs (including key stakeholders and Organs of State) was developed. This was undertaken based on research. Appendix F of this EIA Report includes a copy of the latest I&AP Database, which has been updated throughout the Scoping and EIA Processes based on requests for registration and de-registration received, as well as based on stakeholders providing comments, stakeholders communicated with, and additional research to obtain valid email addresses, where possible.

In line with Regulation 41 (2) (b) of 2014 NEMA EIA Regulations (as amended), the database includes the details of the following:

- Landowners of the affected and adjacent farm portions for the study area;
- Occupiers of the affected and adjacent farm portions, where relevant. Most of the landowners have confirmed that there are no other occupiers on the properties;
- The municipal councillor of the ward in which the proposed projects will be undertaken;
- The municipality which has jurisdiction in the area (i.e. Mohokare Local Municipality and XDM);
- Relevant Organs of State that have jurisdiction in respect of any aspect of the activity (e.g. the Free State DESTEA, DWS, DALRRD, Eskom etc.); and
- Any other party as required by the Competent Authority.

In addition, the I&AP database includes the Competent Authority (i.e. the DFFE); and potential and registered I&APs.

While I&APs have been encouraged to register their interest in the project from the start of the process, following the public announcements, the identification and registration of I&APs was ongoing for the duration of the study. Stakeholders from a variety of sectors, geographical locations and/or interest groups were expected to show an interest in the proposed project, for example:

- Provincial and Local Government Departments;
- Local interest groups, for example, Councillors and Rate Payers associations;
- Surrounding landowners;
- Farmer Organisations;
- Environmental Groups and NGOs; and
- Grassroots communities and structures.

As per Regulation 42 of the 2014 NEMA EIA Regulations (as amended), in terms of the electronic database, I&AP details were captured and automatically updated as and when information was distributed to or received from I&APs. This ongoing record of communication is an important component of the PPP. It must be noted that while not required by the regulations, those I&APs proactively identified at the outset of the Scoping and EIA Process have remained on the project database throughout the process and have been kept informed of all opportunities to comment and were only removed from the database by request.

In accordance with the Protection of Personal Information Act (Act 4 of 2013), the CSIR will conduct itself responsibly when collecting, processing, storing and sharing any personal information collected for the purposes of PPP in terms of the 2014 NEMA EIA Regulations (as amended) and the 2014 National Appeal Regulations (as amended). By registering as an I&AP and/or submitting information and comments, the stakeholder essentially consents to the collection, collation, processing, and storing of such information and the use and disclosure of such information for the aforementioned purpose, including for purposes of potential appeal processes whereby such information may be made available to an appellant in the case of an appeal to satisfy the requirements of Regulation 4 of the 2014 National Appeal Regulations (as amended)¹⁴.

The above is maintained on all correspondence sent throughout the EIA Process. The stakeholders were also given an opportunity to send an email to the EAP if they wish to opt out of communications on the proposed projects.

¹⁴ CSIR Privacy Notice. Website: <https://www.csir.co.za/csir-privacy-notice>

4.6.5 Site Notices

One specific mechanism of informing I&APs of the proposed projects includes the placement of site notice boards. Regulation 41 (2) (a) of the 2014 NEMA EIA Regulations (as amended) requires that a notice board providing information on the project and Scoping and EIA Process is fixed at a place that is conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of the site where the application will be undertaken or any alternative site.

Notice boards in the English, Afrikaans, isiXhosa and Sesotho languages were placed at the key affected farm portions on which the proposed projects will be constructed, as well as at other strategic locations, such as well-known retail, public and/or government facilities in the wider region, as indicated in Table 4.11.

Table 4.10: Site Notice Board Placement for the Proposed Projects

Number	Locality / Description	Co-ordinates	
		Latitude	Longitude
1	Intersection of the N6 national road and S1262 gravel provincial road	30° 03' 28.63" S	026° 26' 24.66" E
2	Intersection of the S1262 gravel provincial road and gravel road leading to the study area	30° 03' 43.68" S	026° 25' 54.93" E
3	Along the S119 gravel provincial road on the Remaining Extent of Farm Biesjespoort 521, west of Access Route Option C for the proposed projects	30° 05' 05.33" S	026° 22' 15.63" E
4	Intersection of the S119 gravel provincial road and Access Route Option C for the proposed projects	30° 05' 18.17" S	026° 22' 41.84" E
5	Fence line between Farm Benoni 534 and Remaining Extent of Farm Schoemanskraal 34 just south and west of the area proposed for Biesjesvlei PV2 (Project 2)	30° 07' 24.95" S	026° 20' 32.37" E
6	Along a gravel road running through Portion 1 of Farm Schoemanskraal 34 in the area proposed for Biesjesvlei PV2 (Project 2)	30° 08' 14.41" S	026° 21' 56.41" E
7	At the south-western border of Portion 1 of Farm Schoemanskraal 34 and the proposed Biesjesvlei PV2 (Project 2)	30° 08' 32.63" S	026° 21' 27.46" E
8	Dr De Wet Library, Smithfield	30° 12' 51.55" S	026° 31' 53.75" E
9	Smithfield Magistrate Court	30° 12' 50.12" S	026° 31' 52.83" E
10	Smithfield Post Office	30° 12' 48.58" S	026° 31' 50.89" E
11	Orange Vrystaat Koöperasie (OVK) - Smithfield	30° 12' 46.31" S	026° 31' 55.46" E
12	SASSA (South African Social Security Agency), Smithfield Local Office	30° 12' 54.42" S	026° 32' 12.60" E
13	USave, Smithfield	30° 12' 49.44" S	026° 31' 57.07" E
14	Intersection of the S119 gravel provincial road and Access Route Option A for the proposed projects, in the vicinity of cropland on Farm Salpetervlei 756	30° 06' 08.10" S	026° 24' 27.54" E
15	Intersection of the S119 gravel provincial road and Access Route Option B for the proposed projects on Farm Benoni 534	30° 05' 36.34" S	026° 23' 19.13" E

Refer to Appendix G.1 of this EIA Report for a copy of the content and proof of placement of the site notice boards. The site notice boards include the following, in compliance with Regulation 41 (3) of the 2014 NEMA EIA Regulations (as amended):

- The details of the proposed projects that are subjected to public participation;
- Explanation that a Scoping and EIA procedure is applicable to the proposed projects;
- The nature and location of the proposed projects;
- Details on where further information on the proposed projects can be obtained; and

- The manner in which and the person to whom representations in respect of the proposed projects can be made.

4.6.6 Newspaper Advertisements

Regulation 41 (2) (c) of the 2014 NEMA EIA Regulations (as amended) requires the placement of a newspaper advertisement in one local newspaper or any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of the NEMA EIA Regulations.

In line with this, in order to notify and inform the public of the proposed projects, to invite I&APs to register on the project database, as well as to inform I&APs of the release of the Draft Scoping Reports for comment, the Scoping and EIA Processes were advertised in two local newspapers at the commencement of the 30-day comment period on the Draft Scoping Reports. Specifically, advertisements were placed in the Bloemnuus on 7 March 2024 in the English and Afrikaans languages; and placed in the Express on 6 March 2024 in the isiXhosa and Sesotho languages. The content of the newspaper advertisement complied with Regulation 41 (3) of the 2014 NEMA EIA Regulations (as amended) and also included the details of the project website, where information available on the proposed projects could be downloaded from. Refer to Appendix G.2 of this EIA Report for a copy of the content of and proof of placement of the newspaper advertisements (i.e. tear sheets from the newspaper).

For the EIA Phase, the availability of the EIA Report for the 30-day comment period was also advertised in the same two local newspapers and languages used during the Scoping Phase, as indicated above. Specifically, advertisements were placed in the Bloemnuus on 1 August 2024 in the English and Afrikaans languages; and placed in the Express on 31 July 2024 in the isiXhosa and Sesotho languages. Refer to Appendix I.3 of this EIA Report for a copy of the content of and proof of placement (i.e. tear sheets) of the newspaper advertisements.

There were no official Gazettes published specifically for the purpose of providing public notice of applications or other submissions made in terms of the 2014 NEMA EIA Regulations (as amended).

4.6.7 PPP for the EIA Report Phase

In terms of Regulation 41 (6) of GN R326, the section below outlines the PPP for the EIA Phase of this assessment in order to provide potential I&APs, Stakeholders and Organs of State access to information on the proposed projects and the opportunity to comment at the various stages of the assessment process.

4.6.7.1 Task 1 - I&AP Review of the Draft EIA Report and EMPs

The first stage in the process entailed the release of the Draft EIA Reports for a 30-day comment period, which extended from 2 August 2024 to 2 September 2024 (excluding public holidays). Relevant stakeholders, Organs of State and I&APs were informed of the review period in the manner described below, which summarises the PPP for the review of the Draft EIA Reports.

- **Database Development and Maintenance:** In line with Regulation 42 of GN R326, an initial database of potential I&APs (including key stakeholders and Organs of State) was developed for the Scoping and EIA Processes and has been updated throughout the process. Refer to Appendix F of this EIA Report for a copy of the latest I&AP database that includes all I&APs that have registered, de-registered, and commented on the projects during the relevant phases. The database was also regularly updated based on research to obtain valid email addresses, where possible. Refer to Section 4.6.4 of this chapter for additional information on the I&AP database development and maintenance.
- **Site Notice Boards:** As noted in Section 4.6.5 above, notice boards have been placed for the proposed projects. A copy of the content and proof of placement of the notice boards is included in Appendix G.1 of this EIA Report.
- **Advertisements to Register Interest:** As noted in Section 4.6.6 above, an advertisement was placed in the English, Afrikaans, isiXhosa and Sesotho languages in two local newspapers (i.e. Express and Bloemnuus) on 31 July 2024 and 1 August 2024, respectively, for the commencement of the 30-day comment period for the Draft EIA Reports. A copy of the content of and proof of placement of the newspaper advertisements is included in Appendix I.3 of this EIA Report.
- **Letter 3¹⁵ to I&APs (Outcome of the consideration of the FSRs and commencement of EIA Phase):** Written notification of the outcome of the consideration of the FSRs and the commencement of the EIA Phase (i.e. Letter 3) was sent to all I&APs and Organs of State included on the updated project database via email, where email addresses are available. This letter was sent after the outcome of the consideration of the FSRs was received from the Competent Authority. Letter 3 included notification of the commencement of the EIA Phase for the proposed projects, and it was written in English. Copies of Letter 3 and emails sent are included in Appendix G.10 of this EIA Report.
- **Submission of the Amended Applications for EA and Draft EIA Reports to the DFFE for Comment; and DFFE Acknowledgement of Receipt:** The Amended Application Forms for EA were submitted to the DFFE with the Draft EIA Reports via the DFFE Novell S-Filer System and proof of upload was accordingly emailed to the DFFE. Proof of submission of the Draft EIA Reports for comment and Amended Applications for EA to the DFFE, and proof of upload to the DFFE Novell S-Filer System, is included in Appendix I.5 of this Final EIA Report. The DFFE sent emails thereafter acknowledging receipt of the Amended Applications for EA and Draft EIA Reports for comment, which is included in Appendix I.5 of this Final EIA Report.
- **Letter 4 to I&APs (Availability of the Draft EIA Reports for public comment):** Written notification of the availability of the Draft EIA Reports (i.e. Letter 4) was sent to all I&APs, Stakeholders and Organs of State included on the updated project database via email, where email addresses are available. This letter was sent at the commencement of the 30-day review period on the Draft EIA Reports (i.e. on 2 August 2024) and included information on the proposed projects and notification of the release and availability of the reports. Letter 4 was written in English. Proof of email, as well as copies of the Letter 4, are included in Appendix I.4 of the Final EIA Reports that have been submitted to the DFFE for decision-making.

¹⁵ Note that Letters 1, 2, and 3 are also addressed in Chapter 4 of the Final Scoping Report and apply to the Scoping Phase.

- **Text Messaging:** SMS texts were also sent to all I&APs on the updated project database, where cell phone numbers are available, to inform them of the proposed projects and how to access the Draft EIA Reports during the 30-day comment period. These text messages were sent on 3 August 2024 for the release of the Draft EIA Reports, and 16 August 2024 as a reminder of the comment period closure. Refer to Appendix I.4 of this Final EIA Report for proof of text message consultation.
- **Local/Broader Networks:** Communication was made during the EIA Phase with the relevant Municipal Ward Councillors and municipal representatives to provide notification of the release of the Draft EIA Reports with the objective to increase awareness. During the Scoping Phase and EIA Phase, attempts were made to contact the ward councillors, however no feedback was received. Refer to Appendix G.4 and Appendix I.4 of this EIA Report for proof of follow-up email correspondence sent in this regard. The Free State Agriculture / Vrystaat Landbou also provided correspondence regarding the proposed projects via the local area representative and Farmers Association. Furthermore, Smithfield Agriculture / Smithfield Landbou are on the project stakeholder database and provided comments during the Draft Scoping Report phase. These factors have also increased awareness within the local/broader networks.
- **30-day Comment Period:** As noted above, potential I&APs, including authorities and Organs of State, were notified via Letter 4, of the 30-day comment and registration period within which to submit comments on the Draft EIA Reports and/or to register on the I&AP database.
- **Executive Summaries:** Executive summaries of the Draft EIA Reports were also uploaded to the project Google Drive.
- **Availability of Information:** As indicated above, the Draft EIA Reports were made available for a 30-day comment period and distributed electronically to ensure access to information on the projects. The Draft EIA Reports were uploaded to the project website (i.e. <https://www.csir.co.za/environmental-impact-assessment>) for I&APs to access it. The Draft EIA Reports were also uploaded to Google Drive (https://bit.ly/Biesjesvlei_PV_BEES_EGI_Projects). If an I&AP could not access the reports via the project website or Google Drive, and if additional information was required (other than what was provided in the Executive Summaries), then the I&AP could contact the EAP, to then make an electronic copy available (*where feasibly possible*). However, no such requests were received during the 30-day comment period on the Draft EIA Reports.
- **Reminder / Follow Up Emails of the Comment Period Closure:** A number of reminder / follow up emails informing stakeholders of the comment period closure and to seek comments were sent to I&APs, stakeholders and Organs of State included on the project database, where email addresses are available. Reminder emails were sent on 16 August 2024, 28 August 2024 and 2 September 2024. In addition, personalised reminder emails were sent on 21 August 2024 and to various targeted stakeholders continuously throughout the 30-day comment period. Refer to Appendix I.4 of this Final EIA Report for proof of such correspondence.
- **Telephonic calls:** During the 30-day comment period, key stakeholders were called telephonically, followed by a confirmation of discussion email or text message. Refer to Appendix I.4 of this EIA Report for proof of such correspondence.

- **Comments Received:** A key component of the Scoping and EIA Process is documenting and responding to the comments received from I&APs and the authorities. Copies of all comments received during the 30-day review of the Draft EIA Report are included in Appendix I.6 of this Final EIA Report, as well as in the Comments and Responses Trail in Appendix I.7. Comments/feedback were received from the following stakeholders during the 30-day review of the Draft EIA Reports:
 - DFFE Chief Directorate: Integrated Environmental Authorisations (Competent Authority);
 - DFFE: Biodiversity Conservation / CBO: Biodiversity Mainstreaming and EIA Directorate;
 - DFFE: Protected Areas Planning and Management Effectiveness Directorate;
 - DALRRD;
 - DWS;
 - Eskom;
 - Free State Agriculture / Vrystaat Landbou;
 - Free State DESTEA;
 - Openserve;
 - SAHRA;
 - South African National Roads Agency SOC Limited (SANRAL);
 - SENTECH;
 - Vodacom;
 - VulPro; and
 - Various private individuals / I&APs.

Note that the correspondence received from stakeholders between the submission of the FSRs to the DFFE for consideration, and prior to the release of the Draft EIA Reports for comment, are included in Appendix I.1 of this EIA Report. These comments have been captured and responded to in a Comments and Responses Report included in Appendix I.2 of this EIA Report. Also note that the DFFE correspondence indicating the acceptance of the FSRs are included in Appendix H of this EIA Report.

4.6.7.2 Task 2 – Comments and Responses Report

A key component of the Scoping and EIA process is documenting and responding to the comments received from I&APs and the authorities. Copies of all written comments received during the review of the Draft EIA Reports have been compiled into a Comments and Responses Report included in Appendix I.7 of the Final EIA Reports that have been submitted to the DFFE for decision-making. The Comments and Responses Report indicates the nature of the comment, as well as when and who raised the comment. The comments received have been considered by the EIA team and appropriate responses provided by the EIA team, the Project Developer and/or specialists. The response provided indicates how the comment received has been dealt with in the EIA Process and considered in the Final EIA Reports, the project design or EMPs, as applicable. If the comment received falls beyond the scope of this EIA, clear reasoning has been provided.

Refer to the feedback below for a summary¹⁶ of the **key** issues raised by stakeholders during the 30-day review of the Draft EIA Reports:

Summary of Key Issues / Comments Raised	Summary of Response
General comments from the Competent Authority on listed activities, the need for comment from relevant stakeholders that have jurisdiction of the geographical areas in Listing Notice 3 of the 2014 NEMA EIA Regulations (as amended), recommendations for layout and sensitivity maps, public participation process (PPP), alternatives, cumulative assessment, specialist assessments, and Environmental Management Programmes (EMPrs)	- The Draft EIA Report (DEIAR) included the relevant listed activities triggered by the proposed projects, and the applicability of the listed activities was updated to ensure it is specific and linked to the project description. This was retained in the Final EIA Report (FEIAR), and no further amendments were made. - The relevant officials that have jurisdiction of the relevant geographical areas in Listing Notice 3 have provided comment on the DSR and DEIAR, and where comment has not been received, proof of follow-up has been provided in Appendix G.4 and Appendix I.4 of the FEIAR. - Final layout and sensitivity maps were provided accordingly in the DEIAR. The layout maps are final, based on specialist recommendations and deemed acceptable by the specialist team. The combined sensitivity and layout maps (i.e. layout maps overlain with the sensitivity), feature maps, and sensitivity maps have been updated in the FEIAR to improve visualisation by using clearer colours and removal of the satellite imagery as a background as recommended by the DFFE. - The PPP has been undertaken in compliance with the 2014 NEMA EIA Regulations (as amended). - Alternatives were considered in line with the requirements of the 2014 NEMA EIA Regulations (as amended) as noted in Chapter 5 of the DEIAR and retained in the FEIAR. In terms of the BESS, only one technology was considered in the Scoping and EIA Process, i.e. Lithium Ion BESS, hence it is the preferred technology. This has been clarified in the relevant chapters. - The cumulative impact assessment was clearly defined by the relevant specialists in the DEIAR and included various associated points for consideration. The cumulative impact assessment informed the need and desirability of the projects, and an overall cumulative environmental statement was provided in the DEIAR, which is retained in the FEIAR. - The recommendations for specialist assessments were responded to accordingly, i.e. no-go areas were clearly identified, and studies are final and contain practical mitigation etc. This was undertaken in the DEIAR and retained in the FEIAR. - The requirements for the EMPrs were already fulfilled in the DEIAR where relevant, especially in terms of compliance with Appendix 4 of the 2014 NEMA EIA Regulations (as amended) for the PV Facility and BESS, as well as the Generic EMPrs for power lines and substations.
Comments from DFFE Directorate: Protected Areas Planning and Management Effectiveness: Relevant stakeholders must be provided with the PPP documents available for comment during relevant stages of the EIA	All relevant stakeholders and organs of state were included on the project stakeholder database since inception of the Scoping and EIA Process and were provided with an opportunity to comment on the Draft

¹⁶ It is important to reiterate that this is only a summary of the key issues that were raised during the 30-day review of the Draft EIA Report. Refer to the complete EIA Phase Comments and Responses Report included in Appendix I.7 of this Final EIA Report for a full table of issues/comments raised and the detailed responses.

Summary of Key Issues / Comments Raised	Summary of Response
Process e.g. DFFE Biodiversity and Conservation, Provincial Departments Local Municipality etc.	Scoping Reports during the Scoping Phase and Draft EIA Reports during the EIA Phase.
Comments from DFFE Directorate: Protected Areas Planning and Management Effectiveness: The proposed projects do not take place within protected areas and their buffers in terms of the National Environmental Management: Protected Areas Act (NEMPAA), nor do they take place within National Protected Area Expansion Strategy (NPAES) focus areas.	This comment is concurred with, as described in Chapter 3 of the DEIAR and retained in the FEIAR.
Comments from DFFE Directorate: Biodiversity Conservation: Recommendations regarding alien plant invasive management and rehabilitation; ensuring that very highly sensitive habitats close to the development footprint are demarcated as no-go areas; ensuring that permits are obtained from relevant authorities for the removal or damage of any protected plant species; ensuring that specialist buffers are to be established around medium/high sensitivity areas; considering pylons to be prioritized in areas of medium and low site ecological importance; and ensuring power lines are installed with flappers/diverters to avoid excessive bird mortalities.	- These aspects were already addressed and captured in the relevant specialist studies (i.e. Terrestrial Biodiversity and Species, Aquatic Biodiversity and Species, and Avifauna) and EMPs included in the DEIAR and retained in the FEIAR. - All the relevant specialists have confirmed that the development footprints are acceptable. None of the proposed development footprints of the key infrastructure intersect with any of the no-go or very high sensitivity areas identified by the specialists. In some cases, the specialists have noted that certain associated infrastructure, such as access roads and power lines, is allowed in no-go areas as adequate mitigation measures have been recommended in the EMPs. Pylons are unavoidable in these areas for certain projects.
Comments from the Department of Agriculture, Land Reform and Rural Development (DALRRD): Request for various documents, such as title deeds of the affected properties, locality map and layout map. Comments relating to avoiding construction on high potential agricultural land; reducing impacts on planned production areas and agricultural infrastructure; impacts relating to soil degradation, soil loss, soil erosion, degradation of water resources, degradation of vegetation, as well as comments on access routes and maintenance; prevention of veld fires and reducing alien invasive plants.	- It is understood that the request for information from the DALRRD applies only to the EIA Process, and not to the re-zoning applications or applications in terms of the Subdivision of Agricultural Land Act (Act 70 of 1970) (SALA). The Applicant is undertaking the re-zoning and SALA applications separately, outside of the EIA Process. The requested documentation was sent to the DALRRD on 16 August 2024 via email. - The additional comments raised by DALRRD were already addressed in the Agriculture Compliance Statement included in the DEIAR, as well as the relevant specialist studies and EMPs. Detailed responses from the agriculture specialist and CSIR to these specific comments raised by the DALRRD are included in Appendix I.7 of this FEIAR.
Comments from Free State Agriculture (Vrystaat Landou): Comments on notification of landowners, especially those that are not Free State Agriculture members; community facilitation; social cohesion (a divide in the community between landowners that are strategically located to benefit financially from the development and those who are not); critically assess the cumulative effect of the entire Biesjesvlei development and other related projects (not just each individual Biesjesvlei project component on its own); and recommendations to ensure landowners and their legal representatives are thoroughly informed of the lease contracts and its implications.	- The PPP has been undertaken in compliance with the 2014 NEMA EIA Regulations (as amended) and is considered adequate, and included various mechanisms such as, but not limited to, emails, text messaging, telephonic communication, and for a wider coverage, the placement of newspaper advertisements and site notice boards. All affected and adjacent landowners have been notified of the proposed projects and have remained on the project stakeholder database. - The Applicant did not set out to seek the farm portions to specifically benefit certain farmers. The sites were selected based on various factors. Note that whilst income generation for the affected landowners is considered as a positive impact, other wider community benefits are also expected as a result of the proposed projects, which has been discussed in the relevant specialist studies. The broader community in the area would be in a position to benefit from the Socio-Economic Development Plan contributions from the proposed projects (should they go ahead).

Summary of Key Issues / Comments Raised	Summary of Response
	The cumulative impact assessment has taken into account the relevant projects in the 30 km radius (no other renewable energy projects were identified as described in this Chapter of the EIA Report), and all 10 Biesjesvlei projects i.e. the entire Biesjesvlei development and not just each individual project component on its own. The relevant specialists have assessed cumulative impacts in detail. No fatal flaws were identified in terms of cumulative impacts, and the overall cumulative impact significance ranged from Very Low to Moderate significance. Aspects regarding runoff, hydrology and geohydrology (groundwater recharge) were adequately addressed in the EIA Report and relevant specialist studies.
Comments from the South African Heritage Resources Agency (SAHRA): Confirmation that the SAHRA Development Applications Unit (DAU) has no objections to the proposed development; that the recommendations of the specialists are supported and must be adhered to; and that no further additional specific conditions are provided for the development. Reminders regarding Section 38 (4) (c) (i); 38 (4) (c) (ii); 38 (4) (d); and 38 (4) (e) of the NHRA were provided.	- The recommendations of the specialists have been included in the relevant EMPs and will be adhered to. - The EMPs included in the DEIAR already included the requirements of Section 38 (4) (c) (i); 38 (4) (c) (ii); 38 (4) (d); and 38 (4) (e) of the NHRA. This has been retained in the EMPs included in the FEIARs.
Comments from the Department of Water and Sanitation (DWS): General notes on when a Water Use Authorisation may be required in terms of activities close to or within aquatic features or abstraction of water etc.	If a Water Use Licence or General Authorisation (GA) is needed, this will be applied for post Environmental Authorisation (EA) (should such authorisation be granted), i.e. consent will be applied for from the DWS prior to commencement of the proposed projects.
Comments from the DWS: Measures to manage storm water, erosion, spills, waste, hazardous material, wastewater, and pollution occurring as a result of the proposed projects must be specified.	The relevant specialists identified impact management actions regarding these aspects, which were included in the EMPs appended to the DEIARs and retained in the FEIARs.
Comments from Eskom: Mapping files were requested.	The required files were provided to Eskom accordingly. No further comments were received during the 30-day comment period on the DEIARs.
Comments from Openserve: Once detailed plans of the proposed projects are available, these need to be submitted to Openserve, in order to indicate their existing/proposed underground and/or overhead services.	Openserve will be contacted by the relevant parties prior to the commencement of the proposed projects, should EA be granted.
Comments from Vodacom and SENTECH: No objections to the proposed projects in terms of impacts to the infrastructure belonging to these stakeholders.	These comments are noted with thanks.
Comments from the Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTA): The Department is satisfied that the environmental impacts were identified and assessed thoroughly in the DEIAR. In general, the DEIAR is accepted by the Department and there are no further comments.	This comment is noted with thanks.
Comments from VulPro: Recommendations for the proposed Loop-In-Loop-Out (LILO) to the Eskom Beta Delphi 1 400 kV Transmission Power Line based on the presence of a temporary Cape Vulture power line roost and overall impacts to Cape Vultures.	- VulPro's comments regarding the presence of a temporary Cape Vulture power line roost on existing transmission and distribution power line infrastructure within the study area is noted and acknowledged. - The comments raised by VulPro during the Scoping Phase were responded to in detail by the Avifauna specialist. The same applies to the EIA Phase. Refer to the Avifauna Assessment for additional information (Appendix E.4 of this FEIAR). - Based on the comments received from VulPro, the power line EMPs have also been updated to include a specific recommendation regarding avoiding the placement of

Summary of Key Issues / Comments Raised	Summary of Response
	water sources, such as concrete reservoirs or animal water troughs, directly under any new proposed power line infrastructure for the Biesjesvlei projects.
Comments from SANRAL: SANRAL has no objections to the proposed development, and various recommendations have been made regarding transportation of abnormal loads, pavement rehabilitation, construction traffic management and traffic accommodation, as well as standard terms and conditions.	- The Applicant has taken note of the standard terms and conditions, and content of the approval from SANRAL. - The Traffic Impact Assessment and EMPs have been updated, as relevant, to include the management actions recommended by SANRAL, specifically with regards to work at the N6 and S1262 intersection.
Queries / comments from Interested and Affected Parties (I&APs): Requests to de-register from the project (as the projects fall outside of the stakeholders interested area), comments for support of the projects; and comments notifying the Applicant that accommodation facilities (i.e. guesthouses) are available close to the project sites should it be needed.	These comments were noted accordingly.

No new issues were received during the 30-day comment period on the Draft EIA Report that were not already considered during Scoping and/or addressed in the EIA Phase. Therefore, updates were not needed to most of the specialist studies, however, where required, responses from specialists are documented in the Comments and Responses Report in Appendix I.7 of this Final EIA Report. Updates were made to the Traffic Impact Assessment (Appendix E.9 of this Final EIA Report) and Avifauna Assessment (Appendix E.4 of this Final EIA Report) to document key comments received from the relevant stakeholders, and associated updates to the mitigation measures and/or EMPs inputs.

4.6.7.3 Task 3 – Compilation of the Final EIA Reports and Submission to DFFE (Current Stage)

Following the 30-day commenting period on the Draft EIA Reports and incorporation of the comments received into the reports, the Final EIA Reports have been submitted to the DFFE for decision-making in line with Regulation 23 (1) (a) of the 2014 NEMA EIA Regulations (as amended). The reports have been submitted electronically to the DFFE, as recommended by the DFFE since June 2020.

In line with best practice, I&APs on the project database will be notified via **Letter 5** via email (where email addresses are available) of the submission of the Final EIA Reports to the DFFE for decision-making. To ensure ongoing access to information, copies of the Final EIA Reports that have been submitted for decision-making and the Comments and Response Reports (detailing comments received during the EIA Phase and responses thereto) will be placed on the project website (i.e. <https://www.csir.co.za/environmental-impact-assessment>). As a supplementary mechanism, the Final EIA Reports will also be uploaded to Google Drive.

The Final EIA Reports, which have been submitted for decision-making to the DFFE, include proof of the PPP that was undertaken to inform Organs of State, Stakeholders and I&APs of the availability of the Draft EIA Reports for the 30-day comment period (as explained above).

The DFFE will have 107 days (from receipt of the Final EIA Reports) to either grant or refuse EA (in line with Regulation 24 (1) of the 2014 NEMA EIA Regulations, as amended). However, it is

understood that decision-making for renewable energy applications is being reduced to 57 days, as best as possible.

4.6.7.4 Task 4 – Environmental Authorisation (EA) and Appeal Process

Subsequent to the decision-making phase, all registered I&APs, Organs of State and Stakeholders on the project database will receive an emailed notification of the outcome of the DFFE's decision on the proposed projects (i.e. to grant or refuse EA) and the associated appeal period. The 2014 NEMA EIA Regulations (as amended) (i.e., Regulation 4 (1)) states that after the Competent Authority has reached a decision, it must inform the Project Applicant of the decision, in writing, within 5 days of such decision. Regulation 4 (2) of the 2014 NEMA EIA Regulations (as amended) stipulates that I&APs need to be informed of the EA decision and associated appeal period within 14 days of the date of the decision.

The notification of the EA decision and associated appeal period will include a letter (i.e., **Letter 6** (Release of EA decision and Notification of Opportunity to Appeal)) that will be sent via email to all registered I&APs, Stakeholders and Organs of State on the project database, where email addresses are available. The letter will include information on the appeal period, as well as details regarding where to obtain a copy of the EA decision. SMS texts will also be sent to all I&APs on the database, where cell phone numbers are available, to inform them of the EA decision.

4.7 Authority Consultation during the EIA Phase

Authority consultation is integrated into the PPP, with meetings or discussions held on online platforms with the lead authorities, where necessary. The Competent Authority (i.e., the DFFE) as well as other lead authorities were consulted at various stages during the EIA Process. The following key authorities have been identified for the purpose of this EIA Process:

- Air Traffic Navigation Services (ATNS)
- AgriSA;
- Agri Free State (Free State Agriculture);
- Birdlife South Africa;
- DWS;
- DALRRD;
- DFFE Integrated Environmental Authorisations Directorate;
- DFFE Biodiversity and Conservation Directorate;
- DFFE Protected Areas Directorate;
- Endangered Wildlife Trust;
- Eskom SOC Ltd;
- Free State DESTEA;
- Free State Department of Community Safety, Roads and Transport;
- Free State Provincial Heritage Resources Authority (FSPHRA);
- National Energy Regulator of South Africa (NERSA);
- Xhariep District Municipality;
- Mohokare Local Municipality;
- South African Civil Aviation Authority (CAA);
- SAHRA;
- South African Local Government Association (SALGA) (Free State);

- South African National Parks (SANParks);
- SANRAL;
- SARAO;
- South African Weather Services (SAWS);
- VulPro;
- Wildlife and Environmental Society of South Africa (WESSA); and
- World Wildlife Fund South Africa (WWF SA).

The authority consultation process for the EIA Phase is outlined in Table 4.12 below.

Table 4.12: Authority Communication Schedule.

STAGE IN EIA PHASE	FORM OF CONSULTATION
During preparation of EIA Reports	Communication (via email or online platforms (i.e. Microsoft Teams)) with the DFFE on the outcome of Specialist Studies, if required.
On submission of EIA Reports for comment	Online meetings with dedicated departments, if requested by the DFFE, with jurisdiction over particular aspects of the project (e.g. Local Authority). This was not requested during the EIA Process.

4.8 Schedule for the Scoping and EIA Processes

The proposed schedule for the Scoping and EIA Processes based on the legislated EIA timeframes, is presented in Table 4.13.

Table 4.11: Provisional Schedule for the proposed Biesjesvlei Solar PV, BESS, EGI, MTS and LILO Development (Projects 1 to 10).

Key Milestones	Proposed Timeframe
Appointment of CSIR	July - August 2023
Appointment of Specialists	Phase 1 (Screening): November 2022 Phase 2 (EIA): August – November 2023
Specialist Site Visits	November 2022 – October 2023
Project Initiation and Pre-Application Consultation with the Department of Forestry, Fisheries and the Environment (DFFE)	October 2023
Approval of Notes of the Pre-Application Meeting	24 October 2023
Submission of Combination Request	11 October 2023
DFFE Decision on the Combination Request	6 November 2023
Specialist Inputs for Scoping for Projects 1 to 10	August 2023 – February 2024

Key Milestones	Proposed Timeframe
Prepare 4 x Draft Scoping Reports (DSRs) and Plan of Study for EIA for Projects 1 to 10: ▪ Report 1: Project 1 (Biesjesvlei PV1); Project 4 (Biesjesvlei BESS 1); and Project 7 (Biesjesvlei EGI 1). ▪ Report 2: Project 2 (Biesjesvlei PV2); Project 5 (Biesjesvlei BESS 2); and Project 8 (Biesjesvlei EGI 2). ▪ Report 3: Project 3 (Biesjesvlei PV3); Project 6 (Biesjesvlei BESS 3); and Project 9 (Biesjesvlei EGI 3). ▪ Report 4: Project 10 (Biesjesvlei MTS and LILO).	August 2023 – February 2024
Release the 4 x DSRs for Projects 1 to 10 for 30-day comment period	8 March 2024 to 10 April 2024 (excluding public holidays)
Submit the 4 x Final Scoping Reports (FSRs) for Projects 1 to 10 to the DFFE for Consideration	22 April 2024
DFFE Accepted FSRs for Projects 1 to 10	30 May 2024 to 05 June 2024
Prepare 4 x Draft EIA Reports for Projects 1 to 10	May 2024 – July 2024
Release 4 x Draft EIA Reports for Projects 1 to 10 for 30-day comment period	02 August 2024 to 02 September 2024 (excluding public holidays)
Submit 4 x Final EIA Reports for Projects 1 to 10 to DFFE for Decision-Making	Mid-September 2024
DFFE Decision-Making on the Final EIA Reports and issue of Decisions (i.e. grant or refuse EA): 107 days [or reduced to 57 days]	November 2024 or January 2025
EAP to Notify I&APs of Decisions (14 days)	14 days after EA is issued

4.9 Approach to the Impact Assessment Methodology and Specialist Assessments

This section outlines the assessment methodology for the specialist assessments, as recommended by the then Department of Environmental Affairs (DEA) 2006 Guideline on Assessment of Impacts.

4.9.1 Impact Assessment Methodology

The Impact Assessment Methodology has been aligned with the requirements for EIA Reports as stipulated in Appendix 3 (3) (1) (j) of the 2014 NEMA EIA Regulations (as amended) which states the following:

“An environmental impact assessment report must contain the information that is necessary for the Competent Authority to consider and come to a decision on the application, and must include an assessment of each identified potentially significant impact and risk, including -

- (i) *cumulative impacts;*

- (ii) *the nature, significance and consequences of the impact and risk;*
- (iii) *the extent and duration of the impact and risk;*
- (iv) *the probability of the impact and risk occurring;*
- (v) *the degree to which the impact and risk can be reversed;*
- (vi) *the degree to which the impact and risk may cause irreplaceable loss of resources; and*
- (vii) *the degree to which the impact and risk can be mitigated".*

The identification of potential impacts includes impacts that may occur during the construction, operational and decommissioning phases of the development. The assessment of impacts includes direct, indirect as well as cumulative impacts. In order to identify potential impacts (both positive and negative) it is important that the nature of the proposed projects is well understood so that the impacts associated with the projects can be assessed. The process of identification and assessment of impacts includes:

- Determining the current environmental conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured;
- Determining future changes to the environment that will occur if the activity does not proceed;
- Develop an understanding of the activity in sufficient detail to understand its consequences; and
- The identification of significant impacts, which are likely to occur if the activity is undertaken.

The following principles underpin the application of this methodology:

- Transparent and repeatable process - specialists are to describe the thresholds and limits they apply in their assessment, wherever possible.
- Adapt parameters to context (where justified) – the methodology proposes some thresholds (e.g. for spatial extent, in Step 3 below), however, if the nature of the impact requires a different definition of the categories of spatial extent, then this can be provided and described by the specialist.
- Combination of a quantitative and qualitative assessment – where possible, specialists are to provide quantitative assessments (e.g. areas of habitat affected, number of jobs), however, it is recognised that not all impacts can be quantified, and then qualitative assessments are to be provided.

As per the then Department of Environmental Affairs and Tourism (DEAT) Guideline 5: Assessment of Alternatives and Impacts, the following methodology has been applied to the prediction and assessment of impacts and risks. Potential impacts and risks are rated in terms of direct, indirect and cumulative impacts, where relevant:

- **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.
- **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest

immediately when the activity is undertaken, or which occur at a different place as a result of the activity.

- **Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

In addition to the above, the Impact Assessment Methodology includes the following aspects, which has been considered and adopted by the relevant specialists:

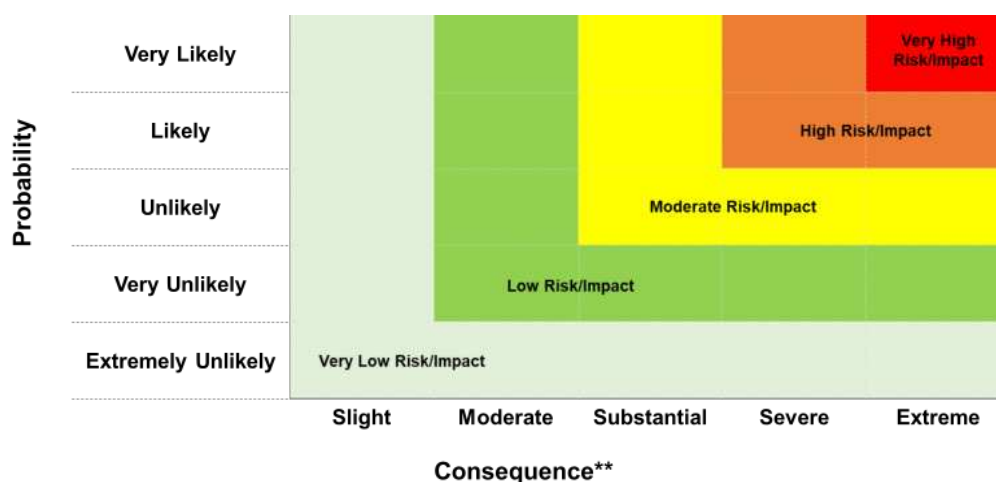
- **Step 1: Nature of impact/risk** - this reviews the type of effect that a proposed activity will have on the environment and includes “what will be affected and how?” The term environment has a broad interpretation that includes both the natural (biophysical) environment and the socio-economic environment. The term socio-ecological system is also used to describe the natural and socio-economic environment and the interactions amongst these components.
- **Step 2: Status** - Whether the impact/risk on the overall environment (social, biophysical and economic) will be:
 - Positive - environment overall will benefit from the impact/risk;
 - Negative - environment overall will be adversely affected by the impact/risk; or
 - Neutral - environment overall will not be affected.
 - Note: The significance of a negative impact may be called a risk, and the significance of a positive impact may be called an opportunity.
- **Step 3:** Qualitative determination of the consequence of the impact/risk by identifying the a) spatial extent; b) duration; c) reversibility; and d) irreplaceability.
 - **A) Spatial extent** – The size of the area that will be affected by the impact/risk:
 - Site specific;
 - Local (<10 km from site);
 - Regional (<100 km of site / within the district municipality);
 - National; or
 - International (e.g. Greenhouse Gas emissions or migrant birds).
 - **B) Duration** – The timeframe during which the impact/risk will be experienced:
 - Very short term (instantaneous);
 - Short term (less than 1 year);
 - Medium term (1 to 10 years);
 - Long term (the impact will cease after the operational life of the activity (i.e. the impact or risk will occur for the project duration)); or
 - Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient (i.e. the impact will occur beyond the project decommissioning)).

- **C) Reversibility** of the Impacts - the extent to which the impacts/risks are reversible assuming that the project has reached the end of its life cycle (decommissioning phase):
 - High reversibility of impacts (impact is highly reversible at end of project life i.e. this is the most favourable assessment for the environment);
 - Moderate reversibility of impacts;
 - Low reversibility of impacts; or
 - Impacts are non-reversible (impact is permanent, i.e. this is the least favourable assessment for the environment).
- **D) Irreplaceability** of Receiving Environment/Resource Loss caused by impacts/risks – the degree to which the impact causes irreplaceable loss of resources assuming that the project has reached the end of its life cycle (decommissioning phase):
 - High irreplaceability of resources (project will destroy unique resources that cannot be replaced, i.e. this is the least favourable assessment for the environment);
 - Moderate irreplaceability of resources;
 - Low irreplaceability of resources; or
 - Resources are replaceable (the affected resource is easy to replace/rehabilitate, i.e. this is the most favourable assessment for the environment).

These criteria are then combined in a qualitative manner to determine the **consequence**. The consequence terms ranging from slight to extreme (as described below) will be calibrated per Specialist Study, where required, so that there is transparency and consistency in the way a risk/impact is measured.

- **Consequence** – The anticipated consequence of the risk/impact is generally defined as follows:
 - Extreme (extreme alteration of natural or socio-economic systems, patterns or processes, i.e. where environmental or socio-economic functions and processes are altered such that they permanently cease);
 - Severe (severe alteration of natural or socio-economic systems, patterns or processes, i.e. where environmental or socio-economic functions and processes are altered such that they temporarily or permanently cease);
 - Substantial (substantial alteration of natural or socio-economic systems, patterns or processes, i.e. where environmental or socio-economic functions and processes are altered such that they temporarily or permanently cease);
 - Moderate (notable alteration of natural or socio-economic systems, patterns or processes, i.e. where the natural or socio-economic environment continues to function but in a modified manner; or
 - Slight (negligible and transient alteration of natural or socio-economic systems, patterns or processes, i.e. where natural systems/environmental or socio-economic functions, patterns, or processes are not affected in a measurable manner, or if affected, that effect is transient and the system recovers).
- **Step 4:** The **probability** of the impact/risk must be rated using the criteria below:

- **Probability** – The probability of the impact/risk occurring:
 - Extremely unlikely (little to no chance of occurring);
 - Very unlikely (<30% chance of occurring);
 - Unlikely (30-50% chance of occurring)
 - Likely (51 – 90% chance of occurring); or
 - Very Likely (>90% chance of occurring regardless of prevention measures).
- **Step 5:** Determination of the **significance** of the identified impact/risk using both the **consequence** and **probability** (qualitatively as shown in Figure 4.2). The approach incorporates internationally recognised methods from the Intergovernmental Panel on Climate Change (IPCC) (2014) assessment of the effects of climate change and is based on an interpretation of existing information in relation to the proposed activity, to generate an integrated picture of the risks related to a specified activity in a given location, with and without mitigation. Risk is assessed for each significant stressor (e.g. physical disturbance), on each different type of receiving entity (e.g. the municipal capacity, a sensitive wetland), qualitatively (very low, low, moderate, high, very high) against a predefined set of criteria. Significance definitions and rankings are provided below:



****[Qualitatively determined based on Spatial Extent, Duration, Reversibility and Irreplaceability]**

Figure 4.2. Guide to assessing risk/impact significance as a result of consequence and probability.

- **Significance** – Will the impact cause a notable alteration of the environment?
 - Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
 - Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
 - Moderate (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated);

- High (the risk/impact will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making); and
- Very high (the risk/impact will result in very major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating)).

With the implementation of mitigation measures, the residual impacts/risks are ranked as follows in terms of significance:

- Very low = 5;
 - Low = 4;
 - Moderate = 3;
 - High = 2; and
 - Very high = 1.
-
- **Step 6: Determine the Confidence Level** – The degree of confidence in predictions based on available information and specialist knowledge:
 - Low;
 - Medium; or
 - High.

Other aspects to be taken into consideration in the assessment of impact significance are:

- Impacts need to be evaluated for the construction, operational and decommissioning phases of the proposed developments, where relevant. The assessment of impacts for the decommissioning phase may be brief, as there is limited understanding at this stage of what this might entail. The relevant rehabilitation guidelines and legal requirements applicable at the time will need to be applied;
- Impacts need to be evaluated with and without mitigation in order to determine the effectiveness of mitigation measures on reducing the significance of a particular impact;
- The impact evaluation needs to, where possible, take into consideration the cumulative effects associated with the Biesjesvlei projects and other Wind and Solar PV, and EGI projects which are either developed or in the process of being developed (i.e. that have lodged EA Applications) in the local area (i.e. within 30 km from the proposed study area). Refer to Section 4.9.2 for a description of the cumulative impact assessment methodology; and
- The impact assessment needs to attempt to quantify the magnitude of potential impacts (direct, indirect and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.

Impacts are then collated into the EMPs, and these include the following:

- Quantifiable standards for measuring and monitoring mitigatory measures and enhancements are set. This includes a programme for monitoring and reviewing the recommendations to ensure their ongoing effectiveness (as required and where relevant);

- Identifying negative impacts and prescribing mitigation measures to avoid or reduce negative impacts. Where no mitigatory measures are possible this is stated; and
- Positive impacts have been identified and augmentation measures have also been identified to potentially enhance positive impacts where possible.

Table 4.14 below has been used by the specialists for the rating of impacts, and repeated for the Construction, Operational and Decommissioning Phases, where relevant.

Table 4.14: Example of Table for Assessment of Impacts/Risks.

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
CONSTRUCTION PHASE						
Habitat and species loss as a result of clearance of vegetation for the PV Facility	Status	Negative	Moderate (3)	Plant search and rescue (EMPr)	Low (4)	Medium
	Spatial Extent	Site Specific				
	Duration	Long-term				
	Consequence	Substantial				
	Probability	Very likely				
	Reversibility	Moderate				
	Irreplaceability	Moderate				

4.9.2 Cumulative Impact Assessment Methodology

The cumulative impact assessment aimed to include other renewable energy projects (i.e. Wind and Solar PV) and EGI projects within a 30 km radius that are in different stages of planning and/or development (e.g. have received an EA, have lodged the EA application and the BA/EIA has commenced and is in progress at the commencement of this Scoping and EIA Process, or has been constructed); including the proposed Biesjesvlei Projects 1 to 10.

The information has been sourced from the National DFFE Renewable Energy EIA Application (REEA) database; the SAHRIS, as well as the 2022 Eskom Generation Connection Capacity Assessment (GCCA).

Based on the above databases, no other proposed or existing BESS, Solar PV or Wind developments have been identified within a 30 km radius of the Biesjesvlei study area.

All withdrawn or lapsed projects have not been considered.

The REEA states that the following project is located within the 30 km radius of the study area:

- Reference Number: 12/12/20/2179;
- Title: Proposed construction of a 10 MW Photovoltaic Solar Facility near Kakamas, Northern Cape Province; and
- EA Status: Approved.

However, the above project is incorrectly indicated on REEA as being located in the Free State. The above project is in fact located within the Northern Cape (i.e. the proposed development of

the Inca Solar PV project near Kakamas) (SAHRA, 2011¹⁷), and thus does not fall within the 30 km radius of the study area.

Table 4.15 provides more details, whilst Figure 4.3 provides an illustration of the projects that have been considered in the cumulative impact assessment. Each project has been allocated a specific number indicated in the table below, which correlates to the display on the map below, for ease of reference.

Refer to each specialist assessment in Appendix E of this EIA Report for a description on how cumulative impacts have been identified, where relevant.

A summary of the general process flow followed in the cumulative impact assessment is provided below:

- A list of Renewable Energy and EGI projects within a 30 km radius was identified based on research, SAHRIS, REEA and the 2022 Eskom GCCA. As indicated above, research showed that there were no existing or proposed renewable energy projects (with applications for EA lodged at the commencement of the Biesjesvlei projects) within the 30 km radius, or any that are being constructed.
- The cumulative impacts were then clearly defined, and **where possible** the size of the identified impact was quantified and indicated. In most cases the actual development footprint of the nearby developments could not be easily quantified. This typically allowed the determination of the following aspects (or similar aspects) in the relevant specialist assessments:
 - The total affected area of the 10 Biesjesvlei projects.
 - The total area within the 30 km radius around the proposed projects.
 - The total combined size of the projects as a percentage of the land in the 30 km radius.
- Therefore, the assessment of cumulative impacts was based on the specialist and EAP's knowledge of similar approved projects. The specialists assessed such impacts based on their expertise and knowledge of similar projects and management actions. However, the following points are important to note in terms of the cumulative impact assessment:
 - The assessment of cumulative impacts is not necessarily solely focused on an assessment of impacts linked to previously authorised similar developments and consideration of their mitigation measures, but also about the sensitivities of the land on which the projects take place.
 - From an agricultural perspective, EGI projects and fibre optic cables do not contribute to a loss of agricultural land and are not therefore included in the calculation of cumulative land loss. Furthermore, the cumulative impact assessment for a particular project, is not the same as an assessment of the impact of all surrounding projects. The cumulative assessment is an assessment only of the impacts associated with these Biesjesvlei projects, but seen in the context of all surrounding impacts, and it deals with the contribution of the Biesjesvlei projects to the overall impact, within the context of the overall impact.

¹⁷ SAHRA (2011). Review Comment on Heritage Impact Assessment for the proposed Inca Solar PV Power Plant near Kakamas, Northern Cape. Accessed online: <https://sahris.sahra.org.za/sites/default/files/heritagereports/ARC%20Inca%20PV.pdf> [December 2023].

- From a heritage perspective, these impacts are difficult to quantify because of the variable survey conditions that are likely to have pertained during the assessments of the various projects.

Refer to the relevant specialist studies for additional information.

Table 4.15: Proposed EGI projects, located within 30 km of the proposed Biesjesvlei projects, that have been considered in the Cumulative Impact Assessment (in addition to the Biesjesvlei Projects 1 to 10) (Source: DFFE REEA, Quarter 1, 2024; and SAHRIS).

CSIR NUMBER	DFFE REFERENCE	TECHNOLOGY	MW/KV	STATUS	PROJECT TITLE	EIA REGULATIONS	ASSESSMENT PROCESS	APPLICANT	EAP
1	12/12/20/2139	Fibre Optics	N/A	Unknown	Fibre Optic Cable between Johannesburg and Cape Town	NEMA 2010	Basic Assessment	Sirius Access Solutions (Pty) Ltd / Opti-Communications (Pty) Ltd	Jeffares & Green (Pty) Ltd
2	Not Applicable	Electrical infrastructure	22 kV	Unknown	8.8 km 22 kV powerline in the area between Edenburg and Smithfield, Free State province	Not Applicable	Not Applicable	Eskom SOC Ltd	Not Applicable
3	Not Applicable	Electrical infrastructure	22 kV	Unknown	Notification of a deviation of a 692 m of fox conductor power line in the Smithfield area, Free State	Not Applicable	Not Applicable	Eskom SOC Ltd	Not Applicable
4	Not Applicable	Electrical infrastructure	22 kV	Unknown	Eskom RESY 22 kV power line deviation	Not Applicable	Not Applicable	Eskom SOC Ltd	Not Applicable
5	12/12/20/230	Electrical infrastructure	400 kV	Operational	Existing Beta Delphi 1 powerline - 400 kV	GN R1182 (September 1997) of the Environmental Conservation Act (Act 73 of 1989)	Scoping and EIA	Eskom SOC Ltd	P. D. Naidoo & Associates
Shown as the study area	- Biesjesvlei PV1: 14/12/16/3/3/2/2526 - Biesjesvlei PV2: 14/12/16/3/3/2/2531 - Biesjesvlei PV3: 14/12/16/3/3/2/2533	Solar PV	Up to 350 MW DC each	In Scoping and EIA Phase (Final EIA Report submitted in September 2024)	PROJECTS 1 to 3: The proposed development of three Solar Photovoltaic (PV) Facilities and associated infrastructure (i.e. Biesjesvlei PV1 to Biesjesvlei PV3).	NEMA 2014	Scoping and EIA	Biesjesvlei 1 (Pty) Ltd Biesjesvlei 2 (Pty) Ltd Biesjesvlei 3 (Pty) Ltd	Council for Scientific and Industrial Research (CSIR)
Shown as the study area	- Biesjesvlei BESS 1: 14/12/16/3/3/2/2527 - Biesjesvlei BESS 2: 14/12/16/3/3/2/2529 - Biesjesvlei BESS 3: 14/12/16/3/3/2/2532	BESS	Not Applicable	In Scoping and EIA Phase (Final EIA Report submitted in September 2024)	PROJECTS 4 to 6: The proposed development of three Battery Energy Storage Systems (BESS) and associated infrastructure for Biesjesvlei PV1 to PV3 (Biesjesvlei BESS 1 to Biesjesvlei BESS 3).	NEMA 2014	Scoping and EIA	Biesjesvlei 4 (Pty) Ltd	Council for Scientific and Industrial Research (CSIR)
Shown as the study area	- Biesjesvlei EGI 1: 14/12/16/3/3/2/2528 - Biesjesvlei EGI 2: 14/12/16/3/3/2/2530 - Biesjesvlei EGI 3: 14/12/16/3/3/2/2534	Electrical infrastructure	132 kV each	In Scoping and EIA Phase (Final EIA Report submitted in September 2024)	PROJECTS 7 to 9: The proposed development of a 132 kV Overhead Power Line from each Biesjesvlei PV Facility to the proposed MTS, and associated infrastructure (i.e. Biesjesvlei EGI 1 to Biesjesvlei EGI 3).	NEMA 2014	Scoping and EIA	Biesjesvlei 1 (Pty) Ltd Biesjesvlei 2 (Pty) Ltd Biesjesvlei 3 (Pty) Ltd	Council for Scientific and Industrial Research (CSIR)
Shown as the study area	Biesjesvlei MTS and LILO: 14/12/16/3/3/2/2535	Electrical infrastructure	400 kV LILO 400/132kV MTS	In Scoping and EIA Phase (Final EIA Report submitted in September 2024)	PROJECT 10: The proposed development of an independent 400/132kV MTS and a 400 kV LILO from the MTS to the existing Eskom power line, as well as associated infrastructure (i.e. Biesjesvlei MTS and LILO)	NEMA 2014	Scoping and EIA	Biesjesvlei 1 (Pty) Ltd	Council for Scientific and Industrial Research (CSIR)

Proposed 3 x 350 MW Biesjesvlei Solar PV, BESS and EGI Development near Smithfield, Free State, South Africa

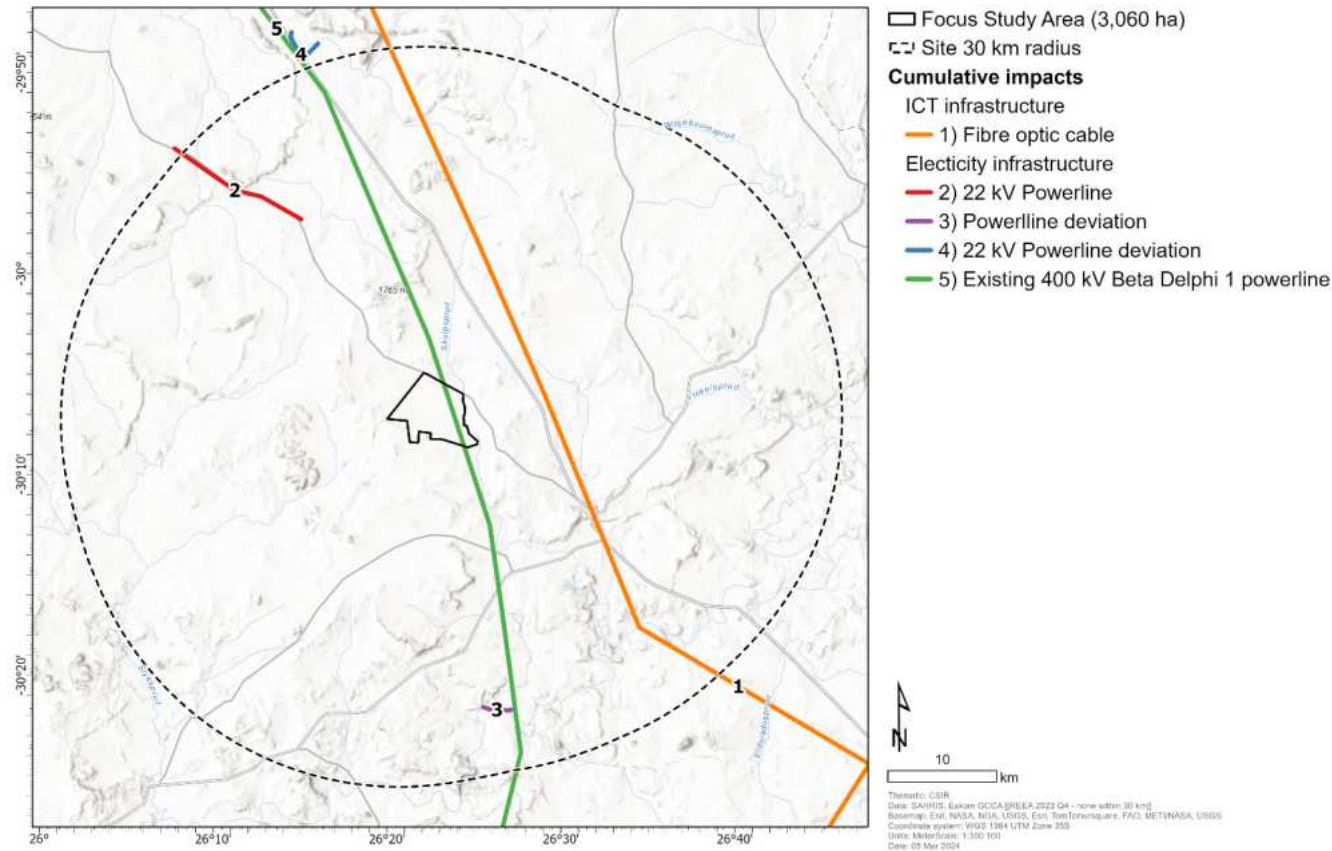


Figure 4.3. EGI projects within the 30 km radius considered for the Cumulative Impact Assessment
(Source: DFFE REEA Quarter 1, 2024; and SAHRIS).

4.10 Terms of Reference for the Specialist Assessments

The specialist studies / inputs / technical studies / letters of opinion have been undertaken based on compliance with relevant legislation and based on the Terms of Reference indicated in the Plan of Study for the EIA, i.e. Chapter 7 of the FSR¹⁸, which was accepted in May 2024. The Terms of Reference did not require any update following the 30-day commenting period of the Draft Scoping Report.

The Terms of Reference has also been included in the relevant specialist summary chapters, i.e., Chapters 6 to 19 of this EIA Report. The Terms of Reference for the specialist studies / inputs / technical studies / letters of opinion essentially consist of the generic assessment requirements and the specific issues identified for each discipline, as captured in the Plan of Study for EIA.

¹⁸ CSIR, 2024. Scoping and Environmental Impact Assessment for the Proposed Development of a Solar Photovoltaic (PV) Facility and associated infrastructure (Biesjesvlei PV1); Battery Energy Storage System and associated infrastructure (Biesjesvlei BESS 1); and 132 kV Overhead Power Line from the on-site substation to a proposed Main Transmission Substation and associated infrastructure (Biesjesvlei EGI 1); near Smithfield, within the Mohokare Local Municipality, Xhariep District Municipality, Free State. Final Scoping Report. CSIR Report Number: CSIR/SPLA/SECO/ER/2024/0002/B.



CHAPTER 5: Project Alternatives

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5. APPROACH TO THE ASSESSMENT OF ALTERNATIVES

This chapter discusses the alternatives that have been considered as part of the Environmental Impact Assessment (EIA) Phase, as well as the selection process of the preferred alternatives that have been assessed for the following proposed projects that are addressed in this report:

- **PROJECT 1:** The proposed development of a Solar Photovoltaic (PV) Facility and associated infrastructure (i.e. Biesjesvlei PV1).
- **PROJECT 4:** The proposed development of a Battery Energy Storage System (BESS) and associated infrastructure for Biesjesvlei PV1 (Biesjesvlei BESS 1).
- **PROJECT 7:** The proposed development of a 132 kV Overhead Power Line from the on-site substation to the proposed Main Transmission Substation (MTS) and associated infrastructure (Biesjesvlei EGI 1).

Note: The information throughout this chapter applies to each of the projects addressed in this report (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1)), unless where mentioned otherwise.

Sections 24(4) (b) (i) and 24(4A) of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) require an Environmental Assessment to include investigation and assessment of impacts associated with alternatives to the proposed project. In addition, Section 24O (1)(b)(iv) also requires that the Competent Authority, when considering an application for Environmental Authorisation (EA), takes into account “*where appropriate, any feasible and reasonable alternatives to the activity which is the subject of the application and any feasible and reasonable modifications or changes to the activity that may minimise harm to the environment*”.

The 2014 NEMA EIA Regulations (as amended) define “alternatives”, in relation to a proposed activity, “*as different means of meeting the general purpose and requirements of the activity, which may include alternatives to the:*

- *property on which or location where the activity is proposed to be undertaken;*
- *type of activity to be undertaken;*
- *design or layout of the activity;*
- *technology to be used in the activity;*
- *operational aspects of the activity; and*
- *includes the option of not implementing the activity”.*

Appendix 3 of the 2014 NEMA EIA Regulations (as amended) provides the following objectives, *inter alia*, of the EIA Process in relation to alternatives:

- To identify the location of the development footprint within the approved site as contemplated in the accepted scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment; and
- To identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment.

The EIA Report is therefore required to provide a full description of the process followed to reach the proposed preferred activity, technology, site and location of the development footprint within the site, including details of all the alternatives considered and the outcome of the site selection matrix.

5.1 Assessment of Alternatives

5.1.1 No-go Alternative

The no-go alternative assumes that the proposed projects will not go ahead i.e. it is the option of not developing the proposed projects and associated infrastructure. This alternative would result in no environmental impacts on the site or surrounding local area as a result of the proposed projects. It provides the baseline against which other alternatives are compared. The following implications will occur if the “no-go” alternative is implemented (i.e. the proposed projects do not proceed):

- No benefits will be derived from the implementation of an additional land-use;
- No additional power will be generated or supplied through means of renewable energy resources by the proposed projects at this location;
- The “no-go” alternative will not contribute to and assist the government in achieving its renewable energy target of 26 630 MW total installed capacity by 2030 (for Wind, Solar PV and Concentrated Solar Power (CSP)) (Integrated Resource Plan (IRP), 2019);
- Electricity generation will remain constant (i.e. no renewable energy generation will occur on the site) and as a result, the local economy in terms of surrounding communities and towns within the local municipality will not be diversified, while existing electricity generation sources nationally will age and degrade over time, with maintenance requirements potentially leading to outages;
- There will be lost opportunity for skills transfer and education/training of local communities;
- The positive socio-economic impacts likely to result from the proposed projects, such as increased local spending and the creation of local employment opportunities, will not be realised;
- There will be no opportunity for additional employment in an area where job creation is identified as a key priority;

- The local economic benefits associated with the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) and Battery Energy Storage Independent Power Producer Procurement Programme (BESIPPPP) will not be realised, and socio-economic contribution payments into the local community trust will not be realised;
- The development of solar PV facilities instead of coal fired power stations can directly contribute to South Africa's response to climate mitigation; and
- Wind and solar energy are the cheapest source of electricity in South Africa. The development of the proposed projects can contribute to the competitive nature of the REIPPPP and BESIPPPP to drive prices down even further to ensure that South Africans have access to affordable yet clean electricity.

Converse to the above, the following benefits could occur if the "no-go" alternative is implemented:

- Only the agricultural land use (livestock farming/grazing) will remain;
- No vegetation or protected species (flora) will be removed or disturbed during the development of the proposed projects;
- No aquatic resources will be impacted upon during the construction and operation of the proposed projects;
- No destruction of habitat will occur;
- No change to the current landscape will occur (i.e. the visual character of the area will remain unchanged);
- No heritage features will be impacted on;
- No noise impacts associated with construction activities will occur;
- No avifaunal impacts will occur due to the establishment of the proposed projects;
- No additional traffic will be generated; and
- No additional water use will be required.

The no-go alternative has been considered by the specialists in the EIA Phase. Refer to the Specialist Assessments captured in Appendix E.1 to E.12 of this EIA Report for the Specialist Studies and Inputs, that include feedback on the no-go alternative, where relevant. **It is important to note that none of the Specialist Studies and Inputs have identified any environmental fatal flaws, and no unacceptable residual impacts have been identified.**

The no-go alternative means no addition of renewable energy, energy storage and transmission infrastructure, which means further reliance on fossil fuels that will continue to have a negative environmental impact. While the no-go alternative i.e. not developing the proposed projects will not result in any negative environmental impacts in the area, it will also not have any positive community development or socio-economic benefits. In addition, it will not assist government in addressing climate change, reaching its set targets for renewable energy, nor will it assist in supplying the increasing electricity demand within the country. **Hence, the no-go alternative is not the preferred alternative, nor is it a reasonable and feasible alternative to be considered in this EIA Process.**

5.1.2 Land-Use Alternatives

According to the Agricultural Compliance Statement (Appendix E.1 of this EIA Report), the cropping potential of the study area is limited by the combination of climate and soil constraints. The climate is classified as arid; and soils are limited by shallow depth and limited drainage. Moisture availability is insufficient for viable rain-fed cropping. Although such cropping may have been done in the study area in the past, such production is no longer economically viable, and the agricultural potential of the study area is limited to being suitable for grazing only.

The current land-use within the study area is limited to grazing. The footprints of the proposed projects have deliberately avoided all areas of viable cropland towards the north-east (high agricultural sensitivity). The buildable areas are confirmed as low to medium agricultural sensitivity. Therefore cultivation (i.e. agricultural land-use) is not deemed feasible as a land-use alternative for assessment during the EIA Phase. The proposed projects will also have wider societal benefits of generating additional income and employment in the local economy. The development of the proposed projects at the preferred site is more favourable than the agricultural land-use alternative. **Hence, the agricultural land use is not a preferred alternative, and is not deemed as feasible for consideration in the EIA Phase, based on the motivation provided above.**

5.1.3 Type of Activity Alternatives

For Project 1 (Biesjesvlei PV1), the type of activity relates to the generation of electricity from a renewable energy source. Scatec Africa (Pty) Ltd and Veroniva (Pty) Ltd focus on solar and wind technologies and work with landowners, technology providers, regulators and investors to source and develop renewable energy projects. Therefore, the **generation of electricity from a renewable energy source** was the only activity considered by the Applicant, and thus considered in this Scoping and EIA Process. **No other activity types were considered or deemed appropriate based on the expertise of the Applicant.**

For Project 4 (Biesjesvlei BESS 1), the type of activity relates to the storage and dispatching of electricity that is generated from the proposed solar PV facility. Electrochemical BESS was the only energy storage option that was identified and considered feasible by the Applicant. Other mechanical, electrical and thermal energy storage systems were not considered. **Therefore, no other activity types were considered or deemed appropriate for this Scoping and EIA Process.**

In terms of the alternatives considered for Project 7 (Biesjesvlei EGI 1), this is entirely dependent on the activity associated with the proposed solar PV facility. Essentially, the proposed solar PV facility governs the type of activity associated with the proposed projects. The activity to be undertaken for Project 7 (Biesjesvlei EGI 1) is therefore the transmission of electricity that will be generated by the proposed solar PV facility. The only feasible method of transmitting the electricity that is generated by the proposed solar PV facility to the proposed MTS is via power lines. **Therefore, no other activity types were considered or deemed appropriate for this Scoping and EIA Process.**

5.1.4 Renewable Energy Alternatives

The information presented in this section is applicable to Project 1 (Biesjesvlei PV1) only.

Where the “activity” is the generation of electricity from a renewable energy source, possible alternatives that could potentially be considered include Biomass, Hydro Energy, Wind Energy and Solar Energy. However, based on the preliminary investigations undertaken by the Project Applicant, **Solar PV development is the preferred renewable energy alternative** and no other renewable energy technologies are deemed to be feasible for the study area. The unsuitability of other renewable energy technologies in the study area, and impacts of each, are discussed below.

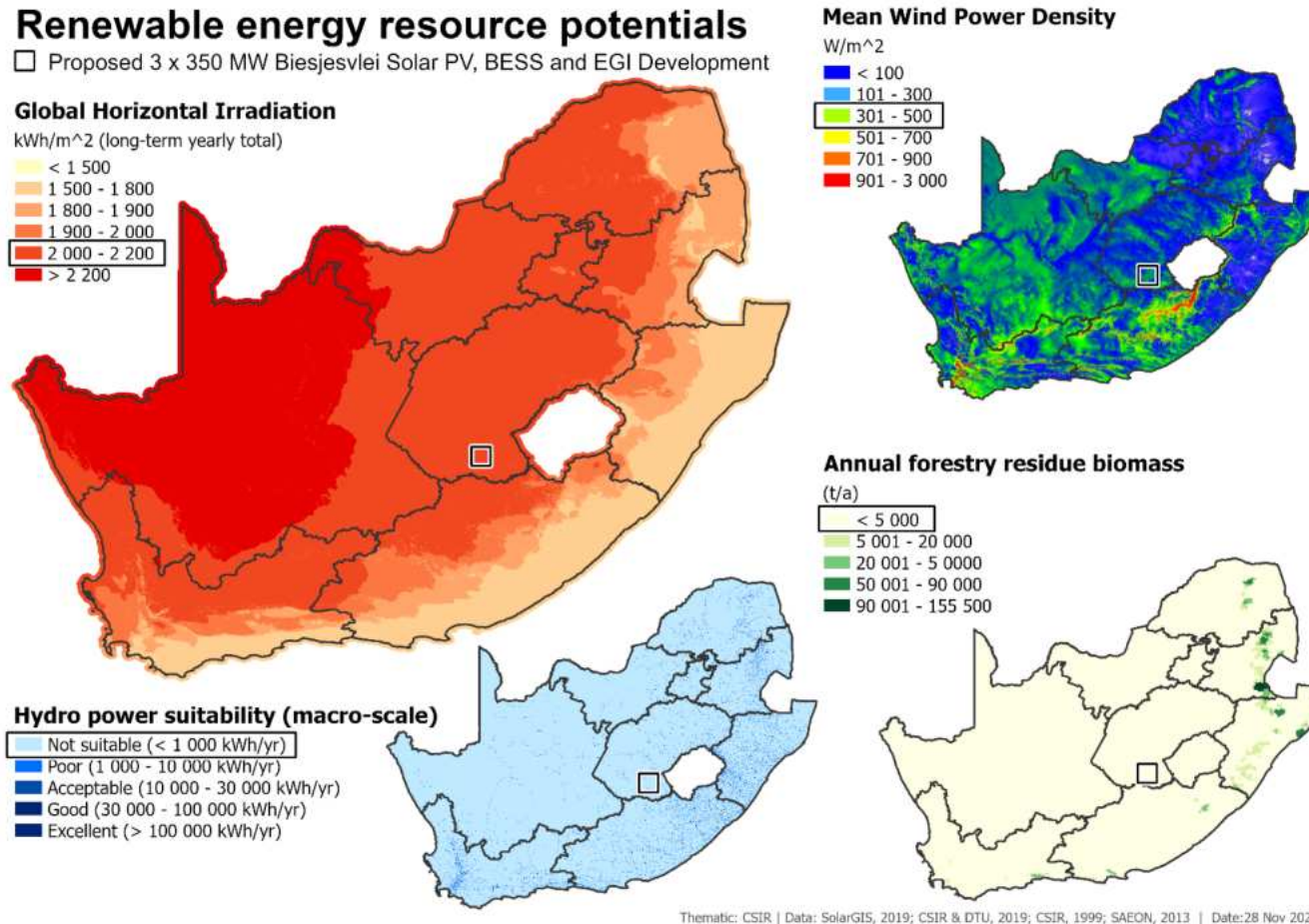


Figure 5.1: Solar Resource Availability / Global Horizontal Irradiation (kWh/m²); Annual Mean Wind Power Density (W/m²); Hydropower Potential (kWh/year); and Biomass Potential in terms of Annual Forestry Residue (t/a) for South Africa. The proposed project location is indicated by the black square.

5.1.4.1 Biomass Energy

The study area does not contain an abundant or sustainable supply of biomass. As indicated in Figure 5.1, the study area has less than 5 000 t/a annual forestry residue biomass, which is the lowest for this category. Therefore, the study area does not have any biomass energy potential.

Therefore, the implementation of a Biomass Energy Facility within the study area is not considered to be a reasonable and feasible alternative for assessment as part of this Scoping and EIA Process.

5.1.4.2 Hydro Energy

The study area does not contain any large inland water bodies, which excludes the possibility of renewable energy from small- or large-scale hydro energy generation. In terms of macroscale hydropower potential (Figure 5.1), the study area falls within an area classified as “Not Suitable” (i.e. less than 1 000 kWh/year).

Therefore, the implementation of a Hydro Energy Facility within the study area is not considered to be a reasonable and feasible alternative for assessment as part of this Scoping and EIA Process.

5.1.4.3 Wind and Solar Energy

5.1.4.3.1 National Planning: IRP 2019¹

The 2019 IRP was published in Government Gazette (GG) 42784, Government Notice (GN) 1360 on 18 October 2019 for the period 2019 to 2030. As indicated in Figure 5.2 for the projection to 2030, coal makes up approximately 43 % of the total installed capacity, whereas Wind and Solar PV respectively make up 23 % and 10 % (Table 5, Page 42 of the IRP 2019 published in GG 42784).

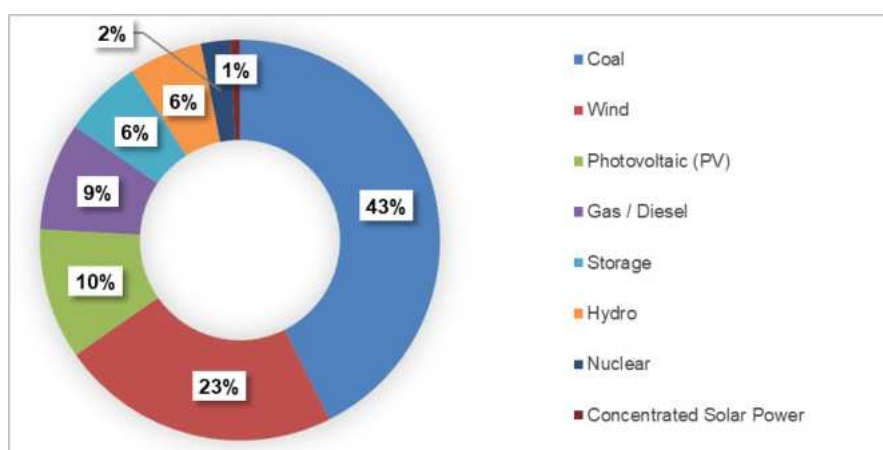


Figure 5.2: Total Installed Capacity for 2030 (% of MW) in the IRP of 2019.

¹ The IRP was updated in 2023 (2023 Draft IRP) and released for public comment in January 2024. It has not been gazetted for implementation yet.

The 2019 IRP proposes to secure 26 630 MW of renewable energy capacity by 2030 (for Wind, Solar PV and CSP). This amount excludes Hydropower and Storage. Of this total, 1 474 MW of Solar PV, 1 980 MW of Wind and 300 MW of CSP is already installed capacity. In addition, of the 26 630 MW, approximately 814 MW of Solar PV, 1 362 of Wind and 300 MW of CSP is committed or already contracted capacity. Furthermore, of the 26 630 MW total, 6 000 MW is allocated to Solar PV, and 14 400 MW is allocated to wind as new additional capacity. Refer to Figure 5.3 for additional information.

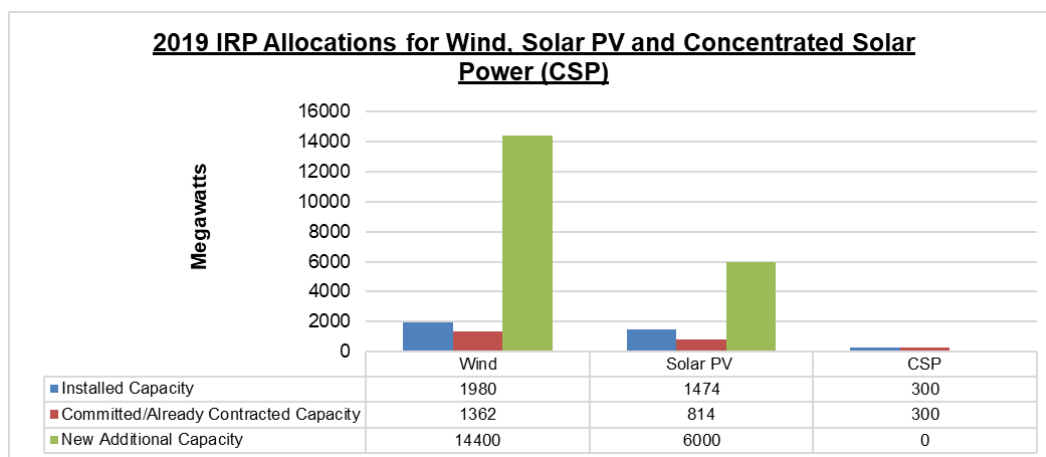


Figure 5.3: 2019 IRP Allocations for Wind, Solar and CSP in MW.

As part of the rollout of renewable energy in the country, the Department of Mineral Resources and Energy (DMRE) developed a bidding process for the procurement of a set amount (MW) of renewable energy in accordance with the IRP from Independent Power Producers (IPPs). The REIPPPP was launched in 2011 to implement the vision of the IRP and it included several bidding rounds (called “Bidding Windows”). To date, Bidding Windows 1, 2, 3, 3.5, 4, 5, 6, and 7 have been announced.

On 18 August 2015, an additional procurement target of 6 300 MW to be generated from renewable energy sources was added to the REIPPPP for the years 2021 - 2025, as published in GN 733, GG 39111. Of this, the additional target allocated for solar PV was 2 200 MW.

On 28 October 2021, the Minister of Mineral Resources and Energy (DMRE, 2021a²) announced the Preferred Bidders of Bid Window 5 of the REIPPPP, which was released in April 2021. The aim was to procure a total of 2 600 MW (consisting of 1 600 MW from onshore wind and 1 000 MW from Solar PV). Approximately 102 Bids were submitted in August 2021. Twenty-five (25) Preferred Bidder Projects, totalling 2 583 MW, were selected (DMRE, 2021a¹). Of the 2 583 MW, approximately 1 608 MW and 975 MW will be respectively procured from 12 wind projects and 13 Solar PV projects (DMRE, 2022a³). In Bid Window 5, the Preferred Bidders provided an average

² DMRE (2021a). Announcement by the Minister of Mineral Resources and Energy, the Honourable Gwede Mantashe 28 October 2021 Renewable Energy IPP Procurement Programme (REIPPPP) Bid Window 5 Announcement of Preferred Bidders. <https://ipp-projects.co.za/PressCentre> [online]. Accessed November 2021.

³ DMRE (2022a). Media Statement by the DMRE: Signing of an additional three project agreements under the 5th Bid Window of the Renewable Energy Independent Power Producer Programme (REIPPPP BID WINDOW 5), dated 10 November 2022. <https://ipp-projects.co.za/PressCentre> [online]. Accessed November 2022.

tariff of 50 c/kWh for wind and of 43 c/kWh for solar PV. This is a considerable reduction in tariff from Bid Window 4 in November 2015 where the tariff provided for wind and solar PV were both 78 c/kWh. This confirms the crucial role that renewable energy is playing in being the lowest cost energy alternative in South Africa, while supporting the decarbonisation of the power system and ensuring that electricity is cost-effective and sustainable.

According to the IPP Office, in a presentation made at the Bid Window 6 Bidders' Conference on 7 July 2022 (IPP Office, 2022b⁴), as of March 2022 (excluding Bid Window 5 statistics), the DMRE had selected 92 Preferred Bidders, with a total combined electricity capacity of 6 323 MW procured, of which 5 826 MW is already operational from 87 IPPs. Based on a media statement dated 30 April 2024, at the time, the REIPPPP had 95 IPP projects supplying 7 336 MW to the national grid (including from renewable and diesel generators) (DMRE, 2024a⁵).

Bid Window 6 was announced in April 2022 and closed on 3 October 2022, and aims to procure 4 200 MW (i.e. 3 200 MW from wind and 1 000 MW from Solar PV). Six preferred bidders for Solar PV projects have been announced for Bid Window 6. It is understood that two of the six preferred bidders reached Commercial Close on 30 April 2024 (DMRE, 2024a).

Bid Window 7 was announced in December 2023 and closed on 15 August 2024. It aims to procure 5 000 MW (i.e. 3 200 MW from wind and 1 800 MW from Solar PV).

On 7 July 2020, in GG 43509, GN R753, the Minister of Mineral Resources and Energy, in consultation with the National Energy Regulator of South Africa (NERSA), determined that new generation capacity needs to be procured to contribute towards energy security. Specifically, the gazette noted that 2000 MW needs to be procured from a range of energy source technologies in accordance with the short-term risk mitigation capacity allocated for the years 2019 to 2022 (under "other" in the allocation table contained in the 2019 IRP). In line with this, the Risk Mitigation IPP Procurement Programme (RMIPPPP) was designed and launched in August 2020 by the DMRE in order to fulfil the GN R753 Ministerial Determination. Bids were submitted by various IPPs on 22 December 2020, and on 18 March 2021, the Minister of Mineral Resources and Energy, announced eight Preferred Bidders selected under the RMIPPPP, totalling 1 845 MW (DMRE, 2021b⁶). Three additional Preferred Bidder projects were also announced on 1 June 2021 under the RMIPPPP with a combined capacity of 150 MW, resulting in a total of approximately 1 995 MW to be procured under the RMIPPPP (DMRE, 2021c⁷).

In terms of energy storage, in 2023, the DMRE announced the first bid window of the BESIPPPP for 513 MW (DMRE, 2024b⁸). Four preferred bidders were announced in late 2023, with a total contract capacity of 360 MW at the Nieuwehoop, Mookodi, Ferrum and Aggeneis substations. In

⁴ IPP Office (2022b). Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) Bid Window 6 Bidders' Conference dated 7 July 2022. <https://ipp-projects.co.za/PressCentre> [online]. Accessed August 2022.

⁵ DMRE (2024a). Media Statement: First two projects reach Commercial Close under the 6th Bid Window of the REIPPPP (30 April 2024). <https://www.ipp-renewables.co.za/> [online]. Accessed July 2024.

⁶ DMRE (2021b). Media Statement: To Announce Preferred Bidders for the Risk Mitigation IPP Procurement Programme (RMIPPPP). <https://www.dmr.gov.za/news-room/post/1894/media-statement-to-announce-preferred-bidders-for-the-risk-mitigation-ipp-procurement-programme-rmipppp> [online]. Accessed November 2021.

⁷ DMRE (2021c). Media Statement: Department of Mineral Resources and Energy Announces Three Additional Preferred Bidders Appointed under the Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP). <https://www.ipp-rm.co.za/> [online]. Accessed November 2021.

⁸ DMRE (2024b). Energy Storage IPP Procurement Programme. <https://www.ipp-storage.co.za/> [online]. Accessed July 2024.

December 2023, the DMRE announced the second bid window of the BESIPPPP which closed on 29 August 2024, focusing on substations in the North-West province, totalling 615 MW. In March 2024, the DMRE also announced the third bid window of the BESIPPPP which is scheduled to close in October 2024, focused on substations in the Free State province, totalling 616 MW (DMRE, 2024b).

It is intended for the proposed projects to be bid under the future rounds of the REIPPPP, BESIPPPP or similar bidding processes, following the issuing of EAs, should such authorisations be granted.

5.1.4.3.2 Wind Energy

In order to ensure that a wind energy facility is successful, a reliable wind resource is required. Wind resource is defined in terms of average wind speed and includes Weibull distribution (used to describe wind speed distributions); turbulence, wind direction, and pattern of wind direction (as depicted by a wind rose). These factors are all key considerations used in determining whether a site is suitable for the development of a wind energy facility. A mean wind power density map has been created (CSIR, 2018), which is not related to any specific turbine type and demonstrates the wind resource of the country. The mean wind power density map shows that the study area falls within an area of approximately 301 – 500 W/m² (Figure 5.1).

Overall, wind energy development can occur within this area but other localities in South Africa may be more favourable for such development. Site specific requirements for **wind energy facilities** however make this study area a **less feasible alternative** when compared to solar PV.

Furthermore, one of the aims is to try and receive EA (should it be granted) as promptly as possible in order to ensure the project is bid in the next bidding windows of the REIPPPP, BESIPPPP or similar tender processes; and development of wind energy facilities would need at least 12 months of pre-construction monitoring for birds and bats. In addition, for wind energy developments, collecting on-site wind data is necessary to confirm both the presence of the wind resource on site and the bankable viability of the proposed project. The provision of at least 12 months on-site wind monitoring data is also a requirement of the REIPPPP. The timelines for these monitoring programmes are not favourable to the overall current project schedule.

Therefore, the implementation of a wind energy facility within the study area is not considered to be a feasible alternative for assessment as part of this current Application for EA. However, it is possible for the Applicant to pursue this technology in the future and undertake detailed environmental screening to determine if it is feasible.

5.1.4.3.3 Solar Energy

In terms of the suitability of solar energy development at this location, the study area falls within the **second highest** Global Horizontal Irradiation⁹ (GHI) category, relevant to PV installations

⁹ Global Horizontal Irradiance is the total amount of shortwave radiation received from above by a surface horizontal to the ground.

(Figure 5.1). The study area has a GHI of 2 000 kWh/m² to 2 200 kWh/m² in terms of the long-term yearly total (Figure 5.1).

Therefore, this area is deemed as one of the most suitable for the construction and operation of solar energy facilities as opposed to other areas and provinces within South Africa. For example, coastal regions within the Eastern Cape and KwaZulu-Natal mainly have a lower GHI (shown in the lighter orange shades in Figure 5.1), which is not completely feasible for the proposed projects. Furthermore, the location of the site is closer to the main demand centre for energy in South Africa (i.e. Gauteng) than much of the area in the highest GHI category.

Therefore, the implementation of a solar energy facility (with BESS) within the study area is more favourable and feasible than wind energy, biomass and hydropower development, especially from a project economic and energy generation viability and location compatibility perspective. Therefore, solar PV is the most feasible and preferred renewable energy alternative.

Finally, since the alternative renewable energy generation activities considered were deemed to be unreasonable and unfeasible for the study area, no other renewable energy alternatives were further assessed as part of the current Scoping and EIA Processes.

5.1.4.3.4 Summary of the Renewable Energy Alternatives

Table 5.1 presents a summary and an evaluation matrix for the possible renewable energy alternatives with regards to resource suitability and availability, and potential risks and impacts.

Table 5.1: Summary of Evaluation of Potential Risks and Impacts for Renewable Energy Alternatives

Type of Renewable Energy Alternative	Are suitable resources available at the proposed project site?	Main Potential Impacts and Risks	Is this the preferred Alternative?
Biomass Energy	No – not suitable i.e. less than 5 000 t/a annual forestry residue.	- Significant Waste Generation with the potential need for a Waste Management Licence; and - Air Emissions with the potential need for an Atmospheric Emissions Licence.	No
Hydro Energy	No – “Not Suitable” (i.e. less than 1 000 kWh/year)	- Significant impacts on aquatic biodiversity and hydrology of the affected river system; - Water Use Licence would be required for the establishment of an in-stream hydropower development; and - Long lead times would be required for the various permits needed for such development.	No
Wind Energy	Yes, but other sites might have better wind resources - 301 – 500 W/m²	- Visual impacts as a result of construction activities and turbines during operation; - Noise generation as a result of construction activities and turbines during operation; - Bird and bat collisions during the operational phase;	No

Type of Renewable Energy Alternative	Are suitable resources available at the proposed project site?	Main Potential Impacts and Risks	Is this the preferred Alternative?
		- More restrictive avifauna buffers; - Impacts on aquatic ecology and terrestrial ecology; - Impact on archaeology and palaeontology; and - Impact on civil aviation.	
Solar Energy	Yes – 2 000 - 2 200 kWh/m²	- Visual impacts as a result of construction activities and the PV panels during operation; - Noise generation as a result of construction activities; - Loss of agricultural land (i.e. grazing); - Impacts on heritage resources (i.e. archaeology and palaeontology); - Impacts on the water balance as a result of water required for panel cleaning; - Impacts on avifauna, aquatic ecology and terrestrial ecology.	Yes

5.1.5 Site Alternatives

The 2014 NEMA EIA Regulations (as amended), requires a site selection matrix to be provided to show how the preferred site was determined through a site selection process. Within this context, the “site” is the farms or land portions earmarked for the development of the proposed projects. This is essentially the study area, which consists of 11 farm portions, as indicated in Chapter 2 of this EIA Report. The total study area for Projects 1 to 10 is approximately 3 060 ha.

The preferred site (i.e. study area) was strategically selected by the Project Developer based on various factors and detailed research, as noted below:

- It was determined that one solar PV project (in the order of 350 MW) would not be able to justify the significant costs associated with developing a LILO to connect to the existing Eskom power line. Therefore, it was decided that three solar PV facilities would be required in order to justify the said costs. Therefore, the Project Developer targeted a site that was large enough to accommodate three solar PV facilities, BESS, and EGI, as well as associated infrastructure.
- As an initial step, the Project Developer undertook internal research, exploration work, and a desktop feasibility analysis (based on the grid connection options, solar resource and land availability) in order to identify the preferred site. When selecting the preferred site, the developer also considered the following:
 - Proximity to the national grid: The Eskom 400 kV Beta – Delphi power line runs through the study area, which makes a potential connection opportunity available for the proposed projects. This was a considerable pull factor in selecting the preferred site, as grid connection is an important factor.

- Proximity to the Square Kilometre Array (SKA): It was also important for the site to be located outside of the Karoo Central Astronomy Advantage Area (KCAAA) so that there are no unacceptable impacts on the SKA, which could potentially be a fatal flaw or require significant investment in Radio Frequency Interference and Electromagnetic Control studies to be undertaken.
- The Project Developer then consulted the National Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool, other available datasets, the South African National Biodiversity Institute (SANBI) Biodiversity GIS (BGIS) system, as well as the Endangered Wildlife Trust (EWT) No-Go Screening Tool, in order to identify desktop environmental sensitivities and to determine if there are any clear fatal flaws and concerns. The findings indicated that the study area is generally developable.
- The Project Developer then consulted with the owners of the farm portions forming the study area to obtain consent to develop the proposed projects, and to also identify any areas where development must be excluded based on the requirements of the landowners. These landowner exclusion zones were then acknowledged and implemented, which influenced the site selection process. Specifically, the adjacent farms Reineke's Kraal and De Draai were also considered for development, however the landowner explained that these properties need to be excluded from the study area, as these properties are currently being used by the landowner for other purposes.

At a local level, the 11 farm portions for the development of the proposed projects were selected based on a combination of the factors listed above. Furthermore, from an impact and risk assessment perspective, the implementation of the proposed projects at the **preferred site** will most likely result in fewer risks in comparison to its implementation at alternative sites within the Free State (i.e. regions with similar solar radiation levels), based on the following points:

- There is no guarantee that the current land use of alternative sites will be flexible in terms of development potential, for example, the agricultural potential at the alternative sites might be higher and of greater significance.
- There is no guarantee of the willingness of other landowners to allow the implementation of a solar facility, BESS and EGI on their land and if the landowners strongly object, then the project will not be feasible.
- There is no guarantee that other sites will be located close to existing or proposed EGI to enable connection to the national grid. The further away a project is from the grid, the higher the potential for significant environmental and economic impacts.

5.1.5.1 Site Specific Considerations

On a site specific level, the preferred site was deemed suitable due to all the site selection factors (such as land availability, environmental sensitivities, irradiation levels, distance to the national grid, site accessibility, topography, current land use and landowner willingness) being favourable. The site selection criteria considered by Scatec Africa (Pty) Ltd and Veroniva (Pty) Ltd are discussed in detail below in Table 5.2.

Table 5.2: Site selection factors and suitability of the preferred site for the development of the proposed projects

FACTOR	SUITABILITY OF THE PREFERRED SITE
Land Availability	The farm portions comprising the preferred site are of a suitable size for the proposed projects. The land available for the development of all the proposed projects is approximately 3 060 ha in extent. Although this total area was assessed by the specialists during the site sensitivity verifications and assessments, the entire area will not be required for the permanent development footprint of the proposed projects and their associated infrastructure. Refer to Chapter 2 of this EIA Report for project footprint specifications.
Environmental Sensitivity	Although the preferred site for the proposed projects does contain environmental features that need to be avoided due to very high or high environmental sensitivity, as described in Chapter 3, and other relevant chapters of the EIA Report, as well as the Specialist Studies and Inputs in Appendix E of this EIA Report, following these exclusions sufficient suitable land is still available to ensure the development feasibility of the proposed projects.
Irradiation Levels	The availability of the solar resource is the main driver of project viability. The site was identified by the Project Developer through a desktop analysis based on the estimation of the solar energy resource, and other factors. 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 direct and indirect benefits for the South African economy. The study area has a GHI of 2 000 to 2 200 kWh/m ² in terms of the long-term yearly total.
Distance to and availability of the Grid	The proposed projects are planned to connect to the existing Eskom Beta – Delphi 400 kV overhead power line via dedicated proposed 132 kV power lines, as well as an independent Main Transmission Substation (MTS) and Loop-In-Loop-Out (LILO). The Eskom Beta – Delphi 400 kV power line is located within the study area. This proximity presents a significant benefit to potential connection to the grid.
Site Accessibility	The study area can be accessed via existing roads. Specifically, Access Route Option A, Option B and Option C, which runs along the N6; S1262; and S119. Access Route Options A, B and C have different access points off the S119. Direct access to the proposed projects will be taken from the S119 along an existing farm access point, and thereafter new access roads will be developed within the study area, where they do not align with existing roads, or existing roads will be used where possible. Where new access roads are required within the study area, these will be 4 - 8 m wide. Where existing roads are used within the study area, they may need to be upgraded. Additional information is provided in Chapter 2 of this EIA Report, as well as the Traffic Impact Assessment which is included in Appendix E.9 of this EIA Report. Key findings of the Traffic Impact Assessment are also summarised and included in Chapter 14 of this EIA Report. The Applicant is seeking authorisation of all three road options listed above so that any one of them can be used at the time of construction, depending on feasibility analysis and detailed design. Note that all options have been considered by the specialists, and no fatal flaws have been identified.
Topography	The Visual Specialist noted that the study area lies within an expansive gently rolling landscape of the Southern Free State uplands, composed of mudstone and sandstone of the Tarkastad Subgroup, Beaufort Group (Karoo Supergroup), interspersed with dolerite-capped koppies. The koppies are the main scenic features of the area and provide topographic relief. The elevation ranges from about 1500 m to 1600 m in the local area. Additional information regarding topography is included in the Visual Impact Assessment, which is included in Appendix E.5 of this EIA Report. The key findings of the Visual Impact Assessment are also summarised and included in Chapter 10 of this EIA Report.
Current Land Use	Agriculture (mainly livestock grazing)

FACTOR	SUITABILITY OF THE PREFERRED SITE
Landowner Willingness	All affected landowners have signed letters of consent for the use of the land for the proposed projects (should EA be granted). This is considered an important aspect of the proposed projects in terms of its viability (i.e. this will limit potential appeals during the decision-making process, as the landowner is willing and supportive of the proposed projects being undertaken on the affected farm portions).

Furthermore, one of the main determining points for the Project Developer was to find suitable, developable land in one contiguous block to (i) optimize design, (ii) minimize construction and operational costs, and (iii) minimize sprawling development and limit the impact footprints. The proximity to the existing Eskom 400 kV power line was also a major determinant for identifying suitable sites for the proposed development, as indicated above.

Given the site selection requirements and the suitability of the land available on the **preferred site**, and the fact that no initial fatal flaws are present on the site, as well as the motivating factors listed above, **no other site alternatives were considered as part of this Scoping and EIA Process. Therefore, the site is deemed feasible and selected as the preferred site.**

5.1.6 Location Alternatives – Development Footprint within the Preferred Site

The strategic process followed to reach the preferred site and to consider various development footprints (or location alternatives) within the preferred site is discussed in this section and illustrated in Figure 5.4. The approach followed was to use environmental and social constraints to avoid sensitive features, thus applying mitigation hierarchy thinking. This approach replaces the need to rank alternative sites and locations, as it leads to the selection of the least sensitive development footprint.

Once the preferred site was identified, the study area was plotted on the DFFE Screening Tool to identify high-level environmental sensitivities. Following this, the Council for Scientific and Industrial Research (CSIR) serving as the independent Environmental Assessment Practitioner (EAP) and Specialists were appointed to undertake the Scoping and EIA Processes for the proposed projects.

The specialists then considered the high-level sensitivities identified on the Screening Tool and undertook Site Sensitivity Verifications (SSVs) within the study area, where required, in order to confirm or dispute the sensitivities identified by the Screening Tool. The specialists assessed the full extent of the preferred site (i.e. approximately 3 060 ha), which serves as the study area for this Scoping and EIA Processes. The specialists then formulated environmental feature and sensitivity maps for the study area. These maps (where relevant) are included in Chapter 3 and Chapter 20 of this EIA Report, as well as in Appendix D (Maps) and Appendix E (Specialist Studies and Inputs) of the EIA Report. These maps show the identified environmental features and sensitivities such as terrestrial biodiversity, aquatic features, avifauna, heritage, visual, and geohydrological features present within the study area.

Based on the specialist findings, the Project Developer took such sensitivities, and other considerations, into account and formulated the **Buildable Areas**, which avoid the no-go areas identified by the specialists. The Buildable Areas are estimated to be 2 130 ha in extent.

The no-go or very highly sensitive environmental features found within the preferred site were able to be avoided by the location, layout and design of the proposed projects. Following the exclusion of the required areas, sufficient developable area is still available on site which does not compromise the current ecological integrity of the site. The current layout is thus a culmination of extensive technical, economic and environmental planning.

The layout has been further refined and/or detailed during the EIA Phase. Chapter 20 of this EIA Report includes the proposed project layout maps, which are also included in Appendix D of this EIA Report, as well as the specialist studies (Appendix E) and EMPs.

It must be re-iterated that a strategic site, location and development footprint identification process has been followed, where the selection is informed by the environmental constraints identified through screening. This is based on the mitigation hierarchy approach of firstly trying to avoid impacts through careful siting. Therefore, it must be noted that different site, location or development footprint alternatives are not ranked, but rather a strategic process was followed (as shown in Figure 5.4) where sensitive features are screened out, such as in Table 5.2, in order to reach the preferred location or development footprint within the preferred site.

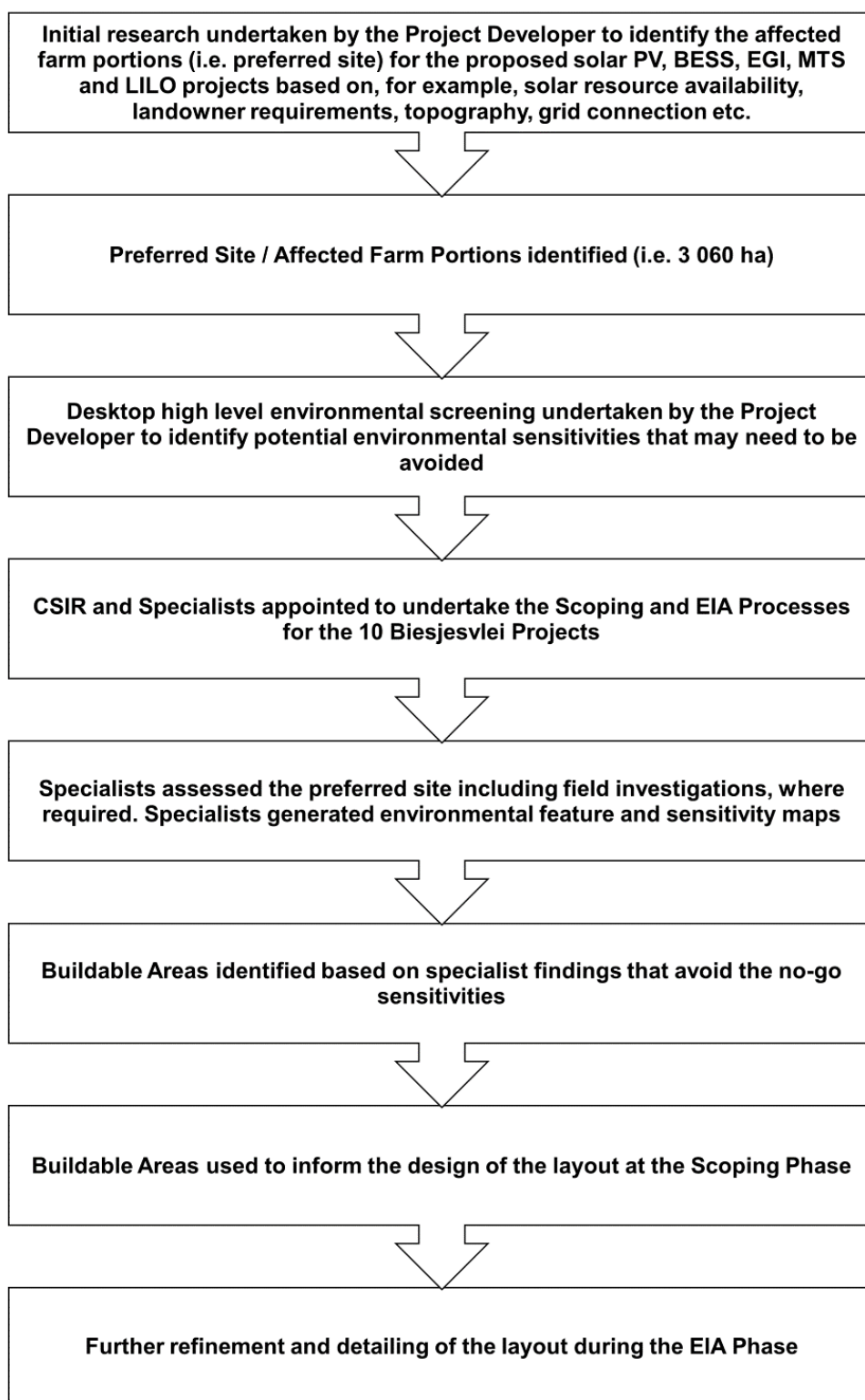


Figure 5.4: Process flow for the identification of the Preferred Site and Development Footprint

5.1.7 Technology Alternatives

The following technologies were considered as part of this Scoping and EIA Process. Note that there are no feasible technology alternatives for power lines (i.e. Project 7 (Biesjesvlei EGI 1)).

5.1.7.1 Solar Panel Types

This section is only applicable to Project 1 (Biesjesvlei PV1).

Only the PV solar panel technology type has been considered in this Scoping and EIA Process (i.e. no other technology types were considered in this regard). Due to the scarcity of water in the study area and the large volume of water required for CSP, this technology is not deemed feasible or sustainable and has not been considered in this Scoping and EIA Process. This is the main difference between PV and CSP technology that led to the selection of PV as the preferred solar panel technology.

Furthermore, CSP technology requires a larger development footprint to obtain the same energy output as PV technology, and it requires active solar tracking to be effective. As described above, in terms of the 2019 IRP, 300 MW capacity is already installed for CSP; and an additional 300 MW has been allocated for 2019, whilst there is no new additional capacity allocated for this technology. Solar PV is allocated an additional new capacity of 6 000 MW in terms of the 2019 IRP. This means that the need and desirability of CSP is not as evident and justified compared to PV.

5.1.7.2 PV Mounting System

This section is only applicable to Project 1 (Biesjesvlei PV1).

Solar panels can be mounted in various ways to ensure maximum exposure of the PV panels to sunlight. The main mounting systems considered as part of the Scoping and EIA Process and design are Single Axis Tracking structures (aligned north-south); Fixed Axis Tracking (aligned east-west); Dual Axis Tracking (aligned east-west and north-south); Fixed Tilt Mounting Structure; and Bifacial Solar Modules.

Note that the mounting options are not weighed against each other in order to identify the most preferred alternative at the end of the EIA Phase. Instead, the specialists have considered all of the above mounting systems as they are all deemed acceptable, and thus all are put forward for approval in the EA (should it be granted). Regardless of the mounting system, the maximum height of the PV panel structure has been assessed by the specialists.

5.1.7.3 Battery Energy Storage Systems

This section is only applicable to Project 4 (Biesjesvlei BESS 1).

As indicated in Chapter 2 of this EIA Report, **Solid State, Lithium-Ion BESS** is being proposed. It must be reiterated that only one technology i.e. Solid State Lithium-Ion BESS was assessed as part of this Scoping and EIA Process since the inception and no other technologies were assessed. The information described below regarding Redox Flow BESS was intended to serve as background and contextual information (not for formal ranking against each other in order to identify the most preferred alternative at the end of the EIA Phase).

However, Redox Flow BESS was also considered by the Project Developer during the initial planning phases (i.e. before the Scoping and EIA Process was initiated). Table 5.3 provides high level advantages and disadvantages of the two technologies.

Table 5.3: Advantages and disadvantages associated with Solid State and Redox Flow BESS technologies (Sources: Parsons, 2017¹⁰; Zhang *et al.*, 2016¹¹)

BESS technologies being considered	Advantages	Disadvantages
<u>Solid State Lithium-Ion BESS</u>	- Sealed systems i.e. pre-assembled off site and delivered to site for placement (i.e. carries less potential risk to the environment in terms of spillages). Hence, they are easier to install and will not likely need many permanent staff. - Reduced risk of spillage as storage of large quantities of electrolyte is not required.	- Explosions and fires can occur as well as the possibility of generating noxious smoke under these circumstances. This can occur as result of electrolytes mixing when a breach occurs due to: - improper maintenance near operating temperature, - thermal expansion, or - freeze thaw cycles. - Over the long term, these BESS may be more difficult to repurpose / dispose of and may present cumulative long term environmental impacts.
<u>Redox Flow Batteries (RFB)</u>	- RFBs are self-discharging systems therefore generally require little maintenance. However, RFBs are more difficult to install, i.e. formal brick and mortar structures, and will potentially require many permanent staff. - High economic efficiency, for example, Vanadium has a high economic value and can be recycled.	- Risk of spillage tends to be higher for RFB as opposed to sealed solid-state BESS as the storage tanks of RFB, may be subjected to leaks or spills during the replacement or blending of the electrolyte, or during transport of the battery to and from site. - Electrolyte used is generally considered as a dangerous good in terms of the EIA Regulations, which would most likely trigger listed activities and require the need for an EA.

During the initial planning phase (prior to the Scoping and EIA Phase initiation), based on the advantages and disadvantages associated with both BESS technologies, as well as recent technology trends, the Project Developer selected Solid State Lithium-Ion BESS as the preferred option. Redox Flow BESS was thus not assessed or considered in this Scoping and EIA Process. It is important to note that no fatal flaws exist for the Redox Flow BESS, should the Applicant wish to consider it later (via an EA Amendment process, should such authorisation be granted).

A High-Level Safety, Health and Environment (SHE) Risk Assessment was undertaken during the EIA Phase which provides high level information on the safety, health and environmental risks of

¹⁰ Parsons, 2017. US Trade and Development Agency. South Africa Energy Storage Technology and Market Assessment. Order Number: TDA-IE201511210. USTDA Activity Number: 2015-11032A. Parsons Job Number: 640368.

¹¹ Zhang, X., Tang, Y., Zhang, F., and Lee, C. S., (2016). A novel aluminum-graphite dual-ion battery. *Advanced energy materials*, 6(11), p.1502588.

the **Lithium-Ion BESS technology** being proposed. The BESS High-Level SHE Risk Assessment is included in Appendix E.12 of this EIA Report.

5.2 Concluding Statement of Preferred Alternatives

As per Appendix 3, Section 3 (1) (h) (x) of the 2014 NEMA EIA Regulations (as amended), and based on Section 5.1 above, the following is a concluding statement on the alternatives considered:

- **No-Go Alternative:**
 - The no-go alternative would result in no environmental impacts (positive and negative) on the preferred site or surrounding local area, as a result of the proposed projects. The no-go alternative has been assessed in the EIA Phase by all the specialists on the project team. **At the EIA Phase, the no-go alternative is not preferred.**
- **Land-Use Alternative:**
 - The current land-use within the study area is limited to grazing. The buildable areas are confirmed as low to medium agricultural sensitivity. **Cultivation is not deemed feasible as a land-use alternative for assessment during the EIA Phase.** The development of the proposed projects at the preferred site is more favourable than the agricultural land-use alternative.
- **Type of Activity Alternative:**
 - The information presented below is applicable to Project 1 (Biesjesvlei PV1) only:
 - The generation of electricity from a renewable energy source was the only activity considered by the Applicant, and thus considered in this EIA Report. **No other activity types were considered or deemed appropriate** based on the expertise of the Applicant.
 - The information presented below is applicable to Project 4 (Biesjesvlei BESS 1) only:
 - Electrochemical BESS was the only energy storage option that was identified and considered feasible by the Applicant. Other mechanical, electrical and thermal energy storage systems were not considered. **Therefore, no other activity types were considered or deemed appropriate for this Scoping and EIA Process.**
 - The information presented below is applicable to Project 7 (Biesjesvlei EGI 1) only:
 - The activity to be undertaken for Project 7 (Biesjesvlei EGI 1) is the transmission of electricity that will be generated by the proposed Solar PV facility. The only feasible method of transmitting the electricity to the proposed MTS is via power lines. **Therefore, no other activity types were considered or deemed appropriate for this Scoping and EIA Process.**
- **Renewable Energy Alternatives:**
 - The information presented below is applicable to Project 1 (Biesjesvlei PV1) only:

- The development of Solar PV is the preferred and only renewable energy technology to be developed on site because the site has a **very good solar resource availability** (i.e. Global Horizontal Irradiation of 2 000 to 2 200 kWh/m² in terms of the long-term yearly total) and the **local conditions are favourable**.
 - In addition, **Hydro Power and Biomass Energy** are deemed **unsuitable**.
 - The study area does have wind resources (i.e. 301 – 500 W/m²), however other sites might have better wind resources.
- **Preferred Site and Development Footprint within the site:**
 - The preferred site for all the proposed Biesjesvlei Projects 1 to 10 comprises the following farm portions, which serves as the 3 060 ha study area for this Scoping and EIA Process:
 - Farm Benoni 534;
 - Remaining Extent of Farm Biesjespoort 521;
 - Farm Biesjesvlei 372;
 - Farm Klein Badfontein 369;
 - Farm Modderkuil 396;
 - Farm Paalland 373;
 - Remaining Extent of Farm Pompoenfontein 118;
 - Portion 1 of Farm Pompoenfontein 118;
 - Farm Ronde Bult 408;
 - Farm Salpetervlei 756; and
 - Portion 1 of Farm Schoemanskraal 34.
 - At a specific (local) level, sites on the above listed farm properties were deemed suitable due to all the site selection factors (such as land availability, distance to the national grid, site accessibility, topography, current land use and landowner willingness) being favourable.
 - Furthermore, a screening and SSV exercise of the study area was undertaken by the specialist team during the Scoping Phase. This led to the identification of the Buildable Areas within the preferred site. The Buildable Areas avoid the no-go sensitivities identified by the specialists. The development footprint and layout were identified based on this.
 - The project layout has been detailed and confirmed during the EIA Phase. A layout plan has been included in Chapter 20 of this EIA Report, as well as Appendix D and the EMPs.
- **Technology Alternatives:**
 - The information presented below is applicable to Project 1 (Biesjesvlei PV1) only:
 - Only the PV solar panel type has been considered in this Scoping and EIA Process, along with various mounting options that will be considered in the design.
 - The information presented below is applicable to Project 4 (Biesjesvlei BESS 1) only:
 - Only Lithium-Ion BESS was considered and assessed as part of this Scoping and EIA Process. Lithium-Ion BESS is the preferred option.
 - The information presented below is applicable to Project 7 (Biesjesvlei EGI 1) only:

- There are no feasible technology alternatives for power lines and switching stations.

5.3 Summary of Legislative Requirements for the Assessment of Alternatives

As noted in Chapter 1 of this EIA Report, the 2014 NEMA EIA Regulations (as amended) have certain requirements in terms of the selection of the **proposed preferred activity, site and location of the development footprint within the site**. Table 5.4 below indicates the requirements of the 2014 NEMA EIA Regulations (as amended) in terms of alternatives, and a corresponding response from the EAP showing how the requirements have been addressed in this report.

Table 5.4: Requirements for the consideration of Alternatives based on the 2014 NEMA EIA Regulations (as amended)

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (as amended)	Response from EAP
1	Appendix 3 – 3 – 1 – h – (i)	3. (1) An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include: (h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including: (i) details of all the development footprint alternatives considered;	Refer to Sections 5.1, 5.2, and 5.3 (i.e. this section) of this chapter which provides a description of the process that led to the identification of the preferred alternatives and which alternatives were taken further into the EIA Phase for assessment. It also provides a description of the process that led to the identification of the development footprint within the approved site (i.e. 3060 ha study area). A strategic site, location and development footprint identification process was followed based on the mitigation hierarchy approach of trying to avoid impacts through careful siting. Therefore, different site, location or development footprint alternatives are not ranked, but rather a strategic process was followed.
2	Appendix 3 – 3 – 1 – h – (ii)	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Refer to Chapter 4 of this EIA Report, which details the process followed in terms of Public Participation. Appendix G and Appendix I of this EIA Report respectively include the supporting documentation for the Public Participation Process undertaken during the Scoping Phase and EIA Phase.
3	Appendix 3 – 3 – 1 – h – (iii)	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues	Issues raised by Stakeholders, Organs of State and Interested and Affected Parties (I&APs) prior to and during the 30-day comment period on the Draft Scoping Report

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (as amended)	Response from EAP
		were incorporated, or the reasons for not including them;	were captured and responded to in an Issues and Responses Trail included as Appendix G.7 of this EIA Report. Appendix I.2 of this EIA Report includes the Comments and Responses Trail for comments received between the submission of the Final Scoping Report to the DFFE for consideration and the release of the Draft EIA Report for the 30-day comment period, which extended from 2 August 2024 to 2 September 2024. Comments raised during the 30-day review of the Draft EIA Report were also captured and responded to in a Comments and Responses Trail, included in Appendix I.7 of this Final EIA Report. In addition, Chapter 4 of this Final EIA Report provides a summary of the key comments raised during the 30-day review period on the Draft EIA Report. No new issues or impacts were raised during the Scoping Process, or just before release of the EIA Report for comment, that were not already addressed during the Scoping Phase or planned to be addressed in the EIA Phase. No new issues or impacts were raised during the 30-day review period on the Draft EIA Report, which were not already addressed in the EIA Phase. Appendix E of this EIA Report includes the Specialist Studies and Inputs, which include an assessment of the potential issues and impacts, where relevant. These have also been summarised in Chapters 6 to 17 of the EIA Report, where relevant. In addition, the Specialist Studies and Inputs in Appendix E of this EIA Report also discuss the issues and comments raised during the Scoping Phase (and EIA Phase, where relevant).
4	Appendix 3 – 3 – 1 – h – (iv)	(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical,	Refer to Chapter 3 and Appendix E (Specialist Studies and Inputs) of this EIA Report for a description of the environmental sensitivities associated with the preferred site (i.e. the

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (as amended)	Response from EAP
		biological, social, economic, heritage and cultural aspects;	study area) and the development footprints within. Section 5.1.4 of this chapter also provides information on environmental attributes that were considered in the selection of the preferred site and development footprints for the proposed projects.
5	Appendix 3 – 3 – 1 – h – (v)	(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts: (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Feedback on the impacts and risks that informed the identification of the preferred activity (i.e. generation of energy from solar resources, and storage, dispatching and transmission of electricity) is provided in Section 5.1.3 and Section 5.1.4 above. The impacts and risks identified for the proposed projects at the preferred site, including the location of the development footprints within the site, are included in the Specialist Studies and Inputs in Appendix E of this EIA Report, where relevant. The impact assessment, where relevant, includes a description and assessment of the nature, significance, consequence, extent, duration and probability of the identified impacts, as well as an assessment of the reversibility and irreplaceability of the potential identified impacts, as well as the degree to which the identified impacts can be avoided, managed or mitigated. The impact assessment has also been summarised in Chapters 6 to 17 of the EIA Report, where relevant. In terms of the no-go alternative, this is not considered as the preferred alternative, as discussed in Section 5.1.1 of this chapter. The impacts and risks of both adopting and not adopting the no-go alternative have been discussed in this section. Furthermore, this has been unpacked by the relevant specialists in the EIA Phase.
6	Appendix 3 – 3 – 1 – h – (vi)	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and	Refer to Chapter 4 of this EIA Report, as well as the Specialist Studies and Inputs (Appendix E of this EIA Report) for the impact

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (as amended)	Response from EAP
		probability of potential environmental impacts and risks;	assessment methodology that was used in the assessment of impacts, where applicable and relevant.
7	Appendix 3 – 3 – 1 – h – (vii)	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Feedback on the impacts and risks that informed the identification of the preferred activity (i.e. generation of energy from solar resources, and storage, dispatching and transmission of electricity) is provided in Section 5.1.3 and Section 5.1.4 above.
8	Appendix 3 – 3 – 1 – h – (viii)	(viii) the possible mitigation measures that could be applied and level of residual risk;	Such feedback relating to the preferred site and development footprints is captured in the Specialist Studies and Inputs in Appendix E of this EIA Report, where relevant. These chapters include an assessment of impacts and risks of the proposed projects at the preferred site and based on the development footprints. The impact assessment has also been summarised in Chapters 6 to 17 of the EIA Report, where relevant.
10	Appendix 3 – 3 – 1 – h – (ix)	(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such; and	Where no further alternatives were considered, a motivation has been provided in this chapter, within the relevant sections. This applies to land-use alternatives, type of activity alternatives, renewable energy alternatives, and technology alternatives. However, with regards to alternatives for the preferred site and development footprint within the site, a strategic site, location and development footprint identification process was followed based on the mitigation hierarchy approach of trying to avoid impacts through careful siting. Therefore, different site, location or development footprint alternatives are not ranked, but rather a strategic process was followed.
11	Appendix 3 – 3 – 1 – h – (x)	(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report.	Refer to Section 5.2 of this chapter for a concluding statement.



CHAPTER 6: Agriculture

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6. AGRICULTURE

6.1 Introduction

This chapter provides a brief summary of the Agricultural Compliance Statement for the Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of the Biesjesvlei Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Facility, and their associated Electricity Grid Infrastructure (EGI), near Smithfield in the Free State Province. **Refer to the full Agricultural Compliance Statement which is included in Appendix E.1 of this EIA Report for additional information.**

This chapter specifically deals with the **Biesjesvlei PV1 (Project 1), the Biesjesvlei BESS 1 (Project 4) and the Biesjesvlei EGI 1 (Project 7)** (hereinafter referred to as the “proposed projects”).

The information presented throughout this chapter applies equally to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1), unless where mentioned otherwise.

6.2 Need for the Agricultural Compliance Statement

The following Assessment Protocols have been published in Government Gazette (GG) 43110, Government Notice (GN) R320 by the then Department of Environment, Forestry and Fisheries (DEFF) on 20 March 2020 in terms of Sections 24(5)(A) and (H) and 44 of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA), which are relevant to the proposed projects:

- *Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources:*
 - The above applies to Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1).
- *Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources by onshore wind and/or solar PV energy generation facilities where the electricity output is 20 MW or more:*
 - The above applies to Project 1 (Biesjesvlei PV1).

The above Assessment Protocols (GN R320, March 2020) state that before commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the study area, as identified by the National Web-based Environmental Screening Tool (Screening Tool), must be confirmed by undertaking a Site Sensitivity Verification. Therefore, a Site Sensitivity Verification for Agriculture was undertaken for the proposed projects.

Furthermore, the Agriculture Protocol published in GN R320 states the following:

“An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “very high” or “high” sensitivity for agricultural resources must submit an Agricultural Agro-Ecosystem Specialist Assessment, unless:

- *Paragraph 1.1.1: The application includes a linear activity for which impacts to the agricultural resource are temporary and the land in the opinion of the soil scientist or agricultural specialist, based on the mitigation and remedial measures, can be returned to the current land capability within two years of the completion of the construction phase;*
- *Paragraph 1.1.2: The impact on agricultural resources is from an electricity pylon; or*
- *Paragraph 1.1.3: Information gathered from the site sensitivity verification differs from the designation of “very high” or “high” agricultural sensitivity, and it is found to be of a “medium” or “low” sensitivity.*
- *Should paragraphs 1.1.1; 1.1.2; or 1.1.3 apply, an Agricultural Compliance Statement must be submitted.”*

The Biesjesvlei EGI 1 (Project 7) includes the proposed development of a switching station, 132 kV power line and service road below the power line, as well as associated infrastructure. This is mainly regarded as a linear development. Furthermore, the power line will include the development of pylons. The level of agricultural assessment required by the protocol for linear infrastructure is an Agricultural Compliance Statement. However, in this case, the agricultural sensitivity of the site is less than high, and therefore, regardless of whether the activity is linear or not, only an Agricultural Compliance Statement is required. Therefore, an Agricultural Compliance Statement was undertaken for the proposed projects.

It is important to note that the Screening Tool does not require Agriculture specialist input for clearance of vegetation associated with the BESS development; however, to ensure that all potential impacts are addressed, the Agricultural Compliance Statement covers all proposed projects.

6.3 Scope of the Agricultural Compliance Statement

The Agriculture Site Sensitivity Verification was undertaken in order to confirm or dispute the current use of the land and the environmental sensitivity from an agricultural perspective as identified by the Screening Tool, such as new developments or infrastructure, the change in vegetation cover or status etc. The Agricultural Compliance Statement was undertaken in order to verify and confirm that the site is of low or medium sensitivity from an agricultural perspective and to indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site. Refer to Section 6.5 below for the Terms of Reference that was provided to the specialist.

6.4 Details of the Specialist

The Agricultural Compliance Statement was undertaken by Johann Lanz, a Soil Scientist, registered with the South African Council for Natural Scientific Professions (SACNASP) (Registration Number: 400268/12).

6.5 Terms of Reference for the Agricultural Compliance Statement

The Agricultural Compliance Statement was completed based on the following Terms of Reference:

- Compile Agricultural Compliance Statement in compliance with the relevant Agriculture Assessment Protocol (GN 320, March 2020) and must confirm that the site is of “low” or “medium” sensitivity for agriculture; and indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site;
- Specify development setbacks or buffers required (if any), and clear motivations for these recommendations;
- Provide a map showing the proposed development footprint (including supporting infrastructure) with a 50 m buffered development envelope, overlaid on the agricultural sensitivity map generated by the Screening Tool;
- Include calculations of the physical development footprint area for each land parcel as well as the total physical development footprint area of the proposed development including supporting infrastructure (this is applicable to Project 1 (Biesjesvlei PV1) only);
- Include confirmation that the development footprint is in line with the allowable development limits contained in GN R320 (this is applicable to Project 1 (Biesjesvlei PV1) only);
- Identify the direct, indirect and cumulative impacts associated with the proposed development, where possible, (although an assessment and rating of impacts is not strictly required for a Compliance Statement stipulated in GN R320);
- For cumulative impacts, consider other specified renewable energy and EGI projects within 30 km of the proposed projects;
- Confirm that all reasonable measures have been taken through micro-siting to avoid or minimise fragmentation and disturbance of agricultural activities;
- Provide a substantiated statement indicating the level of acceptability of the proposed development and a recommendation if the development should go ahead or not; as well as any conditions to which this statement is subjected;
- Provide a description of assumptions, any uncertainties or gaps in knowledge or data, and limitations;
- Include a signed specialist statement of independence and details and relevant expertise as well as the South African Council for Natural Scientific Professions (SACNASP) registration number of the specialist, including a Curriculum Vitae;
- Where required, provide recommendations with regards to proposed impact management outcomes or any monitoring requirements for inclusion in the Environmental Management Programmes (EMPrs) for the proposed projects;
- Determine mitigation and/or management measures, which could be implemented to as far as possible, reduce the effect of negative impacts and enhance the effect of positive impacts.
- Incorporate and address relevant comments and concerns raised by the stakeholders, commenting authorities and Interested and Affected Parties (I&APs) prior to submitting the Final EIA Report to the Competent Authority for decision-making; and
- Review the Generic EMPrs for Substations and Power Lines (GN R435) and confirm if there are any specific environmental sensitivities or attributes present on the project site and any

resultant site-specific impact management outcomes and actions that are not included in the pre-approved generic EMPs.

6.6 Study Methodology

A description of the process undertaken for the Agricultural Compliance Statement and to identify potential impacts associated with the proposed projects are captured in Appendix E.1 of this EIA Report.

6.7 Assumptions, Uncertainties and Gaps in Knowledge

There are no specific assumptions, uncertainties or gaps in knowledge or data that affect the findings of the Agricultural Compliance Statement.

6.8 Key Issues and Impacts

Potential Agricultural impacts associated with the development of the proposed projects are listed below for each of the proposed projects, including cumulative impacts. It is important to note that an Agricultural Compliance Statement is not required to formally rate agricultural impacts by way of impact assessment tables.

The impacts and cumulative impacts listed below equally apply to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1), unless where mentioned otherwise.

6.8.1 Construction, Operational and Decommissioning Phase Impacts

Construction, Operational and Decommissioning Phases:

- Potential negative impacts:
 - Loss of agricultural potential by occupation of land. Agricultural land that is directly occupied by the proposed infrastructure will become unavailable for agricultural use. However, in this case, the footprints of the proposed projects are considered to be below the threshold for needing to be conserved as agricultural production land because of the limitations that make it unsuitable as viable cropland. Refer to Section 6.9 of this chapter for additional information in this regard.
 - Loss of agricultural potential by soil degradation and erosion. Erosion; topsoil loss; and contamination can cause soil degradation. Soil degradation will reduce the ability of the soil to support vegetation growth. However, this can be addressed via standard management actions via the EMP.
 - Loss of agricultural potential by dust generation. The disturbance of the soil surface will generate dust that can negatively impact the surrounding veld and farm animals. However, this can be addressed via standard management actions via the EMP.

- Potential positive impacts:
 - Income generated through lease of the land to the proposed projects and increased financial security for farming operations. This is via the creation of a reliable income stream through the lease of the land for the proposed projects, which is highly likely to exceed the potential agricultural income from the site. In addition, it will diversify the farm's income sources and provide predictable income that is independent of variable agricultural economic factors such as weather, agricultural markets, and agricultural input costs. This is likely to increase financial security and may thereby improve farming operations and productivity on other parts of the farm or properties owned by the same farmer, through increased investment into farming.
 - Improved security against stock theft and other crime due to the presence of security infrastructure and security personnel.

6.8.2 Cumulative Impacts

The potential cumulative agricultural impact of importance is a regional loss (including by degradation) of future agricultural production potential. The cumulative impact of the proposed projects is regarded as low significance (for the Biesjesvlei PV1 and Biesjesvlei BESS 1 projects), and very low significance for the Biesjesvlei EGI 1 project. The proposed projects will not have an unacceptable negative impact on the agricultural production capability of the area.

6.9 Findings and Conclusion of the Agricultural Compliance Statement

The findings and conclusion below equally apply to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1), and Project 7 (Biesjesvlei EGI 1).

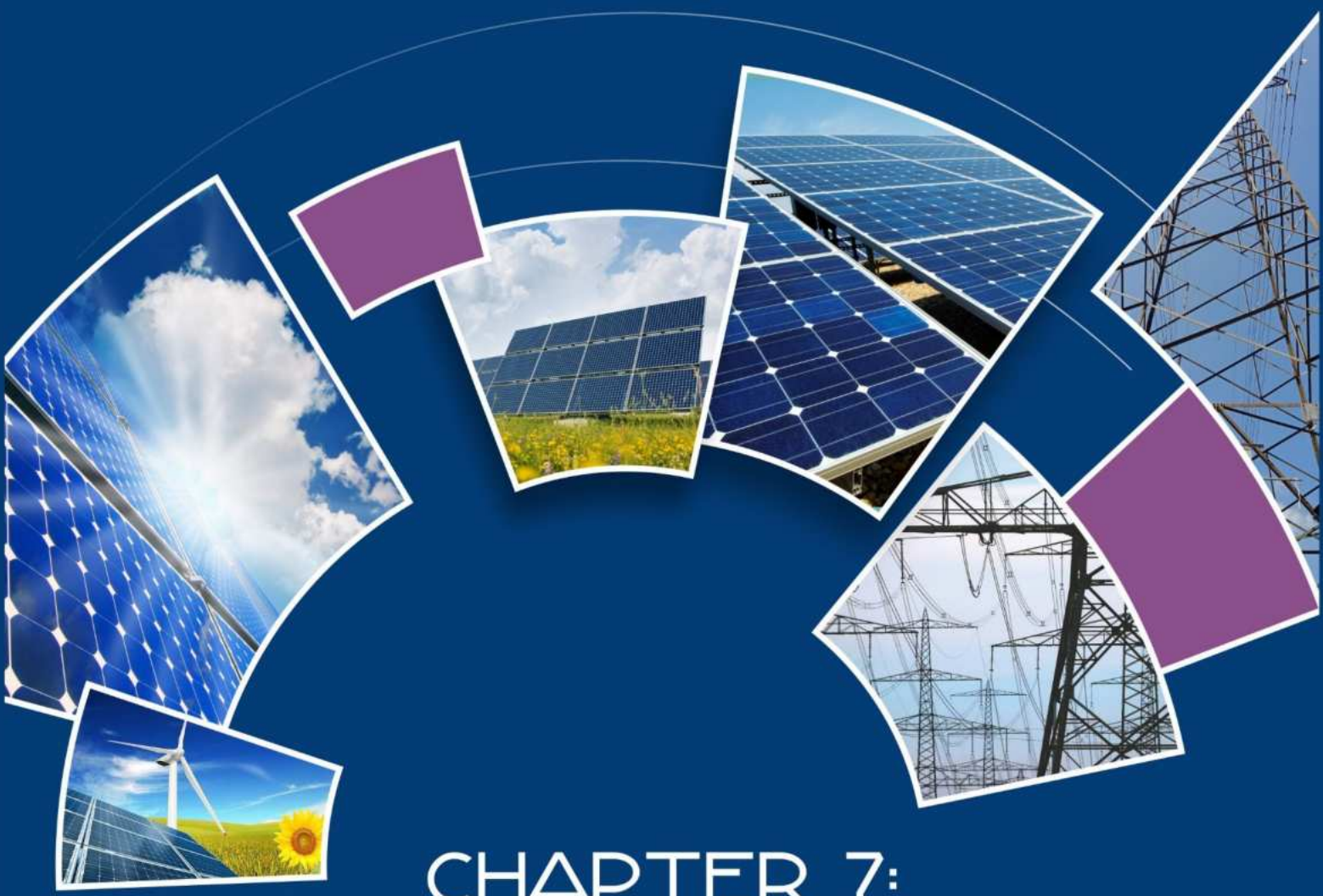
The Screening Tool classified the study area as ranging from low to high agricultural sensitivity. However, the agricultural sensitivity, as identified by the Screening Tool, was disputed by the Agricultural Compliance Statement included in Appendix E.1 of this EIA Report. The motivation for disputing the agricultural sensitivity is due to the current agricultural land use and agricultural production potential of the land.

Some of the land within the study area was incorrectly classified as cropland by the Screening Tool. The dataset used by the Screening Tool to classify cropland is outdated and it was found that all land across the footprint is no longer used as cropland. The footprint of the proposed projects has deliberately avoided all areas of viable cropland (i.e. of a high agricultural sensitivity). The cropping potential of the site is limited by a combination of climate and soil constraints. The climate is classified as arid, and soils are limited by shallow depth and limited drainage. Moisture availability is also insufficient for viable rain-fed cropping. Although such cropping may have been done on the site in the past, such production is no longer economically viable. Therefore, the agricultural production potential of the site is limited to being suitable for grazing only. There is no particular scarcity of grazing land in the country, in comparison to arable land, which is very scarce. As such, the use of this land for non-agricultural purposes will cause minimal loss of agricultural production potential in terms of national food security.

In addition, as indicated in Section 6.8.1 of this chapter, at the farm level, the positive economic impacts associated with the development of the proposed projects include an increase in financial security which may improve farming operations and productivity on other parts of the farm or properties owned by the same farmer, through increased investment into farming, as well as the potential improvement of farm security against stock theft and other crime.

Taking the above factors into consideration, the specialist has rated the site as being of low to medium agricultural sensitivity. Seeing that the proposed projects will not occupy scarce, viable cropland and that their negative impacts are offset by economic benefits to farming, the specialist has assessed the overall negative agricultural impact of the development (i.e. loss of future agricultural production potential) as being of low significance and as acceptable. The specialist has therefore recommended that the proposed projects be approved.

Refer to Appendix E.1 of the EIA Report for additional information including *inter alia* a detailed Site Sensitivity Verification inclusive of maps from the Screening Tool, a description of potential impacts, as well as a list of potential mitigation measures and recommendations for inclusion in the EMPs.



CHAPTER 7:

Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species

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7. TERRESTRIAL BIODIVERSITY AND SPECIES

7.1 Introduction

This chapter provides a brief summary of the Terrestrial Biodiversity and Species Impact Assessment for the Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of the Biesjesvlei Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Facility, and their associated Electricity Grid Infrastructure (EGI), near Smithfield in the Free State Province. **Refer to the full Terrestrial Biodiversity and Species Impact Assessment which is included in Appendix E.2 of this EIA Report for additional information.**

This chapter specifically deals with the **Biesjesvlei PV1 (Project 1), the Biesjesvlei BESS 1 (Project 4) and the Biesjesvlei EGI 1 (Project 7)** (hereinafter referred to as the “proposed projects”).

The information presented throughout this chapter applies equally to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1), unless where mentioned otherwise.

7.2 Need for the Terrestrial Biodiversity and Species Impact Assessment

Government Gazette 43110, Government Notice (GN) R320 published by the then Department of Environment, Forestry and Fisheries (DEFF) on 20 March 2020, includes a protocol (i.e., Part B of GN R320) which provides the criteria for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity for activities requiring Environmental Authorisation (EA). In addition, Government Gazette 43855, GN R1150 published by the then DEFF on 30 October 2020, includes a protocol which provides the criteria for the specialist assessment and minimum report content requirements for environmental impacts on plant species and animal species for activities requiring EA. This protocol was amended in July 2023, in GN 3717. Section 2 of the Terrestrial Biodiversity Protocol (Part B of GN R320, March 2020) and Section 2 of the Terrestrial Plant Species and Terrestrial Animal Species Protocols (GN R1150, October 2020 and amended in GN 3717, July 2023) provide the requirements for the Site Sensitivity Verification, which states that prior to commencing with the specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration, as identified by the National Web-based Environmental Screening Tool (Screening Tool), must be confirmed by undertaking a Site Sensitivity Verification. Since Terrestrial Biodiversity, Plant Species and Animal Species were identified as relevant themes and recommended studies in the Screening Tool Report, GN R320 and GN R1150 must be complied with. The specialist confirmed that the terrestrial biodiversity sensitivity of the study area warranted an Impact Assessment which has been undertaken in compliance with GN R320. The specialist also confirmed that the terrestrial plant and animal species sensitivity of the study area warranted Compliance Statements which have been undertaken in compliance with GN R1150.

7.3 Scope of the Terrestrial Biodiversity and Species Impact Assessment

The Terrestrial Biodiversity and Species Impact Assessment was undertaken in order to identify environmental sensitivities and no-go areas from a terrestrial biodiversity and species perspective, as well as identify impacts of the proposed projects on these features. Refer to Section 7.5 below for the Terms of Reference that was provided to the specialists.

7.4 Details of the Specialists

The Terrestrial Biodiversity Impact Assessment, and Terrestrial Plant and Animal Species Compliance Statements were undertaken by Corné Niemandt of Enviro-Insight CC. Corné has an MSc in Plant Science (University of Pretoria, 2015) and is professionally registered with the South African Council for Natural and Scientific Professions (SACNASP), with Registration Number 116598 in the field of Ecological Science. Terrestrial Animal Species input is also provided by Sam Laurence, who is registered with the SACNASP in the field of Zoological and Ecological Science, with Registration Number 400450/13.

7.5 Terms of Reference for the Terrestrial Biodiversity and Species Impact Assessment

The Terrestrial Biodiversity and Species Impact Assessment was completed based on the following Terms of Reference:

- Compile a Terrestrial Biodiversity and Species Impact Assessment Report in compliance with the specialist assessment protocols established in Government Gazette 43110, GN R320 (March, 2020) [Terrestrial Biodiversity] and in Government Gazette 43855, GN 1150 (October, 2020 and amended in GN 3717, July 2023) [Plant and Animal Species], and other relevant legislation and guidelines that may be deemed necessary. However, the July 2023 amendments to the species protocol is not applicable in this case as the Terrestrial specialist was appointed in November 2022 and undertook site visits in November 2022, which is prior to the publication of the amendments in GN 3717. However, it must be noted that this will not have a significant impact on the outcome of the work and is only considered as formalities that need to be complied with;
- Provide the contact details of the specialist, SACNASP registration number, field of expertise, relevant experience, and a Curriculum Vitae;
- Provide a signed statement of independence by the specialist;
- Provide a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;
- Provide a description of the methodology used to undertake the Site Sensitivity Verification and impact assessment and site inspection, including equipment and modelling used, where relevant;
- Provide a description of assumptions and limitations in the report and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;

- Provide a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);
- Provide a description of the terrestrial ecology and ecosystem features of the project site, with focus on features that are to be potentially impacted by the proposed projects. The description will include the major habitat forms within the study area, giving due consideration to terrestrial biodiversity;
- Provide a motivation if there were development footprints that were identified as having a “low” terrestrial biodiversity sensitivity and that were not considered appropriate;
- Determination, description and mapping of the baseline environmental condition and sensitivity of the study area. Specify development setbacks or buffers required, and clear motivations for these recommendations. Include a description of the extent of disturbance and transformation of the site;
- Provide review input on the preferred infrastructure layout following the sensitivity analysis and layout identification;
- Assess local and regional biodiversity conservation planning relevant to the project area;
- Identify and assess the potential direct, indirect and cumulative impacts of the construction, operational and decommissioning phases of the proposed developments on terrestrial biodiversity and species using the prescribed impact assessment methodology captured in Chapter 4 of the EIA Report. For cumulative impacts, consider other specified renewable energy and EGI projects within 30 km of the proposed projects. Rate impacts both without and with the implementation of mitigation or enhancement measures;
- Provide a substantiated statement indicating the acceptability of the proposed development and a recommendation if the development should go ahead or not; and any conditions to which this statement is subjected;
- Identify any additional protocols, licensing and/or permitting requirements that are relevant to the project and the implications thereof;
- Assess the project alternatives and identification of a preferred alternative with motivation for this selection;
- Provide recommendations with regards to potential monitoring programmes;
- Determine mitigation, impact management actions and outcomes for inclusion in the Environmental Management Programmes (EMPrs), which could be implemented to, as far as possible, reduce the effect of negative impacts and enhance the effect of positive impacts. Identify best practice management actions, monitoring requirements, and rehabilitation guidelines for all identified impacts;
- Incorporate and address relevant comments and concerns raised by the stakeholders, commenting authorities and Interested and Affected Parties (I&APs) prior to submitting the Final EIA Report to the Competent Authority for decision-making; and
- Review the Generic EMPrs for Substations and Power Lines (GN R435) and confirm if there are any specific environmental sensitivities or attributes present on the project site and any resultant site-specific impact management outcomes and actions that are not included in the pre-approved generic EMPrs (Part B – Section 1).

The Terrestrial Plant and Animal Species Compliance Statements were completed based on the following:

- Confirm that the study area is of “low” sensitivity for terrestrial animal species and terrestrial plant species; and indicate whether or not the proposed development will have any impact on Species of Conservation Concern (SCC);
- Provide the contact details and relevant experience as well as the SACNASP registration number of the specialist, including a Curriculum Vitae;
- Provide a signed statement of independence by the specialist;
- Provide a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;
- Provide a description of the methodology used to undertake the site survey and to prepare the compliance statement, including equipment and modelling used where relevant;
- Provide the mean density of observations/number of samples sites per unit area, where possible, as noted in the Species Environmental Assessment Guideline;
- Where required, provide proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPs;
- Provide a description of the assumptions made and any uncertainties or gaps in knowledge or data; and
- Provide any conditions to which the compliance statement is subjected.

7.6 Study Methodology

A full description of the process undertaken for the Terrestrial Biodiversity and Species Impact Assessment and the Terrestrial Plant and Animal Species Compliance Statements as well as to identify potential impacts associated with the proposed projects are captured in Appendix E.2 of this EIA Report. The impact assessment methodology is also described in detail in Chapter 4 of this EIA Report.

7.7 Assumptions, Uncertainties and Gaps in Knowledge

The Terrestrial Biodiversity and Species Impact Assessment included the following assumptions, uncertainties and knowledge gaps:

- It is assumed that all third-party information acquired is correct (e.g., GIS data and scope of work).
- The survey was conducted in the early wet season. However, due to the unusual heavy rains received in the weeks before, many species were already in flower due to optimal conditions.
- Due to the nature of most biophysical studies, it is not always possible to cover every square metre of a given study area. Due to the large study area, it is possible that small individual plant SCC may have been overlooked even though care has been taken to search for specific SCC.
- The literature review for plant species identified several limitations in the use of online data platforms.

7.8 Key Issues

Potential terrestrial biodiversity and species impacts arising from the proposed projects are listed below for each of the projects and each phase, including cumulative impacts. No indirect impacts have been identified.

7.8.1 Biesjesvlei PV1, Biesjesvlei BESS 1 and Biesjesvlei EGI 1

Construction Phase:

- Impact 1: Fragmentation and loss of habitat and sensitive features.
- Impact 2: Loss of protected species.
- Impact 3: Introduction and spread of alien invasive species.
- Impact 4: Increased erosion and soil compaction.
- Impact 5: Littering and General Pollution.

Operational Phase:

- Impact 1: Increase in alien invasive species.
- Impact 2: Loss of species composition and diversity (*Note: This impact is only applicable to the proposed PV and EGI projects*).
- Impact 3: Littering and General Pollution (*Note: This impact is only applicable to the proposed PV and EGI projects*).

Decommissioning Phase:

- Impact 1: Alien invasive species management.
- Impact 2: Loss of habitat.

7.8.2 Cumulative Impacts

- Potential impact 1: Fragmentation and loss of habitat and sensitive features during the construction phase;
- Potential impact 2: Loss of protected species during the construction phase; and
- Potential impact 3: Increased alien invasive species during all phases.

7.9 Key Impacts

The impacts and mitigation measures are described in this section. Each project has different potential impact ratings, hence separate impact tables have been provided for each project in this section.

Table 7.1 provides potential impacts for **Project 1 (Biesjesvlei PV1)**.

Table 7.2 provides potential impacts for **Project 4 (Biesjesvlei BESS 1)**.

Table 7.3 provides potential impacts for **Project 7 (Biesjesvlei EGI 1)**.

Table 7.4 provides potential cumulative impacts.

Table 7.1: Assessment of the potential Terrestrial Biodiversity and Species risks and impacts of Project 1 (Biesjesvlei PV1).

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Habitat loss and fragmentation of non-threatened ecosystem.	Status	Negative	High (2)	- No development should take place within High and Very High sensitivity areas and / or buffer zones. Accordingly, the Koppies habitat should be avoided. The Watercourse habitat should be avoided as per the sensitivity map compiled for Terrestrial Biodiversity. In addition, refer to the Aquatic Biodiversity Assessment where the watercourse is delineated, mapped and suitable buffers recommended by the Aquatic Biodiversity specialist. - No construction related activities, such as the site camp, storage of materials, temporary roads or ablution facilities may be located in the very high sensitivity areas including their buffers. - Minimise impacts to surrounding natural areas by demarcating development footprint and clearly indicating no-go areas. - For PV panel installations, no bulldozing to take place for ground preparation. Only sites where PV panels are to be placed may be transformed, including making use of the existing roads and planned roads. There might still be bulldozing in other areas, like for roads, substation, and laydown area, therefore some transformation will occur for permanent infrastructure, but this is a small extent of the total development footprint.	Moderate (3)	Medium
	Spatial Extent	Site specific				
	Duration	Long term				
	Consequence	Severe				
	Probability	Very Likely				
	Reversibility	Low				
	Irreplaceability	Moderate				
Loss of protected species	Status	Negative	Moderate (3)	Where the approved layout designs impact on provincially protected individuals, permit applications are required for either the relocation or destruction of provincially protected species (Free State Nature Conservation Ordinance (FSNCO) 8 of 1969).	Low (4)	High
	Spatial Extent	Site specific				
	Duration	Long term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
Increased alien invasive species	Status	Negative	Moderate (3)	- Implement an alien and invasive species control and monitoring plan in terms of National Environmental Management: Biodiversity Act (Act 10 of 2004, as amended) (NEMBA) during and after construction. - Alien invasive species establishment and spreading should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with such plants.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
Increased erosion and soil compaction	Irreplaceability	Low				
	Status	Negative	Moderate (3)	- No bulldozing of grasslands and topsoil for placement of PV panels. Only disturb areas where placement will take place. - Utilise existing access routes as far as possible. - Confine the movement of vehicles to the access routes to and from the site and to the construction areas. - Do not drive in the natural veld. - Rehabilitate new vehicle tracks and areas where the soil has been compacted as soon as possible. - Monitor the entire site for signs of erosion throughout the construction phase of the project. - Refer to mitigation measures relevant to watercourse crossings and development close to watercourses as recommended by the Aquatic Biodiversity Specialist.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
Littering and general pollution	Irreplaceability	Low				
	Status	Negative	Moderate (3)	- The site camp must not be located in very high sensitivity areas and their buffer zones. - Dangerous goods may not be stored within 100m of a watercourse. - Hydrocarbon fuels must be stored in a secure, bunded area. - Sufficient waste disposal bins must be available on site and clearly marked. Skip bins may be required during the construction phase which must be emptied on a regular basis by an approved/licenced waste disposal contractor. Proof of disposal to be kept on file. - Ablution facilities must be located outside sensitive areas and their buffer zones. - Portable ablution facilities must be regularly cleaned and maintained in good working condition.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Short to Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
				- Any spillage from ablution facilities must be cleaned up immediately and disposed of in an appropriate manner. - Vehicles must be in good working condition, with no oil, water, or fuel leaks. Vehicles must be regularly inspected, and any problems corrected. - Refuelling may only take place in an appropriate, bunded area. Refuelling may not take place in sensitive areas. - Hydrocarbon spills must be contained and cleaned up immediately. Spill kits must be available on site in case of accidental spillage.		
OPERATIONAL PHASE						
Loss of species composition and diversity	Status	Negative	Moderate (3)	- The loss of species composition and diversity cannot be mitigated due to a permanent structure which will change microclimatic conditions for the life of the facility operation. - Implement appropriate rehabilitation¹ measures to return the grassland to sustainable, productive use that was representative of the respective vegetation type prior to the commencement of construction.	Moderate (3)	Medium
	Spatial Extent	Site specific				
	Duration	Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Moderate				
Increased alien invasive species	Status	Negative	Moderate (3)	Follow an alien and invasive species control and monitoring plan in terms of NEMBA by implementing appropriate control methods.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				
Littering and general pollution	Status	Negative	Moderate (3)	- Vehicles must be in good working condition, with no oil, water or fuel leaks. - Vehicles must be regularly inspected, and any problems corrected. - Refuelling may only take place in an appropriate, designated bunded area.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Short to Medium term				
	Consequence	Substantial				

¹ "rehabilitation" means returning a disturbed, degraded or destroyed ecosystem to sustainable, productive use, with the emphasis on repairing ecological processes and ecosystem services.

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
	Probability	Likely		- Any spillages must be reported immediately and dealt with appropriately. - Spill kits must be available on site in case of accidental spillage. - Sufficient waste disposal bins must be available on site and clearly marked.		
	Reversibility	Moderate				
	Irreplaceability	Low				
DECOMMISSIONING PHASE						
Loss of habitat	Status	Negative	Low (4)	- The loss of vegetation is unavoidable within the approved layout development footprint, but sensitive areas must be avoided when dismantling of infrastructure. - Implement appropriate rehabilitation measures to return the grassland to sustainable, productive use that was representative of the respective vegetation type prior to the commencement of construction.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Low				
	Irreplaceability	Moderate				
Increased alien invasive species	Status	Negative	Moderate (3)	Follow an alien and invasive species control and monitoring plan in terms of NEMBA by implementing appropriate control methods during and after decommissioning.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				

Table 7.2: Assessment of the potential Terrestrial Biodiversity and Species risks and impacts of Project 4 (Biesjesvlei BESS 1).

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Habitat loss and fragmentation	Status	Negative	High (2)	- No BESS development should take place within High or Very sensitivity areas and/or buffer zones. Accordingly, the Koppies habitat should be avoided. The Watercourse habitat should be avoided as per the sensitivity map compiled for Terrestrial Biodiversity. In addition, refer to the Aquatic Biodiversity Assessment where the watercourse is delineated, mapped and suitable buffers recommended by the Aquatic Biodiversity specialist. - No construction related activities, such as the site camp, storage of materials, temporary roads or ablution facilities may be located in the very high sensitivity areas including their buffers. - Minimise impacts to surrounding natural areas by demarcating development footprint and clearly indicating no-go areas. - Rehabilitate immediately after construction and eradicate Alien Invasive Species. - Increased water runoff due to hard surfaces occurring close to watercourses need to be considered as part of the stormwater management on site	Moderate (3)	Medium
	Spatial Extent	Site specific				
	Duration	Long term				
	Consequence	Severe				
	Probability	Very Likely				
	Reversibility	Low				
	Irreplaceability	Moderate				
Loss of protected species	Status	Negative	Moderate (3)	Where the approved layout designs impact on provincially protected individuals, permit applications are required for either the relocation or destruction of provincially protected species (Free State Nature Conservation Ordinance (FSNCO) 8 of 1969).	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Long term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				
Introduction and spread of	Status	Negative	Moderate (3)	Implement an alien and invasive species control and monitoring plan in terms of National Environmental Management: Biodiversity	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Long term				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
alien invasive species	Consequence	Substantial		Act (Act 10 of 2004, as amended) (NEMBA) during and after construction. Alien invasive species establishment and spreading should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with such plants.		
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				
Increased erosion and soil compaction	Status	Negative	Moderate (3)	- Utilise existing access routes as far as possible. - Confine the movement of vehicles to the access routes to and from the site and to the construction areas. - Do not drive in the natural veld. - Rehabilitate new vehicle tracks and areas where the soil has been compacted as soon as possible. - Monitor the entire site for signs of erosion throughout the construction phase of the project. - Refer to mitigation measures relevant to watercourse crossings and development close to watercourses as recommended by the Aquatic Biodiversity Specialist.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				
Littering and General Pollution	Status	Negative	Moderate (3)	- The site camp must not be located in very high sensitivity areas and their buffer zones. - Dangerous goods may not be stored within 100m of a watercourse. - Hydrocarbon fuels must be stored in a secure, bunded area. - Sufficient waste disposal bins must be available on site and clearly marked. Skip bins may be required during the construction phase which must be emptied on a regular basis by an approved/licenced waste disposal contractor. Proof of disposal to be kept on file. - Ablution facilities must be located outside sensitive areas and their buffer zones. - Portable ablution facilities must be regularly cleaned and maintained in good working condition. - Any spillage from ablution facilities must be cleaned up immediately and disposed of in an appropriate manner. - Vehicles must be in good working condition, with no oil, water, or fuel leaks. Vehicles must be regularly inspected, and any problems corrected.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Short to Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
				- Refuelling may only take place in an appropriate, bunded area. Refuelling may not take place in sensitive areas. - Hydrocarbon spills must be contained and cleaned up immediately. Spill kits must be available on site in case of accidental spillage.		
OPERATIONAL PHASE						
Increased alien invasive species	Status	Negative	Moderate (3)	Follow an alien and invasive species control and monitoring plan in terms of NEMBA by implementing appropriate control methods.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				
DECOMMISSIONING PHASE						
Loss of habitat	Status	Negative	Low (4)	- The loss of vegetation is unavoidable within the approved layout development footprint, but sensitive areas must be avoided when dismantling of infrastructure. - Implement appropriate rehabilitation measures to return the grassland to sustainable, productive use that was representative of the respective vegetation type prior to the commencement of construction.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Low				
	Irreplaceability	Moderate				
Increased alien invasive species	Status	Negative	Moderate (3)	Follow an alien and invasive species control and monitoring plan in terms of NEMBA by implementing appropriate control methods during and after decommissioning.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				

Table 7.2: Assessment of the potential Terrestrial Biodiversity and Species risks and impacts of Project 7 (Biesjesvlei EGI 1).

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Habitat loss and fragmentation	Status	Negative	Moderate (3)	- No substation should be placed within High and Very High sensitivity areas and / or buffer zones. Accordingly, the Koppies habitat should be avoided. The Watercourse habitat should be avoided as per the sensitivity map compiled for Terrestrial Biodiversity. In addition, refer to the Aquatic Biodiversity Assessment where the watercourse is delineated, mapped and suitable buffers recommended by the Aquatic Biodiversity specialist. - Minimise impacts to surrounding natural areas by demarcating development footprint and clearly indicating no-go areas. Rehabilitate immediately after construction activities. - Linear infrastructure such as roads and overhead powerlines can cross the Watercourse habitat as delineated and mapped by the Aquatic specialist, but it is advised to construct pylons outside the buffer areas, where possible. - No construction related activities, such as the site camp, storage of materials, temporary roads or ablution facilities may be located in the very high sensitivity areas including their buffers. - Vegetation and topsoil removal outside of areas planned for power line and switching station placement must be avoided.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Long term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				
Loss of protected species	Status	Negative	Moderate (3)	Where the approved layout designs impact on provincially protected individuals, permit applications are required for either the relocation or destruction of provincially protected species (FSNCO 8 of 1969).	Low (4)	High
	Spatial Extent	Site specific				
	Duration	Long term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				
	Status	Negative	Moderate (3)		Low (4)	Medium

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
Increased alien invasive species	Spatial Extent	Local		- Implement an alien and invasive species control and monitoring plan in terms of NEMBA during and after construction. - Alien invasive species establishment and spreading should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with such plants.		
	Duration	Long term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				
Increased erosion and soil compaction	Status	Negative	Low (4)	- Utilise existing access routes as far as possible. - Confine the movement of vehicles to the access routes to and from the site and to the construction areas. - Do not drive in the natural veld. - Rehabilitate new vehicle tracks and areas where the soil has been compacted (especially where pylons are constructed) as soon as possible. - Monitor the entire site for signs of erosion throughout the construction phase of the project. - Refer to mitigation measures relevant to watercourse crossings and development close to watercourses as recommended by the Aquatic Biodiversity Specialist.	Very Low (5)	Medium
	Spatial Extent	Site specific				
	Duration	Medium term				
	Consequence	Moderate				
	Probability	Unlikely				
	Reversibility	Moderate				
	Irreplaceability	Low				
Littering and general pollution	Status	Negative	Low (4)	- The site camp must not be located in very high sensitivity areas and their buffer zones. - Dangerous goods may not be stored within 100m of a watercourse. - Hydrocarbon fuels must be stored in a secure, bunded area. - Sufficient waste disposal bins must be available on site and clearly marked. Skip bins may be required during the construction phase which must be emptied on a regular basis by an approved/licenced waste disposal contractor. Proof of disposal to be kept on file. - Ablution facilities must be located outside sensitive areas and their buffer zones. - Portable ablution facilities must be regularly cleaned and maintained in good working condition. - Any spillage from ablution facilities must be cleaned up immediately and disposed of in an appropriate manner.	Very Low (5)	Medium
	Spatial Extent	Local				
	Duration	Short to Medium term				
	Consequence	Moderate				
	Probability	Unlikely				
	Reversibility	Moderate				
	Irreplaceability	Low				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
				- Vehicles must be in good working condition, with no oil, water, or fuel leaks. Vehicles must be regularly inspected, and any problems corrected. - Refuelling may only take place in an appropriate, bunded area. Refuelling may not take place in sensitive areas. - Hydrocarbon spills must be contained and cleaned up immediately. Spill kits must be available on site in case of accidental spillage.		
OPERATIONAL PHASE						
Loss of species composition and diversity	Status	Negative	Moderate (3)	- Manage plants below overhead power line based on continuous maintenance as per the management plan. - Implement appropriate rehabilitation measures to return the grassland to sustainable, productive use that was representative of the respective vegetation type prior to the commencement of construction.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Moderate				
Increased alien invasive species	Status	Negative	Moderate (3)	Follow an alien and invasive species control and monitoring plan in terms of NEMBA by implementing appropriate control methods.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				
Littering and general pollution	Status	Negative	Moderate (3)	- Vehicles must be in good working condition, with no oil, water or fuel leaks. - Vehicles must be regularly inspected, and any problems corrected. - Refuelling may only take place in an appropriate, designated bunded area. - Any spillages must be reported immediately and dealt with appropriately. - Spill kits must be available on site in case of accidental spillage. - Sufficient waste disposal bins must be available on site and clearly marked.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Short to Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
DECOMMISSIONING PHASE						
Loss of habitat	Status	Negative	Low (4)	- The loss of vegetation is unavoidable within the approved layout development footprint, but sensitive areas must be avoided when dismantling of infrastructure. - Implement appropriate rehabilitation measures to return the grassland to sustainable, productive use that was representative of the respective vegetation type prior to the commencement of construction.	Very Low (5)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Low				
	Irreplaceability	Moderate				
Increased alien invasive species	Status	Negative	Moderate (3)	Follow an alien and invasive species control and monitoring plan in terms of NEMBA by implementing appropriate control methods during and after decommissioning.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				

Table 7.4: Assessment of the potential Terrestrial Biodiversity and Species cumulative risks and impacts of the proposed projects.

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
CUMULATIVE IMPACTS						
CONSTRUCTION PHASE						
Habitat loss and fragmentation	Status	Negative	Moderate (3)	- Minimise impacts to surrounding natural areas by demarcating development footprint and clearly indicating no-go areas. - Rehabilitate immediately after construction activities. - Linear infrastructure such as roads and overhead powerlines can cross the Watercourse habitat as delineated and mapped by an Aquatic Biodiversity specialist, but it is advised to construct pylons outside the buffer areas, where possible. - No construction related activities, such as the site camp, storage of materials, temporary roads or ablution facilities may be located in the very high sensitivity areas including their buffers. - Vegetation and topsoil removal outside of areas planned for power line and switching station placement must be avoided.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Long term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				
Loss of protected species	Status	Negative	Moderate (3)	Where the approved layout designs impact on provincially protected individuals, permit applications are required for either the relocation or destruction of provincially protected species (FSNCO 8 of 1969).	Low (4)	High
	Spatial Extent	Site specific				
	Duration	Long term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				
Increased alien invasive species	Status	Negative	Moderate (3)	- Implement an alien and invasive species control and monitoring plan in terms of NEMBA during and after construction. - Alien invasive species establishment and spreading should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with such plants. - If Alien Invasive Species are eradicated and managed at development sites, it should not be a problem cumulatively.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Long term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				
OPERATIONAL PHASE						

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
Increased alien invasive species	Status	Negative	Moderate (3)	- Implement an alien and invasive species control and monitoring plan in terms of NEMBA during and after construction. - Alien invasive species establishment and spreading should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with such plants. - If Alien Invasive Species are eradicated and managed at development sites, it should not be a problem cumulatively.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Long term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				
DECOMMISSIONING PHASE						
Increased alien invasive species	Status	Negative	Moderate (3)	- Implement an alien and invasive species control and monitoring plan in terms of NEMBA during and after construction. - Alien invasive species establishment and spreading should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with such plants. - If Alien Invasive Species are eradicated and managed at development sites, it should not be a problem cumulatively.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Long term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				

7.10 Findings and Conclusion of the Terrestrial Biodiversity and Species Impact Assessment

The findings and conclusion below equally apply to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1), and Project 7 (Biesjesvlei EGI 1), unless where mentioned otherwise.

The study area is located in the Aliwal North Dry Grassland (Gh2) vegetation type which is listed as Least Threatened with a conservation target of 24%. However, it is hardly protected with no areas conserved in statutory conservation areas. From a terrestrial biodiversity perspective, the vegetation units are important systems for grasslands and grassland associated animals, waterbodies as well as important areas for the conservation of avifauna.

From the Terrestrial Biodiversity and Species Impact Assessment, it was evident that the proposed projects are not located in a threatened vegetation type or ecosystem and there are no high sensitivity features on site for the proposed projects. Furthermore, no plant SCC were recorded on site. However, several provincially protected species occur within the proposed project areas, which requires permits for relocation or destruction from the provincial authority.

In terms of the impact assessment the study concluded that all the impacts assessed can be reduced through avoidance and mitigation measures. Furthermore, it is noted that there are no residual impacts anticipated. Some impacts such as habitat loss and ecological functioning cannot be avoided, but the overall impact for this vegetation type is moderate to low significance post mitigation.

Based on the outcomes of the Terrestrial Biodiversity and Species Impact Assessment, it is the opinion of the specialists that the development of the proposed projects can proceed provided that all no-go sensitive areas are avoided, and the recommended mitigation measures are implemented.

Refer to Appendix E.2 of the EIA Report for additional information including *inter alia* a detailed Site Sensitivity Verification inclusive of maps from the Screening Tool and site specific maps generated by the specialists, an assessment of the impacts, a list of key issues and impacts from a terrestrial biodiversity and species perspective, a list of potential mitigation measures and recommendations for inclusion in the EMPs, as well as a list of the EA condition recommendations as recommended by the specialists.

7.11 Findings and conclusion of the Terrestrial Biodiversity and Species Compliance Statements

This section provides a brief summary of the key findings and outcomes of the Plant Species and Animal Species Compliance Statements. Refer to Appendix E.2 of this EIA Report for the detailed Plant Species and Animal Species Compliance Statements.

The findings and conclusion of the Plant Species and Animal Species Compliance Statements below equally apply to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1), and Project 7 (Biesjesvlei EGI 1), unless where mentioned otherwise.

7.11.1 Plant Species Compliance Statement

The results of the Plant Species Compliance Statement indicated that no Red List species were indicated for the region in which the study area is located. Furthermore, according to the Screening Tool, no plant SSC were flagged for the study area, which was confirmed by the Site Sensitivity Verification undertaken by the specialists. Therefore, no plant SCC were found on site; and as a result, none will be affected by the proposed development. There are no threatened, near threatened or rare species that occur in or close to the proposed development area. It was therefore verified by the specialists that the Plant Species Theme has low sensitivity for the development footprints and study area.

Refer to the Plant Species Compliance Statement included in Appendix E.2 of this EIA Report for additional information.

7.11.2 Animal Species Compliance Statement

It was found that the study area is in a natural or semi-natural state due to the presence of alien invasive species and moderate grazing occurring. Accordingly, the study area is considered to be of a medium sensitivity for animal species. The results of the Animal Species Compliance Statement indicated that no animal SCC were recorded but the potential presence of *Hydricotis maculicollis* (Spotted-necked otter) and *Aonyx capensis* (African Clawless Otter) in the watercourse should be considered for the construction of the bridge access road to reduce direct impacts on the species and its habitat and applying appropriate rehabilitation measures to restore the species habitat and promote ecosystem services after construction activities. The Spotted-necked otter was not recorded during the site visit, but suitable habitat does exist. The watercourse is excluded from the development and well buffered, and accordingly the habitat for the species is protected and the indirect impacts are moderate to low significance. However, as indicated above, the necessary mitigation measures need to be in place to reduce any negative impacts on the feeding and breeding habitat as well as movement of the species. The compliance statement includes various management actions for terrestrial fauna that have been included in the EMPs, where relevant.

Almost all fauna species recorded on site are provincially protected as per the Free State Nature Conservation Ordinance (FSNCO) 8 of 1969. Should it be necessary to capture and relocate any of these animals prior or during construction, or during the operational phase of the proposed projects, a permit application will need to be lodged with the provincial authority. No species may be killed or injured during any phase of the proposed projects.

Refer to the Animal Species Compliance Statement included in Appendix E.2 of this EIA Report for additional information.



CHAPTER 8: Aquatic Biodiversity and Species

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8. AQUATIC BIODIVERSITY AND SPECIES

8.1 Introduction

This chapter provides a brief summary of the Aquatic Biodiversity and Species Impact Assessment for the Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of the Biesjesvlei Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Facility, and their associated Electricity Grid Infrastructure (EGI), near Smithfield in the Free State Province. **Refer to the full Aquatic Biodiversity and Species Impact Assessment which is included in Appendix E.3 of this EIA Report for additional information.**

This chapter specifically deals with the **Biesjesvlei PV1 (Project 1), the Biesjesvlei BESS 1 (Project 4) and the Biesjesvlei EGI 1 (Project 7)** (hereinafter referred to as the “proposed projects”).

The information presented throughout this chapter applies equally to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1), unless where mentioned otherwise.

8.2 Need for the Aquatic Biodiversity and Species Impact Assessment

Government Gazette 43110, Government Notice (GN) R320 published by the then Department of Environment, Forestry and Fisheries (DEFF) on 20 March 2020, includes a protocol (i.e., Part B of GN R320) which provides the criteria for the specialist assessment and minimum report content requirements for environmental impacts on aquatic biodiversity for activities requiring Environmental Authorisation (EA). Section 2 of the Aquatic Biodiversity Protocol provides the requirements for the Site Sensitivity Verification, which states that prior to commencing with the specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration, as identified by the National Web-based Environmental Screening Tool (Screening Tool), must be confirmed by undertaking a Site Sensitivity Verification. Since Aquatic Biodiversity was identified as a relevant theme and recommended study in the Screening Tool Report, GN R320 must be complied with.

8.3 Scope of the Aquatic Biodiversity and Species Impact Assessment

An Aquatic Biodiversity and Species Site Sensitivity Verification was undertaken in order to confirm the current use of the land and environmental sensitivity from an aquatic biodiversity and species perspective of the proposed project area as identified by the Screening Tool. An Aquatic Biodiversity and Species Impact Assessment was undertaken in order to assess the condition, nature, extent and potential impacts to the watercourses and aquatic biodiversity associated with the proposed projects and associated infrastructure. Refer to Section 8.5 below for the Terms of Reference that was provided to the specialist.

8.4 Details of the Specialist

The Aquatic Biodiversity and Species Impact Assessment was undertaken by Russell Tate of TESS. Russell is registered with the South African Council for Natural and Scientific Professions (SACNASP), with Registration Number 400089/15 in the field of Aquatic Science.

8.5 Terms of Reference for the Aquatic Biodiversity and Species Impact Assessment

The Aquatic Biodiversity and Species Impact Assessment was completed based on the following Terms of Reference:

- Compile an Aquatic Biodiversity and Species Impact Assessment Report in compliance with the specialist assessment protocols established in Government Gazette 43110, GN R320 (March, 2020) [Aquatic Biodiversity] and in Government Gazette 43855, GN 1150 (October, 2020 and amended in GN 3717, July 2023) [Plant and Animal Species, where relevant], and other relevant legislation and guidelines that may be deemed necessary. Note that July 2023 amendments to the species protocol were considered, however no aquatic Species of Conservation Concern (SCC) were found during the Site Sensitivity Verification and assessment;
- Provide the contact details of the specialist, SACNASP registration number, field of expertise, relevant experience, and a Curriculum Vitae;
- Provide a signed statement of independence by the specialist;
- Provide a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;
- Provide a description of the methodology used to undertake the Site Sensitivity Verification and impact assessment and site inspection, including equipment and modelling used, where relevant;
- Provide a description of the aquatic biodiversity and ecosystems of the project site, with a focus on features that are to be potentially impacted by the proposed project. The description should include the aquatic ecosystem types, presence of aquatic species, the major habitat forms giving due consideration to the composition of aquatic species communities, their habitat, distribution and movement patterns within the study area;
- Describe the extent of disturbance and transformation of the site, as necessary;
- Indicate the historic ecological condition (reference) and the Present Ecological State (PES) of identified aquatic features (in- stream, riparian and floodplain habitat) on site that are to be potentially impacted by the proposed project i.e. possible changes to the channel and flow regime (surface and groundwater); and comment on the recommended ecological condition of aquatic habitats to be achieved within the project area;
- Provide a map (if possible) describing the ecosystem processes that operate in relation to the aquatic ecosystems on and immediately adjacent to the project site (e.g. movement of surface and subsurface water, recharge, discharge, sediment transport, etc.);
- Identify and delineate wetlands that may occur on the sites, using the relevant protocols established;
- Provide an indication of the national and provincial priority status of the aquatic ecosystem, including a description of the criteria for the given status (i.e. if the site includes a wetland or a

river freshwater ecosystem priority area or sub catchment, a strategic water source area, whether or not they are free-flowing rivers, wetland clusters, a critical biodiversity or ecologically sensitive area);

- Consider seasonal changes and long-term trends, such as due to climate change;
- Identify any SCC or protected species on site;
- Compile a Risk Matrix and determine whether an application for Water Use Authorisation (e.g. General Authorisation or Water Use License) is required and if so, determine the requirements thereof;
- Assess local and regional biodiversity conservation planning relevant to the project area;
- Provide a motivation if there were development footprints that were identified as having a “low” aquatic biodiversity sensitivity and that were not considered appropriate;
- Provide review input on the preferred infrastructure layout following the sensitivity analysis and layout identification;
- Assess the project alternatives and identify a preferred alternative with motivation for this selection;
- Determination, description and mapping of the baseline environmental condition and sensitivity of the study area. Specify development setbacks or suitable construction and operational buffers for the aquatic ecosystem, using the accepted methodologies, and clear motivations for these recommendations including a description of the location of areas not suitable for development and to be avoided during construction and operation, where relevant;
- Provide a section indicating how the Screening Tool was interrogated and whether classification of the site is accurate or not. If not, it must be motivated why the classification is not accurate;
- Provide the threat status of the ecosystem and species as identified by the Screening Tool;
- Identify and assess the potential direct, indirect and cumulative impacts of the construction, operational and decommissioning phases of the proposed developments on aquatic biodiversity and species using the prescribed impact assessment methodology captured in Chapter 4 of the EIA Report. For cumulative impacts, consider other specified renewable energy and EGI projects within 30 km of the proposed projects. Rate impacts both without and with the implementation of mitigation or enhancement measures;
- Provide a substantiated statement indicating the acceptability of the proposed development and a recommendation if the development should receive approval or not; and any conditions to which this statement is subjected;
- Provide a description of assumptions and limitations in the report and any uncertainties or gaps in knowledge or data;
- Identify any additional protocols, licensing and/or permitting requirements that are relevant to the project and the implications thereof;
- Provide recommendations with regards to potential monitoring programmes;
- Determine mitigation, impact management actions and outcomes for inclusion in the Environmental Management Programmes (EMPrs), which could be implemented to, as far as possible, reduce the effect of negative impacts and enhance the effect of positive impacts. Identify best practice management actions, monitoring requirements, and rehabilitation guidelines for all identified impacts, where relevant;
- Incorporate and address relevant comments and concerns raised by the stakeholders, commenting authorities and Interested and Affected Parties (I&APs) prior to submitting the Final EIA Report to the Competent Authority for decision-making; and

- Review the Generic EMPs for Substations and Power Lines (GN R435) and confirm if there are any specific environmental sensitivities or attributes present on the project site and any resultant site-specific impact management outcomes and actions that are not included in the pre-approved generic EMPs (Part B – Section 1).

8.6 Study Methodology

A full description of the process undertaken for the Aquatic Biodiversity and Species Impact Assessment and to identify potential impacts associated with the proposed projects are captured in Appendix E.3 of this EIA Report. The impact assessment methodology is also described in detail in Chapter 4 of this EIA Report.

8.7 Assumptions, Uncertainties and Gaps in Knowledge

The Aquatic Biodiversity and Species Impact Assessment included the following assumptions, uncertainties and knowledge gaps:

- The results of the Aquatic Biodiversity and Species study were derived from rapid ecological assessments.
- No floodline delineation was completed for the Aquatic Biodiversity and Species assessment.
- Areas directly affected by the proposed projects were surveyed, whilst within the 500 m screening area, desktop information was utilised.
- Watercourses are defined by dynamic processes. Temporal variation of the extent and condition of the watercourses is a naturally occurring process. Therefore, the spatial extent of the watercourses provided in the Aquatic Biodiversity and Species study should be reconsidered within at least 5-10 years from the publishing of the study.
- No hydrological assessment was completed for the Aquatic Biodiversity and Species assessment.
- Aside for discussions with local landowners and specialists working on the overall project, there was no additional consultation completed for this project.
- Cumulative impacts were assessed by adding expected impacts from this proposed development to existing and proposed developments with similar impacts in a 30 km radius. The existing and proposed developments that were taken into consideration for cumulative impacts are listed in Section 6.4 of the Aquatic Biodiversity and Species Impact Assessment Report, which is included in Appendix E.3 of this EIA Report.

8.8 Key Issues

Potential aquatic biodiversity and species impacts arising from the proposed projects are listed below for each of the projects and each phase, including cumulative impacts. No indirect impacts have been identified.

8.8.1 Biesjesvlei PV1, Biesjesvlei BESS 1 and Biesjesvlei EGI 1

Construction, Operational and Decommissioning Phases:

- Impact 1: Water quality deterioration.
- Impact 2: Habitat quality deterioration.
- Impact 3: Aquatic habitat connectivity loss.

8.8.2 Cumulative Impacts

Construction, Operational and Decommissioning Phases:

- Impact 1: Water quality deterioration.
- Impact 2: Habitat quality deterioration.
- Impact 3: Aquatic habitat connectivity loss.

8.9 Key Impacts

The impacts and mitigation measures are described in this section. Each project has different potential impact ratings, hence separate impact tables have been provided for each project in this section.

Table 8.1 provides potential impacts for **Project 1 (Biesjesvlei PV1)**.

Table 8.2 provides potential impacts for **Project 4 (Biesjesvlei BESS 1)**.

Table 8.3 provides potential impacts for **Project 7 (Biesjesvlei EGI 1)**.

Table 8.4 provides potential cumulative impacts.

Table 8.1: Assessment of the potential Aquatic Biodiversity and Species risks and impacts of Project 1 (Biesjesvlei PV1).

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Habitat Quality Degradation	Status	Negative	High (2)	- Avoidance must be implemented i.e. the very high and high sensitivity areas identified, delineated and mapped by the Aquatic Specialist must be avoided by main infrastructure. - Culverts and road crossings are recommended to be designed based on the stream simulation culvert design process (United States Department of Agriculture (USDA), 2008). - Culverts should allow for the free movement of aquatic biota including fish such as <i>Enteromius sp.</i> - The placement of instream crossing infrastructure must not result in downstream erosion or upstream impoundment. - The implementation of bank rehabilitation actions must take place. - Where culverts are required, it is recommended that these are spread across the wetland units and not directed through single culverts. - All contractors and staff are to have undergone an induction / training on the location of sensitive No-Go areas and basic environmental awareness. - Access routes into or adjacent to the wetlands must make use of existing road ways and crossings where possible. - Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be avoided. - Storm-water generated from roadways and denuded areas must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment. - Storm-water verges as well as other denuded areas must be grassed (re-vegetated) with local indigenous grasses to protect against erosion.	Moderate (3)	Medium
	Spatial Extent	Local				
	Duration	Short term				
	Consequence	Severe				
	Probability	Likely				
	Reversibility	Moderate reversibility				
	Irreplaceability	Moderate				

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
				- Any materials excavated must not be deposited in the wetlands or areas where it is prone to being washed downstream or impeding natural flow. - The installation of sedimentation/erosion protection measures must be implemented before the start of construction, e.g., several rows of silt traps and fences (this is particularly important in the access roads leading or adjacent to the watercourses). - Stockpiling or storage of materials and/or waste must be placed beyond the defined buffers in the Aquatic Biodiversity and Species Assessment for each respective activity. - No vehicles shall enter watercourse buffer zones outside of construction footprints. - Hydrocarbons for refuelling purposes must be stored in a suitable storage device on an impermeable surface outside of the delineated wetland buffer zones. - Disturbed areas must be re-vegetated after completion of the phase. - A three-month timeframe for the initiation of this action is required. - Drainage channels constructed for the access roads must be constructed so as not to result in erosion. - An inspection of the drainage channels must be completed within 3 months following the end of activities and within a month after the first rainfall event which exceeds 50mm. Should excessive sediment be transported down the channels it is recommended that sediment screens are implemented. - Sediment screens must be inspected, maintained and cleared every month or after significant rainfall (>150mm/24hrs). - An alien vegetation removal and management plan must be implemented along the verges of the roads and crossing points. - General storm-water management practices should be included in the design phase and implemented during the construction phase of this project.		

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
				Watercourse monitoring should take place annually as part of the environmental management programme (EMPr).		
Water Quality Degradation	Status	Negative	High (2)	Refer to the mitigation measures provided for the potential impact relating to Habitat Quality Degradation for the construction phase listed above.	Moderate (3)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Severe				
	Probability	Likely				
	Reversibility	High reversibility				
	Irreplaceability	Moderate				
Aquatic Habitat Connectivity Loss	Status	Negative	High (2)	Refer to the mitigation measures provided for the potential impact relating to Habitat Quality Degradation for the construction phase listed above.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Medium term				
	Consequence	Severe				
	Probability	Likely				
	Reversibility	High reversibility				
	Irreplaceability	Moderate				
OPERATIONAL PHASE						
Habitat Quality Degradation	Status	Negative	Moderate (3)	- The implementation of the buffer zones stipulated in the Aquatic Biodiversity and Species Assessment. - Clean and dirty surface water separation and a storm-water management plan must be put into place via standard best practice methods. - A clear storm-water management plan for hardened surfaces must be implemented.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Medium term				
	Consequence	Substantia				
	Probability	Likely				
	Reversibility	Moderately reversible				
	Irreplaceability	Moderate				

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
				- The revegetation of disturbed non-active cleared areas must take place within the first growing season between September and March following completion of the activity. - The above must be audited within 3 months of completing the phase. - No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. - Monitoring of instream structures on an annual basis.		
Water Quality Degradation	Status	Negative	Moderate (3)	Refer to the mitigation measures provided for the potential impact relating to Habitat Quality Degradation for the operational phase listed above.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				
Aquatic Habitat Connectivity Loss	Status	Negative	Moderate (3)	Refer to the mitigation measures provided for the potential impact relating to Habitat Quality Degradation for the operational phase listed above.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				
DECOMMISSIONING PHASE						
Habitat Quality Degradation	Status	Negative	High (2)	- All contractors and staff are to have undergone an induction / training on the location of sensitive No-Go areas and basic environmental awareness. - Areas where decommissioning is to take place must be clearly demarcated. Any areas not demarcated must be avoided. - Storm-water generated from roadways must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment.	Moderate (3)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Severe				
	Probability	Likely				
	Reversibility	Moderately reversible				
	Irreplaceability	Moderate				

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
				- Storm-water verges as well as other denuded areas must be grassed (re-vegetated) with local indigenous grasses to protect against erosion. - Any materials excavated must not be deposited in the wetlands or areas where it is prone to being washed downstream or impeding natural flow. - Stockpiling or storage of materials and/or waste must be placed beyond the defined buffers in the Aquatic Biodiversity and Species Assessment for each respective activity. - No vehicles shall enter watercourse buffer zones outside of decommissioning footprints. - No vehicles shall be serviced on site; a suitable workshop with appropriate pollution control facilities should be utilised offsite. - Hydrocarbons for refuelling purposes must be stored in a suitable storage device on an impermeable surface outside of the delineated wetland buffer zones. - Disturbed areas must be re-vegetated after completion of the phase. - An alien vegetation removal and management plan must be implemented along the verges of the roads and crossing points.		
Water Quality Degradation	Status	Negative	High (2)	Refer to the mitigation measures provided for the potential impact relating to Habitat Quality Degradation for the decommissioning phase listed above.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Severe				
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				
Aquatic Habitat Connectivity Loss	Status	Negative	Moderate (3)	Refer to the mitigation measures provided for the potential impact relating to Habitat Quality Degradation for the decommissioning phase listed above.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Substantial				
	Probability	Likely				

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				

Table 8.2: Assessment of the potential Aquatic Biodiversity and Species risks and impacts of Project 4 (Biesjesvlei BESS 1).

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Habitat Quality Degradation	Status	Negative	Moderate (3)	- Avoidance must be implemented i.e. the very high and high sensitivity areas identified, delineated and mapped by the Aquatic Specialist must be avoided by main infrastructure. - Culverts and road crossings are recommended to be designed based on the stream simulation culvert design process (USDA, 2008). - Culverts should allow for the free movement of aquatic biota including fish such as <i>Enteromius sp.</i> - The placement of instream crossing infrastructure must not result in downstream erosion or upstream impoundment. - The implementation of bank rehabilitation actions must take place. - Where culverts are required, it is recommended that these are spread across the wetland units and not directed through single culverts. - All contractors and staff are to have undergone an induction / training on the location of sensitive No-Go areas and basic environmental awareness. - Access routes into or adjacent to the wetlands must make use of existing road ways and crossings where possible.	Low (4)	Medium
	Spatial Extent	Site Specific				
	Duration	Short term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderately reversible				
	Irreplaceability	Moderate				

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
				- Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be avoided. - Storm-water generated from roadways and denuded areas must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment. - Storm-water verges as well as other denuded areas must be grassed (re-vegetated) with local indigenous grasses to protect against erosion. - Any materials excavated must not be deposited in the wetlands or areas where it is prone to being washed downstream or impeding natural flow. - The installation of sedimentation/erosion protection measures must be implemented before the start of construction, e.g., several rows of silt traps and fences (this is particularly important in the access roads leading or adjacent to the watercourses). - Stockpiling or storage of materials and/or waste must be placed beyond the defined buffers in the Aquatic Biodiversity and Species Assessment for each respective activity. - No vehicles shall enter watercourse buffer zones outside of construction footprints. - Hydrocarbons for refuelling purposes must be stored in a suitable storage device on an impermeable surface outside of the delineated wetland buffer zones. - Disturbed areas must be re-vegetated after completion of the phase. - A three-month timeframe for the initiation of this action is required. - Drainage channels constructed for the access roads must be constructed so as not to result in erosion. - An inspection of the drainage channels must be completed within 3 months following the end of activities and within a month after the first rainfall event which exceeds 50mm. Should excessive sediment be transported down the channels it is recommended that sediment screens are implemented.		

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
				- Sediment screens must be inspected, maintained and cleared every month or after significant rainfall (>150mm/24hrs). - An alien vegetation removal and management plan must be implemented along the verges of the roads and crossing points. - General storm-water management practices should be included in the design phase and implemented during the construction phase of this project. - Watercourse monitoring should take place annually as part of the environmental management programme (EMPr).		
Water Quality Degradation	Status	Negative	Moderate (3)	Refer to the mitigation measures provided for the potential impact relating to Habitat Quality Degradation for the construction phase listed above.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				
Aquatic Habitat Connectivity Loss	Status	Negative	Moderate (3)	Refer to the mitigation measures provided for the potential impact relating to Habitat Quality Degradation for the construction phase listed above.	Low (4)	Medium
	Spatial Extent	Site Specific				
	Duration	Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				
OPERATIONAL PHASE						
Habitat Quality Degradation	Status	Negative	Moderate (3)	The implementation of the buffer zones stipulated in the Aquatic Biodiversity and Species Assessment.	Low (4)	Medium
	Spatial Extent	Site specific				

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
	Duration	Medium term		- Clean and dirty surface water separation and a storm-water management plan must be put into place via standard best practice methods. - A clear storm-water management plan for hardened surfaces must be implemented. - The revegetation of disturbed non-active cleared areas must take place within the first growing season between September and March following completion of the activity. - The above must be audited within 3 months of completing the phase. - No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. - Monitoring of instream structures on an annual basis.		
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderately reversible				
	Irreplaceability	Moderate				
Water Quality Degradation	Status	Negative	Moderate (3)	Refer to the mitigation measures provided for the potential impact relating to Habitat Quality Degradation for the operational phase listed above.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				
Aquatic Habitat Connectivity Loss	Status	Negative	Moderate (3)	Refer to the mitigation measures provided for the potential impact relating to Habitat Quality Degradation for the operational phase listed above.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Medium term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				
DECOMMISSIONING PHASE						
Habitat Quality Degradation	Status	Negative	Moderate (3)	All contractors and staff are to have undergone an induction / training on the location of sensitive No-Go areas and basic environmental awareness.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
	Consequence	Substantial		- Areas where decommissioning is to take place must be clearly demarcated. Any areas not demarcated must be avoided. - Storm-water generated from roadways must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment. - Storm-water verges as well as other denuded areas must be grassed (re-vegetated) with local indigenous grasses to protect against erosion. - Any materials excavated must not be deposited in the wetlands or areas where it is prone to being washed downstream or impeding natural flow. - Stockpiling or storage of materials and/or waste must be placed beyond the defined buffers in the Aquatic Biodiversity and Species Assessment for each respective activity. - No vehicles shall enter watercourse buffer zones outside of decommissioning footprints. - No vehicles shall be serviced on site; a suitable workshop with appropriate pollution control facilities should be utilised offsite. - Hydrocarbons for refuelling purposes must be stored in a suitable storage device on an impermeable surface outside of the delineated wetland buffer zones. - Disturbed areas must be re-vegetated after completion of the phase. - An alien vegetation removal and management plan must be implemented along the verges of the roads and crossing points.		
	Probability	Likely				
	Reversibility	Moderately reversible				
	Irreplaceability	Moderate				
Water Quality Degradation	Status	Negative	Moderate (3)	Refer to the mitigation measures provided for the potential impact relating to Habitat Quality Degradation for the decommissioning phase listed above.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
Aquatic Habitat Connectivity Loss	Status	Negative	Moderate (3)	Refer to the mitigation measures provided for the potential impact relating to Habitat Quality Degradation for the decommissioning phase listed above.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				

Table 8.2: Assessment of the potential Aquatic Biodiversity and Species risks and impacts of Project 7 (Biesjesvlei EGI 1).

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Habitat Quality Degradation	Status	Negative	Low (4)	- Avoidance must be implemented i.e. the very high and high sensitivity areas identified, delineated and mapped by the Aquatic Specialist must be avoided by main infrastructure. - Culverts and road crossings are recommended to be designed based on the stream simulation culvert design process (USDA, 2008). - Culverts should allow for the free movement of aquatic biota including fish such as <i>Enteromius sp.</i> - The placement of instream crossing infrastructure must not result in downstream erosion or upstream impoundment.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Short term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Moderately reversible				
	Irreplaceability	Moderate				
Water Quality Degradation	Status	Negative	Low (4)	- The implementation of bank rehabilitation actions must take place. - Where culverts are required, it is recommended that these are spread across the wetland units and not directed through single culverts.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
	Consequence	Moderate		- All contractors and staff are to have undergone an induction / training on the location of sensitive No-Go areas and basic environmental awareness. - Access routes into or adjacent to the wetlands must make use of existing road ways and crossings where possible. - Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be avoided. - Storm-water generated from roadways and denuded areas must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment. - Storm-water verges as well as other denuded areas must be grassed (re-vegetated) with local indigenous grasses to protect against erosion. - Any materials excavated must not be deposited in the wetlands or areas where it is prone to being washed downstream or impeding natural flow. - The installation of sedimentation/erosion protection measures must be implemented before the start of construction, e.g., several rows of silt traps and fences (this is particularly important in the access roads leading or adjacent to the watercourses). - Stockpiling or storage of materials and/or waste must be placed beyond the defined buffers in the Aquatic Biodiversity and Species Assessment for each respective activity. - No vehicles shall enter watercourse buffer zones outside of construction footprints. - Hydrocarbons for refuelling purposes must be stored in a suitable storage device on an impermeable surface outside of the delineated wetland buffer zones. - Disturbed areas must be re-vegetated after completion of the phase. - A three-month timeframe for the initiation of this action is required. - Drainage channels constructed for the access roads must be constructed so as not to result in erosion.		
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				
Aquatic Habitat Connectivity Loss	Status	Negative	Low (4)		Low (4)	Medium
	Spatial Extent	Local				
	Duration	Medium term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
				- An inspection of the drainage channels must be completed within 3 months following the end of activities and within a month after the first rainfall event which exceeds 50mm. Should excessive sediment be transported down the channels it is recommended that sediment screens are implemented. - Sediment screens must be inspected, maintained and cleared every month or after significant rainfall (>150mm/24hrs). - An alien vegetation removal and management plan must be implemented along the verges of the roads and crossing points. - General storm-water management practices should be included in the design phase and implemented during the construction phase of this project. - Watercourse monitoring should take place annually as part of the environmental management programme (EMPr).		
OPERATIONAL PHASE						
Habitat Quality Degradation	Status	Negative	Low (4)	- The implementation of the buffer zones stipulated in the Aquatic Biodiversity and Species Assessment. - Clean and dirty surface water separation and a storm-water management plan must be put into place via standard best practice methods. - A clear storm-water management plan for hardened surfaces must be implemented. - The revegetation of disturbed non-active cleared areas must take place within the first growing season between September and March following completion of the activity. - The above must be audited within 3 months of completing the phase. - No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. - Monitoring of instream structures on an annual basis.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Medium term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Moderately reversible				
	Irreplaceability	Moderate				
Water Quality Degradation	Status	Negative	Low (4)	Refer to the mitigation measures provided for the potential impact relating to Habitat Quality Degradation for the operational phase listed above.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Medium term				

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				
Aquatic Habitat Connectivity Loss	Status	Negative	Low (4)	Refer to the mitigation measures provided for the potential impact relating to Habitat Quality Degradation for the operational phase listed above.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Medium term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				
DECOMMISSIONING PHASE						
Habitat Quality Degradation	Status	Negative	Low (4)	- All contractors and staff are to have undergone an induction / training on the location of sensitive No-Go areas and basic environmental awareness. - Areas where decommissioning is to take place must be clearly demarcated. Any areas not demarcated must be avoided. - Storm-water generated from roadways must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment. - Storm-water verges as well as other denuded areas must be grassed (re-vegetated) with local indigenous grasses to protect against erosion. - Any materials excavated must not be deposited in the wetlands or areas where it is prone to being washed downstream or impeding natural flow. - Stockpiling or storage of materials and/or waste must be placed beyond the defined buffers in the Aquatic Biodiversity and Species Assessment for each respective activity.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Moderately reversible				
	Irreplaceability	Moderate				

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
				- No vehicles shall enter watercourse buffer zones outside of decommissioning footprints. - No vehicles shall be serviced on site; a suitable workshop with appropriate pollution control facilities should be utilised offsite. - Hydrocarbons for refuelling purposes must be stored in a suitable storage device on an impermeable surface outside of the delineated wetland buffer zones. - Disturbed areas must be re-vegetated after completion of the phase. - An alien vegetation removal and management plan must be implemented along the verges of the roads and crossing points.		
Water Quality Degradation	Status	Negative	Low (4)	Refer to the mitigation measures provided for the potential impact relating to Habitat Quality Degradation for the decommissioning phase listed above.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				
Aquatic Habitat Connectivity Loss	Status	Negative	Low (4)	Refer to the mitigation measures provided for the potential impact relating to Habitat Quality Degradation for the decommissioning phase listed above.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				

Table 8.4: Assessment of the potential Aquatic Biodiversity and Species cumulative risks and impacts of the proposed projects.

Impact	Probability		Significance and Ranking (Pre-Mitigation)	Potential Mitigation Measures	Significance and Ranking (Post-Mitigation)	Confidence Level
CUMULATIVE IMPACTS						
Habitat Quality Degradation	Status	Negative	Moderate (3)	- The presentation and engagement with the local catchment forum. - The implementation of mitigation actions for the construction, operation and decommissioning phases as captured in the above tables for each relevant impact.	Moderate (3)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate reversibility				
	Irreplaceability	Moderate				
Water Quality Degradation	Status	Negative	Moderate (3)	Refer to the mitigation measures provided for the potential cumulative impact relating to Habitat Quality Degradation listed above.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				
Aquatic Habitat Connectivity Loss	Status	Negative	Moderate (3)	Refer to the mitigation measures provided for the potential cumulative impact relating to Habitat Quality Degradation listed above.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Highly reversible				
	Irreplaceability	Moderate				

8.10 Findings and Conclusion of the Aquatic Biodiversity and Species Impact Assessment

The findings and conclusion below equally apply to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1), and Project 7 (Biesjesvlei EGI 1), unless where mentioned otherwise.

The results of the Aquatic Biodiversity Impact Assessment indicates that moderately and largely modified watercourses are present in the Area of Interest (Aol) of the proposed projects. These systems were considered to have a high-level importance and sensitivity.

Three wetland hydrogeomorphic (HGM) types were identified within the established Aol of the proposed projects. The HGM types consisted of Channelled Valley Bottom (CVB), Unchanneled Valley Bottom (UVB) and hillslope seep wetland units. The sensitivity and buffer allocated for these watercourse features are indicated below.

Watercourse Feature	Sensitivity	Buffer
Channelled Valley Bottom (CVB) Wetland	Very High	19 m
Unchanneled Valley Bottom (UVB) Wetland	Very High	19 m
Seep Wetlands	High	19 m

Watercourses within the Aol are sensitive and important habitats and must be avoided. In order to ensure the preservation of these systems, a 19 m buffer zone must be applied between the main PV layouts and the watercourses. The proposed development has largely avoided the watercourses, as well as their buffer zones; however, effective mitigation of the potential impacts arising from linear infrastructure is required. Direct unavoidable impacts to sensitive habitats due to road crossing requirements of the proposed development are expected; therefore, it is recommended that appropriate culvert options are investigated and implemented. These must consider habitat connectivity and should not result in hydraulic impact to downstream or upslope environments.

Based on the outcomes of the Aquatic Biodiversity Impact Assessment and provided that the recommended avoidance and mitigation actions are implemented, it is the opinion of the Aquatic Biodiversity Specialist that no fatal flaws, from an aquatic biodiversity and species perspective, would prevent the proposed development from occurring.

Refer to Appendix E.3 of the EIA Report for additional information including *inter alia* a detailed Site Sensitivity Verification inclusive of maps from the Screening Tool and site specific maps generated by the specialist, an assessment of the impacts, a list of key issues and impacts from an aquatic biodiversity and species perspective, a list of potential mitigation measures and recommendations for inclusion in the EMPs as well as a list of the EA condition recommendations as recommended by the specialist.



CHAPTER 9: Avifauna

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9. AVIFAUNA

9.1 Introduction

This chapter provides a brief summary of the Avifauna Impact Assessment for the Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of the Biesjesvlei Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Facility, and their associated Electricity Grid Infrastructure (EGI), near Smithfield in the Free State Province. **Refer to the full Avifauna Impact Assessment which is included in Appendix E.4 of this EIA Report for additional information.**

This chapter specifically deals with the **Biesjesvlei PV1 (Project 1), the Biesjesvlei BESS 1 (Project 4) and the Biesjesvlei EGI 1 (Project 7)** (hereinafter referred to as the “proposed projects”).

The information presented throughout this chapter applies equally to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1), unless where mentioned otherwise.

9.2 Need for the Avifauna Impact Assessment

Government Gazette 43855, GN R1150 published by the then DEFF on 30 October 2020, includes a protocol which provides the criteria for the specialist assessment and minimum report content requirements for environmental impacts on plant species and animal species for activities requiring Environmental Authorisation (EA). Section 2 of the Terrestrial Animal Species Protocols (GN R1150, October 2020 and amended in GN 3717, July 2023) provides the requirements for the Site Sensitivity Verification, which states that prior to commencing with the specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration, as identified by the National Web-based Environmental Screening Tool (Screening Tool), must be confirmed by undertaking a Site Sensitivity Verification. Since Animal Species were identified as relevant themes and recommended studies in the Screening Tool Report, GN R1150 must be complied with. The specialist confirmed that the avifauna sensitivity of the study area warranted an Impact Assessment which has been undertaken in compliance with GN R1150.

9.3 Scope of the Avifauna Impact Assessment

An Avifauna Site Sensitivity Verification was undertaken in order to confirm the current use of the land and environmental sensitivity from an avifauna perspective of the proposed project area as identified by the Screening Tool. An Avifauna Impact Assessment was undertaken in order to determine how the proposed projects and their associated infrastructure will impact on the terrestrial ecological integrity of the area (as it pertains to avifauna) and if necessary, to demarcate appropriate ecological buffers around sensitive communities or receptors. Refer to Section 9.5 below for the Terms of Reference that was provided to the specialist.

9.4 Details of the Specialist

The Avifauna Impact Assessment was undertaken by Sam Laurence of Enviro-Insight cc. Sam is registered with the South African Council for Natural Scientific Professions (SACNASP), Registration Number 400450/13.

9.5 Terms of Reference for the Avifauna Impact Assessment

The pre-construction avifaunal monitoring programme followed the Regime 2 protocol as defined in the Birds and Solar Energy best practice guidelines (Jenkins et al. 2017). This is based on the size of the study area (> 150 ha), the high avifaunal sensitivity (based on the animal species theme on the Screening Tool), and type of technology that will be used for the proposed projects. The duration, in terms of data collection, for this study was a minimum of 3 surveys (of which one must be in the peak season) of 3-4 days. Surveys were undertaken in November 2022 (early wet season); February 2023 (wet season); April 2023 (late wet season). This complies with the requirements of the Best Practice Guidelines available at the time (Jenkins et al., 2017).

The avifaunal sensitivity was determined based on the number of priority species occurring, or potentially present, within or around the study area; the regional or global threat status of these species; avifaunal habitat found in the area; population of priority species; bird movement corridor and proximity to Important Bird and Biodiversity Areas.

Based on the findings of the site visit and the Site Sensitivity Verification undertaken by the specialist, it was confirmed that a full assessment is required during the EIA Phase.

The Avifauna Specialist Assessment undertaken during the EIA Phase was based on existing information, national and provincial databases, and professional experience and fieldwork conducted by the Specialist, as considered necessary and in accordance with relevant legislated requirements. The Assessment Report was also in adherence to any additional relevant legislation and guidelines that was deemed necessary.

The Avifaunal Impact Assessment was completed based on the following Terms of Reference:

- Compile an Avifauna Impact Assessment Report in compliance with the specialist assessment protocols established in Government Gazette 43855, GN 1150 (October, 2020 and amended in GN 3717, July 2023) [Animal Species], and other relevant legislation and guidelines that may be deemed necessary, such as Guidelines for the Implementation of the Terrestrial Flora and Terrestrial Fauna Species Protocols for EIAs in South Africa produced by the South African National Biodiversity Institute (SANBI) on behalf of the then DEFF (2020); and the BirdLife South Africa (BLSA) Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa ¹ to determine the level of survey effort that is required;

¹ Jenkins, A.R., Ralston-Patton, Smit-Robinson, A.H. 2017. Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa. BirdLife South Africa. BirdLife South Africa by Jenkins, A.R., Ralston-Patton, Smit- Robinson, A.H. 2017.

- Provide the contact details of the specialist, SACNASP registration number, field of expertise, relevant experience, and a Curriculum Vitae;
- Provide a signed statement of independence by the specialist;
- Provide a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;
- Provide a description of the methodology used to undertake the Site Sensitivity Verification, impact assessment and site inspection, including equipment and modelling used where relevant;
- Provide a description of the mean density of observations/number of sample sites per unit area of site inspection observations, where possible, as noted in the Species Environmental Assessment Guideline;
- Provide details of all Species of Conservation Concern (SCC) found or suspected to occur on site, ensuring sensitive species are appropriately reported;
- Finalise the findings and outcomes of the pre-construction avifaunal monitoring programme that was conducted over a period of six months in accordance with the BLSA guideline for Solar PV developments (i.e. Regime 2);
- Determine, describe and map the baseline environmental condition and sensitivity of the study area in terms of avifaunal features such as habitat use, roosting, feeding and nesting/breeding;
- Specify development setbacks or buffers required, and provide clear motivations for these recommendations, including a description of the location of areas not suitable for development and to be avoided during construction and operation, where relevant;
- Provide a motivation if there were any development footprints identified as having “low” or “medium” terrestrial animal species sensitivity and were not considered appropriate.
- Provide review input on the preferred infrastructure layout following the sensitivity analysis and layout identification;
- Assess the project alternatives and identify a preferred alternative with motivation for this selection;
- Describe the affected environment from an avifaunal perspective, including consideration of the surrounding habitats and avifaunal features (e.g. Ramsar sites, Important Bird Areas, wetlands, migration routes, feeding, roosting and nesting areas, etc.);
- Describe and map bird habitats on the site, based on on-site monitoring, desktop review, collation of available information, studies in the local area and previous experience. The assessment must also consider the maps generated by the Screening Tool;
- Identify and assess the potential direct, indirect and cumulative impacts of the construction, operational and decommissioning phases of the proposed development on birds using the prescribed impact assessment methodology captured in Chapter 4 of the EIA Report. For cumulative impacts, consider other specified renewable energy and EGI projects within 30 km of the proposed projects. Rate impacts both without and with the implementation of mitigation or enhancement measures;
- Provide a reasoned opinion, based on the findings of the specialist assessment, indicating the acceptability of the proposed development and a recommendation if the development should receive approval or not; and any conditions to which the opinion is subjected if relevant;
- Provide a description of the assumptions made, any uncertainties or gaps in knowledge or data, and limitations in the report;

- Provide a section indicating how the Screening Tool was interrogated and whether classification of the site is accurate or not. If not, it must be motivated why the classification is not accurate;
- Identify any additional protocols, licensing and/or permitting requirements that are relevant to the project and the implications thereof;
- Provide recommendations for mitigation of impacts to acceptable levels (where possible) and potential monitoring programmes;
- Determine mitigation, impact management actions and outcomes for inclusion in the Environmental Management Programmes (EMPrs), which could be implemented to, as far as possible, reduce the effect of negative impacts and enhance the effect of positive impacts. Identify best practice management actions, monitoring requirements, and rehabilitation guidelines for all identified impacts;
- Incorporate and address relevant comments and concerns raised by the stakeholders, commenting authorities and Interested and Affected Parties (I&APs) prior to submitting the Final EIA Report to the Competent Authority for decision-making; and
- Review the Generic EMPrs for Substations and Power Lines (GN R435) and confirm if there are any specific environmental sensitivities or attributes present on the project site and any resultant site-specific impact management outcomes and actions that are not included in the pre-approved generic EMPrs (Part B – Section 1).

9.6 Study Methodology

A full description of the process undertaken for the Avifauna Impact Assessment and to identify potential impacts associated with the proposed projects are captured in Appendix E.4 of this EIA Report. The impact assessment methodology is also described in detail in Chapter 4 of this EIA Report.

9.7 Assumptions, Uncertainties and Gaps in Knowledge

The Avifauna Impact Assessment included the following assumptions, uncertainties and knowledge gaps:

- It is assumed that all third-party information acquired is correct (e.g. GIS data and scope of work).
- Owing to extremely dry, early spring conditions occurring during the reconnaissance site visit in 2022, bird activity was at its lowest and results reflected as such. The wet season yielded significantly higher quality data.
- Access to many areas of the site was challenging given the flooding and large wetland systems. Although this was seasonally dependent, the wetlands were almost permanently waterlogged. However, the access improved during the survey period and was considered adequate to fulfil the minimum requirements.
- In general, there is an error with the Screening Tool reports which are manifested within the PV methodology of the Screening Tool, which always shows “low” sensitivity for the “Relative Avian Theme Sensitivity”. The “Relative Animal Species” Theme however stipulates the triggers for sensitive avifauna accordingly.

9.8 Key Issues

Potential avifauna impacts arising from the proposed projects are listed below for each of the projects and each phase, including cumulative impacts. No indirect impacts have been identified.

9.8.1 Biesjesvlei PV1

Construction Phase:

- Impact 1: Habitat destruction.
- Impact 2: Disturbance of bird roosts.
- Impact 3: Disturbance due to noise such as machinery movements and construction activities.

Operational Phase:

- Impact 1: Disturbance due to noise such as machinery movements and maintenance operations.
- Impact 2: Bird mortalities.
- Impact 3: Loss of Bird Foraging Habitat.
- Impact 4: Disruption of bird migratory pathways during the operational phase.
- Impact 5: Attraction to the facility.
- Impact 6: Chemical pollution spills.

Decommissioning Phase:

- Impact 1: Disruption of bird migratory pathways during the decommissioning phase.
- Impact 2: Habitat loss reclamation from rehabilitation activities.

9.8.2 Biesjesvlei BESS 1

Construction Phase:

- Impact 1: Habitat destruction.
- Impact 2: Disturbance of bird roosts.
- Impact 3: Disturbance due to noise such as machinery movements and construction activities.

Operational Phase:

- Impact 1: Disturbance due to noise such as machinery movements and maintenance operations.
- Impact 2: Loss of Bird Foraging Habitat.
- Impact 3: Attraction to the facility.
- Impact 4: Chemical pollution spills.

Decommissioning Phase:

- Impact 1: Disturbance of foraging and breeding behaviours of birds due to noise, dust and lighting.

9.8.3 Biesjesvlei EGI 1

Construction Phase:

- Impact 1: Disturbance of foraging and breeding behaviours of birds due to noise, dust and lighting.
- Impact 2: Loss of habitat due to clearing, trenching, alteration and exclusion from previously accessible habitats.

Operational Phase:

- Impact 1: Continued disturbance due to operational activities (use of vehicles, lights, etc.).
- Impact 2: Loss of habitat due to altered and excluded habitats and threat of fire.
- Impact 3: Direct mortality from electrocution and collision with infrastructure (e.g. fences, overhead power lines, etc.).
- Impact 4: Attraction to the facility exacerbating potential impacts.

Decommissioning Phase:

- Impact 1: Continued disturbance due to decommissioning activities (use of vehicles, lights etc.).
- Impact 2: Habitat loss reclamation from rehabilitation activities.
- Impact 3: Removal of power lines to promote safe passage (lowering collision risk) through the site and avoiding attraction by birds perching and nesting.

9.8.4 Cumulative Impacts

- Potential impact 1: Habitat loss; and
- Potential impact 2: Collision mortality (power lines).

9.9 Key Impacts

The impacts and mitigation measures are described in this section. Each project has different potential impact ratings, hence separate impact tables have been provided for each project in this section.

Table 9.1 provides potential impacts for **Project 1 (Biesjesvlei PV1)**.

Table 9.2 provides potential impacts for **Project 4 (Biesjesvlei BESS 1)**.

Table 9.3 provides potential impacts for **Project 7 (Biesjesvlei EGI 1)**.

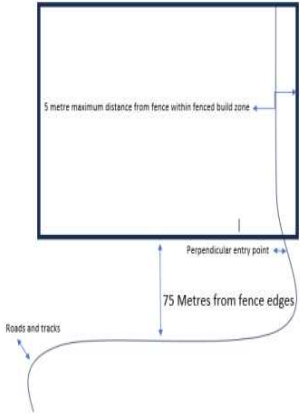
Table 9.4 provides potential cumulative impacts.

Table 9.1: Assessment of the potential Avifauna risks and impacts of Project 1 (Biesjesvlei PV1).

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures / enhancement measures	Significance / Ranking (Post-Mitigation / Enhancement)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Habitat destruction Significant habitat loss (including foraging and breeding) and fragmentation due to displacement (avoidance of disturbance) because of infrastructure installation (panels, on-site medium voltage internal power lines, roads, fences and sub surface cables) and associated dust effects. Habitat loss has the tendency to not only destroy existing habitat but also displace bird species from large areas of natural habitat. This specifically has a greater impact on bird species restricted to a specific habitat and its requirements.	Status	Negative	High (2)	- Impacts associated with the loss of bird foraging habitat due to construction activity cannot be mitigated in relation to the majority of the habitats but can be mitigated by avoiding avifaunal specific highly sensitive areas and their associated buffers, such as the local drainage lines, impoundments, smaller watercourses, pans and rocky koppies. The overall severity of the impact can be reduced to being less significant if avoidance mitigation is applied related to the positioning of the panels and supporting infrastructure and minimisation mitigation is applied. <u>Note that the PV panels and supporting infrastructure have avoided the no-go areas identified by the avifauna specialists.</u> - Roads must utilise or upgrade existing farm roads as far as possible. All roads and crossings must be engineered not to impede surface or subsurface flow in any way. - All underground cables bisecting sensitive habitats must be placed below the subsurface flow of the ephemeral wetlands with the linear construction pits subjected to full rehabilitation in order to maintain normal subsurface flow. - Finally, for all panel infrastructure, <u>commencement of construction should be restricted to the months of March, April, May, June, July, August, September, October</u> (latest) to minimise destruction of the avifaunal habitats during their optimal conditions.	Low (4)	High
	Spatial Extent	Local				
	Duration	Permanent				
	Consequence	Severe				
	Probability	Very likely				
	Reversibility	Low				
	Irreplaceability	Low				

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures / enhancement measures	Significance / Ranking (Post-Mitigation / Enhancement)	Confidence Level
Disturbance of bird roosts The destruction or disturbance of bird roosts during the construction phase.	Status	Negative	High (2)	As with other impacts, this impact can be mitigated by timing of any panel construction to <u>not commence in November, December, January and February</u> in order to avoid breeding periods of species within the sensitive drainage lines, wetlands and the general region.	Low (4)	Moderate
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Severe				
	Probability	Very likely				
	Reversibility	Low				
	Irreplaceability	Low				
Disturbance due to noise such as machinery movements and construction activities. Disturbance (including of nesting SCCs) due to noise such as machinery movements and construction activities during the construction phase of the proposed PV solar farm impacting breeding success.	Status	Negative	Moderate (3)	As with other impacts, this impact can be mitigated by timing of any panel construction to <u>not commence in November, December, January and February</u> in order to avoid breeding periods of species within the sensitive drainage lines, wetlands and the general region.	Low (4)	High
	Spatial Extent	Regional				
	Duration	Permanent				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				
OPERATIONAL PHASE						
Disturbance due to noise such as machinery movements and maintenance operations Disturbance (including nesting SCCs) due to noise such as machinery movements and maintenance operations	Status	Negative	Low (4)	No mitigation required.	Low (4)	High
	Spatial Extent	Regional				
	Duration	Short Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures / enhancement measures	Significance / Ranking (Post-Mitigation / Enhancement)	Confidence Level
during the operational phase of the proposed PV solar farm impacting breeding success.						
Bird mortalities during the operational phase due to vehicle collisions, collisions with infrastructure and/or combustion.	Status	Negative	Moderate (3)	- Impacts due to bird mortalities during the operational phase are practically unavoidable for any large facility, but with the appropriate buffering of sensitive habitats, these impacts can be minimised. It is likely that most of the avifaunal populations will be largely displaced from the majority of the project infrastructure (thus reducing risk), although significant risks are associated with the likelihood of project vehicles flushing birds into fencing infrastructure (see fence specific mitigations below). Although the current overall bird activity qualifies the proposed solar development boundary as a high-density area, there are certain times of the year (and day) when it appears that large flocks of birds (such as cranes, bustards and large birds of prey) are far more prevalent. It is therefore recommended that speed limits of 40 kmph within the PA be strictly enforced during the wet season (November to April). - In all areas where internal roads intersect with semi-natural or natural habitat, all new fences that are constructed (if any) must be set back at least (strictly) 75 m from the edge of every service road in order to allow for vulnerable species such as coursers, cranes and korhaans to obtain adequate height after being flushed by vehicle traffic. An alternative mitigation measure and where a 75 m buffer is not possible, new fences must be set back preferably 2 m and no more than 5 m (directly adjacent) from the edge of internal roads (as shown in Figure 9-1 below). Through the essential elimination of habitat, this will limit any chance of vulnerable species foraging on verge side vegetation and causing subsequent fence collisions. Speed limit enforcement must be implemented in conjunction with this.	Low (4)	High
	Spatial Extent	Regional				
	Duration	Medium Term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures / enhancement measures	Significance / Ranking (Post-Mitigation / Enhancement)	Confidence Level
				Finally, reflective diverters should be attached to new fencing alongside regular internal maintenance roads every 50 m.  Figure 9-1: Diagrammatic representation of road alignment with fencing infrastructure.		
Loss of Bird Foraging Habitat	Status	Negative	High (2)	Impacts associated with the loss of bird foraging habitat due to operations can be mitigated by avoiding avifaunal specific sensitive areas and their associated buffers, such as the local drainage lines, impoundments, smaller watercourses, pans and koppies. <u>Note that the PV panels and supporting infrastructure have avoided the no-go areas identified by the avifauna specialist.</u> Buffers should be maintained around all habitats with a SEI designated as High or above in accordance with the site sensitivity verification and delineations undertaken by the Aquatic specialists.	Moderate (3)	High
	Spatial Extent	Regional				
	Duration	Permanent				
	Consequence	Severe				
	Probability	Very likely				
	Reversibility	Low				
	Irreplaceability	Low				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				
	Status	Negative	Moderate (3)		Low (4)	Moderate

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures / enhancement measures	Significance / Ranking (Post-Mitigation / Enhancement)	Confidence Level
Disruption of bird migratory pathways during the operational phase	Spatial Extent	Regional		Migratory pathways of birds cannot be changed, and the resulting impacts are unavoidable. However, severity of the impacts can be reduced with appropriate mitigation measures. Some significant discernible migratory flight pathways were able to be established which could be explained by large areas of generic habitats punctuated by some distinguishing geographic features in the landscape, such as large ridges, large impoundments, wetlands and drainage lines. The linear drainage line habitats must be buffered by a minimum of 100 m from the edge of the demarcated wetland. <u>Note that the PV panels and supporting infrastructure have avoided the no-go areas identified by the avifauna specialist.</u>		
	Duration	Medium Term				
	Consequence	Substantial				
	Probability	Likely				
	Irreplaceability	Low				
Attraction to the facility The attraction of some novel bird species due to the development of a solar farm with associated infrastructure such as lake effect, perches, nest, foraging and shade opportunities may cause both damage to the infrastructure through acidic defecation by certain species but also draw birds closer to infrastructure and cause significant direct mortality risks.	Status	Negative	Moderate (3)	- Essentially, all habitat attractants should be eliminated so that avifaunal populations will not embed themselves within the infrastructure over time. This includes bird diverters and perch deterrents on <u>relevant</u> new infrastructure proposed for the Biesjesvlei projects, and the application of non-polarising white tape can be used around and/or across panels to minimise reflection which can attract aquatic birds and insects (food) as panels mimic reflective surfaces of waterbodies. This will only be required if mortality thresholds are reached and the Lake Effect is in fact recognised as an Impact (EMP). - In the event of increased rodent activity, non-harmful pest control measures should be applied to control population numbers and limit the attractiveness of the project area for foraging.	Low (4)	Moderate
	Spatial Extent	Regional				
	Duration	Long Term				
	Consequence	Substantial				
	Probability	Unlikely				
	Reversibility	Moderate				
	Irreplaceability	Low				
Chemical pollution spills	Status	Negative	High (2)	Application of strict chemical control procedures as per the recommendations provided in the Environmental Management Programme (EMPr). Zero spills should be targeted and full clean-	Low (4)	High
	Spatial Extent	Regional				
	Duration	Permanent				

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures / enhancement measures	Significance / Ranking (Post-Mitigation / Enhancement)	Confidence Level
Chemicals being used to keep the PV panels clean from dust (suppressants) etc.	Consequence	Severe		up kits available in the event of any chemical spill. Soil testing, in the event of spillages, subject to EMPr.		
	Probability	Very likely				
	Reversibility	Low				
	Irreplaceability	Low				
DECOMMISSIONING PHASE						
Disruption of bird migratory pathways during the decommissioning phase	Status	Negative	Moderate (3)	Decommissioning of panels <u>must not commence during the peak wet season months of November, December, January, and February.</u>	Low (4)	High
	Spatial Extent	Regional				
	Duration	Permanent				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Low				
	Irreplaceability	Low				
Habitat loss reclamation from rehabilitation activities After removal of the panels and the implementation of appropriate rehabilitation measures, the recovery of habitat and subsequently also the natural avifauna assemblages are expected to occur. However, this requires careful management to ensure success.	Status	Positive	Low (4)	- Remove all infrastructure not originally present prior to the construction phase. - Rehabilitate all areas disturbed immediately after decommissioning activities and removal of infrastructure. - Continue to implement an Alien and Invasive Plant Control Plan until the rehabilitation specialist deems it unnecessary.	Moderate (3)	High
	Spatial Extent	Local				
	Duration	Permanent				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Low				
	Irreplaceability	Low				

Table 9.2: Assessment of the potential Avifauna risks and impacts of Project 4 (Biesjesvlei BESS 1).

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation)	Potential mitigation measures	Significance / Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Habitat destruction Significant habitat loss (including foraging and breeding) and fragmentation due to displacement (avoidance of disturbance) because of infrastructure installation (BESS, BESS IPP Substation, on-site medium voltage internal power lines/cables, roads, fences and sub-surface cables) and associated dust effects. Habitat loss has the tendency to not only destroy existing habitat but also displace bird species from large areas of natural habitat. This specifically has a greater impact on bird species restricted to a specific habitat and its requirements.	Status	Negative	High (2)	- Impacts associated with the loss of bird foraging habitat due to construction activity cannot be mitigated in relation to the majority of the habitats but can be mitigated by avoiding avifaunal-specific highly sensitive areas and their associated buffers, such as the local drainage lines, impoundments, smaller watercourses, pans and rocky koppies. The overall severity of the impact can be reduced to being less significant if avoidance mitigation is applied related to the positioning of the BESS and supporting infrastructure and minimisation mitigation is applied. <u>Note that the BESS and supporting infrastructure have avoided the no-go areas identified by the avifauna specialist.</u> - Roads must utilise or upgrade existing farm roads as far as possible. All roads and crossings must be engineered not to impede surface or subsurface flow in any way. - All underground cables bisecting sensitive habitats must be placed below the subsurface flow of the ephemeral wetlands with the linear construction pits subjected to full rehabilitation in order to maintain normal subsurface flow. - Finally, for all BESS infrastructure, <u>commencement of construction should be restricted to the months of March, April, May, June, July, August, September, October</u> (latest) to minimise dust effects and subsequent destruction of the avifaunal habitats.	Low (4)	High
	Spatial Extent	Local				
	Duration	Permanent				
	Consequence	Severe				
	Probability	Very likely				
	Reversibility	Low				
	Irreplaceability	Low				

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation)	Potential mitigation measures	Significance / Ranking (Post-Mitigation)	Confidence Level
Disturbance of bird roosts The destruction or disturbance of bird roosts during the construction phase.	Status	Negative	High (2)	• As with other impacts, this impact can be mitigated by timing of BESS construction to <u>not commence in November, December, January and February</u> in order to avoid breeding periods of species within the sensitive drainage lines, wetlands and the general region.	Low (4)	Moderate
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Severe				
	Probability	Very likely				
	Reversibility	Low				
	Irreplaceability	Low				
Disturbance due to noise such as machinery movements and construction activities Disturbance (including of nesting SCCs) due to noise such as machinery movements and construction activities during the construction phase of the proposed BESS facility impacting breeding success.	Status	Negative	Moderate (3)	• As with other impacts, this impact can be mitigated by timing of BESS construction to <u>not commence in November, December, January and February</u> in order to avoid breeding periods of species within the sensitive drainage lines, wetlands and the general region.	Low (4)	High
	Spatial Extent	Regional				
	Duration	Permanent				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				
OPERATIONAL PHASE						
Disturbance due to noise such as, machinery movements and maintenance operations Disturbance (including of nesting SCC) due to noise such as machinery movements and maintenance operations	Status	Negative	Low (4)	• No mitigation required.	Low (4)	High
	Spatial Extent	Regional				
	Duration	Short Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation)	Potential mitigation measures	Significance / Ranking (Post-Mitigation)	Confidence Level
during the operational phase of the proposed BESS facility impacting breeding success.						
Loss of bird foraging habitat	Status	Negative	High (2)	Impacts associated with the loss of bird foraging habitat due to operations can be mitigated by avoiding avifaunal specific sensitive areas and their associated buffers, such as the local drainage lines, impoundments, smaller watercourses, pans and koppies. <u>Note that the BESS facility and supporting infrastructure have avoided the no-go areas identified by the avifauna specialist.</u> The designated buffer should be maintained around all habitats with a SEI designated as High or above in accordance with the SSV.	Moderate (3)	High
	Spatial Extent	Regional				
	Duration	Permanent				
	Consequence	Severe				
	Probability	Very likely				
	Reversibility	Low				
	Irreplaceability	Low				
Attraction to the facility The attraction of some novel bird species due to the proposed development may cause both damage to the infrastructure through acidic defecation by certain species but also draw birds closer to infrastructure and cause significant direct mortality risks.	Status	Negative	Moderate (3)	- Essentially, all habitat attractants should be eliminated so that avifaunal populations will not embed themselves within the infrastructure over time. This includes bird diverters and perch deterrents on <u>relevant</u> new infrastructure proposed for the Biesjesvlei projects. - In the event of increased rodent activity, non-harmful pest control measures should be applied to control population numbers and limit the attractiveness of the project area for foraging.	Low (4)	Moderate
	Spatial Extent	Regional				
	Duration	Long Term				
	Consequence	Substantial				
	Probability	Unlikely				
	Reversibility	Moderate				
	Irreplaceability	Low				
Chemical pollution spills	Status	Negative	Low (4)	Application of strict chemical control procedures as per the recommendations provided in the Environmental Management Programme (EMPr). Zero spills should be targeted and full clean-up kits available in the event of any chemical spill. Soil testing, in the event of spillages, subject to EMPr.	Low (4)	High
	Spatial Extent	Regional				
	Duration	Permanent				
	Consequence	Moderate				
	Probability	Unlikely				
	Reversibility	Low				

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation)	Potential mitigation measures	Significance / Ranking (Post-Mitigation)	Confidence Level
	Irreplaceability	Low				
DECOMMISSIONING PHASE						
Disturbance of foraging and breeding behaviours of birds due to noise, dust and lighting. Sensory disturbances to avifauna are inevitable during the decommissioning phase. Although dust, noise and human activity is unavoidable, much can be done to reduce the effect of these sensory disturbance impacts on avifauna.	Status	Negative	Moderate (3)	- Adopt temporal avoidance strategies to prevent executing the most intensive activities generating noise and dust during the most sensitive period between December to January when it is the most likely time that waterbirds will be attracted to the site due to the presence of water. Therefore, <u>intensive activities should be scheduled as far as practically possible between February-November</u> (latest). Note that light activities such as normal vehicle use of the roads are not affected by this mitigation measure and these may proceed year-round. - Minimise light pollution. - Enforce a speed limit of 40 km/h on site. - If necessary, apply dust-suppression measures (road wetting) to limit dust.	Low (4)	High
	Spatial Extent	Regional				
	Duration	Short Term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				

Table 9.2: Assessment of the potential Avifauna risks and impacts of Project 7 (Biesjesvlei EGI 1).

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures / enhancement measures	Significance / Ranking (Post-Mitigation / Enhancement)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Disturbance of foraging and breeding behaviours of birds due to noise, dust and lighting. Sensory disturbances to avifauna are inevitable during the construction phase. Although dust, noise and human activity during construction is unavoidable, much can be done to reduce the effect of these sensory disturbance impacts on avifauna.	Status	Negative	Moderate (3)	- Adopt temporal avoidance strategies to prevent executing the most intensive activities generating noise and dust during the most sensitive period between December to January when it is the most likely time that waterbirds will be attracted to the site due to the presence of water. Therefore, <u>intensive activities should be scheduled as far as practically possible between February-November</u> (latest). Note that light activities such as normal vehicle use of the roads are not affected by this mitigation measure and these may proceed year-round. - Minimise light pollution and fit external lighting with downward facing hoods. - Enforce a speed limit of 40 km/h on site. - If necessary, apply dust-suppression measures (road wetting) to limit dust.	Low (4)	High
	Spatial Extent	Regional				
	Duration	Permanent				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				
Loss of habitat due to clearing, trenching, alteration and exclusion from previously accessible habitats. Clearing of natural vegetation for the construction of the EGI will result in the loss, degradation and fragmentation of foraging	Status	Negative	High (2)	- Limit the areas cleared for construction purposes (e.g. laydown areas). - Do not implement a bare earth policy for construction of road servitudes. - Rehabilitate all areas disturbed immediately after construction. - Prioritise existing roads for access routes, where possible. - Implement an Alien and Invasive Plant Control Plan. - All staff must undergo a strict induction process to inform them of the importance of preventing fires.	Low (4)	High
	Spatial Extent	Local				
	Duration	Permanent				
	Consequence	Severe				
	Probability	Very likely				
	Reversibility	Low				
	Irreplaceability	Low				

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures / enhancement measures	Significance / Ranking (Post-Mitigation / Enhancement)	Confidence Level
and breeding habitat for avifauna.						
OPERATIONAL PHASE						
Continued disturbance due to operational activities (use of vehicles, lights, etc.) Sensory disturbances to avifauna will still occur during the operation phase as described for the construction phase but is expected to be much reduced, intermittent and of lower intensity.	Status	Negative	Low (4)	- Minimise light pollution and fit external lighting with downward-facing hoods. - Enforce a speed limit of 40 km/h on site. - If necessary, apply dust-suppression measures (road wetting) to limit dust.	Low (4)	High
	Spatial Extent	Regional				
	Duration	Short Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				
Loss of habitat due to altered and excluded habitats and threat of fire. Cleared natural vegetation replaced with infrastructure (i.e. EGI and substations) will result in the continued loss, degradation and fragmentation of foraging and breeding habitat for avifauna.	Status	Negative	High (4)	- Limit the areas cleared for maintenance purposes. - Implement an Alien and Invasive Plant Control Plan. - All staff must undergo a strict induction process to inform them of the importance of preventing fires.	Moderate (3)	High
	Spatial Extent	Regional				
	Duration	Permanent				
	Consequence	Severe				
	Probability	Very likely				
	Reversibility	Low				
	Irreplaceability	Low				
Direct mortality from electrocution and collision with	Status	Negative	High (2)	For power lines, attempts should be made to minimise the route length to the closest existing substation and that the route should be aligned with existing power lines/roads as far as possible.	Moderate (3)	High
	Spatial Extent	Regional				
	Duration	Medium Term				

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures / enhancement measures	Significance / Ranking (Post-Mitigation / Enhancement)	Confidence Level
infrastructure (e.g. fences, overhead power lines, etc.) Mortality from collision and electrocution is a potential impact to avifauna from overhead power lines. This risk is likely to be highest in close proximity to areas of high habitat complexity and resource availability where bird abundances are higher (e.g. pans). In addition, vehicle-induced collisions (direct collisions with vehicles or vehicle-induced flushes into fence infrastructure) can pose significant direct mortality risk, especially to large ground-dwelling species. In addition, electrocution of birds within the substations/switching stations is also possible.	Consequence	Severe		- Additionally, the route should avoid wetland crossings or potentially be routed underground if this is not possible utilising strict wetland rehabilitation measures captured in the Section 7.6.2.1 of this Avifauna Specialist Assessment. - In all new raised power line crossings developed for the Biesjesvlei projects, install bird flight diverters to enhance visibility of lines. Install Eskom-approved bird flight diverters (flappers or coils) on new above-ground transmission lines and on any new guide-wires used to anchor infrastructure such as pylons, and/or new monopoles developed for the Biesjesvlei projects. This can help to increase the visibility of transmission lines and other infrastructure, especially the thinner earth line with which most collisions tend to be associated. - Design of new overhead electrical lines developed for the Biesjesvlei projects must take into account potential for electrocution by large species and pre-emptively avoid the likelihood of this by increasing distances between spans to avoid faecal "streamers" or large open wings creating a short. - Avoid siting lines in areas where birds concentrate. - Where possible, power lines of 132 kV or less should be buried underground. However, if mitigated as per this Avifauna EIA Report, above ground lines are not considered a fatal flaw. - In order to reduce avian mortalities related to bird collisions or nests, perch guards should be installed on all new power line infrastructure developed for the Biesjesvlei projects (such as poles and platforms). - In all areas where the service road intersects with semi-natural or natural habitat, all new fences that are constructed (if any) must be set back at least (strictly) 75 m from the edge of every service road in order to allow for vulnerable species such as coursers, cranes and korhaans to obtain adequate height after being flushed by vehicle traffic. An alternative mitigation measure and where a		
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Moderate				

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures / enhancement measures	Significance / Ranking (Post-Mitigation / Enhancement)	Confidence Level
				75 m buffer is not possible, new fences must be set back preferably 2 m and no more than 5 m (directly adjacent) from the edge of service roads (Figure 9-1 above). Through the essential elimination of habitat, this will limit any chance of vulnerable species foraging on verge side vegetation and causing subsequent fence collisions. Speed limit enforcement must be implemented in conjunction with this. - Light reflecting markers / bird flight diverters are a requirement to avoid collision by nocturnal species. Such markers / diverters need to be closely spaced (<15 m) on new overhead power lines and must glow in the dark or reflect light to make the transmission lines more visible at night. - No water sources, such as concrete reservoirs or animal water troughs, should be located directly under any new proposed power line infrastructure for the Biesjesvlei projects. Any existing concrete reservoirs should either be covered or fitted with a mechanism to allow birds to escape if they become trapped in low-water scenarios.		
Attraction to the facility exacerbating potential impacts. Certain (mainly commensal species) are often attracted by the establishment of EGI as it presents additional resources in the form of perches, nesting habitat, foraging, shade and often food availability (increased rodents and	Status	Negative	Moderate (3)	- Install bird deterrent devices on proposed transmission line poles, pylons and / or monopoles developed for the Biesjesvlei projects to limit perching and minimise collision and electrocution risk. - Light reflecting markers / bird flight diverters are a requirement to avoid collision by nocturnal species. Such markers / diverters need to be closely spaced (<15 m) on new overhead power lines and must glow in the dark or reflect light to make the transmission lines more visible at night. - No water sources, such as concrete reservoirs or animal water troughs, should be located directly under any new proposed power line infrastructure for the Biesjesvlei projects. Any existing concrete reservoirs should either be covered or fitted with a mechanism to allow birds to escape if they become trapped in low-water scenarios.	Low (4)	Moderate
	Spatial Extent	Regional				
	Duration	Long Term				
	Consequence	Substantial				
	Probability	Unlikely				
	Reversibility	Moderate				
	Irreplaceability	Low				

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures / enhancement measures	Significance / Ranking (Post-Mitigation / Enhancement)	Confidence Level
weedy annual plants). This artificial increase in the abundance of some species has the effect of augmentation of the natural abundance and species composition of birds but more importantly places these opportunistic species and their predators at risk of collision and electrocution.						
DECOMMISSIONING PHASE						
Continued disturbance due to decommissioning activities (use of vehicles, lights etc.) Sensory disturbances to avifauna will still occur during the decommissioning phase as described for the construction phase but is expected to be of lower intensity.	Status	Negative	Low (4)	- Adopt temporal avoidance strategies to prevent executing the most intensive activities generating noise and dust during the most sensitive period between December to January when it is the most likely time that waterbirds will be attracted to the site due to the presence of water. Therefore, <u>intensive activities should be scheduled as far as practically possible between February-November (latest)</u>. Note that light activities such as normal vehicle use of the roads are not affected by this mitigation measure and these may proceed year-round. - Minimise light pollution and fit external lighting with downward-facing hoods. - Enforce a speed limit of 40 km/h on site. - If necessary, apply dust-suppression measures (road wetting) to limit dust.	Low (4)	High
	Spatial Extent	Regional				
	Duration	Short Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				
Habitat loss reclamation from rehabilitation activities	Status	Positive	Low (4)	- Remove all infrastructure (mainly pylons) not originally present prior to the construction phase. - Rehabilitate all areas disturbed immediately after decommissioning activities and removal of infrastructure.	Moderate (3)	High
	Spatial Extent	Local				
	Duration	Permanent				
	Consequence	Moderate				

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures / enhancement measures	Significance / Ranking (Post-Mitigation / Enhancement)	Confidence Level
After removal of the EGI and the implementation of appropriate rehabilitation measures, the recovery of habitat and subsequently also the natural avifauna assemblages are expected to occur. However, this requires careful management to ensure success.	Probability	Likely		Continue to implement an Alien and Invasive Plant Control Plan until the rehabilitation specialist deems it unnecessary.		
	Reversibility	Low				
	Irreplaceability	Low				
Removal of power lines to promote safe passage (lowering collision risk) through the site and avoiding attraction by birds perching and nesting.	Status	Positive	Moderate (3)	- By removing the overhead electrical lines, the potential for electrocution by large species is no longer applicable. - Removal of nests during decommissioning should not be a problem should the appropriate perch guards be installed during the construction period on all power line infrastructure developed for the Biesjesvlei projects (such as poles and platforms).	High (2)	High
	Spatial Extent	Local				
	Duration	Permanent				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				

Table 9.4: Assessment of the potential Avifauna cumulative risks and impacts of the proposed projects.

Impact	Impact Criteria		Significance / Ranking (Pre-mitigation)	Potential mitigation measures	Significance Ranking (Post-mitigation)	Confidence Level
CUMULATIVE IMPACTS						
Habitat loss	Status	Negative	High (2)	▪ Construction and Operation Phases: Not able to be mitigated quantitatively within the project footprint/EIA. With regional application of mitigation measures (such as retrofitting and the application of diverters to lines within the PAOI, the Cumulative	Moderate (3)	Medium
	Spatial Extent	Local				
	Duration	Permanent				
	Consequence	Severe				

Impact	Impact Criteria		Significance / Ranking (Pre-mitigation)	Potential mitigation measures	Significance Ranking (Post-mitigation)	Confidence Level
Regional saturation of renewable energy facilities causing habitat loss.	Probability	Very likely		Impacts can be reduced to Low Significance). Retrofitting will only be applicable if mortality thresholds are breached as indicated during the Environmental Monitoring Program (EMP) where final implementation and locations of interventions will be identified.		
	Reversibility	Low				
	Irreplaceability	Low				
Collision mortality (power lines) Increased mortality due to higher regional densities of power lines.	Status	Negative	High (2)	Operation Phase: Application (retrofit) of bird diverters and flappers to specified existing power line infrastructure as well as perch deterrents. This will only be implemented if mortalities during operation phase reach an unacceptable monitoring threshold (number of mortalities per year) as indicated during the Environmental Monitoring Program (EMP) and as a cumulative result of new and existing powerlines causing mortalities. Thus, the specific location of retrofitting is currently unknown within the PAOI.	Low (4)	High
	Spatial Extent	Regional				
	Duration	Long Term				
	Consequence	Severe				
	Probability	Very Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				

9.10 Findings and Conclusion of the Avifauna Impact Assessment

The findings and conclusion below equally apply to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1), and Project 7 (Biesjesvlei EGI 1), unless where mentioned otherwise.

The study area is located in the Aliwal North Dry Grassland (Gh2) vegetation type and is anticipated to support breeding populations of several large terrestrial bird species such as Red-Listed cranes, bustards, korhaans and large raptor species in sufficiently large densities or within breeding habitat that may be considered highly significant.

The Avifauna Impact Assessment indicated that the wet season results were highly significant given the density increase in observed avifauna which was representative of an abundance of food and breeding resources. However, even in optimal conditions, the diversity of priority species was medium, and the abundance of priority species and SCC was high. In addition, a total of 60 priority species were recorded within and around the study area, although only 8 Red-Listed species have been identified within the project footprint and most will be regular foraging and breeding residents. However, it is important to note that some of the priority bird species are not habitat-bound to the area for nesting and/or foraging purposes.

The Avifauna Specialist concluded that some significant major negative impacts to avifauna SCC are expected from the proposed development. However, these negative impacts fall within acceptable levels, provided that the proposed mitigation measures described in the Avifauna Impact Assessment are applied. The proposed projects are likely to represent an acceptable risk to avifauna (post-mitigation).

Based on the outcomes of the Avifauna Impact Assessment, it is the opinion of the specialist that the Competent Authority should grant EA for this proposed development on condition that all mitigation measures stipulated in the Avifauna Specialist Study are adhered to; and that all monitoring and mitigation are applied as captured in the Environmental Management Plan (EMP) included in the Avifauna Specialist Study (Appendix E.4 of this EIA Report).

During the respective 30-day comment periods on the Draft Scoping Report and Draft EIA Report, comments relating to avifauna were mainly raised by VulPro. These comments were taken into consideration by the Avifauna Specialist during the EIA Phase and responded to accordingly. The EMPs have also been updated to include a specific recommendation regarding avoiding the placement of water sources, such as concrete reservoirs or animal water troughs, directly under any new proposed power line infrastructure for the Biesjesvlei projects.

Refer to Appendix E.4 of the EIA Report for additional information including *inter alia* a detailed Site Sensitivity Verification inclusive of maps from the Screening Tool and site specific maps generated by the specialist, an assessment of the impacts, a list of key issues and impacts from an avifauna perspective, a list of potential mitigation measures and recommendations for inclusion in the EMPs, as well as a list of the EA condition recommendations as recommended by the specialist.



CHAPTER 10: Visual

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10. VISUAL

10.1 Introduction

This chapter provides a brief summary of the Visual Impact Assessment for the Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of the Biesjesvlei Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Facility, and their associated Electricity Grid Infrastructure (EGI), near Smithfield in the Free State Province. **Refer to the full Visual Impact Assessment which is included in Appendix E.5 of this EIA Report for additional information.**

This chapter specifically deals with the **Biesjesvlei PV1 (Project 1), the Biesjesvlei BESS 1 (Project 4) and the Biesjesvlei EGI 1 (Project 7)** (hereinafter referred to as the “proposed projects”).

The information presented throughout this chapter applies equally to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1), unless where mentioned otherwise.

10.2 Need for the Visual Impact Assessment

Government Gazette 43110, Government Notice (GN) R320 published by the then Department of Environment, Forestry and Fisheries (DEFF) on 20 March 2020, includes a general protocol (i.e., Part A of GN R320) that provides the requirements for the Site Sensitivity Verification and minimum report content requirements where a specialist assessment is required but no specific environmental theme protocol has been prescribed. The protocol states “*where a specialist assessment is required and no specific environmental theme protocol has been prescribed, the required level of assessment must be based on the findings of the site sensitivity verification and must comply with Appendix 6 of the EIA Regulations.*” This is applicable where the National Web-based Environmental Screening Tool (Screening Tool) includes the maps of the relevant themes to verify. Since Visual was identified as a relevant theme and recommended study in the Screening Tool Report, GN R320 must be complied with.

It is important to note that the Screening Tool does not require a Visual Impact Assessment (VIA) for substation development; however, to ensure that all potential impacts are addressed, the VIA has covered all proposed projects. In addition, the Visual Landscape Theme on the Screening Tool is only available for Solar PV development and thus it is only applicable to Biesjesvlei PV1 (Project 1). However, detailed visual sensitivity mapping (at the project scale) was undertaken by the specialists for all proposed projects and have been reported on in Chapter 3 of this EIA Report, as well as in the detailed VIA included in Appendix E.5 of this EIA Report.

Furthermore, there is no dedicated assessment protocol prescribed for VIAs. A VIA in terms of Appendix 6 of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (as amended) was therefore undertaken for the proposed projects.

10.3 Scope of the Visual Impact Assessment

A Visual Site Sensitivity Verification was undertaken in order to confirm the current use of the land and environmental sensitivity from a visual perspective of the proposed project area as identified by the Screening Tool. A VIA was undertaken in order to assess the potential visual impacts associated with the proposed projects. Refer to Section 10.5 below for the Terms of Reference that was provided to the specialists.

10.4 Details of the Specialists

The VIA was undertaken by Bernard Oberholzer (BOLA) and Quinton Lawson (QARC). Bernard Oberholzer is a Landscape Architect, who is registered with the South African Council for the Landscape Architecture Profession (SACLAP), Registration 87018. Quinton Lawson is an Architect, who is registered with the South African Council for the Architecture Profession (SACAP), Registration 3686.

10.5 Terms of Reference for the Visual Impact Assessment

The VIA was completed based on the following Terms of Reference:

- Compile a VIA Report in compliance with Part A of the Assessment Protocols (GN 320, March 2020) and Appendix 6 of the 2014 NEMA EIA Regulations (as amended), as well as any other additional relevant legislation and guidelines that may be deemed necessary, if applicable;
- Determination, description and mapping of the baseline environmental condition and sensitivity of the study area. Specify set-backs or buffers, and provide clear reasons for these recommendations;
- Provide a description of the visual character and visual absorption capacity of the local area. Identify and map any significant visual features or visual disturbances, as well as any sensitive visual receptors within the study area or within viewsheds of the proposed projects;
- Assessment of the preferred project layout following the Site Sensitivity Verification and layout identification;
- Calculate, define and present the viewshed for various elements of the proposed development, and highlight the varying sensitivities of these viewsheds. Provide maps depicting viewsheds or line of sight across the sites. These maps are to indicate current viewsheds/visual landscape/obstructions, as well as expected visual impacts during the construction, operational and decommissioning phases of the proposed projects, as relevant;
- Map the visual sensitivity of the site taking into consideration visual receptors outside the site, and sensitivity to development on the site for potentially affected visual receptors of “very high” sensitivity;
- Provide review input on the preferred infrastructure layout following the sensitivity analysis and layout identification;
- Identify and assess the potential direct, indirect and cumulative impacts of the construction, operational and decommissioning phases of the proposed development on the receiving environment from a visual perspective using the prescribed impact assessment methodology captured in Chapter 4 of the EIA Report. For cumulative impacts, consider other specified

renewable energy and EGI projects within 30 km of the proposed projects. Rate impacts both without and with the implementation of mitigation or enhancement measures;

- Provide a reasoned opinion indicating the acceptability of the proposed development and a recommendation if the development should go ahead or not;
- Provide a description of assumptions and limitations in the report;
- Include a section indicating how the Screening Tool was interrogated and whether classification of the site is accurate or not. If not, motivate why the classification is not accurate;
- Identify any additional protocols, licensing and/or permitting requirements that are relevant to the projects and the implications thereof;
- Provide a Specialist Declaration of Independence and Curriculum Vitae;
- Provide recommendations with regards to potential monitoring programmes
- Determine mitigation and/or management measures for inclusion in the Environmental Management Programmes (EMPrs), which could be implemented to, as far as possible, reduce the effect of negative impacts and enhance the effect of positive impacts. Identify best practice management actions, monitoring requirements, and rehabilitation guidelines for all identified impacts, where relevant.
- Incorporate and address relevant comments and concerns raised by the stakeholders, commenting authorities and Interested and Affected Parties (I&APs) prior to submitting the Final EIA Report to the Competent Authority for decision-making; and
- Review the Generic EMPrs for Substations and Power Lines (GN R435) and confirm if there are any specific environmental sensitivities or attributes present on the project site and any resultant site-specific impact management outcomes and actions that are not included in the pre-approved generic EMPrs (Part B – Section 1).

10.6 Study Methodology

A full description of the process undertaken for the VIA and to identify potential impacts associated with the proposed projects are captured in Appendix E.5 of this EIA Report. The impact assessment methodology is also described in detail in Chapter 4 of this EIA Report.

10.7 Assumptions, Uncertainties and Gaps in Knowledge

The VIA included the following assumptions, uncertainties and knowledge gaps:

- The detailed design of the solar arrays that may be used have not been determined at this stage, but a maximum height of 10 m was used to prepare the viewshed map.
- Assumptions were made regarding the configuration and finishes of the proposed substations and BESS, as well as lighting related to the proposed projects.

10.8 Key Issues

Potential visual impacts arising from the proposed projects are listed below for each of the projects and each phase, including cumulative impacts. No indirect impacts have been identified.

10.8.1 Biesjesvlei PV1

Construction Phase:

- Impact 1: Potential effect of dust and noise from trucks and construction machinery during the construction period, and the effect of this on nearby farmsteads and visitors to the area.
- Impact 2: Potential visual effect of haul roads, access roads, stockpiles and construction camps¹ in the visually exposed landscape.

Operational Phase:

- Impact 1: Potential visual intrusion of solar arrays and related infrastructure on receptors including glint and glare.
- Impact 2: Potential visual impact of an industrial type of activity on the pastoral / rural character and sense of place of the area.

Decommissioning Phase:

- Impact 1: Potential visual effect of any remaining structures, platforms and disused roads on the landscape.

10.8.2 Biesjesvlei BESS 1

Construction Phase:

- Impact 1: Potential effect of dust and noise from trucks and construction machinery during the construction period, and the effect of this on nearby farmsteads and visitors to the area.
- Impact 2: Potential visual effect of haul roads, access roads, stockpiles and construction camps in the visually exposed landscape.

Operational Phase:

- Impact 1: Potential visual intrusion of the BESS and related infrastructure on receptors.
- Impact 2: Potential visual impact of an industrial type of activity on the pastoral / rural character and sense of place of the area.

Decommissioning Phase:

- Impact 1: Potential visual effect of any remaining structures, platforms and disused roads on the landscape.

¹ Note that no staff accommodation will be provided on site. Staff will be transported to and from site daily. The term construction camp refers to the contractor's site office and centralised facilities.

10.8.3 Biesjesvlei EGI 1

Construction Phase

- Impact 1: Potential effect of dust and noise from trucks and construction machinery during the construction period, and the effect of this on nearby farmsteads and visitors to the area.
- Impact 2: Potential visual effect of haul roads, access roads, stockpiles and construction camps in the visually exposed landscape.

Operational Phase

- Impact 1: Potential visual intrusion of the switching station and power line and related infrastructure on receptors.
- Impact 2: Potential visual impact of an industrial type of activity on the pastoral / rural character and sense of place of the area.

Decommissioning Phase

- Impact 1: Potential visual effect of any remaining structures, platforms and disused roads on the landscape.

10.8.4 Cumulative Impacts

- Impact 1: Potential combined visual effect of the proposed three Biesjesvlei Solar PV facilities, three Biesjesvlei BESS, three Biesjesvlei power lines and EGI, and Biesjesvlei MTS and LILO in the study area, and other developments in the 30 km radius (i.e. existing and proposed Eskom power lines and the proposed fibre optic cable) seen together during the construction, operational and decommissioning phases. No known other existing and proposed renewable energy facilities occur in the general area. Others are so far away as to have no combined visual significance.

10.9 Key Impacts

The impacts and mitigation measures are described in this section. These impacts and mitigation measures have also been fully incorporated into the EMPs, which are included as relevant appendices to this EIA Report. Each project has different potential impact ratings, hence separate impact tables have been provided for each project in this section.

Table 10.1 provides potential impacts for **Project 1 (Biesjesvlei PV1)**.

Table 10.2 provides potential impacts for **Project 4 (Biesjesvlei BESS 1)**.

Table 10.3 provides potential impacts for **Project 7 (Biesjesvlei EGI 1)**.

Table 10.4 provides potential cumulative impacts.

Table 10.1: Assessment of the potential Visual risks and impacts of the Project 1 (Biesjesvlei PV1).

Impact	Impact Criteria		Significance / Ranking (Pre-mitigation)	Potential mitigation measures	Significance Ranking (Post-mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Potential effect of dust and noise from trucks and construction machinery during the construction period, and the effect of this on nearby farmsteads and visitors to the area.	Status	Negative	Low (4)	- Locate construction camps, batching plants, and stockpiles in visually unobtrusive areas, away from public roads. - Implement the Environmental Management Programme (EMPr) with the Environmental Control Officer (ECO) during construction.	Low (4)	High
	Spatial Extent	Local				
	Duration	Short Term				
	Consequence	Moderate				
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				
Potential visual effect of haul roads, access roads, stockpiles and construction camps in the visually exposed landscape.	Status	Negative	Low (4)	The mitigation measures recommended are as per the above.	Low (4)	High
	Spatial Extent	Local				
	Duration	Short Term				
	Consequence	Moderate				
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				
OPERATIONAL PHASE						
Potential visual intrusion of solar arrays and related infrastructure on receptors, including glint and glare.	Status	Negative	Low (4)	- Substation to be located in an unobtrusive low-lying area, away from public roads, where possible. - Muted natural colours and non-reflective finishes to be used for structures generally. - Internal access roads to be as narrow as possible, and existing roads or tracks used as far as possible. - Outdoor/ security lighting to be fitted with reflectors to obscure the light source, and to minimise light spillage. - Internal power lines (33 kV) to be located underground where possible. (In some cases, such as stream crossings, internal power lines may need to be above ground).	Low (4)	High
	Spatial Extent	Local				
	Duration	Long Term				
	Consequence	Moderate				
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				

Impact	Impact Criteria		Significance / Ranking (Pre-mitigation)	Potential mitigation measures	Significance Ranking (Post-mitigation)	Confidence Level
				Outdoor signage to be discrete and commercial / billboard signage avoided.		
Potential visual impact of an industrial type of activity on the pastoral / rural character and sense of place of the area.	Status	Negative	Low (4)	The mitigation measures recommended are as per the above.	Low (4)	High
	Spatial Extent	Local				
	Duration	Long Term				
	Consequence	Moderate				
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				
DECOMMISSIONING PHASE						
Potential visual effect of any remaining structures, platforms and disused roads on the landscape.	Status	Negative	Low (4)	- Solar arrays and infrastructure to be removed and recycled. - Access roads no longer required to be ripped and regraded. - Exposed or disturbed areas to be revegetated to blend with the surroundings.	Very Low (5)	High
	Spatial Extent	Local				
	Duration	Short Term				
	Consequence	Moderate				
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				

Table 10.2: Assessment of the potential Visual risks and impacts of the Project 4 (Biesjesvlei BESS 1).

Impact	Impact Criteria		Significance / Ranking (Pre-mitigation)	Potential mitigation measures	Significance Ranking (Post-mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Potential effect of dust and noise from trucks and construction machinery during the construction	Status	Negative	Low (4)	- Locate construction camps and stockpiles in visually unobtrusive areas, away from public roads. - Implement EMPr with ECO during construction.	Low (4)	High
	Spatial Extent	Local				
	Duration	Short Term				
	Consequence	Moderate				

Impact	Impact Criteria		Significance / Ranking (Pre-mitigation)	Potential mitigation measures	Significance Ranking (Post-mitigation)	Confidence Level
period, and the effect of this on nearby farmsteads and visitors to the area.	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				
Potential visual effect of haul roads, access roads, stockpiles and construction camps in the visually exposed landscape.	Status	Negative	Low (4)	▪ The mitigation measures recommended are as per the above.	Low (4)	High
	Spatial Extent	Local				
	Duration	Short Term				
	Consequence	Moderate				
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				
	OPERATIONAL PHASE					
Potential visual intrusion of the BESS and related infrastructure on receptors.	Status	Negative	Low (4)	▪ BESS to be located in an unobtrusive low-lying area, away from public roads, where possible. ▪ Muted natural colours and non-reflective finishes to be used for structures generally. ▪ Access roads and internal roads to be as narrow as possible, and existing roads or tracks used as far as possible. ▪ Outdoor/security lighting to be fitted with reflectors to obscure the light source, and to minimise light spillage. ▪ Outdoor signage to be discrete and commercial/billboard signage avoided.	Low (4)	High
	Spatial Extent	Local				
	Duration	Long Term				
	Consequence	Moderate				
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				
Potential visual impact of an industrial type of activity on the pastoral / rural character and sense of place of the area.	Status	Negative	Low (4)	▪ The mitigation measures recommended are as per the above.	Low (4)	High
	Spatial Extent	Local				
	Duration	Long Term				
	Consequence	Moderate				
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				
DECOMMISSIONING PHASE						
Potential visual effect of any remaining structures,	Status	Negative	Low (4)	▪ BESS facilities to be removed and/or recycled. ▪ Access roads no longer required to be ripped and regraded.	Very Low (5)	High
	Spatial Extent	Local				
	Duration	Short Term				

Impact	Impact Criteria		Significance / Ranking (Pre-mitigation)	Potential mitigation measures	Significance Ranking (Post-mitigation)	Confidence Level
platforms and disused roads on the landscape.	Consequence	Moderate		Exposed or disturbed areas to be revegetated to blend with the surroundings.		
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				

Table 10.2: Assessment of the potential Visual risks and impacts of the Project 7 (Biesjesvlei EGI 1).

Impact	Impact Criteria		Significance / Ranking (Pre-mitigation)	Potential mitigation measures	Significance Ranking (Post-mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Potential effect of dust and noise from trucks and construction machinery during the construction period, and the effect of this on nearby farmsteads and visitors to the area.	Status	Negative	Low (4)	- Locate construction camps and stockpiles in visually unobtrusive areas, away from public roads. - Implement EMPr with ECO during construction.	Low (4)	High
	Spatial Extent	Local				
	Duration	Short Term				
	Consequence	Moderate				
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				
Potential visual effect of haul roads, access roads, stockpiles and construction camps in the visually exposed landscape.	Status	Negative	Low (4)	The mitigation measures recommended are as per the above.	Low (4)	High
	Spatial Extent	Local				
	Duration	Short Term				
	Consequence	Moderate				
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				
OPERATIONAL PHASE						
Potential visual intrusion of the switching station	Status	Negative	Low (4)	EGI to be located along unobtrusive corridors away from public roads and farmsteads as far as practically possible.	Low (4)	High
	Spatial Extent	Local				

Impact	Impact Criteria		Significance / Ranking (Pre-mitigation)	Potential mitigation measures	Significance Ranking (Post-mitigation)	Confidence Level
and power line and related infrastructure on receptors.	Duration	Long Term		- Access or service roads to be as narrow as possible, and existing roads or tracks used as far as possible. - Use monopoles in preference to lattice pylons, where possible. - Outdoor/security lighting to be fitted with reflectors to obscure the light source, and to minimise light spillage.		
	Consequence	Moderate				
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				
Potential visual impact of an industrial type of activity on the pastoral / rural character and sense of place of the area.	Status	Negative	Low (4)	The mitigation measures recommended are as per the above.	Low (4)	High
	Spatial Extent	Local				
	Duration	Long Term				
	Consequence	Moderate				
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				
DECOMMISSIONING PHASE						
Potential visual effect of any remaining structures, platforms and disused roads on the landscape.	Status	Negative	Low (4)	- EGI facilities to be removed and/or recycled. - Access roads no longer required to be ripped and regraded. - Exposed or disturbed areas to be revegetated to blend with the surroundings.	Very Low (5)	High
	Spatial Extent	Local				
	Duration	Short Term				
	Consequence	Moderate				
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				

Table 10.4: Assessment of the potential Visual cumulative risks and impacts of the proposed projects.

Impact	Impact Criteria		Significance / Ranking (Pre-mitigation)	Potential mitigation measures	Significance Ranking (Post-mitigation)	Confidence Level
CUMULATIVE IMPACTS						
CONSTRUCTION PHASE						
Potential combined visual effect of the proposed three Biesjesvlei Solar PV facilities; three Biesjesvlei BESS; three Biesjesvlei power lines and EGI; Biesjesvlei MTS and LILO, and other developments in the 30 km radius (i.e. existing and proposed Eskom power lines and the proposed fibre optic cable) seen together during the construction phase.	Status	Negative	Low (4)	▪ The mitigation measures recommended are as per those for the construction phase in Table 10.1, Table 10.2 and Table 10.3.	Low (4)	High
	Spatial Extent	Local				
	Duration	Short Term				
	Consequence	Moderate				
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				
OPERATIONAL PHASE						
Potential combined visual effect of the proposed three Biesjesvlei Solar PV facilities; three Biesjesvlei BESS; three Biesjesvlei power lines and EGI; Biesjesvlei MTS and LILO, and other developments in the 30 km radius (i.e. existing and proposed Eskom power lines and the proposed fibre optic cable)	Status	Negative	Moderate (3)	▪ The mitigation measures recommended are as per those for the operational phase in Table 10.1, Table 10.2 and Table 10.3.	Moderate (3)	High
	Spatial Extent	Local				
	Duration	Long Term				
	Consequence	Substantial				
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				

Impact	Impact Criteria		Significance / Ranking (Pre-mitigation)	Potential mitigation measures	Significance Ranking (Post-mitigation)	Confidence Level
seen together during the operational phase.						
DECOMMISSIONING PHASE						
Potential combined visual effect of the proposed three Biesjesvlei Solar PV facilities; three Biesjesvlei BESS; three Biesjesvlei power lines and EGI; Biesjesvlei MTS and LILO, and other developments in the 30 km radius (i.e. existing and proposed Eskom power lines and the proposed fibre optic cable) seen together during the decommissioning phase.	Status	Negative	Low (4)	The mitigation measures recommended are as per those for the decommissioning phase in Table 10.1, Table 10.2 and Table 10.3.	Very Low (5)	High
	Spatial Extent	Local				
	Duration	Short Term				
	Consequence	Moderate				
	Probability	Very Likely				
	Reversibility	High				
	Irreplaceability	Low				

10.10 Findings and Conclusion of the Visual Impact Assessment

The findings and conclusion below equally apply to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1), and Project 7 (Biesjesvlei EGI 1), unless where mentioned otherwise.

Overall, the 3 060 ha study area was confirmed to be low to medium sensitivity, with some minor areas of high sensitivity along the periphery of the study area, associated with the district road in the north and koppie in the south, as well as minor areas of very high sensitivity associated with the Skulpspruit River along the east of the study area. The Salpetersvlei farmstead (including its very high and high sensitivity buffers) lies within the study area.

The area selected for the proposed projects and associated infrastructure is generally featureless, with the dolerite koppies having been avoided. Several of the nearby farmsteads are associated with the projects (i.e. they belong to owners who have formed part of the proposed projects (i.e. affected landowners of the proposed projects)), therefore implying that these receptors are not considered visually sensitive, and the remaining farmsteads are mostly more than 2 km away. Furthermore, there are no known formally protected areas, nature reserves, game farms or tourist/visitor accommodation within 5 km of the proposed projects. In addition, due to the industrial nature of the proposed projects and their associated infrastructure, some change to the rural character and sense of place of the local area is anticipated. On the other hand, the fairly limited zone of visual influence (viewshed) and the avoidance of topographic features, means that the visual impact would be localised.

Following the VIA and based on a range of visual assessment criteria, the Visual Specialists concluded that the overall visual impact significance (post-mitigation) was considered to be low for the construction and operational phases, and very low for the decommissioning phase. However, the visual impact significance (post-mitigation) could potentially increase to moderate for the operational phase in terms of the cumulative visual impact of all three proposed Biesjesvlei solar PV facilities, three proposed Biesjesvlei BESS facilities, three proposed Biesjesvlei EGI, and the Biesjesvlei MTS and LILO, and related infrastructure, together with other EGI and communication related projects in the area, seen together.

The layout of the proposed projects has generally responded to the visual sensitivity mapping carried out at the screening stage.

Provided that the recommended mitigation measures and EMPs form part of the Environmental Authorisation (EA) and are implemented, the Visual Specialists are of the opinion that the proposed projects would not present a potential fatal flaw from a visual perspective and could be authorised. Refer to Appendix E.5 of the EIA Report for additional information including *inter alia* a detailed Site Sensitivity Verification inclusive of maps from the Screening Tool and site specific maps generated by the specialists, an assessment of the impacts, a list of key issues and impacts from a visual perspective, a list of potential mitigation measures and recommendations for inclusion in the EMPs as well as a list of the EA condition recommendations as recommended by the specialists.



CHAPTER 11:

Heritage

(Archaeology and Cultural Heritage)

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11. HERITAGE (ARCHAEOLOGY AND CULTURAL HERITAGE)

11.1 Introduction

This chapter provides a brief summary of the Heritage Impact Assessment for the Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of the Biesjesvlei Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Facility, and their associated Electricity Grid Infrastructure (EGI), near Smithfield in the Free State Province. **Refer to the full Heritage Impact Assessment (HIA) which is included in Appendix E.6 of this EIA Report for additional information.**

This chapter specifically deals with the **Biesjesvlei PV1 (Project 1), the Biesjesvlei BESS 1 (Project 4) and the Biesjesvlei EGI 1 (Project 7)** (hereinafter referred to as the “proposed projects”).

The information presented throughout this chapter applies equally to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1), unless where mentioned otherwise.

11.2 Need for the Heritage Impact Assessment

Government Gazette 43110, Government Notice (GN) R320 published by the then Department of Environment, Forestry and Fisheries (DEFF) on 20 March 2020, includes a general protocol (i.e., Part A of GN R320) that provides the requirements for the Site Sensitivity Verification and minimum report content requirements where a specialist assessment is required but no specific environmental theme protocol has been prescribed. Part A of GN R320 states that prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the study area, as identified by the National Web-based Environmental Screening Tool (Screening Tool), where determined, must be confirmed by undertaking a Site Sensitivity Verification. The protocol states “*where a specialist assessment is required and no specific environmental theme protocol has been prescribed, the required level of assessment must be based on the findings of the site sensitivity verification and must comply with Appendix 6 of the EIA Regulations.*” This is applicable where the Screening Tool includes the maps of the relevant themes to verify. Since Heritage was identified as a relevant theme and recommended study in the Screening Tool Report, GN R320 must be complied with.

Furthermore, it is important to note that there is no dedicated assessment protocol prescribed for HIAs. Therefore, an HIA was undertaken for the proposed projects in compliance with Appendix 6 of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (as amended) as well as the requirements of the National Heritage Resources Act (Act 25 of 1999).

11.3 Scope of the Heritage Impact Assessment

A Heritage Site Sensitivity Verification was undertaken in order to confirm the current use of the land and environmental sensitivity from a heritage perspective of the proposed project area as identified by the Screening Tool. The HIA was undertaken in order to identify any significant heritage resources before development begins so that these can be managed in a manner that would allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. The HIA Report aims to fulfil the requirements of the heritage authorities such that a comment can be issued by them for consideration by the Competent Authority. The HIA Report also outlines any management and/or mitigation requirements that will need to be complied with from a heritage perspective and that should be included in the conditions of the EA (should it be granted). Refer to Appendix E.6 of this EIA Report for the detailed HIA. Refer to Section 11.5 below for the Terms of Reference that was provided to the specialist.

11.4 Details of the Specialist

The HIA was undertaken by Dr Jayson Orton of ASHA Consulting (Pty) Ltd. He has an MA (UCT, 2004) and a D.Phil (Oxford, UK, 2013), both in archaeology, and has been conducting HIAs and archaeological specialist studies in South Africa (primarily in the Western Cape and Northern Cape provinces) since 2004. He has also conducted research on aspects of the Later Stone Age in these provinces and published widely on the topic. He is an accredited heritage practitioner with the Association of Professional Heritage Practitioners (APHP; Member #43) and also holds archaeological accreditation with the Association of Southern African Professional Archaeologists (ASAPA) Cultural Resources Management (CRM) section (Member #233) as follows:

- Principal Investigator: Stone Age, Shell Middens & Grave Relocation; and
- Field Director: Colonial Period & Rock Art.

11.5 Terms of Reference for the Heritage Impact Assessment

The HIA was completed based on the following Terms of Reference:

- Compile an HIA in compliance with Appendix 6 of the 2014 NEMA EIA Regulations (as amended) and Part A of the Assessment Protocols published in GN R320. The Specialist Assessment must also be in adherence to any additional relevant legislation and guidelines that may be deemed necessary, as applicable;
- Describe and assess the heritage features of the sites and surrounding area, based on desktop reviews, fieldwork, available databases and findings from other heritage studies in the area, where relevant. Make reference to the grade of heritage feature and any heritage status the feature may have been awarded (where possible);
- Specify development setbacks or buffers required, and clear motivations for these recommendations;
- Map the heritage sensitivity for the study area, clearly showing any “no-go” areas in terms of heritage (i.e. “very high” sensitivity).
- Provide review input on the preferred infrastructure layout following the sensitivity analysis and layout identification;

- Identify and assess the potential direct, indirect and cumulative impacts of the construction, operational and decommissioning phases of the proposed development on the full scope of heritage features, including archaeology and the cultural-historical landscape, as required by heritage legislation, using the prescribed impact assessment methodology captured in Chapter 4 of this EIA Report. For cumulative impacts, consider other specified renewable energy and EGI projects within 30 km of the proposed projects. Rate impacts both without and with the implementation of mitigation or enhancement measures;
- Liaise with the relevant authorities (i.e. South African Heritage Resources Agency (SAHRA)) in order to obtain a letter of approval, comments or a Permit in terms of the National Heritage Resources Act (Act 25 of 1999), including Regulations issued thereunder, as necessary. This also includes meeting the reporting requirements of SAHRA;
- Provide a reasoned opinion indicating the acceptability of the proposed development and a recommendation if the development should go ahead or not;
- Provide a description of assumptions and limitations in the report;
- Include a section indicating how the Screening Tool was interrogated and whether classification of the site is accurate or not. If not, it must be motivated why the classification is not accurate;
- Identify any additional protocols, licensing and/or permitting requirements that are relevant to the project and the implications thereof;
- Assess the project alternatives and identification of a preferred alternative with motivation for this selection;
- Provide a Specialist Declaration of Independence and Curriculum Vitae;
- Provide recommendations with regards to potential monitoring programmes;
- Determine mitigation and/or management measures for inclusion in the Environmental Management Programmes (EMPrs), which could be implemented to, as far as possible, reduce the effect of negative impacts and enhance the effect of positive impacts. Identify best practice management actions, monitoring requirements, and rehabilitation guidelines for all identified impacts, where relevant;
- Incorporate and address relevant comments and concerns raised by the stakeholders, commenting authorities and Interested and Affected Parties (I&APs) prior to submitting the Final EIA Report to the Competent Authority for decision-making; and
- Review the Generic EMPrs for Substations and Power Lines (GN R435) and confirm if there are any specific environmental sensitivities or attributes present on the project site and any resultant site-specific impact management outcomes and actions that are not included in the pre-approved generic EMPrs (Part B – Section 1).

11.6 Study Methodology

A full description of the process undertaken for the HIA and to identify potential impacts associated with the proposed projects are captured in Appendix E.6 of this EIA Report. The impact assessment methodology is also described in detail in Chapter 4 of this EIA Report.

11.7 Assumptions, Limitations and Gaps in Knowledge

The assumptions, limitations and knowledge gaps with respect to the HIA are described below.

The field study was carried out at the surface only and hence any completely buried archaeological sites would not be readily located. Similarly, it is not always possible to determine the depth of archaeological material visible at the surface. The study area was large, but the survey attempted to (1) identify all obvious heritage resources, (2) cover transects through all areas so as to enable a good understanding of the types and density of heritage resources present, and (3) determine the relationship between heritage resources and landscape features. It is assumed that the findings would be indicative of the overall pattern on the landscape. The grass cover was a significant limitation to the surveys, but denuded/eroded areas did offer opportunities to examine the substrate from time to time during the surveys. During the first site visit, large areas were flooded after a heavy thunderstorm which also restricted visibility in those areas. All areas were dry during the second site visit. Despite the limitations, there is enough information to enable a reliable impact assessment.

In addition, cumulative impacts are difficult to assess due to the variable site conditions that would have been experienced in different areas and in different seasons. Survey quality is thus likely to be variable. As such, some assumptions need to be made in terms of what and how much heritage might be impacted by other developments in the broader area.

11.8 Key Issues

Potential impacts on heritage resources arising from the proposed projects are listed below for each of the projects and each phase, including cumulative impacts. No indirect impacts have been identified.

11.8.1 Biesjesvlei PV1, Biesjesvlei BESS 1 and Biesjesvlei EGI 1

Construction Phase:

- Impact 1: Impacts to archaeological resources.
- Impact 2: Impacts to graves.
- Impact 3: Impacts to built heritage resources.
- Impact 4: Impacts to the cultural landscape.

Operational and Decommissioning Phases:

- Impact 1: Impacts to the cultural landscape.

11.8.2 Cumulative Impacts

11.8.2.1 Biesjesvlei PV1

- Impact 1: Impacts to archaeology, graves, buildings.
- Impact 2: Intrusion of facility and equipment into the landscape.

11.8.2.2 Biesjesvlei BESS 1

- Impact 1: Impacts to archaeology, graves, buildings.
- Impact 2: Intrusion of BESS and equipment into the landscape.

11.8.2.3 Biesjesvlei EGI 1

- Impact 1: Impacts to archaeology, graves, buildings.
- Impact 2: Intrusion of powerline and equipment into the landscape.

The cumulative impacts described above apply to all phases, i.e. construction, operational and decommissioning.

11.9 Key Impacts

The impacts and mitigation measures are described in this section. These impacts and mitigation measures have also been incorporated into the EMPs as relevant, which are included as relevant appendices to this EIA Report. Each project has different potential impact ratings, hence separate impact tables have been provided for each project in this section.

Table 11.1 provides potential impacts and potential cumulative impacts for **Project 1 (Biesjesvlei PV1)**.

Table 11.2 provides potential impacts and potential cumulative impacts for **Project 4 (Biesjesvlei BESS 1)**.

Table 11.3 provides potential impacts and potential cumulative impacts for **Project 7 (Biesjesvlei EGI 1)**.

Table 11.1: Assessment of the potential Heritage risks and impacts (including cumulative risks and impacts) of Project 1 (Biesjesvlei PV1).

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Damage or destruction of archaeological materials	Status	Negative	Very low (5)	- Demarcate known heritage sites within 50 m of the project footprint as No-Go areas. - Report any chance finds to SAHRA and/or an archaeologist.	Very low (5)	High
	Spatial extent	Site specific				
	Duration	Permanent				
	Consequence	Slight				
	Probability	Unlikely				
	Reversibility	Non-reversible				
	Irreplaceability	High				
Damage or destruction of graves	Status	Negative	Low (4)	- Fence known graves with a wire farm fence and gate at least 5 m from all visible graves. - Demarcate known graves within 50 m of the project footprint as No-Go areas. - Report any chance finds to SAHRA and/or an archaeologist. - Protect chance finds <i>in situ</i> and appoint an archaeologist to exhume under an approved permit.	Very low (5)	High
	Spatial extent	Local				
	Duration	Permanent				
	Consequence	Extreme				
	Probability	Very unlikely				
	Reversibility	Non-reversible				
	Irreplaceability	High				
Damage to built heritage resources	Status	Negative	Very low (5)	Demarcate buildings as no-go areas.	Very low (5)	High
	Spatial extent	Site specific				
	Duration	Permanent				
	Consequence	Substantial				
	Probability	Extremely unlikely				
	Reversibility	Non-reversible				
	Irreplaceability	High				
Intrusion of facility and equipment into the landscape	Status	Negative	Low (4)	- Minimise duration of construction period. - Minimise cut-and-fill and landscape scarring in general.	Low (4)	High
	Spatial extent	Local				
	Duration	Medium				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
	Consequence	Moderate		▪ Ensure effective rehabilitation of areas not needed during operation.		
	Probability	Very likely				
	Reversibility	Moderate				
	Irreplaceability	Moderate				
OPERATIONAL PHASE						
Intrusion of facility into the landscape	Status	Negative	Low (4)	▪ Paint buildings in earthy tones. ▪ Ensure that all maintenance vehicles stay within the authorised footprint. ▪ Make use of lighting mitigation measures such as motion sensors and downlighting.	Low (4)	High
	Spatial extent	Local				
	Duration	Long term				
	Consequence	Moderate				
	Probability	Very likely				
	Reversibility	Moderate				
	Irreplaceability	Moderate				
DECOMMISSIONING PHASE						
Intrusion of facility and equipment into the landscape	Status	Negative	Low (4)	▪ Minimise duration of decommissioning period. ▪ Ensure effective rehabilitation of all affected areas.	Low (4)	High
	Spatial extent	Local				
	Duration	Medium				
	Consequence	Moderate				
	Probability	Very likely				
	Reversibility	Moderate				
	Irreplaceability	Moderate				
CUMULATIVE IMPACTS						
Impacts to archaeology, graves, buildings	Status	Negative	Very low (5)	▪ As per measures listed above (i.e. refer to the mitigation measures noted above for the corresponding impact for the construction phase).	Very low (5)	High
	Spatial extent	Local				
	Duration	Permanent				
	Consequence	Slight				
	Probability	Unlikely				
	Reversibility	Non-reversible				
	Irreplaceability	High				
Intrusion of facility and equipment into the landscape	Status	Negative	Low (4)	▪ As per measures listed above (i.e. Refer to the mitigation measures noted above for the	Low (4)	High
	Spatial extent	Local				
	Duration	Permanent				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
	Consequence	Moderate		corresponding impacts for the construction, operational and decommissioning phases).		
	Probability	Very likely				
	Reversibility	Moderate				
	Irreplaceability	Moderate				

Table 11.2: Assessment of the potential Heritage risks and impacts (including cumulative risks and impacts) of Project 4 (Biesjesvlei BESS 1).

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Damage or destruction of archaeological materials	Status	Negative	Very low (5)	- Demarcate known heritage sites within 50 m of the project footprint as No-Go areas. - Report any chance finds to SAHRA and/or an archaeologist.	Very low (5)	High
	Spatial extent	Site specific				
	Duration	Permanent				
	Consequence	Slight				
	Probability	Unlikely				
	Reversibility	Non-reversible				
	Irreplaceability	High				
Damage or destruction of graves	Status	Negative	Low (4)	- Fence known graves with a wire farm fence at least 5 m from all visible graves. - Demarcate known graves within 50 m of the project footprint as No-Go areas. - Report any chance finds to SAHRA and/or an archaeologist. - Protect chance finds <i>in situ</i> and appoint an archaeologist to exhume under an approved permit.	Very low (5)	High
	Spatial extent	Local				
	Duration	Permanent				
	Consequence	Extreme				
	Probability	Very unlikely				
	Reversibility	Non-reversible				
	Irreplaceability	High				
Damage to built heritage resources	Status	Negative	Very low (5)	Demarcate buildings as no-go areas.	Very low (5)	High
	Spatial extent	Site specific				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
	Duration	Permanent				
	Consequence	Substantial				
	Probability	Extremely unlikely				
	Reversibility	Non-reversible				
	Irreplaceability	High				
Intrusion of BESS and equipment into the landscape	Status	Negative	Very low (5)	- Minimise duration of construction period. - Ensure effective rehabilitation of areas not needed during operation.	Very low (5)	High
	Spatial extent	Local				
	Duration	Medium				
	Consequence	Slight				
	Probability	Very likely				
	Reversibility	Moderate				
	Irreplaceability	Moderate				
OPERATIONAL PHASE						
Intrusion of BESS into the landscape	Status	Negative	Very low (5)	- Paint buildings in earthy tones (if feasible). - Ensure that all maintenance vehicles stay within the authorised footprint. - Make use of lighting mitigation measures such as motion sensors and downlighting.	Very low (5)	High
	Spatial extent	Local				
	Duration	Long term				
	Consequence	Slight				
	Probability	Very likely				
	Reversibility	Moderate				
	Irreplaceability	Moderate				
DECOMMISSIONING PHASE						
Intrusion of BESS and equipment into the landscape	Status	Negative	Very low (5)	- Minimise duration of decommissioning period. - Ensure effective rehabilitation of all affected areas.	Very low (5)	High
	Spatial extent	Local				
	Duration	Medium				
	Consequence	Slight				
	Probability	Very likely				
	Reversibility	Moderate				
	Irreplaceability	Moderate				
CUMULATIVE IMPACTS						
Impacts to archaeology, graves, buildings	Status	Negative	Very low (5)		Very low (5)	High
	Spatial extent	Local				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
	Duration	Permanent		As per measures listed above (i.e. refer to the mitigation measures noted above for the corresponding impact for the construction phase).		
	Consequence	Slight				
	Probability	Unlikely				
	Reversibility	Non-reversible				
	Irreplaceability	High				
Intrusion of BESS and equipment into the landscape	Status	Negative	Very low (5)	As per measures listed above (i.e. refer to the mitigation measures noted above for the corresponding impacts for the construction, operational and decommissioning phases).	Very low (5)	High
	Spatial extent	Local				
	Duration	Permanent				
	Consequence	Slight				
	Probability	Very likely				
	Reversibility	Moderate				
	Irreplaceability	Moderate				

Table 11.3: Assessment of the potential Heritage risks and impacts (including cumulative risks and impacts) of Project 7 (Biesjesvlei EGI 1).

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Damage or destruction of archaeological materials	Status	Negative	Very low (5)	- Demarcate known heritage sites within 50 m of the project footprint as No-Go areas. - Report any chance finds to SAHRA and/or an archaeologist.	Very low (5)	High
	Spatial extent	Site specific				
	Duration	Permanent				
	Consequence	Slight				
	Probability	Unlikely				
	Reversibility	Non-reversible				
	Irreplaceability	High				
Damage or destruction of graves	Status	Negative	Low (4)	Fence known graves with a wire farm fence at least 5 m from all visible graves.	Very low (5)	High
	Spatial extent	Local				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
	Duration	Permanent		- Demarcate known graves within 50 m of the project footprint as No-Go areas. - Report any chance finds to SAHRA and/or an archaeologist. - Protect chance finds <i>in situ</i> and appoint an archaeologist to exhume under an approved permit.		
	Consequence	Extreme				
	Probability	Very unlikely				
	Reversibility	Non-reversible				
	Irreplaceability	High				
Damage to built heritage resources	Status	Negative	Very low (5)	Demarcate buildings as no-go areas.	Very low (5)	High
	Spatial extent	Site specific				
	Duration	Permanent				
	Consequence	Substantial				
	Probability	Extremely unlikely				
	Reversibility	Non-reversible				
	Irreplaceability	High				
Intrusion of powerline and equipment into the landscape	Status	Negative	Very low (5)	- Minimise duration of construction period. - Ensure effective rehabilitation of areas not needed during operation.	Very low (5)	High
	Spatial extent	Local				
	Duration	Medium				
	Consequence	Slight				
	Probability	Very likely				
	Reversibility	Moderate				
	Irreplaceability	Moderate				
OPERATIONAL PHASE						
Intrusion of powerline into the landscape	Status	Negative	Very low (5)	- Paint buildings in earthy tones. - Ensure that all maintenance vehicles stay within the authorised footprint. - Make use of lighting mitigation measures such as motion sensors and downlighting at substation.	Very low (5)	High
	Spatial extent	Local				
	Duration	Long term				
	Consequence	Slight				
	Probability	Very likely				
	Reversibility	Moderate				
	Irreplaceability	Moderate				
DECOMMISSIONING PHASE						
	Status	Negative	Very low (5)	Minimise duration of decommissioning period.	Very low (5)	High

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
Intrusion of powerline and equipment into the landscape	Spatial extent	Local		▪ Ensure effective rehabilitation of all affected areas.		
	Duration	Medium				
	Consequence	Slight				
	Probability	Very likely				
	Reversibility	Moderate				
	Irreplaceability	Moderate				
CUMULATIVE IMPACTS						
Impacts to archaeology, graves, buildings	Status	Negative	Very low (5)	▪ As per measures listed above (i.e. refer to the mitigation measures noted above for the corresponding impact for the construction phase).	Very low (5)	High
	Spatial extent	Local				
	Duration	Permanent				
	Consequence	Slight				
	Probability	Unlikely				
	Reversibility	Non-reversible				
Intrusion of powerline and equipment into the landscape	Irreplaceability	High	Very low (5)	▪ As per measures listed above (i.e. refer to the mitigation measures noted above for the corresponding impacts for the construction, operational and decommissioning phases).	Very low (5)	High
	Status	Negative				
	Spatial extent	Local				
	Duration	Permanent				
	Consequence	Slight				
	Probability	Very likely				
Intrusion of powerline and equipment into the landscape	Reversibility	Moderate				
	Irreplaceability	Moderate				

11.10 Findings and Conclusion of the Heritage Impact Assessment

The findings and conclusion below equally apply to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1), unless where mentioned otherwise.

The broader 3060 ha study area is predominantly flat with the exception of an extremely slight slope from west to east towards the river that borders the eastern edge of the study area. It is coated in dense grass, but rare small areas of denuded soil occur in places. No hills occur within the study area; however, some do occur in the surrounding area with one being along the southern edge of the study area.

Several heritage resources were found; including low density background scatters of stone artefacts (including a small handaxe); small, historical stone-walled features; a stone-walled archaeological farmstead; two small farm graveyards; an abandoned historical farmstead with several ruins and a standing (but insensitively altered) structure; and the cultural landscape which has a strong rural character.

The developer has located the project footprints such that all identified significant heritage sites (i.e. grade GPB and above) have been avoided and no impacts to these sites are expected from any of the proposed projects. All heritage resources but one have been avoided by a minimum of 50 m. The exception is the buffer around the abandoned farmstead, in the north of the study area, where the existing access road to the study area passes the farmstead and is one of the access options. Although it is generally ideal to reuse existing roads, the existing road passes close to an archaeological site and a cemetery; therefore, the road has been rerouted in that area to ensure that these features are avoided by 50 m. This is entirely acceptable from a heritage perspective. Reusing and upgrading/widening the existing access road along the indicated alignment (Option A) through the farmstead buffer is acceptable. There are no further areas that need to be avoided within the proposed development footprints.

The development footprint and detailed layout for each of the proposed projects are considered suitable from a heritage perspective. Any further changes to the detailed layouts, as might become necessary, are deemed acceptable provided that the changes remain within the overall development footprint area as assessed during this Scoping and EIA Process.

Based on these conclusions, it is the opinion of the Heritage Specialist that the proposed projects will not have significant impacts on heritage resources due to the careful positioning of the footprints so as to avoid such resources. As such, it is the opinion of the Heritage Specialist that the proposed projects may be authorised.

Refer to Appendix E.6 of this EIA Report for additional information including *inter alia* a detailed Site Sensitivity Verification inclusive of maps from the Screening Tool and site specific maps generated by the specialist, an assessment of the impacts, a list of key issues and impacts from a heritage perspective, a list of potential mitigation measures and recommendations for inclusion in the EMPs as well as a list of the Environmental Authorisation (EA) condition recommendations as recommended by the specialist.



CHAPTER 12: Palaeontology

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12. PALAEOLOGY

12.1 Introduction

This chapter provides a brief summary of the Palaeontology Site Sensitivity Verification for the Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of the Biesjesvlei Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Facility, and their associated Electricity Grid Infrastructure (EGI), near Smithfield in the Free State Province. **Refer to the full Palaeontology Site Sensitivity Verification which is included in Appendix E.7 of this EIA Report for additional information.**

One Palaeontology Site Sensitivity Verification was compiled to address all the proposed Biesjesvlei projects, as per the Competent Authority's approval of the combination request. Therefore, this chapter deals with all 10 of the following proposed projects (hereinafter referred to as the "proposed projects"):

- **PROJECTS 1 TO 3:** The proposed development of three Solar PV Facilities and associated infrastructure (i.e. Biesjesvlei PV1 to Biesjesvlei PV3).
- **PROJECTS 4 TO 6:** The proposed development of three BESS and associated infrastructure (i.e. Biesjesvlei BESS 1 to Biesjesvlei BESS 3).
- **PROJECTS 7 TO 9:** The proposed development of a 132 kV Overhead Power Line from each Biesjesvlei PV Facility to the proposed Main Transmission Substation (MTS), and associated infrastructure (i.e. Biesjesvlei EGI 1 to Biesjesvlei EGI 3).
- **PROJECT 10:** The proposed development of an independent 400/132kV MTS and a 400 kV Loop-In-Loop-Out (LILO) from the MTS to the existing Eskom power line, as well as associated infrastructure (i.e. Biesjesvlei MTS and LILO).

Therefore, the information presented in this chapter applies equivalently to all 10 of the above proposed projects, unless where stated otherwise.

12.2 Need for the Site Sensitivity Verification

Government Gazette 43110, Government Notice (GN) R320 published by the then Department of Environment, Forestry and Fisheries (DEFF) on 20 March 2020, includes a general protocol (i.e., Part A of GN R320) that provides the requirements for the Site Sensitivity Verification and minimum report content requirements where a specialist assessment is required but no specific environmental theme protocol has been prescribed. The protocol states "*where a specialist assessment is required and no specific environmental theme protocol has been prescribed, the required level of assessment must be based on the findings of the site sensitivity verification and must comply with Appendix 6 of the EIA Regulations.*" Since Palaeontology was identified as a relevant theme and recommended study in the National Web-based Environmental Screening Tool (Screening Tool) Report, GN R320 must be complied with. A Palaeontology Site Sensitivity Verification in terms of Part A of GN R320 and Appendix 6 of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (as amended) was therefore undertaken for the proposed projects.

12.3 Scope of the Site Sensitivity Verification

A combined field-based and desktop Site Sensitivity Verification was undertaken in order to determine the level of environmental sensitivity assigned to the study area and to confirm or contest the current use of the land and environmental sensitivity (from a palaeontology perspective) of the study area as identified by the Screening Tool. Refer to Section 12.5 below for the Terms of Reference that was provided to the Palaeontologist.

12.4 Details of the Specialist

The Palaeontology Site Sensitivity Verification was undertaken by Dr John Almond of Natura Viva cc from 23 – 24 August 2023. Dr John Almond is an accredited member of the Palaeontological Society of South Africa (PSSA) as well as the Association of Professional Heritage Practitioners (APHP) – Western Cape.

12.5 Terms of Reference for Palaeontology

The Palaeontology Site Sensitivity Verification was completed based on the following Terms of Reference:

- Comply with Part A of the Assessment Protocols that were published on 20 March 2020, in Government Gazette 43110, GN 320.
- Undertake a site visit in order to identify the level of sensitivity assigned to the project area on the Screening Tool relating to palaeontology, and to verify and confirm this sensitivity and land-use.
- Provide a Site Sensitivity Verification Report based on the requirements documented in the Assessment Protocols published on 20 March 2020, in Government Gazette 43110, GN 320.
- Determination, description and mapping of the baseline environmental condition and sensitivity of the study area.
- Provide review input on the preferred infrastructure layout following the sensitivity analysis and layout identification.
- Describe the type and location of known palaeontology and fossil heritage sites in the study area and characterize all items that may be affected by the proposed projects.
- Determine mitigation and/or management measures, for inclusion in the Environmental Management Programmes (EMPrs) which could be implemented to, as far as possible, reduce the effect of negative impacts and enhance the effect of positive impacts.
- Provide a Specialist Declaration of Independence and Curriculum Vitae.
- Incorporate and address relevant comments and concerns raised by the stakeholders, commenting authorities and Interested and Affected Parties (I&APs) prior to submitting the Final EIA Report to the Competent Authority for decision-making.

12.6 Study Methodology

A description of the process undertaken for the Site Sensitivity Verification is captured in Appendix E.7 of this EIA Report. No assumptions, limitations or knowledge gaps have been included in the Site Sensitivity Verification.

12.7 Findings of the Site Sensitivity Verification

The Palaeontologist conducted a two-day site visit and field surveys in August 2023 in order to identify the level of sensitivity assigned to the study area, and to verify and confirm this sensitivity and land use as per the Screening Tool. The Palaeontology Site Sensitivity Verification is included in Appendix E.7 of this EIA Report. According to the Screening Tool, the majority of the study area is of medium to very high palaeo-sensitivity. This provisional assessment has been contested by the Palaeontologist, based on the palaeontological site visit. The Palaeontologist concluded that the study area is in fact of low to very low palaeo-sensitivity. However, the potential for rare, largely unpredictable fossil sites of high palaeo-sensitivity associated with older alluvial and pan deposits in the subsurface cannot be entirely discounted. However, such fossil sites would already be protected during construction by environmental buffer zones along drainage lines (as is the case). Such sites, and if any fossiliferous deposits are exposed by surface clearance or excavations during the construction phase of the development, the Chance Fossils Finds Protocol included in Appendix E.7 of this EIA Report should be fully implemented.

Pending the discovery of significant, previously unrecorded fossil sites in the construction phase (which can be handled using a Chance Fossil Finds Protocol); and provided that the Chance Fossil Finds Protocol is incorporated into the EMPs and fully implemented during the construction phase, the Palaeontologist has confirmed and concluded that no further specialist palaeontological studies, reporting, monitoring or mitigation are considered necessary for the proposed developments.

Based on the above, an impact assessment is not required. This approach has been accepted and supported by the South African Heritage Resources Agency (SAHRA), as indicated in Appendix G.6 of this EIA Report.

It must be noted that the Chance Fossils Finds Protocol has been fully incorporated into the EMPs, which are included as relevant appendices to the EIA Report.

12.8 Conclusion of the Site Sensitivity Verification

The Palaeontologist confirmed that the study area is of low to very low palaeo-sensitivity, and also confirmed that there are no fatal flaws and no objections on palaeontological heritage grounds to the authorisation of these 10 proposed projects.

Refer to Appendix E.7 of the EIA Report for additional information including *inter alia* a description of the geological context and palaeontological heritage of the study area, maps from the Screening Tool, as well as the Chance Fossil Finds Protocol.



CHAPTER 13: Socio-Economic

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13. SOCIO-ECONOMIC

13.1 Introduction

This chapter provides a brief summary of the Socio-Economic Impact Assessment for the Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of the Biesjesvlei Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Facility, and their associated Electricity Grid Infrastructure (EGI), near Smithfield in the Free State Province. **Refer to the full Socio-Economic Impact Assessment (SIA) which is included in Appendix E.8 of this EIA Report for additional information.**

This chapter specifically deals with the **Biesjesvlei PV1 (Project 1) and the Biesjesvlei BESS 1 (Project 4)** (hereinafter referred to as the “proposed projects”).

The information presented throughout this chapter applies equally to Project 1 (Biesjesvlei PV1) and Project 4 (Biesjesvlei BESS 1), unless where mentioned otherwise.

13.2 Need for the Socio-Economic Impact Assessment

Government Gazette 43110, Government Notice (GN) R320 published by the then Department of Environment, Forestry and Fisheries (DEFF) on 20 March 2020, includes a general protocol (i.e., Part A of GN R320) that provides the requirements for the Site Sensitivity Verification and minimum report content requirements where a specialist assessment is required but no specific environmental theme protocol has been prescribed. Part A of GN R320 states that prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the study area, as identified by the National Web-based Environmental Screening Tool (Screening Tool), where determined, must be confirmed by undertaking a Site Sensitivity Verification. This is applicable where the Screening Tool includes the maps of the relevant themes to verify. However, there are no dedicated Socio-Economic themes on the Screening Tool; therefore, the environmental sensitivity of the study area as identified by the Screening Tool is not applicable. As such, a Site Sensitivity Verification report is not required.

The protocol also states, “*where a specialist assessment is required and no specific environmental theme protocol has been prescribed, the required level of assessment must be based on the findings of the site sensitivity verification and must comply with Appendix 6 of the EIA Regulations.*” Since a Socio-Economic Assessment was identified as a recommended study in the Screening Tool Report, GN R320 must be complied with. An SIA was therefore commissioned; however, it is important to note that the Screening Tool does not require an SIA for EGI projects such as power lines and substations. Therefore, the SIA does not address the proposed Biesjesvlei EGI 1 (Project 7) and as such, the SIA only addresses the proposed PV and BESS projects. Furthermore, there is no dedicated assessment protocol prescribed for Socio-Economics; therefore, an SIA in compliance with Appendix 6 of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (as amended) was undertaken for the proposed projects.

13.3 Scope of the Socio-Economic Impact Assessment

The SIA was undertaken to assess the Socio-Economic impacts of the proposed projects in order to inform the EIA Process being undertaken for the proposed projects. Refer to Appendix E.8 of this EIA Report for the detailed SIA. Refer to Section 13.5 below for the Terms of Reference that was provided to the specialist.

13.4 Details of the Specialist

The SIA was undertaken by Sue Reuther of SLR Consulting (Pty) Ltd. Sue Reuther is a Registered Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioners Association of South Africa (EAPASA), with Registration Number 2020/425. Sue Reuther is an Environmental Consultant with more than 19 years of experience, primarily in South Africa, Southern and West Africa, South America, the Middle East and Asia. She has managed complex EIAs for a wide range of projects in the infrastructure, mining, coastal, energy and industrial sectors. Sue also undertakes SIAs for a range of developments, including mining, infrastructure and alternative energy projects in South Africa, Southern Africa, South America and Asia. She has two years of previous experience in strategy and financial research.

13.5 Terms of Reference for the Socio-Economic Impact Assessment

The SIA was completed based on the following Terms of Reference:

- Compile an SIA Report in compliance with Part A of the Assessment Protocols (GN R320, March 2020) and Appendix 6 of the 2014 NEMA EIA Regulations (as amended), as well as any other additional relevant legislation and guidelines that may be deemed necessary, if applicable;
- Describe the socio-economic context of the study area, focusing on aspects that are potentially affected by the proposed projects, and taking into consideration the current situation as well as the local trends, the local planning (Integrated Development Plans and Spatial Development Frameworks), and other developments in the area. The economic aspect of the assessment includes aspects such as direct employment figures, feedback on the Gross Domestic Product (GDP) etc., and was not intended to require a detailed economic analysis;
- Identify the potential social and economic impacts (including benefits) associated with the proposed projects;
- Consider social issues such as potential in-migration of job seekers, opportunities offered by training and skills development, phasing of employment over the duration of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), cumulative effects with other REIPPPP projects in the local area, implications for local planning and resource use;
- Apply a variety of appropriate options for sourcing information, such as review of analogous studies, available databases and social indicators, use of online interviews with key stakeholders such as local communities, local landowners and government officials (local and regional), etc., where possible, to inform the assessment. Undertake the collection of both primary and secondary data;

- Evaluate the implications of the social investment programme associated with REIPPPP projects on the local socio-economic context;
- Identify and assess the potential direct, indirect and cumulative impacts of the construction, operational and decommissioning phases of the proposed development on the receiving environment from a socio-economic perspective using the prescribed impact assessment methodology captured in Chapter 4 of the EIA Report. For cumulative impacts, consider other specified renewable energy and EGI projects within 30 km of the proposed projects. Rate impacts both without and with the implementation of mitigation or enhancement measures;
- Provide a reasoned opinion indicating the acceptability of the proposed development and a recommendation if the development should go ahead or not;
- Provide a description of assumptions and limitations in the report;
- Identify any additional protocols, licensing and/or permitting requirements that are relevant to the project and the implications thereof, if any;
- Provide a Specialist Declaration of Independence and Curriculum Vitae;
- Provide recommendations with regards to potential monitoring programmes;
- Determine mitigation and/or management measures for inclusion in the Environmental Management Programmes (EMPRs), which could be implemented to, as far as possible, reduce the effect of negative impacts and enhance the effect of positive impacts. Identify best practice management actions, monitoring requirements, and rehabilitation guidelines for all identified impacts, where relevant;
- Incorporate and address relevant comments and concerns raised by the stakeholders, commenting authorities and Interested and Affected Parties (I&APs) prior to submitting the Final EIA Report to the Competent Authority for decision-making; and
- Review the Generic EMPRs for Substations (GN R435) and confirm if there are any specific environmental sensitivities or attributes present on the project site and any resultant site-specific impact management outcomes and actions that are not included in the pre-approved generic EMPR (Part B – Section 1).

13.6 Study Methodology

A full description of the process undertaken for the SIA and to identify potential impacts associated with the proposed projects are captured in Appendix E.8 of this EIA Report. The impact assessment methodology is also described in detail in Chapter 4 of this EIA Report.

13.7 Assumptions, Limitations and Gaps in Knowledge

The SIA included the following assumptions, limitations and knowledge gaps. It is important to note that the validity of the findings of the SIA study is not expected to be affected by these assumptions and limitations:

- The assessment is based on information supplied to the specialist, which is assumed to be accurate. This includes the proposed location and dimensions of the proposed projects as well as information on *inter alia* employment and community investments;
- The detailed layout does not have any bearing on the specialist study. Changes to the detailed layouts are deemed acceptable if the changes remain within the approved buildable areas and

area assessed during the Scoping and EIA Process with relevant no-go sensitive areas avoided;

- It is assumed that owners of the affected farms are appropriately compensated for any loss in income, crops, infrastructure or land incurred as a result of the proposed projects. The SIA therefore does not focus on impacts on private landowners. It is assumed that landowners have communicated any constraints associated with the placement of project infrastructure, due to e.g. homesteads, during project planning and development;
- The study does not motivate for or against the proposed projects, but rather seeks to give insight into the socio-economic character of the area and the significance of the anticipated socio-economic impacts created by the proposed projects. In the event that unacceptable social impacts are identified, this is clearly indicated in the report;
- The SIA is based largely on secondary data gathered during a desktop analysis. Limited primary data was also collected via phone interviews or email engagement with landowners and local councillors;
- The report is based on the most recent available census data that is from Census 2022 (with limited data currently available) and 2011 (full census) and the 2016 Community Survey (limited census) and data contained in municipal reports. Given the low population growth rates recorded in the past and the remoteness of the area, the data is considered sufficient to paint a socio-economic picture of the region; and
- It is assumed that no significant developments or changes in the socio-economic characteristics will take place in the area of influence between data collection and submission of the report.

Other assumptions made in the SIA are explicitly stated in the relevant sections of the SIA included in Appendix E.8 of this EIA Report.

13.8 Key Issues

Potential Socio-Economic impacts associated with the development of the proposed projects are listed below for each phase, including direct, indirect and cumulative impacts. The direct, indirect and cumulative impacts listed below equally apply to Project 1 (Biesjesvlei PV1) and Project 4 (Biesjesvlei BESS 1), unless where mentioned otherwise.

13.8.1 Construction, Operational and Decommissioning Phase Impacts

Construction Phase:

- Direct Impacts:
 - Impact 1: Capital investment (CapEx) contributing to the national, regional and local economy (*positive impact*).
 - Impact 2: Generation of employment, income and skills (*positive impact*).
- Indirect Impacts:
 - Impact 3: Social disruption and change in social dynamics (*negative impact*).
 - Impact 4: Reduced quality of life and increased risks due to construction near residences (*negative impact*).

Operational Phase:

- Direct Impacts:
 - Impact 1: Operational investment (OpEx) contributing to the national, regional and local economy (*positive impact*).
 - Impact 2: Generation of employment, income and skills (*positive impact*).
 - Impact 3: Increased community prosperity through contributions and income from the proposed projects (*positive impact*).
- Indirect Impacts:
 - Impact 4: Increased power generation reducing the probability of load shedding (*positive impact*) (*Note: This impact is only applicable to the Biesjesvlei Solar PV project*).

Decommissioning Phase:

- Direct Impacts:
 - Impact 1: Reduced employment and funding (*negative impact*).

13.8.2 Cumulative Impacts

- Direct Impacts:
 - Construction Phase: Impact 1: Stimulation of economic and employment growth (*positive impact*).
 - Operational Phase: Impact 2: Increased community prosperity through contributions and income from Independent Power Producers (IPPs) and operational spending (*positive impact*).
- Indirect Impacts:
 - Operational Phase: Impact 3: Increased power generation reducing the probability of load shedding (*Note: This impact is only applicable to the Biesjesvlei Solar PV project*) (*positive impact*).

13.9 Key Impacts

The impacts and mitigation measures are described in this section. These impacts and mitigation measures have also been incorporated into the EMPs as relevant, which are included as relevant appendices to this EIA Report. Each project has different potential impact ratings, hence separate impact tables have been provided for each project in this section.

Table 13.1 provides potential impacts for **Project 1 (Biesjesvlei PV1)**.

Table 13.2 provides potential impacts for **Project 4 (Biesjesvlei BESS 1)**.

Table 13.3 provides potential cumulative impacts.

Table 13.1: Assessment of the potential Socio-Economic risks and impacts of the Project 1 (Biesjesvlei PV1).

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures	Significance and Ranking (Post-Mitigation / Enhancement)	Confidence Level
CONSTRUCTION PHASE						
DIRECT IMPACTS						
Capital investment contributing to the national, regional and local economy	Status	Positive	Moderate (3)	- Source as many goods and services as far as possible from the local and regional economy (e.g. use local contractors and accommodation and equipment suppliers as far as possible and purchase perishable goods locally). - Provide suitable training to service providers, where possible and practicable. - Develop and implement a fair and transparent procurement policy. - Provide training to staff and service providers on how to position themselves for other employment opportunities once construction ends. - Consult with existing Independent Power Producer (IPP) projects that successfully procure from local Small, Micro and Medium Enterprises (SMMEs) to share learnings, where possible.	Moderate (3)	Medium
	Spatial Extent	Regional				
	Duration	Medium-term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Irreversible				
	Irreplaceability	Not Applicable				
Generation of employment, income and skills	Status	Positive	Low (4)	- Maximise use of local skills and resources through preferential employment of locals where practicable. - Develop, communicate and implement a fair and transparent labour and recruitment policy. - Ensure diversity and gender equality in recruitment, as far as possible. - Provide training to staff and service providers before and/or during the construction phase. - Provide training to staff and service providers on how to position themselves for other employment opportunities once construction ends.	Moderate (3)	Medium
	Spatial Extent	Regional				
	Duration	Medium-term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Employment reversible, training irreversible				
	Irreplaceability	Not Applicable				
INDIRECT IMPACTS						
	Status	Negative	Moderate (3)	Clearly publicise and implement a recruitment policy.	Low (4)	Medium

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures	Significance and Ranking (Post-Mitigation / Enhancement)	Confidence Level
Social disruption and change in social dynamics	Spatial Extent	Regional		▪ Work together with impartial local representatives to identify local people during the recruitment process. ▪ Provide transport to site and other incentives to reduce the number of workers accommodated in Engineering, Procurement and Construction (EPC) accommodation to an absolute minimum. ▪ Consult with the municipality regarding the capacity of existing services and infrastructure (e.g. provision of water, electricity, waste removal, sanitation and housing) to cope with additional workers brought into the area during the construction period. ▪ Consider supporting projects that improve local services and infrastructure and/or deal with social problems or conflicts through the social upliftment programme, if the need arises.		
	Duration	Medium-term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Partially reversible				
	Irreplaceability	Not Applicable				
Reduced quality of life and increased risks due to construction near residences	Status	Negative	Low (4)	▪ Liaise with nearby residents before and during construction to inform them of construction status and discuss safety management measures to reduce security risks. ▪ Maintain a visible security presence on site. ▪ Implement a grievance mechanism during the construction phase. ▪ Communicate and implement a compensation procedure in the event of damages directly linked to the construction. ▪ Control site access. ▪ Provide transportation to site for unskilled workers. ▪ Declare areas outside of the construction site (that are on private land associated with the project) as no-go areas for construction staff. ▪ Erect and regularly inspect a boundary fence. ▪ Regularly inspect the project area and surrounding area for signs of illegal activity. ▪ Regularly clean any litter from the project area and surrounding area.	Very low (5)	High
	Spatial Extent	Local				
	Duration	Medium-term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Reversible				
	Irreplaceability	Not Applicable				
OPERATIONAL PHASE						
DIRECT IMPACTS						
	Status	Positive	Low (4)		Low (4)	Medium

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures	Significance and Ranking (Post-Mitigation / Enhancement)	Confidence Level
Operational investment contributing to the national, regional and local economy	Spatial Extent	Regional		- Source as many goods and services as possible from the local and regional economy (e.g. use local contractors (where needed during the operational phase) and accommodation and equipment suppliers as far as possible and purchase perishable goods locally). - Provide suitable training to service providers, where possible and practicable. - Develop and implement a fair and transparent procurement policy.		
	Duration	Long term				
	Consequence	Moderate				
	Probability	Very likely				
	Reversibility	Partially reversible				
	Irreplaceability	Not Applicable				
Generation of employment, income and skills	Status	Positive	Low (4)	- Maximise use of local skills and resources through preferential employment of locals where practicable. - Develop and implement a fair and transparent labour and recruitment policy. - Ensure diversity and gender equality in recruitment, as far as possible. - Provide suitable training. - Provide ancillary training to workers on maximising the use of income and training to further future economic prospects, potentially through projects initiated as part of the social upliftment programme.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Long term				
	Consequence	Moderate				
	Probability	Very likely				
	Reversibility	Employment reversible, training irreversible				
	Irreplaceability	Not Applicable				
Increased community prosperity through contributions and income from the PV component assuming it is part of the REIPPPP	Status	Positive	Moderate (3)	- Regularly engage with community stakeholders to develop meaningful strategies for community development. - Define vision for economic development in consultation with communities. - Ensure that funding requirements for each project are considered into the future so that projects are viable and sustainable. - Set clear goals for each project and phase out funding once these goals are achieved. - Consider auditing projects for several years after funding has ceased to ensure their benefits are sustained.	Moderate (3)	Medium
	Spatial Extent	Regional				
	Duration	Long term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Not Applicable				
	Irreplaceability	Not Applicable				
Increased community prosperity through contributions and income	Status	Positive	Low (4)	Set clear goals for each project and phase out funding once these goals are achieved.	Low (4)	Medium
	Spatial Extent	Regional				
	Duration	Long term				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures	Significance and Ranking (Post-Mitigation / Enhancement)	Confidence Level
from the PV component, assuming it is not part of the REIPPPP	Consequence	Moderate		- Consider auditing projects for several years after funding has ceased to ensure their benefits are sustained. - Regularly engage with community stakeholders to develop meaningful strategies for community development. - Define vision for economic development in consultation with communities. - Ensure that funding requirements for each project are considered into the future so that projects are viable and sustainable.		
	Probability	Likely				
	Reversibility	Not Applicable				
	Irreplaceability	Not Applicable				
INDIRECT IMPACTS						
Increased South African power generation reducing the probability of load shedding and de-fossilisation of energy generation ¹	Status	Positive	Not rated	None [Note: Energy demand and supply are highly complex, and solar energy facilities are not on-demand facilities that always produce a predictable, dispatchable power output. Moreover, limitations in transmission line capacity is another external factor that affects dispatchability of renewable energy. These values can thus not be directly translated into a tangible benefit, and no single renewable energy project can address the energy shortfall South Africa currently faces. As such, this impact has not been rated formally but is positive].	Not rated	Medium
	Spatial Extent	Not Applicable				
	Duration	Not Applicable				
	Consequence	Not Applicable				
	Probability	Not Applicable				
	Reversibility	Not Applicable				
	Irreplaceability	Not Applicable				
DECOMMISSIONING PHASE						
DIRECT IMPACTS						
Reduced employment and Funding	Status	Negative	Low (4)	- Clearly communicate project duration to staff and communities. - Prolong the operational life of the project as much as possible. - Assist with recommendations and referrals where possible. - Assist with the sustainable administration of funds throughout the project lifetime.	Low (4)	Medium
	Spatial Extent	Regional				
	Duration	Short-term				
	Consequence	Moderate				
	Probability	Very likely				
	Reversibility	Not Applicable				
	Irreplaceability	Not Applicable				

¹ Note: For input on the national scale benefits of the proposed projects in terms of energy security, reducing load-shedding, providing least cost energy generation and de-fossilisation of energy generation in order to meet South Africa's commitments to climate change and decarbonising energy, refer to Chapter 1 of this EIA Report, specifically Section 1.4 and Section 1.10 on the project motivation, and need and desirability. Refer also to Chapter 5 of this EIA Report and Section 6.4 of the SIA (Appendix E.8 of this EIA Report) for the implications of the no-go alternative.

Table 13.2: Assessment of the potential Socio-Economic risks and impacts of the Project 4 (Biesjesvlei BESS 1).

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures	Significance and Ranking (Post-Mitigation / Enhancement)	Confidence Level
CONSTRUCTION PHASE						
DIRECT IMPACTS						
Capital investment contributing to the national, regional and local economy	Status	Positive	Moderate (3)	- Source as many goods and services as far as possible from the local and regional economy (e.g. use local contractors and accommodation and equipment suppliers as far as possible and purchase perishable goods locally). - Provide suitable training to service providers, where possible and practicable. - Develop and implement a fair and transparent procurement policy. - Provide training to staff and service providers on how to position themselves for other employment opportunities once construction ends. - Consult with existing Independent Power Producer (IPP) projects that successfully procure from local Small, Micro and Medium Enterprises (SMMEs) to share learnings, where possible.	Moderate (3)	Medium
	Spatial Extent	Regional				
	Duration	Medium-term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Irreversible				
	Irreplaceability	Not Applicable				
Generation of employment, income and skills	Status	Positive	Very low (5)	- Maximise use of local skills and resources through preferential employment of locals where practicable. - Develop, communicate and implement a fair and transparent labour and recruitment policy. - Ensure diversity and gender equality in recruitment, as far as possible. - Provide training to staff and service providers before and/or during the construction phase. - Provide training to staff and service providers on how to position themselves for other employment opportunities once construction ends.	Low (4)	Medium
	Spatial Extent	Regional				
	Duration	Medium-term				
	Consequence	Slight				
	Probability	Likely				
	Reversibility	Employment reversible, training irreversible				
	Irreplaceability	Not Applicable				
INDIRECT IMPACTS						
Social disruption and change in social dynamics	Status	Negative	Very low (5)	Clearly publicise and implement a recruitment policy.	Very low (5)	Medium
	Spatial Extent	Regional				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures	Significance and Ranking (Post-Mitigation / Enhancement)	Confidence Level
	Duration	Medium-term		- Work together with impartial local representatives to identify local people during the recruitment process. - Provide transport to site and other incentives to reduce the number of workers accommodated in Engineering, Procurement and Construction (EPC) accommodation to an absolute minimum. - Consult with the municipality regarding the capacity of existing services and infrastructure (e.g. provision of water, electricity, waste removal, sanitation and housing) to cope with additional workers brought into the area during the construction period. - Consider supporting projects that improve local services and infrastructure and/or deal with social problems or conflicts through the social upliftment programme, if the need arises.		
	Consequence	Slight				
	Probability	Unlikely				
	Reversibility	Partially reversible				
	Irreplaceability	Not Applicable				
Reduced quality of life and increased risks due to construction near residences	Status	Negative	Very low (5)	- Liaise with nearby residents before and during construction to inform them of construction status and discuss safety management measures to reduce security risks. - Maintain a visible security presence on site. - Implement a grievance mechanism during the construction phase. - Communicate and implement a compensation procedure in the event of damages directly linked to the construction. - Control site access. - Provide transportation to site for unskilled workers. - Declare areas outside of the construction site (that are on private land associated with the project) as no-go areas for construction staff. - Erect and regularly inspect a boundary fence. - Regularly inspect the project area and surrounding area for signs of illegal activity. - Regularly clean any litter from the project area and surrounding area.	Very low (5)	High
	Spatial Extent	Local				
	Duration	Medium-term				
	Consequence	Slight				
	Probability	Unlikely				
	Reversibility	Reversible				
	Irreplaceability	Not Applicable				
OPERATIONAL PHASE						
DIRECT IMPACTS						
	Status	Positive	Low (4)		Low (4)	Medium

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures	Significance and Ranking (Post-Mitigation / Enhancement)	Confidence Level
Operational investment contributing to the national, regional and local economy	Spatial Extent	Regional		- Source as many goods and services as possible from the local and regional economy (e.g. use local contractors (where needed during the operational phase) and accommodation and equipment suppliers as far as possible and purchase perishable goods locally). - Provide suitable training to service providers, where possible and practicable. - Develop and implement a fair and transparent procurement policy.		
	Duration	Long term				
	Consequence	Moderate				
	Probability	Very likely				
	Reversibility	Partially reversible				
	Irreplaceability	Not Applicable				
Generation of employment, income and skills	Status	Positive	Very low (5)	- Maximise use of local skills and resources through preferential employment of locals where practicable. - Develop and implement a fair and transparent labour and recruitment policy. - Ensure diversity and gender equality in recruitment, as far as possible. - Provide suitable training. - Provide ancillary training to workers on maximising the use of income and training to further future economic prospects, potentially through projects initiated as part of the social upliftment programme.	Very low (5)	Medium
	Spatial Extent	Local				
	Duration	Long term				
	Consequence	Slight				
	Probability	Very likely				
	Reversibility	Employment reversible, training irreversible				
	Irreplaceability	Not Applicable				
Increased community prosperity through contributions and income from the BESS component, assuming it is part of the REIPPPP	Status	Positive	Moderate (3)	- Regularly engage with community stakeholders to develop meaningful strategies for community development. - Define vision for economic development in consultation with communities. - Ensure that funding requirements for each project are considered into the future so that projects are viable and sustainable. - Set clear goals for each project and phase out funding once these goals are achieved. - Consider auditing projects for several years after funding has ceased to ensure their benefits are sustained.	Moderate (3)	Medium
	Spatial Extent	Regional				
	Duration	Long term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Not Applicable				
Increased community prosperity through contributions and income	Irreplaceability	Not Applicable	Low (4)	Regularly engage with community stakeholders to develop meaningful strategies for community development.	Low (4)	Medium
	Status	Positive				
	Spatial Extent	Regional				
	Duration	Long term				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation / Enhancement)	Potential mitigation measures	Significance and Ranking (Post-Mitigation / Enhancement)	Confidence Level
from the BESS component, assuming it is not part of the REIPPPP	Consequence	Moderate		▪ Define vision for economic development in consultation with communities. ▪ Ensure that funding requirements for each project are considered into the future so that projects are viable and sustainable. ▪ Set clear goals for each project and phase out funding once these goals are achieved. ▪ Consider auditing projects for several years after funding has ceased to ensure their benefits are sustained.		
	Probability	Likely				
	Reversibility	Not Applicable				
	Irreplaceability	Not Applicable				
DECOMMISSIONING PHASE						
DIRECT IMPACTS						
Reduced employment and Funding	Status	Negative	Low (4)	▪ Clearly communicate project duration to staff and communities. ▪ Prolong the operational life of the project as much as possible. ▪ Assist with recommendations and referrals where possible. ▪ Assist with the sustainable administration of funds throughout the project lifetime.	Low (4)	Medium
	Spatial Extent	Regional				
	Duration	Short-term				
	Consequence	Moderate				
	Probability	Very likely				
	Reversibility	Not Applicable				
	Irreplaceability	Not Applicable				

Table 13.3: Assessment of the potential Socio-Economic cumulative risks and impacts of the proposed projects.

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
CONSTRUCTION PHASE						
DIRECT IMPACTS						
Stimulation of Economic and Employment Growth	Status	Positive	Low (4)	- Maximise use of local skills and resources through preferential employment of locals where practicable. - Develop, communicate and implement a fair and transparent labour and recruitment policy.	Moderate (3)	Medium
	Spatial Extent	Regional				
	Duration	Medium-term				
	Consequence	Moderate				
	Probability	Likely				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
	Reversibility	Employment reversible, training irreversible		- Ensure diversity and gender equality in recruitment, as far as possible. - Provide training to staff and service providers before and/or during the construction phase. - Provide training to staff and service providers on how to position themselves for other employment opportunities once construction ends.		
	Irreplaceability	Not Applicable				
OPERATIONAL PHASE						
DIRECT IMPACTS						
Increased Community Prosperity through Contributions and Income from IPPs	Status	Positive	Moderate (3)	- Regularly engage with community stakeholders to develop meaningful strategies for community development. - Define vision for economic development in consultation with communities. - Ensure that funding requirements for each project are considered into the future so that projects are viable and sustainable. - Set clear goals for each project and phase out funding once these goals are achieved. - Consider auditing projects for several years after funding has ceased to ensure their benefits are sustained.	Moderate (3)	Medium
	Spatial Extent	Regional				
	Duration	Long term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Not Applicable				
	Irreplaceability	Not Applicable				
INDIRECT IMPACTS						
Increased South African power generation reducing the probability of load shedding and de-fossilisation of energy generation ²	Status	Positive	Not rated	None [Note: Energy demand and supply are highly complex, and solar energy facilities are not on-demand facilities that always produce a predictable, dispatchable power output. Moreover, limitations in transmission line capacity is another external factor that affects dispatchability of renewable energy. These values can thus not be directly translated into a tangible benefit, and no single renewable energy project can address the energy shortfall South Africa currently faces. As such, this impact has not been rated formally but is positive].	Not rated	Medium
	Spatial Extent	Not Applicable				
	Duration	Not Applicable				
	Consequence	Not Applicable				
	Probability	Not Applicable				
	Reversibility	Not Applicable				
	Irreplaceability	Not Applicable				

² Note: For input on the national scale benefits of the proposed projects in terms of energy security, reducing load-shedding, providing least cost energy generation and de-fossilisation of energy generation in order to meet South Africa's commitments to climate change and decarbonising energy, refer to Chapter 1 of this EIA Report, specifically Section 1.4 and Section 1.10 on the project motivation, and need and desirability. Refer also to Chapter 5 of this EIA Report and Section 6.4 of the SIA (Appendix E.8 of this EIA Report) for the implications of the no-go alternative.

13.10 Findings and Conclusion of the Socio-Economic Impact Assessment

The findings and conclusion below equally apply to Project 1 (Biesjesvlei PV1) and Project 4 (Biesjesvlei BESS 1), unless where mentioned otherwise.

The study area falls within the Xhariep District Municipality (XDM) and Mohokare Local Municipality (MLM) in the Free State Province. As a general observation, socio-economic development within both the XDM and MLM is worse than that of the Free State Province as a whole with all areas still facing many social and economic challenges. The construction of the proposed projects will likely provide significant socio-economic benefits, related to economic growth, employment and financial contributions to and upliftment of Previously Disadvantaged Individuals (PDIs) in rural communities.

The fundamental motivations associated with the proposed projects include more secure power generation, which would reduce the probability of load shedding and the many socio-economic costs of such outages, as well as generation of renewable power, which would contribute to the reduction of social and economic risks from climate change. The main direct positive impacts associated with the proposed projects include capital and operational investment contributing to the national, regional and local economy, as well as generation of employment, income and skills. The negative impacts associated with the proposed projects include a possible change in social dynamics in surrounding communities and a temporary reduction in quality of life of select nearby residents during the construction phase (when activity on the site increases) and possible social conflict in the event of poor governance of community funding, such as Socio-Economic Development (SED) and Economic Development (ED) contributions and upliftment initiatives. Mitigation of these impacts is critical, whereupon they are more than counterbalanced by the socio-economic benefits of the proposed projects.

Cumulative impacts are also highly likely, as the Biesjesvlei Cluster comprises several renewable energy facilities, and other IPPs may also establish in the region (i.e. within a 30 km radius of the study area) in the future. The projects would cumulatively magnify the benefits and some impacts of the proposed projects, and the risk of distorting effects is present as the area is sparsely populated and there are limited economic opportunities.

From the SIA, it is evident that the proposed projects have acceptable socio-economic impacts and desirable benefits; however, careful management of benefits such as governance of community funds is critical. Based on these conclusions, it is of the opinion of the specialist that the proposed projects should be authorised and is preferred to the No-Go alternative from a socio-economic perspective. It is also important to note that technology or layout alternatives or changes within the assessed footprint are not expected to impact the socio-economic impacts and benefits identified in the SIA. Refer to Appendix E.8 of this EIA Report for additional information including *inter alia* an assessment of the impacts, a list of key issues and impacts from a socio-economic perspective, a list of potential mitigation measures and recommendations for inclusion in the EMPs as well as a list of the EA condition recommendations as recommended by the specialist.



CHAPTER 14: Traffic

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14. TRAFFIC

14.1 Introduction

This chapter provides a brief summary of the Traffic Impact Assessment for the Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of the Biesjesvlei Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Facility, and their associated Electricity Grid Infrastructure (EGI), near Smithfield in the Free State Province. **Refer to the full Traffic Impact Assessment (TIA) which is included in Appendix E.9 of this EIA Report for additional information.**

This chapter specifically deals with the **Biesjesvlei PV1 (Project 1) and the Biesjesvlei BESS 1 (Project 4)** (hereinafter referred to as the “proposed projects”).

The information presented throughout this chapter applies equally to Project 1 (Biesjesvlei PV1) and Project 4 (Biesjesvlei BESS 1), unless where mentioned otherwise.

14.2 Need for the Traffic Impact Assessment

Government Gazette 43110, Government Notice (GN) R320 published by the then Department of Environment, Forestry and Fisheries (DEFF) on 20 March 2020, includes a general protocol (i.e., Part A of GN R320) that provides the requirements for the Site Sensitivity Verification and minimum report content requirements where a specialist assessment is required but no specific environmental theme protocol has been prescribed. Part A of GN R320 states that prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the study area, as identified by the National Web-based Environmental Screening Tool (Screening Tool), where determined, must be confirmed by undertaking a Site Sensitivity Verification. This is applicable where the Screening Tool includes the maps of the relevant themes to verify. However, there are no dedicated Traffic or Transport related themes on the Screening Tool; therefore, the environmental sensitivity of the study area as identified by the Screening Tool is not applicable. As such, a Site Sensitivity Verification report is not required.

The protocol also states, “*where a specialist assessment is required and no specific environmental theme protocol has been prescribed, the required level of assessment must be based on the findings of the site sensitivity verification and must comply with Appendix 6 of the EIA Regulations.*” It is important to note that the Screening Tool does not identify the need for TIAs for Solar PV, BESS and EGI projects. However, to ensure all main potential impacts are addressed, a TIA was commissioned for the Solar PV and BESS projects, not for the EGI projects¹. Furthermore, there

¹ Therefore, the TIA does not address the proposed Biesjesvlei EGI 1 (Project 7), and only addresses the PV and BESS projects. However, the expected trip generation for the EGI projects is not anticipated to be significantly more than the BESS and PV projects. Any abnormal load trucks that are required for the EGI projects will require a permit to be applied for in terms of Section 81 of the National Road Traffic Act, 1996 (Act No. 93 of 1996) and authorisation needs to be obtained from the relevant road authorities to modify the road reserve to accommodate turning movements at intersections, if required. The findings of the TIA for the PV and BESS projects inform the EGI projects, and adequate traffic related aspects are covered in the respective EMPs for the EGI projects.

is no dedicated assessment protocol prescribed for Traffic; therefore, a TIA in compliance with Appendix 6 of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (as amended) was undertaken for the proposed PV and BESS projects.

14.3 Scope of the Traffic Impact Assessment

The TIA was undertaken in order to investigate the transportation implications associated with the abnormal load vehicles transporting components to the site and the transportation of construction materials, equipment and workers to the site during the construction, operational and decommissioning phases of the proposed projects. The TIA also identifies the preferred haulage route to the site, comments on the condition of the existing roads in the vicinity of the site and identifies possible access points to the site. Refer to Appendix E.9 of this EIA Report for the detailed TIA. Refer to Section 14.5 below for the Terms of Reference that was provided to the specialist.

14.4 Details of the Specialist

The TIA was undertaken by Annebet Krige of Sturgeon Consulting (Pty) Ltd, Traffic Engineering and Transport Planning Specialists. Annebet Krige is registered with the Engineering Council of South Africa with Registration Number 20150161 in the field of Traffic Engineering.

14.5 Terms of Reference for the Traffic Impact Assessment

The TIA was completed based on the following Terms of Reference:

- Compile a TIA in compliance with Appendix 6 of the 2014 NEMA EIA Regulations (as amended) and Part A of the Assessment Protocols published in GN R320. The Specialist Assessment must also be in adherence to any additional relevant legislation and guidelines that may be deemed necessary, as applicable;
- Undertake a site visit to gather relevant information in terms of access, road conditions etc. and provide feedback following the site visit confirming if there are any aspects that need to be considered in the layout planning;
- Describe the traffic and transportation context of the study area, focusing on aspects that are potentially affected by the proposed projects;
- Determine and describe the baseline transport and traffic condition of the study area;
- Consider traffic issues such as impact on the road network, congestion etc.;
- Assess the preferred project layout and how it relates to traffic impact;
- Determine the national and local haulage routes between port of entry/manufacturer and site;
- Assess site access points;
- Assess freight requirements and permitting needed for abnormal loads;
- Identify and assess the potential direct, indirect and cumulative impacts of the construction, operational and decommissioning phases of the proposed development on the receiving environment from a traffic perspective using the prescribed impact assessment methodology captured in Chapter 4 of the EIA Report. For cumulative impacts, consider other specified renewable energy and EGI projects within 30 km of the proposed projects. Rate impacts both without and with the implementation of mitigation or enhancement measures;

- Provide a description of assumptions and limitations in the report;
- Provide a reasoned opinion indicating the acceptability of the proposed development and a recommendation if the development should go ahead or not;
- Identify any additional protocols, licensing and/or permitting requirements that are relevant to the project and the implications thereof;
- Provide a Specialist Declaration of Independence and Curriculum Vitae;
- Provide recommendations with regards to potential monitoring programmes;
- Determine mitigation and/or management measures, for inclusion in the Environmental Management Programmes (EMPrs), which could be implemented to, as far as possible, reduce the effect of negative impacts and enhance the effect of positive impacts. Identify best practice management actions, monitoring requirements, and rehabilitation guidelines for all identified impacts, where relevant;
- Incorporate and address relevant comments and concerns raised by the stakeholders, commenting authorities and Interested and Affected Parties (I&APs) prior to submitting the Final EIA Report to the Competent Authority for decision-making; and
- Review the Generic EMPrs for Substations (GN R435) and confirm if there are any specific environmental sensitivities or attributes present on the project site and any resultant site-specific impact management outcomes and actions that are not included in the pre-approved generic EMPr (Part B – Section 1).

14.6 Study Methodology

A full description of the process undertaken for the TIA and to identify potential impacts associated with the proposed projects are captured in Appendix E.9 of this EIA Report. The impact assessment methodology is also described in detail in Chapter 4 of this EIA Report.

14.7 Assumptions, Limitations and Gaps in Knowledge

The TIA included the following assumptions, limitations and knowledge gaps:

- The TIA is based on information supplied by the Developers (Scatec Africa (Pty) Ltd and Veroniva (Pty) Ltd) and the Environmental Consultants (CSIR);
- Haulage and access will be limited to existing surfaced national and provincial and gravel roads;
- The internal farm roads within the boundary of the proposed PV and BESS Facilities will not be included in the TIA;
- Construction materials are to be sourced and transported from local manufacturers, where possible;
- All imported materials are to be transported from the nearest, most viable port of entry;
- Maximum vertical height clearance along the haulage route is 5.2 m for abnormal loads;
- The power lines that will be constructed to facilitate the grid connection, and the associated MTS and 400 KV LILO are subjected to separate assessments, and do not require a TIA as per the requirements of the Screening Tool.

14.8 Key Issues

The potential transport and traffic related impacts associated with the development of the proposed projects are listed below for each phase, including cumulative impacts. The impacts listed below equally apply to Project 1 (Biesjesvlei PV1) and Project 4 (Biesjesvlei BESS 1), unless where mentioned otherwise.

14.8.1 Construction, Operational and Decommissioning Phase Impacts

Construction Phase:

- Impact 1: Potential congestion and delays on the surrounding road network.
- Impact 2: Potential impact on traffic safety and increase in accidents with other vehicles or animals.
- Impact 3: Potential change in the quality of the surface condition of the roads.
- Impact 4: Potential noise and dust pollution.

Operational Phase:

- The traffic generated during the operational phase are mainly related to the staff that will be transported to and from the sites and are not anticipated to have a significant traffic impact on the surrounding road network.

Decommissioning Phase:

- Impact 1: Potential congestion and delays on the surrounding road network.
- Impact 2: Potential impact on traffic safety and increase in accidents with other vehicles or animals.
- Impact 3: Potential change in the quality of the surface condition of the roads.
- Impact 4: Potential noise and dust pollution.

14.8.2 Cumulative Impacts

- Congestion and delays on the surrounding road network.
- Impact on traffic safety and increase in accidents with other vehicles or animals.
- Change in the quality of the surface condition of the roads.
- Noise and dust pollution.

14.9 Key Impacts

The impacts and mitigation measures are described in this section. These impacts and mitigation measures have also been incorporated into the EMPs as relevant, which are included as relevant appendices to this EIA Report.

Table 14.1 provides potential impacts for **Project 1 (Biesjesvlei PV1)** and **Project 4 (Biesjesvlei BESS 1)**.

Table 14.2 provides potential cumulative impacts.

Table 14.1: Assessment of the potential Traffic risks and impacts of Project 1 (Biesjesvlei PV1) and Project 4 (Biesjesvlei BESS 1).

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Congestion and delays on road network	Status	Neutral	Very Low (5)	Stagger delivery trips and schedule trips, including staff trips outside of peak hours where possible.	Very Low (5)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Slight				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Potential impact on traffic safety and increase in accidents with other vehicles and animals	Status	Negative	Moderate (3)	- Implement speed control by means of a stop and go system and speed limit road signage within the construction site. - Ensure all vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Low				
	Irreplaceability	High				
Condition of road surface	Status	Neutral	Very Low (5)	- Regular maintenance of the existing external gravel access roads that are used by and impacted on by the proposed projects (i.e. the relevant sections of the S1262 and S119 under the authority of the Free State Government) by the contractor during the construction phase. - Ensure private access roads (i.e. existing internal farm roads leading off the S119) that are used by and impacted on by the proposed developments are restored to original pre-construction road condition or upgraded to suitable standards as specified by the civil engineer and regularly maintained during all	Very Low (5)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Slight				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
				phases of the projects, especially during the construction and decommissioning phases.		
Dust Pollution	Status	Neutral	Low (4)	- Implement dust control on gravel roads within the construction site. - Implement speed control by means of a stop and go system and speed limit road signage within the construction site.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Noise Pollution	Status	Neutral	Low (4)	Stagger delivery trips.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
OPERATIONAL PHASE						
The traffic generated during the operational phase will not have a significant impact on the surrounding road network.						
DECOMMISSIONING PHASE						
Congestion and delays on road network	Status	Neutral	Very Low (5)	Stagger delivery trips and schedule trips, including staff trips outside of peak hours where possible.	Very Low (5)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Slight				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Potential impact on traffic safety and increase in accidents with other vehicles and animals	Status	Negative	Moderate (3)	- Implement speed control by means of a stop and go system and speed limit road signage within the decommissioning site. - Ensure all vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Low				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
	Irreplaceability	High				
Condition of road surface	Status	Neutral	Very Low (5)	- Regular maintenance of the existing external gravel access roads that are used by and impacted on by the proposed projects (i.e. the relevant sections of the S1262 and S119 under the authority of the Free State Government) by the contractor during the decommissioning phase. - Ensure private access roads (i.e. existing internal farm roads leading off the S119) that are used by and impacted on by the proposed developments are restored to original pre-construction road condition or upgraded to suitable standards as specified by the civil engineer and regularly maintained during all phases of the projects, especially during the construction and decommissioning phases.	Very Low (5)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Slight				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Dust Pollution	Status	Neutral	Low (4)	- Implement dust control on gravel roads within the decommissioning site. - Implement speed control by means of a stop and go system and speed limit road signage within the decommissioning site.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Noise Pollution	Status	Neutral	Low (4)	Stagger delivery trips.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				

Table 14.2: Assessment of the potential Traffic cumulative risks and impacts of the proposed projects.

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION AND DECOMMISSIONING PHASE						
Congestion and delays on road network	Status	Neutral	Moderate (3)	▪ Stagger delivery trips and schedule trips, including staff trips outside of peak hours where possible.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Potential impact on traffic safety and increase in accidents with other vehicles and animals	Status	Negative	Moderate (3)	▪ Implement speed control by means of a stop and go system and speed limit road signage within the construction and decommissioning site. ▪ Ensure all vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Low				
	Irreplaceability	High				
Condition of road surface	Status	Neutral	Moderate (3)	▪ Regular maintenance of the existing external gravel access roads that are used by and impacted on by the proposed projects (i.e. the relevant sections of the S1262 and S119 under the authority of the Free State Government) by the contractor during the construction and decommissioning phases. ▪ Ensure private access roads (i.e. existing internal farm roads leading off the S119) that are used by and impacted on by the proposed developments are restored to original pre-construction road condition or upgraded to suitable standards as specified by the civil engineer and regularly maintained during all phases of the projects, especially during the construction and decommissioning phases.	Very Low (5)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
Dust Pollution	Status	Neutral	Low (4)	- Implement dust control on gravel roads within the construction and decommissioning site. - Implement speed control by means of a stop and go system and speed limit road signage within the construction and decommissioning site.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Noise Pollution	Status	Neutral	Low (4)	Stagger delivery trips.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				

14.10 Findings and Conclusion of the Traffic Impact Assessment

The findings and conclusion below equally apply to Project 1 (Biesjesvlei PV1) and Project 4 (Biesjesvlei BESS 1), unless where mentioned otherwise.

During the construction phase of the proposed Solar PV project, the construction site will need to be accessed by single-unit trucks transporting building materials, double axel trucks transporting 40-foot-long containers containing the solar panels, frames and inverters, minibus taxis and buses transporting labourers and abnormal load trucks transporting the transformers. During the construction phase of the proposed BESS project, the construction site will need to be accessed by single-unit trucks transporting building materials, double axel trucks transporting 40-foot-long containers containing the BESS units, minibus taxis transporting labourers and abnormal load trucks transporting the transformers.

The TIA proposed three different haulage routes to the site and the preferred haulage route was identified as the route between the Port of East London and the site. The preferred haulage route is approximately 446 km and follows the N6 from the Port north up to the access point to the site. Various provincial roads can provide access to the site via the N6.

Three access route options to the proposed development have been considered (i.e. Access Route Option A, Access Route Option B and Access Route Option C). All access routes will be from the gravel S1262, located along the N6 approximately 17.9 km northeast of Smithfield. Access Route Option A, Access Route Option B and Access Route Option C have different access points off the gravel S119. Direct access to the proposed projects will be taken from the S119 along an existing farm access point and thereafter new access roads will be developed, where they do not align with existing roads, or existing roads will be used where possible. Access Route Option A will provide the most direct access to the proposed development. Sufficient shoulder sight distances (SSD) are available along the N6 at S1262 in both directions.

Localised widening will be required at the N6 and S1262 intersection to accommodate the turning movements of the abnormal load vehicles. The N6 and S1262 intersection must be widened by approximately 2 m (approximately 35 m²) on the western side of the intersection and by approximately 2 m (approximately 40 m²) on the eastern side of the intersection. Road widening required at the N6 and S1262 intersection will not exceed 4 m and 6 m.

The widening by more than 4 m and 6 m will be required at the following intersections:

- S1262 and S119 intersection by approximately 400 m² / 9 m;
- S119 and Access Route Option A intersection by approximately 800 m² / 14 m;
- S119 and Access Route Option B intersection by approximately 200 m² / 7 m; and
- S119 and Access Route Option C intersection by approximately 450 m² / 14 m.

The existing bridge on S119 must be inspected by a Structural Engineer and if it is found that the bridge is unsuitable, upgrading will be required. Vehicle tracking analysis indicated that widening is not required for the existing bridge on the S119. If Access Route Option A is used for the proposed projects, then the existing bridge on the internal farm road along Access Route Option A must be rebuilt/upgraded or the route will need to be realigned, and a new bridge constructed.

Upgrading of the existing bridge will include the widening of the existing bridge to a minimum width of 5.5 m and require the clearing of the area south of the existing bridge to accommodate the turning movements of the trucks. If Access Route Option B is used for the proposed projects, then a new bridge must be constructed on the internal farm Access Route Option B with a minimum width of 5.5 m. If Access Route Option C is used for the proposed projects, then a new bridge must be constructed on the internal farm road Access Route Option C with a minimum width of 5.5 m.

Based on data from temporary SANRAL counting stations for 2006 and the application of a 2% annual growth rate, the TIA determined that the Average Daily Traffic (ADT) is expected to be approximately 29 vehicles per day (two-way) along the S1262 and approximately 27 vehicles per day (two-way) along the S395 for 2024. These numbers indicate that there are extremely low volumes of traffic along these roads in the vicinity of the site. Based on data from a temporary counting station, located along the N6 just south of Reddersburg, for 2012 and the application of a 2% annual growth rate, the TIA determined that the ADT is expected to be approximately 2 557 vehicles per day (two-way) along the N6 for 2024, north of the proposed development. Based on data from a permanent SANRAL traffic counting station, located along the N6 south of Smithfield, for 2023 and the application of a 4% annual growth rate, the TIA determined that the ADT is expected to be approximately 3 215 vehicles per day (two-way) along the N6 for 2024, south of the proposed development. The N6 therefore operates well below capacity of 2 000 vehicles per hour for a Class 1 principal arterial with two lanes.

Traffic will be generated during the construction, operational and decommissioning phases of the proposed projects. The TIA determined that for each of the construction and decommissioning phases of the proposed Solar PV project, a total of 66 daily trips (two-way) will be generated and that a total of 24 daily trips (two-way) will be generated during the operational phase of this project. For the proposed BESS project, it was determined that a total of 16 daily trips (two-way) will be generated during each of the construction, operational and decommissioning phases of this project. In addition, the AM and PM peak hour trips each constitute approximately 20% of the total daily traffic which relates to approximately an additional 14 trips (two-way) each on the road network during the peak hours for the construction and decommissioning phases of the proposed Solar PV project and approximately an additional 5 trips (two-way) during the peak hours for the operational phase of this project. Furthermore, this relates to approximately an additional 4 trips (two-way) each on the road network during the peak hours for the construction, operational and decommissioning phases of the proposed BESS project. Therefore, the additional peak hour trips during the construction, operational and decommissioning phases of the proposed projects will have an insignificant traffic impact on the surrounding road network.

From the TIA, it is evident that the proposed projects will have a range of potential traffic related impacts ranging from very low to moderate significance before mitigation, which is expected to be reduced to very low to low significance provided that appropriate mitigation is implemented. The specialist also concluded that no fatal flaws were discovered during the investigations. Based on these conclusions, it is the opinion of the specialist that the proposed projects can be supported, from a traffic engineering perspective, provided that the mitigation measures and recommendations provided in the TIA are adhered to.

During the 30-day comment period on the Draft EIA Report, traffic related comments were raised by SANRAL. These include, but not limited to, the need for a condition assessment of key intersections of National Roads where the development traffic is expected to impact the pavement condition prior to commencement of construction; a construction traffic management plan (CTMP) and traffic accommodation strategy; and a safety appraisal for the N6 and S1262 intersection. The relevant management actions recommended by SANRAL have been included in the TIA and relevant EMPs for the proposed projects.

Refer to Appendix E.9 of this EIA Report for additional information including *inter alia* a description of access, existing traffic conditions and expected trip generation, an assessment of the impacts, a list of key issues and impacts from a traffic perspective, a list of potential mitigation measures and recommendations for inclusion in the EMPs as well as a list of the Environmental Authorisation (EA) condition recommendations as recommended by the specialist.



CHAPTER 15: Geohydrology

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15. GEOHYDROLOGY

15.1 Introduction

This chapter provides a brief summary of the Geohydrology Assessment for the Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of the Biesjesvlei Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Facility, and their associated Electricity Grid Infrastructure (EGI), near Smithfield in the Free State Province. **Refer to the full Geohydrology Assessment which is included in Appendix E.10 of this EIA Report for additional information.**

This chapter specifically deals with the **Biesjesvlei PV1 (Project 1) and the Biesjesvlei BESS 1 (Project 4)** (hereinafter referred to as the “proposed projects”).

The information presented throughout this chapter applies equally to Project 1 (Biesjesvlei PV1) and Project 4 (Biesjesvlei BESS 1), unless where mentioned otherwise.

15.2 Need for the Geohydrology Impact Assessment

Government Gazette 43110, Government Notice (GN) R320 published by the then Department of Environment, Forestry and Fisheries (DEFF) on 20 March 2020, includes a general protocol (i.e., Part A of GN R320) that provides the requirements for the Site Sensitivity Verification and minimum report content requirements where a specialist assessment is required but no specific environmental theme protocol has been prescribed. Part A of GN R320 states that prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the study area, as identified by the National Web-based Environmental Screening Tool (Screening Tool), where determined, must be confirmed by undertaking a Site Sensitivity Verification. This is applicable where the Screening Tool includes the maps of the relevant themes to verify. However, there are no dedicated Geohydrology or Groundwater themes on the Screening Tool; therefore, the environmental sensitivity of the study area as identified by the Screening Tool is not applicable. As such, a Site Sensitivity Verification report is not required.

The protocol also states, “*where a specialist assessment is required and no specific environmental theme protocol has been prescribed, the required level of assessment must be based on the findings of the site sensitivity verification and must comply with Appendix 6 of the EIA Regulations.*” It is important to note that the Screening Tool does not identify the need for Geohydrology Assessments for any developments, including Solar PV, BESS and EGI projects. However, to ensure all potential impacts are addressed, a Geohydrology Assessment was commissioned. Furthermore, there is no dedicated assessment protocol prescribed for Geohydrology or Groundwater; therefore, a Geohydrology Assessment in compliance with Appendix 6 of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (as amended) has been undertaken for the proposed projects. However, note that the Geohydrology Assessment will only address the proposed PV and BESS projects.

15.3 Scope of the Geohydrology Impact Assessment

The Geohydrology Assessment was undertaken in order to assess the groundwater to be used for construction, operational and decommissioning phases of the proposed projects, including solar panel cleaning for the PV project; assess the impact of the proposed development on geohydrological resources; provide recommendations to minimise or mitigate impacts as well as to confirm the type of authorisation that is required to utilise the groundwater. The results of the investigation, along with the data analysis and interpretation are described in the Geohydrology Assessment which is included in Appendix E.10 of this EIA Report. Refer to Section 15.5 below for the Terms of Reference that was provided to the specialist.

15.4 Details of the Specialist

The Geohydrology Assessment was undertaken by Louis Jonk of GEOSS South Africa (Pty) Ltd. Louis Jonk is registered as a Professional Natural Scientist with the South African Council for Natural and Scientific Professions (SACNASP), with Registration Number 121278.

15.5 Terms of Reference for the Geohydrology Impact Assessment

The Geohydrology Assessment was completed based on the following Terms of Reference:

- Compile a Geohydrology Impact Assessment in compliance with Appendix 6 of the 2014 NEMA EIA Regulations (as amended) and Part A of the Assessment Protocols published in GN R320. The Specialist Assessment must also be in adherence to any additional relevant legislation and guidelines that may be deemed necessary, as applicable;
- Obtain data for all the PV and BESS sites (i.e. obtain data from the National Groundwater Archive (NGA) (and associated groundwater use databases) and internal GEOSS database (which includes information relevant to the site)). Obtain data from the local Department of Water and Sanitation (DWS) monitoring boreholes. Obtain relevant geological maps and geohydrological maps, as well as relevant groundwater reports;
- Undertake a site visit in order to identify the level of sensitivity relating to geohydrology, and to complete a hydrocensus;
- Analyse the hydrocensus data using geohydrological and spatial analysis methods to address the project objectives;
- Determination, description and mapping of the baseline environmental condition and sensitivity of the study area relating to geohydrology (including hydrogeological characterisation of aquifers (types, sensitivity, vulnerability), and groundwater (quality, quantity, use, potential for industrial or domestic use) in the area surrounding the proposed development;
- Specify set-backs or buffers (if relevant), and provide clear reasons for these recommendations;
- Provide review input on the preferred infrastructure layout following the sensitivity analysis and layout identification;
- Identify significant features or disturbances within the study area and define any environmental risks in terms of geohydrology and the proposed project infrastructure;
- Confirm what type of authorisation or licence is required to make use of the groundwater;

- Identify and assess the potential direct, indirect and cumulative impacts of the construction, operational and decommissioning phases of the proposed development on the receiving environment from a geohydrology perspective using the prescribed impact assessment methodology captured in Chapter 4 of the EIA Report. For cumulative impacts, consider other specified renewable energy and EGI projects within 30 km of the proposed projects. Rate impacts both without and with the implementation of mitigation or enhancement measures;
- Provide a reasoned opinion indicating the acceptability of the proposed development and a recommendation if the development should go ahead or not;
- Provide a description of assumptions and limitations in the report;
- Identify any additional protocols, licensing and/or permitting requirements that are relevant to the project and the implications thereof, if any;
- Provide a Specialist Declaration of Independence and Curriculum Vitae;
- Provide recommendations with regards to potential monitoring programmes;
- Determine mitigation and/or management measures, for inclusion in the Environmental Management Programmes (EMPrs), which could be implemented to, as far as possible, reduce the effect of negative impacts and enhance the effect of positive impacts. Identify best practice management actions, monitoring requirements, and rehabilitation guidelines for all identified impacts, where relevant;
- Incorporate and address relevant comments and concerns raised by the stakeholders, commenting authorities and Interested and Affected Parties (I&APs) prior to submitting the Final EIA Report to the Competent Authority for decision-making; and
- Review the Generic EMPrs for Substations (GN R435) and confirm if there are any specific environmental sensitivities or attributes present on the project site and any resultant site-specific impact management outcomes and actions that are not included in the pre-approved generic EMPr (Part B – Section 1).

15.6 Study Methodology

A full description of the process undertaken for the Geohydrology Assessment and to identify potential impacts associated with the proposed projects are captured in Appendix E.10 of this EIA Report. The impact assessment methodology is also described in detail in Chapter 4 of this EIA Report.

15.7 Assumptions, Limitations and Gaps in Knowledge

The Geohydrology Assessment included the following assumptions, limitations and knowledge gaps:

- A limitation to the investigation was that the area received extensive rainfall prior to the site visit leading to extremely wet roads. Consequently, the specialist was advised against driving on certain roads on some of the farm properties. Despite this, the field work conducted is deemed suitable for the study and meets the objectives of the study.
- The investigation was conducted after anomalous non-seasonal rains outside of the rainfall season of the region. The data, therefore, does not completely reflect conditions that prevail during the drier portion of the year. However, it is not expected that this would affect the outcome of the assessment.

- The geohydrological assessment is based on available literature for the study area. This includes regional scale GIS datasets based on 1: 1 000 000.
- The NGA data is available at a local scale, although is known to sometimes contain false information.
- Since the area earmarked for the development of the proposed Biesjesvlei PV1 falls across the farms Biesjespoort, Klein Badfontein and Benoni, the water requirement for the proposed Biesjesvlei PV1 was calculated based on a ratio of 34:33:33 respectively split between the three mentioned portions, respectively.
- Since the area earmarked for the development of Biesjesvlei BESS 1 falls across the farms Klein Badfontein and Paalland, the water requirement for Biesjesvlei BESS 1 was calculated based on a ratio of 5:95 split between the two mentioned portions, respectively.
- It is believed that the final BESS solution will utilise pre-assembled Lithium-Ion battery systems within a closed container.

No drill records or yield test data exists for production or wind pump boreholes to clarify yields and geological logs.

The acquisition of groundwater levels and quality was difficult for some boreholes; however, most of the boreholes were accessible and the information obtained was sufficient to provide comprehensive geohydrological characterisation of the regional setting.

It is important to note that there are no areas on site that should be avoided from a groundwater sensitivity perspective.

15.8 Key Issues

Potential impacts on groundwater arising from the proposed projects are listed below for each of the projects and each phase, including cumulative impacts. No indirect impacts have been identified.

15.8.1 Biesjesvlei PV1

Construction Phase:

- Impact 1: Potential lowering of the groundwater levels as a result of over-abstraction due to construction requirements.
- Impact 2: Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages.
- Impact 3: Potential impact on groundwater quality as a result of foundation construction occurring below the water table.

Operational Phase:

- Impact 1: Potential lowering of the groundwater levels as a result of over-abstraction due to operational requirements.
- Impact 2: Potential impact on groundwater quality as a result of using cleaning agents for solar panel cleaning.

Decommissioning Phase:

- Impact 1: Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages.
- Impact 2: Potential lowering of the groundwater levels as a result of over-abstraction due to decommissioning requirements.

15.8.2 Biesjesvlei BESS 1

Construction Phase:

- Impact 1: Potential lowering of the groundwater levels as a result of over-abstraction due to construction requirements.
- Impact 2: Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages.
- Impact 3: Potential impact on groundwater quality as a result of foundation construction occurring below the water table.

Operational Phase:

- Impact 1: Potential lowering of the groundwater levels as a result of over-abstraction due to operational requirements.
- Impact 2: Potential impact on groundwater quality as a result of potential spillage associated with the BESS.

Decommissioning Phase:

- Impact 1: Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages.
- Impact 2: Potential lowering of the groundwater levels as a result of over-abstraction due to decommissioning requirements.

15.8.3 Cumulative Impacts

- Potential Impact 1: Potential lowering of the groundwater levels as a result of abstraction during the construction, operational and decommissioning phases for all three Biesjesvlei PV facilities and three BESS facilities.
- Potential Impact 2: Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages from the construction and the decommissioning phases for all three Biesjesvlei PV facilities, and three BESS facilities.
- Potential Impact 3: Potential impact on groundwater quality as a result of foundation construction occurring below the water table from the construction phase for all three Biesjesvlei PV facilities, and three BESS facilities.
- Potential Impact 4: Potential impact on groundwater quality as a result of using cleaning agents for solar panel cleaning during the operational phase for all three Biesjesvlei PV facilities.
- Potential Impact 5: Potential impact on groundwater quality as a result of potential spillage associated with the BESS.

15.9 Key Impacts

The impacts and mitigation measures are described in this section. These impacts and mitigation measures have also been incorporated into the EMPs as relevant, which are included as relevant appendices to this EIA Report. Each project has different potential impact ratings, hence separate impact tables have been provided for each project in this section.

Table 15.1 provides potential impacts for **Project 1 (Biesjesvlei PV1)**.

Table 15.2 provides potential impacts for **Project 4 (Biesjesvlei BESS 1)**.

Table 15.3 provides potential cumulative impacts.

Table 15.1: Assessment of the potential Geohydrology risks and impacts of the Project 1 (Biesjesvlei PV1).

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Lowering of groundwater levels as a result of over-abstraction	Status	Negative	Moderate (3)	- Adhere to the borehole's safe yield and to monitor water levels and flow. - Boreholes must be correctly yield tested according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes). This includes a Step Test, Constant Discharge Test and recovery monitoring.	Low (4)	High
	Spatial Extent	Local				
	Duration	Short Term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				
Accidental oil spillage / fuel leakage	Status	Negative	Very Low (5)	Vehicles must be regularly serviced and maintained to check and ensure there are no leakages. Any engines that stand in one place for an excessive length of time must have drip trays. Diesel fuel storage tanks, if required, should be above ground on an impermeable surface in a bunded area. Vehicles and equipment should also be refuelled on an impermeable surface. A designated area should be established at the construction site camp for this purpose, if off-site refuelling is not possible. If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, and reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes.	Very Low (5)	High
	Spatial Extent	Site Specific				
	Duration	Short Term				
	Consequence	Slight				
	Probability	Extremely Unlikely				
	Reversibility	High				
	Irreplaceability	Low				
Foundation construction occurring below the water table potentially impacting on ground water quality	Status	Negative	Low (4)	- Barriers and liner to be successfully implemented to prevent chemical contamination of underground water during foundation construction. - It is recommended that this is coupled with a groundwater monitoring program starting prior to the construction phase.	Very Low (5)	High
	Spatial Extent	Site Specific				
	Duration	Short Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				
OPERATIONAL PHASE						

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
Lowering of groundwater levels as a result of over-abstraction	Status	Negative	Moderate (3)	- Adhere to the borehole's safe yield and to monitor water levels and flow. - Boreholes must be correctly yield tested according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes). This includes a Step Test, Constant Discharge Test and recovery monitoring.	Low (4)	High
	Spatial Extent	Local				
	Duration	Long Term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				
Potential impact on groundwater quality as a result of using cleaning agents for solar panel cleaning	Status	Negative	Very Low (5)	Use environmentally safe cleaning agents that breakdown naturally and do not cause adverse effects.	Very Low (5)	High
	Spatial Extent	Site Specific				
	Duration	Long Term				
	Consequence	Slight				
	Probability	Extremely Unlikely				
	Reversibility	High				
	Irreplaceability	Low				
DECOMMISSIONING PHASE						
Accidental oil spillage / fuel leakage	Status	Negative	Very Low (5)	Vehicles must be regularly serviced and maintained to check and ensure there are no leakages. Any engines that stand in one place for an excessive length of time must have drip trays. Diesel fuel storage tanks, if required, should be above ground on an impermeable surface in a bunded area. Vehicles and equipment should also be refuelled on an impermeable surface. A designated area should be established at the site camp for this purpose, if off-site refuelling is not possible. If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, and reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes.	Very Low (5)	High
	Spatial Extent	Site Specific				
	Duration	Short Term				
	Consequence	Slight				
	Probability	Extremely Unlikely				
	Reversibility	High				
	Irreplaceability	Low				
Lowering of groundwater levels as a result of over-abstraction	Status	Negative	Moderate (3)	- Adhere to the borehole's safe yield and to monitor water levels and flow. - Boreholes must be correctly yield tested according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water	Low (4)	High
	Spatial Extent	Local				
	Duration	Short Term				
	Consequence	Substantial				
	Probability	Likely				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
	Reversibility	High		boreholes). This includes a Step Test, Constant Discharge Test and recovery monitoring.		
	Irreplaceability	Low				

Table 15.2: Assessment of the potential Geohydrology risks and impacts of the Project 4 (Biesjesvlei BESS 1).

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACTS						
CONSTRUCTION PHASE						
Lowering of groundwater levels as a result of over-abstraction	Status	Negative	Low (4)	- Adhere to the borehole's safe yield and to monitor water levels and flow. - Boreholes must be correctly yield tested according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes). This includes a Step Test, Constant Discharge Test and recovery monitoring.	Very Low (5)	High
	Spatial Extent	Local				
	Duration	Short Term				
	Consequence	Substantial				
	Probability	Very unlikely				
	Reversibility	High				
	Irreplaceability	Low				
Accidental oil spillage / fuel leakage	Status	Negative	Very Low (5)	Vehicles must be regularly serviced and maintained to check and ensure there are no leakages. Any engines that stand in one place for an excessive length of time must have drip trays. Diesel fuel storage tanks, if required, should be above ground on an impermeable surface in a bunded area. Vehicles and equipment should also be refuelled on an impermeable surface. A designated area should be established at the construction site camp for this purpose, if off-site refuelling is not possible. If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, and reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes.	Very Low (5)	High
	Spatial Extent	Site Specific				
	Duration	Short Term				
	Consequence	Slight				
	Probability	Extremely Unlikely				
	Reversibility	High				
	Irreplaceability	Low				
Foundation construction occurring below the water	Status	Negative	Low (4)		Very Low (5)	High
	Spatial Extent	Site Specific				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
table potentially impacting on ground water quality	Duration	Short Term		- Barriers and liner to be successfully implemented to prevent chemical contamination of underground water during foundation construction. - It is recommended that this is coupled with a groundwater monitoring program starting prior to the construction phase.		
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				
OPERATIONAL PHASE						
Lowering of groundwater levels as a result of over-abstraction	Status	Negative	Very Low (5)	- Adhere to the borehole’s safe yield and to monitor water levels and flow. - Boreholes must be correctly yield tested according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes). This includes a Step Test, Constant Discharge Test and recovery monitoring.	Very Low (5)	High
	Spatial Extent	Local				
	Duration	Long Term				
	Consequence	Substantial				
	Probability	Extremely Unlikely				
	Reversibility	High				
	Irreplaceability	Low				
Potential impact on groundwater quality as a result of potential spillage associated with the BESS	Status	Negative	Low (4)	Any waste products produced from the BESS should be removed and disposed of appropriately. Wastewater produced by fire hydrants should not be allowed to runoff into the environment. It is recommended that all BESS are placed a minimum of 50 m from any borehole. Ensure that the BESS is assembled in line with relevant product specifications and with the necessary measures to prevent potential contamination of the surrounding environment.	Very Low (5)	High
	Spatial Extent	Site Specific				
	Duration	Long Term				
	Consequence	Substantial				
	Probability	Very Unlikely				
	Reversibility	High				
	Irreplaceability	Low				
DECOMMISSIONING PHASE						
Accidental oil spillage / fuel leakage	Status	Negative	Very Low (5)	Vehicles must be regularly serviced and maintained to check and ensure there are no leakages. Any engines that stand in one place for an excessive length of time must have drip trays. Diesel fuel storage tanks, if required, should be above ground on an impermeable surface in a bunded area. Vehicles and equipment should also be refuelled on an impermeable surface. A designated area should be established at the site camp for this purpose, if off-site refuelling is not possible. If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, and reported. Proof of	Very Low (5)	High
	Spatial Extent	Site Specific				
	Duration	Short Term				
	Consequence	Slight				
	Probability	Extremely Unlikely				
	Reversibility	High				
	Irreplaceability	Low				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
				disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes.		
Lowering of groundwater levels as a result of over-abstraction	Status	Negative	Low (4)	- Adhere to the borehole's safe yield and to monitor water levels and flow. - Boreholes must be correctly yield tested according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes). This includes a Step Test, Constant Discharge Test and recovery monitoring.	Very Low (5)	High
	Spatial Extent	Local				
	Duration	Short Term				
	Consequence	Substantial				
	Probability	Very Unlikely				
	Reversibility	High				
	Irreplaceability	Low				

Table 15.3: Assessment of the potential Geohydrology cumulative risks and impacts of the proposed projects.

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
CONSTRUCTION PHASE						
Lowering of groundwater levels as a result of over-abstraction	Status	Negative	Moderate (3)	- Adhere to the borehole's safe yield and to monitor water levels and flow. Boreholes must be correctly yield tested according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes). This includes a Step Test, Constant Discharge Test and recovery monitoring. - A monitoring program needs to be adhered to so as to determine and remain below safe abstraction rates.	Low (4)	High
	Spatial Extent	Local				
	Duration	Short Term to Medium Term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				
Accidental oil spillage / fuel leakage	Status	Negative	Very Low (5)	Vehicles must be regularly serviced and maintained to check and ensure there are no leakages. Any engines that stand in one place for an excessive length of time must have drip trays. Diesel fuel storage tanks, if required, should be above ground on an impermeable surface in a bunded area. Vehicles and equipment	Very Low (5)	High
	Spatial Extent	Site Specific				
	Duration	Short Term to Medium Term				
	Consequence	Slight				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
	Probability	Unlikely to Likely		should also be refuelled on an impermeable surface. A designated area should be established at the construction site camp for this purpose, if off-site refuelling is not possible. If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, and reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes.		
	Reversibility	High				
	Irreplaceability	Low				
Foundation construction occurring below the water table potentially impacting on ground water quality	Status	Negative	Low (4)	- Barriers and liner to be successfully implemented to prevent chemical contamination of underground water during foundation construction. - It is recommended that this is coupled with a groundwater monitoring program starting prior to the construction phase.	Very Low (5)	High
	Spatial Extent	Site Specific				
	Duration	Short Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				
OPERATIONAL PHASE						
Lowering of groundwater levels as a result of over-abstraction	Status	Negative	Moderate (3)	- Adhere to the borehole’s safe yield and to monitor water levels and flow. Boreholes must be correctly yield tested according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes). This includes a Step Test, Constant Discharge Test and recovery monitoring. - A monitoring program needs to be adhered to so as to determine and remain below safe abstraction rates.	Low (4)	High
	Spatial Extent	Local				
	Duration	Long Term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	High				
Potential impact on groundwater quality as a result of using cleaning agents for solar panel cleaning	Status	Negative	Very Low (5)	Use environmentally safe cleaning agents that breakdown naturally and do not cause adverse effects.	Very Low (5)	High
	Spatial Extent	Site Specific				
	Duration	Long Term				
	Consequence	Slight				
	Probability	Unlikely				
	Reversibility	High				
Potential impact on groundwater quality as a	Status	Negative	Moderate (3)	Any waste products produced from the BESS should be removed and disposed of appropriately. Wastewater produced by fire	Low (4)	High
	Spatial Extent	Site Specific				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
result of potential spillage associated with the BESS	Duration	Long Term		hydrants should not be allowed to runoff into the environment. It is recommended that all BESS are placed a minimum of 50m from any borehole. Ensure that the BESS is assembled in line with relevant product specifications and with the necessary measures to prevent potential contamination of the surrounding environment.		
	Consequence	Substantial				
	Probability	Unlikely				
	Reversibility	High				
	Irreplaceability	Low				
DECOMMISSIONING PHASE						
Accidental oil spillage / fuel leakage	Status	Negative	Very Low (5)	Vehicles must be regularly serviced and maintained to check and ensure there are no leakages. Any engines that stand in one place for an excessive length of time must have drip trays. Diesel fuel storage tanks, if required, should be above ground on an impermeable surface in a bunded area. Vehicles and equipment should also be refuelled on an impermeable surface. A designated area should be established at the site camp for this purpose, if off-site refuelling is not possible. If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, and reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes.	Very Low (5)	High
	Spatial Extent	Site Specific				
	Duration	Short to Medium Term				
	Consequence	Slight				
	Probability	Unlikely to Likely				
	Reversibility	High				
	Irreplaceability	Low				
Lowering of groundwater levels as a result of over-abstraction	Status	Negative	Moderate (3)	- Adhere to the borehole's safe yield and to monitor water levels and flow. Boreholes must be correctly yield tested according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes). This includes a Step Test, Constant Discharge Test and recovery monitoring. - A monitoring program needs to be adhered to so as to determine and remain below safe abstraction rates.	Low (4)	High
	Spatial Extent	Local				
	Duration	Short Term to Medium Term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				

15.10 Findings and Conclusion of the Geohydrology Impact Assessment

The findings and conclusion below equally apply to Project 1 (Biesjesvlei PV1) and Project 4 (Biesjesvlei BESS 1), unless where mentioned otherwise.

It was found that the proposed projects and surrounding area are underlain by two aquifers with regional groundwater electrical conductivity ranges between 0 and 70 milli-Siemens per metre (mS/m). This is considered to be an “ideal” quality for water with respect to drinking water standards.

The representative hydrocensus conducted by the specialist confirmed the presence of several boreholes on site and/or on neighbouring properties, representing a potentially viable source of groundwater for the development of the proposed projects. The specialist recommended that HBH19 be considered as a production borehole for the proposed projects. The use of this borehole would depend on the operational requirements of the facility, negotiations with the landowners and proximity to the facility.

The results of the chemical analysis indicated that groundwater is generally acceptable in terms of drinking quality except for lead and fluoride which may be elevated in certain boreholes. Therefore, some form of treatment will likely be required for these water sources to adhere to SANS 241-1:2015 standards. Given the generally low turbidity (with some exception) of groundwater samples, groundwater may possibly be used for cleaning of solar panels. This can be confirmed by chemical speciation modelling. However, treatment in the form of reverse osmosis or boiling may be required should groundwater be used for washing of solar panels. Groundwater is also deemed suitable for use in concrete batching with regards to the maximum allowable concentrations of chlorides, sulphates, alkalinity, nitrates, lead, and zinc. However, phosphate concentrations would need to be identified and confirmed to be lower than the maximum allowable value for concrete batching before groundwater is used within the concrete batching process.

Considering that the required peak (operational) water supply is 16 000 m³/a (0.51 L/s) for the proposed Biesjesvlei PV1, and peak (construction) water supply is 450 m³/a (0.01 L/s) for Biesjesvlei BESS 1, the required water volumes should be readily available and could be supplied by the regional average borehole yield of 0.5 – 2.0 L/s given that water for Biesjesvlei PV1 is not sourced from the northernmost portion of the study area where the regional average borehole yield is 0.1 – 0.5 L/s.

If the proposed development is planned appropriately with regards to groundwater use, all the water can be obtained from groundwater, with the use potentially being Generally Authorised. Registration of the usage in terms of the General Authorisation (GA) with DWS would be required and additional restrictions or considerations from DWS may apply. Alternatively, to source all the water from a single property, a Water Use License Application will be required to meet the demands of the construction, operational and decommissioning periods.

From the Geohydrology Impact Assessment, it is evident that the development will have a low to very low impact on the local geohydrological system as long as the recommended mitigation measures are adhered to. Based on these conclusions, it is the opinion of the specialist that the

development of the proposed projects and associated infrastructure be authorised to proceed (from a geohydrological perspective) provided that the mitigation measures recommended by the specialist are implemented during each phase of the proposed projects.

Refer to Appendix E.10 of this EIA Report for additional information including *inter alia* the results of the hydrocensus, site-specific maps, an assessment of the impacts, a list of key issues and impacts from a geohydrological perspective, a list of potential mitigation measures and recommendations for inclusion in the EMPs as well as a list of the EA condition recommendations as recommended by the specialist.



CHAPTER 16: Geotechnical

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16. GEOTECHNICAL LETTER OF OPINION

16.1 Introduction

This chapter provides a brief summary of the Geotechnical Letter of Opinion for the Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of the Biesjesvlei Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Facility, and their associated Electricity Grid Infrastructure (EGI), near Smithfield in the Free State Province. **Refer to the full Geotechnical Letter of Opinion which is included in Appendix E.11 of this EIA Report for additional information.**

One Geotechnical Letter of Opinion was compiled to address all the proposed Biesjesvlei projects, as per the Competent Authority's approval of the combination request. Therefore, this chapter deals with all 10 of the following proposed projects (hereinafter referred to as the "proposed projects"):

- **PROJECTS 1 TO 3:** The proposed development of three Solar PV Facilities and associated infrastructure (i.e. Biesjesvlei PV1 to Biesjesvlei PV3).
- **PROJECTS 4 TO 6:** The proposed development of three BESS and associated infrastructure (i.e. Biesjesvlei BESS 1 to Biesjesvlei BESS 3).
- **PROJECTS 7 TO 9:** The proposed development of a 132 kV Overhead Power Line from each Biesjesvlei PV Facility to the proposed Main Transmission Substation (MTS), and associated infrastructure (i.e. Biesjesvlei EGI 1 to Biesjesvlei EGI 3).
- **PROJECT 10:** The proposed development of an independent 400/132kV MTS and a 400 kV Loop-In-Loop-Out (LILO) from the MTS to the existing Eskom power line, as well as associated infrastructure (i.e. Biesjesvlei MTS and LILO).

Therefore, the information presented in this chapter applies equivalently to all 10 of the above proposed projects, unless where stated otherwise.

16.2 Need for the Geotechnical Letter of Opinion

The National Web-based Environmental Screening Tool (Screening Tool) lists a Geotechnical Assessment to be undertaken for Solar PV and EGI developments. Discussions regarding the need for such an assessment were undertaken during the Pre-Application Meeting held with the Competent Authority, i.e. the National Department of Forestry, Fisheries and the Environment (DFFE) on 6 October 2023. Based on these discussions, the DFFE confirmed that a full Geotechnical Assessment in compliance with Appendix 6 of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (as amended) is not required for the proposed projects, however a letter of opinion from a relevant geotechnical specialist would instead suffice. Refer to Appendix C of this EIA Report for a copy of the Pre-Application Meeting Notes. A Geotechnical Letter of Opinion was therefore compiled for the proposed projects.

16.3 Scope of the Geotechnical Letter of Opinion

The Geotechnical Letter of Opinion was undertaken in order to confirm the specialists' opinion towards the proposed development, to confirm whether the study area is suitable from a geotechnical perspective, as well as to provide a statement on whether there are any fatal flaws associated with the proposed projects. The letter of opinion also provides a description of the geological and geotechnical conditions, a list of potential impacts of the proposed development from a geotechnical perspective, and a list of recommended management actions for inclusion in the Environmental Management Programmes (EMPrs). In addition, a list of Environmental Authorisation (EA) condition recommendations is provided in the letter of opinion. Refer to Section 16.5 below for the Terms of Reference for the Geotechnical Letter of Opinion.

16.4 Details of the Specialists

The Geotechnical Letter of Opinion was undertaken by Louis Jonk and Hardy Luttig of GEOSS South Africa (Pty) Ltd. Louis Jonk is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP), with Registration Number 121278. Hardy Luttig has a pending registration with SACNASP as Professional Natural Scientist.

16.5 Terms of Reference for the Geotechnical Letter of Opinion

As indicated above, the letter is not a full Geotechnical Assessment report that complies with Appendix 6 of the 2014 NEMA EIA Regulations (as amended), but it does, on a desktop basis, summarise the geology of the area, including the likely distribution of potential geotechnical challenges related to the underlying geology for the proposed projects.

The letter of professional opinion was completed based on the following Terms of Reference:

- Determine whether problem soils are likely to be encountered within the study area;
- Describe the geology and anticipated soil conditions;
- Include a general discussion of possible and likely engineering characteristics of the respective geological materials;
- Identify possible development constraints that may be present across the study area, e.g., topographical constraints, major discontinuities, or shallow groundwater conditions (permanent or non-permanent);
- Evaluation of the seismic potential of the area based on available published literature;
- Provide commentary on any potentially sensitive areas across the study area, such as ridges, outcrops and exposures;
- Provide broad recommendations that may be used to guide the geotechnical design and plan future investigations within the study area;
- Specification of set-backs or buffers, and provide clear reasons for these recommendations;
- Provide review input on the preferred infrastructure layout following the sensitivity analysis and layout identification;
- Identify significant features or disturbances within the proposed project area and define any environmental risks in terms of geology or geotechnical features and the proposed project infrastructure;

- Identify the potential impacts of the proposed developments from a geotechnical perspective. This is not a formal assessment, however the impacts are listed and described;
- Provide a reasoned opinion indicating the acceptability of the proposed development and a recommendation if the development should go ahead or not;
- Provide a description of assumptions and limitations;
- Provide a Specialist Declaration of Independence and Curriculum Vitae;
- Provide recommendations with regards to potential monitoring programmes;
- Determine mitigation and/or management measures for inclusion in the EMPs, which could be implemented to, as far as possible, reduce the effect of negative impacts and enhance the effect of positive impacts.
- Incorporate and address relevant comments and concerns raised by the stakeholders, commenting authorities and Interested and Affected Parties (I&APs) prior to submitting the Final EIA Report to the Competent Authority for decision-making.

16.6 Study Methodology

A full description of the process undertaken for the letter of opinion and to identify potential impacts associated with the proposed projects are captured in Appendix E.11 of this EIA Report.

16.7 Assumptions, Uncertainties and Gaps in Knowledge

The letter of opinion excludes a site reconnaissance of the study area and intrusive investigations. The information, results and recommendations in the letter are solely based on a thorough review of existing literature and desktop assessment. Nevertheless, the services rendered by the specialists align with the standard level of care and expertise typically demonstrated by geotechnical professionals operating under similar circumstances within the project's vicinity. Hence, the letter of opinion is deemed sufficient for the current investigation scope, with third-party information incorporated in good faith. It is recommended that an intrusive geotechnical study must be conducted prior to the construction of the proposed projects to inform design and to confirm and characterise the subsurface soil conditions. However, an intrusive geotechnical investigation is not required to fulfil the requirements of the EIA process. This approach is suitable and is not flawed.

16.8 Key Issues and Impacts

The potential impacts of the proposed development on the geotechnical conditions of the study area are described in Table 16.1 below for the construction-, operational- and decommissioning phases. Note that these potential impacts are applicable to the proposed Biesjesvlei Projects 1 to 10. Based on previous similar projects, these potential impacts are generally considered low significance without the implementation of mitigation measures.

Table 16.1: Summary table of potential impacts from a geotechnical perspective for the proposed Biesjesvlei Projects 1 to 10¹.

Phase	Potential Impact	Description
Construction	Displacement of geologic material	Initial construction stages often involve actions like topsoil removal, site grading, and rock extraction. These actions lead to the depletion of geological resources, disruption of natural soil integrity, and removal of vegetation, all contributing to soil erosion.
Construction Operational Decommissioning	Contamination of subsoils and loss of topsoil.	Construction activities necessitate the use of heavy machinery, notably during earthwork tasks. This machinery includes graders, bulldozers, rollers, excavators, water trucks, and concrete mixers. Such equipment requires regular maintenance, involving greasing, and operates using hydraulic fluid and diesel, posing a potential risk of contaminating geological materials. Throughout the operational phase, maintenance activities or accidental spillages may lead to potential contamination of geological materials. To ensure optimal performance of the solar facilities, the solar panels need to remain free from dust and any obstruction on their surfaces. However, the cleaning and maintenance of these panels might introduce chemical contaminants to geological materials. Additionally, spillages from the Battery Energy Storage Systems (BESS) can also contribute to chemical contamination. During the decommissioning phase, dismantling the infrastructure may require heavy machinery. The maintenance and refueling of this machinery increase the likelihood of spillages, posing a potential risk of contaminating geological materials.
Operational Decommissioning	Increased unnatural hard surfaces yielding increased runoff, potentially increasing erosion.	Throughout the operational phase, access points and internal roads will be established, characterized by newly constructed road layers that create artificial hardened surfaces. This construction may also involve the installation of earth, or concrete drains designed to redirect water away from access points and roads. However, these measures could lead to heightened runoff, consequently amplifying erosion. In the decommissioning phase, the presence of access points, internal roads, and adequate drainage will persist. The enduring existence of artificial hard surfaces will likely perpetuate increased runoff, contributing to ongoing erosion.

¹ The Geotechnical Letter of Opinion addresses all projects (i.e. Biesjesvlei Projects 1 to 10).

16.9 Recommended Mitigation Measures

Notable EMP inputs and management actions are detailed below for the various phases.

▪ **Construction Phase:**

- Development of a stormwater management plan by a qualified professional before construction is recommended.
- Installation of suitable systems to redirect water away from areas designated for solar infrastructure. Ongoing monitoring of these systems during the initial construction phase to address erosion or sedimentation promptly. *This is applicable to the PV projects specifically.*
- Immediate rehabilitation post-construction, optimising the conditions for vegetation regrowth.
- Implementation of safeguards during refuelling to protect soil from spillages, ensuring swift and proper disposal if incidents occur.

▪ **Operational Phase:**

- Similar to the construction phase, stormwater management planning by a qualified professional will be required.
- Diversion of water away from road layers and erected structures, akin to the construction phase.
- Replication of mitigation measures for spillages/leakages from the construction phase.
- Proper designed structures and suitable containment to be implemented at the BESS to mitigate potential contamination of the surrounding environment, as recommended by the specialist undertaking the High Level Safety, Health and Environment (SHE) Risk Assessment for the BESS, which is included in Appendix E.12 of the EIA Report. *This is applicable to the BESS projects specifically.*
- Close monitoring of solar panel maintenance, avoiding hazardous chemical use during cleaning. *This is applicable to the PV projects specifically.*

▪ **Decommissioning Phase:**

- Restoration of natural topography and land rehabilitation to near-natural state, including removal of foundations and hard surfaces, followed by proper backfilling.
- Use of locally sourced materials for reinstating and backfilling to ensure uniformity.
- Implementation of standard environmental management procedures for infrastructure.
- Stringent measures to prevent pollution and contamination of the riparian zone, including well-maintained equipment and safeguards during refuelling operations.

16.10 Findings and Conclusion of the Geotechnical Letter of Opinion

Due to the varying geology across the study area, it is likely that the geotechnical properties across the study area will also be variable. These variations might influence foundation conditions, foundation designs, drainage properties, excavatability of soil and rock mass, and the occurrence of problem soils. Therefore, it is recommended that an intrusive geotechnical study must be undertaken prior to construction of the proposed projects. An intrusive geotechnical investigation

is not required to fulfil the requirements of the EIA Process; however, it is recommended that it be conducted post EA (should such authorisation be granted) and prior to construction.

Based on the geotechnical analysis conducted, the specialists have recommended that the proposed Biesjesvlei Projects 1 to 10 be authorised, as no fatal flaws were found during the desktop assessment. However, it is crucial to implement appropriate mitigation measures as recommended by the specialists at every phase of the project to minimise the intensity of the identified impacts. Following the implementation of these mitigation measures, the proposed development is anticipated to have a very low to low impact significance on the local soil conditions and geology.

Refer to Appendix E.11 of the EIA Report for additional information including a description of the geological and geotechnical conditions of the study area, as well as a list of the EA condition recommendations as recommended by the specialists.



CHAPTER 17:

Battery Energy Storage Systems (BESS) High Level Risk Assessment

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17. BATTERY ENERGY STORAGE SYSTEMS HIGH LEVEL RISK ASSESSMENT

17.1 Introduction

This chapter provides a brief summary of the Battery Energy Storage Systems (BESS) High Level Safety, Health and Environment (SHE) Risk Assessment for the Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of the Biesjesvlei Solar Photovoltaic (PV) and BESS Facility, and their associated Electricity Grid Infrastructure (EGI), near Smithfield in the Free State Province. **Refer to the full BESS High Level SHE Risk Assessment which is included in Appendix E.12 of this EIA Report for additional information.**

This chapter specifically deals with the **Biesjesvlei BESS 1 (Project 4)** (hereinafter referred to as the “proposed project”).

The information presented throughout this chapter only applies to Project 4 (Biesjesvlei BESS 1), unless where mentioned otherwise.

17.2 Need for the Battery Energy Storage Systems High Level Risk Assessment

The National Web-based Environmental Screening Tool (Screening Tool) does not identify the need for a BESS Risk Assessment, however in order to consider all main potential impacts, such a study has been commissioned for the proposed projects. The High-Level BESS SHE Risk Assessment is a technical study that does not need to comply with the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA), the 2014 NEMA EIA Regulations (as amended), or the Assessment Protocols published in Government Notice (GN) R320 (March 2020).

17.3 Scope of the Battery Energy Storage Systems High Level Risk Assessment

The BESS High Level SHE Risk Assessment was undertaken in order to assess all applicable risks (e.g., fire, explosion, contamination, end-of life disposal, etc.) associated with the proposed BESS. The Risk Assessment includes the identification of likely hazards and hazardous events related to the construction, operation and decommissioning of the proposed BESS, an estimation of the likelihood/probability of these hazardous events occurring, an estimation of the consequences of these hazardous events, as well as an estimation of the risk and comparison against certain acceptability criteria. Refer to Section 17.5 below for the Terms of Reference that was provided to the specialist.

17.4 Details of the Specialist

The Risk Assessment was undertaken by Debra Mitchell of ISHECON cc. Debra Mitchell is a registered Professional Engineer with the Engineering Council of South Africa (ECSA).

17.5 Terms of Reference for the Battery Energy Storage Systems High Level Risk Assessment

The BESS High Level Risk Assessment was completed based on the following Terms of Reference:

- Provide a description of the region and local features;
- Study the battery technologies to be used;
- Identify sensitive receptors in the area;
- Identify the potential impacts on the health and safety of employees, contractors and public persons;
- Identify relevant legislation and legal requirements; and
- Provide recommendations on possible preventative and mitigation measures for inclusion in the Environmental Management Programme (EMPr) for the BESS.

17.6 Study Methodology

A full description of the process undertaken for the BESS High Level Risk Assessment and to identify potential risks and hazards associated with the proposed project are captured in Appendix E.12 of this EIA Report.

17.7 Key Issues

Potential impacts arising from the proposed project are listed below for each phase, including cumulative impacts.

17.7.1 Construction, Operational and Decommissioning Phases

- Impact 1: Human Health – chronic exposure to toxic chemical or biological agents.
- Impact 2: Human Health – exposure to noise.
- Impact 3: Human Health – exposure to temperature extremes and/or humidity.
- Impact 4: Human Health – exposure to psychological stress.
- Impact 5: Human Health – exposure to ergonomic stress.
- Impact 6: Human and Equipment Safety – exposure to fire radiation.
- Impact 7: Human and Equipment Safety – exposure to explosion over pressures.
- Impact 8: Human and Equipment Safety – exposure to acute toxic chemical and biological agents.
- Impact 9: Human and Equipment Safety – exposure to violent release of kinetic or potential energy.

- Impact 10: Human and Equipment Safety – exposure to electromagnetic waves.
- Impact 11: Environment – emissions to air.
- Impact 12: Environment – emissions to water.
- Impact 13: Environment – emissions to earth.
- Impact 14: Environment – waste of resources, e.g., water, power, etc.
- Impact 15: Public – Aesthetics.
- Impact 16: Investors – Financial.
- Impact 17: Employees and investors – Security.
- Impact 18: Emergencies.
- Impact 19: Investors – Legal.

17.7.2 Cumulative Impacts

Unless another large BESS is installed within 500 m of the BESS location proposed for this project, cumulative impacts of other developments in the greater area do not affect the safety and health of employees, contractors or members of the public within the proposed BESS impact zone. The same can be said for the proposed BESS electrical infrastructure and grid connection. The Biesjesvlei Cluster does plan an additional BESS within 500 m of the proposed Biesjesvlei BESS 1 (Project 4) and this will increase the risks within 500 m of either installation. However, such risks are tolerable as neither BESS is a particularly large facility, and increased risks to employees can be mitigated by improved safety management. As there are no independent occupied facilities (e.g. farmhouses) within 500 m of either BESS, the cumulative risks are not of concern. It is important to note that the proposed Biesjesvlei BESS 3 is located more than 1.5 km away from these facilities.

17.8 Key Risks / Impacts

Refer to the Risk Assessment which is included in Appendix E.12 of this EIA Report for the potential impacts/risks associated with the proposed BESS and for the recommended preventative and mitigative measures for the construction, operational and decommissioning phases of the proposed project.

17.9 Findings and Conclusion of the Battery Energy Storage Systems High Level Risk Assessment

The findings and conclusion below only apply to Project 4 (Biesjesvlei BESS 1), unless where mentioned otherwise.

It was found that for the construction and operational phases of the proposed project, the average raw risk significance was rated as moderate, and the average residual risk was rated as low. There will always be residual risks but with the recommended preventative and mitigative measures, these could be considered suitably low and therefore broadly acceptable.

In terms of a worst conceivable case container fire, the significant impact zone is likely to be limited to within 10 m of the container and mild impacts to 20 m. In terms of a worst conceivable case

explosion, the significant impact zone is likely to be limited to within 10 m of the container and minor impacts such as debris within 50 m. However, based on the current proposed layout, impacts at the closest isolated farmhouses are not expected in both these scenarios.

In terms of a worst reasonably conceivable toxic smoke scenario, provided the units are placed suitably far apart to prevent propagation from one unit to another and large external fires are prevented, the amount of material burning should be limited to one container at any one time. In this case, beyond the immediate vicinity of the fire, the concentrations of harmful gases within the smoke should be low.

In addition, the location of the proposed BESS installation should ideally be located over 500 m from any occupied farmhouses/developments. However, based on the current proposed layout, there are no occupied facilities within 500 m of the proposed BESS; therefore, the risks are considered to be very low.

Based on the outcomes of the BESS Risk Assessment, the specialist concluded that the construction, operational and decommissioning phases of the proposed project does not present any excessively high risks provided the preventative and mitigative measures are incorporated. Furthermore, from a SHE risk perspective, no fatal flaws were identified. Therefore, it is the opinion of the specialist that there is no reason to prohibit the proposed development from a SHE risk perspective.

Refer to Appendix E.12 of the EIA Report for additional information including *inter alia* a detailed risk assessment, a list of recommended preventative and mitigative measures, as well as recommendations for inclusion in the EMP.



CHAPTER 18: Civil Aviation

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18. CIVIL AVIATION

18.1 Introduction

This chapter provides a brief summary of the Site Sensitivity Verification for Civil Aviation for the Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of the Biesjesvlei Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Facility, and their associated Electricity Grid Infrastructure (EGI), near Smithfield in the Free State Province. **Refer to the full Site Sensitivity Verification for Civil Aviation which is included in Appendix E.13 of this EIA Report for additional information.**

This chapter deals with the **Biesjesvlei PV1 (Project 1), the Biesjesvlei BESS 1 (Project 4) and the Biesjesvlei EGI 1 (Project 7)** (hereinafter referred to as the “proposed projects”). It is important to note that the National Web-based Environmental Screening Tool (Screening Tool) does not trigger the need for a Civil Aviation Study and Site Sensitivity Verification for the proposed substations and BESS projects. However, this has been reported on in this chapter for comprehensiveness.

18.2 Need for the Site Sensitivity Verification

Government Gazette 43110, Government Notice (GN) R320 published by the then Department of Environment, Forestry and Fisheries (DEFF) on 20 March 2020, includes a protocol that provides the criteria for the specialist assessment and minimum report content requirements for impacts on civil aviation installations for relevant activities requiring Environmental Authorisation (EA). Since the proposed projects require an EA in terms of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (as amended), and Civil Aviation was identified as a relevant theme and recommended study in the Screening Tool Report, GN R320 must be complied with. A Site Sensitivity Verification for Civil Aviation was therefore undertaken for the proposed projects.

18.3 Scope of the Site Sensitivity Verification

The Site Sensitivity Verification for Civil Aviation was undertaken in order to determine the current use of the land and the potential environmental sensitivity (from a civil aviation perspective) of the site under consideration as identified by the Screening Tool.

The Site Sensitivity Verification for Civil Aviation was undertaken by Lizande Kellerman and Willan Adonis¹ of the Council for Scientific and Industrial Research (CSIR) from 12 – 13 December 2023. Lizande Kellerman is registered with the South African Council for Natural and Scientific Professions (SACNASP), with Registration Number 400076/10 in the field of Botanical Sciences.

¹ Note that this staff member resigned from the CSIR at the end of 2023.

18.4 Findings and Conclusion of the Site Sensitivity Verification

The Screening Tool depicted the entire study area for the proposed projects as being located in a low sensitivity area from a civil aviation perspective based on the various themes used for the proposed projects. However, for the civil aviation themes associated with the proposed BESS and EGI developments, the Screening Tool identified the Bloemfontein Military Low Flying Area (FAD28 – GND 1000 FT AGL), which is demarcated as high sensitivity and located outside of the study area, and a significant distance away. In addition, the Landfontein Aerodrome was identified to be located approximately 28 km south of the study area, on private land that was inaccessible during the site visit. However, based on their locations, and the height of the proposed project infrastructure, and other existing high voltage power lines (extending to 40 m high) in the study area, the Bloemfontein Military Low Flying Area and the Landfontein Aerodrome will not be impacted on by the proposed projects.

The low sensitivity from a civil aviation perspective was verified during a site visit, whereby no civil aviation features or installations were found within the study area and the development footprints of the proposed projects. Therefore, in terms of GN R320, no further requirements are applicable i.e. a Compliance Statement is not required, if the site is indeed found to be of low sensitivity during the site visit.

Refer to Appendix E.13 of the EIA Report for maps from the Screening Tool and of the Civil Aviation features discussed above.



CHAPTER 19: Defence

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19. DEFENCE

19.1 Introduction

This chapter provides a brief summary of the Site Sensitivity Verification for Defence for the Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of the Biesjesvlei Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Facility, and their associated Electricity Grid Infrastructure (EGI), near Smithfield in the Free State Province. **Refer to the full Site Sensitivity Verification for Defence which is included in Appendix E.14 of this EIA Report for additional information.**

This chapter deals with the **Biesjesvlei PV1 (Project 1) only** (hereinafter referred to as the “proposed project”). It is important to note that the National Web-based Environmental Screening Tool (Screening Tool) does not trigger the need for a Defence Study and Site Sensitivity Verification for the proposed substations, BESS, MTS and LILO projects.

19.2 Need for the Site Sensitivity Verification

Government Gazette 43110, Government Notice (GN) R320 published by the then Department of Environment, Forestry and Fisheries (DEFF) on 20 March 2020, includes a protocol that provides the criteria for the specialist assessment and minimum report content requirements for impacts on defence installations for relevant activities requiring Environmental Authorisation (EA). Since the proposed project requires an EA in terms of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (as amended), and Defence was identified as a relevant theme and recommended study in the Screening Tool Report, GN R320 must be complied with. A Site Sensitivity Verification for Defence was therefore undertaken for the proposed project.

19.3 Scope of the Site Sensitivity Verification

The Site Sensitivity Verification for Defence was undertaken in order to determine the current use of the land and the potential environmental sensitivity (from a defence perspective) of the site under consideration as identified by the Screening Tool.

The Site Sensitivity Verification for Defence was undertaken by Lizande Kellerman and Willan Adonis¹ of the Council for Scientific and Industrial Research (CSIR) from 12 – 13 December 2023. Lizande Kellerman is registered with the South African Council for Natural and Scientific Professions (SACNASP), with Registration Number 400076/10 in the field of Botanical Sciences.

¹ Note that this staff member resigned from the CSIR at the end of 2023.

19.4 Findings and Conclusion of the Site Sensitivity Verification

The Screening Tool depicted the entire study area for the proposed project as being located in a low sensitivity area from a defence perspective i.e. there are no major or other types of defence installations or buffers that intersect with the study area or the development footprint. However, the latest Air Traffic and Navigational Services (ATNS) data (2024) indicates the presence of what is classified as the Bloemfontein Military Low Flying Area (FAD28 – GND 1000 FT AGL), which is located outside of the study area, and a significant distance away. However, based on its location, and the height of the proposed project infrastructure, and other existing high voltage power lines (extending to 40 m high) in the study area, the Bloemfontein Military Low Flying Area will not be impacted on by the proposed project.

The low sensitivity from a defence perspective was verified during a site visit, whereby no defence features or installations were found within the study area and the development footprint of the proposed project. Therefore, in terms of GN R320, no further requirements are applicable i.e. a Compliance Statement is not required, if the site is indeed found to be of low sensitivity during the site visit.

Refer to Appendix E.14 of the EIA Report for maps from the Screening Tool and of the Defence features discussed above.



CHAPTER 20: Conclusions and Recommendations

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20. CONCLUSIONS AND RECOMMENDATIONS

This chapter contains the main conclusions and recommendations from the Environmental Impact Assessment (EIA) Process, provides the key findings of the specialist assessments (i.e., outlines the most significant key impacts identified, together with the key mitigation and management actions required to avoid or mitigate the negative impacts or enhance positive benefits), and an integrated summary of factors that will inform decision-making by the Competent Authority (i.e., the Department of Forestry, Fisheries and the Environment (DFFE)). In addition, the chapter also includes the recommendation of the Environmental Assessment Practitioner (EAP) on the environmental suitability of the projects and whether the projects should receive Environmental Authorisation (EA).

This chapter deals with the following proposed projects that are addressed in this report:

- **PROJECT 1:** The proposed development of a Solar Photovoltaic (PV) Facility and associated infrastructure (i.e. Biesjesvlei PV1).
- **PROJECT 4:** The proposed development of a Battery Energy Storage System (BESS) and associated infrastructure for Biesjesvlei PV1 (Biesjesvlei BESS 1).
- **PROJECT 7:** The proposed development of a 132 kV Overhead Power Line from the on-site substation to the proposed Main Transmission Substation (MTS) and associated infrastructure (Biesjesvlei EGI 1).

Note: The information throughout this chapter applies to each of the projects addressed in this report (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1)), unless where mentioned otherwise.

This EIA Report has investigated and assessed the significance of potential positive and negative direct, indirect and cumulative impacts associated with the proposed projects. Detailed assessments of the potential impacts identified and assessed by the specialists during the EIA Phase are included in Appendix E of this EIA Report, as well as summarised in Chapters 6 to 17 of this EIA Report. **Following the exclusion of all “no-go” areas as shown in Section 3.7 of Chapter 3 of this EIA Report (which has been successfully achieved by the project layouts), no negative residual impacts have been identified within this EIA that, in the opinion of the EAP who has conducted this Scoping and EIA Process, should be considered “fatal flaws” from an environmental perspective, and thereby necessitate substantial re-design or termination of the project.**

This chapter constitutes an **Environmental Impact Statement**, as required in terms of Appendix 3 of the 2014 NEMA EIA Regulations (as amended), which includes the following:

- a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted Scoping Report indicating any areas that should be avoided, including buffers (Section 20.1);
- a summary of the identified project alternatives (Sections 20.2);
- a summary of the key findings of the EIA (Section 20.5 and Section 20.6); and

- a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives (Section 20.4 and Section 20.5).

20.1 Environmental Sensitivity Mapping and Development Footprint for Approval

During the Scoping Phase, detailed specialist studies were conducted for the 3 060 ha study area, including further desktop analysis and field surveys, where relevant. The farm portions forming part of the study area and per project are listed in Chapter 2 of this EIA Report. The assessment of the study area led to the identification of environmental features, which were assigned relevant sensitivities by the specialists, as described in Section 3.7 of Chapter 3 of this EIA Report. The sensitivities identified were taken into consideration and the Scoping Buildable Areas were formulated, which avoided all no-go areas. During the EIA Phase, the development footprints and layout plans were developed based on the acceptable buildable areas i.e. the development footprints and layout plans avoid the no-go areas identified by the specialists. Some linear infrastructure such as access roads and power lines are acceptable to traverse high or very high sensitivity areas as the relevant specialists have provided adequate mitigation measures and recommendations, which have been incorporated into the Environmental Management Programmes (EMPrs) for the proposed projects. The EMPrs are included in Appendix J to Appendix O of this EIA Report.

Based on comments received from the DFFE Integrated EA Directorate during the 30-day comment period on the Draft EIA Report, the following must be noted regarding the maps as explained in Section 3.7 of Chapter 3 of this EIA Report:

- The layout maps that were included in Chapter 20 of the Draft EIA Report and relevant appendices were the **final layout maps**. The layout maps included in this chapter of this Final EIA Report and relevant appendices are also the **final layout maps**. These final layout maps adhere to all the specialist recommendations regarding placement of infrastructure. As indicated in the specialist reports (Appendix E of this EIA Report), all the relevant specialists have confirmed that the development footprints and project layouts are acceptable, **there are no fatal flaws associated with the projects and they are recommended to receive EA**. None of the proposed development footprints of the key infrastructure intersect with any of the no-go areas identified by the specialists. As noted above, the specialists explain that associated infrastructure, such as access roads and power lines, are allowed in these no-go areas as adequate mitigation measures have been recommended.
- The sensitivity maps, and combined project and layout maps provided herein **show all identified no-go areas, features and their associated buffers** (i.e. the sensitivities mapped are inclusive of the features and their buffers).
- The feature and sensitivity maps for the study area, as well as the combined project layout and sensitivity maps (i.e. project layouts overlap with sensitivities identified) have been updated in this Final EIA Report to **improve visualisation** (e.g. use of more distinct colours).

Refer to Section 3.7 of Chapter 3 of this EIA Report for the following maps:

- **Study Area Environmental Feature Map**, which shows the identified and assessed environmental features present within the study area and allocated buffers;
- **Study Area Environmental Sensitivity Map**, which shows the environmental sensitivity that has been allocated to these features within the study area, inclusive of the associated buffers;
- **Study Area Combined Environmental Feature and Layout Map**, which shows the layout and development footprints of Biesjesvlei Projects 1 to 10 overlain onto the above-mentioned feature map; and
- **Study Area Combined Environmental Sensitivity and Layout Map**, which shows the layout and development footprints of Biesjesvlei Projects 1 to 10 overlain onto the above-mentioned sensitivity map.

The sensitivity map indicates that the inherent environmental sensitivity of the study area for the proposed projects are generally low, medium, and high sensitivity, with some very high sensitivity areas. However, as indicated in these maps, all no-go areas have been avoided by the proposed projects (with access roads and power lines acceptable to traverse these areas). The study area is suited for the proposed development based on the understanding that measures have been taken to firstly avoid the sensitive features as best as possible, and all aspects to manage or mitigate potential impacts have been identified in the EIA Phase and included in the EMPs.

Project specific maps have been included in this chapter, whereby the development footprints are overlain onto the sensitivity maps to show how they relate to the environmental features and sensitivities, and how the no-go areas have been avoided. Refer to the following maps in this regard:

- Figure 20.1 illustrates a **final** project layout map detailing the development footprint for Project 1 (Biesjesvlei PV1).
- Figure 20.2 illustrates a **final** project layout map detailing the development footprint for Project 4 (Biesjesvlei BESS 1).
- Figure 20.3 illustrates a **final** project layout map detailing the development footprint for Project 7 (Biesjesvlei EGI 1).
- Figure 20.4 provides, for context, a **final** project layout map indicating the development footprints of all three projects in relation to each other (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1), and Project 7 (Biesjesvlei EGI 1)) [as well as Project 10 (Biesjesvlei MTS and LILO), which is covered in a separate report].
- Figure 20.5 illustrates a combined **final** project layout and sensitivity map for Project 1 (Biesjesvlei PV1).
- Figure 20.6 illustrates a combined **final** project layout and sensitivity map for Project 4 (Biesjesvlei BESS 1).
- Figure 20.7 illustrates a combined **final** project layout and sensitivity map for Project 7 (Biesjesvlei EGI 1).
- Figure 20.8 provides, for context, a combined **final** project layout and sensitivity map for all three projects in relation to each other (i.e. Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1), and Project 7 (Biesjesvlei EGI 1)) [as well as Project 10 (Biesjesvlei MTS and LILO), which is covered in a separate report].

Key maps are also included in Appendix D of this EIA Report.

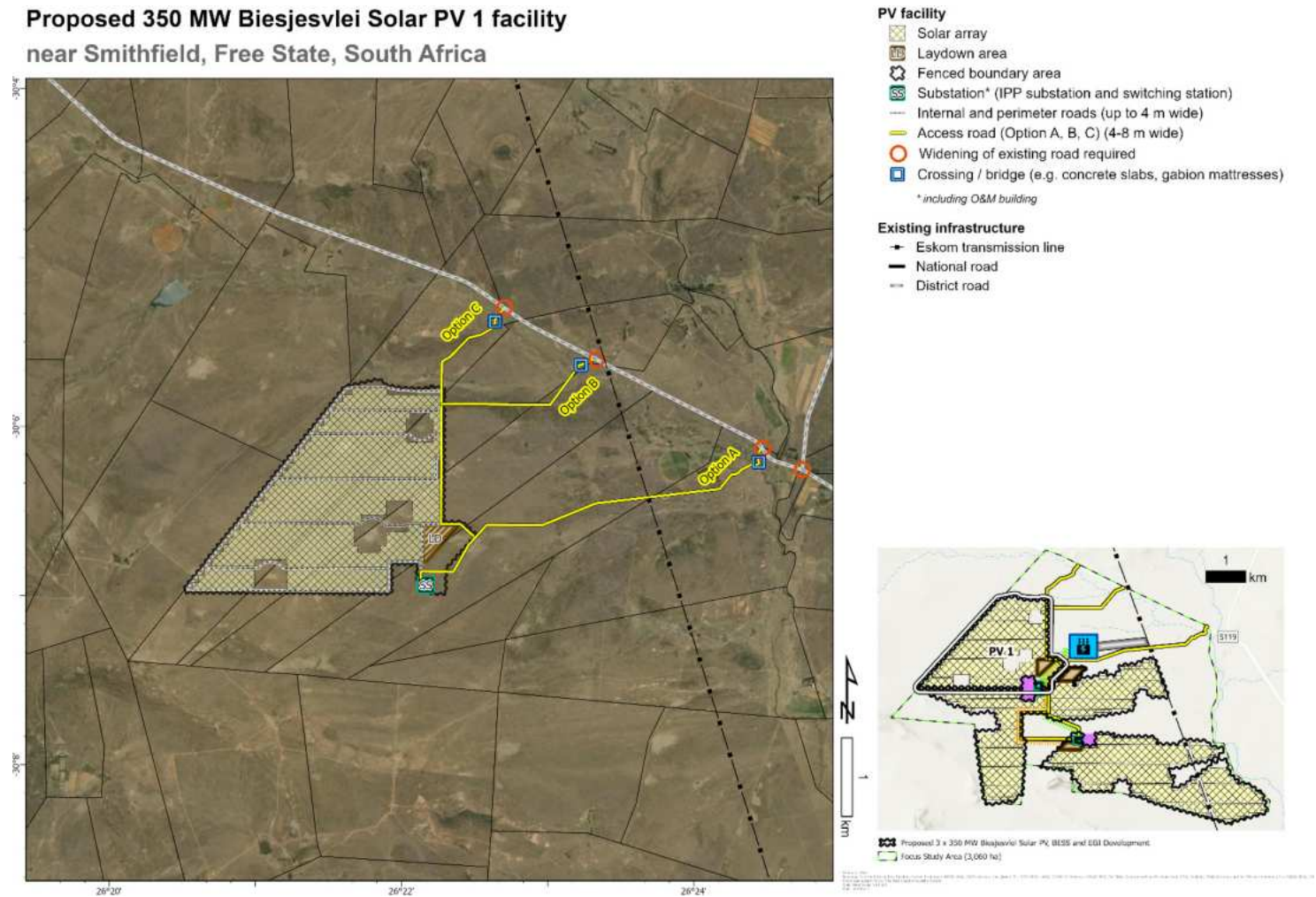


Figure 20.1: Final Project Layout Map showing the detailed infrastructure and development footprints for Biesjesvlei PV1.

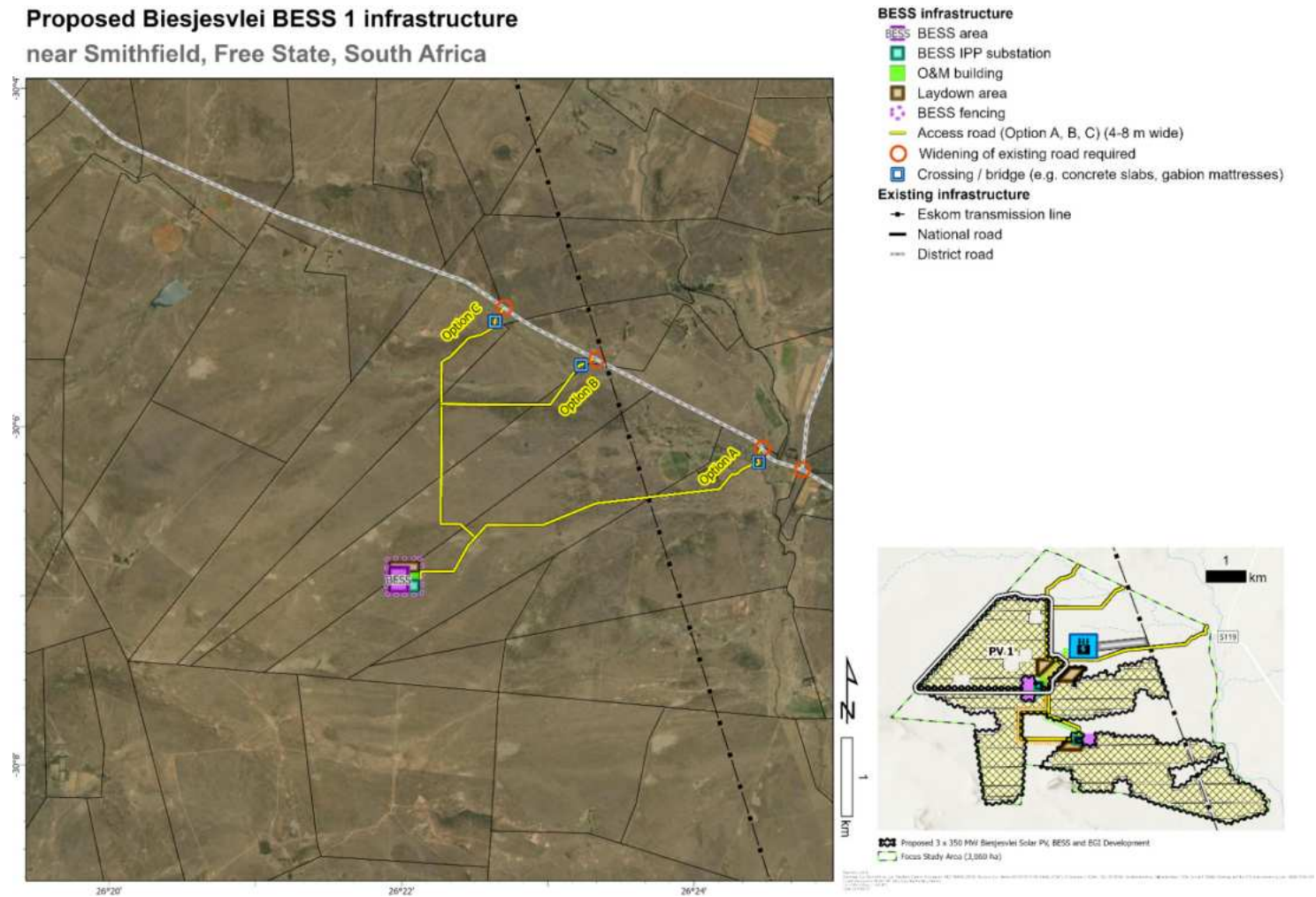


Figure 20.2: Final Project Layout Map showing the detailed infrastructure and development footprints for Biesjesvlei BESS 1.

**Proposed Biesjesvlei EGI 1 infrastructure
near Smithfield, Free State, South Africa**



Figure 20.3: Final Project Layout Map showing the detailed infrastructure and development footprints for Biesjesvlei EGI 1.

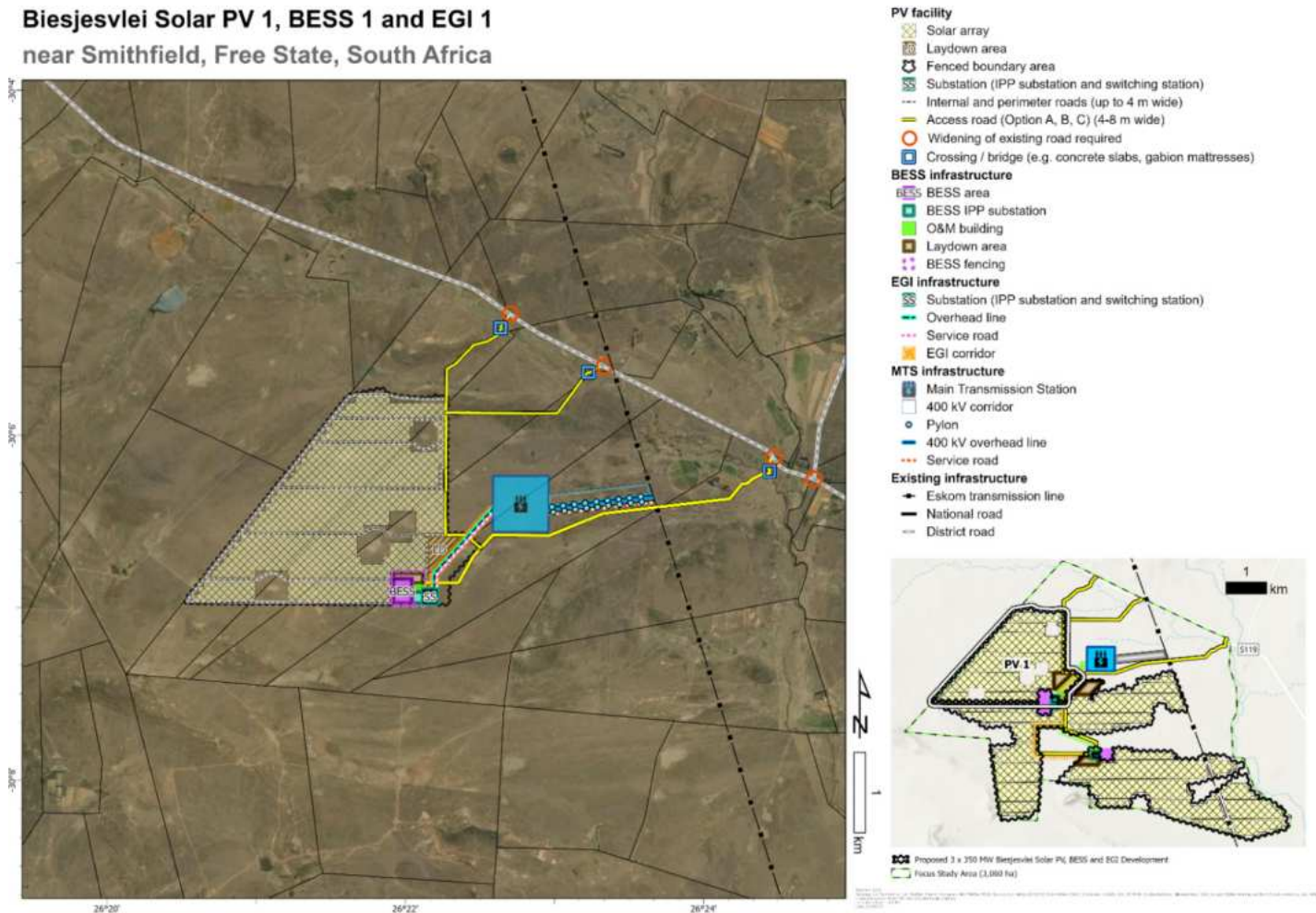


Figure 20.4: Final Project Layout for Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1), and Project 7 (Biesjesvlei EGI 1) [including Project 10 (Biesjesvlei MTS and LIL0)].

**Proposed 350 MW Biesjesvlei Solar PV 1 facility
near Smithfield, Free State, South Africa**

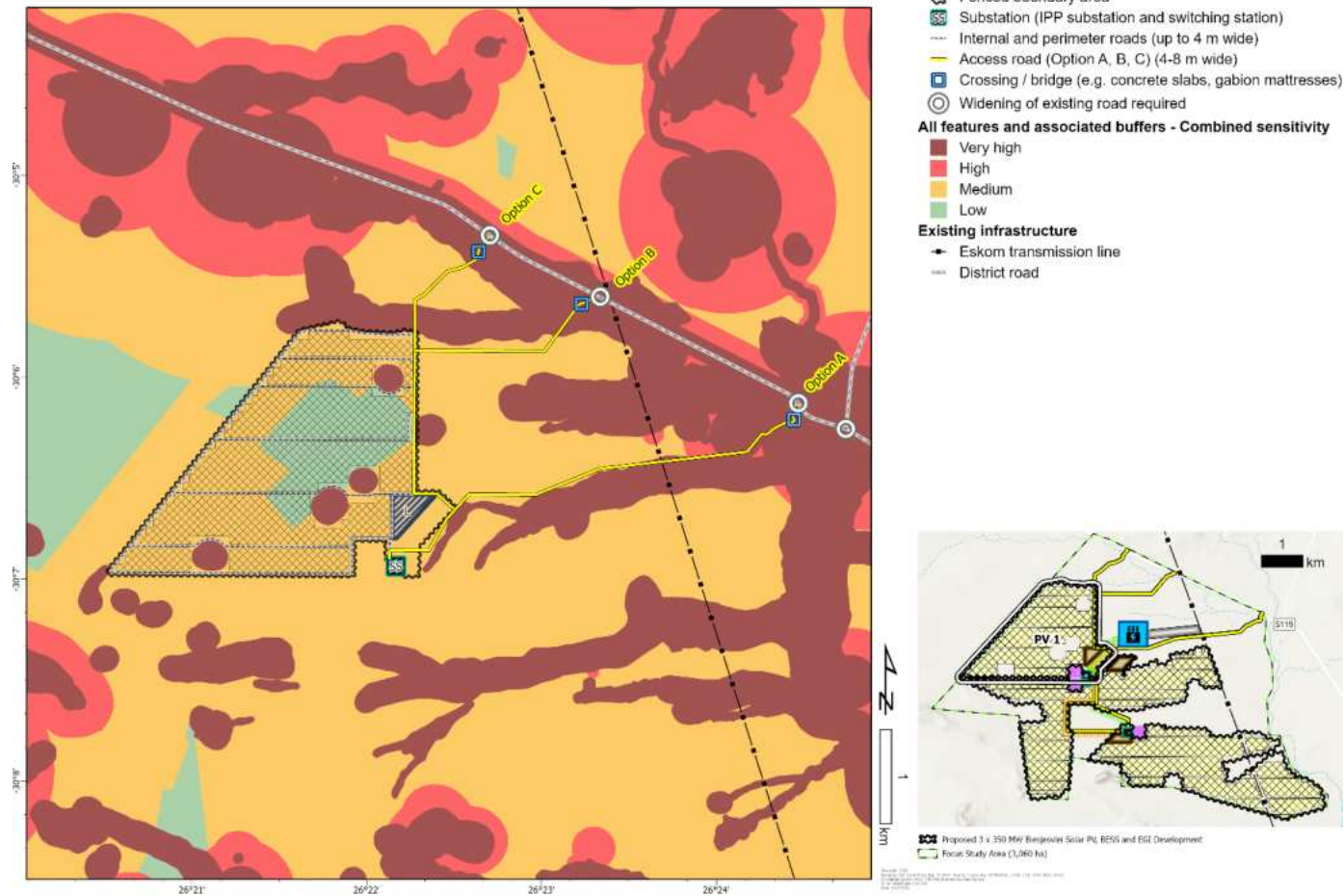


Figure 20.5: Combined Final Project Layout and Sensitivity Map for Biesjesvlei PV1.

Proposed Biesjesvlei BESS 1 infrastructure near Smithfield, Free State, South Africa

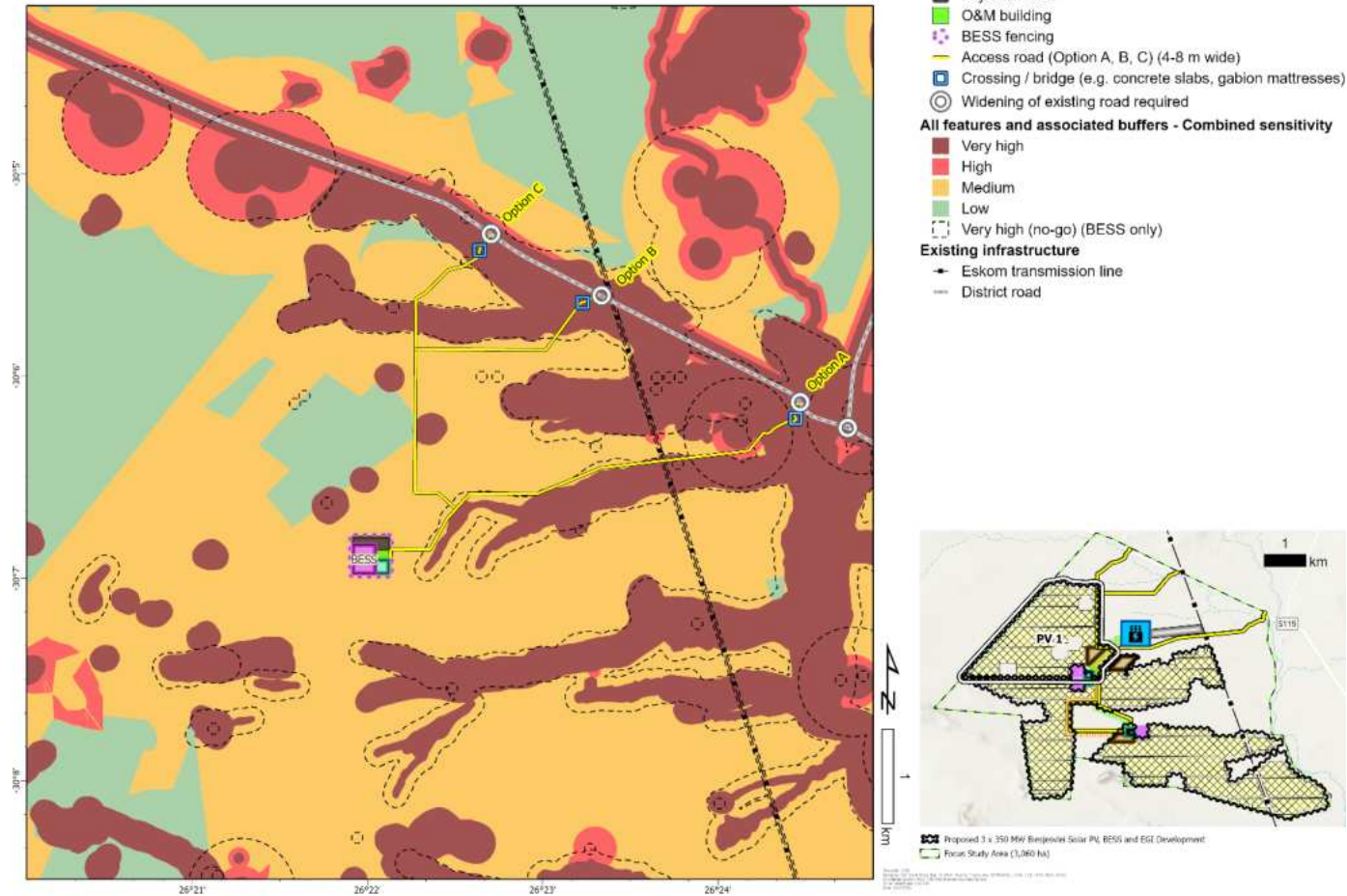


Figure 20.6: Combined Final Project Layout and Sensitivity Map for Biesjesvlei BESS 1.

**Proposed Biesjesvlei EGI 1 infrastructure
near Smithfield, Free State, South Africa**



Figure 20.7: Combined Final Project Layout and Sensitivity Map for Biesjesvlei EGI 1.

Biesjesvlei Solar PV 1, BESS 1 and EGI 1 Development near Smithfield, Free State, South Africa

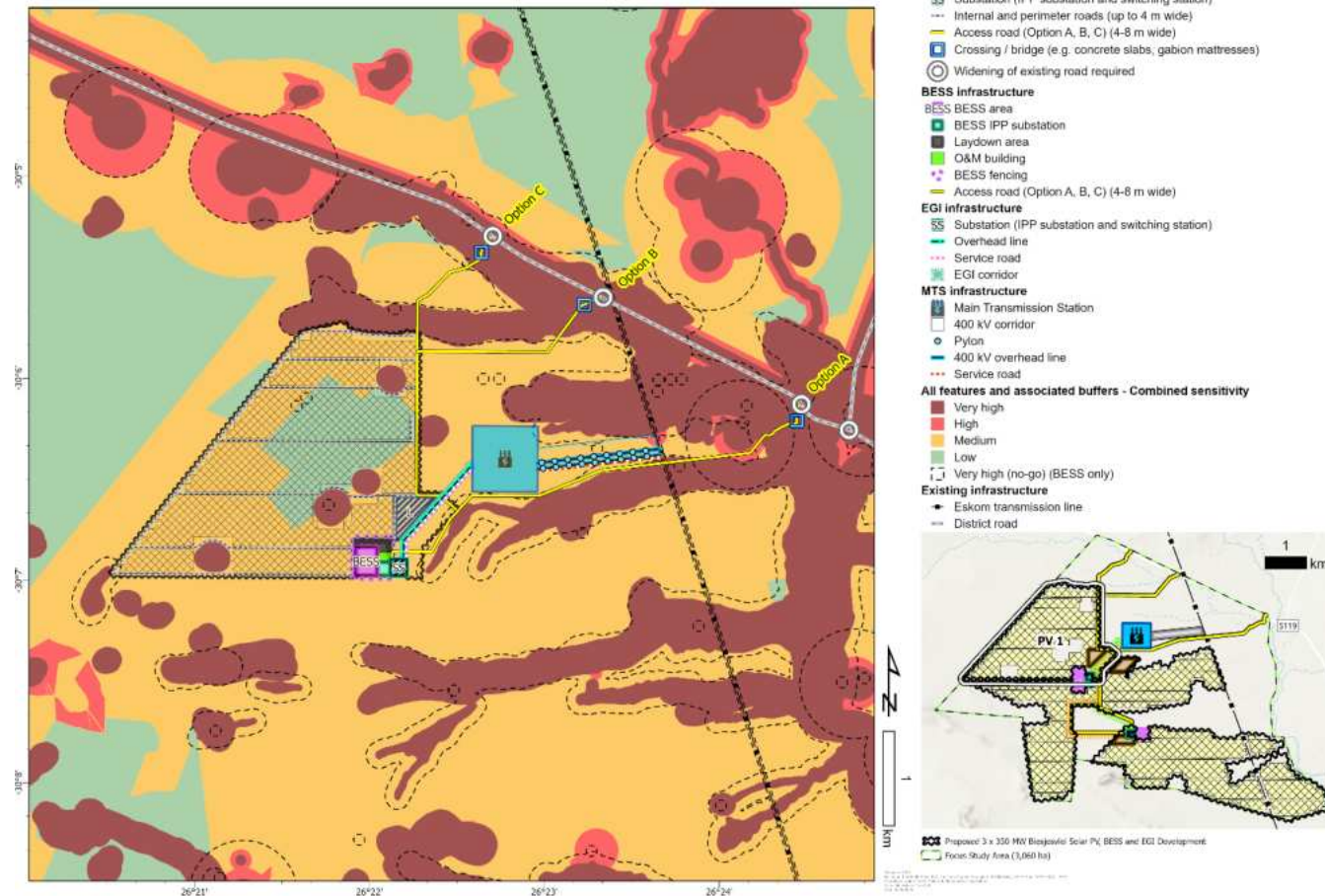


Figure 20.8: Combined Final Project Layout and Sensitivity Map for Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1), and Project 7 (Biesjesvlei EGI 1) [including Project 10 (Biesjesvlei MTS and LILO)].

20.2 Summary of Project Alternatives

As discussed in Chapter 5 of this EIA Report, various alternatives have been considered and assessed as part of the EIA Phase.

- **Land-Use Alternative:**

- The current land-use is agriculture, specifically grazing. The study area has low to medium agricultural sensitivity. The development of the proposed projects at the preferred site is regarded as the preferred land-use.

- **Type of Activity Alternative:**

- The information presented below is applicable to Project 1 (Biesjesvlei PV1) only:
 - The generation of electricity from a renewable energy source was the only activity considered by the Applicant, and thus considered in this EIA Report. **No other activity types were considered or deemed appropriate for this Scoping and EIA Process** based on the expertise of the Applicant.
- The information presented below is applicable to Project 4 (Biesjesvlei BESS 1) only:
 - Electrochemical BESS was the only energy storage option that was identified and considered feasible by the Applicant. Other mechanical, electrical and thermal energy storage systems were not considered. **Therefore, no other activity types were considered or deemed appropriate for this Scoping and EIA Process.**
- The information presented below is applicable to Project 7 (Biesjesvlei EGI 1) only:
 - The activity to be undertaken for Project 7 (Biesjesvlei EGI 1) is the transmission of electricity that will be generated by the proposed Solar PV facility. The only feasible method of transmitting the electricity to the proposed MTS is via power lines. **Therefore, no other activity types were considered or deemed appropriate for this Scoping and EIA Process.**

- **Renewable Energy Alternatives:**

- The information presented below is applicable to Project 1 (Biesjesvlei PV1) only:
 - The development of Solar PV is the preferred and only renewable energy technology to be developed on site because the site has a **very good solar resource availability** (i.e. Global Horizontal Irradiation of 2 000 to 2 200 kWh/m² in terms of the long-term yearly total) and the **local conditions are favourable**.

- **Preferred Site and Development Footprint within the site:**

- The preferred site for all the proposed Biesjesvlei Projects 1 to 10 comprises the 11 farm portions, which served as the 3 060 ha study area for this Scoping and EIA Process. This is the approved site as per the accepted Final Scoping Report.

- As indicated above, a screening and Site Sensitivity Verification (SSV) exercise of the study area was undertaken by the specialist team. This led to the identification of the Buildable Areas and development footprints within the preferred site. The Buildable Areas and development footprints avoid the no-go environmental sensitivities identified by the specialists. The layout, and combined layout and environmental sensitivity maps are shown in Section 20.1 of this chapter.
 - The approach followed was to use environmental and social constraints to avoid sensitive features, thus applying mitigation hierarchy thinking. This approach replaces the need to rank alternative sites and locations, as it leads to the selection of the least sensitive development footprint.
- **No-Go Alternative:**
 - The no-go alternative assumes that the proposed projects will not go ahead i.e. it is the option of not constructing the proposed Biesjesvlei PV, BESS and EGI projects. This alternative would result in no environmental impacts (positive and negative) on the preferred site or surrounding local area, as a result of the proposed projects. The no-go alternative has been assessed in the EIA Phase by all relevant specialists on the project team. Table 20.1 is a summary of the findings of the no-go alternative consideration.

Table 20.1: Summary of the No-Go Alternative based on Specialist Assessments

Specialist Assessment	No-Go Alternative
Appendix E.1: Agriculture Compliance Statement	▪ The no-go alternative considers impacts that will occur to the agricultural environment in the absence of the proposed development. There are no agricultural impacts of the no-go alternative. Even though the impacted land has insufficient agricultural production potential for cropping, and the impact of the development is low, its negative agricultural impact is marginally more significant than that of the no-go alternative, and so from an agricultural impact perspective, the no-go alternative is the preferred alternative. However, the no-go option would prevent the proposed development from contributing to the environmental, social, and economic benefits associated with the development of renewable energy in South Africa. The no-go option would also prevent an additional income source to agriculture to the affected landowners.
Appendix E.2: Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species Assessment	▪ The no-go alternative means the projects do not get developed and no transformation or disturbance of topsoil and vegetation takes place, and no removal of provincially protected species is required. The baseline conditions signify the Aliwal North Dry Grassland, which will remain as is with all current impacts still present, including livestock pens, waterpoints, windpumps, alien invasive species, fences and existing overhead power lines. Furthermore, impacts on ecosystem functions including biodiversity protection, water regulation, quantity and quality, protection of medicinal plants, and climate refugia habitats will not be impacted on, and will continue as normal. ▪ Should the development not proceed, the landowners will continue to utilise the grassland (baseline - dominant land use) for grazing and other agricultural purposes and creates an opportunity for the land to be used for other means, should the landowner, for example, wish to do other developments on site. Any development considered for this site, should result in a net benefit to society and should avoid undesirable negative impacts. ▪ It must be noted however, that not approving these projects does not exclude other renewable energy projects from being developed in this area.

Specialist Assessment	No-Go Alternative
	- Accordingly, since this area is not considered an exclusion zone for development, multiple applications for renewable energy are likely to be submitted to the competent authority for approval. - Therefore, the no-go alternative cannot be looked in isolation and must take into account the regional land use and other developments to determine the 'sense of place' and whether this development will significantly impact on the baseline conditions in a regional context.
Appendix E.3: Aquatic Biodiversity and Species Assessment	- Existing activities within the project area include livestock, dryland and irrigated agriculture, road and electricity infrastructure. These activities have had a moderate to large impact on the status of the watercourses. - The no-go situation for the project area indicates the long-term maintenance of the assessed watercourses within their existing Present Ecological Status (PES) categories. Should the provided mitigation actions be implemented it is however expected that the existing PES categories can be maintained where no fatal flaws in the proposed project design were identified from an aquatic biodiversity perspective, therefore maintaining the current condition of watercourses under the no-go scenario.
Appendix E.4: Avifauna Assessment	The no-go option (applied as a buffer) has accounted for highly sensitive features which may result in unacceptable change in populations where impacted (at a landscape level scale). Where adequate buffers are applied, this will result in no additional impacts on avifauna and will result in the ecological status quo being maintained, which will not affect avifauna assemblages (significantly).
Appendix E.5: Visual Impact Assessment	The 'no-go' alternative is the option of not constructing the proposed projects in which case the status quo of the current landscape character would prevail, the disadvantage being that no solar energy would be produced for export to the national grid. The potential visual impact would be neutral where the status quo is maintained, with neither impacts nor benefits occurring.
Appendix E.6: Heritage Impact Assessment (Archaeology and Cultural Landscape)	- If the projects were not implemented, then the study area would stay as it currently is (impact significance of neutral in most cases but moderate negative for built heritage). - Although the heritage impacts with implementation would generally be greater than the existing impacts, the loss of socio-economic benefits is more significant and suggests that the No-Go option is less desirable in heritage terms.
Appendix E.7: Palaeontology Site Sensitivity Verification Report	Not applicable as the study did not require an impact assessment due to the low to very low palaeo-sensitivity.
Appendix E.8: Socio-Economic Assessment	- If the projects are not authorised, then the impacts or benefits discussed in the Socio-Economic Assessment will not materialise. - The projects have significant socio-economic benefits at the local and regional scale which outweigh the potential negative socio-economic impacts. From a socio-economic perspective the No-Go alternative is thus considered less desirable than proceeding with the projects.
Appendix E.9: Traffic Impact Assessment	- The no-go option will result in no additional impacts on traffic and will result in the road and traffic status quo being maintained. - However, with that being said, no fatal flaws were discovered in the course of the investigations for the proposed projects, and with mitigation the potential impact significance is rated as mainly low to very low.
Appendix E.10: Geohydrology Assessment	Presently, the site proposed for development is used mainly for agricultural purposes, i.e. open fields for grazing of various types of livestock and limited irrigation of feed crops. In the scenario that the proposed projects did not go ahead it would be expected that these activities would continue and represent the baseline against which other impacts can be compared.

Specialist Assessment	No-Go Alternative
	- The farm portions where the proposed projects are proposed do not currently utilise significant volumes of groundwater and small-scale abstraction is predominantly for domestic purposes and agricultural purposes. As such the no-go alternative does not represent a risk to groundwater or aquifer depletion. - However, as noted above, there is a low water demand in the study area and a large spatial extent; and the impacts relating to the use of groundwater for the proposed projects are not considered to be very significant, especially if the projects are planned and phased suitably.
Appendix E.11: Geotechnical Letter of Professional Opinion	The no-go alternative is not required to be assessed based on the professional opinion approach of the study (i.e. does not need to comply with Appendix 6 of the 2014 NEMA EIA Regulations (as amended)).
Appendix E.12: Battery Energy Storage System High Level Safety, Health and Environment (SHE) Risk Assessment	The no-go alternative is not required to be assessed based on technical nature of the study.

- As outlined in Section 20.4 and Section 20.5 of this chapter, the majority of the negative impacts identified as part of this assessment can be reduced to moderate or low significance with the implementation of mitigation measures. None of the specialists found that the proposed projects should not go ahead i.e. no fatal flaws were identified. As noted above, the Socio-Economic Impact Assessment identified positive impacts from a social upliftment perspective.
- Therefore, while the “no-go” alternative will not result in any negative environmental impacts as a result of the proposed projects; it will also not result in any positive community development or socio-economic benefits. It will not assist government in addressing climate change commitments and reaching its set targets for reduced carbon emissions. Furthermore, it will not assist in generating the additional electricity that is urgently required to address the shortage of generation capacity in the country and the need for new solar PV generation capacity that is specified in the energy planning for the country. **Hence the “no-go” alternative is not a preferred alternative, or a reasonable and feasible alternative considered in this Scoping and EIA Process.**

● Technology Alternatives

- The information presented below is applicable to Project 1 (Biesjesvlei PV1) only:
 - Only the PV solar panel type has been considered in this Scoping and EIA Process, along with various mounting options that will be considered in the design.
- The information presented below is applicable to Project 4 (Biesjesvlei BESS 1) only:
 - Only solid state, Lithium-Ion BESS was considered and assessed in this Scoping and EIA Process. Lithium-Ion BESS is the preferred option.
- The information presented below is applicable to Project 7 (Biesjesvlei EGI 1) only:
 - There are no feasible technology alternatives for power lines and switching stations.

20.3 Bridge and Access Road Options

Note: The information in this section only applies to the Project 1 (Biesjesvlei PV1) and Project 4 (Biesjesvlei BESS 1) projects.

As indicated in Chapter 2 of the EIA Report, the potential main access roads to the proposed projects are indicated below:

- Access Route Option A: Along N6, S1262 and S119.
- Access Route Option B: Along N6, S1262 and S119.
- Access Route Option C: Along N6, S1262 and S119.

Access Route Options A, B and C have different access points off the S119. Direct access to the proposed projects will be taken from the S119 along existing farm access points, and thereafter new access roads will be developed, where they do not align with existing roads, or existing roads will be used where possible. Where new access roads are required, these will have a width ranging between 4 m and 8 m. Where existing roads are used, they may need to be upgraded or widened.

All three Access Route Options have been considered in this EIA Process. However, these are not alternatives for comparison and selection of the most preferred. The Applicant is seeking authorisation (should such authorisation be granted) of all three route options so that any of the routes can be used at the time of construction based on feasibility studies, especially since bridge construction is required.

The specialists have all considered the routes and adequate and relevant mitigation measures have been included in the EMPs for the proposed projects. None of the proposed routes were deemed a fatal flaw by the specialists. Refer to Table 20.2 below for additional information based on specialist findings, where relevant. Therefore, all three access route options have been included in the Applications for EA for the PV and BESS projects.

Table 20.2: Summary of the Access Road Options based on Specialist Assessments

Specialist Assessment	Specialist Findings for the Access Road Options
Appendix E.1: Agriculture Compliance Statement	▪ All three access road options were considered, and no objections were raised.
Appendix E.2: Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species Assessment	▪ Access Road Option B and Access Road Option C is preferred above Access Road Option A, as the impacts on vegetation and fauna species are more significant at Access Road Option A. Accordingly, Access Road Option A is the least favourable option but does not represent a fatal flaw following the mitigation measures proposed. The riverbanks need to be stabilised during the construction phase for river crossing development.
Appendix E.3: Aquatic Biodiversity and Species Assessment	▪ The results of the assessment of the road options indicate that Access Route Option C is the most desirable option. It was however noted that highly sensitive cobbled habitats are located downstream of this option. The implementation of erosion and sedimentation control is therefore of the utmost importance for this option. Specific mitigation actions have been provided in the Aquatic Biodiversity and Species Assessment. It is noted that none of the proposed options would constitute a fatal flaw for the proposed projects.

Specialist Assessment	Specialist Findings for the Access Road Options
Appendix E.4: Avifauna Assessment	- With regard to the bridging options, no design that causes upstream inundation should be considered acceptable as it will act as a near unacceptable attractant to the footprint. - Access Road Option B is considered preferable from an avifaunal perspective, however there are no flaws associated with Access Road Options A and C, provided that adequate mitigation is implemented. No large surface areas of water must be created as a result of bridge construction. Habitat maintenance (wetlands and inundated plains), engineering regarding culverts and water flow must be assured.
Appendix E.5: Visual Impact Assessment	The three Access Route Options (i.e. Options A, B and C) towards the north of the study area are acceptable.
Appendix E.6: Heritage Impact Assessment (Archaeology and Cultural Landscape)	The proposed development, including all access route options, has been positioned to avoid all known significant heritage resources, all known graves, and the single heritage structure in the study area (i.e. Salpetersvlei farmhouse at waypoint 342). As a result, the impact significance ranges from low to very low. The access road options make no difference to the heritage impact assessment.
Appendix E.7: Palaeontology Site Sensitivity Verification Report	Due to the low to very low sensitivity across the study area, the location of the infrastructure within the study area does not make any difference in palaeontological terms.
Appendix E.8: Socio-Economic Assessment	From a socio-economic perspective all three of the access road options are acceptable with no specific preference.
Appendix E.9: Traffic Impact Assessment	- Should Access Route Option A be used for the proposed projects, the existing bridge on the internal farm road along Access Route Option A will need to be rebuilt/upgraded. The upgrading of the existing bridge will include the widening of the bridge to a minimum width of 5.5 m (with an estimated 3 m on either side for gabion mattresses) and require the clearing of the area south of the bridge to accommodate the turning movements of the trucks. - Should Access Route Option B be used for the proposed projects, a new bridge will need to be constructed on the internal farm road Access Route Option B with a minimum width of 10 m (with an estimated 3 m on either side for gabion mattresses) to accommodate the turning movements of the trucks. - Should Access Route Option C be used for the proposed projects, a new bridge will need to be constructed on the internal farm road Access Route Option C with a minimum width of 5.5 m (with an estimated 3 m on either side for gabion mattresses). - Vehicle tracking indicated that Access Route Option B and Access Route Option C would provide smoother paths for the trucks to/from the site. - All Access Route Options A, B and C are acceptable from a traffic impact perspective and no flaws were identified.
Appendix E.10: Geohydrology Assessment	The access road options, and layout do not influence geohydrological aspects.

20.4 Need and Desirability

This EIA considered the nature, scale and location of the proposed development as well as the wise use of land (i.e., is this the right time and place for the development of these proposed projects). The proposed projects are linked to the national planning vision for large-scale wind and solar development in South Africa. The development of solar energy, BESS and EGI is important for South Africa to reduce its overall environmental footprint from power generation (including externality costs), and thereby to steer the country on a pathway towards sustainability.

The Socio-Economic Assessment (Appendix E.8 of this EIA Report) explains that there are two significant factors that motivate these projects i.e. more secure power generation (reducing the probability of load shedding and the many socio-economic costs of such outages) and generation of renewable power (contributing to the reduction of social and economic risks from climate change).

The development of renewable energy is strongly supported at a national, provincial, and local level. The Free State region is attractive for renewable energy projects due to the significant solar energy resources.

The Mohokare Local Municipality (MLM) Final Integrated Development Plan (IDP) (2023 – 2024) recognises solar energy development as key opportunities in terms of local economic development (MLM, 2023¹). The development of the proposed projects will also be in line with the mission and vision of the MLM in terms of sustainability and efficient use of resources. The MLM IDP states that unemployment is a challenge in the municipality (MLM, 2023). In line with this, the proposed projects will create various job opportunities and economic spin offs during the construction and operational phases (if EA is granted by the DFFE).

20.5 Specialist Impact Assessment

Based on the detailed specialist assessments, various potential impacts have been identified. A summary of the **main impacts** identified is provided in Table 20.3. Note that several mitigation measures have also been provided by the specialists, however only selected key measures are noted in the table below. The specialist assessments included in Appendix E of this EIA Report, and the summaries with Impact Assessment tables included in Chapters 6 to 17 of this EIA Report, contain all the detail. The recommended mitigation measures have also been included in the EMPs in Appendix J to Appendix O of this EIA Report.

¹ Mohokare Local Municipality Final Integrated Development Plan (IDP) 2023 – 2024. 2023. Available: [https://www.mohokare.gov.za/documents/idp/FINAL%20IDP%20\(2023\).pdf](https://www.mohokare.gov.za/documents/idp/FINAL%20IDP%20(2023).pdf) [online] Accessed: November 2023.

Table 20.3: Summary of Key Impacts that were identified and assessed during the EIA Phase as part of the Specialist Assessments, including key recommended mitigation measures

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
Appendix E.1 – Agriculture Compliance Statement	Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1; Project 4 – Biesjesvlei BESS 1; and Project 7 – Biesjesvlei EGI 1. <u>Negative Direct Impact:</u> Construction, Operation and Decommissioning Phases: - Loss of agricultural potential by occupation of land. There is only ever a single agricultural impact of any development, and it is a net change to the future agricultural production potential of land. It occurs as a result of different mechanisms, some of which decrease production potential and some of which increase it. In most developments, including the proposed Biesjesvlei projects, the decrease in production potential is primarily caused by the exclusion of agriculture from the footprint of the development. Soil erosion and degradation may also contribute to loss of agricultural production potential, but these can be managed so as not to cause impact. - However, the proposed power line has negligible agricultural impact, regardless of its route and design and the agricultural potential and sensitivity of the land it crosses.	Note: The information presented below applies to Project 1 – Biesjesvlei PV1 and Project 4 – Biesjesvlei BESS 1. Design Phase: - Design an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. Construction and Decommissioning Phases: - Implement an effective system of stormwater run-off control, where it is required (as specified above). - Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion. - Topsoil should only be stripped in areas that are excavated. Across most of the site, including construction laydown areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface. - If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface. Operational Phase: - Maintain the stormwater run-off control system. Monitor erosion and remedy the stormwater control system in the event of any erosion occurring. - Facilitate re-vegetation of denuded areas throughout the site.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
Appendix E.2: Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species Assessment	<u>Negative Direct Impacts:</u> Note: The information presented below applies to Project 1 – Biesjesvlei PV1 only. Construction Phase: - Fragmentation and loss of habitat and sensitive features. - Loss of protected species. - Introduction and spread of alien invasive species. - Increased erosion and soil compaction. - Littering and General Pollution. Operational Phase: - Increase in alien invasive species. - Loss of species composition and diversity. - Littering and General Pollution. Decommissioning Phase: - Alien invasive species management. - Loss of habitat. Note: The information presented below applies to Project 4 – Biesjesvlei BESS 1 only. Construction Phase: - Fragmentation and loss of habitat and sensitive features. - Loss of protected species. - Introduction and spread of alien invasive species. - Increased erosion and soil compaction. - Littering and General Pollution. Operational Phase: - Increase in alien invasive species. Decommissioning Phase: - Alien invasive species management. - Loss of habitat.	Note: The mitigation measures below apply equally to the Biesjesvlei PV1, Biesjesvlei BESS 1 and Biesjesvlei EGL 1 projects, except where a mitigation measure is specifically indicated as applying to a specific project only. Construction Phase: - No development should take place within High and Very High sensitivity areas and/or buffer zones. Accordingly, the Koppies habitat should be avoided. The Watercourse habitat should be avoided as per the sensitivity map compiled for Terrestrial Biodiversity. In addition, refer to the Aquatic Biodiversity Assessment where the watercourse is delineated, mapped and suitable buffers recommended by the Aquatic Biodiversity specialist. - No construction related activities, such as the site camp, storage of materials, temporary roads or ablation facilities may be located in the very high sensitivity areas including their buffers. - Minimise impacts to surrounding natural areas by demarcating development footprint and clearly indicating no-go areas. - Where the approved layout designs impact on provincially protected individuals, permit applications are required for either the relocation or destruction of provincially protected species (Free State Nature Conservation Ordinance (FSNCO) 8 of 1969). - Alien invasive species establishment and spreading should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with such plants. - Utilise existing access routes as far as possible. Confine the movement of vehicles to the access routes to and from the site and to the construction areas. - Rehabilitate new vehicle tracks and areas where the soil has been compacted as soon as possible. - Monitor the entire site for signs of erosion. - Refer to mitigation measures relevant to watercourse crossings and development close to watercourses as recommended by the Aquatic Biodiversity Specialist. - General good management actions in terms of spills, refuelling and waste management. These have been included in the Environmental Management Programme. - Where the access road crosses the watercourse the necessary mitigation measures need to be in place to reduce any negative impacts on the feeding and breeding habitat as well as movement of <i>A. capensis</i> (African Clawless Otter) and <i>H. maculicollis</i> (Spotted-necked otter). Where required, the necessary rehabilitation must be done to

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	Note: The information presented below applies to Project 7 – Biesjesvlei EGI 1 only. Construction Phase: - Fragmentation and loss of habitat and sensitive features. - Loss of protected species. - Introduction and spread of alien invasive species. - Increased erosion and soil compaction. - Littering and General Pollution. Operational Phase: - Increase in alien invasive species. - Loss of species composition and diversity. - Littering and General Pollution. Decommissioning Phase: - Alien invasive species management. - Loss of habitat. Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1; Project 4 – Biesjesvlei BESS 1; and Project 7 – Biesjesvlei EGI 1. Negative Cumulative Impacts: Construction Phase: Fragmentation and loss of habitat and sensitive features. Construction Phase: Loss of protected species. Construction, Operational and Decommissioning Phases: Increased alien invasive species.	restore habitat and ecosystem functioning for the species. Restoring riparian habitats and maintaining ecosystem services can align with the Working for Water Programme. - The riverbanks need to be stabilised during the construction phase (in terms of river crossing development). - Ideally, the bridge crossing should be constructed in the dry winter months (June to September) to reduce potential physical impacts on fauna, and to reduce sedimentation runoff in the watercourse which is less favourable for other species. However, since the construction phase has a tight window period (18-24 months) to finish construction and construction is dependent on heavy vehicles reaching the site, it might not necessarily be feasible to wait. Furthermore, once financial closure has been reached, the developer cannot wait to commence with the construction of the bridge. Biesjesvlei PV1: For PV panel installations, no bulldozing to take place for ground preparation. Only sites where PV panels are to be placed may be transformed, including making use of the existing roads and planned roads. There might still be bulldozing in other areas, like for roads, substation, and laydown area, therefore some transformation will occur for permanent infrastructure, but this is a small extent of the total development footprint. Operational Phase: Biesjesvlei PV1 and Biesjesvlei EGI 1: Implement appropriate rehabilitation measures to return the grassland to sustainable, productive use that was representative of the respective vegetation type prior to the commencement of construction. Biesjesvlei PV1 and Biesjesvlei EGI 1: General good management actions in terms of spills, refuelling and waste management. These have been included in the Environmental Management Programme. - Manage plants below the overhead power line based on continuous maintenance. - Follow an alien and invasive species control and monitoring plan. Decommissioning Phase: - The loss of vegetation is unavoidable within the approved layout development footprint, but sensitive areas must be avoided when dismantling of infrastructure. - Implement appropriate rehabilitation measures to return the grassland to sustainable, productive use that was representative of the respective vegetation type prior to the commencement of construction - Alien invasive management as per the construction and operational phase.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
Appendix E.3: Aquatic Biodiversity and Species	Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1; Project 4 – Biesjesvlei BESS 1; and Project 7 – Biesjesvlei EGI 1. <u>Negative Direct Impacts:</u> Construction, Operational, Decommissioning Phases: - Habitat quality degradation. - Water quality degradation. - Aquatic habitat connectivity loss. <u>Negative Cumulative Impacts:</u> Construction, Operational, Decommissioning Phases: - Habitat quality degradation. - Water quality degradation. - Aquatic habitat connectivity loss.	Note: The mitigation measures below apply equally to the Biesjesvlei PV1, Biesjesvlei BESS 1 and Biesjesvlei EGI 1 projects. Construction Phase: - Avoidance must be implemented i.e. the very high and high sensitivity areas identified, delineated and mapped by the Aquatic Specialist must be avoided by main infrastructure. - Culverts and road crossings are recommended to be designed based on the stream simulation culvert design process (United States Department of Agriculture (USDA), 2008). - Culverts should allow for the free movement of aquatic biota including fish such as <i>Enteromius sp.</i> - The placement of instream crossing infrastructure must not result in downstream erosion or upstream impoundment. - The implementation of bank rehabilitation actions must take place. - Where culverts are required, it is recommended that these are spread across the wetland units and not directed through single culverts. - Access routes into or adjacent to the wetlands must make use of existing road ways and crossings where possible. - Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be avoided. - Storm-water generated from roadways and denuded areas must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment. - Storm-water verges as well as other denuded areas must be grassed (re-vegetated) with local indigenous grasses to protect against erosion. - An inspection of the drainage channels must be completed within 3 months following the end of activities and within a month after the first rainfall event which exceeds 50mm. Should excessive sediment be transported down the channels it is recommended that sediment screens are implemented. - Sediment screens must be inspected, maintained and cleared every month or after significant rainfall (>150mm/24hrs). - An alien vegetation removal and management plan must be implemented along the verges of the roads and crossing points. - General storm-water management practices should be included in the design phase and implemented during the construction phase.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
		- Watercourse monitoring should take place annually as part of the environmental management programme (EMPr). Operational Phase: - The implementation of the buffer zones stipulated in the Aquatic Biodiversity and Species Assessment. - Clean and dirty surface water separation and a storm-water management plan must be put into place via standard best practice methods. - A clear storm-water management plan for hardened surfaces must be implemented. - The revegetation of disturbed non-active cleared areas must take place within the first growing season between September and March following completion of the activity. - The above must be audited within 3 months of completing the phase. - No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. - Monitoring of instream structures on an annual basis. Decommissioning Phase: - All contractors and staff are to have undergone an induction / training on the location of sensitive No-Go areas and basic environmental awareness. - Areas where decommissioning is to take place must be clearly demarcated. Any areas not demarcated must be avoided. - Storm-water generated from roadways must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment. - Storm-water verges as well as other denuded areas must be grassed (re-vegetated) with local indigenous grasses to protect against erosion. - Any materials excavated must not be deposited in the wetlands or areas where it is prone to being washed downstream or impeding natural flow. - Stockpiling or storage of materials and/or waste must be placed beyond the defined buffers in the Aquatic Biodiversity and Species Assessment for each respective activity. - Disturbed areas must be re-vegetated after completion of the phase.
Appendix E.4: Avifauna Assessment	Negative Direct Impacts: Note: The information presented below applies to Project 1 – Biesjesvlei PV1 only. Construction Phase:	Note from the CSIR: Several mitigation measures have been identified in the assessment. The list below is only a summary of some of the recommendations. Note: The mitigation measures below apply to the Biesjesvlei PV1 project only. Construction Phase:

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	- Habitat destruction and loss (including foraging and breeding), and fragmentation due to displacement (avoidance of disturbance) due to infrastructure installation and associated dust effects. - Destruction or disturbance of bird roosts. - Disturbance due to noise such as machinery and construction activities. Operational Phase: - Disturbance due to noise such as, machinery movements and maintenance operations. - Loss of bird foraging habitat. - Attraction to the facility. - Chemical pollution spills. - Bird mortalities due to vehicle collisions, collisions with infrastructure and/or combustion. - Disruption of bird migratory pathways. Decommissioning Phase: - Disruption of bird migratory pathways during the decommissioning phase. - Habitat loss reclamation from rehabilitation activities (<i>positive impact</i>). Note: The information presented below applies to Project 4 – Biesjesvlei BESS 1 only. Construction Phase: - Habitat destruction and loss (including foraging and breeding), and fragmentation due to displacement (avoidance of disturbance) due to infrastructure installation and associated dust effects. - Destruction or disturbance of bird roosts. - Disturbance due to noise such as machinery and construction activities. Operational Phase: - Disturbance due to noise such as, machinery movements and maintenance operations. - Loss of bird foraging habitat. - Attraction to the facility. - Chemical pollution spills. Decommissioning Phase: - Disturbance of foraging and breeding behaviours of birds due to noise, dust and lighting.	- Avoid avifaunal specific highly sensitive areas and their associated buffers, such as the local drainage lines, impoundments, smaller watercourses, pans and rocky koppies. Avoidance mitigation to be applied to the positioning of the main infrastructure and supporting infrastructure. <i>Note that the panels have avoided the no-go areas identified by the avifauna specialists.</i> - Roads must utilise or upgrade existing farm roads as far as possible. All roads and crossings must be engineered not to impede surface or subsurface flow in any way. - All underground cables bisecting sensitive habitats must be placed below the subsurface flow of the ephemeral wetlands with the linear construction pits subjected to full rehabilitation in order to maintain normal subsurface flow. - For all panel infrastructure, commencement of construction should be restricted to the months of March, April, May, June, July, August, September, October (latest) to minimise destruction of the avifaunal habitats during their optimal conditions. Timing of any panel construction to not commence in November, December, January and February in order to avoid breeding periods of species within the sensitive drainage lines, wetlands and the general region. Operational Phase: - It is recommended that speed limits of 40 km/h within the project area be strictly enforced during the wet season (November to April). - In all areas where internal roads intersect with semi-natural or natural habitat, all new fences that are constructed (<u>if any</u>) must be set back at least (strictly) 75 m from the edge of every service road in order to allow for vulnerable species such as coursers, cranes and korhaans to obtain adequate height after being flushed by vehicle traffic. An alternative mitigation measure and where a 75 m buffer is not possible, new fences must be set back preferably 2 m and no more than 5 m (directly adjacent) from the edge of internal roads. - Buffers should be maintained around all habitats with a Site Ecological Importance (SEI) designated as High or above in accordance with the site sensitivity verification and delineations. - All habitat attractants should be eliminated so that avifaunal populations will not embed themselves within the infrastructure over time. This includes bird diverters, perch deterrents and the application of non-polarising white tape around and/or across panels to minimise reflection which can attract aquatic birds and insects (food) as panels mimic reflective surfaces of waterbodies. <u>Retrofitting of perch diverters will only be applied if mortality thresholds are breached within the Project Area of Influence (PAOI) (as per</u>

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	Note: The information presented below applies to Project 7 – Biesjesvlei EGI 1 only. Construction Phase: - Disturbance of foraging and breeding behaviours of birds due to noise, dust and lighting. - Loss of habitat due to clearing, trenching, alteration and exclusion from previously accessible habitats. Operational Phase: - Continued disturbance due to operational activities (use of vehicles, lights etc.). - Loss of habitat due to altered and excluded habitats and threat of fire. - Direct mortality from electrocution and collision with infrastructure (e.g. fences, overhead power lines). - Attraction to the facility exacerbating potential impacts. Decommissioning Phase: - Habitat loss reclamation from rehabilitation activities (<i>positive impact</i>). - Continued disturbance due to decommissioning activities (use of vehicles, lights etc.). - Removal of power lines to promote safe passage (lowering collision risk) through the site and avoiding attraction by birds perching and nesting (<i>positive impact</i>). <u>Negative Cumulative Impacts:</u> Construction and Operational Phases: - Construction and Operational Phases: Habitat loss due to a regional saturation of renewable energy facilities. - Operational Phase: Increased collision mortality due to higher regional densities of power lines.	<u>bird monitoring in the EMPr). Retrofitting on panels with non-polarising white tape will only be applicable if mortality thresholds are breached (as per the bird monitoring in the EMPr) and the Lake Effect indeed acts as an impact.</u> Decommissioning Phase: - Decommissioning of panels must not commence during the peak wet season months of November, December, January, and February. - Remove all infrastructure not originally present prior to the construction phase. - Rehabilitate all areas disturbed immediately after decommissioning activities and removal of infrastructure. Note: The mitigation measures below apply to the Biesjesvlei BESS 1 project only. Construction Phase: - Avoid avifaunal specific highly sensitive areas and their associated buffers, such as the local drainage lines, impoundments, smaller watercourses, pans and rocky koppies. Avoidance mitigation to be applied to the positioning of the main infrastructure and supporting infrastructure. <i>Note that the BESS has avoided the no-go areas identified by the avifauna specialists.</i> - Roads must utilise or upgrade existing farm roads as far as possible. All roads and crossings must be engineered not to impede surface or subsurface flow in any way. - For BESS infrastructure, commencement of construction should be restricted to the months of March, April, May, June, July, August, September, October (latest) to minimise destruction of the avifaunal habitats during their optimal conditions. Timing of any BESS construction to not commence in November, December, January and February in order to avoid breeding periods of species within the sensitive drainage lines, wetlands and the general region. Operational Phase: - Buffers should be maintained around all habitats with a SEI designated as High or above in accordance with the site sensitivity verification and delineations. - In the event of increased rodent activity, non-harmful pest control measures should be applied to control population numbers and limit the attractiveness of the project area for foraging. - Application of strict chemical control procedures as per the recommendations provided in the EMPr.

Specialist Assessment undertaken	<u>Key Impacts Identified</u>	Recommended Mitigation Measures
		Decommissioning Phase: - Intensive activities should be scheduled as far as practically possible between February-November (latest). Note that light activities such as normal vehicle use of the roads are not affected by this mitigation measure and these may proceed year-round. - Minimise light pollution. - Enforce a speed limit of 40 km/h on site. - If necessary, apply dust-suppression measures (road wetting) to limit dust. Note: The information presented below applies to Project 7 – Biesjesvlei EGI 1 only. Construction Phase: - Intensive activities should be scheduled as far as practically possible between February-November (latest). Note that light activities such as normal vehicle use of the roads are not affected by this mitigation measure and these may proceed year-round. - Minimise light pollution and fit external lighting with downward facing hoods. - Enforce a speed limit of 40 km/h on site. - Limit the areas cleared for construction purposes (e.g. laydown areas). - Rehabilitate all areas disturbed immediately after construction. - Prioritise existing roads for access routes, where possible. Operational Phase: - For power lines, attempts should be made to minimise the route length to the closest existing substation and that the route should be aligned with existing power lines/roads as far as possible. - Additionally, the route should avoid wetland crossings or potentially be routed underground if this is not possible utilising strict wetland rehabilitation measures captured in the Avifauna Specialist Assessment. - In all new raised power line crossings developed for the Biesjesvlei projects, install bird flight diverters to enhance visibility of lines. Install Eskom-approved bird flight diverters (flappers or coils) on new above-ground transmission lines and on any new guide-wires used to anchor infrastructure such as pylons, and/or new monopoles developed for the Biesjesvlei projects. - Design of new overhead electrical lines developed for the Biesjesvlei projects must take into account potential for electrocution by large species and pre-emptively avoid the

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
		likelihood of this by increasing distances between spans to avoid faecal “streamers” or large open wings creating a short. ▪ Avoid siting lines in areas where birds concentrate. ▪ Where possible, power lines of 132 kV or less should be buried underground. However, if mitigated as per the recommendations in the Avifauna Specialist Assessment, above ground lines are not considered a fatal flaw. ▪ In order to reduce avian mortalities related to bird collisions or nests, perch guards should be installed on all new power line infrastructure developed for the Biesjesvlei projects (such as poles and platforms). ▪ Light reflecting markers / bird flight diverters are a requirement to avoid collision by nocturnal species. Such markers / diverters need to be closely spaced (<15 m) on new overhead power lines and must glow in the dark or reflect light to make the transmission lines more visible at night. ▪ Landowner cooperation will be required in order to ensure no livestock persists within the fenced off area of the projects, or no carcasses should persist within the 3060 ha study area. This is required in terms of removal of attractants for Species of Conservation Concern (SCC) such as vultures. ▪ No water sources, such as concrete reservoirs or animal water troughs, should be located directly under any new proposed power line infrastructure for the Biesjesvlei projects. Any existing concrete reservoirs should either be covered or fitted with a mechanism to allow birds to escape if they become trapped in low-water scenarios. Decommissioning Phase: ▪ Intensive activities should be scheduled as far as practically possible between February-November (latest). Note that light activities such as normal vehicle use of the roads are not affected by this mitigation measure and these may proceed year-round. ▪ Minimise light pollution and fit external lighting with downward-facing hoods. ▪ Enforce a speed limit of 40 km/h on site. ▪ If necessary, apply dust-suppression measures (road wetting) to limit dust. ▪ Remove all infrastructure (mainly pylons) not originally present prior to the construction phase. ▪ Rehabilitate all areas disturbed immediately after decommissioning activities and removal of infrastructure.
Appendix E.5: Visual Impact Assessment	Negative Direct Impacts: Note: The information presented below applies to Project 1 – Biesjesvlei PV1 only.	Note: The information presented below applies to Project 1 – Biesjesvlei PV1 only. Construction Phase:

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	Construction Phase: - Potential effect of dust and noise from trucks and construction machinery during the construction period, and the effect of this on nearby farmsteads and visitors to the area. - Potential visual effect of haul roads, access roads, stockpiles and construction camps in the visually exposed landscape. Operational Phase: - Potential visual intrusion of solar arrays and related infrastructure on receptors including glint and glare. - Potential visual impact of an industrial type of activity on the pastoral / rural character and sense of place of the area. Decommissioning Phase: - Potential visual effect of any remaining structures, platforms and disused roads on the landscape. Note: The information presented below applies to Project 4 – Biesjesvlei BESS 1 only. Construction Phase: - Potential effect of dust and noise from trucks and construction machinery during the construction period, and the effect of this on nearby farmsteads and visitors to the area. - Potential visual effect of haul roads, access roads, stockpiles and construction camps in the visually exposed landscape. Operational Phase: - Potential visual intrusion of the BESS and related infrastructure on receptors. - Potential visual impact of an industrial type of activity on the pastoral / rural character and sense of place of the area. Decommissioning Phase:	- Locate construction camps, batching plants and stockpiles in visually unobtrusive areas, away from public roads. - Implement EMP with ECO during construction. Operational Phase: - Substation to be located in an unobtrusive low-lying area, away from public roads, where possible. - Muted natural colours and non-reflective finishes to be used for structures generally. - Internal access roads to be as narrow as possible, and existing roads or tracks used as far as possible. - Outdoor/ security lighting to be fitted with reflectors to obscure the light source, and to minimise light spillage. - Internal power lines (33 kV) to be located underground where possible. (In some cases, such as stream crossings, internal power lines may need to be above ground). - Outdoor signage to be discrete and commercial / billboard signage avoided. Decommissioning Phase: - Solar arrays and infrastructure to be removed and recycled. - Access roads no longer required to be ripped and regraded. - Exposed or disturbed areas to be revegetated to blend with the surroundings. Note: The information presented below applies to Project 4 – Biesjesvlei BESS 1 only. Construction Phase: - Locate construction camps and stockpiles in visually unobtrusive areas, away from public roads. - Implement EMP with ECO during construction. Operational Phase: - BESS to be located in an unobtrusive low-lying area, away from public roads, where possible. - Muted natural colours and non-reflective finishes to be used for structures generally. - Access roads and internal roads to be as narrow as possible, and existing roads or tracks used as far as possible. - Outdoor/ security lighting to be fitted with reflectors to obscure the light source, and to minimise light spillage.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	- Potential visual effect of any remaining structures, platforms and disused roads on the landscape. Note: The information presented below applies to Project 7 – Biesjesvlei EGI 1 only. Construction Phase: - Potential effect of dust and noise from trucks and construction machinery during the construction period, and the effect of this on nearby farmsteads and visitors to the area. - Potential visual effect of haul roads, access roads, stockpiles and construction camps in the visually exposed landscape. Operational Phase: - Potential visual intrusion of the switching station and power line and related infrastructure on receptors. - Potential visual impact of an industrial type of activity on the pastoral / rural character and sense of place of the area. Decommissioning Phase: - Potential visual effect of any remaining structures, platforms and disused roads on the landscape. Negative Cumulative Impacts: Construction, Operational and Decommissioning Phases: - Potential combined visual effect of the proposed three Biesjesvlei Solar PV facilities, three Biesjesvlei BESS, three Biesjesvlei power lines and EGI, and Biesjesvlei MTS and LILO in the study area, and other developments in the 30 km radius (i.e. existing and proposed Eskom power lines and the proposed fibre optic cable) seen together during the construction, operational and decommissioning phases. No known other existing and proposed renewable energy facilities occur in the general area. Others are so far away as to have no combined visual significance.	- Outdoor signage to be discrete and commercial / billboard signage avoided. Decommissioning Phase: - BESS facilities to be removed and/or recycled. - Access roads no longer required to be ripped and regraded. - Exposed or disturbed areas to be revegetated to blend with the surroundings. Note: The information presented below applies to Project 7 – Biesjesvlei EGI 1 only. Construction Phase: - Locate construction camps and stockpiles in visually unobtrusive areas, away from public roads. - Implement EMP with ECO during construction. Operational Phase: - EGI to be located along unobtrusive corridors away from public roads and farmsteads as far as practically possible. - Access or service roads to be as narrow as possible, and existing roads or tracks used as far as possible. - Use monopoles in preference to lattice pylons, where possible. - Outdoor/ security lighting to be fitted with reflectors to obscure the light source, and to minimise light spillage. Decommissioning Phase: - EGI facilities to be removed and/or recycled. - Access roads no longer required to be ripped and regraded. - Exposed or disturbed areas to be revegetated to blend with the surroundings.
Appendix E.6: Heritage Impact Assessment (Archaeology)	Negative Direct and Cumulative Impacts: Note: The information presented below only applies to Project 1 – Biesjesvlei PV1. Construction Phase:	Note: The mitigation measures below apply equally to the Biesjesvlei PV1, Biesjesvlei BESS 1 and Biesjesvlei EGI 1 projects, except where a mitigation measure is specifically indicated as applying to a specific project only. Construction Phase:

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
and Cultural Landscape)	- Damage or destruction of archaeological materials. - Damage or destruction of graves. - Damage to built heritage resources. - Intrusion of the facility and equipment into the landscape. Operational Phase: - Intrusion of the facility into the landscape. Decommissioning Phase: - Intrusion of the facility and equipment into the landscape. Cumulative Impacts: - Impacts to archaeology, graves, buildings. - Intrusion of the facility and equipment into the landscape. Note: The information presented below only applies to Project 4 – Biesjesvlei BESS 1. Construction Phase: - Damage or destruction of archaeological materials. - Damage or destruction of graves. - Damage to built heritage resources. - Intrusion of the BESS and equipment into the landscape. Operational Phase: - Intrusion of the BESS into the landscape. Decommissioning Phase: - Intrusion of the BESS and equipment into the landscape. Cumulative Impacts: - Impacts to archaeology, graves, buildings. - Intrusion of the BESS and equipment into the landscape. Note: The information presented below only applies to Project 7 – Biesjesvlei EGI 1.	- Demarcate known heritage sites within 50 m of the project footprint as No-Go areas. - Fence known graves with a wire farm fence and gate at least 5 m from all visible graves. - Demarcate known graves within 50 m of the project footprint as No-Go areas. - Report any chance finds to South African Heritage Resources Agency (SAHRA) and/or an archaeologist. In the case of graves, protect chance finds <i>in situ</i> and appoint an archaeologist to exhume under an approved permit. - Demarcate buildings as no-go areas. - Minimise the duration of the construction period. - Minimise cut-and-fill and landscape scarring in general. - Ensure effective rehabilitation of areas not needed during operation. Operational Phase: - Paint buildings in earthy tones (Note: This applies to the PV and EGI project but is only recommended, if feasible, for the BESS project). - Ensure that all maintenance vehicles stay within the authorised footprint. - Make use of lighting mitigation measures such as motion sensors and downlighting. Decommissioning Phase: - Minimise duration of decommissioning period - Ensure effective rehabilitation of all affected areas.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	Construction Phase: - Damage or destruction of archaeological materials. - Damage or destruction of graves. - Damage to built heritage resources. - Intrusion of power line and equipment into the landscape. Operational Phase: - Intrusion of the power line into the landscape. Decommissioning Phase: - Intrusion of the power line and equipment into the landscape. Cumulative Impacts: - Impacts to archaeology, graves, buildings. - Intrusion of the power line and equipment into the landscape.	
Appendix E.7: Palaeontology Site Sensitivity Verification Report	Note: The information presented below applies equivalently to Projects 1 to 10 (i.e. Biesjesvlei PV1 to 3; Biesjesvlei BESS 1 to 3; Biesjesvlei EGI 1 to 3; and Biesjesvlei MTS and LILO). The study area has been confirmed as low to very low palaeo-sensitivity. Provided that the Chance Fossil Finds Protocol is incorporated into the EMPs and fully implemented during the construction phase, there are no objections on palaeontological heritage grounds to authorisation of the proposed projects. Pending the discovery of significant, previously unrecorded fossil sites during the construction phase (which can be handled using the Chance Fossil Finds Protocol), no further specialist palaeontological studies, reporting, monitoring or mitigation are considered necessary for the proposed projects. This approach was accepted and supported by the South African Heritage Resources Agency (SAHRA), as indicated in Appendix G.6 of this EIA Report. Furthermore, SAHRA issued final comments for the proposed projects confirming that the SAHRA Development Applications Unit (DAU) has no objections to the proposed development.	Note: The mitigation measure presented below applies equivalently to Projects 1 to 10 (i.e. Biesjesvlei PV1 to 3; Biesjesvlei BESS 1 to 3; Biesjesvlei EGI 1 to 3; and Biesjesvlei MTS and LILO). The Chance Fossil Finds Protocol has been incorporated into the project EMPs (Appendix J to Appendix O of this EIA Report).
Appendix E.8: Socio-Economic Assessment	Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1 and Project 4 – Biesjesvlei BESS 1, unless where mentioned otherwise.	Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1 and Project 4 – Biesjesvlei BESS 1, unless where mentioned otherwise.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	Construction Phase: <u>Direct Impacts:</u> - Capital investment (CapEx) contributing to the national, regional and local economy (<u>positive impact</u>). - Generation of employment, income and skills (<u>positive impact</u>). <u>Indirect Impacts:</u> - Social disruption and change in social dynamics (<u>negative impact</u>). - Reduced quality of life and increased risks due to construction near residences (<u>negative impact</u>). Operational Phase: <u>Direct Impacts:</u> - Operational investment (OpEx) contributing to the national, regional and local economy (<u>positive impact</u>). - Generation of employment, income and skills (<u>positive impact</u>). - Increased community prosperity through contributions and income from the proposed projects (<u>positive impact</u>). <u>Indirect Impacts:</u> - Increased power generation reducing the probability of load shedding (<u>positive impact</u>) (Note: This impact is only applicable to the Biesjesvlei Solar PV project). Decommissioning Phase: <u>Direct Impacts:</u> - Reduced employment and funding (<u>negative impact</u>). <u>Cumulative impacts:</u> - Construction Phase: Stimulation of economic and employment growth (<u>positive impact</u>). - Operational Phase: Increased community prosperity through contributions and income from Independent Power Producers (IPPs) and operational spending (<u>positive impact</u>).	Note from the CSIR: Several mitigation and enhancement measures have been identified in the assessment. The list below is only a summary of some of the recommendations. Positive Impacts – Enhancement Measures: Construction Phase: - Source as many goods and services as far as possible from the local and regional economy (e.g. use local contractors and accommodation and equipment suppliers as far as possible and purchase perishable goods locally). - Provide suitable training to service providers, where possible and practicable. - Develop and implement a fair and transparent procurement policy. - Provide training to staff and service providers on how to position themselves for other employment opportunities once construction ends. - Consult with existing Independent Power Producer (IPP) projects that successfully procure from local Small, Micro and Medium Enterprises (SMMEs) to share learnings, where possible. - Maximise use of local skills and resources through preferential employment of locals where practicable. - Develop, communicate and implement a fair and transparent labour and recruitment policy. - Ensure diversity and gender equality in recruitment, as far as possible. Operational Phase: - Source as many goods and services as possible from the local and regional economy (e.g. use local contractors (where needed during the operational phase) and accommodation and equipment suppliers as far as possible and purchase perishable goods locally). - Provide suitable training to staff and service providers, where possible and practicable. - Develop and implement a fair and transparent procurement policy. - Provide ancillary training to workers on maximising the use of income and training to further future economic prospects, potentially through projects initiated as part of the social upliftment programme - Maximise use of local skills and resources through preferential employment of locals where practicable. - Develop and implement a fair and transparent labour and recruitment policy.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	Operational Phase: Increased power generation reducing the probability of load shedding (Note: This impact is only applicable to the Biesjesvlei Solar PV project (positive impact)).	- Ensure diversity and gender equality in recruitment, as far as possible. - Regularly engage with community stakeholders to develop meaningful strategies for community development. - Define vision for economic development in consultation with communities. - Ensure that funding requirements for each project are considered into the future so that projects are viable and sustainable. - Set clear goals for each project and phase out funding once these goals are achieved. - Consider auditing projects for several years after funding has ceased to ensure their benefits are sustained. Negative Impacts – Mitigation Measures: Construction Phase: - Liaise with nearby residents before and during construction to inform them of construction status and discuss safety management measures to reduce security risks. - Consider supporting projects that improve local services and infrastructure and/or deal with social problems or conflicts through the social upliftment programme, if the need arises. - Maintain a visible security presence on site. Decommissioning Phase: - Clearly communicate project duration to staff and communities. - Prolong the operational life of the project as much as possible. - Assist with recommendations and referrals where possible. - Assist with the sustainable administration of funds throughout the project lifetime.
Appendix E.9: Traffic Impact Assessment	Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1 and Project 4 – Biesjesvlei BESS 1, unless where mentioned otherwise. <u>Direct Negative Impacts</u> Construction and Decommissioning Phases: - Potential congestion and delays on the surrounding road network. - Potential impact on traffic safety and increase in accidents with other vehicles or animals. - Potential change in the quality of the surface condition of the roads. - Potential noise and dust pollution.	Note: The information presented below applies equivalently to Project 1 – Biesjesvlei PV1 and Project 4 – Biesjesvlei BESS 1, unless where mentioned otherwise. Construction and Decommissioning Phases: - Stagger delivery trips and schedule trips, including staff trips outside of peak hours where possible. - Implement speed control by means of a stop and go system and speed limit road signage within the construction and decommissioning site. - Ensure all vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	Operational Phase: - The traffic generated during the operational phase are mainly related to the staff that will be transported to and from the sites and are not anticipated to have a significant traffic impact on the surrounding road network. Cumulative Negative Impacts Construction and Decommissioning Phases: - Potential congestion and delays on the surrounding road network. - Potential impact on traffic safety and increase in accidents with other vehicles or animals. - Potential change in the quality of the surface condition of the roads. - Potential noise and dust pollution.	- Regular maintenance of the existing external gravel access roads that are used by and impacted on by the proposed projects (i.e. the relevant sections of the S1262 and S119 under the authority of the Free State Government) by the contractor during the construction phase. - Ensure private access roads (i.e. existing internal farm roads leading off the S119) that are used by and impacted on by the proposed developments are restored to original pre-construction road condition or upgraded to suitable standards as specified by the civil engineer and regularly maintained during all phases of the projects, especially during the construction and decommissioning phases. - Implement dust control on gravel roads within the construction and decommissioning site.
Appendix E.10: Geohydrology Assessment	Note: The information presented below applies to Project 1 – Biesjesvlei PV1. Direct Negative Impacts: Construction Phase: - Potential lowering of the groundwater level from construction requirements. - Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages. - Potential impact on groundwater quality as a result of foundation construction occurring below the water table. Operational Phase: - Potential lowering of the groundwater levels as a result of over-abstraction due to operational requirements. - Potential impact on groundwater quality as a result of using cleaning agents for solar panel cleaning. Decommissioning Phase: - Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages. - Potential lowering of the groundwater levels as a result of over-abstraction due to decommissioning requirements.	Note: The mitigation measures presented below apply equivalently to Project 1 – Biesjesvlei PV1 and Project 4 – Biesjesvlei BESS 1, except where a mitigation measure is specifically indicated as applying to a specific project only. Construction and Decommissioning Phases: - Adhere to the borehole's safe yield and to monitor water levels and flow. - Boreholes must be correctly yield tested according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes). This includes a Step Test, Constant Discharge Test and recovery monitoring. - Vehicles must be regularly serviced and maintained to check and ensure there are no leakages. - Diesel fuel storage tanks, if required, should be above ground on an impermeable surface in a bunded area. - Vehicles and equipment should also be refuelled on an impermeable surface. A designated area should be established at the construction site camp for this purpose, if off-site refuelling is not possible. If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, and reported. - Barriers and liner to be successfully implemented to prevent chemical contamination of underground water during foundation construction. It is recommended that this is coupled with a groundwater monitoring program starting prior to the construction phase.

Specialist Assessment undertaken	<u>Key Impacts Identified</u>	Recommended Mitigation Measures
	Note: The information presented below applies to Project 4 – Biesjesvlei BESS 1. Construction Phase: - Potential lowering of the groundwater levels as a result of over-abstraction due to construction requirements. - Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages. - Potential impact on groundwater quality as a result of foundation construction occurring below the water table. Operational Phase: - Potential lowering of the groundwater levels as a result of over-abstraction due to operational requirements. - Potential impact on groundwater quality as a result of potential spillage associated with the BESS. Decommissioning Phase: - Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages. - Potential lowering of the groundwater levels as a result of over-abstraction due to decommissioning requirements. <u>Cumulative Negative Impacts:</u> - Potential lowering of the groundwater levels as a result of abstraction during the construction, operational and decommissioning phases for all three Biesjesvlei PV facilities and three BESS facilities. - Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages from the construction and the decommissioning phases for all three Biesjesvlei PV facilities, and three BESS facilities. - Potential impact on groundwater quality as a result of foundation construction occurring below the water table from the construction phase for all three Biesjesvlei PV facilities, and three BESS facilities.	Operational Phase: - Adhere to the borehole's safe yield, monitoring and yield testing as per the construction phase. <u>Biesjesvlei PV1:</u> Use environmentally safe cleaning agents that breakdown naturally and do not cause adverse effects. <u>Biesjesvlei BESS 1:</u> - Any waste products produced from the BESS should be removed and disposed of appropriately. - Wastewater produced by fire hydrants should not be allowed to runoff into the environment. - It is recommended that all BESS are placed a minimum of 50m from any borehole. - Ensure that the BESS is assembled in line with relevant product specifications and with the necessary measures to prevent potential contamination of the surrounding environment.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	- Potential impact on groundwater quality as a result of using cleaning agents for solar panel cleaning during the operational phase for all three Biesjesvlei PV facilities. - Potential impact on groundwater quality as a result of potential spillage associated with the BESS.	
Appendix E.11: Geotechnical Letter of Professional Opinion	Note: The information presented below applies equivalently to Projects 1 to 10 (i.e. Biesjesvlei PV1 to 3; Biesjesvlei BESS 1 to 3; Biesjesvlei EGI 1 to 3; and Biesjesvlei MTS and LILO). Direct Negative Impacts: Construction Phase: - Displacement of geologic materials. Construction, Operational and Decommissioning Phases: - Contamination of subsoils and loss of topsoil. Operational and Decommissioning Phases: - Increased unnatural hard surfaces yielding increased runoff, potentially increasing erosion.	Note: The information presented below applies equivalently to Projects 1 to 10 (i.e. Biesjesvlei PV1 to 3; Biesjesvlei BESS 1 to 3; Biesjesvlei EGI 1 to 3; and Biesjesvlei MTS and LILO), unless where a specific project is mentioned. Construction Phase: - Development of a stormwater management plan by a qualified professional before construction is recommended. Biesjesvlei PV Projects: Installation of suitable systems to redirect water away from areas designated for solar infrastructure. Ongoing monitoring of these systems during the initial construction phase to address erosion or sedimentation promptly. <i>This is applicable to the PV projects specifically.</i> - Immediate rehabilitation post-construction, optimising the conditions for vegetation regrowth. - Implementation of safeguards during refuelling to protect soil from spillages, ensuring swift and proper disposal if incidents occur. Operational Phase: - Similar to the construction phase, stormwater management planning by a qualified professional will be required. - Diversion of water away from road layers and erected structures, akin to the construction phase. - Replication of mitigation measures for spillages/leakages from the construction phase. Biesjesvlei BESS Projects: Proper designed structures and suitable containment to be implemented at the BESS to mitigate potential contamination of the surrounding environment, as recommended by the specialist undertaking the High Level Safety, Health and Environment (SHE) Risk Assessment for the BESS. <i>Note: This is applicable to the BESS projects specifically.</i> Biesjesvlei PV Projects: Close monitoring of solar panel maintenance, avoiding hazardous chemical use during cleaning. <i>Note: This is applicable to the PV projects specifically.</i> Decommissioning Phase:

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
		- Restoration of natural topography and land rehabilitation to near-natural state, including removal of foundations and hard surfaces, followed by proper backfilling. - Use of locally sourced materials for reinstating and backfilling to ensure uniformity. - Implementation of standard environmental management procedures for infrastructure. - Stringent measures to prevent pollution and contamination of the riparian zone, including well-maintained equipment and safeguards during refuelling operations.
Appendix E.12: Battery Energy Storage System High Level Safety, Health and Environment (SHE) Risk Assessment	Note: The information presented below only applies to Project 4 – Biesjesvlei BESS 1. Various risks were identified in terms of safety, health and the environment due to the proposed BESS. The BESS High Level Safety, Health and Environment Risk Assessment identified risks, hazards, and consequences, such as, but not limited to: - Human Health - chronic exposure to toxic chemical or biological agents. Causes: Construction materials such as cement, paints, solvents, welding fumes, truck fumes etc. Consequences - Employee / contractor illness. - Human Health - exposure to noise. Causes: Drilling, piling, generators, air compressors. Consequences - Adverse impact on hearing of workers. Possible nuisance factor in nearby areas. - Human and Equipment Safety - exposure to fire radiation. Causes: Involvement in an external fire. Fire involving fuels used in construction vehicles or vehicles themselves (e.g., tyre fire). Fire due to uncontrolled welding or other hot-work. Consequences - Injuries due to radiation especially amongst first responders and bystanders. Fatalities unlikely from the heat radiation as not highly flammable nor massive fire. - Human and Equipment Safety - exposure to explosion over pressures. With solid state lithium containers, flammable gases generated by thermal run away reach explosive limits. Ignition on hot surfaces, static. Consequences - Potential fatalities amongst first responders. Damage to container, transport truck or other nearby items, e.g., other container in the port. - Human and Equipment Safety - exposure to explosion over pressures. Cause 1 - Transformer shorting / overheating / explosion. Cause 2 - Flammable gases generated by thermal run away reach explosive limits. Ignition on hot surfaces, static. Lithium Cobalt Oxide generates O₂ during decomposition – escalation. Consequences - Potential fatalities amongst first responders. Damage to container or other nearby items, e.g., other container.	Note: The information presented below only applies to Project 4 – Biesjesvlei BESS 1. - There are numerous different battery technologies but using one consistent battery technology system for the BESS installations associated with all the Biesjesvlei developments in the Smithfield area would allow for ease of training, maintenance, emergency response and could significantly reduce risks. - Where reasonably practicable, “state-of-the-art” battery technology should be used with all the necessary protective features, e.g., draining of cells during shutdown and standby-mode, full Battery Management System (BMS) with deviation monitoring and trips, leak detection systems. - Ensure that the technical and system suggestions for managing and reducing risks, as specified in the assessment, specifically in terms of preventative and mitigative measures are included in the design. - The overall design should be subject to a full Hazard and Operability Study (HAZOP) prior to finalisation of the design. - Prior to importing any solid-state battery containers into the country, the contractor should ensure that: - An Emergency Response Plan is in place that would be applicable for the full route from the ship to the site. This plan would include details of the most appropriate emergency response to fires both while the units are in transit and once they are installed and operating. - An End-of-Life plan is in place for the handling, repurposing or disposal of dysfunctional, severely damaged batteries, modules and containers. - The site layout and spacing between lithium solid-state containers should be such that it mitigates the risk of a fire or explosion event spreading from one container to another. - In order to limit the possibility of domino failures from the BESS onto transformers and to limit direct impacts of any fire or explosion on the substation, the BESS should be separated from the substation by at least 20 m, or greater if specified in local or International Standards.

Specialist Assessment undertaken	<u>Key Impacts Identified</u>	Recommended Mitigation Measures
		▪ In order to limit on-site risks, any office and maintenance buildings should be located at least 20 m, although preferably 50 m, from the BESS. ▪ From a high-level SHE Risk Assessment perspective, where there is a choice of location that is further from public roads, water courses or isolated farmhouses/occupied developments, this would be preferred. Solid-state systems may experience fires that may result in toxic smoke and loss of containment of liquids or the use of large amounts of fire water which could be contaminated. One would not want these liquids to enter water courses nor the smoke to pass close to houses / public traffic. The current chosen location of the BESS meets these separation requirements, and the relevant specialists such as aquatic and geohydrology have provided inputs on setback distances. It is noted that there are no aquatic and geohydrological features in the BESS area. ▪ Finally, it is suggested once the BESS technology has been chosen and more details of the final design are available, the necessary updated Risk Assessments should be in place (prior to commencement, after EA and other necessary approvals are granted (should such be granted)).

20.6 Summary of Key Impact Assessment Findings

Tables 20.4, 20.5 and 20.6 below provide a summary of the impact assessment for the proposed projects post-mitigation for direct impacts. Table 20.7 provides the same information for the cumulative impacts. Some impacts were not identified, or are considered insignificant, or could not be measured empirically at the time of assessment.

Based on the findings of the detailed specialist impact assessments, which are included in Appendix E of this EIA Report, the following is concluded for the proposed projects:

- **Biesjesvlei PV1**: With the implementation of mitigation measures, this project is considered to have an **overall Low to Very Low negative environmental impact, with some moderate negative environmental impacts for Terrestrial Biodiversity during the construction and operational phases; Aquatic Biodiversity during the construction and decommissioning phases, and Avifauna during the operational phase.** With the implementation of enhancement measures, this project is considered to have an **overall Moderate to Low positive socio-economic impact.** Refer to Table 20.4.
- **Biesjesvlei BESS 1**: With the implementation of mitigation measures, this project is considered to have an **overall Low to Very Low negative environmental impact, with some moderate negative environmental impacts for Terrestrial Biodiversity during the construction phase; and Avifauna during the operational phase.** With the implementation of enhancement measures, this project is considered to have an **overall Moderate to Very Low positive socio-economic impact.** Refer to Table 20.5.
- **Biesjesvlei EGI 1**: With the implementation of mitigation and enhancement measures, this project is considered to have an **overall Low to Very Low negative environmental impact, with some moderate negative environmental impacts Avifauna during operations.** Refer to Table 20.6.

Based on Table 20.7, the majority of the cumulative negative impacts were rated with a **Low or Very Low** post-mitigation impact significance for the **construction and decommissioning phases**, with the exception of Aquatic Biodiversity impacts, which were rated with a Moderate to Low post-mitigation impact significance; and Avifauna impacts, which were rated with a Moderate to Low post-mitigation impact significance for the construction phase (not identified for the decommissioning phase). A similar trend is applicable to the **operational phase**, with Visual impacts also being rated as **Moderate**. Socio-Economic cumulative impacts are rated as **Moderate** positive with the implementation of enhancement measures for the construction and operational phases.

Table 20.4: Overall Impact Significance with the Implementation of Mitigation Measures for Direct Negative and Positive Impacts for Biesjesvlei PV1

Specialist Assessment	Construction Phase		Operational Phase		Decommissioning Phase	
DIRECT NEGATIVE IMPACTS						
Agriculture and Soils	Low		Low		Low	
Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species	Moderate	Low	Moderate	Low	Low	
Aquatic Biodiversity	Low	Moderate	Low		Low	Moderate
Avifauna	Low		Moderate	Low	Low	
Visual	Low		Low		Very Low	
Heritage (Archaeology and Cultural Landscape)	Low		Low		Low	
Palaeontology	Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable	
Socio-Economic	Low	Very Low	Not identified		Low	
Traffic	Low	Very Low	Insignificant		Low	Very Low
Geohydrology	Low	Very Low	Low	Very Low	Low	Very Low
Geotechnical	Low	Very Low	Low	Very Low	Low	Very Low
DIRECT POSITIVE IMPACTS						
Socio-Economic	Moderate		Low	Moderate	Insignificant and/or not identified and/or not applicable	
Avifauna	Not identified		Not identified		Moderate	

Table 20.5: Overall Impact Significance with the Implementation of Mitigation Measures for Direct Negative and Positive Impacts for Biesjesvlei BESS 1

Specialist Assessment	Construction Phase		Operational Phase	Decommissioning Phase
DIRECT NEGATIVE IMPACTS				
Agriculture and Soils	Low		Low	Low
Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species	Moderate	Low	Low	Low
Aquatic Biodiversity	Low		Low	Low

Specialist Assessment	Construction Phase		Operational Phase		Decommissioning Phase	
Avifauna	Low		Moderate	Low	Low	
Visual	Low		Low		Very Low	
Heritage (Archaeology and Cultural Landscape)	Very Low		Very Low		Very Low	
Palaeontology	Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable	
Socio-Economic	Very Low		Not identified		Low	
Traffic	Low	Very Low	Insignificant		Low	Very Low
Geohydrology	Very Low		Very Low		Very Low	
Geotechnical	Low	Very Low	Low	Very Low	Low	Very Low
DIRECT POSITIVE IMPACTS						
Socio-Economic	Low	Moderate	Very Low	Moderate	Insignificant and/or not identified and/or not applicable	

Table 20.6: Overall Impact Significance with the Implementation of Mitigation Measures for Direct Negative and Positive Impacts for Biesjesvlei EGI 1

Specialist Assessment	Construction Phase		Operational Phase		Decommissioning Phase	
DIRECT NEGATIVE IMPACTS						
Agriculture and Soils	Low		Low		Low	
Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species	Low	Very Low	Low		Low	Very Low
Aquatic Biodiversity	Low		Low		Low	
Avifauna	Low		Moderate	Low	Low	
Visual	Low		Low		Very Low	
Heritage (Archaeology and Cultural Landscape)	Very Low		Very Low		Very Low	
Palaeontology	Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable	
Geotechnical	Low	Very Low	Low	Very Low	Low	Very Low
DIRECT POSITIVE IMPACTS						
Avifauna	Not identified		Not identified		Moderate	High

Table 20.7: Overall Impact Significance with the Implementation of Mitigation Measures for Cumulative Negative and Positive Impacts

Specialist Assessment	Construction Phase		Operational Phase		Decommissioning Phase	
CUMULATIVE NEGATIVE IMPACTS						
Agriculture and Soils	Low		Low		Low	
Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species	Low		Low		Low	
Aquatic Biodiversity	Moderate	Low	Moderate	Low	Moderate	Low
Avifauna	Moderate	Low	Moderate	Low	Not identified	
Visual	Low		Moderate		Very Low	
Heritage (Archaeology and Cultural Landscape)	Low	Very Low	Low	Very Low	Low	Very Low
Palaeontology	Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable	
Traffic	Low	Very Low	Insignificant		Low	Very Low
Geohydrology	Low	Very Low	Low	Very Low	Low	Very Low
CUMULATIVE POSITIVE IMPACTS						
Socio-Economic	Moderate		Moderate		Not identified	

20.7 Overall Environmental Impact Statement and Reasoned Opinion from the EAP

Note: The information in this section equally applies to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1), unless where mentioned otherwise.

The information presented above contributes to this overall environmental impact statement and reasoned opinion from the EAP as to whether the proposed projects should or should not be authorised, including any conditions that should be made in respect of the authorisation (should it be granted).

Based on the findings of the detailed specialist assessments and technical studies, which all recommend that the proposed projects can proceed and should be authorised by the DFFE, the proposed projects are considered to have an **overall Moderate to Very Low negative environmental impact, and an overall Moderate to Very Low positive socio-economic impact** (with the implementation of respective mitigation and enhancement measures).

The proposed projects will take place within the development footprint on the preferred and approved project site, as contemplated in the accepted Final Scoping Report. The development footprint and buildable areas avoid the “no-go” sensitive features identified and mapped by the respective specialists, where relevant and applicable, as discussed in Section 20.1 of this chapter. The project layouts are final, avoid the “no-go” sensitivities for key infrastructure placement, and are based on the recommendations of the specialists. The specialists also confirmed that the project layouts are acceptable.

This EIA has considered the nature, scale and location of the development as well as the wise use of land. When considering the timing of this project, the IRP 2019 proposes to secure 17 800 MW of renewable energy capacity by 2030. As discussed in the preceding chapters of this EIA Report, it is the Project Applicant’s intention to bid this project in the future bidding rounds of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) and Battery Energy Storage Independent Power Producers Procurement Programme (BESIPPPP).

The proposed projects will be in line with and will be supportive of the objective of the MLM IDP in terms of creating more job opportunities. The proposed projects will assist in local job creation during the construction and operational phases (if approved by the DFFE). It should be noted that employment during the construction phase will be temporary.

Section 24 of the Constitutional Act states that “*everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that prevents pollution and ecological degradation; promotes conservation; and secures ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*”. Based on this, this EIA was undertaken to ensure that these principles are met through the inclusion of appropriate management and mitigation measures, and monitoring requirements. These measures will be undertaken to promote conservation by avoiding the sensitive environmental

features present on site and through appropriate monitoring and management plans (refer to the EMPs in Appendix J to Appendix O of this EIA Report).

The outcomes of these projects therefore succeed in meeting the environmental management objectives of protecting the ecologically sensitive areas and supporting sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development in the towns nearest to the project site. The findings of this EIA show that all natural resources will be used in a sustainable manner (i.e., this is a renewable energy, BESS and EGI project, and the majority of the negative site specific and cumulative environmental impacts are considered to be of low significance with mitigation measures implemented), while the benefits from the projects will promote justifiable economic and social development. Refer to Table 20.8 for a summary of reasoned opinions from the specialists.

Table 20.8: Summary of the Reasoned Opinions from the Specialists

Specialist Assessment undertaken	Reasoned Opinion on whether the project should be authorised
Appendix E.1: Agriculture Compliance Statement	▪ The overall conclusion of the assessment is that the proposed developments are acceptable because they can provide benefits to agriculture but lead to no loss of potential cropland and therefore minimal loss of future agricultural production potential. ▪ Based on various factors, including that the proposed projects will not occupy scarce, viable cropland and that the negative impact of the proposed projects is offset by economic and other benefits to farming, the overall negative agricultural impact of the development (loss of future agricultural production potential) is assessed in the compliance statement as being of low significance and as acceptable. ▪ From an agricultural impact perspective, it is recommended that the proposed development be approved. The conclusion of the agriculture assessment on the acceptability of the proposed development and the recommendation for its approval is not subject to any conditions other than the recommended mitigation.
Appendix E.2: Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species Assessment	▪ The proposed development is not located in a threatened vegetation type or ecosystem and is located in an ESA mainly due to the presence of watercourses. However, in the specialist's opinion, the ESA1 and ESA2 are not considered Very High sensitivity as they are not irreplaceable areas, and depending on what ecological features it is based on, can be regarded as high and medium sensitivity from a Terrestrial Biodiversity perspective. ▪ There are no high sensitivity features on site for the proposed projects, and no plant Species of Conservation Concern (SCC) were recorded. However, several provincially protected species occur within the proposed project areas and require permits for relocation or destruction from the provincial authority. ▪ The proposed projects can proceed should all no-go sensitive areas be avoided (which has been achieved in the layout plan), and the recommended mitigation measures be implemented.
Appendix E.3: Aquatic Biodiversity and Species Assessment	▪ The results of the Aquatic Biodiversity and Species Assessment indicate that moderately and largely modified watercourses are present in the Area of Interest (AoI) of the proposed projects. These systems were considered to have a high-level of

Specialist Assessment undertaken	Reasoned Opinion on whether the project should be authorised
	importance and sensitivity. The proposed development has largely avoided the watercourses, as well as their 19 m buffer zones. However, there is a requirement to effectively mitigate the potential impacts stemming from linear infrastructure (which has been included in the Environmental Management Programmes (EMPRs)). Based on the outcomes of the Aquatic Biodiversity and Species Assessment, should the avoidance and mitigation actions provided in the study be implemented, it is the opinion of the specialist, that no fatal flaws would prevent the proposed development from occurring.
Appendix E.4: Avifauna Assessment	- There are some significant major negative impacts to avifauna SCC expected from the proposed development which falls within acceptable levels, provided that the proposed mitigation measures described in the Avifauna Specialist Assessment are applied. In certain instances, actions will only be required should mortality thresholds are breached based on the findings of construction phase monitoring. - The proposed project activities are likely to represent an acceptable risk to avifauna (after application of mitigation). - The specialists therefore recommend that the Competent Authority should grant EA for the proposed development on condition that all mitigation measures stipulated in the Avifauna Specialist Study are adhered to; and all monitoring and mitigation is applied as captured in the EMPr recommended by the specialist.
Appendix E.5: Visual Impact Assessment	- The currently proposed layout of the proposed projects has a fairly limited zone of visual influence (viewshed) and succeeds in avoiding visually sensitive areas as indicated on the visual sensitivity maps in the Visual Impact Assessment. - It is the opinion of the Visual Specialists that provided the recommended mitigation measures and EMPr form part of the EAs (should such authorisations be granted), and are implemented, the proposed projects would not present a potential fatal flaw in visual terms and may be authorised.
Appendix E.6: Heritage Impact Assessment (Archaeology and Cultural Landscape)	The proposed projects will not have significant impacts on heritage resources due to the careful positioning of the footprints so as to avoid such resources. As such, it is the opinion of the heritage consultant that the projects may be authorised.
Appendix E.7: Palaeontology Site Sensitivity Verification Report	Provided that the Chance Fossil Finds Protocol is incorporated into the EMPRs and fully implemented during the construction phase, there are no objections on palaeontological heritage grounds to authorisation of the proposed projects.
Appendix E.8: Socio-Economic Assessment	The projects have acceptable socio-economic impacts and desirable benefits, though careful management of benefits (governance of community funds) is critical. From a socio-economic perspective the proposed projects should be authorised and is preferred to the No-Go alternative.
Appendix E.9: Traffic Impact Assessment	- The proposed projects will have a range of potential traffic related impacts ranging from very low to moderate significance before mitigation, which is expected to be reduced to very low to low significance with the appropriate mitigation. - No fatal flaws were discovered during the investigations. The proposed projects are supported, and it is therefore recommended that the activities are authorised, with the

Specialist Assessment undertaken	Reasoned Opinion on whether the project should be authorised
	understanding that all mitigation measures recommended in the Traffic Impact Assessment report will be strictly implemented.
Appendix E.10: Geohydrology Assessment	Based on various factors, such as the low to very low post-mitigation impact assessment, it is the opinion of the specialist that development of the proposed projects may be authorised, provided that the mitigation measures are implemented during each phase of the project to suppress the intensity of identified impacts.
Appendix E.11: Geotechnical Letter of Professional Opinion	Based on the geotechnical analysis conducted, it is recommended that the proposed Biesjesvlei Projects 1 to 10 be authorised, as no fatal flaws were found during the desktop assessment. However, it is crucial to implement appropriate mitigation measures at every phase of the project to minimise the intensity of the identified impacts.
Appendix E.12: Battery Energy Storage System High Level Safety, Health and Environment Risk Assessment	This Risk Assessment has found that provided suitable preventative and mitigative measures are in place, none of the identified potential risks are excessively high, i.e., from a Safety, Health and Environment (SHE) risk perspective, no fatal flaws were found and therefore, from a SHE risk perspective, there is no reason to prohibit the development. This overall finding applies to the construction, operations and decommissioning phases.

Taking into consideration the findings of the Scoping and EIA Process and given the national and provincial strategic requirements for infrastructure development, particularly from an electricity generation perspective, and based on the fact that the environmental sensitivity of the study area is low, medium, and high sensitivity, with some very high sensitivity areas, it is the opinion of the EAP, that the benefits of the projects outweigh the costs and that the projects will make a positive contribution to sustainable infrastructure development in the MLM, as well as the town of Smithfield.

Provided that the specified mitigation measures and management actions are applied effectively throughout, it is recommended that the proposed projects receive EA in terms of the 2014 NEMA EIA Regulations (as amended), promulgated under the NEMA.

It is understood that the information contained in this EIA Report and appendices is sufficient to make a decision in respect of the activities applied for.

It is recommended that the EAs (should they be granted) be **valid for a period of 10 years**.

In addition, it is recommended that the EMPs compiled as part of this EIA Process, included in Appendix J to Appendix O of this EIA Report, be approved concurrently in the EAs (should they be granted). A detailed **final** layout of the PV Facility, BESS and EGI was identified during the EIA Phase and included in this chapter of the Final EIA Report, as well as Appendix D and the EMPs.

If any changes are needed to the detailed final layouts post EA (should such authorisations be granted), the specialists have confirmed that such changes would be deemed acceptable if the changes remain within the approved buildable areas and area assessed during the Scoping and EIA Process with no-go sensitive areas avoided. Any changes can be subjected to an EA amendment process, where warranted.

20.8 Cumulative Environmental Impact Statement

Note: The information in this section equally applies to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1).

The cumulative impacts have been assessed by all the relevant specialists. The cumulative assessment included other grid connection projects (including a fibre optic cable) within a 30 km radius of the proposed projects.

No cumulative impacts have been identified that were considered to be fatal flaws. The overall cumulative impact assessment is described above in Section 20.6 and Table 20.7 of this chapter. Based on the findings of the detailed specialist assessments and technical studies, the proposed projects are considered to have an **overall Moderate to Very Low negative cumulative environmental impact, and an overall Moderate positive cumulative socio-economic impact** (with the implementation of respective mitigation and enhancement measures).

The specialists recommended that the projects receive EA in terms of the 2014 NEMA EIA Regulations (as amended), including consideration of cumulative impacts, provided the mitigation is applied.

20.9 Conditions to be included in the EA

Note: The information in this section equally applies to Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1), unless where mentioned otherwise.

In order to ensure the effective implementation of the mitigation measures and management actions, EMPs have been compiled and are included in Appendix J to Appendix O of this EIA Report. Separate EMPs have been compiled as follows:

- Appendix J includes the EMP for the proposed Solar PV facility and associated infrastructure [in compliance with Appendix 4 of the 2014 NEMA EIA Regulations (as amended)];
- Appendix K includes the EMP for the proposed Independent Power Producer (IPP) substation [Generic EMP published for substation development (Government Gazette 42323, GN 435, dated 22 March 2019)];
- Appendix L includes the EMP for the BESS and associated infrastructure [in compliance with Appendix 4 of the 2014 NEMA EIA Regulations (as amended)];
- Appendix M includes the EMP for the BESS IPP Substation [Generic EMP published for substation development (Government Gazette 42323, GN 435, dated 22 March 2019)];
- Appendix N includes the EMP for the switching station [Generic EMP published for substation development (Government Gazette 42323, GN 435, dated 22 March 2019)]; and
- Appendix O includes the EMP for the 132 kV power line [Generic EMP published for power lines (Government Gazette 42323, GN 435, dated 22 March 2019)].

The mitigation measures necessary to ensure that the proposed projects are planned and carried out in an environmentally responsible manner are listed in the EMPs. The EMPs include the mitigation

measures noted in this EIA Report, inclusive of the specialist assessments and technical studies, as relevant. The EMPr is a dynamic document that should be updated as required and provides clear and implementable measures for the proposed projects.

Listed below are the main recommendations applicable to the proposed projects that should be considered for inclusion in the EAs (should such authorisations be granted by the DFFE). These main recommendations as well as additional recommendations are included in the EMPrs and EIA Report. The main recommendations are separated per project below or where they apply to all projects, this has been clearly indicated.

In line with the approval of the combination and multiple EA request (as noted in Appendix C.7 of this EIA Report), it is proposed that for these projects, one EA will be issued for Project 1 (Biesjesvlei PV1); one EA will be issued for Project 4 (Biesjesvlei BESS 1), and one EA will be issued for Project 7 (Biesjesvlei EGI 1).

The following main recommendations apply equally to the Project 1 (Biesjesvlei PV1), Project 4 (Biesjesvlei BESS 1) and Project 7 (Biesjesvlei EGI 1):

- Mitigation measures detailed within the EIA Report, specialist assessments and technical studies are to be implemented, where relevant and applicable.
- All mitigation measures and monitoring requirements stipulated in the Avifauna Specialist Assessment must be adhered to as relevant.
- No-go areas of very high sensitivity identified by the specialists, and mapped accordingly, should be avoided by key infrastructure; however linear infrastructure such as access roads and power lines may traverse these areas provided that proper recommended mitigation is implemented as recommended by the relevant specialists and captured in the EMPrs.
- All relevant recommended mitigation measures (included in the EMPrs) for use of Access Route Option A, Access Route Option B or Access Route Option C must be implemented.
- Vegetation clearing must be limited to the development footprint and kept to a minimum.
- A walk through of the approved site prior to construction activities must be undertaken to record all provincially protected species that will be impacted on by the development.
- Ensure the necessary permit applications are submitted to the provincial authority prior to construction for the relocation or removal of provincially protected species. Copies of the permits must be kept on site by the Environmental Control Officer (ECO).
- Implement appropriate rehabilitation measures to restore each habitat to a natural state that is representative of the respective vegetation type after construction and decommissioning.
- Topsoil from excavations must be salvaged and reapplied during rehabilitation.
- No alien and invasive plant species may be used for rehabilitation purposes; only indigenous species of the area / vegetation type may be used.
- Cleared alien vegetation may not be dumped on adjacent natural vegetation during clearing but must be temporarily stored in a demarcated area and disposed of at a legal facility.
- Removal of alien and invasive species, monitoring and follow-up procedures must be in accordance with the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA).
- Electric fencing must not have any strands within 30 cm of the ground which still remain as an effective security barrier while allowing smaller mammals and reptiles to pass through.

- Carry out Environmental Awareness Training throughout the construction period and conduct audits of signed attendance registers to ensure compliance with the EMPs and EA conditions.
- Where the access road crosses the watercourse the necessary mitigation measures need to be in place to reduce any negative impacts on the feeding and breeding habitat as well as movement of *A. capensis* (African Clawless Otter) and *H. maculicollis* (Spotted-necked otter). Where required, the necessary rehabilitation must be done to restore habitat and ecosystem functioning for the species. Restoring riparian habitats and maintaining ecosystem services can align with the Working for Water Programme.
- The riverbanks need to be stabilised during the construction phase for river crossing development.
- The avoidance of delineated wetlands and the 19 m buffer zone identified by the Aquatic Biodiversity Specialist must be implemented.
- Ensure that there is suitable design and implementation of culverts and crossing points. These must consider habitat connectivity, should not result in hydraulic impact to downstream or upslope environments, and they must allow for the continued distribution of flows across the watercourses. Where culverts are required, it is recommended that these are spread across the wetland units and not directed through single culverts.
- A floodline delineation must be undertaken for the Skulpspruit in order to provide information for culvert conceptual design.
- Construction and operational monitoring activities specified in the EMPs by the Aquatic Biodiversity Specialist are recommended to take place.
- Historical dumps may occur in proximity to historical archaeological sites noted in the Heritage Impact Assessment, and a close watch must be kept in these areas for ash, glass and ceramic concentrations.
- No stones may be removed from any historical or archaeological sites identified in the Heritage Impact Assessment.
- The two small cemeteries (at waypoints 345 and 1643 documented in the Heritage Impact Assessment) must be fenced with a farm-style fence and pedestrian gate at least 5 m from all grave dressings.
- All heritage sites identified in the Heritage Impact Assessment within 50 m of the footprint areas must be marked with No-Go signage.
- If any archaeological material or human burials are uncovered during the course of development, then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.
- Implement the Chance Fossil Finds Protocol identified by the Palaeontology Specialist during the construction phase.
- A stormwater management plan should be developed prior to the construction phase by an accredited professional.
- Stormwater should be managed throughout the duration of the projects to successfully mitigate potential soil erosion.
- Rehabilitation of soil and geological material to commence during the construction phase, if possible, alternatively following the construction phase to allow successful re-vegetation.
- Authorised vehicles to only use proposed access points and roads and keep within the footprint of the proposed projects.

- Soil and geological material should be reinstated to natural or near natural conditions following decommissioning.
- Machinery and equipment to be maintained throughout the projects.
- Ground protection measures to be implemented during maintenance and refuelling operations.
- Spillages to be removed and contained as rapidly as possible.

The following main recommendations equally apply to Project 1 (Biesjesvlei PV1) and Project 4 (Biesjesvlei BESS 1) only:

- Implement dust control of the gravel roads within the construction site.
- Undertake regular maintenance of the existing external gravel access roads (i.e. the relevant sections of the S1262 and S119 under the authority of the Free State Government) and existing internal farm access roads (i.e. internal private roads leading off the S119) that will be used and impacted on by the proposed projects. Such maintenance must be undertaken by the contractor during the construction and decommissioning phases and then by the operator during the operational phase.
- Upgrading of the S1262 and S119 intersection; the S119 and Access Route Option A intersection; the S119 and Access Route Option B intersection; and the S119 and Access Route Option C intersection to accommodate the turning movements of the abnormal load vehicles.
- Inspection of the existing bridge along S119 by a Structural Engineer.
- Should Access Route Option A be used for the proposed projects, then upgrading, including widening, of the existing bridge on the internal farm road along Access Route Option A and the clearing of the area south of the existing bridge will be required.
- Should Access Route Option B be used for the proposed projects, then construction of a new bridge on the internal farm road along Access Route Option B will be required.
- Should Access Route Option C be used for the proposed projects, then construction of a new bridge on the internal farm road along Access Route Option C will be required.
- Ensure private access roads (i.e. existing internal farm roads leading off the S119) that are used by and impacted on by the proposed development are restored to original pre-construction road conditions or upgraded to suitable standards as specified by the civil engineer and regularly maintained during all phases of the project, especially during the construction and decommissioning phases.
- Implement speed control by means of a stop and go system and speed limit road signage within the construction site.
- Ensure all vehicles are roadworthy, visible, adequately marked and operated by an appropriately licensed operator.
- The route to the site should be further investigated to ensure that the abnormal loads are not obstructed at any point by geometric, height and width limitations along the route.
- The applicable permits to transport the abnormal loads should be obtained.
- Ensure that the necessary permits or approvals from the relevant road authority are in place for the widening of identified intersections to accommodate the turning movements of the abnormal load vehicles.
- Stagger delivery trips and schedule deliveries/trips outside of the peak traffic periods, where possible.
- Staff trips should also occur outside of the peak hours where possible.

- If groundwater is sourced from existing boreholes, in the case that multiple Biesjesvlei projects are constructed simultaneously, adherence to recommended mitigation measures in the Geohydrology Assessment should be strictly followed to prevent over abstraction.
- If groundwater is used for the proposed Biesjesvlei projects, the proposed groundwater monitoring plan is to be discussed and evaluated and should be followed with a special focus on groundwater level monitoring to ensure that the aquifer is not over abstracted and falls to levels below historic borehole depths.
- Ensure the recommended precautionary approaches aimed at preventing oil spills and fuel leaks are implemented.

The following main recommendations apply to Project 1 (Biesjesvlei PV1) only:

- Ensure the use of environmentally safe panel cleaning agents.

The following main recommendations apply to Project 4 (Biesjesvlei BESS 1) only:

- Ensure that the BESS facilities are placed 50 m from any identified boreholes in the Geohydrology Assessment.
- Ensure that the BESS facilities are suitably designed and assembled in line with relevant product specifications, with necessary measures for containment and leak detection to be implemented.

The following main recommendations apply to Project 7 (Biesjesvlei EGI 1) only:

- Install Eskom-approved bird flight diverters (flappers or coils) on new above-ground transmission lines and on any new guide-wires used to anchor infrastructure such as pylons, and/or new monopoles developed for the Biesjesvlei projects.
- Design of new overhead power lines developed for the Biesjesvlei projects must take into account potential for electrocution by large species and pre-emptively avoid the likelihood of this by increasing distances between spans to avoid faecal “streamers” or large open wings creating a short.
- In order to reduce avian mortalities related to bird collisions or nests, perch guards should be installed on all new power line infrastructure developed for the Biesjesvlei projects (such as poles and platforms).
- Ensure no livestock persists within the fenced off area of the projects.

Paul Lochner

NAME OF EAP



SIGNATURE OF EAP

7 September 2024

DATE