DRAFT BASIC ASSESSMENT REPORT

Proposed Development of a 132 kV Overhead Power Line and Supporting Infrastructure for the Proposed Vhuvhili Solar Photovoltaic Energy Facility, near Secunda in the Mpumalanga Province

Prepared by:
CSIR Environmental Management Services
PO Box 320, Stellenbosch 7599 South Africa

Prepared for:
Vhuvhili Solar RF (Pty) Ltd

November 2022

ENERTRAG

CSIR
Touching lives through innovation

DRAFT BASIC ASSESSMENT REPORT

for the

Proposed Development of a 132 kV Overhead Power Line and Supporting Infrastructure for the Proposed Vhuvhili Solar Photovoltaic Energy Facility, near Secunda in the Mpumalanga Province.

November 2022

Prepared for:

Vhuvhili Solar RF (Pty) Ltd

Prepared by:

CSIR Environmental Management Services
P. O. Box 320, Stellenbosch, 7599
Tel: 021 888 2400
Fax: 021 888 2693

Lead Authors:

Paul Lochner (EAP 2019/745), Willan Adonis and Minnelise Levendal (CSIR)

Specialists:

Johann Lanz; Dr Noel van Rooyen; Lorainmari den Boogert; Chris van Rooyen; Albert Froneman, Kerry Schwartz; Dr Jayson Orton;Professor Marion Bamford, and Lizande Kellerman

GIS Mapping:

Willan Adonis and Dhiveshni Moodley (CSIR)

Formatting and Desktop Publishing:

Magdel van der Merwe (DTP Solutions)

CSIR/SPLA/SECO/ER/2022/0047/B

Report details

Title:	Basic Assessment for the Proposed Development of a 132 kV Overhead Power Line and Supporting Infrastructure for the proposed Vhuvhili Solar Photovoltaic Energy Facility, near Secunda in the Mpumalanga Province: DRAFT BASIC ASSESSMENT (BA) REPORT
Purpose of this report:	The purpose of this Draft BA Report is to: • Present the details of and the need for the proposed project; • Describe the receiving environment at a sufficient level of detail to facilitate informed decision-making; • Provide an overview of the BA Process being followed, including public consultation; • Assess the potential positive and negative impacts of the proposed project on the environment; • Provide recommendations to avoid or mitigate negative impacts and to enhance the positive benefits of the project; and • Provide an Environmental Management Programme (EMPr) for the proposed project. The Draft BA Report is currently being made available to all Interested and Affected Parties (I&APs), Organs of State and stakeholders for a 30-day review and commenting period extending from **15 November 2022 to 14 December 2022**, excluding public holidays. All comments submitted during the 30-day review will be incorporated and addressed, as applicable and where relevant, into the Final BA Report. The Final BA Report will then be submitted to the Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA) as the Competent Authority (CA), for decision-making.
Prepared for:	Vhuvhili Solar RF (Pty) Ltd Contact Person: Kyle Swartz
Prepared by:	Council for Scientific and Industrial Research (CSIR), Environmental Management Services: P. O. Box 320, Stellenbosch, 7599 Tel: +27 21 888 2400 Fax: +27 21 888 2693
Authors:	CSIR: Paul Lochner (EAP 2019/745), Willan Adonis and Minnelise Levendal (CSIR) SPECIALISTS: Johann Lanz; Dr Noel van Rooyen; Lorain den Boogert; Chris van Rooyen; Albert Froneman, Kerry Schwartz; Dr Jayson Orton; Professor Marion Bamford; Lizande Kellerman and Helen Antonopoulos
Mapping:	Willan Adonis and Dhiveshni Moodley (CSIR)
Date:	November 2022
Formatting and Desktop Publishing:	Magdel van der Merwe, DTP Solutions
To be cited as:	CSIR, 2022. Basic Assessment for the Proposed Development of a 132 kV Overhead Power Line and Supporting Infrastructure for the Proposed Vhuvhili Solar Photovoltaic Energy Facility, near Secunda in the Mpumalanga Province: CSIR/SPLA/SECO/ER/2022/0047/B

Contents

SECTION A: INTRODUCTION, PROJECT DESCRIPTION, ALTERNATIVES, LEGISLATION, NEED AND DESIRABILITY ____ 22

A.1 Introduction ____ 22

A.2 Project Developer ____ 24

A.3 Project Applicant ____ 25

A.4 Project Team ____ 25

A.5 Project Motivation ____ 27

A.6 Project Description ____ 30

A.6.1 Substations (subject of separate S&EIA processes) ____ 33
A.6.2 Proposed Power line from Vhuvhili Solar Energy Facility to Mukondeleli Wind Energy Facility ____ 34
A.6.3 Service Roads and External Access Roads ____ 35

A.7 Affected Farm Portion and Project Co-ordinates ____ 36

A.8 Overview of the Project Development Cycle ____ 42

A.8.1 Construction Phase ____ 42
A.8.2 Operational Phase ____ 43
A.8.3 Decommissioning Phase ____ 43

A.9 Service Provision: Water Usage, Sewage, Solid Waste and Electricity Requirements ____ 43

A.9.1 Water Usage ____ 43
A.9.2 Sewage or Liquid Effluent ____ 43
A.9.3 Solid Waste Generation ____ 44
A.9.4 Electricity Requirements ____ 44

A.10 Applicable Legislation ____ 45

A.10.1 National Legislation ____ 45
A.10.2 Provincial Legislation ____ 53
A.10.3 District and Local Planning Legislation ____ 62
A.10.4 International Finance Corporation Performance Standards ____ 64

A.11 Listed Activities Associated with the Proposed Project ____ 64

A.12 National Web-Based Environmental Screening Tool ____ 69

A.12.1 Square Kilometre Array and Radio Frequency Interference ____ 71

A.13 Description of Alternatives ____ 73

A.13.1 No-go Alternative ____ 73
A.13.2 Type of Activity Alternatives ____ 74
A.13.3 Technology Alternatives ____ 75
A.13.4 Site Alternatives ____ 75
A.13.5 Development Footprint Location and Layout Alternatives ____ 76
A.13.6 Concluding Statement for Alternatives ____ 77

A.14 Need and Desirability ____ 79

SECTION B: DESCRIPTION OF THE RECEIVING ENVIRONMENT 97

B.1 Project Background 97

B.2 Specialist Input 100

B.3 Biophysical Environment 100

B.3.1 Climate Conditions and Climate Change 100
B.3.2 Topography and Landscape 103
B.3.3 Geology 104
B.3.4 Land Capability and Agricultural Sensitivity 105
B.3.5 Aquatic Biodiversity 106
B.3.6 Terrestrial Biodiversity 117
B.3.7 Avifauna 126
B.3.8 Visual Aspects and Sensitive Receptors 129
B.3.9 Heritage: Archaeology and Cultural Landscape 132
B.3.10 Palaeontology 136

B.4 Tourism Activities 139

B.5 Civil Aviation and Defence 140

SECTION C: PUBLIC PARTICIPATION 142

C.1 Introduction to the Public Participation Process 142

C.2 Requirement for a Public Participation Plan 143

C.3 Landowner Written Consent 145

C.4 Notice Boards 145

C.5 Newspaper Advertisement 147

C.6 Determination of Appropriate Measures 147

C.7 Approach to the PPP 149

C.7.1 BA Report Phase - Review of the Draft BA Report 149
C.7.2 Compilation of Final BA Report for Submission to DARDLEA 151
C.7.3 Environmental Decision-Making and Appeal Period 151

C.8 Consultation with Mpumalanga Provincial Heritage Resources Authority 152

SECTION D: IMPACT ASSESSMENT 153

D.1 Approach to the BA: Methodology of the Impact Assessment 153

D.2 Assessment of Environmental Risks and Impacts 161

D.2.1 Agriculture 161
D.2.2 Visual Impact Assessment 163
D.2.3 Heritage Impact Assessment (Archaeology and Cultural Landscape) 171
D.2.4 Palaeontology Impact Assessment 175
D.2.5 Terrestrial Biodiversity and Species 179
D.2.6 Aquatic Biodiversity 189
D.2.7 Avifauna Impact Assessment 204
D.2.8 Civil Aviation 210
D.2.9 Defence 211
D.2.10 Environmental Sensitivity Mapping 211

SECTION E: RECOMMENDATION OF PRACTITIONER & ENVIRONMENTAL IMPACT STATEMENT _____ 222

SECTION F: APPENDICES

Appendix A	**EAP Details, Expertise and Declaration of Interest**
Appendix B	**Specialists Declarations of Interest**
Appendix C	**Maps**
Appendix D	**Specialist Reports**
Appendix D.1	Agriculture Compliance Statement
Appendix D.2	Visual Impact Assessment
Appendix D.3	Heritage Impact Assessment (Archaeology, Cultural Landscape and Palaeontology)
Appendix D.4	Terrestrial Biodiversity and Species Assessment
Appendix D.5	Aquatic Biodiversity and Species Assessment
Appendix D.6	Avifauna Assessment
Appendix D.7	Civil Aviation Compliance Statement
Appendix D.8	Defence Site Sensitivity Verification
Appendix E	**Interested and Affected Parties Database**
Appendix F	**Public Participation**
Appendix F.1	Copies of Site Notice Boards
Appendix F.2	Proof of Placement of Site Notice Boards
Appendix F.3	Copy of the content of the Newspaper Advertisements
Appendix G	**Environmental Management Programme (EMPr)**
Appendix H	**Additional Information**
Appendix H.1	Vertex coordinates of each power line routing alternative
Appendix H.2:	Screening Tool Report

Tables

Table A: Description of the project components for the proposed 132 kV overhead power line and supporting infrastructure....12
Table B: Specialist inputs and respective appendices. 15
Table C: Overall Impact Significance with the Implementation of Mitigation Measures for DIRECT Negative Impacts for the Vhuvhili Power Line and Supporting Infrastructure Project... 17
Table D: Overall Impact Significance with the Implementation of Mitigation Measures for CUMULATIVE Negative Impacts for the Vhuvhili Power Line and Supporting Infrastructure Project....17
Table A.1: Details of the BA Project Team....27
Table A.2: Details of this BA process and related S&EIA processes underway....30
Table A.3: Description of the project components for the proposed 132 kV overhead power line and supporting infrastructure 33
Table A.4: Proposed Power line and Associated EGI Comprising the Vhuvhili EGI Corridor and the Affected Farm Portion. 37
Table A.5: Co-ordinates of the start, middle and end points of the proposed preferred and alternative 132 kV overhead power line corridors, and the centre-point co-ordinates of the substation sites. See Figure A.2 for mapped reference of infrastructure....40
Table A.6: Applicable Listed Activities for the Proposed Vhuvhili Power line and Associated EGI Project....65
Table A.7: List of Specialist Assessments identified by the Screening Tool....69
Table A.8: SKA sensitivity distance guidelines (Source: DFFE, 2019: Part 3, Page 2)....72
Table A.9: Details of the assessed area and servitude area for each of the four alternatives assessed by the specialists....76
Table A.10: The Guideline on the Need and Desirability's list of questions to determine the "Need and Desirability" of a proposed project. 80
Table B.1: Affected Farm Portions for the Four Power line Routing Alternatives....99
Table B.2: Specialist inputs and respective appendices. 100
Table B.3: Maximum rainfall (mm) in 24 hours, highest maximum and lowest monthly minimum rainfall at Secunda: 26° 30' S; 29° 11' E; 1628 m (Weather Bureau 1998)....101
Table B.4: Temperature data for the Secunda region: 26° 30' S; 29° 11' E; 1628 m (Weather Bureau 1998)....101
Table B.5: Cloud cover at 14:00 and percentage relative air humidity at 08:00 and 14:00 at Bethal: 26° 27' S; 29° 29' E; 1663 m (Weather Bureau 1998)....102
Table B.6: Ecological integrity scores of the sub quaternary reaches surrounding the study area.. 110
Table B.7: Summary of the ecological integrity scores of the wetland features in the study site. 114
Table B.8: Power line sensitive species recoded during field surveys that could occur within the PAOI, with regional status (Source: Van Rooyen, 2022) NT = Near threatened VU = Vulnerable EN = Endangered H = High M = Medium L = Low....126
Table B.9: Pre-construction avifauna monitoring surveys. 128
Table B.10: List of heritage finds recorded during the field surveys (waypoints as per Figure B.22, Figure B.23 and Figure B.24). 133

Table C.1. Extent of withdrawal of various directions regarding measures to address, prevent and combat the spread of COVID-19 (Source: Extracted from Government Gazette 46075, 2022) 144
Table C.2. Site Notice Board Placement for the Proposed Project 145
Table D.1: Proposed and existing EGI projects within 50 km of the proposed project (Source: Eskom GCCA, 2022) 155
Table D.2: Proposed renewable energy that have received EA or are in the process of applying for EA within 50 km of the proposed project (Source: DFFE REEA, 2022, Quarter 2) 157
Table E.1: Overall Impact Significance with the Implementation of Mitigation Measures for DIRECT Negative Impacts for the Vhuvhili Power Line and Supporting Infrastructure Project 224
Table E.2: Overall Impact Significance with the Implementation of Mitigation Measures for CUMULATIVE Negative Impacts for the Vhuvhili Power Line and Supporting Infrastructure Project 225

Figures

Figure A: Locality map showing the proposed 132 kV overhead power line routing alternatives (that is the subject of this BA Report), which extends from the proposed Vhuvhili SEF (subject of a separate S&EIA process) to the proposed Mukondeleli WEF (subject of a separate S&EIA process). 13
Figure B: Combined Sensitivity and Key Features Map for the proposed project 16
Figure A.1: Locality map showing the proposed 132 kV overhead power line routing alternatives (that is the subject of this BA Report), which extends from the proposed Vhuvhili SEF (subject of a separate S&EIA process) to the proposed Mukondeleli WEF (subject of a separate S&EIA process). 22
Figure A.2: Locality map showing the proposed 132 kV overhead power line routing alternatives (that is the subject of this BA Report), which extends from the proposed Vhuvhili SEF (subject of a separate S&EIA process) to the proposed Mukondeleli WEF (subject of a separate S&EIA process). 32
Figure A.3: Photographs of a typical monopole pylon (A) and steel lattice pylon (B) for a 132 kV power line (Source: Eskom, 2017) 34
Figure A.4: Access roads in the study area 35
Figure A.5: Affected farm portions of the proposed 32 m wide servitude that is being secured for the proposed 132 kV power line 39
Figure A.6: Start, middle and end point coordinates of the proposed 132 kV power line 41
Figure A.7: Mpumalanga Composite SDF-Economic Activities (Source: Mpumalanga SDF, 2019) A-60
Figure A.8: Mpumalanga Composite SDF-Land Uses (Source: Mpumalanga SDF, 2019)..... A-61
Figure A.9: Location of the proposed project in relation to the SKA and KCAAA 72
Figure B.1: The average annual precipitation (mm) of South Africa, with the study area indicated by the red square (Source: https://www.worldweatheronline.com/, 2021) 102
Figure B.2: The average monthly distribution of rainfall and the average monthly maximum and minimum temperature within the Secunda area (Source: https://www.worldweatheronline.com/, 2021) 103

Figure B.3: The landscape character and topography of the Vhuvhili power line corridor and surrounds (Source: Schwartz, 2022).....104
Figure B.4: Geology of the Vhuvhili gridline site (2628 East Rand Geological Survey 1986). Legend: Jd = Dolerite; Pv= Sandstone, shale and coal beds (Vryheid Formation, Ecca Group); Yellow = Alluvium.....105
Figure B.5: The entire assessed corridor in which all proposed alternatives will be located (blue outline) overlaid on agricultural sensitivity, as given by the screening tool (yellow = medium; red = high). 106
Figure B.6: Hydrology of the study site and surrounds as per existing spatial layers.....107
Figure B.7: SWSAs in relation to the locality of the proposed power line corridor (i.e. all four alternatives and their assessed 200 m wide corridor). 108
Figure B.8: The proposed Vhuvhili 132 kV Overhead Power line and Supporting Infrastructure corridor in relation to the MBSP aquatic 110
Figure B.9: Present Ecological state of the rivers and streams surrounding the study site based on the 2018 National Biodiversity Assessment.....111
Figure B.10: Delineated watercourses together with their calculated buffer zones and the 500 m DWS regulated area (Source: Den Boogert, 2022). 112
Figure B.11: Map depicting Aquatic Biodiversity Combined Sensitivity in and around the proposed power line corridor (Source: DFFE Screening Tool, 2022). 116
Figure B.12: CBAs, ONAs, moderately and heavily modified areas of the Vhuvhili gridline site and environs (MBSP 2014; biodiversityadvisor.sanbi.org). A-B = On-site substation hub Start Alt 1 & 2; C-D = On-site substation hub Start Alt 3 & 4; E = Switching station End Alt 1 & 3; F = Switching station End Alt 2 & 4; Blue line = Alt 1 & 3; Yellow line = Alt 2 & 4. 118
Figure B.13: Vegetation mapping of the proposed power line corridor (Source: Van Rooyen, 2022).....119
Figure B.14: Sensitivity map of the Vhuvhili gridline site. Orange polygons = high sensitivity; Blue polygons = low sensitivity. A-B = On-site substation hub Start Alt 1 & 2; C-D = On-site substation hub Start Alt 3 & 4; E = Switching station End Alt 1 & 3; F = Switching station End Alt 2 & 4; Blue line = Alt 1 & 3; Yellow line = Alt 2 & 4. 121
Figure B.15: Map indicating Terrestrial Plant Species sensitivity for the proposed Vhuvhili power line corridor (all four alternatives) and surrounds (Source: DFFE Screening Tool, 2022).....123
Figure B.16: Map indicating Terrestrial Animal Species sensitivity for the proposed Vhuvhili power line corridor (all four alternatives) and surrounds (Source: DFFE Screening Tool, 2022). 124
Figure B.17: Map indicating Terrestrial Biodiversity Combined sensitivity for the proposed Vhuvhili power line corridor (all four alternatives) and surrounds (Source: DFFE Screening Tool, 2022).....124
Figure B.18: Map indicating 2 km PAOI Animal sensitivity for the proposed Vhuvhili power line corridor (all four alternatives) and surrounds (Source: DFFE Screening Tool, 2022). 128
Figure B.19: Potentially sensitive receptor locations (Source: Schwartz, 2022).....130
Figure B.20: Potentially sensitive visual receptors within 500 m of the proposed Vhuvhili power line corridor (Source: Schwartz, 2022).....131
Figure B.21: Potential visibility of the proposed Vhuvhili power line (Source: Schwartz, 2022).132
Figure B.22: Aerial view of the north-eastern part of the study area showing the locations of the recorded heritage resources. Here and on Figure B.22 dark red symbols = Grade IIIA (includes two grave sites from Hardwick et al. 2019), red = Grade IIIB, yellow = GPB. Features identified from aerial photography as post-dating 1968 are marked by

white symbols and are not heritage, while potential heritage resources also identified from aerial photography are ringed in black (Source: Orton, 2022). 133
Figure B.23: *Aerial view of the north-eastern part of the study area showing the locations of the recorded heritage resources.* Here and on Figure B.25 dark red symbols = Grade IIIA (includes two grave sites from Hardwick et al. 2019), red = Grade IIIB, yellow = GPB. Features identified from aerial photography as post-dating 1968 are marked by white symbols and are not heritage, while potential heritage resources also identified from aerial photography are ringed in black (Source: Orton, 2022). 134
Figure B.24: Sensitivity map showing the archaeological and cultural heritage sensitivity as determined by the Heritage Impact Assessment (dark red = very high, orange = medium-low, yellow = low). The finds are mapped with 50 m buffers (Source: Orton, 2022)..... 135
Figure B.25: The Screening Tool map for Archaeology and Cultural Heritage Combined Sensitivity for the proposed Vhuvhili power line corridor (Source: DFFE Screening Tool, 2022). 136
Figure B.26: SAHRIS palaeosensitivity map for the proposed Vhuvhili power line shown by the yellow outlines. A = grid connections from Vhuvhili on-site Substation to the main OHLP; B = main OHPL route; C = grid connections to the Mukondeleli switching station. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero..... 137
Figure B.27: SAHRIS palaeosensitivity map for the proposed Vhuvhili power line routes and on-site substation hub alternates 1 and 2. 137
Figure B.28: SAHRIS palaeosensitivity map for the proposed Vhuvhili power line routes and Mukondeleli switching station alternatives E and F. 138
Figure B.29*:* The Screening Tool map for Palaeontology Combined Sensitivity for the proposed power line corridor (Source: DFFE Screening Tool, 2022)..... 139
Figure B.30: Map showing the proposed Vhuvhili power line corridor as it relates to Civil Aviation sensitivity (Source: DFFE Screening Tool, 2022)..... 141
Figure B.31: Map showing the proposed Vhuvhili power line corridor as it relates to Defence sensitivity (Source: DFFE Screening Tool, 2022)..... 141
Figure C.1: Placement of notice boards at the proposed site and public facilities in Secunda for the proposed 132 kV power line project..... 146
Figure D.1: Projects within the 50 km radius considered for the Cumulative Impact Assessment. 155
Figure D.2: Guide to assessing risk/impact significance as a result of consequence and probability 159
Figure D.3: Sensitivity Map for Zones of Visual Sensitivity 215
Figure D.4: Sensitivity Map for Heritage and Palaeontology..... 216
Figure D.5: Sensitivity Map for Aquatic and Terrestrial Biodiversity 217
Figure D.6: Sensitivity Map for Avifauna 218
Figure D.7: Combined Sensitivity Map for the proposed project..... 219
Figure D.8: Combined Sensitivity and Key Features Map for the proposed project 220
Figure D.9: Aerial Crossing Required to mitigate impact on Aquatic and Terrestrial Biodiversity Features, and Heritage Features. 221

Abbreviations

AEWA	Agreement on the Conservation of African-Eurasian Migratory Waterbirds
AIS	Alien Invasive Species
BA	Basic Assessment
BAR	Basic Assessment Report
BESS	Battery Energy Storage System
BFDs	Bird Flight Diverters
CBA	Critical Biodiversity Area
CBD	Convention on Biological Diversity
CITES	Convention on the International Trade in Endangered Species of Wild Flora and Fauna
CSIR	Council for Scientific and Industrial Research
DARDLEA	Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs
DBAR	Draft Basic Assessment Report
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
DM	District Municipality
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EC	Ecological Category
ECO	Environmental Control Officer
EGI	Electrical Grid Infrastructure
EIA	Environmental Impact Assessment
EIS	Ecological Integrity and Sensitivity
EMPr	Environmental Management Programme
EN	Endangered
EPL	Ecosystem Protection Level
ES	Ecosystem Services
ESA	Ecological Support Area
ETS	Ecosystem Threat Status
FEPA	Freshwater Ecosystem Priority Areas
GIS	Geographic Information System
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested and/or Affected Party
IBA	Important Bird Area
IPP	Independent Power Producer

IUCN	International Union for Conservation of Nature
kV	Kilovolt
LM	Local Municipality
MBSP	Mpumalanga Biodiversity Sector Plan
MHRA	Mpumalanga Heritage Resources Authority
MW	Megawatt
NBA	National Biodiversity Assessment
NEM:BA	National Environmental Management: Biodiversity Act
NEMA	National Environmental Management Act (Act 107 of 1998), as amended
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resources Act (No. 25) of 1999
NPAES	National Protected Area Expansion Strategy
NT	Near-threatened
NWA	National Water Act (Act 36 of 1998), as amended
ONA	Other Natural Areas
PA	Protected Area
PAOI	Project Area of Impact
PES/C	Present Ecological State/Category
PPP	Public Participation Process
PV	Photovoltaic
REC	Recommended Ecological Category
REDZ	Renewable Energy Development Zone
REEA	Renewable Energy EIA Application Database
REF	Renewable Energy Facility
REIPPP	Renewable Energy Independent Power Producer Programme
S&EIA	Scoping and Environmental Impact Assessment
SABAP 1	Southern African Bird Atlas Project 1
SABAP 2	Southern African Bird Atlas Project 2
SACNASP	South African Council for Natural and Scientific Professions
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SANBI	South African National Biodiversity Institute
SAPAD	South Africa Protected Areas Database
SEA	Strategic Environmental Assessment
SEF	Solar Energy Facility
SQR	Sub Quaternary Reaches
SWSAs	Strategic Water Source Areas
UNEP	United Nations Environment Programme
VIA	Visual Impact Assessment
VU	Vulnerable
WEF	Wind Energy Facility
WMA	Water Management Area

Executive Summary

INTRODUCTION AND PROJECT BACKGROUND

Vhuvhili Solar RF (Pty) Ltd ("The Applicant") is proposing to develop a 132 kV overhead power line and associated infrastructure to support the proposed Vhuvhili Solar Photovoltaic (PV) Energy Facility (SEF) near Secunda, in the Govan Mbeki Local Municipality and the Gert Sibande District Municipality in the Mpumalanga Province. A Basic Assessment (BA) is being undertaken to assess the proposed 132 kV overhead power line and supporting infrastructure which will transmit electricity, approximately 12 km, from the Vhuvhili SEF to the proposed Mukondeleli Wind Energy Facility (WEF). From there the electricity will be fed into the Sasol grid at the Secunda Synfuels facility to produce green hydrogen (preferred offtake scenario), or alternatively the electricity will be bid in future rounds of South Africa's Renewable Energy Independent Power Producer Procurement Programme to feed into the national electrical grid (alternative scenario). It is important to note that this BA process only includes the assessment of the proposed 132 kV power line and supporting infrastructure. The proposed Vhuvhili SEF and on-site substation are subject to a separate Scoping and Environmental Impact Assessment (S&EIA) process (NEAS: MPP/EIA/0001063/2022). The proposed Mukondeleli WEF and on-site switching station are also subject to a separate S&EIA process (NEAS: MPP/EIA/0001099/2022).

The Electrical Grid Infrastructure (EGI) assessed in this BA is essential to the operation of the proposed Vhuvhili SEF project. A summary description of the key components of the proposed power line and EGI project is provided in Table A below. It is important to note at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering phase (subsequent to the issuing of EA, should such authorisation be granted for the proposed power line and EGI project) but that the information provided below is seen as the worst-case scenario for the proposed power line project.

Table A: Description of the project components for the proposed 132 kV overhead power line and supporting infrastructure

Component	Description
Power line/pylon height	Up to 40 m
Power line length	Approx. 12 km
Power line capacity	Up to 132 kV (either single or double circuit)
Minimum conductor ground clearance	Approx. 8.1 m
Distance between conductors	Between 2.4 m and 3.8 m
Pylon type, span, working area and footprint	Monopole or steel lattice type pylons, or combination of both where required. The pylons will have a span of 200 m to 350 m for monopole pylons and up to approximately 500 m for lattice structures. The working area required around a pylon position during the construction phase is approximately 30 m x 30 m. The size of the final constructed pylon footprint depends on the type of structure used, which will typically range from approximately 0.5 m^2 to 8 m^2 for monopole pylons, and 36 m^2 to 64 m^2 for steel lattice pylons.

Component	Description
Servitude width	Once built, the registered servitude will be up to 32 m wide in line with guideline and requirements for 132 kV power lines stipulated in the 2011 Eskom Distribution Guide Part 19. Note that the entire servitude will not be cleared of vegetation. Vegetation clearance within the servitude will be undertaken in compliance with relevant standards and specifications. Specialists were required to assess an approximately 200 m wide power line corridor (100 m on either side of the centre line).
Supporting Infrastructure	
Service roads	There are a number of existing gravel farm roads (some just jeep tracks) with widths ranging between 4 m and 5 m located around and within the proposed Vhuvhili power line corridor. A service road of approximately 5 m wide will be required below the power line.
Proximity to grid connection	The proposed 132 kV overhead power line will extend approximately 12 km from proposed Vhuvhili SEF on-site substation to a switching station at the proposed Mukondeleli WEF site.

The BA process assessed four power line routing alternatives for the transfer of the electricity generated by the proposed Vhuvhili SEF to the switching station at the proposed Mukondeleli WEF. Please refer to Figure A for the power line routing alternatives which are assessed as part of this BA process. The figure also includes the preferred and alternative substation hubs at the proposed Vhuvhili SEF site and the two switching station alternatives at the proposed Mukondeleli WEF site.

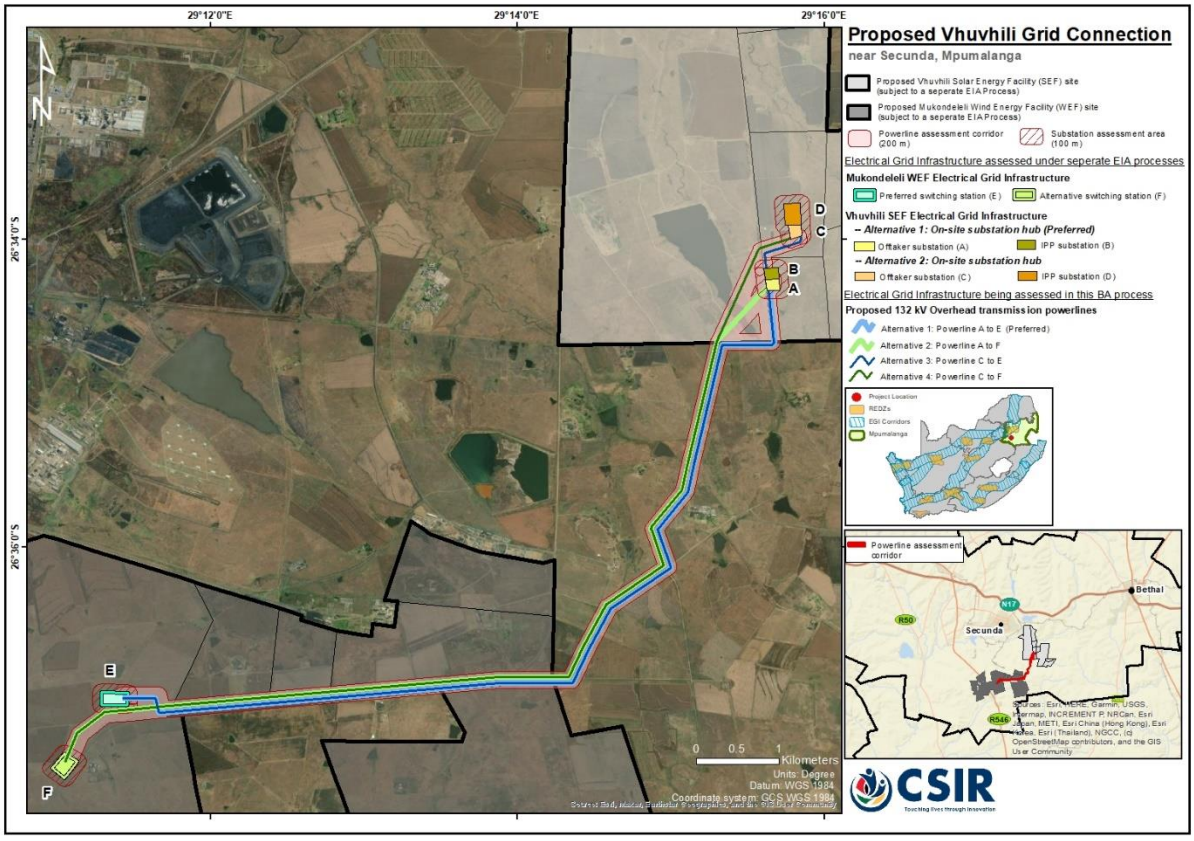


Figure A: Locality map showing the proposed 132 kV overhead power line routing alternatives (that is the subject of this BA Report), which extends from the proposed Vhuvhili SEF (subject of a separate S&EIA process) to the proposed Mukondeleli WEF (subject of a separate S&EIA process).

NEED FOR THE BA

As noted above, in terms of the 2014 NEMA EIA Regulations published in GN R326, R327, R325 and R324, a BA process is required for the proposed power line project. The need for the BA is triggered by, amongst others, the inclusion of Activity 11 listed in GN R327 (Listing Notice 1):

> *"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".*

Section A of this Draft BA Report contains the detailed list of activities contained in GN R327 and R324 which are triggered by the various project components and thus form part of this BA Process.

Section 24 of the Constitution of the Republic of South Africa (Act 108 of 1996) 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*".

Therefore, this BA was undertaken to ensure that these principles are met by identifying, assessing, and reporting any potential impacts that the proposed project, if implemented, may have on the receiving environment. The BA, therefore, shows the Competent Authority, the Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs; and the Project Applicant, Vhuvhili Solar RF (Pty) Ltd, what the consequences of their choices will be in terms of impacts on the biophysical and socio-economic environment and how such impacts can, as far as possible, be enhanced or mitigated and managed as the case may be.

PROJECT MOTIVATION: NEED AND DESIRABILITY

For development to be sustainable, it is important that the BA process ascertain whether the proposed development will meet the needs of people, and whether it will be socially, economically, and ecologically desirable. The need for renewable energy is becoming increasingly apparent, in both local and international contexts, with South Africa's international climate commitments obligating it to transition from its substantial (90%) dependence on a fossil fuel-based energy system to a sustainable, clean, and affordable energy system based on renewable resources and low carbon-emitting technologies. Given that South Africa receives among the highest levels of solar radiation on earth, it is clear that solar power generation should feature prominently in efforts to decarbonise the country's complement of energy sources in order to mitigate human-induced climate change. As recognised by the National Energy Act (Act 34 of 2008) and the National Development Plan: Vision 2030, the clean energy transition can be a critical enabler of inclusive economic development that is contained within the limits of surrounding socio-ecological systems.

The proposed Vhuvhili 132 kV power line project will support the evacuation of electricity generated at the proposed Vhuvhili SEF into the EGI at Mukondeleli WEF wherefrom the electricity will be fed into Sasol's Secunda Synfuels facility for the production of green hydrogen and green aviation fuel. The conversion of renewable energy into green fuels, represents a more (or possibly the only) viable option to decarbonise heavy industry and long-distance cargo transportation in South Africa which are ubiquitously difficult to abate with direct renewable energy and existing battery technologies. The proposed project supports South Africa's pathway to invest R319 billion in

developing and commercialising a green hydrogen sector, as articulated in South Africa's Just Energy Transition Investment Plan, 2023-2027.

On a municipal planning level, the proposed project aligns with the strategic objectives of the Govan Mbeki Local Municipality (2021) and the Gert Sibande District Municipality (2021) as articulated in their respective integrated Development Plans (IDP). The municipal area is attractive for renewable energy facilities and supporting EGI due to the significant solar and wind energy resources. In the SWOT analysis undertaken as part of the local municipality's IDP process, it identifies the closure of the Mining and the Petro-chemical industry due to exhausting coal deposits as a threat which could see Govan Mbeki "become a ghost town with very high unemployment, poverty and poor living conditions" (Govan Mbeki IDP, 2022-2027). According to the Govan Mbeki Municipal Economic Development Strategy (2014), renewable energy developments represent a key side linkage to complement the coal mining and fuel production economic activities of the municipality. It is recognised that such diversification of the local economy, will provide catalytic opportunities for downstream economic development in the municipality. The proposed project represents a move by Sasol to transition to the production of greener energy sources, which will increase business resilience, local economic resilience, securing existing jobs in the petro-chemical sector while also providing advanced skills transfer and training to the local communities, and creating employment in the area. In this manner, should the proposed development be authorised, it will pave the way for a Just Energy Transition in Mpumalanga.

IMPACT ASSESSMENT

This BA process is informed by inputs provided by the specialists as indicated in Table B.

Table B: Specialist inputs and respective appendices.

Specialist	Company	Assessment
Johann Lanz *(Pr.Sci.Nat.)*	Private	Agriculture and Soils Compliance Statement
Kerry Schwartz	SLR Consulting	Visual Impact Assessment
Dr Jayson Orton	ASHA Consulting	Heritage Impact Assessment
Prof. Marion Bamford	Private	Palaeontology Impact Assessment
Dr Noel van Rooyen *(Pr.Sci.Nat.)*	Ekotrust cc	Terrestrial Biodiversity and Species Assessment
Lorainmari den Boogert *(Pr.Sci.Nat.)*, Antoinette Bootsma Nee van Wyk *(Pr.Sci.Nat.)*, Rudi Bezuidenhoudt *(Pr.Sci.Nat.)* and André Strydom	Iggdrasil Scientific Services & Limosella Consulting	Aquatic Biodiversity and Species Assessment
Chris van Rooyen and Albert Froneman *(Pr.Sci.Nat.)*	Chris van Rooyen Consulting	Avifauna Assessment
Lizande Kellerman *(Pr.Sci.Nat.)* with inputs from Helen Antonopoulos and Willan Adonis	CSIR	Civil Aviation Compliance Statement
Lizande Kellerman *(Pr.Sci.Nat.)* with inputs from Helen Antonopoulos and Willan Adonis	CSIR	Defence Site Sensitivity Verification

In terms of the preferred routing of the power line, four alternatives were assessed, and based on specialist input on nine different environmental sensitivity themes. All specialists assessed a 200 m wide corridor (100 m on either side of the centreline) and respective potential areas of impact around the corridor in order to find the best routing for the power line and supporting infrastructure. The specialists considered desktop data, field work, existing literature, and the National Web-based Environmental Screening Tool to inform the identification of sensitivities.

Figure B, below, provides a synopsis of the environmental features and sensitivities identified by the specialist team.

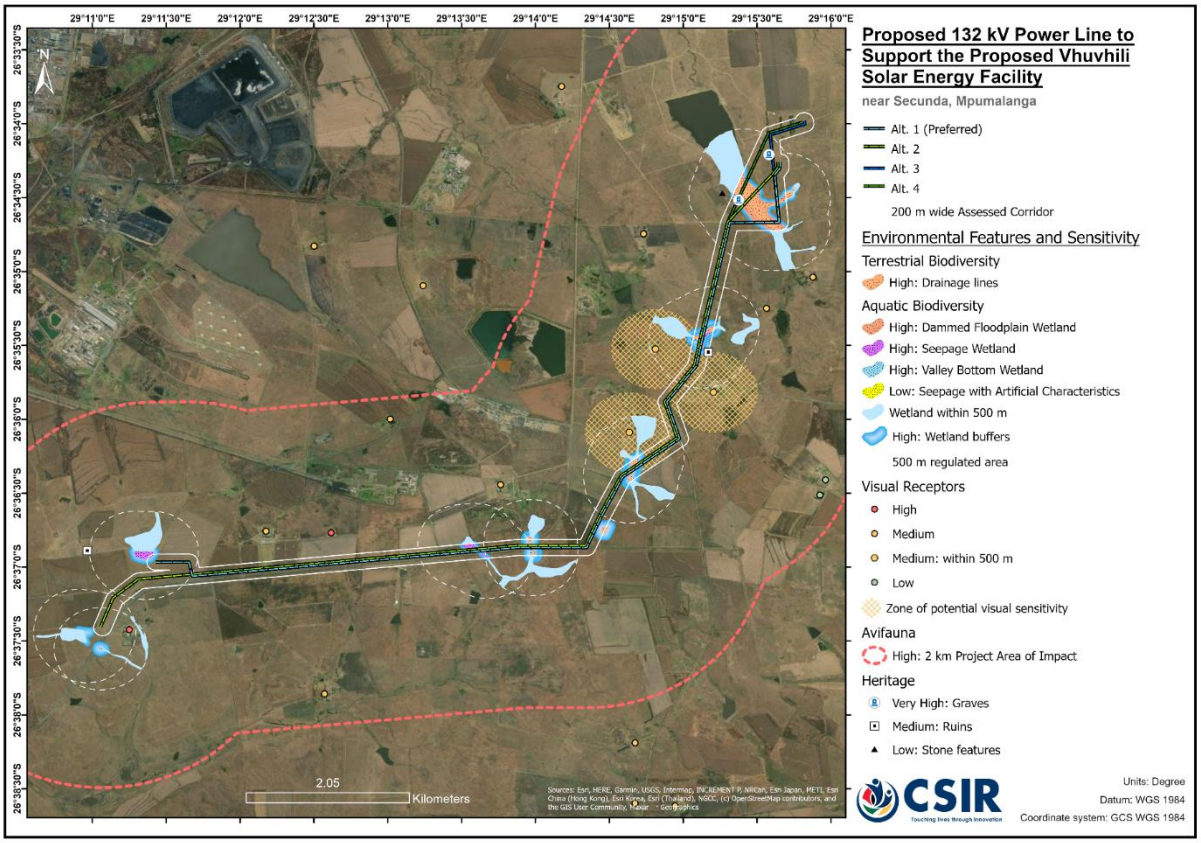


Figure B: Combined Sensitivity and Key Features Map for the proposed project

This BA Report investigated and assessed the significance of potential positive and negative direct, indirect and cumulative impacts associated with the proposed power line project that will support the proposed Vhuvhili SEF and associated infrastructure, near Secunda in the Mpumalanaga Province. No negative impacts have been identified within this BA that, in the opinion of the EAP who has conducted this BA process, should be considered “fatal flaws” from an environmental perspective, and thereby necessitate substantial re-design or termination of the project.

Based on the findings of the specialist assessments, the proposed power line project is considered to have an overall **Low to Very Low** negative environmental impact (with the implementation of respective mitigation and enhancement measures). Table C, below, provides a summary of the impact assessment for the proposed project post-mitigation for direct negative impacts. Table D provides the same information for the cumulative impacts. These overall impact ratings are applicable to all four alternative power line routings.

As indicated in Table C, it is clear that all of the direct negative impacts were rated with a **Low to Very Low** post-mitigation impact significance for the construction phase. In terms of the operational phase, the majority of the direct negative impacts were rated with a **Low to Very Low** post-mitigation impact significance, with only the Avifaunal impacts being rated as **Moderate**. All of the direct negative impacts were rated with a **Low to Very Low** post-mitigation impact significance for the decommissioning phase. Agricultural, Civil Aviation and Defence direct negative impacts are rated as **Insignificant** for all development phases.

The cumulative impacts were assessed by all the specialists on the project team. The cumulative assessment included approved renewable energy projects within a 50 km radius of the power line corridor, as well as existing and planned transmission lines, as well as the currently proposed Mukondeleli WEF and proposed Vhuvhili SEF projects. Based on Table D, the majority of the cumulative negative impacts were rated with a **Low** post-mitigation impact significance for the construction phase, with the Heritage impacts (Archaeology and Cultural Landscape) and Palaeontology impacts being rated as **Very Low** and the Visual impacts rated **Moderate**. A similar trend is applicable to the operational phase, with the majority of cumulative impacts rated **Low**, while Heritage impacts are rated as **Very Low,** and Palaeontology impact rated **Insignificant**, and Visual impacts rated **Moderate**. During the decommissioning phase, the same ratings apply as in the operational phase, with the exception of the Visual Impacts which are rated **Low**. Agricultural, Civil Aviation and Defence cumulative negative impacts are rated as **Insignificant** for all development phases.

Table C: Overall Impact Significance with the Implementation of Mitigation Measures for DIRECT Negative Impacts for the Vhuvhili Power Line and Supporting Infrastructure Project

Specialist Assessment	Construction Phase	Operational Phase	Decommissioning Phase
DIRECT NEGATIVE IMPACTS			
Agriculture	**Insignificant**	**Insignificant**	**Insignificant**
Visual	**Low**	**Low**	**Low**
Heritage (Archaeology and Cultural Landscape)	**Low**	**Very Low**	**Very Low**
Palaeontology	**Very Low**	**Insignificant**	**Insignificant**
Terrestrial Biodiversity and Species	**Low**	**Very Low**	**Very Low**
Aquatic Biodiversity	**Low**	**Low**	**Low**
Avifauna	**Low**	**Moderate**	**Low**
Civil Aviation	**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**
Defence	**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**

Table D: Overall Impact Significance with the Implementation of Mitigation Measures for CUMULATIVE Negative Impacts for the Vhuvhili Power Line and Supporting Infrastructure Project

Specialist Assessment	Construction Phase	Operational Phase	Decommissioning Phase
CUMULATIVE NEGATIVE IMPACTS			
Agriculture	**Insignificant**	**Insignificant**	**Insignificant**
Visual	**Moderate**	**Moderate**	**Low**
Heritage (Archaeology and Cultural Landscape)	**Very Low**	**Very Low**	**Very Low**
Palaeontology	**Very Low**	**Insignificant**	**Insignificant**
Terrestrial Biodiversity and Species	**Low**	**Low**	**Low**
Aquatic Biodiversity	**Low**	**Low**	**Low**

Specialist Assessment	Construction Phase	Operational Phase	Decommissioning Phase
CUMULATIVE NEGATIVE IMPACTS			
Avifauna	**Low**	**Low**	**Low**
Civil Aviation	**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**
Defence	**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**

NOTE: no fatal flaws in terms of direct negative impacts and cumulative negative impacts were identified for any of the proposed power line routing alternatives, and **all of the specialists have recommended that the proposed project receives EA** in terms of the 2014 EIA Regulations promulgated under NEMA (Act 107 of 1998), provided that the recommended mitigation measures are implemented.

OVERALL ENVIRONMENTAL IMPACT STATEMENT

Taking into consideration the findings of this BA process, including the specialists' assessment findings, it is the opinion of the EAP, that the project benefits outweigh the costs and that the project will make a positive contribution to sustainable infrastructure development in the Govan Mbeki Local Municipality, Gert Sibande District Municipality, Mpumalanga Province, and in South Africa. **Although no fatal flaws were identified for either of the four power line routing alternatives**, this BA process determined that **power line routing Alternative 1** – which is also the shortest routing (~11 km versus ~12 km for Alternative 4) – **is the preferred alternative as it would have the least possible overall environmental impact**. It is recommended that, should the EA be granted, it should approve a 100 m wide corridor to enable the final power line alignment to avoid the sensitive features identified by the specialists in the 200 m wide assessed corridor. **Provided that the specified mitigation measures are applied effectively, it is recommended that the proposed preferred (Alternative 1) 132 kV overhead power line project receive EA in terms of the 2014 EIA Regulations (as amended) promulgated under NEMA (Act 107 of 1998).** It is recommended that the EA be valid for a period of 10 years.

Summary of where requirements of Appendix 1 of the 2014 NEMA EIA Regulations (as amended, GN R326) are provided in this BA Report

Appendix 1	YES / NO	SECTION IN BA REPORT
Objective of the basic assessment process 2) The objective of the basic assessment process is to, through a consultative process- a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context; b) identify the alternatives considered, including the activity, location, and technology alternatives; c) describe the need and desirability of the proposed alternatives; d) through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine- (i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and (ii) 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; and e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to- (i) identify and motivate a preferred site, activity and technology alternative; (ii) identify suitable measures to avoid, manage or mitigate identified impacts; and (iii) identify residual risks that need to be managed and monitored.	**Yes**	**Section A of the report includes the Introduction, legislative review, alternatives assessment and needs and desirability** **Section D of the report includes a summary of the specialist studies and associated impact assessments undertaken**
Scope of assessment and content of basic assessment reports 3) (1) A basic 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: (a) details of: (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	**Yes**	**Section A.4 and Appendix A**
(b) the location of the activity, including: (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the co-ordinates of the boundary of the property or properties;	**Yes**	**Section A.7 and Section B, Appendix H.1**
(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; or, if it is- (i) a linear activity, a description and co-ordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the co-ordinates within which the activity is to be undertaken;	**Yes**	**Section A.6 and Section A.7**
(d) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for; and a description of the activities to be undertaken including associated structures and infrastructure;	**Yes**	**Section A.6 and Section A.11**
(e) a description of the policy and legislative context within which the development is proposed including- (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and	**Yes**	**Section A.10**

Appendix 1	**YES / NO**	**SECTION IN BA REPORT**
instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;		
f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	**Yes**	**Section A.5 and Section A.14**
(g) a motivation for the preferred site, activity and technology alternative;	**Yes**	**Section A.13**
(h) A full description of the process followed to reach the proposed preferred alternative within the site, including - (i) details of all the alternatives considered;	**Yes**	**Section A.13**
(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	**Yes**	**Section C, Appendix E and Appendix F**
(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;	**No**	**To be included in Final BA Report, following current 30-day public participation period.**
(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	**Yes**	**Section A.13 and Section B**
(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	**Yes**	**Section A.13, Section B and Section D**
(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	**Yes**	
(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;	**Yes**	
(viii) the possible mitigation measures that could be applied and level of residual risk;	**Yes**	
(ix) the outcome of the site selection matrix;	**Yes**	
(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	**Yes**	
(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity.	**Yes**	**Section E**
(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including- (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	**Yes**	**Section B and Section D**
(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	**Yes**	**Section D, Appendix C and Appendix D**

Appendix 1	**YES / NO**	**SECTION IN BA REPORT**
(vii) the degree to which the impact and risk can be avoided, managed or mitigated;		
(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	**Yes**	**Section D and Section E**
(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 site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	**Yes**	**Section E**
(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr;	**Yes**	**Section D and Appendix G**
(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	**Yes**	**Section E**
(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	**Yes**	**Please refer to each specialist study included in Appendix D**
(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	**Yes**	**Section E**
(q) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post-construction monitoring requirements finalised;	**X**	**N/A**
(r) an undertaking under oath or affirmation by the EAP in relation to - (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and	**Yes**	**Appendix A**
(s) where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post-decommissioning management of negative environmental impacts;	**X**	**N/A**
(t) any specific information that may be required by the competent authority; and	**X**	**N/A**
(u) any other matters required in terms of section 24(4)(a) and (b) of the Act.	**X**	**N/A**
2) Where a government notice *gazetted* by the Minister provides for the basic assessment process to be followed, the requirements as indicated in such a notice will apply.	**Yes**	**Refer to Section A.10 and A.11 for a breakdown of the relevant gazettes that are applicable.**

SECTION A: INTRODUCTION, PROJECT DESCRIPTION, ALTERNATIVES, LEGISLATION, NEED AND DESIRABILITY

A.1 Introduction

The Project Applicant, Vhuvhili Solar RF (Pty) Ltd (hereinafter referred to as "Vhuvhili Solar" or "the Applicant")[1], is proposing to design, construct and operate the Vhuvhili Solar Energy Facility (SEF) and associated infrastructure approximately 7 km south-east of the town of Secunda in the Govan Mbeki Local Municipality and the Gert Sibande District Municipality, in the Mpumalanga Province. The proposed Vhuvhili SEF will have an export capacity of up to approximately 300 MW. The locality and current footprint of the proposed SEF and its associated Electrical Grid Infrastructure (EGI) are depicted in Figure A.1.

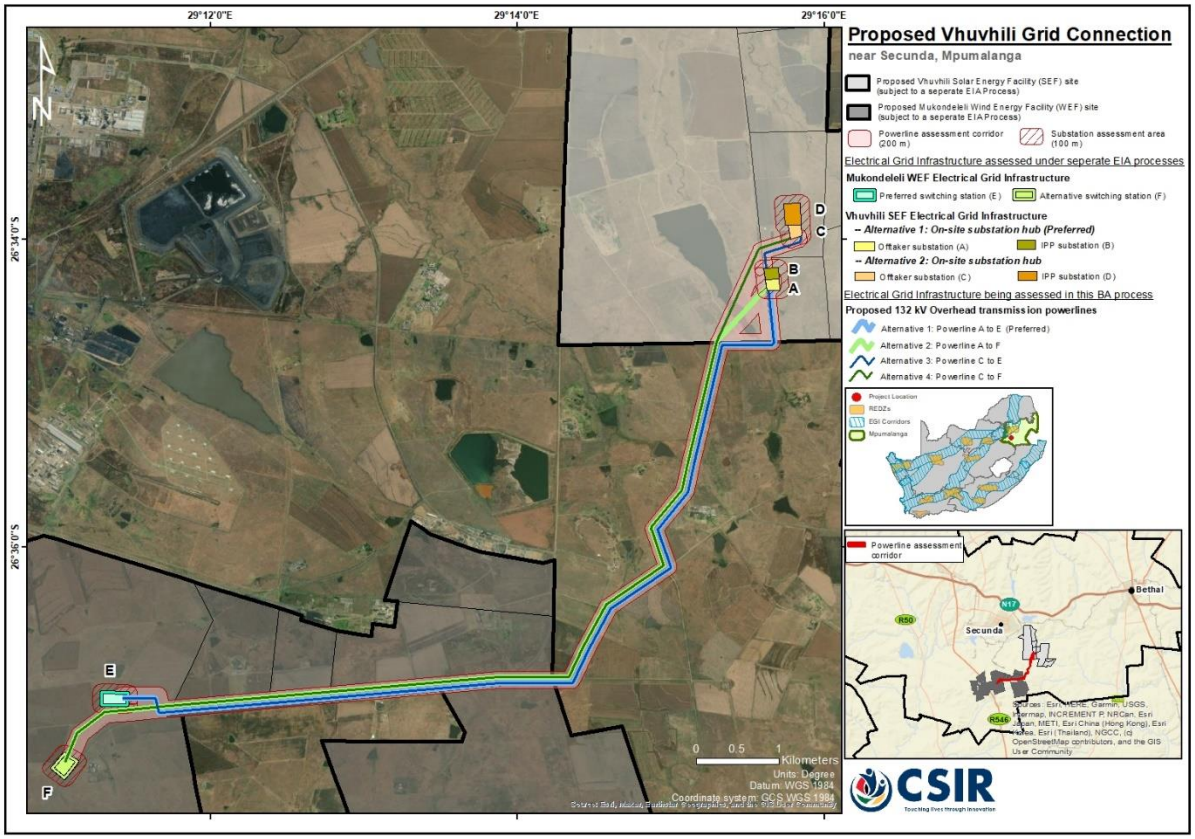


Figure A.1: Locality map showing the proposed 132 kV overhead power line routing alternatives (that is the subject of this BA Report), which extends from the proposed Vhuvhili SEF (subject of a separate S&EIA process) to the proposed Mukondeleli WEF (subject of a separate S&EIA process).

[1]It is important to note that Vhuvhili Solar RF (Pty) Ltd is the Project Applicant, whereas ENERTRAG South Africa (Pty) Ltd (hereafter referred to as the "ENERTRAG"), is the Project Developer.

The proposed Vhuvhili SEF, including an on-site Battery Energy Storage System (BESS) and substation hub, is subjected to a Scoping and Environmental Impact Assessment Process (S&EIA) (MPP/EIA/0001063/2022) as provided in Part 3 of the NEMA EIA Regulations (2014, as amended 2017), which is triggered by, amongst others, the inclusion of Activity 1 listed in GN R325 (Listing Notice 2) that deals with "the development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more" outside an urban area.

In order to transmit the electricity generated from the proposed Vhuvhili SEF into the Sasol grid at the Secunda Synfuels facility for the production of green hydrogen and green aviation fuel, or alternatively to transmit the electricity into the national electrical grid network as part of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), the Project Applicant is undertaking this Basic Assessment Process for the supporting EGI.

Assessed in the BA process is a 132 kV overhead transmission power line which extends approximately 12 km from the proposed Vhuvhili on-site substation to a switching substation at the proposed Mukondeleli Wind Energy Facility (WEF) wherefrom the electricity will be evacuated via the off-taker scenarios discussed below. The switching substation at the Mukondeleli WEF is subject to a separate S&EIA process (MPP/EIA/0001099/2022) which is currently being undertaken by ENERTRAG South Africa (Pty) Ltd (hereinafter referred to as "ENERTRAG" or "the Project Proponent/Developer". A detailed project description is provided in Section A.7 of this Draft Basic Assessment Report (DBAR).

The Project Developer, ENERTRAG, is currently investigating two scenarios for the uptake of energy from the proposed Vhuvhili SEF:

Scenario 1 (preferred):
The proposed Vhuvhili SEF is planned to provide renewable energy to the Sasol Secunda Synfuels facility for the production of green hydrogen and green aviation fuel. This is viewed as the preferred outcome of the proposed project, via an agreement between several consortium parties including ENERTRAG and Sasol.

Scenario 2 (alternative):
However, should the above agreement not materialise under Scenario 1, and a private off-taker of the renewable energy cannot be obtained, the proposed Vhuvhili SEF will be bid into future rounds of the REIPPPP or similar bidding processes.

By assessing both scenarios in this BA and the associated potential environmental impacts, it is understood that the Environmental Authorisation (EA) received for the proposed Vhuvhili EGI would be suitable for both scenarios.

ENERTRAG provided four alternative power line routings and EGI sites (i.e., Alternative 1 to 4) to be considered and assessed by the specialists. Please note that ENERTRAG proposes Alternative 1 to be the preferred power line routing and siting for associated EGI. The Project Applicant requested that the specialist assessments include an approximately 100 m buffer around the substation and BESS complexes, and a 200 m wide corridor for the power line routings (100 m on either side of the centre line). This will allow for micro-siting during project construction.

It is proposed that a final servitude of 32 m wide will be registered for the 132 kV power line.

The Vhuvhili SEF is not located within any of the Renewable Energy Development Zones (REDZs) gazetted in Gazette 41445, GN R114 on 16 February 2018; and Gazette 44191, GN R144 on 26 February 2021. The proposed Vhuvhili power lines are also not located within any of the strategic power corridors gazetted in Gazette 41445, GN R113 on 16 February 2018. However, the need for the Basic Assessment process is triggered by, amongst others, the inclusion of Activity 11 (i) listed in GN R327 (Listing Notice 1):

> *"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".*

Therefore, the proposed Vhuvhili EGI requires EA from the Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA). A Basic Assessment Process is being undertaken for the proposed 132 kV overhead transmission power line with a 107-day decision-making timeframe, as opposed to a 57-day decision-making timeframe allowed for in the REDZs and strategic power line corridors.

This Draft BA Report is currently being released to all Interested and Affected Parties (I&APs), Organs of State and stakeholders for a 30-day review period extending from **14 November 2022 to 14 December 2022**, excluding public holidays. All comments received during the 30-day comment period will be incorporated into the Final BA Report captured in the Comments and Responses Report that will be submitted with the Final BA Report to Mpumalanga DARDLEA in accordance with Regulation 19 (1) of the 2014 NEMA EIA Regulations (as amended), for decision-making (i.e. approval or refusal) in terms of Regulation 20.

A.2 Project Developer

ENERTRAG South Africa (Pty) Ltd ("ENERTRAG") is a subsidiary of the German-based ENERTRAG AG, a hydrogen and renewable energy developer founded in 1992. ENERTRAG AG has an established track-record of renewable energy projects around the world, comprising over 1000+ wind turbines. ENERTRAG specializes in developing and operating high yield renewable energy projects and has an installed capacity of 760MW and over 500 employees. Current projects are in Germany, United Kingdom, France, Poland, Bulgaria, Belarus and now South Africa.

ENERTRAG AG has established itself as a Green Hydrogen Developer globally. It developed its first green hydrogen facility, Hybridkraftwerk, in Germany which is powered by wind energy. The Hybridkraftwerk was commissioned in October 2011 and produces 94 tons of hydrogen per year (Figure 1-6).

ENERTRAG South Africa (Pty) Ltd (hereafter referred to as ENERTRAG) was established in 2017, with the intention to investigate and develop clean energy projects in South Africa. ENERTRAG currently owns the Darling Wind Farm in the Western Cape and has numerous wind measurement campaigns throughout South Africa, and it is the first IPP to commence with a wind measurement campaign in Mpumalanga. Other IPPs are now following suit and securing land for Renewable Energy

Facilities (REFs) throughout Mpumalanga. ENERTRAG's goal is to be a market leader in making the Just Energy Transition a reality for South Africa.

ENERTRAG is, therefore, paving the way towards a Just Energy Transition in the Mpumalanga Province.

A.3 Project Applicant

The Project Applicant seeking EA for the proposed power line project is Vhuvhili Solar RF (Pty) Ltd with registration number 2022/577947/07.

A.4 Project Team

In accordance with Regulation 12 (1) of the 2014 NEMA EIA Regulations (as amended), the Project Applicant has appointed the Council for Scientific and Industrial Research (CSIR) to undertake the BA Process for the Proposed Construction of EGI for the Proposed Vhuvhili SEF in order to determine the biophysical, social and economic impacts associated with undertaking the proposed development. Public participation forms an integral part of the BA Process and assists in identifying issues and possible alternatives to be considered during the BA Process. The CSIR is undertaking the Public Participation Process (PPP) for this BA Process. Details on the PPP are included in Section C of this DBAR.

The project team, which is involved in this BA Process, is listed in Table A.1 below. This team includes several specialists who have extensive experience in conducting specialist studies for renewable energy projects in South Africa.

Paul Lochner (EAP, Technical Advisor and Quality Assurance)

Paul Lochner is an EAP at the CSIR in Stellenbosch, with more than 28 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 10 to 20 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, electricity grid infrastructure, desalination, oil & gas, wetlands & coastal zone management, and industrial & port development. He has been closely involvement in the research and application of Strategic Environmental Assessment (SEA) in South Africa, and he has wide experience in Environmental & Social Impact Assessment, Environmental Management Programmes (EMPRs) and Environmental Screening Studies. He has been the project leader for over 40 SEAs and EIAs over the past 28 years. 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).

Minnelise Levendal (Project Manager)

Minnelise is a Senior Environmental Scientist in the Environmental Management Services (EMS) Group of the CSIR and holds a Masters degree in Botany from Stellenbosch University. She obtained her BSc (Education) and BSc (Honours) degrees at the University of the Western Cape. She has 23 years of experience in Environmental Management (which includes five years working as a case officer at the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP). Minnelise is currently managing various EIAs and BAs for wind and solar renewable energy projects in South Africa. She was the project manager of ten BAs for wind monitoring masts in South Africa as part of the National Wind Atlas Project of the Department of Energy (DoE). EAs for all the ten masts were obtained from DEA in 2010. Minnelise managed the Special Needs and Skills Development Programme of DEA (from 2014 to 2018) which provided *pro bono* environmental assessments (BAs) to applicants with special needs, i.e., applicants who do not have the financial means to appoint an EAP to undertake a BA for their small-scale projects. Under this programme, 30 BAs have been undertaken and received EA.

She is a registered Professional Natural Scientist (117078) with the South African Council for Natural Scientific Professions (SACNASP).

Willan Adonis (Project Officer & GIS mapping)

Willan Adonis is an environmental consultant in training in the CSIR's EMS group. Willan holds a BA, a PGDip and an MPhil (all cum laude) in Development and Environmental Management from Stellenbosch University. After completing his masters, he gained experience in on-site compliance monitoring, assisted with BA reports, compiled EMPRs, and undertook several public participation processes. His key interest lies in how the multi-disciplinary interfaces between Environmental, Social and Governance systems can be used to build stakeholder partnerships and promote sustainable human-environment relationships.

Dhiveshni Moodley (GIS mapping)

Dhiveshni Moodley is a Junior EAP in the EMS group of the CSIR. Dhiveshni holds a BSc, BSc Honours (cum laude) and MSc (cum laude) degrees in Environmental Science from the University of KwaZulu-Natal. She has three year's work and research experience in flood risk, hydropedological- and wetland functional assessment specialist studies, as well as conducting BAs and Scoping/EIAs in the Renewable Energy sector. Her key interest lies in using GIS analyses to apply the formation of accurate, feasible solutions to complex environmental challenges.

Dhiveshni is registered as a Candidate Natural Scientist with the SACNASP (1472997/19).
Various specialists and additional members from the CSIR have contributed to these BAs. The team which is involved in this BA Process is listed in Table A.2 below.

Table A.1: Details of the BA Project Team

Name	Organisation	Role/ Specialist Study
CSIR Project Team		
Paul Lochner (*Registered EAP (2019/745)*)	CSIR	EAP and Project Leader
Minnelise Levendal (*Pr.Sci.Nat.*)	CSIR	Project Manager
Willan Adonis	CSIR	Project Officer & GIS specialist
Dhiveshni Moodley (*Cand.Sci.Nat.*)	CSIR	GIS specialist
Specialists		
Johann Lanz *(Pr.Sci.Nat.)*	Private	Agriculture and Soils
Kerry Schwartz	SLR Consulting	Visual Impact Assessment
Dr Jayson Orton	ASHA Consulting	Heritage Impact Assessment
Prof. Marion Bamford	Private	Palaeontology Assessment
Dr Noel van Rooyen *(Pr.Sci.Nat.)*	Ekotrust cc	Terrestrial Biodiversity
Lorainmari den Boogert *(Pr.Sci.Nat.)*, Antoinette Bootsma Nee van Wyk *(Pr.Sci.Nat.)*, Rudi Bezuidenhoudt *(Pr.Sci.Nat.)* and André Strydom	Iggdrasil Scientific Services & Limosella Consulting	Aquatic Biodiversity and Species
Chris van Rooyen and Albert Froneman *(Pr.Sci.Nat.)*	Chris van Rooyen Consulting	Avifauna Assessment
Lizande Kellerman (*Pr.Sci.Nat.*) with inputs from Helen Antonopoulos and Willan Adonis	CSIR	Civil Aviation Compliance Statement
Lizande Kellerman (*Pr.Sci.Nat.*) with inputs from Helen Antonopoulos and Willan Adonis	CSIR	Defence Site Sensitivity Verification

A.5 Project Motivation

The need for renewable energy is becoming increasingly apparent, in both local and international context, with South Africa becoming an integral part of the global transition towards renewable sources of electricity generation. The urgency behind this evolution can be appreciated considering that South Africa is one of the largest emitters of greenhouse gases in Africa[2], and is also estimated to rank amongst the top 20 largest emitters of greenhouse gases 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. South Africa is therefore one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer of carbon emissions. The South African government is therefore 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.

[2] Ritchie, H. & Roser, M. 2020. South Africa: CO_2 Country Profile. [https://ourworldindata.org/co2-and-other-greenhouse-gas-emission]

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 therefore a need to identify alternative resources that could promote sustainable energy sources. South Africa is facing the challenge of securing clean, affordable and sustainable energy to power its economy and to contribute to the transition to a climate-neutral society. A clean energy future is seen as a critical enabler of inclusive and transformational economic growth and development. This challenge is addressed in the National Energy Act (Act 34 of 2008) which aims to ensure that diverse energy resources are available in affordable quantities to the South African economy to support economic growth and poverty alleviation whilst accounting for surrounding environments and economic sectors[3].

Commitment toward decarbonisation of the economy is clearly illustrated in the South Africa's National Development Plan (NDP) Vision 2030 published in 2012. Chapter 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[3][4]. 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.

Further, the Minister of the Department of Forestry, Fisheries, and the Environment (DFFE), Barbara Creecy announced the approval of the revised National Determined Contribution (NDC), the Climate Bill and South Africa's negotiating position for COP26 during a Media Release on 22 September 2021. The NDC describes South Africa's contribution to global efforts to reduce GHG emissions and mitigate climate change. The revised NDC includes the updated mitigation target range of 350-420 Mt CO_2-eq (previously 398-614 Mt CO_2-eq) in line with targets set out in the Paris Agreement[5]. The transition from an intense carbon-based energy system with substantial dependence on coal to a sustainable, clean, and affordable energy system based on renewable resources is therefore a priority for South Africa as it pursues both economic prosperity and its international climate commitments.

While renewable electricity is essential to achieve decarbonization targets globally as per the 2015 UN Paris Agreement, direct electrification is not feasible in hard-to-abate sectors, such as heavy-duty, long-distance transport (buses, trucks, shipping, and commercial aviation) and heavy manufacturing industries (Roos, 2021)[6]. It is more feasible to decarbonize these sectors using renewable electricity in an indirect manner, by means of synthetic gaseous or liquid fuels (Roos, 2021). Green hydrogen has been identified as a low-carbon solution to meet Greenhouse Gas (GHG) emission reduction targets and to power industries in which emissions have previously been difficult to abate (Department of Science and Innovation, 2021)[7]. Hydrogen is also used in various industrial processes, such as ammonia production, and thus has the potential to contribute to decarbonising a variety of industries.

[3] Strambo, Claudia, Jesse Burton, and Aaron Atteridge.2019, The End of Coal? Planning a 'Just Transition' in South Africa. Stockholm Environment Institute.
[4] Roos, T and Wright, J., 2021, Powerfuels and Green Hydrogen (public version). European Union.
[5] Department of Forestry, Fisheries and the Environment (DFFE), South African delegation meets climate envoys ahead of CoP26, Media release, [Online]. Available https://www.environment.gov.za/mediarelease/cop26climateenvoysmeeting. [Accessed 30 September 2021]
[6] Roos, T.H. 2021. The cost of production and storage of renewable hydrogen in South Africa and transport to Japan and EU up to 2050 under different scenarios. Available: https://www.sciencedirect.com/science/article/pii/S0360319921034406
[7] DSI (Department of Science and Innovation). 2021. Hydrogen Society Roadmap for South Africa 2021: Securing A Clean, Affordable and Sustainable Energy. [https://www.dst.gov.za /index.php/resource-center/strategies-and-reports/3574-hydrogen-society-roadmap-for-south-africa-2021]

What makes green hydrogen 'green' is the input of energy from a renewable energy source (e.g. solar or wind energy) to operate the electrolyser – the key component in the green hydrogen production process. In October 2021, at the second Sustainable Infrastructure Development Symposium, President Cyril Ramaphosa stated that green energy had the potential to drive industrialisation and establish a whole new industrial reality. Furthermore, the President stated that "We stand ready to be a major exporter in this market, to use hydrogen to rapidly decarbonise our existing industries, and attract industrial investment from across the globe seeking to meet new standards of green power in the production process". This was furthered in the release of South Africa's Just Energy Transition Investment Plan 2023-2027 which earmarks the green hydrogen sector as a priority industry requiring an investment of R319 billion (22% of the investment plan) to decarbonize South African industry and generate clean fuels for export[8]. The proposed development of the Vhuvhili SEF directly contributes to the Presidency's plans to develop renewable energy and green fuel industries in South Africa.

The proposed Vhuvhili EGI project will support the proposed Vhuvhili SEF in transmitting the electricity generated at Vhuvhili SEF into a switching substation at the Mukondeleli WEF wherefrom the electricity will be fed via another 132 kV power line (subject of another environmental assessment process) into the Sasol grid at the Secunda Synfuels facility for the production of green hydrogen and green aviation fuel (best case preferred scenario), or alternatively the electricity will be transmitted into the national electrical grid network as part of South Africa's REIPPPP contributing towards meeting the national renewable energy targets as set by the Department of Mineral Resources and Energy (DMRE).

In the Govan Mbeki Local Municipality, the mining sector (39%) and manufacturing sector (24%) contributes the most in terms of GDP. In the SWOT[9] analysis undertaken as part of the municipality's Integrated Development Planning (IDP) process, one of the threats identified is the closure of the Mining and the Petro-chemical industry. It notes that "coal is a finite resource and exhausting coal deposits, and reserves means Govan Mbeki will become a ghost town with very high unemployment, poverty and poor living conditions" (Govan Mbeki IDP, 2022-2027). The proposed project will therefore improve the resilience of the local economy which has come to depend on coal mining, which the IDP recognises as a vulnerability of the local economy. Therefore, the proposed project would help to address the need to increase local economic resilience while also providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area. According to the Govan Mbeki Municipal Economic Development Strategy (2014), new energy sources (preferably renewable energy such as solar and wind) represent a key side linkage to complement the coal mining and fuel production economic activities of the municipality. It is recognised that such side linkages, or diversification of the local economy, will provide catalytic opportunities for further economic development in the municipality. The project also represents a move by Sasol to transition to the production of greener energy sources, which will additionally create business and employment resilience in the energy production industry. In this manner, should the proposed development be authorised, it will pave the way for a Just Energy Transition in Mpumalanga.

The proposed power line project would also have international significance as it facilitates the connectivity of the proposed Vhuvhili SEF to Sasol's Secunda Synfuels facility for the production of green fuels which will contribute to South Africa being able to meet some of its international

[8] The Presidency of the Republic of South Africa. 2022. South Africa's Just Energy Transition Investment Plan, 2023-2027. [https://www.thepresidency.gov.za/download/file/fid/2644]
[9] Strengths, Weaknesses, Opportunities, Threats

decarbonisation obligations by aligning domestic policy with internationally agreed strategies and standards as set by the UN Framework Convention on Climate Change (UNFCCC), the Paris Agreement on Climate Change, Kyoto Protocol, and UN Convention on Biological Diversity (UN CBD), all to which South Africa is a signatory. 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.

A.6 Project Description

As noted in Section A.1 of this BA Report, the Project Applicant is proposing the construction of a 132 kV overhead transmission power line and associated EGI to feed the electricity generated by the proposed Vhuvhili SEF to the switching station at the proposed Mukondeleli WEF. The electricity will be transferred from the proposed on-site substation at the proposed Vhuvhili SEF via a 132 kV power line which extends approximately 12 km in length to the proposed switching station at the proposed Mukondeleli WEF.

It is important to note that this BA process only includes the assessment of the proposed 132 kV power line to transfer the electricity from the proposed Vhuvhili SEF to the proposed Mukondeleli WEF switching station. The proposed Vhuvhili SEF, including the on-site substation and Battery Energy Storage System (BESS), is subject to a separate Scoping and Environmental Impact Assessment (S&EIA) process which is currently underway (DARDLEA NEAS Reference Number: MPP/EIA/0001063/2022). The proposed Mukondeleli WEF, including the on-site switching station to which the proposed 132 kV power line will connect, is also subject to a separate S&EIA process, as summarised below.

Table A.2: Details of this BA process and related S&EIA processes underway

Project	Process	Authority Reference Number	EAP	Status	Subject of this application and BA process
Proposed Vhuvhili-to-Mukondeleli 132 kV power line and associated EGI	BA	To be assigned	Paul Lochner (CSIR) (EAP 2019/745)	Application submitted, Draft BA Report out for comment	Yes
Proposed Vhuvhili SEF Proposed on-site substation and BESS complex at the proposed Vhuvhili SEF site	S&EIA	NEAS: MPP/EIA/0001063/2022	Paul Lochner (CSIR) (EAP 2019/745)	Application submitted. Final Scoping Report accepted. Draft EIA Report released for comment.	No
Proposed Mukondeleli WEF Proposed switching station at the proposed Mukondeleli WEF site	S&EIA	NEAS: MPP/EIA/0001099/2022	WSP	Application and Final Scoping Report submitted	No

The BA process assessed four power line routing alternatives for the transfer of the electricity generated by the proposed Vhuvhili SEF to the switching station at the proposed Mukondeleli WEF. Please refer to Figure A-2 for the power line routing alternatives which are assessed as part of this BA process. The figure also includes the preferred and alternative substation and BESS complexes at the proposed Vhuvhili SEF site and the two switching station alternatives at the proposed Mukondeleli WEF site.

The specialists were requested to assess the following power line routing alternatives:

Proposed alternatives should the Vhuvhili on-site substation hub A-B (Preferred) be built:

- *Alternative 1 (Preferred) (A to E as marked in Figure A-2)*

  This is the Preferred power line routing should the proposed Preferred on-site substation hub A-B at the Vhuvhili SEF site be built. The proposed 132 kV power line will extend from the Preferred on-site substation hub at the proposed Vhuvhili SEF site to switching station E at the proposed Mukondeleli WEF site.

- *Alternative 2 (A to F as marked in Figure A-2)*

  Alternative proposed 132 kV power line that will extend from the Preferred on-site substation hub A-B at the proposed Vhuvhili SEF site to switching station F at the proposed Mukondeleli WEF site.

Proposed alternatives should the Vhuvhili on-site substation hub C-D (Alternative 2) be built:

- *Alternative 3 (Preferred) (C to E as marked in Figure A-2)*

  This is the Preferred power line routing should the proposed Alternative 2 on-site substation hub C-D at the Vhuvhili SEF site be built. The proposed 132 kV power line will extend from the Alternative 2 on-site substation hub at the proposed Vhuvhili SEF site to switching station E at the proposed Mukondeleli WEF site.

- *Alternative 4 (C to F as marked in Figure A-2)*

  Alternative proposed 132 kV power line that will extend from the Alternative 2 on-site substation hub C-D at the proposed Vhuvhili SEF site to switching station F at the proposed Mukondeleli WEF site.

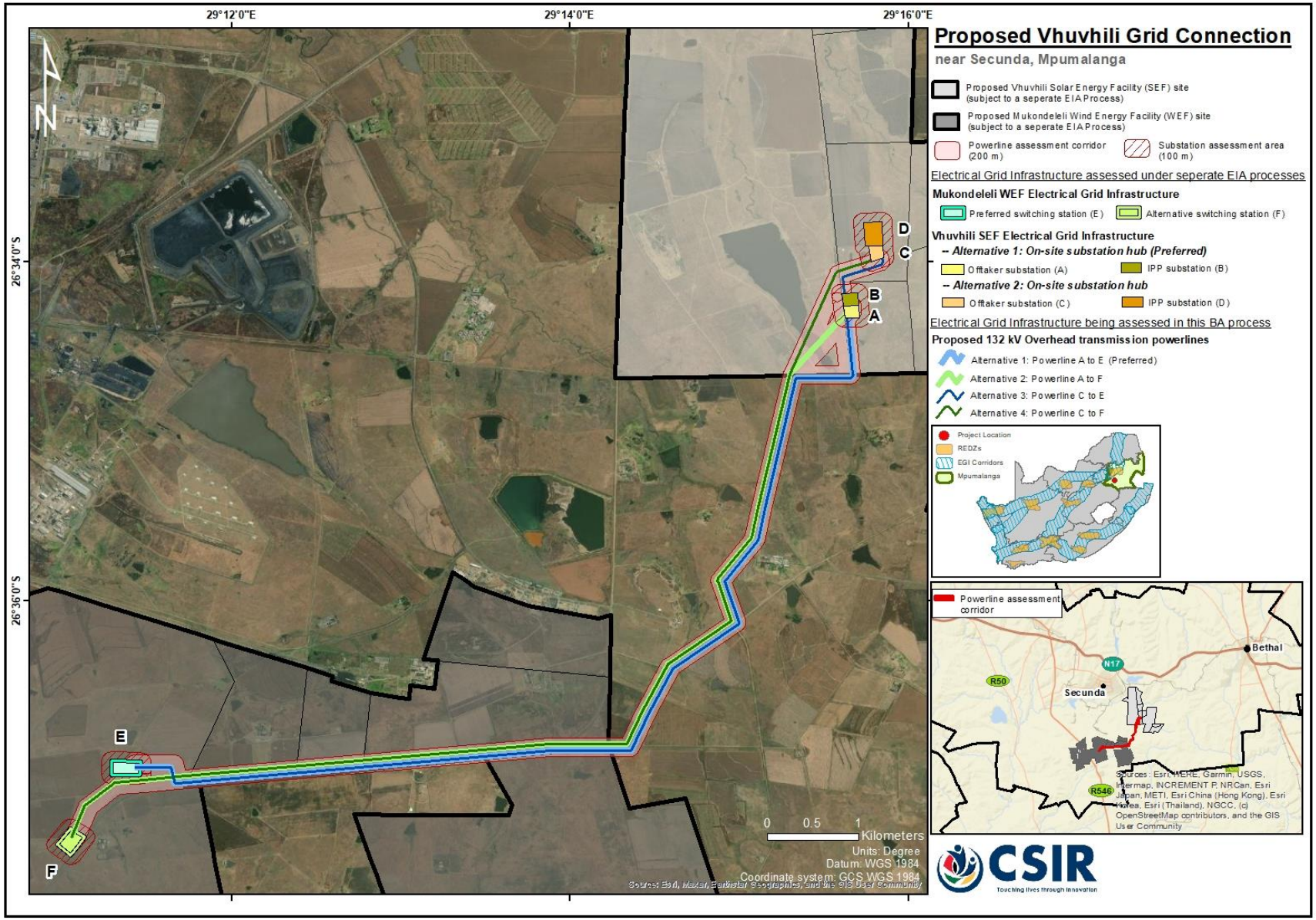


Figure A.2: Locality map showing the proposed 132 kV overhead power line routing alternatives (that is the subject of this BA Report), which extends from the proposed Vhuvhili SEF (subject of a separate S&EIA process) to the proposed Mukondeleli WEF (subject of a separate S&EIA process).

A description of the key components of the proposed power line and EGI project is provided in Table A.3 below and is also discussed within the forthcoming sub-sections. It is important to note at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering phase (subsequent to the issuing of EA, should such authorisation be granted for the proposed power line and EGI project) but that the information provided below is seen as the worst-case scenario for the proposed power line project.

Table A.3: Description of the project components for the proposed 132 kV overhead power line and supporting infrastructure

Component	Description
Power line/pylon height	Up to 40 m
Power line length	Approx. 12 km
Power line capacity	Up to 132 kV (either single or double circuit)
Minimum conductor ground clearance	Approx. 8.1 m
Distance between conductors	Between 2.4 m and 3.8 m
Pylon type, span, working area and footprint	Monopole or steel lattice type pylons, or combination of both where required. The pylons will have a span of 200 m to 350 m for monopole pylons and up to approximately 500 m for lattice structures. The working area required around a pylon position during the construction phase is approximately 30 m x 30 m. The size of the final constructed pylon footprint depends on the type of structure used, which will typically range from approximately 0.5 m^2 to 8 m^2 for monopole pylons, and 36 m^2 to 64 m^2 for steel lattice pylons.
Servitude width	Once built, the registered servitude will be up to 32 m wide in line with guideline and requirements for 132 kV power lines stipulated in the 2011 Eskom Distribution Guide Part 19. Note that the entire servitude will not be cleared of vegetation. Vegetation clearance within the servitude will be undertaken in compliance with relevant standards and specifications. Specialists were required to assess an approximately 200 m wide power line corridor (100 m on either side of the centre line).
Supporting Infrastructure	
Service roads	There are a number of existing gravel farm roads (only jeep tracks) with widths ranging between 4 m and 5 m located around and within the proposed Vhuvhili power line corridor. A service road of approximately 5 m wide will be required below the power line.
Proximity to grid connection	The proposed 132 kV overhead power line will extend approximately 12 km from proposed Vhuvhili SEF on-site substation to a switching station at the proposed Mukondeleli WEF site.

A.6.1 Substations (subject of separate S&EIA processes)

The BESS and on-site substation at Vhuvhili SEF will be the start point of the proposed 132 kV power line, and the switching station at the Mukondeleli WEF will be the end point of the proposed 132 kV power line. The substation infrastructure is not assessed as part of this BA but is discussed here as it provides the start and end points for the alternative power line routings that are the subject of this BA process.

The Applicant provided four alternative substation sites (i.e., Alternative 1 to Alternative 4) to be considered and assessed in the Vhuvhili SEF S&EIA process, and two alternative switching station sites to be assessed as part of the Mukondeleli WEF S&EIA (Figure A.2). **As depicted in Figure**

A-2, the Alternative 1 on-site substation hub marked by areas A and B at the Vhuvhili SEF is the Preferred alternative, and the on-site substation hub marked by areas C and D is the alternative option. **At the Mukondeleli WEF, the switching station** alternatives are marked by areas E and F as depicted in Figure A.2, where **E is the Preferred alternative**.

The co-ordinates for the centre-point of the substation site alternatives at the Vhuvhili SEF are noted in Table A.5, below.

A.6.2 Proposed Power line from Vhuvhili Solar Energy Facility to Mukondeleli Wind Energy Facility

As explained above, a 132 kV power line of approximately 12 km is proposed to feed electricity from the on-site substation hub at the proposed Vhuvhili SEF to the switching station at the proposed Mukondeleli WEF. The applicant provided four alternative power line routings that are linked to the locality of the proposed Vhuvhili on-site substation infrastructure as the starting point of the proposed power line, and the proposed Mukondeleli switching station infrastructure as the end point of the proposed power line.

An overhead power line consists of one or more conductors that are strung (using insulators) on in-line (intermediate) structures and bend (strain) structures. The structures proposed for this 132 kV power line are monopole pylons or steel lattice pylons, or a combination of both where required.

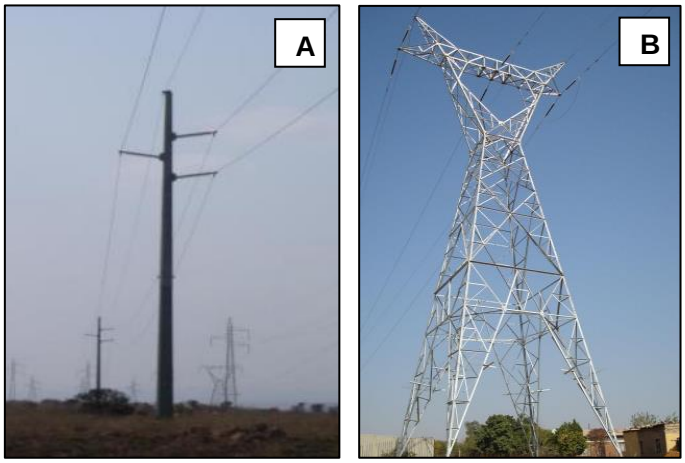


Figure A.3: Photographs of a typical monopole pylon (A) and steel lattice pylon (B) for a 132 kV power line (Source: Eskom, 2017)

The choice of pylon type depends on the topography and the alignment of the power line corridor such as whether the pylons will be placed within a straight section within the power line corridor (intermediate structures) or at bends (strain structures), as well as how sharp the bend is. The span lengths are estimated to range between 200 m and 350 m depending on the topography and sensitivities of the area. Generally, monopole-type pylons are used for shorter spans, whereas steel lattice-type pylons are used where long spans (>500m) across valleys and rivers are required.

Each structure varies in height from approximately 12 m to 40 m. The size of the footprint depends on the type of structure used, i.e. whether it is an intermediate or strain structure. This will typically range from approximately 0.5 m^2 to 8 m^2 for monopole pylons, and 36 m^2 to 64 m^2 for steel lattice pylons. The size and type of foundation to be installed will depend on underlying geotechnical conditions, i.e. the soil bearing capacity (actual sub-soil conditions). The working area required around a pylon position during the construction phase can range up to 30 m x 30 m.

As noted above, the power line will be constructed within the assessed 200 m wide EGI corridor. The servitude width required for a 132 kV power line is 32 m (i.e. 16m on either side of the centreline).

The exact specifications of the proposed pylon component will be determined during the detailed engineering phase and the information provided here is seen as the worst-case scenario.

A.6.3 Service Roads and External Access Roads

The proposed EGI corridor can be accessed via the D619 gravel road to the west of the northern portion of the corridor and via the tarred D823 road along the southern portion of the corridor. The D823 connects the site with the R546, an arterial route that connects to the N17 national road north of the study area (see Figure A.4).

The current width of the D823 and D619 roads is approximately 5 m. It is proposed that these existing roads will be upgraded and widened to a maximum width of 10 m. The widening and upgrading of the existing roads are being assessed as part of the separate S&EIA process which is currently being undertaken for the proposed Vhuvhili SEF.

Service roads will also be constructed below the power lines for maintenance purposes. The service roads are expected to be composed of gravel and extend approximately 5 m wide. Exact specifications of the widening, length and upgrading of the farm gravel roads will be confirmed during the detailed design phase.

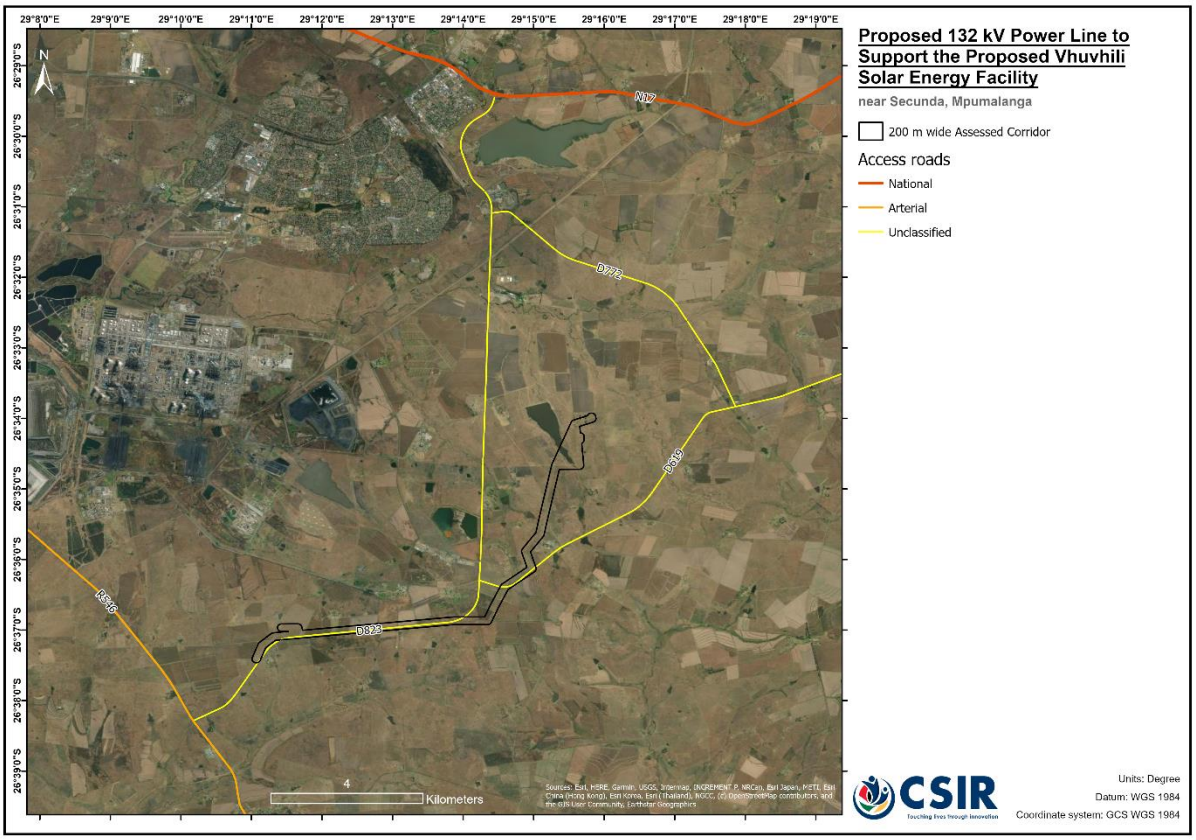


Figure A.4: Access roads in the study area

A.7 Affected Farm Portion and Project Co-ordinates

Appendix 1 of the 2014 NEMA EIA Regulations (as amended) states that a BA Report must provide the location of the activity, including the 21-digit Surveyor General code of each cadastral land parcel; where available, the physical address and farm name; or the co-ordinates of the boundary of the property or properties if the aforementioned is not available.

The proposed 132 kV overhead power line and supporting infrastructure are proposed to be constructed on the farm portions marked with an “x” in Table A.4 below. Note that the farm portions indicated in Table A.4 and shown in Figure A.5 are those land portions with which the Project Developer has or is in the process of securing a servitude with the affected landowners. However, the specialists assessed a 200 m wide corridor for the power line alternatives (100 m on either side of the centre line) which includes five additional farm portions with whom the Project Applicant is not pursuing servitude agreements at this stage. Please note the farm portions of the proposed Vhuvhili SEF are also included to provide context and to indicate where the affected farm portions for the EGI and the SEF may overlap, however the Vhuvhili SEF forms part of a separate S&EIA process (NEAS: MPP/EIA/0001063/2022).

Table A.4: Proposed Power line and Associated EGI Comprising the Vhuvhili EGI Corridor and the Affected Farm Portion.

INFRASTRUCTURE									AFFECTED FARM PORTIONS		
Power line (subject of this BA process)				Subject of separate S&EIA process (NEAS: MPP/EIA/0001063/2022)					Farm	Portion	SG code
				Substations				SEF			
Alt 1 (pref.)	Alt 2	Alt 3	Alt 4	Off-taker (A)	IPP (B)	Off-taker (C)	IPP (D)				
								x	Grootvlei No.293	18/293	T0IS00000000029300018
								x	Grootvlei No.293	21/293	T0IS00000000029300021
								x	Poverty Acres No.585	RE/585	T0IS00000000058500000
								x	Vlakspruit No.292	21/292	T0IS00000000029200021
		x	x			x	x	x	Grootvlei No.293	20/293	T0IS00000000029300020
x	x	x	x	x	x			x	Grootvlei No.584	RE/584	T0IS00000000058400000
x		x							Vlakspruit No.292	RE/292	T0IS00000000029200000
x	x	x	x						Vlakspruit No.292	19/292	T0IS00000000029200019
x	x	x	x						Vlakspruit No.292	14/292	T0IS00000000029200014
x	x	x	x						Vlakspruit No.292	15/292	T0IS00000000029200015
x		x							Vlakspruit No.292	13/292	T0IS00000000029200013
x	x	x	x						Vlakspruit No.292	3/292	T0IS00000000029200003
x	x	x	x						Vlakspruit No.292	2/292	T0IS00000000029200002
x	x	x	x						Vlakspruit No.292	16/292	T0IS00000000029200016
x	x	x	x						Vlakspruit No.292	18/292	T0IS00000000029200018

INFRASTRUCTURE									AFFECTED FARM PORTIONS		
Power line (subject of this BA process)				Subject of separate S&EIA process (NEAS: MPP/EIA/0001063/2022)					Farm	Portion	SG code
				Substations				SEF			
Alt 1 (pref.)	Alt 2	Alt 3	Alt 4	Off-taker (A)	IPP (B)	Off-taker (C)	IPP (D)				
x	x	x	x						Knoppies No.314	RE/314	T0IS00000000031400000
x	x	x	x						Brandwacht No.316	3/316	T0IS00000000031600003
x	x	x	x						Bosjesspruit No. 291	6/291	T0IS00000000029100006
x	x	x	x						Bosjesspruit No. 291	13/291	T0IS00000000029100013
x	x	x	x						Bosjesspruit No. 291	10/291	T0IS00000000029100010
x	x	x	x						Bosjesspruit No. 291	11/291	T0IS00000000029100011
x	x	x	x						Tondershoek No. 317	2/317	T0IS00000000031700002
	x		x						Tondershoek No. 317	12/317	T0IS00000000031700012

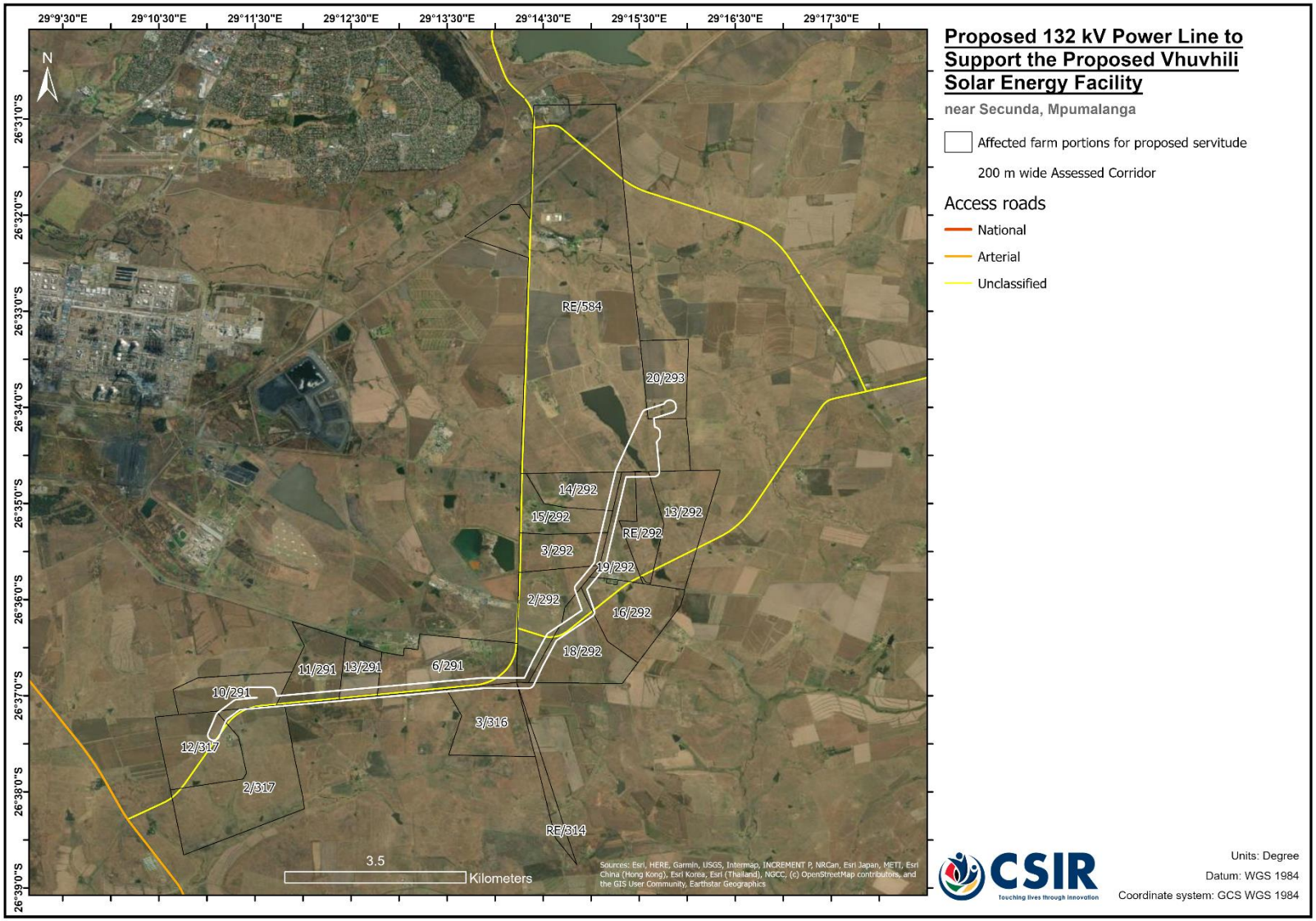


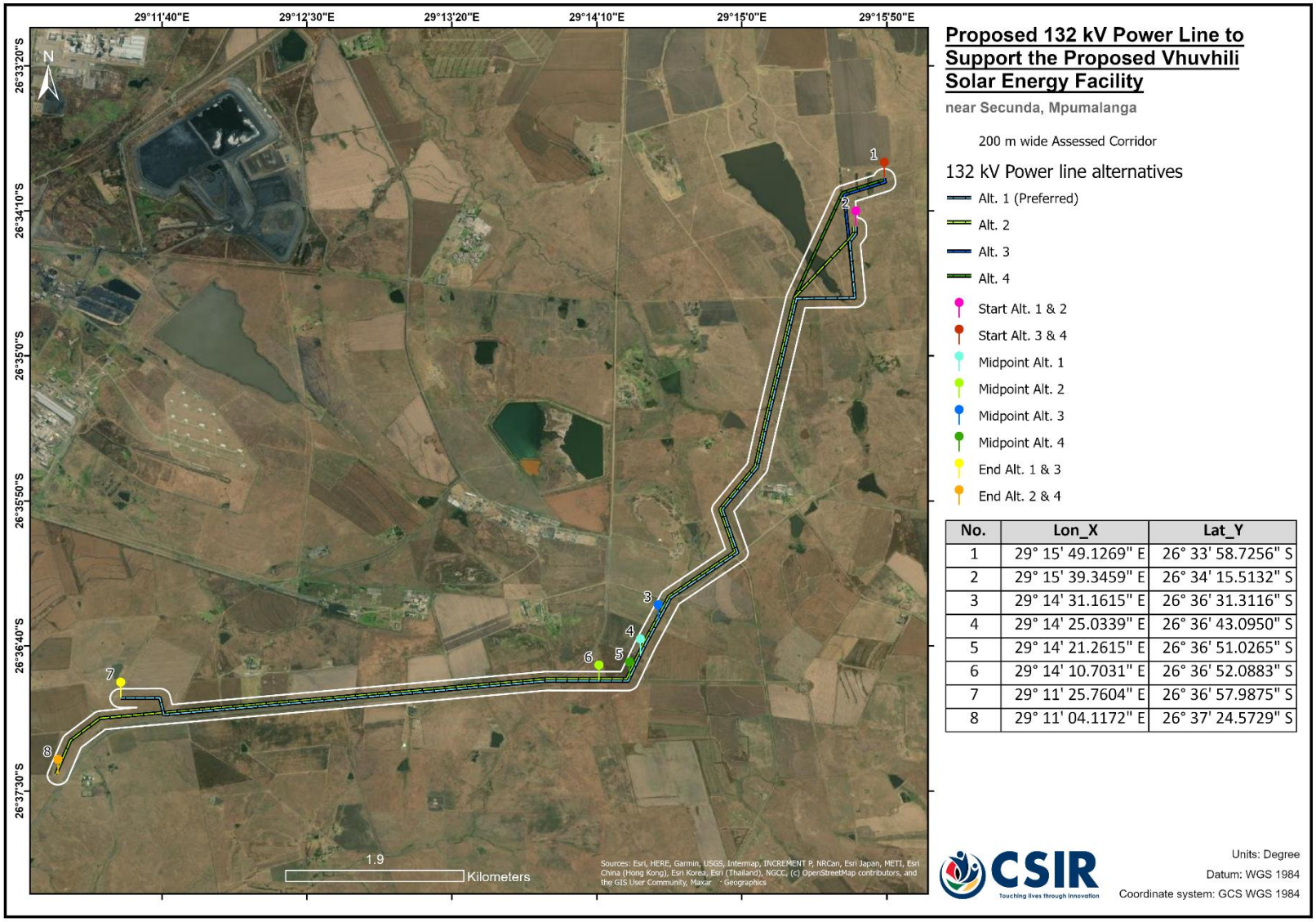
Figure A.5: Affected farm portions of the proposed 32 m wide servitude that is being secured for the proposed 132 kV power line

Appendix 1 of the 2014 NEMA EIA Regulations (as amended) also states that a BA 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, a description and co-ordinates of the corridor in which the proposed activity or activities is to be undertaken. The co-ordinates of the start, middle and end points of the proposed preferred and alternative 132 kV overhead power line corridors are provided in Table A.5 and shown in Figure A.6, and the centre-point co-ordinates of the substation sites are provided in Table A.5.

Table A.5: Co-ordinates of the start, middle and end points of the proposed preferred and alternative 132 kV overhead power line corridors, and the centre-point co-ordinates of the substation sites. See Figure A.2 for mapped reference of infrastructure

Infrastructure		Point	Degrees, Minutes, Seconds	
			Longitude (X)	Latitude (Y)
Power line (subject of this BA process)	Alternative 1 (A to E) - Preferred	Start	29° 15' 39.34590120" E	26° 34' 15.51316800" S
		Middle	29° 14' 25.03393800" E	26° 36' 43.09497720" S
		End	29° 11' 25.76041080" E	26° 36' 57.98754360" S
	Alternative 2 (A to F)	Start	29° 15' 39.34590120" E	26° 34' 15.51316800" S
		Middle	29° 14' 10.70307240" E	26° 36' 52.08826680" S
		End	29° 11' 04.11716400" E	26° 37' 24.57291360" S
	Alternative 3 (C to E)	Start	29° 15' 49.12692120" E	26° 33' 58.72557240" S
		Middle	29° 14' 31.16146560" E	26° 36' 31.31159760" S
		End	29° 11' 25.76041080" E	26° 36' 57.98754360" S
	Alternative 4 (C to F)	Start	29° 15' 49.12692120" E	26° 33' 58.72557240" S
		Middle	29° 14' 21.26148720" E	26° 36' 51.02650080" S
		End	29° 11' 04.11716400" E	26° 37' 24.57291360" S
Vhuvhili substations (subject of separate S&EIA)	Off-taker (A) – start of power line Alternatives 1 & 2	Centre	29° 15' 39.67658560" E	26° 34' 17.74000858" S
	IPP (B)	Centre	29° 15' 39.18179301" E	26° 34' 13.33713593" S
	Off-taker (C) – start of power line Alternatives 3 & 4	Centre	29° 15' 48.33040278" E	26° 33' 56.79424092" S
	IPP (D)	Centre	29° 15' 47.34679076" E	26° 33' 50.11707494" S
Mukondeleli switching stations (subject of separate S&EIA)	E – end of Power line Alternatives 1 & 3	Centre	29° 11' 22.47058375" E	26° 36' 59.36827715" S
	F – end of Power line Alternatives 2 & 4	Centre	29° 11' 02.84407702" E	26° 37' 25.36051666" S

Note: Detailed coordinates of the vertices for each of the power line routing alternatives are provided in Appendix H.1 of this Draft BA report.



No.	Lon_X	Lat_Y
1	29° 15' 49.1269" E	26° 33' 58.7256" S
2	29° 15' 39.3459" E	26° 34' 15.5132" S
3	29° 14' 31.1615" E	26° 36' 31.3116" S
4	29° 14' 25.0339" E	26° 36' 43.0950" S
5	29° 14' 21.2615" E	26° 36' 51.0265" S
6	29° 14' 10.7031" E	26° 36' 52.0883" S
7	29° 11' 25.7604" E	26° 36' 57.9875" S
8	29° 11' 04.1172" E	26° 37' 24.5729" S

Figure A.6: Start, middle and end point coordinates of the proposed 132 kV power line

A.8 Overview of the Project Development Cycle

The proposed project can be divided into the following three main phases:

- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

Each activity undertaken as part of the above phases may have environmental impacts and has therefore been assessed by the specialist assessments (summarised in Section D and full studies included in Appendix D of this BA Report).

A.8.1 Construction Phase

The construction phase will take place subsequent to the issuing of an EA from the Competent Authority (i.e., the Mpumalanga DARDLEA) and once the commercial agreements have been concluded with a suitable off-taker, which could either be private offtakers (such as Sasol) or via suitable public procurement programmes (such as the REIPPPP). The construction phase for the proposed 132 kV overhead power line and supporting infrastructure project is expected to be up to 24 months.

The main activities that are proposed to take place during the construction phase will entail:

- Site preparations, construction of servitude access and detailed geotechnical investigations of the power line servitude and grid corridor footprint;
- Preparation of a detailed layout of the grid connection infrastructure;
- Removal of vegetation within the power line servitude and substation site for the placement of pylons and EGI, where necessary;
- Stockpiling of topsoil and vegetation will be retained for replanting, where necessary;
- Establishment of a temporary laydown area for storage of construction equipment and machinery;
- Excavations of pylon infrastructure and associated anchorage, as well as busbar foundations;
- Onsite assembly and erection of pylon tower sections and stringing of the power line cables; and
- Rehabilitation of disturbed areas and removal of equipment and machinery following completion of power line construction.

The construction phase will also involve the transportation of personnel, construction materials and equipment to and from the site. All efforts will be made to ensure that all construction work will be undertaken in compliance with local, provincial and national legislation, local and international best practice, as well as the approved EMPr that has been compiled and included in Appendix G of this BA 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.

A.8.2 Operational Phase

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

- Transmission of electricity generated by the proposed authorised Vhuvhili SEF (should authorisation be granted) to the switching station at the proposed Mukondeleli WEF site (subject to a separate EIA process) when it becomes operational;
- On-going maintenance of the grid connection infrastructure; and
- Bush clearing within the power line servitude in accordance with relevant grid safety standards and regulations.

During the life span of the proposed project, on-going maintenance will be required on a scheduled basis. 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 (Appendix G of this BA Report) includes the requirement for method statements to be compiled prior to the operational phase to describe the manner in which maintenance will be undertaken.

A.8.3 Decommissioning Phase

The main aim of decommissioning is to return the land to its original, pre-construction condition. Should the unlikely need for decommissioning of the proposed power line and associated EGI arise, the decommissioning procedures will be undertaken in line with the EMPr (Appendix G of this BA Report), and the site will be rehabilitated. All decommissioned materials will be recycled (as far as technically possible), or else be disposed of in accordance with local regulations and international best practice, where possible.

A.9 Service Provision: Water Usage, Sewage, Solid Waste and Electricity Requirements

A.9.1 Water Usage

During the construction phase of the proposed power line project, water will be sourced from a registered water service provider or from existing boreholes within the Vhuvhili SEF site. If boreholes are utilised, sustainable yield practises will be implemented to ensure no negative impacts on the environment or downstream uses. Water use during the construction phase will mainly be required for:

- Human consumption (potable drinking water will be provided from a third-party service provider);
- Ablution facilities;
- Road construction;
- Road compaction and dust suppression; and
- Concrete production and curing for the construction of foundations for the power line and EGI, i.e., pylons, substations, etc.

A.9.2 Sewage or Liquid Effluent

The proposed project will require sewage services for personnel during the construction phase. The generation of small volumes of sewage or liquid effluent are estimated as liquid effluent will

be limited to the ablution facilities during the construction phase. Portable sanitation facilities (i.e., chemical toilets) will be used during the construction phase, which will be regularly serviced and emptied by a registered third-party contractor on a regular basis. Service slips will be obtained from the contractor and these slips will be kept in the site environmental file for auditing purposes as proof of appropriate servicing and emptying of chemical toilets. References and requirements of Sections 22 and 40 of the National Water Act of 1998, (Act 36 of 1998) have been included in the EMPr (refer to Appendix G of this BA Report).

A.9.3 Solid Waste Generation

Solid waste which comprises hazardous and non-hazardous (or general) waste will be generated mainly during the construction phase of the proposed power line project. Non-hazardous solid waste materials could include the following:

- Office and general waste material such as cardboard, plastic and wooden packaging;
- Electrical grid waste components such as cable off-cuts and derelict transformers, etc;
- Building rubble, discarded bricks, wood and concrete;
- Domestic waste generated by on-site construction staff; and
- Vegetation waste generated from the clearing of vegetation.

Minimal hazardous waste materials are expected to be generated during the construction and operational phases. Hazardous waste components could include fuels, oils, lubricants, chemicals and contaminated soils (in the event of accidental spillages).

Solid waste will be managed via the EMPr during the construction and operational phases, which incorporates proper waste management principles (see Appendix G of the BA Report). During the construction phase, general solid waste will be collected and temporarily stockpiled in skips in a designated area on site and thereafter removed and disposed of at a registered waste disposal facility on a regular basis by an approved waste disposal Contractor (i.e., a suitable Contractor) or the local municipality. Any hazardous waste will be temporarily stockpiled (for less than 90 days) 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 in the site environmental 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.

A.9.4 Electricity Requirements

In terms of electricity supply during the construction phase, the Project Developer will make use of generators on site.

A.10 Applicable Legislation

The scope and content of this BA Report has been informed by the legislation, guidelines and information series documents listed below. It is important to note that the specialist studies included in Appendix D of this BA Report also include a description of the relevant applicable legislation.

A.10.1 National Legislation

A.10.1.1 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 project 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 project site.

A.10.1.2 NEMA and EIA Regulations published on 8 December 2014 (as amended on 7 April 2017 and 11 June 2021; GN R327, GN R326, GN R325 and GN R324)

Chapter 1, Section 2 of NEMA sets out a number of principles to give guidance to developers, private landowners, members of the public and authorities. The proclamation of 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 a number of 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 peoples' environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

GN R327 contains the relevant listed activities that are triggered, thus requiring a BA. Please refer to Section A.11 of this BA Report for the complete list of listed activities.

A.10.1.3 Government Notice (GN) R960 (published 5 July 2019)

GN R960 was published on 5 July 2019 and came into effect for compulsory use of the National Web Based Environmental Screening Tool from 4 October 2019. The notice outlines the requirement to submit a report generated by the National Web Based Environmental Screening Tool, in terms of Section 24(5)(h) of the NEMA 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 Application for EA for the proposed power line project has been run through the National Web Based Environmental Screening Tool, and the associated report generated and attached as Appendix H.2 to this BA Report and attached to the Application for EA, which has been submitted to the Mpumalanga DARDLEA with the Draft BA Report.

A.10.1.4 Government Notice (GN) R320 (20 March 2020)

GN R320 prescribes the general requirements for undertaking site sensitivity verification 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 Specialist Assessments undertaken as part of this BA Process comply with GN R320, where applicable, including Agriculture, Aquatic Biodiversity and Terrestrial Biodiversity. The remaining specialist assessments comply with Appendix 6 of the 2014 NEMA EIA Regulations (as amended), and where relevant, Part A of GN R320 which contains site sensitivity verification requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed. The site sensitivity verifications required for Defence, as well as the Civil Aviation also comply with GN R320. The protocols were enforced within 50 days of publication of the notice i.e., on 9 May 2020.

A.10.1.5 Government Notice (GN) R1150 (30 October 2020)

GN R1150 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 NEMA, when applying for EA. GN R1150 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 Government Gazette, in which case Appendix 6 of the 2014 NEMA EIA Regulations (as amended) will apply to such applications. The Terrestrial Biodiversity Specialist Assessment undertaken as part of this BA Process was commissioned in May 2022. Therefore, the Terrestrial Impact Assessment (included in Appendix D.4) was undertaken in adherence to the protocol.

A.10.1.6 National Environmental Management: Biodiversity Act (Act 10 of 2004)

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (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.

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.

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.

An amendment to the NEMBA has been promulgated in 2011, which lists about 225 threatened or protected ecosystems based on vegetation types present within these ecosystems. Should a project fall within a vegetation type or ecosystem that is listed as being threatened or protected, actions in terms of NEMBA are triggered. Based on the preliminary sensitivity screening, site sensitivity verifications and detailed impact assessment that was undertaken for the proposed development site, none of the listed threatened ecosystems was found to occur within the proposed power line corridor. In addition, no terrestrial animal and plant species of conservation concern (SCC) were identified within the proposed development site (refer to Section D of this BA Report for a summary of the Terrestrial Biodiversity and Species Impact Assessment findings).

A.10.1.7 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 project:

Archaeology, palaeontology and meteorites

Section 35 (4) – No person may, without a permit issued by the responsible heritage resources authority:

- destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
- destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
- 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:

- 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;
- 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
- 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 m^2 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 m^2 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 townscapes" 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.

The Mpumalanga Provincial Heritage Resources Authority (MPHRA; for built environment and cultural landscapes) and the South African Heritage Resources Agency (SAHRA; for archaeology and palaeontology) are required to provide comment on the proposed project in order to facilitate final decision making by the Mpumalanga DARDLEA. An integrated Heritage Impact Assessment (HIA) including archaeology, cultural landscape and palaeontology was undertaken, and an integrated HIA report compiled. The integrated HIA will be submitted to MHRA and released to registered conservation bodies and the relevant local municipalities for a 30-day consultation and commenting period. These relevant specialist assessments are also included in Appendix D.3 of this BA Report which is currently being released to I&APs for a 30-day public comment period.

Once a final comment has been issued by the MHRA, the recommendations should be included in the conditions of the EA (should it be granted). This will essentially give 'permission' from the MHRA to the Project Applicant to proceed from a heritage perspective.

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 submit a Work Plan to the MHRA to conduct the work. This must be carried out well in advance of construction to ensure that there is enough time for the MHRA 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 from the MHRA. 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).

A.10.1.8 National Forests Act (Act 84 of 1998)

The National Forests Act (Act 84 of 1998) (NFA) allows for the protection of certain tree SCC. The Minister has the power to declare a particular tree to be a protected tree. According to Section 12 (1) d (read with Sections (5) 1 and 62 (2) (c)) of the NFA, a licence is required to remove, cut, disturb, damage or destroy any of the listed protected trees. The most recent list of protected tree species was published in 2019. The Department of Agriculture, Land Reform and Rural Development (DALRRD) 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 DALRRD.

A.10.1.9 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 land owner to control invasive alien plants occurring on the land under their control.

Should alien plant species occur within the development footprint, it will be managed in line with the Environmental Management Programme (EMPr) (included as Appendix G of this BA Report). Rehabilitation after disturbance to agricultural land is also managed by CARA. The DALRRD reviews and approves applications in terms of these Acts according to their Guidelines for the evaluation and review of applications pertaining to renewable energy on agricultural land, dated September 2011.

A.10.1.10 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, 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 a watercourse, or 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 risk assessment that was undertaken as part of the Aquatic Biodiversity Specialist Assessment determined that the proposed power line poses a low risk of impacting aquatic habitat, water flow and water quality within the servitude corridor. The water use activities associated with the proposed project could potentially be authorised through the general authorisations for Section 21(c) and (i) water uses. Also, a water use authorisation in terms of Section 21(a) might be required for the proposed groundwater abstraction from boreholes for construction purposes, which would however be highly unlikely to impact on any surface water ecosystem in the area.

A.10.1.11 Water Services Act (Act 108 of 1997)

Water will be required during the construction, operational and decommissioning phases of the proposed project. 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: Govan Mbeki Local Municipality; third-party water supplier; or existing or drilled boreholes within the Vhuvhili SEF site. Should the latter be selected for water use, the boreholes will be subjected to complete geohydrological testing and an assessment, as well as a Water Use Licence Application process. This will be undertaken as a separate process, once more detailed information becomes available, outside of the current EA Application. Compliance with the Water Services Act (Act 108 of 1997) will be undertaken during the relevant phase of the proposed project, in consultation with the local and district municipalities.

A.10.1.12 Hazardous Substances Act (Act 15 of 1973)

During the construction phase of the proposed project, fuel, oils and relevant chemicals would be utilised to power and/or operate vehicles, generators and construction equipment. In addition, potential spills of hazardous materials could occur during the construction and operational phases. Such management actions are recommended in the EMPr, which has been included as Appendix G to this BA Report.

A.10.1.13 Subdivision of Agricultural Land Act (Act 70 of 1970)

The Subdivision of Agricultural Land Act (Act 70 of 1970) (SALA) requires that any long-term lease associated with the renewable energy facility be approved by the DALRRD. The SALA consent is separate from the Application for EA and needs to be applied for and obtained separately. An

application for the change of land use (re-zoning) for the development on agricultural land will be lodged by the Project Applicant for approval in terms of the SALA, as required.

A.10.1.14 National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA)

General and hazardous waste will be generated during the construction, operational and decommissioning phases, which will require proper management. Such management actions are recommended in the EMPr, which is included as Appendix G to this BA Report.

A.10.1.15 National Environmental Management: Air Quality Act (Act 39 of 2004)

The proposed vegetation clearance and stockpiling activities, including earthworks and the use of construction machinery and vehicle traffic, may result in the unsettling of, and temporary exposure to, dust. Appropriate dust control methods will need to be applied. Such management actions are recommended in the EMPr, which has been included as Appendix G to this BA Report.

A.10.1.16 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).

The location of the proposed project does not pose an EMI or RFI risk to the SKA, as the proposed project is located outside of the Northern Cape and outside of the SKA and Karoo Central Astronomy Advantage Area (KCAAA). The proposed Vhuvhili SEF site is located approximately 743 km from the KCAAA. The distance from site to the SKA spiral arm (spiral arm 2) and to the SKA core are 780 km and 864 km respectively. Please refer to Section A.12.1 of this DBAR for additional information on the RFI.

The SKA has been pre-identified as a key stakeholder and therefore included on the project database of I&APs (as shown in Appendix E of this DBAR). The SKA Project Office will be requested to comment on the DBAR during the 30-day review period.

A.10.1.17 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.

A.10.1.18 Other Applicable Legislation

Other applicable national legislation that may apply to the proposed project include:

- Advertising on Roads and Ribbons Act (Act 21 of 1940);
- Electricity Act (Act 41 of 1987);
- 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)[1];
- 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).

A.10.2 Provincial Legislation

A.10.2.1 Mpumalanga Nature Conservation Act (Act 10 of 1998) (MNCA)

A.10.2.1.1 Flora (see Appendix B of the Terrestrial Biodiversity and Species Assessment)

Schedule 11: Protected Plants (Section 69(1)(a) of the MNCA 1998)
A total of thirty (30) plant species are listed as Schedule 11 Protected plant species in the region according to the MNCA (1998) (Appendix B of the Terrestrial Biodiversity and Species Assessment). Most of these species are members of the Amaryllidaceae and Orchidaceae. Seven of the 30 protected plant species (Schedule 11) were recorded on the Vhuvhili SEF site, but not along the power line corridor, during the site survey undertaken by the Terrestrial Biodiversity specialist in December 2021; these include:

Aloe ecklonis
Boophone disticha
Crinum bulbispermum
Cyrtanthus stenanthus
Eucomis autumnalis
Gladiolus crassifolius
Haemanthus humilis

Another five species are on the Mpumalanga Red list (Lötter 2015) although not included in the MNCA (1998) list for Mpumalanga:

Drimia angustifolia	LC
**Hypoxis hemerocallidea*	LC
Khadia beswickii	VU
Nerine gracilis	VU
Trachyandra erythrorrhiza	NT

* Recorded on the Vhuvhili SEF site

Some provisions are given in terms of Schedule 11 Protected plants and Schedule 12 Specially Protected plants (Chapter 6, MNCA 1998):

- No person shall pick a protected plant without a permit.
- No person shall pick an indigenous plant in a nature reserve without a permit.
- No person shall pick an indigenous plant on a public road, land next to a public road within a distance of 100 meters from the centre of the road without a permit.
- No person shall pick an indigenous plant which is not a protected plant or specially protected plant on land which he or she is not the owner or occupier.
- No person shall donate, sell or export or remove from the province a protected plant without a permit.
- No person shall possess, pick, sell, purchase, donate or receive as a donation, import or export or remove from the Province a specially protected plant without a permit.

It will be recommended as part of the EMPr, that a detailed plant search and rescue operation be conducted before the final design process, during the appropriate flowering period where needed, and prior to the commencement of the construction phase. If any of the listed species are found, the relevant permits should be obtained by the Project Applicant prior to their relocation or destruction.

Schedule 12: Specially Protected Plants (Section 69(1)(b) of the MNCA 1998)
No Schedule 12 plant species are listed or were recorded on site during the site survey.

Schedule 13: Invader weeds and plants (MNCA 1998)
Ten Schedule 13 species were recorded on site (Appendix B of the Terrestrial Biodiversity and Species Assessment). No person shall possess, sell, purchase, donate or receive as a donation, convey, import or cultivate a Schedule 13 declared invader weed or plant without a permit.

A.10.2.1.2 Fauna (see Appendix C of the Terrestrial Biodiversity and Species Assessment)

Schedule 1: Specially Protected Game (Section 4 (1)(a) of MNCA 1998)
No Schedule 1 species are listed or were recorded on site during the site survey.

Schedule 2: Protected Game (Section 4 (1)(a) of MNCA 1998)
Under the provincial Act (MNCA 1998), most mammals, reptiles and amphibians are listed as Schedule 2: Protected Game (see Appendix C of the Terrestrial Biodiversity and Species Assessment). Three species were recorded on site or confirmed by the landowners (Appendix C):

- Steenbok
- Hedgehog
- Serval

Schedule 3: Ordinary Game (Section 4(1)(c) of MNCA 1998)
Three species were recorded on site or confirmed by the landowners (Appendix C):

- Springbok
- Blesbok
- Scrub hare

Schedule 4: Protected Wild Animals (Section 4(1)(d) of MNCA 1998)
No species were recorded on site (Appendix C).

Schedule 5: Wild Animals to which Section 33 apply (MNCA 1998)
Provisions of Section 33 apply (MNCA 1998): No person shall import into the province, keep, possess, sell, purchase, donate or receive as a donation or convey a Schedule 5 live wild animal without a permit. Five species were recorded on site or confirmed by the landowners (Appendix C):

- Serval
- Egyptian mongoose
- Meerkat
- Springhare
- Civet

Schedule 6: Exotic Animals to which the provisions of Section 34 apply (MNCA 1998)
Provisions of Section 34 apply (MNCA 1998): No person shall keep, possess, sell, donate or receive as a donation or convey a Schedule 6 live exotic animal without a permit. No species were recorded on site (Appendix C).

Schedule 7: Invertebrates (Section 35 (1) of the MNCA 1998)
Provisions of Section 35(1) apply (MNCA 1998): No person shall collect, catch, kill, keep, purchase, sell, donate or receive as a donation, convey, import or export a Schedule 7 invertebrate without a permit.

Schedule 8: Problem Animals (Section 44(1) of the MNCA 1998)
One species was recorded on site (Appendix C):

- Black-backed jackal

No permits are required for animal species since none should be harmed by the development.

Based on the Terrestrial Biodiversity and Species Specialist Assessment (Appendix D.4 of this DBAR), none of the three plant SCC highlighted by the screening tool were recorded on site due to unsuitable habitat present on site. It should, however, be noted that several other plant SCC are known to occur in the area or have been recorded in the study site These include: *Nerine gracilis, Gladiolus robertsoniae, Kniphofia typhoides, Boophone disticha, Hypoxis hemerocallidea, Crinum bulbispermum* and *Eucomis autumnalis*.

None of the two animal SCC (avifauna excluded) highlighted by the screening tool were recorded on site as the habitat is unsuitable for their presence. The said Terrestrial Biodiversity and Species Assessment notes that the screening tool, however, did not highlight the possible presence of the giant girdled lizard, a species with a Vulnerable IUCN status. However, the species was not recorded on site. Overall, the sensitivity of the animal species theme (avifaunal component excluded) is rated as medium. If the suggested mitigation measures are followed the animal SCC should not be negatively affected by the development.

The Mpumalanga Tourism and Parks Agency (MTPA) is the regulatory authority in Mpumalanga for the issuing of permits for fauna, flora, hunting and CITES and has been pre-identified as a key stakeholder and is included on the project database (as shown in Appendix D of this DBAR). A hard or electronic copy of the DBAR will be couriered to the MPTA for comment.

A.10.2.2 Mpumalanga Vision 2030

The Mpumalanga Vision 2030 Strategic Implementation Framework (2013-2030) provides a provincial expression of the key priorities, objectives and targets outlined in the National Development Plan 2030. In line with the objectives of the NDP the Mpumalanga Vision focusses on the following key socio-economic outcomes:

- Employment and Economic Growth;
- Education and Training;
- Health Care for all; and
- Social Protection.

The Mpumalanga Vision 2030 also identifies nine key drivers that have a bearing on the spatial development of the province. Key Drivers 1 to 6 are focused towards promoting economic development and job creation, Key Drivers 7 and 8 are focused on human settlement in and around the key priority nodes/areas identified and linked to Key Drivers 1-6, and Key Driver 9 is focused on the conservation and sustainable management of the natural environment. The relevant Key Drivers are summarised below.

Key Driver 1: Nodal Development. Key Driver 1 identifies corridors linked to key roads where investment should be focussed. Of relevance to the project is the fact that the N17 has been identified as a key corridor. The N17 is located to the north of the study area. It provides a major link between Johannesburg in the West with Ermelo, and the Eswatini Border in the east. Five primary nodes for development are also identified, including Secunda (and Ermelo).

Key Driver 2: Business, Commercial and Industrial Development. Key driver 2 focuses on development of business and commercial sectors on the primary, secondary and rural nodes in Mpumalanga and the potential for these activities to generate employment. Of relevance to the study is that the vision notes that the bulk of industrial investment in Mpumalanga Province should be clustered around the existing industrial strongholds, including Secunda (Petrochemical Industry).

Key Driver 9: Environmental Management and Conservation. The vision notes that in terms of mining it is important to establish proper environmental management systems during the operational phase of the mines to prevent large-scale water and air pollution. While the section does not specifically refer to renewable energy, much of the mining in Mpumalanga is linked to coal mining and power generation, both of which are large consumers of water. The water demands associated with renewable energy projects are significantly lower than those associated with traditional coal power stations.

A.10.2.3 Mpumalanga Growth and Development Path

The Mpumalanga Economic Growth and Development Path (MEGDP) (2011) is informed by the National Economic Growth Path. The MEGDP notes that Mpumalanga is committed to increasing local economic development and job creation in the agricultural, industrial, manufacturing, ***green economy***, tourism, and mining sectors.

The MEGDP is informed by six key pillars, namely:

1. Job creation;
2. Inclusive and shared growth of a diversified economy;
3. Spatial distribution;
4. Integration of regional economies;
5. Sustainable human development; and
6. Environmental sustainability.

The pillars of job creation, the development of a diversified economy, and sustainable environmental development are all relevant to the proposed Vhuvhili SEF development.

The MEGDP also identifies several key employment drivers aimed at realising the MEGDP objectives and securing strong and sustainable growth for the next decade. Of relevance these include the creation of employment of economic sectors including energy and the development of new economies including green industries. The MEGDP notes that the development of clean forms of energy like wind and hydro power generation opportunities, including gas production from landfill and organic waste should be supported. Although solar PV development is not listed specifically as a potential clean energy form, it shows that the municipality is supporting green energy initiatives in the energy sector of the province.

A.10.2.4 Mpumalanga Spatial Development Framework (2019)

The spatial vision for Mpumalanga Province is “A sustainable, vibrant and inclusive economy, Mpumalanga”. The Spatial Development Framework (SDF) identifies several opportunities and challenges facing the province. The opportunities are linked to the province’s natural resources, well developed economy, and established economies.

Natural Environment: The natural environment is diversified and is associated with the Highveld and the Lowveld areas in the province. Five major river systems flow through Mpumalanga and it is an important catchment area.

Connectivity and Infrastructure: The province is well connected in terms of infrastructure and is connected to Maputo and Richards Bay ports by both rail and road.

Economy: The province’s rich biodiversity and scenic beauty support the tourism industry, while at the same time mining, specifically coal mining, plays a key role in the province’s economy. The availability of high potential soil and diverse climatic conditions also support a range of crops.

Urban settlements: The key urban centres are well established economic centres and offer the opportunity for further economic development by leveraging on the towns’ economic bases.

In terms of challenges, climate change is identified as a key challenge. In this regard the activities in the province, specifically the generation of coal powered energy, account for 90% of South Africa’s scheduled emissions. The province is also home to 50% of the most polluted towns in the country. The predicted impacts associated with climate change include decreased rainfall in the province and increased temperatures. This will increase the risk of natural disasters, including droughts, flooding, and fires.

The SDF identifies five spatial objectives, namely:

Connectivity and corridor functionality: The aim is to ensure connectivity between nodes, secondary towns, marginalised areas, the surrounding area, and to green open space systems.

Sustainable concentration and agglomeration: The aim is to promote the creation of an agglomeration economy that will encourage people and economic activities to locate near one another in urban centres and industrial clusters.

Conservation and resource utilisation: The aim is to promote the maximisation, protection and maintenance of ecosystems, scarce natural resources, high-potential agricultural land, and integrated open space systems.

Liveability and sense of place: The aim is to create settlements that contribute to people's sense of personal and collective wellbeing and to their sense of satisfaction in being residents of a settlement.

Rural diversity and transformation: The aim is to create Urban-Rural anchors and choices for residents within the rural economy linked to access to markets, food security and security of land tenure.

Connectivity and corridor functionality, Sustainable concentration and agglomeration, and Conservation and resource utilisation are of specific relevance to the proposed Vhuvhili SEF development.

Connectivity and corridor functionality

The Strategic Objectives that are relevant the study area and the proposed development include:

- Strategic Objective 2: Development of the existing corridors and building new linkages to increase capacity and economic opportunities and ensure connectivity to the surrounding areas.
- Strategic Objective 5: Decongestion of the coal haul roads and Improvement of Freight Network.

In terms of Strategic Objective 2, the spatial linkages identified for development and upgrading include the upgrade of the N17, **N17**/N2 and the N12 and N11 corridor.

Sustainable concentration and agglomeration

Of specific relevance, Strategic Objective 4, Diversify Economy, focusses on the need to diversify the economy. The SDF notes that the mining sector contributes 25% to Mpumalanga's Gross Value Added (GVA). In addition, there are several other sectors directly or indirectly dependent on mining such as manufacturing (specifically metal processing) and utilities (specifically power generation). The combined GVA of these three sectors makes up more than 40% of the provincial GVA.

However, the SDF recognises that mining is not a sustainable industry and resources are finite. There is therefore a need for a gradual shift from mining-oriented sectors to the sustainable economic sectors to maintain sustained growth of the provincial economy. Mpumalanga's Coal Mining and Coal Fired Power Plant region (located mainly in the Highveld area) will become under increasing pressure due to environmental considerations. As a result, the region is likely to experience a decline in demand for coal and with it a decline in the associated employment it creates. There is therefore a need to diversify the regional economy and facilitate the gradual transition of economic activities in the region. The proposed Vhuvhili Solar development supports the objective of diversifying the province's economy by establishing a green energy project which will create local employment opportunities.

Conservation and resource utilisation

The strategic objectives that are relevant the study area and the proposed development include:

- Strategic Objective 2: Ensure conservation of all water resources and catchment Areas.
- Strategic Objective 4: Promote a low carbon and climate resilient economy.
- Strategic Objective 6: To optimally utilise the mining potential without compromising the long-term sustainability of the natural environment.

Strategic Objective 2: Ensure Conservation of all Water Resources and Catchment Areas

Achieving Strategic Objective 2, "Ensure Conservation of all Water Resources and Catchment Areas", is closely linked to diversifying the economy. The SDF notes that the province's water resources are under pressure from high demand activities, including Eskom's power stations, mining, and industrial uses. The proposed development represents a low consumer of water.

Strategic Objective 4: Promote a Low Carbon and Climate Resilient Economy

Mpumalanga is home to 12 of Eskom's 15 coal-fired power stations; petrochemical plants including Sasol's refinery in Secunda; metal smelters; coal and other mines; brick and stone works; fertiliser and chemical producers; explosives producers; and other smaller industrial operations, making the Highveld one of South Africa's industrial heartlands (CER, 2017). As a result, the air quality within the Mpumalanga Province, especially within the Highveld area, is the poorest in South Africa. The Highveld region accounts for approximately 90 % of South Africa's scheduled emissions of industrial dust, sulphur dioxide and nitrogen oxides (Wells et al. 1996, as cited in Josipovic et al. 2009). Achieving Strategic Objective 4, "Promote a low carbon and climate resilient economy", is closely linked to diversifying the economy. The proposed Vhuvhili SEF development supports the development of a low carbon, climate resistant economy.

Strategic Objective 6: To optimally utilise the mining potential without compromising the long-term sustainability of the natural environment

Mining contributes R 49.6 billion (approximately 25%) to the Mpumalanga economy. The key mining sector is coal, which represents 83% of South Africa's coal production. The mining sector, specifically coal mining, creates employment opportunities and supports the manufacturing and power generation sector. However, mining is also associated with many issues including water and soil contamination, air pollution and environmental degradation.

Achieving Strategic Objective 6, "To optimally utilise the mining potential without compromising the long-term sustainability of the natural environment", is closely linked to diversifying and developing a low carbon climate resistant economy. The proposed development supports the objective of diversifying and developing a low carbon, climate resistant economy. In terms of the high-level composite spatial development framework, Ermelo is identified as a Regional Service Centre (red dot) and the development area located to the south-east of the town falls within a mining area (brown hatched) (Figure 4.1). The economic sectors in the area include mining and power generation. The dominant land use in the area is commercial agriculture (yellow, Figure 4.2).

The proposed Vhuvhili SEF aligns with the focus areas of the Mpumalanga SDF. It will uplift the local communities through employment creation and increased investment in infrastructure. In addition, the proposed development will provide a sustainable source of energy for the national grid or for the Sasol grid. Employment creation would mainly be temporary in nature during the construction phase with limited opportunities created during the operational phase. Refer to Section A.14 of this DBAR for additional information on the proposed employment opportunities.

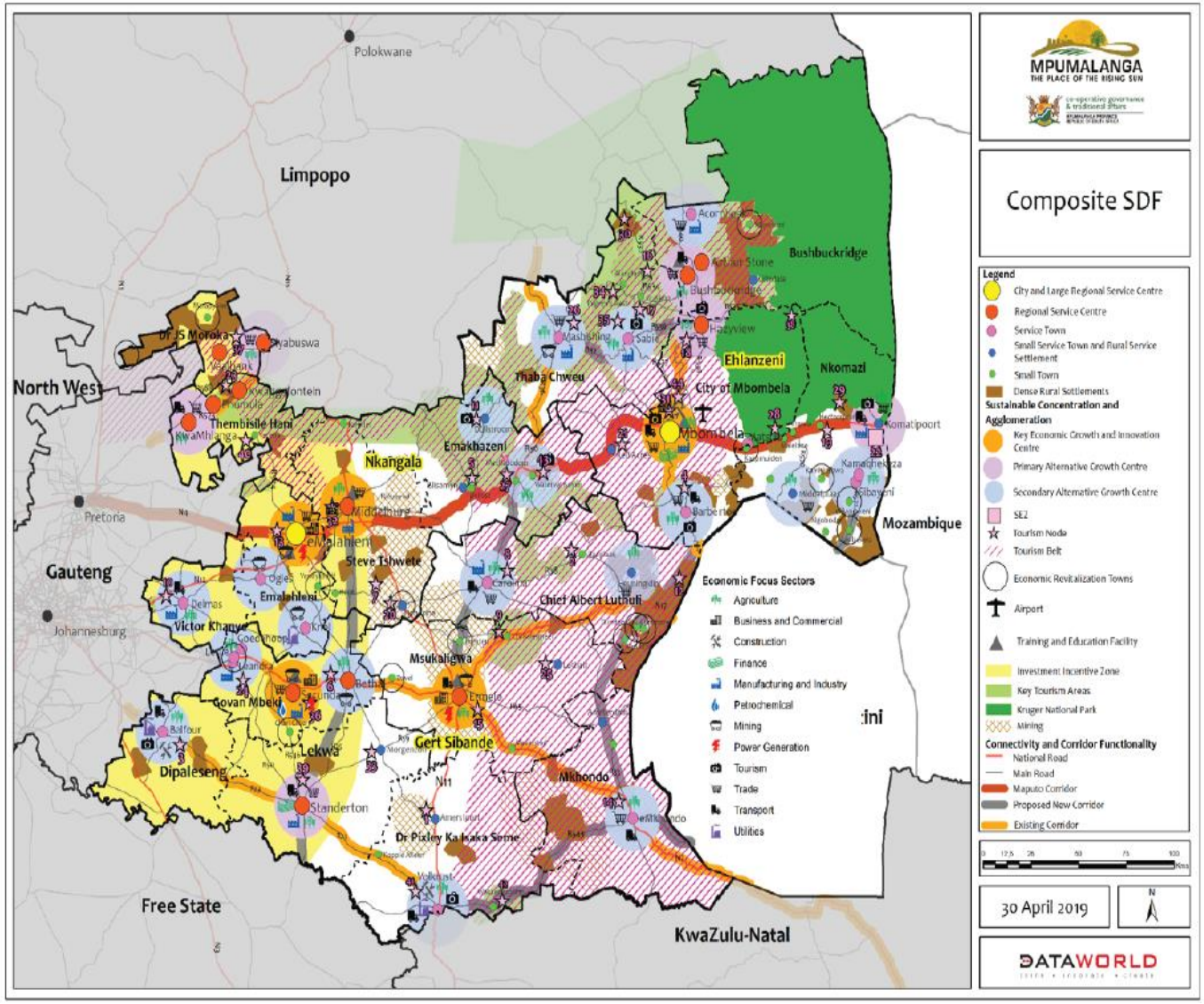


Figure A.7: Mpumalanga Composite SDF-Economic Activities (Source: Mpumalanga SDF, 2019)

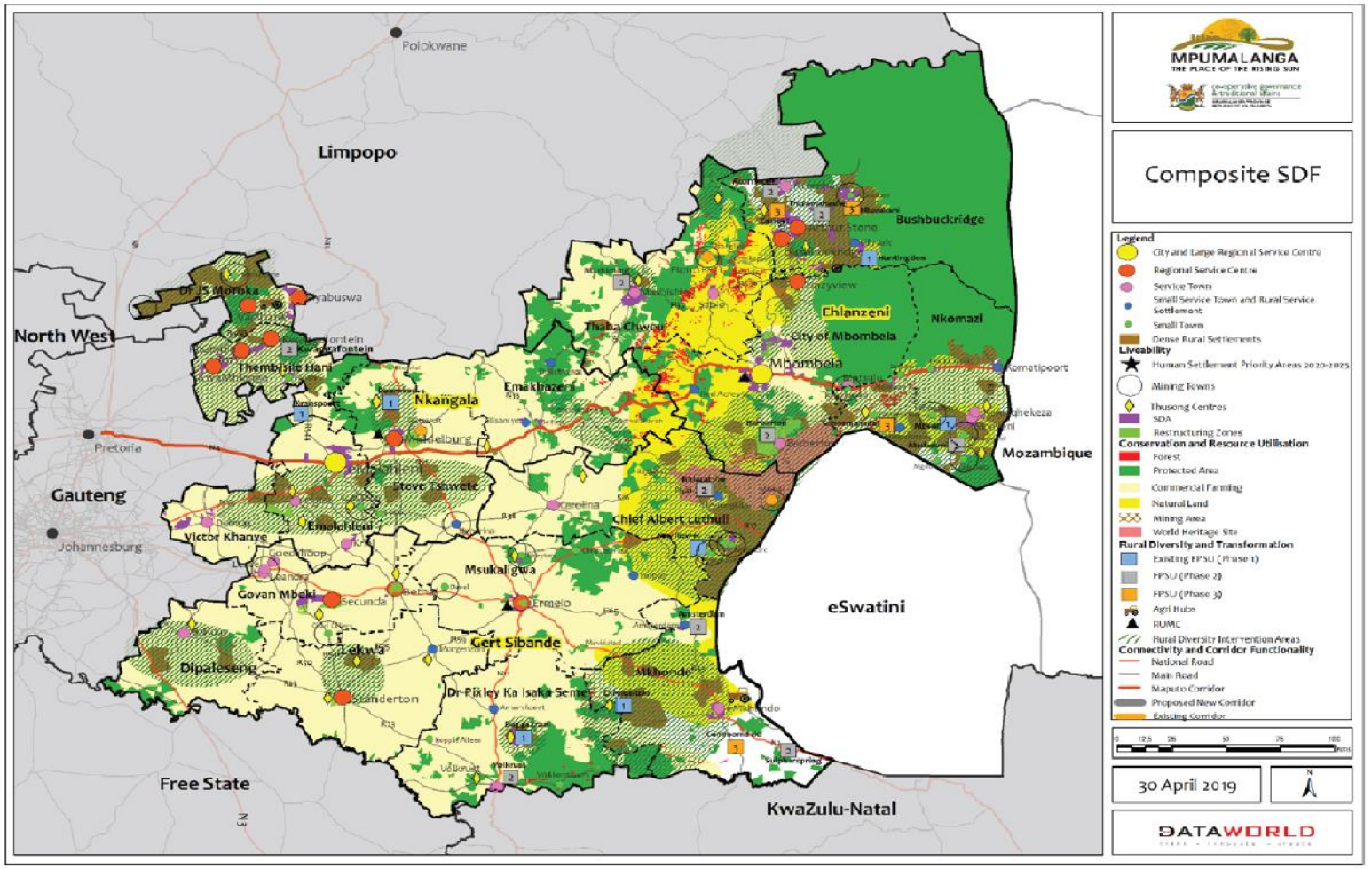


Figure A.8: Mpumalanga Composite SDF-Land Uses (Source: Mpumalanga SDF, 2019)

A.10.3 District and Local Planning Legislation

A.10.3.1 Environmental Management Framework

Research indicates that there is no Environmental Management Framework (EMF) for the Gert Sibande District Municipality. The Screening Tool also notes that no intersections with EMF areas have been found.

A.10.3.2 Gert Sibande District Municipality Integrated Development Plan (IDP) 2021/2022

The Strategic Objectives of the Gert Sibande District Municipality Integrated Development Plan (IDP) 2021/2022, are to:

Strategic Objective 1: To develop and retain skilled and capacitated workforce.
Strategic Objective 2: To facilitate and coordinate provision of sustainable community and social services.
Strategic Objective 3: To facilitate economic growth and development.
Strategic Objective 4: To ensure financial viability and provide support to local municipalities.
Strategic Objective 5: To ensure effective governance in the administration of the institution.
Strategic Objective 6: To support and coordinate spatial transformation.

The IDP states that the Gert Sibande district must achieve sufficient, secure and reliable energy supply and should rapidly expand generation capacity through a diverse energy mix. The proposed Vhuvhili SEF and associated EGI project is in line with the district IDP because it will enable the Gert Sibande District Municipality to expand their generation capacity by developing a 300 MW export solar PV project which will contribute to the diverse energy mix. Furthermore, it will contribute to local economic growth and development as it will create employment and support livelihoods.

A.10.3.3 Govan Mbeki Local Municipality IDP 2021/2022

The vision of the Govan Mbeki Municipality (GMM) as set out in the 2020/2021 IDP review is “To be a Model City and Centre of Excellence.”

The Vision, Mission and Values are informed by six (6) Key Strategic objectives:

Strategic Objective 1: To enhance revenue & secure financial sustainability.
Strategic Objective 2: To provide sustainable services, optimise operations and improve customer care.
Strategic Objective 3: To facilitate and create an enabling environment for diversified local economic development, social cohesion and job creation.
Strategic Objective 4: To enhance the capacity of human capital and deliver institutional transformation.
Strategic Objective 5: To develop spatially integrated, safe communities and a protected environment.
Strategic Objective 6: To promote good corporate governance and effective stakeholder engagement.

Strategic Objectives 1,2,3,5 and 6 are relevant to the proposed Vhuvhili SEF power line project.

The IDP highlights the renewable energy sector as a technical service that can be provided to support the workforce in delivering on the strategic objectives. Green (renewable) energy & energy efficiency is listed as one of the strategic initiatives and proposed interventions to achieve Strategic **Objective 2**, "To provide sustainable services, optimise operations and improve customer care". The proposed Vhuvhili SEF development is therefore directly aligned with this objective as it is a green (renewable) energy initiative.

Strategic **Objective 3**, "To facilitate and create an enabling environment for diversified local economic development, social cohesion, and job creation", is of relevance to this project. The IDP notes that this objective can be achieved through the phasing in of renewable energy options, which include concentrated solar power, wind and natural gas thereby reducing its dependence on coal resources. Although solar PV is not specifically listed as a renewable energy option, it shows that the municipality is supporting green energy initiatives to diversify local economic development. The proposed project will support the Vhuvhili SEF project which is expected to create employment opportunities and economic spin offs during the construction and operational phases (if EA is granted by the Mpumalanga DARDLEA). The Vhuvhili SEF and supporting EGI would help to address the need for sustainable economic growth by leveraging competitive advantages of the region, in terms of harnessing the characteristic high solar resource in the area to generate renewable electricity. The proposed project will also help to address the need to improve basic service delivery and infrastructure development through increased electricity supply while also providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area. This will also address unemployment and poverty as well as Climate Change which have been identified as "Threats" in the SWOT analysis which was undertaken as part of the IDP process for the Govan Mbeki Local Municipality. The proposed project will therefore be supportive of the IDP's priority areas of facilitating job creation to address the high unemployment rate, improving infrastructure development and promoting financial sustainability (**Objective 1**).

Strategic Objective 5, "To develop spatially integrated, safe communities and a protected environment", is also relevant to the proposed Vhuvhili SEF and supporting EGI development.

The proposed project is also aligned with Strategic Objective 6, "Infrastructure Investment", of the SDF for the Govan Mbeki Municipality. The IDP notes that the municipality should invest in green infrastructure e.g. water tanks and **renewable energy (e.g. solar).**

A.10.3.4 Guidelines, Frameworks and Protocols

The following guidelines, frameworks and protocols are applicable to the proposed project:

- 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);
- UN Framework Convention on Climate Change (1997); and
- Kyoto Protocol (which South Africa acceded to in 2002).

A.10.4 International Finance Corporation Performance Standards

In order to promote responsible environmental stewardship and socially responsible development, the proposed power line project will as far as practicable 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 this proposed power line are categorised as Category B projects. As required for Category B projects, a BA process is being undertaken for the proposed power line project. The BA Process examines the project's potential negative and positive environmental impacts and provides the best practicable environmental option and impact mitigation measures.

A.11 Listed Activities Associated with the Proposed Project

Section 24(1) of NEMA states: "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 authorization".

The reference to "listed activities" in Section 24 of NEMA relates to the regulations promulgated in GN R326, R327, R325 and R324, dated 7 April 2017. The relevant GN published in terms of NEMA collectively comprise the NEMA EIA Regulations listed activities that require either a BA, or Scoping and EIA to be conducted. As noted previously, the proposed power line project required a BA process to be undertaken in order to obtain EA.

All the listed activities triggered by the proposed power line and associated EGI and therefore requiring Environmental Authorisation (EA) are included in the Application Form for EA that has

been prepared and submitted to the Mpumalanga DARDLEA with the Draft BA Report. These listed activities are indicated in Table A.6, below.

Table A.6, provides a list of the applicable listed activities associated with the proposed project in terms of Listing Notice 1 (GN R 327), and Listing Notice 3 (GN R324) in terms of the 2014 NEMA EIA Regulations (as amended).

Table A.6: Applicable Listed Activities for the Proposed Vhuvhili Power line and Associated EGI Project

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in GN R327 (Listing Notice (LN) 1) and GN R324 (LN 3) of the 2014 NEMA EIA Regulations, as amended.	Describe the portion of the proposed project to which the applicable listed activity relates.
LN 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 proposed project will entail the construction of a 132 kV overhead transmission power line connecting the proposed Vhuvhili SEF to the proposed switching station at Mukondeleli WEF. The proposed project will be constructed on adjoining farm portions starting approximately 6 km south-east of the town of Secunda (at S26° 33' 58.80" E29° 15' 49.11") and run to a point some 11 km south of Secunda (S26° 37' 24.57" E29° 11' 04.12"). Secunda is located in the Govan Mbeki Local Municipality and the Gert Sibande District Municipality, Mpumalanga Province. The project is therefore situated outside of the urban edge. *This activity would therefore be triggered.*
LN 1 Activity 12 (ii) (a) (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; —	The proposed Vhuvhili Overhead Transmission Power line project will entail the construction of built infrastructure and structures for the 132 kV power line and are expected to exceed a footprint of 100 m^2 and some may occur within small drainage features and within 32 m of the watercourses. The aquatic features within the study area comprise several un/channelled valley bottom wetlands, seepage wetlands and floodplain wetlands, most of which are captured in the Critical Biodiversity Area (CBA). Several of the above-mentioned wetlands and rivers are located on the study site and all drain into the Klipspruit River (which is classified as a floodplain wetland). The Klipspruit River drains into Trichardspruit and then into the Kleinspruit approximately 10 km west of the study site. The study site is situated within an upstream FEPA. Upstream FEPA's are areas in which human activities need to be managed to prevent damage to downstream FEPA's. The Klipspruit River and associated wetlands that

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in GN R327 (Listing Notice (LN) 1) and GN R324 (LN 3) of the 2014 NEMA EIA Regulations, as amended.	Describe the portion of the proposed project to which the applicable listed activity relates.
		drain into the Klipspruit River are all classified as NFEPA Wetlands. *This activity would therefore be triggered.*
LN 1 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.	Based on the inputs provided by the aquatic- and terrestrial biodiversity specialists, several watercourses including the Klipspruit River, some of its associated tributaries and several drainage lines have been identified within the vicinity of the proposed power line corridor. The Aquatic Impact Assessment further noted that the potential aquatic ecosystem impacts of the proposed power line are likely to be low in terms of any potential impact on aquatic ecosystem integrity for all phases of the proposed development as the proposed works will avoid the delineated aquatic features as well as the recommended buffer areas. Existing tracks and roads will be used as far as possible to minimise any new impacts on these systems. However, the proposed project may entail the excavation, removal and moving of more than 10 m^3 of soil, sand, pebbles or rock from nearby watercourses on site mainly for purposes of access roads to enable access to the power line. As a result, the proposed project could potentially also entail the infilling of more than 10 m^3 of material into watercourses crossed by access roads. Details of the infilling of and excavations from the to be affected watercourses / drainage features will be confirmed during the detailed design phase prior to construction. Refer to Appendix D.3 of this draft BA report (Aquatic Biodiversity Specialist Assessment) for additional detail on the aquatic features within the study area. *This activity would therefore be triggered.*
LN 1 Activity 24 (ii)	The development of a road – (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road– a) which is identified and included in activity 27 in Listing Notice 2 of 2014; or	Internal access roads required by the will be between 5 m and 6 m wide and longer than 1 km. Where required for turning circle/bypass areas, however, access or internal roads may be up to 10 m to allow for larger component transport. The exact values will be confirmed once final designs have been provided. *This activity would therefore be triggered.*

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in GN R327 (Listing Notice (LN) 1) and GN R324 (LN 3) of the 2014 NEMA EIA Regulations, as amended.	Describe the portion of the proposed project to which the applicable listed activity relates.
	b) where the entire road falls within an urban area; or c) which is 1 km or shorter.	
LN 1 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 Vhuvhili power line project will be developed outside of an urban area. It will be constructed on various affected farm portions, south-east of the town of Secunda in the Govan Mbeki Local Municipality and Gert Sibande District Municipality, in the Mpumalanga Province. Hence the proposed project will take place outside of an urban area. Portions of the proposed power line corridor are currently used for agricultural purposes (mainly maize cultivation and limited livestock farming). The proposed Vhuvhili power line which is considered as a commercial/industrial development, and the combined pylon footprints will have an estimated footprint of more than 1 ha. *This activity would therefore be triggered.*
LN 3 Activity 4 (f) (i)(ee)	The development of a road wider than 4 meters with a reserve less than 13.5 meters. f. Mpumalanga i. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	The power line servitude is located outside urban areas and mostly constitutes indigenous vegetation in the Mpumalanga Province. In addition, Critical Biodiversity Areas (CBAs) as identified by the National Web-based Environmental Screening Tool and the Mpumalanga Biodiversity Sector Plan (2014) can be found within parts of the project corridor. Service roads will be constructed below the power lines for maintenance purposes. The service roads are expected to be composed of gravel and extend approximately 5 m wide. Where required for turning circle/bypass areas, however, access or internal roads may be up to 10 m to allow for larger component transport. The exact specifications of the service roads will be confirmed during the detailed design phase. *This activity would therefore be triggered.*
LN 3 Activity 12 (f) (ii)	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. f. Mpumalanga ii. Within critical biodiversity areas identified in bioregional plans;	Development of 12km of power line infrastructure will require the clearance of more than 300 m^2 of indigenous vegetation. The power line servitude is located within the Mpumalanga Province and parts of the project corridor contains CBAs as determined by the Mpumalanga Biodiversity Sector Plan (2014). *This activity would therefore be triggered.*

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in GN R327 (Listing Notice (LN) 1) and GN R324 (LN 3) of the 2014 NEMA EIA Regulations, as amended.	Describe the portion of the proposed project to which the applicable listed activity relates.
LN 3 Activity 14 (ii)(a) and c; f, (i)(ff)	The development of – (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs – (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; f. Mpumalanga i. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	The development of the 12km overhead power line infrastructure and associated access roads will have a physical footprint in excess of 10 m^2 and will be located within the Mpumalanga Province, outside the urban edge. In addition, proposed development will be required within and adjacent to watercourses and will also traverse CBAs in certain places. *This activity would therefore be triggered.*
LN 3 Activity 18 (f)(i)(ee)	The widening of a road by more than 4 meters, or the lengthening of a road by more than 1 kilometre: f. Mpumalanga i. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	Existing farm roads may require widening in excess of 4 m and/or lengthening by more than 1 km, to accommodate construction vehicles, in areas containing indigenous vegetation. The widening of the roads will take place within the Mpumalanga Province, outside urban areas, and will require the clearance of indigenous vegetation. The power line servitude is located within the Mpumalanga Province and parts of the project corridor contains CBAs as determined by the Mpumalanga Biodiversity Sector Plan which was developed by the Mpumalanga Parks and Tourism Agency in 2014. *This activity would therefore be triggered.*

A.12 National Web-Based Environmental Screening Tool

As noted above, GN 960 (dated 5 July 2019) published a notice of the requirement to submit a report generated by the National Web Based Environmental Screening Tool, in terms of Section 24(5)(h) of the NEMA 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). GN 960 came into effect for compulsory use of the National Web Based Environmental Screening Tool from 4 October 2019. As such, the Applications for EA for the proposed project has been run through the National Web Based Environmental Screening Tool, and the associated report generated and attached to the Application for EA.

Based on the selected classification, the National Web Based Environmental Screening Tool provides a list of specialist studies that should be undertaken as part of the BA 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). The classification that applies to the proposed project is Utilities Infrastructure; Electricity; Distribution and Transmission; Power line.

The following list of Specialist Assessments have been identified by the National Web Based Environmental Screening Tool for inclusion in the BA Report (Table A.6). The National Web Based Environmental Screening Tool Report notes that it is the responsibility of the EAP to confirm this list and to motivate in the BA Report, the reason for not including any of the identified specialist studies.

Table A.7: List of Specialist Assessments identified by the Screening Tool

	Specialist Study Required by the Screening Tool	Assessment undertaken in BA	Type of Assessment undertaken in BA	Appendix of BA Report
1	Agriculture and Soils	Yes	Protocol GN 320 – Part B - Protocol for the specialist assessment and minimum report content requirements for environmental impacts on agricultural resources.: Compliance Statement	D.1
2	Landscape / Visual Impact Assessment	Yes	Protocol GN R320 – Part A: Site Sensitivity Verification; and Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment	D.2
3	Archaeological and Cultural Heritage Impact Assessment	Yes	Protocol GN R320 – Part A: Site Sensitivity Verification; and Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment An integrated Heritage Impact Assessment including Archaeology, Cultural Landscape and Palaeontology was undertaken.	D.3
4	Palaeontology Impact Assessment			
5	Terrestrial Biodiversity Impact Assessment	Yes	Protocol GN R320 – Part B – Terrestrial Biodiversity (Protocol for the specialist assessment and impacts on terrestrial biodiversity): Impact Assessment	D.4
6	Plant Species Assessment			
7	Animal Species Assessment			

	Specialist Study Required by the Screening Tool	Assessment undertaken in BA	Type of Assessment undertaken in BA	Appendix of BA Report
			Species Protocol, Government Gazette 43855, GN R1150 (Protocol for the specialist assessment and impacts on terrestrial plant species and terrestrial animal species): Impact Assessment The Impact Assessment that was undertaken as part of this BA Process is referred to as a Terrestrial Biodiversity and Species Specialist Assessment.	
8	Aquatic Biodiversity Impact Assessment	Yes	Protocol GN R320 – Part B – Aquatic Biodiversity (Protocol for the specialist assessment and impacts on aquatic biodiversity): Impact Assessment	D.5
9	Avifauna Impact Assessment	Yes	Protocol GN R320 – Part A: Site Sensitivity Verification; and Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment	D.6
10	Civil Aviation Assessment	Yes	Protocol GN R320 – Part B – Civil Aviation (Protocol for the specialist assessment and minimum report content requirements for environmental impacts on civil aviation installations): Site Sensitivity Verification (No further requirements for low sensitivity in terms of GN R320)	D.7
11	Defense Site Sensitivity Verification	Yes	Protocol GN R320 – Part B: Defence (Protocol for the specialist assessment and minimum report content requirements for environmental impacts on defence installations): Site Sensitivity Verification (No further requirements for low sensitivity in terms of GN R320).	D.8
12	Geotechnical Assessment	No	A geotechnical assessment will be undertaken during the detailed engineering phase (subsequent to EA, should such authorization be granted) to inform the exact specifications and routing of the proposed power line in the assessed 200 m wide corridor, taking into account the outcome of the environmental sensitivities highlighted by the specialist team and mapped in the combined sensitivity mapping in Section 0 of this BA report.	N/A
13	Radio Frequency Interference (RFI) Assessment	No	During a pre-application meeting that took place on 23 May 2022 for the Vhuvhili SEF S&EIA process (NEAS: MPP/EIA/0001063/2022), motivation	N/A

	Specialist Study Required by the Screening Tool	Assessment undertaken in BA	Type of Assessment undertaken in BA	Appendix of BA Report
			was provided to Mpumalanga DARDLEA not to undertake this specialist assessment. It was agreed that the South African Radio Astronomy Observatory be registered on the project I&AP database (Appendix E of this BA report) as a key stakeholder and be informed of the availability of the Draft BA Report for a 30-day comment period. Refer to Section A.12.1 below for further clarification.	

A.12.1 Square Kilometre Array and Radio Frequency Interference

In 2012, South Africa and eight (8) partner countries (Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Namibia and Zambia) were selected as the preferred site for hosting the Square Kilometre Array (SKA), the world's largest and most sensitive radio telescope. Five countries submitted responded to an invitation to submit proposals to host the SKA in 2003. The original bid proposal was submitted and endorsed by South African Cabinet in 2003 in line with the national research and development strategy, published in 2002 and the Government's Astronomy Geographic Advantage Programme (AGA) (DFFE, 2019: Part 3, Page 2).

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 Science and Innovation (previously the Department of Science and Technology).

According to the CSIR Wind and Solar Phase 2 SEA (DFFE, 2019: Part 3, Page 2), the majority of the mid-frequency dish array of the Square Kilometre Array (SKA) will be constructed in the core which is in 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) (DFFE, 2019: 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 (DFFE, 2019: Part 3, Page 2).

Table A.8: SKA sensitivity distance guidelines (Source: DFFE, 2019: Part 3, Page 2)

Colour	Sensitivity	Distance from SKA Facility	
		Wind	Other Solar PV
Dark Red	Very High	Less than 18 km	Less than 8 km
Red	High	Between 18 and 26 km	Between 8 and 14 km
Orange	Medium	Between 26 and 48 km	Between 14 and 32 km
Green	Low	Greater than 48 km	Greater than 32 km

The location of the proposed power line project does not pose an EMI or RFI risk to the SKA, as the proposed project is located outside of the Northern Cape as well as the KCAAA. The proposed Vhuvhili power line site is located approximately 743 km from the KCAAA. The distance from site to the SKA spiral arm (spiral arm 2) and to the SKA core are 780 km and 864 km respectively. Refer to Figure A.3 for the location of the proposed project in relation to the SKA and KCAAA. Furthermore, the proposed project power line corridor falls within an area of low sensitivity in terms of SKA sensitivity for the development of electricity generation and transmission (Table A.7).

The South African Radio Astronomy Observatory (SARAO) is registered on the project I&AP database as a key stakeholder and was informed of the availability of the Draft BA Report for a 30-day comment period. Proof of correspondence received from SARAO will be included in the Comments and Responses Report with the Final BA Report

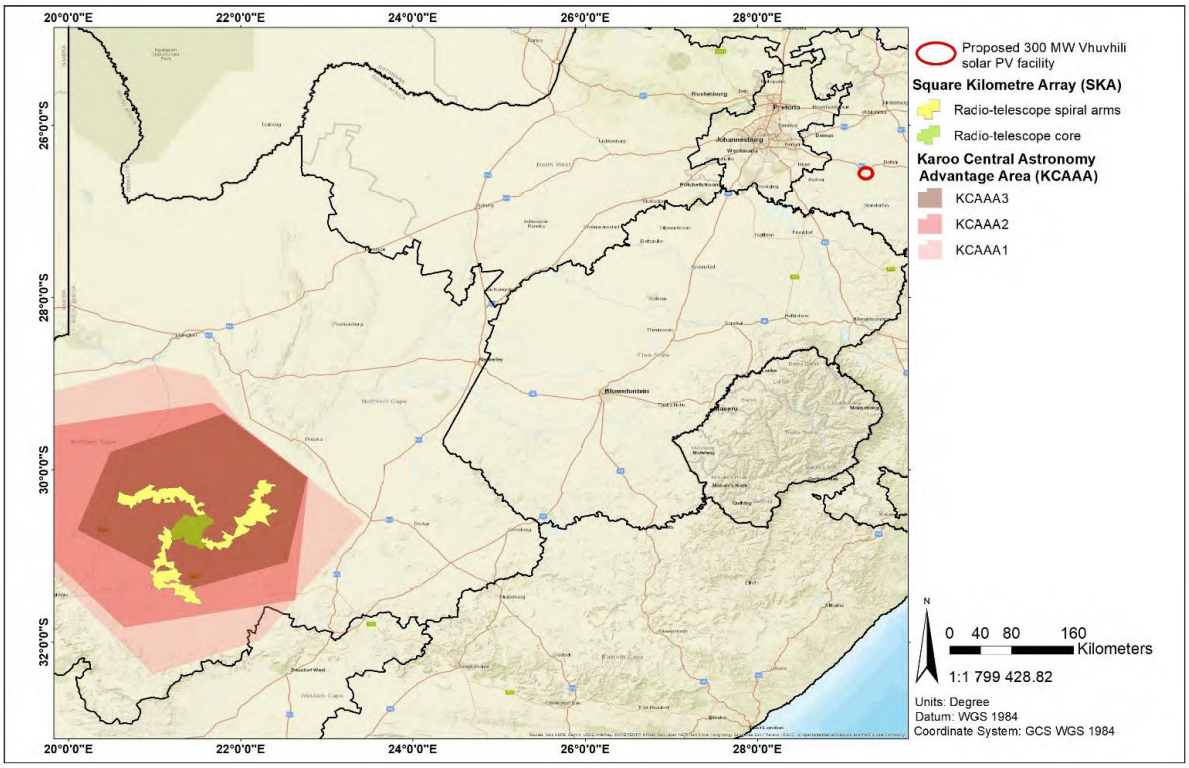


Figure A.9: Location of the proposed project in relation to the SKA and KCAAA

A.13 Description of Alternatives

This section discusses the alternatives that have been considered as part of the BA process. Sections 24(4) (b) (i) and 24(4A) of 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 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".

Therefore, the assessment of alternatives should, as a minimum, include the following:

- The consideration of the no-go alternative as a baseline scenario;
- A comparison of the reasonable and feasible alternatives; and
- Providing a methodology for the elimination of an alternative.

The 2014 NEMA EIA Regulations (as amended) defines 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; or
- and includes the option of not implementing the activity".

Regulation 2 (e) of Appendix 1 of the 2014 NEMA EIA Regulations (as amended) states that one of the objectives of the BA process is to, through a consultative process, and through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to (i) identify and motivate a preferred site, activity and technology alternative; (ii) identify suitable measures to avoid, manage or mitigate identified impacts; and (iii) identify residual risks that need to be managed and monitored.

A.13.1 No-go Alternative

The no-go alternative assumes that the proposed project will not go ahead i.e. it is the option of not developing the proposed 132 kV overhead transmission power line and its associated infrastructure. This alternative would result in no environmental impacts on the site or surrounding local area as a result of the proposed power line project. It provides the baseline against which other alternatives are compared and will be considered throughout the report.

The following implications will occur if the "no-go" alternative is implemented (i.e. the proposed project does not proceed):

- No new benefits will be derived from the implementation of an additional land-use;
- No additional power will be supplied through means of renewable energy resources by this project at this location;
- The "no-go" alternative will not contribute to and assist the government in achieving its decarbonisation targets and and renewable energy target of 26 630 MW total installed capacity by 2030 (for Wind, Solar PV and Concentrated Solar Power);

- Electricity generation on the proposed development site will remain at zero and as a result the local economy 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 project 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; and
- The local economic benefits associated with the production of green hydrogen and green aviation fuel at Sasol's Secunda Synfuels facility will not be realised.

Converse to the above, the following benefits could occur if the "no-go" alternative is implemented:

- No biodiversity (fauna and flora) will be removed or disturbed during the development of this proposed power line;
- No aquatic resources will be impacted upon during the construction of the proposed power line and associated infrastructure;
- No avifaunal impacts will occur due to the establishment of the project;
- No change to the current landscape will occur – the visual character of the area will remain unchanged; and
- No heritage artefacts or palaeontological resources will be impacted on.

The no-go alternative would result in the Vhuvhili SEF not being able to supply the Sasol electrical grid at Secunda or the national electrical grid network, therefore no further addition of renewable energy and thus continued reliance on fossil fuels (such as coal) that will continue to have a negative environmental impact and health impact. The no-go alternative of not developing the proposed power line, could prevent Sasol from utilising 300 MW of renewable energy for producing green fuels. The no-go alternative would then also not have any positive community development or socio-economic benefits from this new initiative from Sasol to transform into global leader in green fuels. South Africa's predominant source of energy is currently hydrocarbon based (e.g. coal and oil) which contributes to global climate change. The overall outcome of this project to generate solar energy to produce green hydrogen (i.e. green fuel) will contribute to reducing South Africa's dependence on fossil fuels, and it may create a catalytic economic industry for South Africa through the production, local consumption and export of green hydrogen (Roos, 2021)[10]. The no-go alternative will not realise these advantages provided by the proposed project, and it will not assist government in addressing climate change, reaching its set targets for renewable energy, nor will it assist in supplying the urgent need for increased electricity supply in the country. **Hence, the no-go alternative is not the preferred alternative.**

A.13.2 Type of Activity Alternatives

In terms of the type of activity, this relates to the distribution and transmission of electricity generated from a renewable energy source, and in this particular case, from solar. As indicated in Section A.2 of this BA Report, the South African subsidiary of German-based ENERTRAG AG focuses on the development of solar, wind and green hydrogen technologies and works with

[10] Roos, T.H. 2021. The cost of production and storage of renewable hydrogen in South Africa and transport to Japan and EU up to 2050 under different scenarios. Available: https://www.sciencedirect.com/science/article/pii/S0360319921034406

landowners, technology providers, regulators and investors to source and develop renewable energy projects. The proposed power line will facilitate the connection of the proposed Vhuvhili SEF (NEAS: MPP/EIA/0001063/2022) to the Mukondeleli WEF (NEAS: MPP/EIA/0001099/2022) which will be connected to a green hydrogen and green aviation fuel production facility at Sasol's Secunda Synfuels facility – as the preferred offtaker scenario, or alternatively it will be bid in a future round of the REIPPPP and connected to the national electrical grid. **Therefore, no other activity types were considered.**

A.13.3 Technology Alternatives

No technology alternatives exist to date for the distribution and transmission of electricity from renewable energy sources to grid networks. 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 suspended power lines in comparison to underground cables, the latter of which would also result in more terrestrial biodiversity disturbance. **Therefore, no technology alternatives have been considered or assessed as part of this BA Process.**

A.13.4 Site Alternatives

The power line corridor is starting approximately 6 km south-east of the town of Secunda (at S26° 33' 58.80" E29° 15' 49.11") and runs to a point some 11 km south of Secunda (S26° 37' 24.57" E29° 11' 04.12") in the Mpumalanga Province. The power line corridor traverses the Govan Mbeki Local Municipality and the Gert Sibande District Municipality. As depicted in Figure A.2 , the Project Developer provided four power line routing alternatives which traverse the farm portions listed previously in Table A.4.

As discussed in Section A.1 above, the proposed power line will facilitate the connection of the proposed Vhuvhili SEF (NEAS: MPP/EIA/0001063/2022) to the Mukondeleli WEF (NEAS: MPP/EIA/0001099/2022) which will be connected to a green hydrogen and green aviation fuel production facility at Sasol's Secunda Synfuels facility – as the preferred offtaker scenario.The main determining point for ENERTRAG was to find suitable, developable land in close proximity to the Sasol Secunda Synfuels facility, as well as sufficient solar resource were major determinants for identifying a suitable site for the development of the proposed Vhuvhili SEF. The primary determinant for the proposed power line routing alternatives is the location of the proposed Vhuvhili SEF and the proposed Mukondeleli WEF.

Therefore, considering the function of the proposed power line (i.e. to facilitate the connection between the Vhuvhili SEF on-site substation and the Mukondeleli WEF switching station), the above four power line routing alternatives were considered in this BA Process.

A.13.5 Development Footprint Location and Layout Alternatives

As an initial step, the Project Applicant consulted the National Web-Based Environmental Screening Tool (https://screening.environment.gov.za/screeningtool/#/pages/welcome) to determine a baseline description of the prevalent environmental sensitivities within the proposed project study area. Subsequent consultation with the affected landowners was then also undertaken in order to identify possible areas within the proposed project study area that should be excluded from development. This then guided the selection of the best suitable developable footprint i.e. power line corridor to be assessed by the specialists from an environmental sensitivities and practical/technical perspective. The power line corridor that was subjected to specialist assessment for purposes of this BA process comprises the aforementioned affected farm portions.

The main project components are the monopole and/or steel lattice pylons with a height of up to 40 m, which inform the layout of associated infrastructure such as roads and construction compound and laydown areas. Detailed consideration was given to selecting areas that would be suitable for the project infrastructure.

Detailed specialist assessment of the power line corridor through desktop-based analysis and fieldwork methodologies (where required) resulted in the verification of environmental sensitivities present on site. Specialists assessed a corridor of approximately 200 m wide and 12 km long (i.e. a corridor of approximately 289 ha, including all four alternatives)[11]. The registered servitude for the proposed overhead transmission power line will be up to 32 m wide, or where multiple adjacent power lines occur, in line with the Eskom Distribution Guide Part 19: Building Line Restrictions, Servitude Widths, Line Separations and Clearances from Power Lines (dated 2011).

As shown in Table A.9, Alternative 1 (the preferred alternative) is least in length, assessed area and final servitude area. Therefore, it will have a smaller footprint during the construction phase and during the operational phase.

Table A.9: Details of the assessed area and servitude area for each of the four alternatives assessed by the specialists.

Alternative	~Length (km)	~Assessed area (ha) *(200 m x length ÷ 10)*	~Servitude area (ha) *(32 m x length ÷ 10)*
1 (pref.)	10.97	219.40	35.10
2	11.39	227.80	36.45
3	11.75	235.00	37.60
4	12.06	241.20	38.59

Findings from the specialist assessments were investigated for purposes of identifying whether the proposed power line route alternatives intersected sensitive features. According to the Terrestrial Biodiversity specialists, all power line alternatives traverse CBA 2 areas. However, the Terrestrial Biodiversity specialists found the use of these areas to be acceptable due to their verified (i.e. ground-truthed) low sensitivity and recommended that where possible CBA areas should, nonetheless, be avoided by way of micro-siting within the assessed 200 m wide corridor.

Eight wetland features within the power line corridor and their recommended buffers were identified as no-go areas. These areas and their associated buffers can be avoided by way of locating pylons

[11] Note the total assessed area (including all four alternatives) amounting to 289 ha accounts for the divergent start and end routings of the alternatives (see Figure A.2).

and associated infrastructure outside of the buffer zones and spanning the overhead power line across the area. It should be noted that the detailed specialist assessments (Appendix D of the BA report) all concluded that the project can proceed, with no fatal flaws or unacceptable impacts identified as part of the project's proposal. This investigation confirmed that the proposed power line route avoids (where possible) the most sensitive features that were identified by the specialists within the original assessed study area. The specialists have, based on their impact assessment of the proposed power line corridor provided recommendations regarding micro-siting and selection of infrastructure location alternatives, as well as required mitigation measures and management actions.

Based on the findings of the specialist studies, a combined environmental sensitivity map showing the project layout was produced and is included in Section D as well as Appendix C of this BA Report. This map shows the sensitivities on site (e.g. terrestrial ecology, watercourse features, and sensitive heritage features, etc.) within the identified and assessed power line corridor. The combined sensitivity map indicates that the preferred power line route (Alt. 1) traverses fewer sensitivities and where sensitivities are present in the corridor, it is viable to span across these sensitive features. No fatal flaws were identified for either of the four power line routes. Therefore, the preferred route is more than suited for the development of the proposed power line project, provided that all measures be taken to avoid, manage or mitigate potential impacts that may be imposed by the proposed development in its construction, operational and decommissioning phases.

The sensitive environmental features found within the power line corridor, as described in the specialist studies (Appendix D) and discussed in Sections B and D of this BA Report, are able to be avoided by the location, layout and design of the proposed power line project. Therefore, following the exclusion of the sensitive areas, sufficient developable area is still available within the power line corridor which does not compromise the current ecological integrity of the site or go against the requirements of the landowners.

A.13.6 Concluding Statement for Alternatives

The following alternatives were considered in the BA process:

- **No-go Alternative:**

The no-go alternative assumes that the proposed project will not go ahead i.e. it is the option of not constructing the proposed 132 kV power line. The no-go alternative would result in the Vhuvhili SEF not being able to supply electricity to the Sasol Secunda facility for the production of green hydrogen which, therefore, means continued reliance on fossil fuels that will persist to have a negative environmental impact. While the no-go alternative i.e. not developing the proposed power line 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 energy demand within the country. **Hence, the no-go alternative is not the preferred alternative**.

- **Type of Activity**

This relates to the distribution and transmission of electricity generated from a renewable energy source, and in this particular case, from a solar photovoltaic resource. The distribution and

transmission electricity generated from a renewable energy source was the only activity considered by the Project Applicant, and thus considered in this BA Report. No other activity types were considered or deemed appropriate based on the expertise of the Project Applicant and the context of the Vhuvhili SEF.

- **Technology Alternatives:**

No feasible technology alternatives exist to date for the distribution and transmission of electricity from renewable energy sources to electrical grid networks. Therefore, no technology alternatives have been considered or assessed as part of this BA Process.

- **Preferred Site and Development Footprint within the Site:**

The location of the power line is determined by its function to transmit energy from the Vhuvhili SEF on-site substation to the Mukondeleli WEF switching station, which themselves are located in close proximity to the Sasol Secunda Synfuels facility. Within this context, the Project Developer provided four power line routing alternatives. The four alternatives affect the following farm portions:

- Portion 20 of Farm Grootvlei No. 293;
- Remaining Extent (RE) Farm Grootvlei No. 584;
- RE of Farm Vlakspruit No.292;
- Portions 2, 3, 13, 14, 15, 16, 18 and 19 of Farm Vlakspruit No. 292;
- RE of Farm Knoppies No. 314;
- Portion 3 of Farm Brandwacht No. 316;
- Portion 6, 10, 11 and 13 of Farm Bosjesspruit No. 291; and
- Portion 2 and 12 of Farm Tondershoek No. 317.

The proposed preferred power line alternative is Alternative 1. As shown in Table A.9 above, Alternative 1 is least in length (~11 km), assessed area (~219 ha) and final servitude area (~35 ha). Therefore, it will have a smaller footprint, compared to the three other alternatives, during the construction phase and during the operational phase.

The development footprint of the preferred power line routing (Alt 1) within the assessed approximately 289 ha corridor was determined through a screening exercise of the project study area by the specialist team (Site Sensitivity Verifications Reports were provided by specialists) as well as through consultation with the affected landowners to identify sensitive areas that should preferably be avoided and thus are excluded from development.

- **Location and Layout Alternatives:**

Specialists have assessed a corridor of approximately 200 m wide and 12 km long (i.e. a corridor of approximately 289 ha). The registered servitude for the proposed overhead transmission power line will be up to 32 m wide, or where multiple adjacent power lines occur, in line with the Eskom Distribution Guide Part 19: Building Line Restrictions, Servitude Widths, Line Separations and Clearances from Power Lines (dated 2011).

Based on the specialists' inputs, the preferred power line route (Alt 1) as proposed does not require revision to avoid environmentally sensitive areas (specifically any no-go areas), while still retaining technical and financial viability, as well as the requirements of landowners (as applicable). The

current proposed layout is the layout that was assessed by all the specialists on the project team (Appendix C and D of this BA Report).

- **Summary Statement:**

Based on the aforementioned, the preferred activity is the development of a 132 kV overhead transmission power line to facilitate the connection of the proposed Vhuvhili SEF to the proposed Mukondeleli WEF. The proposed preferred power line routing alternative to be constructed will be determined based on the final authorized location of the proposed Vhuvhili SEF on-site substation and the proposed Mukondeleli WEF switching station. The location and layout of the preferred activity have also been informed by the outcomes of the specialist assessments and technical feasibility, as well as landowner requirements. The preferred layout is further discussed in Section D of this BA Report.

A.14 Need and Desirability

It is an important requirement in the BA Process to review the need and desirability of the proposed project. Need and desirability requires an analysis of the effect that the proposed project may have on social, economic and ecological systems, and places emphasis on consideration of a project's justification in terms of the specific needs and interests of people. The consideration of need and desirability in EIA decision-making therefore requires the consideration of the strategic context of the project along with broader societal needs and the public interest.

Guidelines on Need and Desirability were published by the DEA (now operating as the DFFE) in 2017[12]. These guidelines list specific questions to determine need and desirability of proposed developments. This 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 A.10 includes a list of questions based on the DFFE's Guideline to determine the need and desirability of the proposed project. It should be noted this table was informed by the outcomes of this BA process.

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

Table A.10: The Guideline on the Need and Desirability's list of questions to determine the "Need and Desirability" of a proposed project.

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 environmental sensitivities, in particular the aquatic and terrestrial biodiversity and ecological sensitivities present on site were assessed in detail within the Aquatic and Terrestrial Biodiversity and Species Impact Assessments. Please refer to Appendix D.4 and D.5 of this BA Report. The specialists have identified all aquatic and terrestrial biodiversity sensitive areas on site that should be avoided by the proposed development, as well as any other ecologically sensitive areas and how to suitably develop within these areas to maintain the ecological integrity of these areas. It is noted that the majority of the proposed power line corridor traverses mostly moderately to heavily modified areas, including disturbed grassland and old croplands, all with a low sensitivity rating. Sections of the proposed power line corridor (all four alternatives) fall in a CBA2 (CBA optimal) and a small section of the proposed power line Alternatives 2 and 4 fall within a CBA 1 (CBA irreplaceable), however the specialist found these areas to be acceptable due to their verified (i.e. ground-truthed) low sensitivity. Nonetheless, it is recommended that where possible CBA (areas of high biodiversity value, needed to meet biodiversity targets) areas should be avoided by way of micro-siting within the assessed 200 m wide corridor. The watercourses in the study area have a low to high ecological importance and a moderate to high sensitivity. The delineated wetlands in the study area have a Present Ecological State that is moderately to seriously/critically modified. No SCC are known to occur in the study area from an aquatic perspective. It is the specialists' opinion that the potential aquatic ecosystem impacts of the proposed power line are likely to be low post-mitigation in terms of any potential impact on aquatic ecosystem integrity for all phases of the proposed development as the proposed works will avoid the delineated aquatic features as well as the recommended buffer areas.
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?	Detailed Aquatic and Terrestrial Biodiversity and Species Impact Assessments were undertaken and are included in Appendix D.4 and D.5 of this BA Report. Based on the screening, assessment and fine scale mapping that was done for the site, the specialists confirmed that the site falls mostly within moderately to heavily modified areas with small parts of the proposed corridor mapped as CBA but ground-truthed to be of low sensitivity. The Aquatic and Terrestrial Biodiversity and Species specialists have also identified all ecological sensitive areas including appropriate buffer zones on site that should be avoided by the proposed development and propose mitigation measures to reduce or minimise impacts to ensure that the ecological integrity of

NEED	
Question	**Response**
	the areas is maintained. The combined environmental sensitivity map is included in Section D of this BA Report. Based on these findings, it is the specialists' view that the potential aquatic and terrestrial biodiversity impacts of the proposed power line are likely to be low in terms of any potential impact on ecosystem integrity for all phases of the proposed development as the proposed works avoid the delineated aquatic features as well as the recommended buffer areas. Among other mitigation measures, the final power line routing determined in the detailed design and engineering process (post-EA) can avoid the delineated sensitive area by micro-siting within the assessed 200 m wide corridor and/or locating the pylons outside of the buffer areas and spanning across sensitive features. Further measures to avoid, remedy, mitigate and manage impacts are included in the Environmental Management Programme (EMPr) that was compiled and included within Appendix G of this BA Report.
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?	Measures to avoid, remedy, mitigate or manage biophysical impacts are included in the EMPr. The EMPr is included within Appendix G of this BA 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 were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	Waste will mostly be generated during the construction and decommissioning phases of the project. Measures to avoid, remedy, mitigate or manage waste are included within the EMPr. The EMPr is included within Appendix G of this BA Report. Waste generated on site will be disposed of at an appropriately licenced landfill site (i.e. a landfill that is licenced to handle the specific type of waste disposed of from the site).
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?	An integrated Heritage Impact Assessment (HIA) was undertaken to assess potential archaeological, palaeontological and cultural impacts resulting from the proposed development. Please refer to Appendix D.3 of this BA Report for the full HIA. The HIA concluded that all known significant heritage resources (aside from the visual landscape) can be avoided by the proposed power line corridor through the implementation of recommended mitigation measures. These are detailed in Sections D.2.3 and D.2.4 and translated into the EMPr (Appendix G of the BA report). The integrated Heritage Impact Assessment (Archaeology, Cultural Landscape and Palaeontology) was submitted to SAHRA and MPHRA for consideration and comment.

NEED	
Question	**Response**
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 biophysical impacts are included in the EMPr. The EMPr is included as Appendix G of this BA Report.
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? **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)** **1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the**	South Africa is among the world's top 10 developing countries required to significantly reduce their carbon emissions, and the introduction of low carbon-emitting technologies into the country's complement of power generation will greatly facilitate achieving this important objective. Given that South Africa receives among the highest levels of solar radiation on earth, it is clear that solar power generation should feature prominently in future national efforts to convert to a more sustainable suite of energy production to combat human-induced climate change. 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 therefore a need to identify alternative resources that could promote sustainable energy sources as well as cleaner energy production mechanisms. The proposed 132 kV power line project aims to facilitate the connection of the proposed Vhuvhili SEF to the proposed Mukondeleli WEF, wherefrom the combined renewable energy produced by the two facilities will be transmitted to Sasol's Secunda facility for the production of green hydrogen and green aviation fuel. Firstly, this project is seen as supporting a source of 'clean energy' in terms of solar energy production and therefore reduces the dependence on non-renewable sources. Secondly, it supports the transition to low-carbon energy sources. Green hydrogen has been identified as a low-carbon solution to meet Greenhouse Gas (GHG) emission reduction targets as contemplated in international agreements (e.g. the 2015 UN Paris Agreement) and to power industries in which emissions have previously been difficult to abate . Hydrogen is also used in various industrial processes, such as ammonia production, and thus has the potential to contribute to decarbonising a variety of industries, including the agricultural industry which is vital for food security. In October 2021, at the second Sustainable Infrastructure Development Symposium, President Cyril Ramaphosa stated that green energy had the potential to drive industrialisation and establish a whole new industrial reality. Furthermore, the President stated that "We stand ready to be a major exporter in this market, to use hydrogen to rapidly decarbonise our existing industries, and attract industrial investment from across the globe seeking to meet new standards of green power in the production

NEED	
Question	**Response**
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?**	process". The proposed development of the Vhuvhili SEF and its supporting EGI (as proposed in the current project) directly addresses the President's statements and the need to implement renewable energy technologies and green fuels and/or products in Mpumalanga. The project also represents a move by Sasol to transition to the production of greener energy sources, which will additionally create business and employment resilience in the energy production industry. The proposed project is a sustainable option for the area and the final proposed power line corridor will avoid all areas of high and very high environmental sensitivity. Where impacts to medium sensitivity areas cannot be avoided, potential impacts to the receiving environment will be appropriately minimised, mitigated or managed.
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 precautionary approach has been adopted for this study, i.e. assuming the worst-case scenario will occur and then identifying ways to mitigate or manage these impacts. A corridor of approximately 200 m wide was assessed by all specialists that provided expert input in terms of potential environmental sensitivities. The 200 m assessed corridor, therefore, allows for the proposed power line infrastructure to be located/ micro-sited outside of highly sensitive areas as verified by the specialist team. The registered servitude for the proposed power line will be up to 32 m wide and approximately 12 km long (i.e., approximately 77 ha, worst case), or where multiple adjacent power lines occur, in line with the Eskom Distribution Guide Part 19: Building Line Restrictions, Servitude Widths, Line Separations and Clearances from Power Lines. Current gaps in knowledge include confirmation of the exact placement of the power line route within the 32 m corridor. Ways in which these gaps are addressed are to consider the worst-case scenarios as noted above in terms of the width of the corridor assessed. Please refer to Section A.6 for the specific project description and proposed power line corridor that was assessed.
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 was conducted as part of the S&EIA Process undertaken for the proposed Vhuvhili SEF (NEAS: MPP/EIA/0001063/2022). Linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area were considered as part of the Socio-Economic Impact Assessment. The assessments concluded that the proposed Vhuvhili SEF project has acceptable socio-economic impacts and desirable benefits related to economic growth and employment, financial contributions to and upliftment of rural local communities and increased, more secure power generation capacity for South Africa's energy complement.

NEED	
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? **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.)?**	As discussed throughout Section A, the proposed 132 kV power line project (subject of this BA Report) will facilitate the connection of the proposed Vhuvhili SEF to the Sasol Secunda facility for the production of green hydrogen and green aviation fuel. What makes green hydrogen 'green' is the input of energy from a renewable energy source (e.g. solar or wind energy) to operate the electrolyser – the key component in the green hydrogen production process. With the use of dedicated renewable energy facility to produce 'green' hydrogen at the Sasol Secunda facility, it offsets the need to use electricity from the national electricity grid. In this manner, the proposed Vhuvhili SEF and supporting EGI (subject of this BA) indirectly makes available an increased electricity availability on the national grid which can be used for improved service delivery to communities, and indirectly reduces the probability of load shedding and the many socio-economic costs of such outages. The proposed power line will therefore contribute toward the realisation of the socio-economic benefits identified during the detailed Socio-Economic Impact Assessment that was conducted for the proposed Vhuvhili SEF.
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 were considered as part of the Aquatic and Terrestrial Biodiversity and Species Impact Assessments undertaken for this project and have been included in Appendix D.4 and D.5 of this BA Report. The specialists recommended measures to maintain the ecological receiving environment; these measures have been translated into the EMPr (Appendix G of the BA) for implementation on site.
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?	Please refer to Section A.13 of this BA Report where the preferred alternatives considered as part of this BA Process are discussed.
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 has assessed the potential cumulative impacts of this proposed development. Please refer to Appendix D and Section D of this BA Report where the potential cumulative impacts are discussed for this project.

NEED	
Question	**Response**
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 power line is located in the Govan Mbeki Local Municipality (GMLM), and the Gert Sibande District Municipality (GSDM). Both the GMLM and the GSDM Integrated Development Plans (IDP) (2021/2022), recognise renewable energy projects as potential sustainable economic development opportunities. The proposed project will therefore be supportive of the GMLM's IDP priority areas of facilitating job creation to address the high unemployment rate (Objective 3), investing in infrastructure development (Objective 2 and 6) and promoting financial sustainability in the municipality (Objective 1) while protecting the environment (Objective 5). The IDP highlights the renewable energy sector as a technical service that can be provided to support the workforce in delivering on the strategic objectives. The IDP notes that this objective can be achieved through the phasing in of renewable energy options, which include concentrated solar power, wind and natural gas thereby reducing its dependence on coal resources. Although solar PV is not specifically listed as a renewable energy option, it shows that the municipality is supporting green energy initiatives to diversify local economic development. The proposed project will support the Vhuvhili SEF project which is expected to create employment opportunities and economic spin offs during the construction and operational phases (if EA is granted by the Mpumalanga DARDLEA). The Vhuvhili SEF and supporting EGI would help to address the need for sustainable economic growth by leveraging competitive advantages of the region, in terms of harnessing the characteristic high solar resource in the area to generate renewable electricity. The proposed project will also help to address the need to improve basic service delivery and infrastructure development through increased electricity supply while also providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area. This will also address unemployment and poverty as well as Climate Change which have been identified as "Threats" in the SWOT analysis which was undertaken as part of the GMLM IDP process. One of the economic priority issues identified within the GMLM IDP (2022-2027) is the fairly high level of unemployment and poverty. The expanded unemployment rate of Govan Mbeki was 32.5% in 2020, and youth unemployment was 45%. These unemployment rates are one of the lower unemployment rates in the province, but still relatively high in comparison with the 6% target by 2030.

NEED	
Question	**Response**
	In the Govan Mbeki LM, the mining sector (39%) and manufacturing sector (24%) contributes the most in terms of GDP. In the SWOT analysis undertaken as part of the IDP process, one of the threats identified is the closure of the Mining and the Petro-chemical industry. It notes that "coal is a finite resource and exhausting coal deposits, and reserves means Govan Mbeki will become a ghost town with very high unemployment, poverty and poor living conditions". The proposed project will create job opportunities and economic spin offs during the construction and operational phases (if an EA is granted by the Mpumalanga DARDLEA). Additionally, the proposed project will improved the resilience of the local economy which has come to depend on coal mining which the IDP recognises as a finite resource and a vulnerability of the local economy. Therefore, the proposed project would help to address the need for increase local economic resilience while also providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area. The proposed project will therefore be supportive of numerous of the GMLM's IDP objectives and is, therefore, needed and desirable.
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 project is located within a rural area and the site is zoned for agricultural use.
2.1.3. Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.)	According to the Visual Impact Assessment and the Integrated Heritage and Cultural Landscape Impact Assessment (Appendix D.2 and D.3 of the BA report, respectively), the current land use and cultural landscape is largely an agricultural one characterised by grazing lands (grass) and arable croplands. The landscape is extensive and is punctuated by towns and coal mines. It is not a particularly sensitive cultural landscape with the majority of its development having taken place during the 20th century. It is compromised by the very large Sasol facility located 6 km west of the study area, and several coal mines in the surrounding landscape. These add a modern industrial layer to the landscape. There are no scenic routes in the area, although the N17 runs west to east about 8.5 km north of the north-eastern end of the proposed power line. Given the visual intrusions of the industrial features in the area, the scenic landscape is of no further concern. It is rated as having low cultural significance at the local level. According to the Site Sensitivity Verification undertaken as part of the Agricultural Compliance Statement (Appendix D.1), the agricultural impacts of the power line are negligible in such an agricultural environment, regardless of the level of agricultural sensitivity of the land which it traverses.

NEED	
Question	**Response**
	Therefore, in the context of the development of overhead power lines, almost no land can be considered to have high sensitivity for impacts on agricultural resources. As noted, an EMPr has been compiled (Appendix G of the BA report) for the proposed project to ensure that all potential negative impacts identified are suitably managed and mitigated, and potential positive impacts are enhanced.
2.1.4. Municipal Economic Development Strategy ("LED Strategy").	According to the GMLM LED Strategy 2014 and beyond, new energy sources (preferably renewable energy such as solar and wind) represent a key side linkage to complement the coal mining and fuel production economic activities of the local economy. It is recognised that such side linkages, or diversifying of the local economy, will provide great opportunities for further economic development of the municipality. The proposed project to develop the Vhuvhili SEF and supporting EGI aligns with the above objective of the GMLM LED Strategy. Furthermore, renewable energy development is earmarked as a catalytic Rural Economic Sector Development Programme and as a municipal industrialisation anchor programme. Secunda is earmarked as a proposed location for the implementation of these programmes within the municipal LED Strategy. Therefore, the proposed development of the 132 kV power line to support the Vhuvhili SEF aligns with the GMLM LED Strategy.
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? **2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?**	See response to Need and Desirability question 2.1.1 and question 2.1.4, above.
2.3. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	The needs and interests of the relevant communities were addressed in a detailed Socio-Economic Impact Assessment that was undertaken as part of the S&EIA Processes for the proposed Vhuvhili SEF (NEAS: MPP/EIA/0001063/2022). The proposed power line will facilitate the connection of the proposed Vhuvhili SEF to the Sasol Secunda facility. Overall, the combined Vhuvhili SEF and supporting EGI projects will improve economic development and resilience in the municipality, provide new permanent and temporary employment opportunities as well as improve the resilience of current employment industries in the municipality (e.g. Sasol Secunda Synfuels facility). Therefore, the proposed power line will contribute toward addressing the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities by aiding the functioning of the proposed Vhuvhili SEF should construction materialize. Further to this, detailed

NEED	
Question	**Response**
	discussion of the proposed project's alignment with the local and district municipal IDPs and the local municipality's LED Strategy is provided in the responses to Need and Desirability question 2.1.1 and question 2.1.4, above. It is important to note that a specific socio-economic impact assessment for the proposed project was not identified by the National Web-Based Screening Tool, as it is not a study that is identified for power line projects.
2.4. Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long term? Will the impact be socially and economically sustainable in the short- and long-term?	The equitable (intra- and inter-generational) impact distribution, in the short- and long term and economical sustainability was addressed in a detailed Socio-Economic Impact Assessment that was undertaken as part of the S&EIA Processes for the proposed Vhuvhili SEF (NEAS: MPP/EIA/0001063/2022). The proposed power line will facilitate the connection of the Vhuvhili SEF to the Sasol Secunda facility or the national grid. Therefore, the proposed power line will contribute toward addressing the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities by aiding the functioning of the Vhuvhili SEF which will contribute to realising a low-carbon energy future for the local municipality, the Mpumalanga province and South Africa more broadly. The proposed project therefore helps to address climate change, and hence it promotes intra- and inter-generational equity.
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. Where possible, the construction of the power lines will utilise contractors who employ labourers from the local community and therefore encourage socio-economic development at a local scale, as is encouraged under the GMLM LED Strategy, 2014 and beyond.
2.5.2. reduce the need for transport of people and goods,	This is not applicable as the proposed project is located within a rural area and the development site is zoned for agricultural use. In addition, this project is proposed for the distribution and transmission of electricity generated from a renewable energy facility.
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 project is located within a rural area and the site is zoned for agricultural use. In addition, this project is proposed for the distribution and transmission of electricity generated from a renewable energy facility.

NEED	
Question	**Response**
2.5.4. compliment other uses in the area,	The Visual Scoping Report (Appendix G.6) notes that the study area has a somewhat mixed visual character, transitioning from the heavily transformed urban / peri-urban landscape associated with the Secunda and Trichardt urban areas, the Sasol Secunda synthetic fuel plant (refinery) and associated infrastructure in the north / north-west to a more rural / pastoral character across the remainder of the study area. An Agricultural Compliance Statement is included in Appendix D.1 of this BA Report to reflect the impact of the proposed project in terms of the land capability and agricultural potential. The Agricultural Compliance Statement concludes that the agricultural impact (loss of future agricultural production potential) resulting from the proposed power line power line is totally insignificant in the context of the agricultural environment. This is because an insignificantly small amount of land will be excluded from agricultural production. The proposed development is therefore acceptable. This is substantiated by the facts the proposed development poses a very low risk in terms of causing soil degradation, and the development offers some positive impact on agriculture as well as wider, societal benefits. Further to this, the proposed project aligns with the strategic planning for the area in terms of renewable energy development plans as contemplated in the local and district municipal IDPs and the local municipality's LED Strategy. A detailed analysis of this strategic alignment is provided in the responses to Need and Desirability question 2.1.1 and question 2.1.4, above.
2.5.5. be in line with the planning for the area,	
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 project is located within a rural area and the site is zoned for agricultural use.
2.5.7. optimise the use of existing resources and infrastructure,	The proposed power line will facilitate the connection of the proposed Vhuvhili SEF to the Mukondeleli WEF wherefrom the electricity will be fed into the existing step-down substation and electrical grid at Sasol. Therefore, existing infrastructure will be used at Sasol as far as possible. As far as reasonably possible and available, existing servitudes will be utilised in accordance with the Eskom Distribution Guide Part 19: Building Line Restrictions, Servitude Widths, Line Separations and Clearances from Power Lines. The potential to use existing servitudes of Sasol will be determined during the detailed engineering phase, subsequent to the issuing of EA, should such authorisation be granted for the proposed power line and EGI project.
2.5.8. opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	The project is proposed for the distribution and transmission of electricity generated from a renewable energy facility and is not related to bulk infrastructure expansion.

NEED	
Question	**Response**
2.5.9. discourage "urban sprawl" and contribute to compaction/densification,	This was addressed in the detailed Socio-Economic Impact Assessment that was undertaken for the proposed Vhuvhili SEF (NEAS: MPP/EIA/0001063/2022) as part of the S&EIA Process. The proposed power line is proposed to facilitate the transmission of electricity from an industrial scale renewable energy facility for use by an existing economically important industry in Secunda. Such large-scale renewable energy facilities and by extension their supporting EGI are an uncommon urban activity as they are generally incompatible for location within the urban edge. According to the Visual Impact Assessment and the Integrated Heritage and Cultural Landscape Impact Assessment (Appendix D.2 and D.3 of the BA report, respectively), the landscape is not particularly sensitive from a cultural viewpoint and is compromised by the very large Sasol facility located only 6 km west of the study area, and several coal mines in the surrounding landscape. As discussed in Section D.1, there are numerous existing power lines within the study area. The proposed project will therefore not be inconsistent with the industrial development of the surrounding landscape.
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 project is located within a rural area and the site is zoned for agricultural use.
2.5.11. encourage environmentally sustainable land development practices and processes,	The proposed power line will facilitate the connection of a proposed renewable energy facility, without the power line the renewable energy facility will not be operable. Such a facility is a sustainable land development practice provided it is constructed and operated in an environmentally friendly manner. The proposed overhead power line pylons have an extremely small footprint and are therefore considered as environmentally sustainable land development practices.
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.),	Please refer to Section A.13 of this BA Report for a description of the process undertaken to identify the site as a preferred site for the proposed power line.
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 was addressed in the detailed Socio-Economic Impact Assessment that was undertaken for the proposed Vhuvhili SEF as part of the S&EIA Process (NEAS: MPP/EIA/0001063/2022). It is important to note that a specific socio-economic impact assessment for the proposed project was not identified by the National Web-Based Screening Tool, as it is not a study that is identified for power line projects. However, an assessment of the project's alignment with the local strategic planning objectives in terms of renewable energy development plans as contemplated in the local and district municipal IDPs and the local municipality's LED Strategy was undertaken in this BA report. A detailed analysis of this

NEED	
Question	**Response**
	strategic alignment is provided in the responses to Need and Desirability question 2.1.1 and question 2.1.4, above.
2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and	The impact of the proposed project on cultural areas and heritage resources (archaeology and palaeontology), as well as on the sense of place was assessed in the HIA and Visual Impact Assessment (VIA) that was undertaken to inform the BA Process (Appendix D.2 and D.3 of the BA report). These assessments found that the vast majority of the proposed corridors (all four alternatives) are likely to be of low sensitivity in terms of sense of history, sense of place, heritage and the cultural landscape. Although built heritage (ruins) does occur in the landscape, none of these sites lie close to the corridors and will therefore not be impacted. The cultural landscape has already been compromised by the Sasol facility just to the north of the study area and, in the surrounding area, coal mines (effectively adding an industrial layer). As such, the proposed project will make a relatively small contribution to sense of place impacts. Please refer to Appendices D.2 and D. 3 and of this BA Report for the detailed impact assessments.
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?	Several Renewable Energy projects and power line projects are being proposed or have been granted authorisation in the vicinity of the proposed project. Section D.1 provides a list of other REFs and power line projects that received EA or are being proposed within 50 km from the Vhuvhili SEF and supporting EGI site that are included in the cumulative impact assessment.
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)?	This was addressed in the detailed Socio-Economic Impact Assessment that was undertaken for the proposed Vhuvhili SEF (NEAS: MPP/EIA/0001063/2022) as part of the S&EIA Process. It is important to note that a socio-economic impact assessment was not identified by the National Web-Based Screening Tool as a study that is required for power line projects. However, the precautionary approach has been adopted for all aspects of this study, i.e. assuming the worst-case scenario will occur and then identifying ways to mitigate or manage these impacts. The Project Developer is in the process of negotiating a servitude agreement and relevant powers of attorney with the landowners of land portions that may potentially be traversed by the proposed power line. It is assumed that owners of the affected land portions will be appropriately compensated for any loss in income, crops, infrastructure or land incurred as a result of the project. It is assumed that landowners will in the process of negotiation communicate any constraints associated with the placement of pylons and associated infrastructure.
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?	

NEED	
Question	**Response**
	The Vhuvhili SEF Socio-Economic Impact Assessment undertaken for the applicable S&EIA process (NEAS: MPP/EIA/0001063/2022), made use of secondary and primary data collection methodologies. 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. Neither the assumptions nor limitations were highlighted to negatively affect the assessment findings of the Socio-Economic Impact Assessment.
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?	Although a Socio-Economic Impact Assessment was not identified by the National Web-Based Screening Tool as a study that is required for power line projects, it is understood that the development of the proposed power line is necessary for the evacuation of the power generated from the Vhuvhili SEF. Therefore, the proposed power lines will assist in the realisation of socio-economic benefits identified by the detailed Socio-Economic Impact Assessment that was undertaken for the proposed Vhuvhili SEF as part of the S&EIA Process (NEAS: MPP/EIA/0001063/2022) and local socio-economic characteristics identified for the Vhuvhili SEF may also be relevant to the proposed power line. An assessment of the local socio-economic conditions and potential impacts of the proposed development can be made by drawing on the local planning documents, i.e. the local municipal IDP. Govan Mbeki is the second fastest growing population with an annual population growth rate of 3.10% in the whole of the Mpumalanga Province (after Steve Tshwete with a population growth of 4.29%) (Govan Mbeki IDP (2021/2022)). A population growth of this proportion is likely to place strain on existing backlogs and the municipality's ability to effectively service the community. This, combined with the high unemployment rates and low-income levels implies the need for employment provision which would be provided during both the construction and operational phase of the proposed Vhuvhili SEF. As indicated, the proposed development aims to provide opportunities for economic growth and development through supporting the proposed Vhuvhili SEF. Furthermore, the provision of temporary employment opportunities, improved income levels, and skills development, aligns the proposed development with several key aspects and strategic objectives outlined in the national, provincial, district, and local policies. The proposed project aligns with the strategic planning for the area in terms of renewable energy development plans as contemplated in the local and district municipal IDPs and
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 (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?	

NEED	
Question	**Response**
2.11. What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	the local municipality's LED Strategy. A detailed analysis of this strategic alignment is provided in the responses to Need and Desirability question 2.1.1 and question 2.1.4, above. To ensure that the proposed project adopts Best Practice, the best practicable environmental option, and responsibility for environmental health and safety consequences throughout the development's life cycle, the BA process was informed by nine specialist assessments as listed in Section A.4. These specialist inputs provided measures to mitigate the potential negative impacts of the proposed project, and to ensure that the best practicable environmental power line routing alternative is selected. The recommended mitigation measures and best practice guidelines provided by the specialist have been translated into the EMPr (Appendix G of the BA report) for implementation on site should the proposed project receive EA and construction materialise.
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 Public Participation Process (PPP) that is undertaken as part of the BA process is included in Section C of this Draft BA Report. It provides a description of various methods to notify potential I&APs of the proposed project and the opportunity to comment on the Draft BA Report, namely, through notices in the local newspaper, sites notices, emails as well as sms text messages. A 30-day PPP and commenting period is currently underway, from 14 November 2022 to 14 December 2022, to provide Interested and Affected Parties (I&APs) with the opportunity to give inputs and raise their concerns regarding the proposed project.
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 BA Process has taken 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 BA 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 Public Participation Process that is planned to be undertaken as part of the BA Process is included in Section C of this BA Report. Various methods are being employed to notify potential I&APs of the proposed project and the opportunity to comment on the Draft BA Report, namely, through notices in the local newspaper, sites notices, emails, as well as SMS text messages. All comments received during the 30-days comment period will be included in the Comments and Responses Report which will be submitted to the Mpumalanga DARDLEA with the Final BA Report. Proof of public participation undertaken to date is included in Appendix F of this BA Report.

NEED	
Question	**Response**
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 BA Process has taken cognisance of all interests, needs and values expressed by all 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 has been provided during the BA 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)?	The interest, needs and values expressed by I&APs in the form of comments received during the 30-days comment period will be included in the Comments and Responses Report which will be submitted to the Mpumalanga DARDLEA with the Final BA Report. In the interim, the proposed project's consistency with the needs of the local community as expressed through the local and district Integrated Development Plans has been determined as acceptable and in alignment with local priorities and objectives. A detailed analysis of this strategic alignment is provided in the responses to Need and Desirability question 2.1.1 and question 2.1.4, above.
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?	An EMPr was developed to address health and safety concerns. An ECO will be appointed to monitor compliance with the EMPr and EA (should such authorisation be granted) during the construction and operational phases. The EMPr is included as Appendix G of this BA Report.
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 was addressed in the detailed Socio-Economic Impact Assessment that was undertaken for the proposed Vhuvhili SEF (NEAS: MPP/EIA/0001063/2022) as part of the S&EIA Process. Although a Socio-Economic Impact Assessment was not identified by the National Web-Based Screening Tool as a study that is required for power line projects, it is understood that the development of the proposed power lines is necessary for the evacuation of the power generated from the proposed Vhuvhili SEF. Therefore, the proposed power line will assist in the realisation of socio-economic benefits identified by the detailed Socio-Economic Impact Assessment that was undertaken for the
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,	

NEED	
Question	**Response**
2.16.4. the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits),	proposed Vhuvhili SEF as part of the S&EIA process (NEAS: MPP/EIA/0001063/2022) and local socio-economic characteristics identified for the Vhuvhili SEF may also be relevant to the proposed power line. In addition, local employment opportunities will be provided as far as possible. Where possible, the construction of the power lines will utilise contractors who employ labourers from the local community and therefore encourage socio-economic development at a local scale, as is encouraged under the GMLM LED Strategy 2014 and beyond.
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,	The different government departments have been listed as I&APs and are given the opportunity to comment on the Draft BA Report during the 30-days public review period. Comments received during the 30-days review period will be included in the Comments and Responses Reports which will be submitted to the Mpumalanga DARDLEA with the Final BA Reports.
2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	
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 power lines will adhere to the principles of environmental management. Measures taken to ensure adherence to the principles of NEMA have been determined during the BA Process and translated into the EMPr (Appendix G of the BA report) for implementation on site (should EA be received, and construction materialise).
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 EMPr, that is included as Appendix G of this BA Report, were informed by the specialist assessments undertaken. This includes detailed assessment of the environment as well as the impacts associated with the proposed development. Detailed specialist assessments (Appendix D of the BA report) have all concluded that the project can proceed, with no fatal flaws or unacceptable impacts identified as part of the project's proposal. Therefore, the mitigation measures are deemed to be realistic. Further, power lines can be dismantled and completely removed from the site leased for the development and do not permanently prevent alternative land-uses on the same land parcel.
2.20. What measures were taken to ensure that he 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 EMPr (Appendix G of the BA Report) of this proposed project must form part of the contractual agreement and be adhered to by both the contractors/workers and the Project Applicant.

NEED	
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?	Please refer to Section A.13 of this BA Report where the preferred alternatives considered as part of this BA Process are discussed. Although a Socio-Economic Impact Assessment was not identified by the National Web-Based Screening Tool as a study that is required for power line projects, the proposed project's consistency with the needs of the local community as expressed through the local and district Integrated Development Plans has been determined as acceptable and in alignment with local priorities and objectives. A detailed analysis of this strategic alignment is provided in the responses to Need and Desirability question 2.1.1 and question 2.1.4, above. Further, to ensure that the proposed project adopts Best Practice and the best practicable environmental option, the BA process was informed by nine specialist assessments as listed in Section A.4. These specialist inputs provided measures to mitigate the potential negative impacts of the proposed project, and to ensure that the best practicable environmental power line routing alternative is selected. The detailed specialist assessments (Appendix D of the BA report) all concluded that the project can proceed, with no fatal flaws or unacceptable impacts identified as part of the project's proposal. The recommended mitigation measures and best practice guidelines provided by the specialist have been translated into the EMPr (Appendix G of the BA report) for implementation on site should the proposed project receive EA and construction materialise.
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 project were objectively determined. The cumulative impacts of similar types of projects that have received EA or whose EA status is pending (e.g. other renewable energy projects and power line projects within a 50 km radius of the proposed project) were assessed and are included in Section D of this BA Report.

SECTION B: DESCRIPTION OF THE RECEIVING ENVIRONMENT

This section of the BA Report provides a broad overview of the receiving environment for the proposed overhead transmission power line corridor and the surrounding area. The receiving environment is understood to include biophysical, socio-economic and heritage aspects, which could be affected by the proposed development or which in turn might impact on the proposed development.

This information is provided to identify the potential issues and impacts of the proposed project on the receiving environment and vice versa. The information presented within this section has been sourced from:

- Inputs from the specialists that form part of the project team (Appendix D);
- Feedback from 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) and the Agricultural Geo-Referenced Information System (AGIS), amongst others;
- The Govan Mbeki Local Municipality Integrated Development Plan (IDP) (2020/2021);
- The Gert Sibande District Municipality IDP (2020/2021); and
- The Mpumalanga Spatial Development Framework (2019).

It is important to note that this section intends to provide a broad overview and does not represent a detailed environmental study. Detailed descriptions of the assessed Vhuvhili EGI Corridor and the proposed power line route alternatives that focused on significant environmental aspects of this proposed project are provided in the relevant specialist assessments, which are included in Appendix D of this BA Report.

B.1 Project Background

The power line corridor is starting approximately 6 km south-east of the town of Secunda (at S26° 33’ 58.80” E29° 15’ 49.11”) and runs to a point some 11 km south of Secunda (S26° 37’ 24.57” E29° 11’ 04.12”) in the Mpumalanga Province. The power line corridor traverses the Govan Mbeki Local Municipality and the Gert Sibande District Municipality. The Project Developer provided four power line routing alternatives which traverse the farm portions indicated in

Table B.1.

Table B.1: Affected Farm Portions for the Four Power line Routing Alternatives

INFRASTRUCTURE				AFFECTED FARM PORTIONS		
Power line (subject of this BA process)				Farm	Portion	SG code
Alt 1 (pref)	Alt 2	Alt 3	Alt 4			
		x	x	Grootvlei No.293	20/293	T0IS00000000029300020
x	x	x	x	Grootvlei No.584	RE/584	T0IS00000000058400000
x		x		Vlakspruit No.292	RE/292	T0IS00000000029200000
x	x	x	x	Vlakspruit No.292	19/292	T0IS00000000029200019
x	x	x	x	Vlakspruit No.292	14/292	T0IS00000000029200014
x	x	x	x	Vlakspruit No.292	15/292	T0IS00000000029200015
x		x		Vlakspruit No.292	13/292	T0IS00000000029200013
x	x	x	x	Vlakspruit No.292	3/292	T0IS00000000029200003
x	x	x	x	Vlakspruit No.292	2/292	T0IS00000000029200002
x	x	x	x	Vlakspruit No.292	16/292	T0IS00000000029200016
x	x	x	x	Vlakspruit No.292	18/292	T0IS00000000029200018
x	x	x	x	Knoppies No.314	RE/314	T0IS00000000031400000
x	x	x	x	Brandwacht No.316	3/316	T0IS00000000031600003
x	x	x	x	Bosjesspruit No. 291	6/291	T0IS00000000029100006
x	x	x	x	Bosjesspruit No. 291	13/291	T0IS00000000029100013
x	x	x	x	Bosjesspruit No. 291	10/291	T0IS00000000029100010
x	x	x	x	Bosjesspruit No. 291	11/291	T0IS00000000029100011
x	x	x	x	Tondershoek No. 317	2/317	T0IS00000000031700002
	x		x	Tondershoek No. 317	12/317	T0IS00000000031700012

As noted in Section A of this BA Report, the specialists have assessed an approximately 200 m wide corridor that is approximately 12 km in length. Note, however, that the registered servitude for the proposed power line will only be a maximum of 32 m wide and totaling approximately 12 km in length, or where multiple adjacent power lines occur, in line with guideline and requirements for 132 kV power lines stipulated in the 2011 Eskom Distribution Guide Part 19. As previously noted, the proposed project is located within the Govan Mbeki Local Municipality in the Gert Sibande District Municipality and is situated to the south of the N17 national road. Figure A.2 in Section A of this report provides a locality map of the proposed project area.

B.2 Specialist Input

The description of the receiving environment discussed hereafter is informed by inputs provided by the specialists as indicated in Table B.2.

Table B.2: Specialist inputs and respective appendices.

Specialist	Company	Assessment	Appendix of BA Report
Johann Lanz *(Pr.Sci.Nat.)*	Private	Agriculture and Soils Compliance Statement	D.1
Kerry Schwartz	SLR Consulting	Visual Impact Assessment	D.2
Dr Jayson Orton	ASHA Consulting	Heritage Impact Assessment	D.3
Prof. Marion Bamford	Private	Palaeontology Impact Assessment	D.3
Dr Noel van Rooyen *(Pr.Sci.Nat.)*	Ekotrust cc	Terrestrial Biodiversity and Species Assessment	D.4
Lorainmari den Boogert *(Pr.Sci.Nat.)*, Antoinette Bootsma Nee van Wyk *(Pr.Sci.Nat.)*, Rudi Bezuidenhoudt *(Pr.Sci.Nat.)* and André Strydom	Iggdrasil Scientific Services & Limosella Consulting	Aquatic Biodiversity and Species Assessment	D.5
Chris van Rooyen and Albert Froneman *(Pr.Sci.Nat.)*	Chris van Rooyen Consulting	Avifauna Assessment	D.6
Lizande Kellerman *(Pr.Sci.Nat.)* with inputs from Helen Antonopoulos and Willan Adonis	CSIR	Civil Aviation Compliance Statement	D.7
Lizande Kellerman *(Pr.Sci.Nat.)* with inputs from Helen Antonopoulos and Willan Adonis	CSIR	Defence Site Sensitivity Verification	D.8

B.3 Biophysical Environment

B.3.1 Climate Conditions and Climate Change

Some of the information described below on climate is based on inputs provided by the Terrestrial Biodiversity Specialist, which are included in Appendix D.4 of this BA Report.

B.3.1.1 General Context

The site falls in a strongly seasonal summer-rainfall, cool-temperate region, with very dry winters. The mean annual precipitation of the Soweto Highveld Grassland is 662 mm.

Rainfall

The mean annual rainfall as measured at Secunda is 693 mm (Table B.3; Figure B.2) with a peak in rainfall during the summer months, from November to January. The annual precipitation coefficient of variation is 27%. Mean annual potential evaporation is 2 060 mm, while the mean annual soil moisture stress is 75%. The total annual rainfall at Secunda during dry and wet years respectively may range from 558 mm to 965 mm, indicating a moderate variation in the annual rainfall. The rainy season at Secunda is predominantly from October to March when about 86% of the annual rainfall occurs. December and January are the wettest months, and the driest period is from May to August, when less than 15 mm of rain per month is recorded. Maximum rainfall measured over a 24-hour period at Secunda was 82 mm, recorded in November. The highest monthly rainfall recorded was 241 mm, also measured in November.

Table B.3: Maximum rainfall (mm) in 24 hours, highest maximum and lowest monthly minimum rainfall at Secunda: 26° 30' S; 29° 11' E; 1628 m (Weather Bureau 1998)

	Rainfall (mm)			
Month	**Mean per month**	**24 h max**	**Max per month**	**Min per month**
Jan	114	66	168	50
Feb	93	69	142	41
Mar	64	55	121	31
Apr	35	56	119	2
May	8	12	18	0
June	14	41	75	0
July	2	6	13	0
Aug	8	24	24	0
Sep	33	26	107	0
Oct	82	59	146	0
Nov	104	82	241	0
Dec	136	76	200	89
Year	693	82	965	558

Temperature

The mean annual temperature for Secunda is 15.8°C (Table 3-3) with the extreme maximum and minimum temperatures 33.0°C and -4.3°C respectively (Figure 3-3). The mean daily maximum for January is 27.2°C and for July it is 18.1°C, whereas the mean daily minimum for January is 13.5°C and for July it is 0.9°C. Frost may occur anytime from April to October with a mean of 41 days frost per annum.

Table B.4: Temperature data for the Secunda region: 26° 30' S; 29° 11' E; 1628 m (Weather Bureau 1998)

	Temperature (°C)												
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Max	27.2	25.9	25.2	23.0	20.8	17.3	18.1	21.5	22.3	24.3	23.8	26.0	27.2
*Ext. Max	33.0	32.5	30.0	30.6	25.5	25.3	25.3	27.0	31.0	32.0	31.0	31.5	33.0
Min	13.5	12.9	12.0	9.8	5.9	2.3	0.9	4.1	6.9	10.0	11.1	13.6	0.9
*Ext. Min	10.1	10.5	7.1	4.2	2.0	-2.6	-4.3	-1.5	1.1	4.3	6.3	8.8	-4.3
Mean	20.4	19.3	18.6	16.3	13.4	9.8	9.5	12.8	14.6	17.1	17.5	19.9	15.8

Max = mean daily maximum temperature for the month
*Ext. Max = extreme maximum temperature recorded per month
Min = mean daily minimum temperature for the month
*Ext. Min = extreme minimum temperature recorded per month
Mean = mean monthly temperature for each month and for the year

Cloudiness and relative air humidity

At Bethal weather station, located about 25 km east of Secunda, the cloud cover at 14:00 is the highest from November to January (5.1 – 5.3 eights) and the lowest in June, July and August (1.5 – 1.9 eights) (Table 3-4). The highest mean relative air humidity (%) at 08:00 occurs during the late summer and autumn months (February to April; 83 – 84%) and the lowest relative air humidity at 14:00 (31%) occurs in early spring (August) (Weather Bureau 1998).

Figure B.1 provides an indication of mean annual rainfall whereas Figure B.2 provides the average monthly distribution of rainfall and the average monthly maximum and minimum temperature.

Table B.5: Cloud cover at 14:00 and percentage relative air humidity at 08:00 and 14:00 at Bethal: 26° 27' S; 29° 29' E; 1663 m (Weather Bureau 1998)

	Cloud (0-8)	Relative air humidity %	
	14:00	08:00	14:00
Jan	5.2	80	51
Feb	4.9	83	48
Mar	4.9	83	44
Apr	4.1	84	41
May	2.4	80	34
June	1.6	81	34
July	1.5	79	33
Aug	1.9	75	31
Sept	3.1	74	33
Oct	4.6	75	41
Nov	5.3	77	49
Dec	5.1	77	48
Year	3.7	80	41

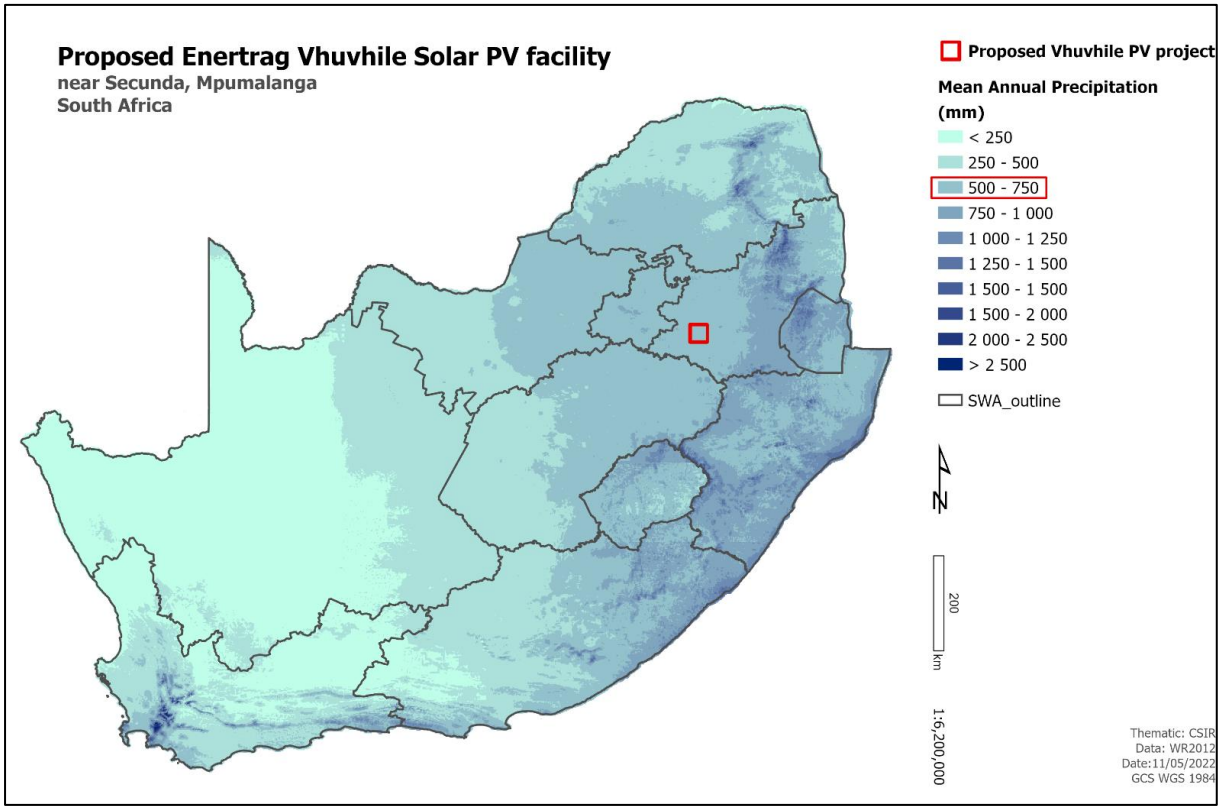


Figure B.1: The average annual precipitation (mm) of South Africa, with the study area indicated by the red square (Source: https://www.worldweatheronline.com/, 2021)

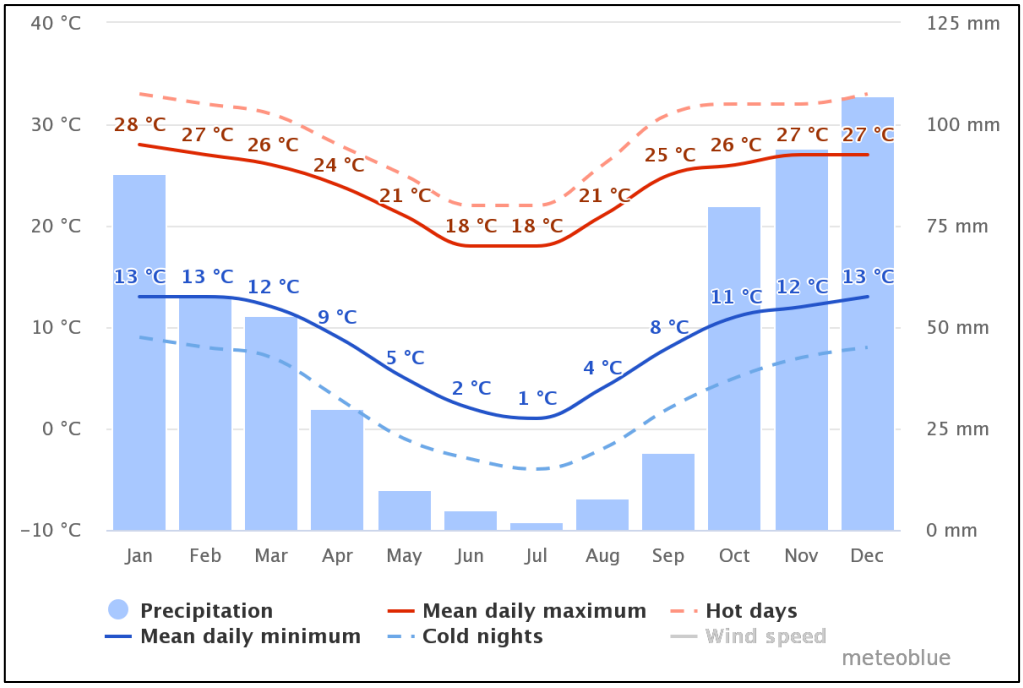


Figure B.2: The average monthly distribution of rainfall and the average monthly maximum and minimum temperature within the Secunda area (Source: https://www.worldweatheronline.com/, 2021)

B.3.1.2 Climate Change

Climate change is identified as a key challenge in the Mpumalanga Spatial Development Framework (2019). In this regard the activities in the province, specifically the generation of coal powered energy, account for 90% of South Africa's scheduled emissions. The province is also home to 50% of the most polluted towns in the country.

Temperatures in the Secunda region are anticipated to rise with resulting lower annual rainfall in the medium to long term, although it is uncertain what impact increasing climate change will have on rainfall patterns in the region. Lower rainfall will also mean higher levels of evaporation and average wind velocities are expected to increase as well. As a result, these increasingly hot, arid conditions will cause the vegetation to become less resilient with an overall reduction in carrying capacity and a potential increase in veld fires. In addition, agricultural potential of the region is expected to be severely impacted with a further decline in productivity and yield. Climate change will also include the risk of droughts and flooding. This will ultimately require the adoption of more drought-tolerant farming practices or the implementation of alternative land uses such as renewable energy generation developments, in particular solar and wind to ensure economic growth.

B.3.2 Topography and Landscape

The information described below is based on scoping inputs provided by the Terrestrial Biodiversity Specialist, which are included in Appendix D.4, and inputs provided by the Visual Specialist, which are included in Appendix D.2 of this BA Report.

The broader area surrounding the proposed Vhuvhili EGI is characterised by a mix of flat to undulating plains intersected by shallow river valleys (see Figure B.3). Areas of slightly higher elevation occur in the central and north-eastern sectors of the study area. Altitude ranges from about 1 620 m a.s.l. in the west at Mukondeleli to about 1 640 m a.s.l. at the Vhuvhili substation in

the northeast (Figure 1). Slopes across the study area are relatively gentle to moderate, with steeper slopes being largely associated with the more incised river valleys. The site is drained from southeast to northwest by the Klipspruit and its tributaries at Vhuvhili and southwards at the Mukondeleli site.

Although the proposed development will contrast with the predominant vegetative cover in the area, scattered trees and shrubs will provide some degree of screening thus potentially reducing impacts experienced by the potentially sensitive visual receptors in the area. In addition, tall trees planted around farmhouses in the area will restrict views of the power line from these receptor locations.

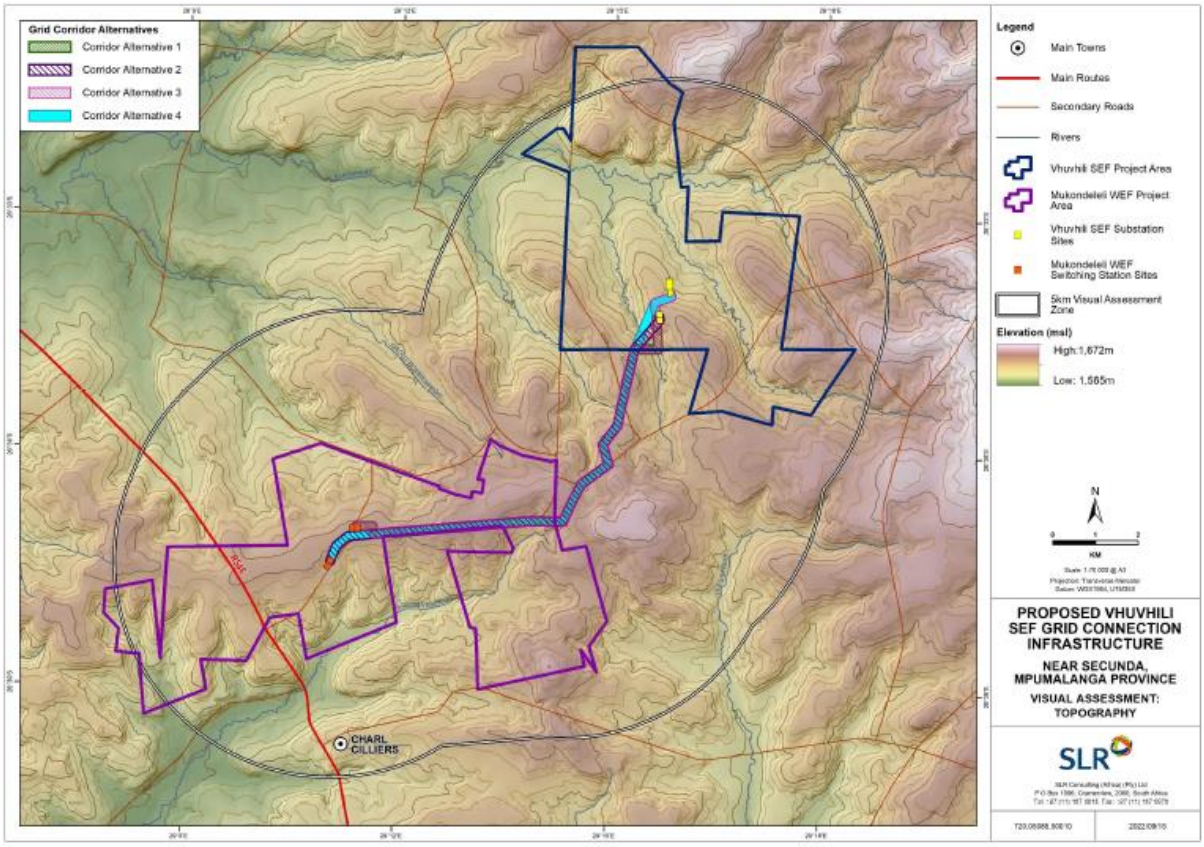


Figure B.3: The landscape character and topography of the Vhuvhili power line corridor and surrounds (Source: Schwartz, 2022)

B.3.3 Geology

The information described below is based on scoping inputs provided by the Terrestrial Biodiversity Specialist which are included in Appendix D.4, and the inputs provided by the Palaeontology Specialist which are included in Appendix D.3 of this BA Report.

The geology of the site is depicted in the 1:250 000 geological map 2626 East Rand (1986) (Figure B.4). The site lies in the central part of the Karoo Basin where most of the site is underlain by non-fossiliferous igneous rocks, the dolerite dykes (Jd) of Jurassic age. The north-eastern substation is located on sandstone, shale and coal beds (Pv) of the Vryheid Formation, Ecca Group. Along the rivers and streams, much younger transported alluvium and sands overlie the older rocks.

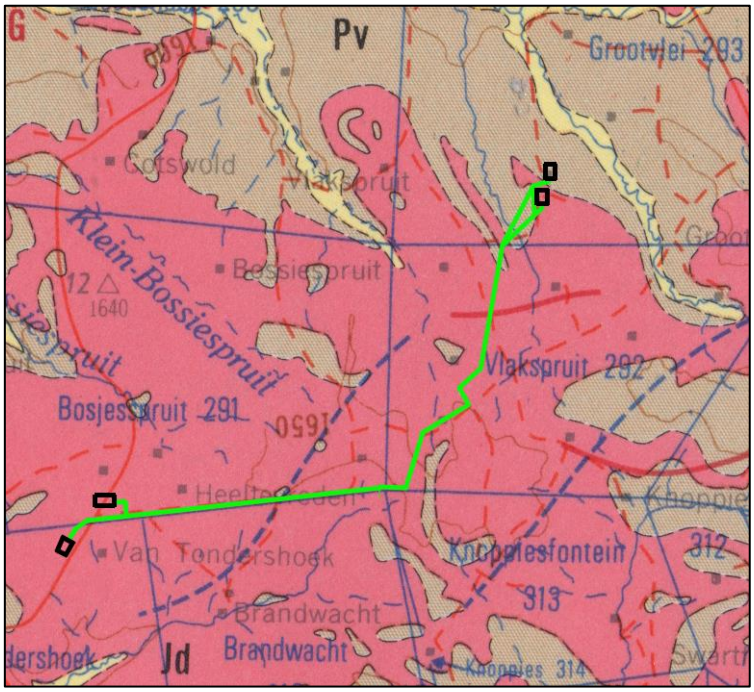


Figure B.4: Geology of the Vhuvhili gridline site (2628 East Rand Geological Survey 1986). Legend: Jd = Dolerite; Pv= Sandstone, shale and coal beds (Vryheid Formation, Ecca Group); Yellow = Alluvium.

B.3.4 Land Capability and Agricultural Sensitivity

The information described below is based on inputs provided by the Agricultural Specialist, which are included in Appendix D.1 of this BA Report.

Agricultural sensitivity, in terms of environmental impact, depicted on the DFFE National Web-Based Environmental Screening Tool (hereafter referred to as the Screening Tool), is a direct function of the capability of the land for agricultural production. This is because a negative impact, or exclusion of agriculture, on land of higher agricultural capability is more detrimental to agriculture than the same impact on land of low agricultural capability. The general assessment of agricultural sensitivity that is employed in the Screening Tool, identifies all arable land that can support viable crop production, as high (or very high) sensitivity. All cultivated land is classified as at least high sensitivity, based on the logic that if it is under cultivation, it is indeed suitable for cultivation, irrespective of its land capability rating. This is because there is a scarcity of arable production land in South Africa and its conservation for agricultural use is therefore a priority. Land which cannot support viable crop production is much less of a priority to conserve for agricultural use and is rated as medium or low agricultural sensitivity.

Uncultivated land is classified by the Screening Tool in terms of its land capability. Land capability is defined as the combination of soil, climate and terrain suitability factors for supporting rain fed agricultural production. It is an indication of what level and type of agricultural production can sustainably be achieved on any land. The higher land capability classes are suitable as arable land for the production of cultivated crops, while the lower suitability classes are only suitable as non-arable, grazing land, or at the lowest extreme, not even suitable for grazing. 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. Values of below 8 are generally not suitable for cropland, but may be suitable for grazing, or at the lowest extreme, not even suitable for grazing. This land capability data is used by the Screening Tool.

According to the Site Sensitivity Verification undertaken as part of the Agricultural Compliance Statement (Appendix D.1), the agricultural impacts of the power line are negligible in such an agricultural environment, regardless of the level of agricultural sensitivity of the land which it traverses. Therefore, in the context of the development of overhead power lines, almost no land can be considered to have high sensitivity for impacts on agricultural resources. For this reason, the screening tool sensitivity of the power line corridor is largely irrelevant.

A map of the proposed corridor, overlaid on the screening tool sensitivity, is given in Figure B.5, but as noted above, the screening tool sensitivity of the power line corridor is largely irrelevant to agricultural impact. The only relevance is that pylons should be located outside of or on the edges of cropland where they do not interfere with it.

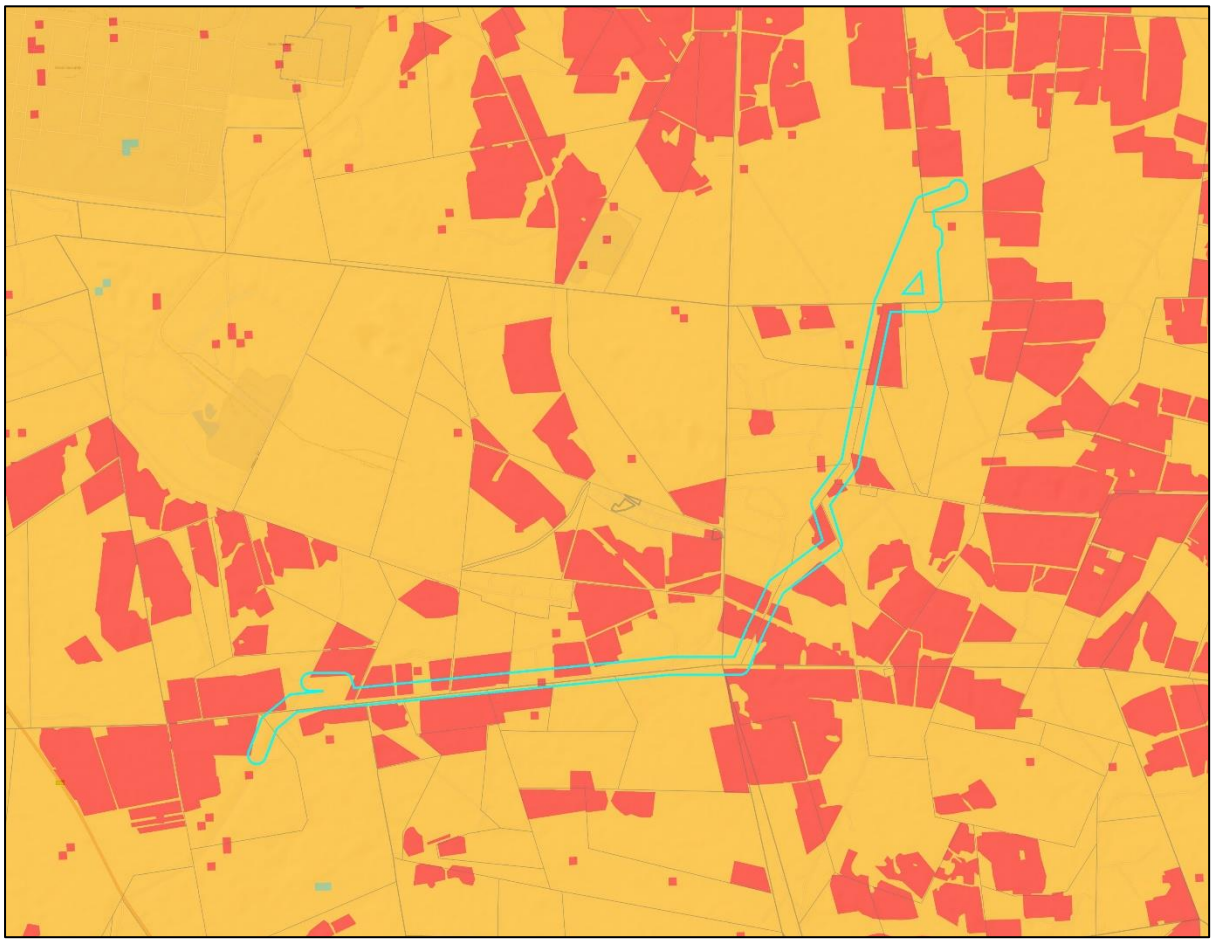


Figure B.5: The entire assessed corridor in which all proposed alternatives will be located (blue outline) overlaid on agricultural sensitivity, as given by the screening tool (yellow = medium; red = high).

A detailed description of the agricultural capability and sensitivity within the study area is provided in the Agricultural Compliance Statement (Appendix D.1) of this BA Report.

B.3.5 Aquatic Biodiversity

Various information sources, such as, but not limited to, Google Earth satellite imagery, the SANBI BGIS, the Mpumalanga Biodiversity Sector Plan (2014), and the National Fresh Water Priority Areas (NFEPA), have been used to define the regional vegetation, water resources, fauna and anticipated ecological sensitivity of the study area. A literature review of existing reports, scientific studies, databases, reference works, guidelines and legislation relevant to the study area was conducted to establish the baseline aquatic biodiversity condition of the site and associated environment. Details pertaining to the aquatic environment is provided in the Aquatic Biodiversity and Species Impact Assessment (which is included in Appendix D.5 of this BA Report).

B.3.5.1 General Context

The proposed power line study area is located in the Vaal Major Water Management Area within the C12D and C12E quaternary catchment areas. The study site is situated within an upstream Freshwater Ecosystem Priority Area (FEPA). Upstream FEPA's are areas in which human activities need to be managed to prevent damage to downstream FEPA's. The Groot-Bossiespruit River and its tributary wetlands are all classified as National FEPA Wetlands. The main rivers draining the study area include the perennial Klipspruit River, the perennial Boesmanspruit River and the perennial Groot-Bossiespruit River all of which flow into the Waterval River and ultimately into the Vaal River which is a very important river in terms of water security for South Africa and is already facing large scale pollution effects. The water courses directly within the power line corridor are largely non-perennial, with the exception of the dammed river to the northeast, in proximity to the proposed Vhuvhili on-site substation hub A-B.

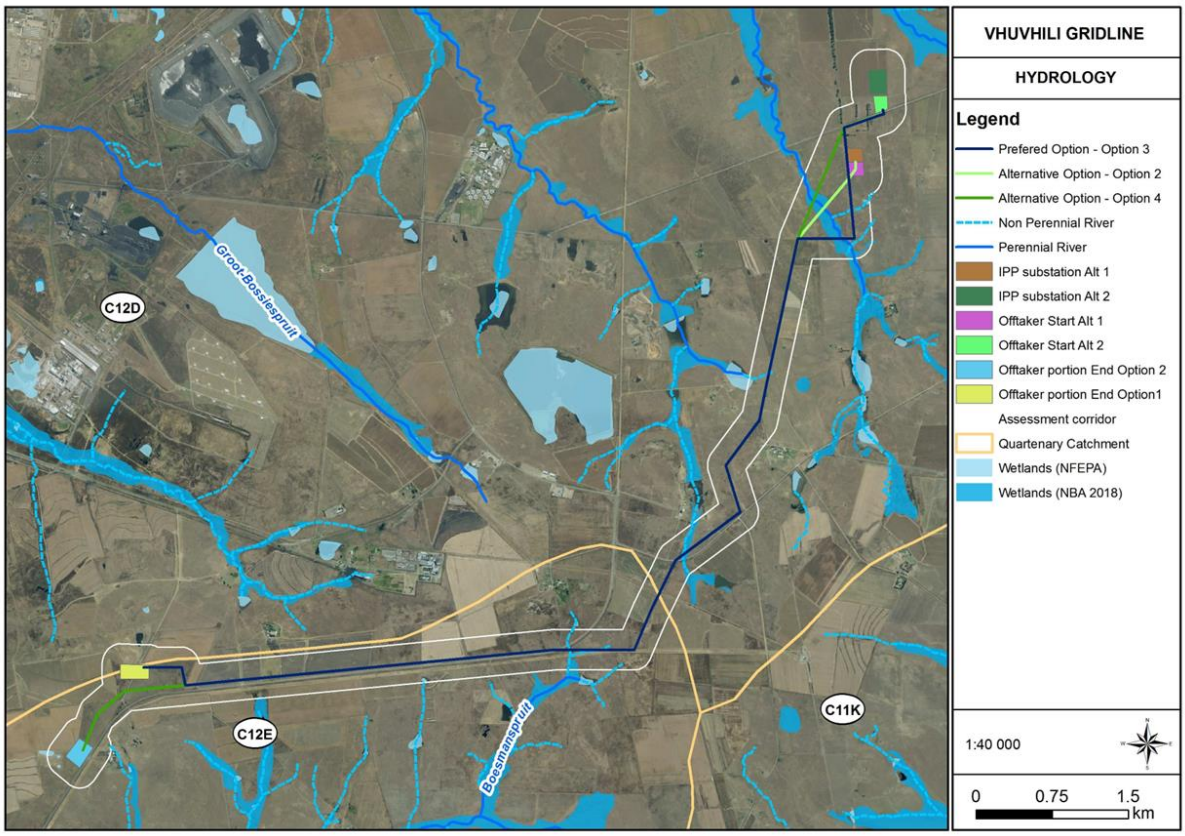


Figure B.6: Hydrology of the study site and surrounds as per existing spatial layers.

B.3.5.2 Biodiversity Conservation Planning

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 DFFE, 2019: 61).

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 km^2 and covers approximately 9% of the land surface of South Africa (Le Maitre et al. 2018, in DEFF, 2019: 61).

The proposed Vhuvhili power line corridor, including all alternatives, does not traverse any SWSAs. Two of the Upper Vaal surface water SWSA are situated approximately 21 km to the northwest and approximately 8 km to the southeast of the proposed corridor (at their nearest points). Refer to Figure B.13 below for a map showing surface water and groundwater SWSAs.

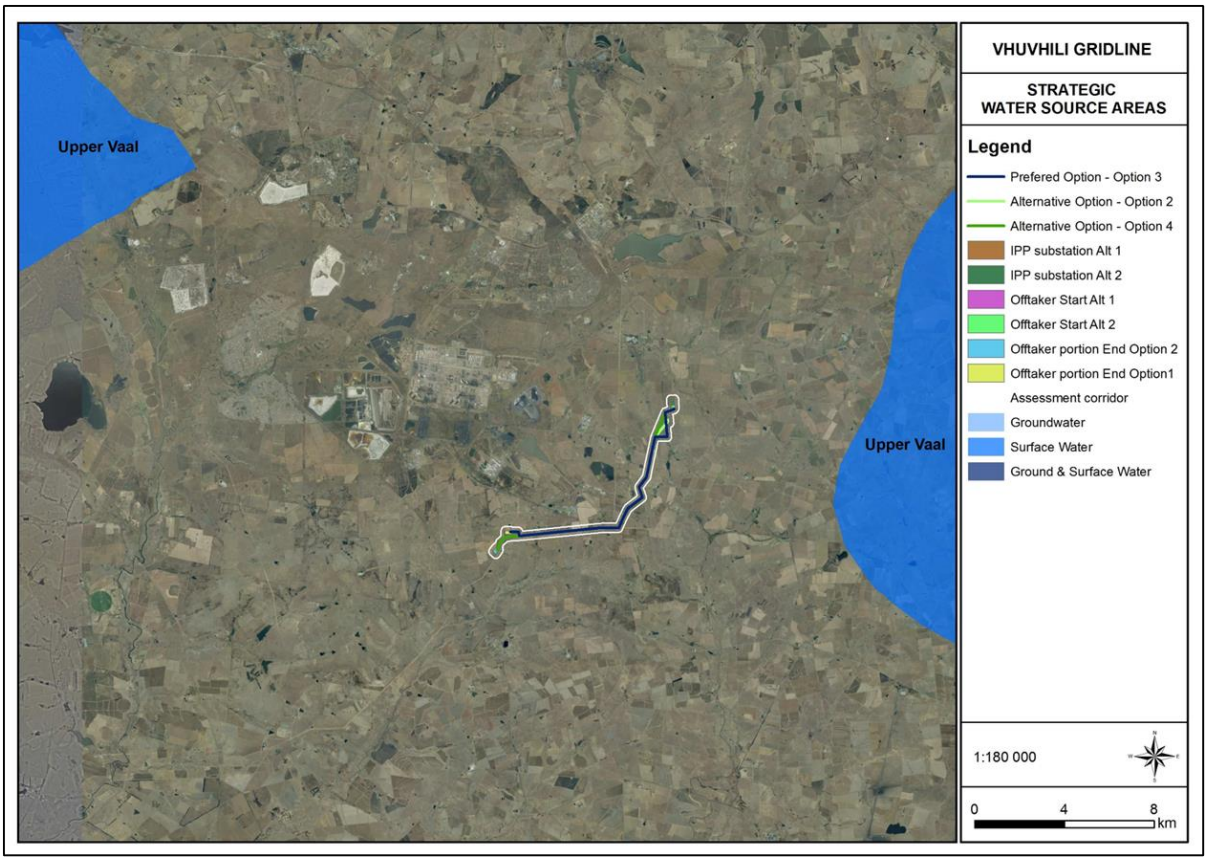


Figure B.7: SWSAs in relation to the locality of the proposed power line corridor (i.e. all four alternatives and their assessed 200 m wide corridor).

Freshwater Ecosystem Priority Areas

Freshwater Ecosystem Priority Areas (FEPAs) are priority areas for conserving freshwater ecosystems and supporting responsible use of water resources in upstream management areas. The Screening Tool made no mention of river or wetland FEPAs for the Vhuvhili power line corridor; however, the entire study site is situated within an Upstream Management Area River FEPA. Upstream FEPAs are sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream river FEPAs and Fish Support Areas. In the study area, the Groot-Bossiespruit River and its tributary wetlands are all classified as NFEPA Wetlands. Several wetland FEPA categories are present in the Vhuvhili power line corridor (further discussed in Section B.3.5.3, below).

However, the sensitivity model applied by the Terrestrial Biodiversity Assessment (Appendix D.4), classified only the drainage lines on site as being of high sensitivity with most of the river FEPA area classified as low sensitivity.

Aquatic Critical Biodiversity Areas and Ecological Support Areas

The 2014 Mpumalanga Biodiversity Sector Plan (MBSP) maps the freshwater ecosystems into the following categories:

- Critical Biodiversity Areas (CBAs) – areas of high biodiversity value, needed to meet biodiversity targets. These areas should be maintained in natural or near natural state;
- Ecological Support Areas (ESAs) – these areas support CBAs, but are not essential for meeting conservation targets;
- Other Natural Areas (ONAs)– these areas have natural characteristics but have not been earmarked as priority areas for conservation but perform a range of biological as well as ecological functions;
- Heavily Modified Areas – Areas that have been impacted and have had a significant or complete loss of natural habitat and ecological function.

This preliminary data provided by the MBSP is the product of a systematic biodiversity planning assessment which identifies portions of land that require safeguarding to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services, across terrestrial and aquatic realms. These spatial priorities are used to inform sustainable development in the Mpumalanga Province.

According to the MBSP freshwater biodiversity map, the majority of the Vhuvhili power line corridor traverses ONAs and heavily modified areas (see Figure B.8). A small section of the power line corridor towards the Mukondeleli switching station F, traverses an aquatic ESA which originates from an artificial wet area caused by artificial trenching in the area (as explained below).

The heavily modified areas are largely due to current and historical crop cultivation which borders on watercourses, and therefore impacts on the functionality of the aquatic features within the study site. Several gullies and trenches from the wetlands can be seen indicating the possibility of attempting to drain the wetlands to aid agriculture. These artificial trenches can create artificial wet areas in an already very wet landscape, this is the case for a wetland area found at Mukondeleli switching station F. Infrastructure, especially from mining and industry has increased significantly especially towards the north of the study area. This has further significantly impacted the watercourses.

Figure B.8: The proposed Vhuvhili 132 kV Overhead Power line and Supporting Infrastructure corridor in relation to the MBSP aquatic

B.3.5.3 Aquatic Ecosystems

The Present Ecological State (PES), Ecological Importance (EI) and Ecological Sensitivity (ES) of the aquatic habitat was determined per Sub Quaternary Reaches (SQR) for Secondary Catchments in South Africa. The perennial tributary of the Klipspruit River as well as the southern non-perennial tributary of the Klipspruit and the Boesmanspruit all have a PES of C-F indicating they are moderately to critically modified (see Table B.6 & Figure B.9). The Groot-Bossiespruit has a PES of E-F indicating a seriously to critically modified system. The SQRs in the study area have a low to high ecological importance and a moderate to high sensitivity. The Ecosystem Threat Status (ETS) is Critically Endangered, and the Ecosystem Protection Level (EPL) of the Klipspruit is poorly protected for all of the rivers surrounding the proposed power line corridor.

Table B.6: Ecological integrity scores of the sub quaternary reaches surrounding the study area.

Sub Quaternary Reach	Present Ecological State	Ecological Importance	Ecological Sensitivity
1657	Seriously modified	Low	Moderate
1660	Moderately modified	Moderate	Moderate
1662	Moderately modified	Moderate	Moderate
1712	Moderately modified	High	High

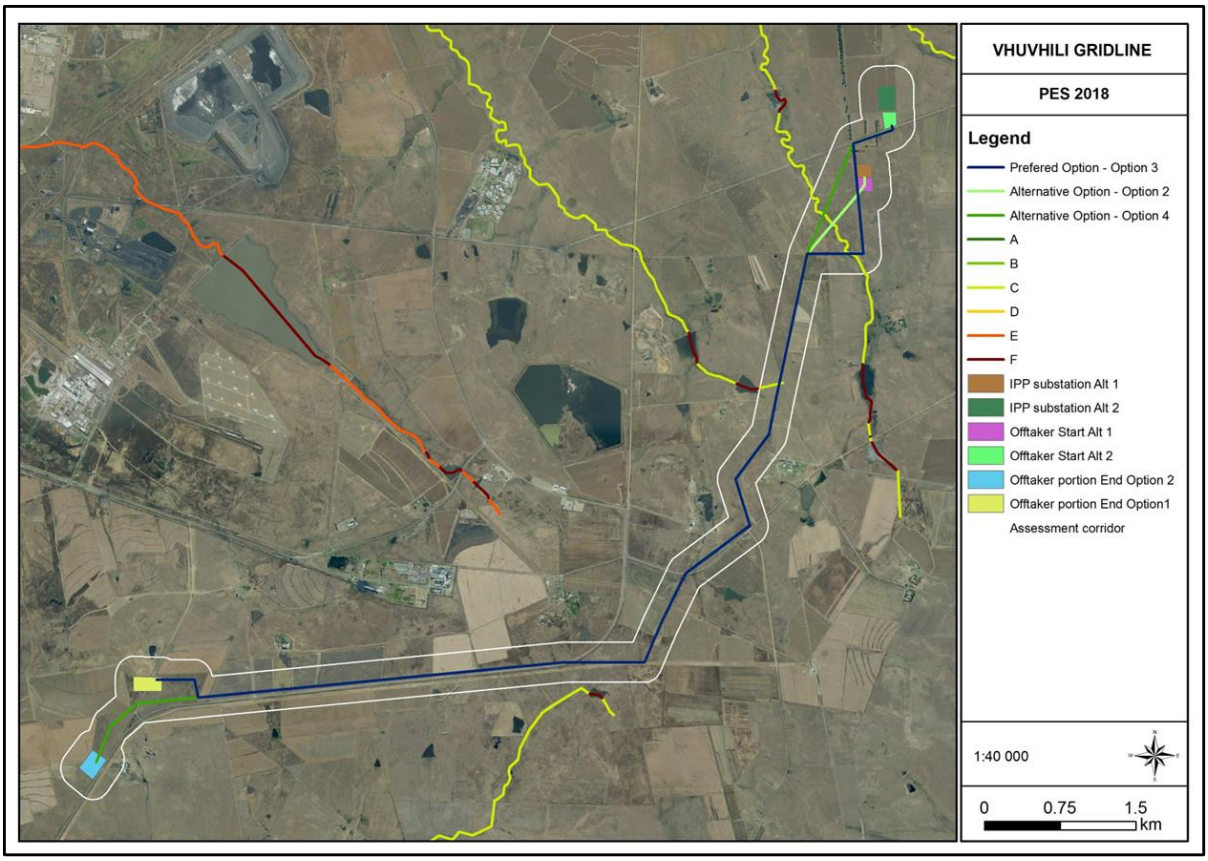


Figure B.9: Present Ecological state of the rivers and streams surrounding the study site based on the 2018 National Biodiversity Assessment.

As illustrated in Figure B.10, eight wetlands cross the proposed power line corridor or occur within close proximity to the proposed substations. Buffer zones were calculated for the wetlands following Macfarlane et al., (2015). Results for each wetland unit are as follows:

1. Seepage with Artificial Characteristics historical trenches – 42 m
2. Valley Bottom Wetlands – 79m
3. Seepage Wetland – 61 m
4. Seepage Wetland – 31 m
5. Valley Bottom Wetlands – 79m
6. Valley Bottom Wetlands – 61m
7. Seepage Wetland – 37 m
8. Dammed section of Floodplain Wetland – 37 m

Figure B.10 shows the delineated watercourses relative to the study areas together with buffer zones and the 500 m DWS regulated area.

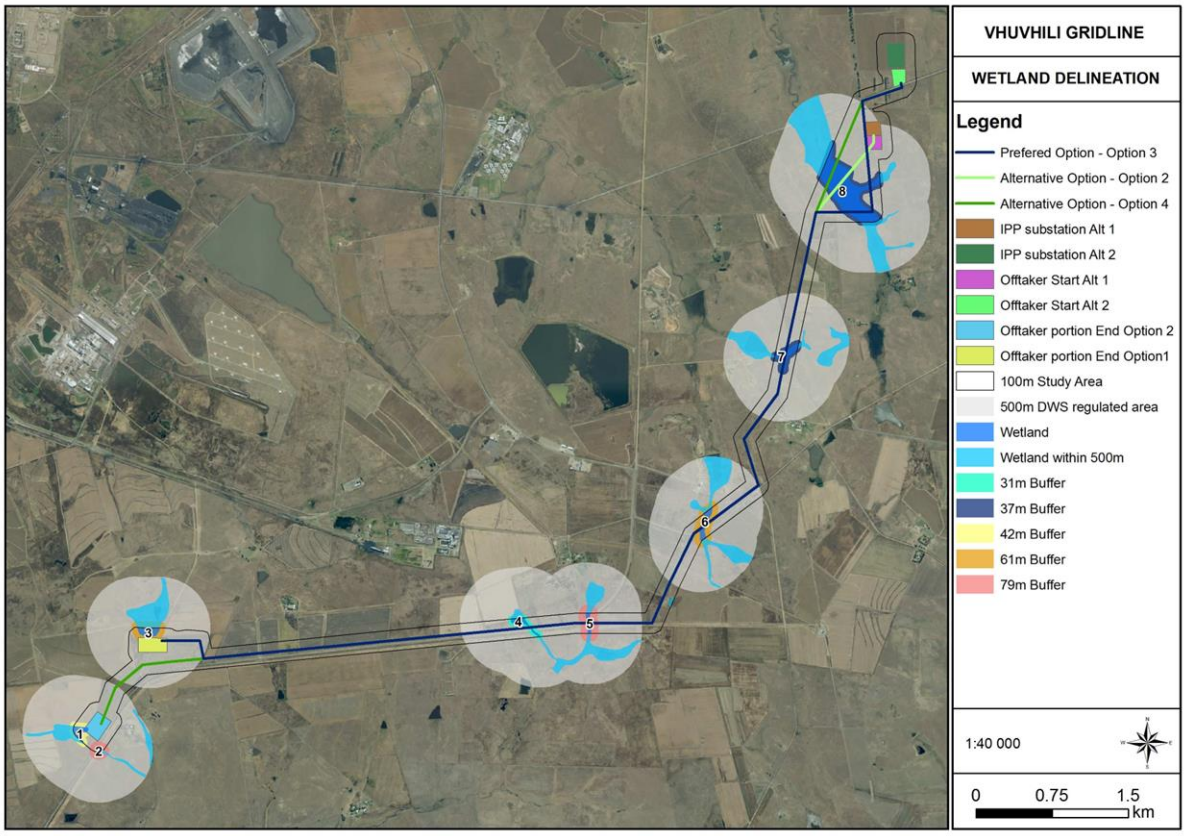


Figure B.10: Delineated watercourses together with their calculated buffer zones and the 500 m DWS regulated area (Source: Den Boogert, 2022).

On-site assessment by the aquatic specialist (Appendix D.5) found that the wetlands were fragmented and/or encroached by current and historical agricultural lands. In the case of active agricultural fields where aerial images indicate a potential wetness signature, site verification revealed that the vegetation and soil was completely transformed and impacted, and wetland species were not recorded here, although hydrologically the flow of wetlands are still potentially important features.

Table B.7 provides a summary of the ecological integrity scores for each of the eight wetlands within the study site

Table B.7: Summary of the ecological integrity scores of the wetland features in the study site.

Wetland number	Wetland Type and Drainage	Calculated Buffer Zone	PES	Ecosystem Services	EI & ES	Recommended Ecological Condition
1	Seepage with Artificial Characteristics historical trenches	42 m	E - Seriously Modified	*Biodiversity maintenance importance* –Low *Regulating services importance* - Low *Provisioning and cultural services importance - Low*	Low	Maintain at C
2	Valley Bottom Wetland	79m	C - Moderately Modified	*Biodiversity maintenance importance* –High *Regulating services importance* - High *Provisioning and cultural services importance - Moderate*	High	Maintain at C
3	Seepage Wetland	61 m	D - Largely Modified	*Biodiversity maintenance importance* –Low *Regulating services importance* - Low *Provisioning and cultural services importance - Low*	Low	D – Maintain at D
4	Seepage Wetland	31 m	E - Seriously Modified	*Biodiversity maintenance importance* –Low *Regulating services importance* - Low *Provisioning and cultural services importance - Low*	Low	Improve to D
5	Valley Bottom Wetland	79 m	C - Moderately Modified	*Biodiversity maintenance importance* –Moderate *Regulating services importance* - High *Provisioning and cultural services importance - High*	High	C -Maintain at C
6	Valley Bottom Wetland	61 m	D - Largely Modified	*Biodiversity maintenance importance* –Moderate *Regulating services importance* - Moderate *Provisioning and cultural services importance - Low*	Low	D – Maintain at D
7	Seepage Wetland	37 m	D - Largely Modified	*Biodiversity maintenance importance* –Moderate *Regulating services importance* - Moderate *Provisioning and cultural services importance - Moderate*	Moderate	D – Maintain at D
8	Dammed section of Floodplain Wetland	37 m	D - Largely Modified	*Biodiversity maintenance importance* –High *Regulating services importance* - Moderate *Provisioning and cultural services importance - High*	High	D – Maintain at D

Knowing what ecosystems are valuable enables the appropriate setting of management objectives (i.e. Recommended Ecological Condition - REC) and the prioritization of management actions and interventions to promote effective water resource management. Considering the largely modified PES of the majority of the wetland ecosystems within the study area and their low to high EI and ES, the REC of these features would be that they remain in their current modified states, with the exception of wetland 4 which is to improve from a seriously modified PES to a largely modified REC.

B.3.5.4 Aquatic Species

The wetlands all occur on the same vegetation type classified as Soweto Highveld Grassland – previously classified as Moist Clay Highveld Grassland. The soils of the wetlands differed and ranged from dark clay soil to loam soil, and although individual wetlands will have some degree of unique vegetation, the dominant species are similar in composition. Cropland cultivation and grazing, as well as many other recorded impacts affect the composition and increases Alien Invasive Species (AIS) recorded at and near these impacts.

Common sedges and forbs include: *Cyperus congestus, Cyperus esculentus, Cyperus haematocephalus, Cyperus laevigatus, Cyperus longus, var. longus, Cyperus fastigiatus, Eleocharis spp. Rumex lanceolatus, Hypoxis obtuse, Berkheya spp., Typha capensis, Kyllinga erecta, Kyllinga melanosperma Phragmites australis, Schoenoplectus corymbosus, Senecio latifolius, Senecio coronatus Haplocarpha scaposa, Helichrysum nudifolium var. nudifolium, Helichrysum rugulosum* and *Schoenoplectus muricinux*.

The dominant grass species include: *Andropogon appendiculatus, Setaria sphacelata, Themeda triandra, Paspalum dilatatum, Eragrostis plana, Eragrostis curvula, Eragrostis chloromelas, Leersia hexandra, Sporobolus africanus, Sporobolus fimbrianthus, Andropogon eucomus* and *Cynodon dactylon*.

The dominant Alien Invasive Species (AIS) recorded in the study area include: *Solanum elaeagnifolium, Oenothera rosea, Pennisetum clandestinum, Verbena bonariensis, Conyza canadensis, Pseudognaphalium luteo-album, Plantago lanceolate, Cosmos bipinnatus, Cirisium vulgare, Persicaria lapathifolia, Tagaets minuta, Bidens pilosa, Bidens bipinnata, Oxalis latifolia, trifolium repens* and the common woody AIS include: *Populus x canescens, Eucalyptus spp, Salix babylonica, Sesbania punicea, Tamarix ramosissima* and *Pinus spp*.

It should also be noted that several plant SCC are known to occur in the area or have been recorded in the study site These include: *Nerine gracilis, Gladiolus robertsoniae, Kniphofia typhoides, Boophone disticha, Hypoxis hemerocallidea, Crinum bulbispermum* and *Eucomis autumnalis*.

The aquatic assessment did not record the presence of sensitive fish taxa.

B.3.5.5 Screening Tool Descriptions and Site Verifications

Figure B.11 below presents the information from the Screening Tool for the Aquatic Biodiversity Combined Sensitivity as it relates to the proposed power line corridor. The Screening Tool has indicated that the majority of the watercourses and aquatic ecosystems surrounding the study site is classified as very high in terms of aquatic biodiversity.

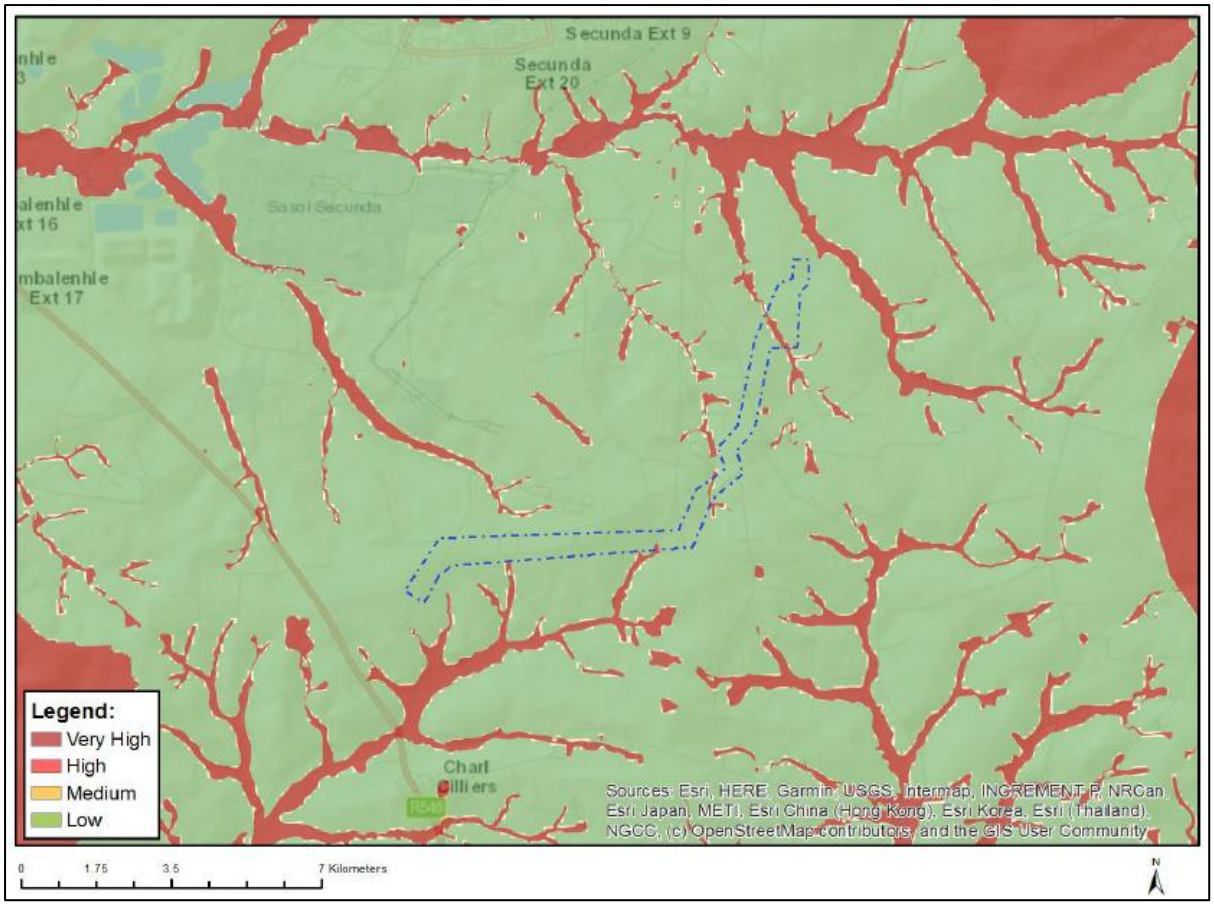


Figure B.11: Map depicting Aquatic Biodiversity Combined Sensitivity in and around the proposed power line corridor (Source: DFFE Screening Tool, 2022).

The specialists' findings from the detailed Aquatic Impact Assessment indicate that the study site has conservation significance both in terms of national as well as provincial conservation planning. The site verification assessment indicated that the proposed layout encroaches on the wetlands and their associated buffer areas.

The desktop assessment conducted by DWS indicated that the sub quaternary reaches surrounding the study site are largely natural (B) to moderately modified (C). The site verification indicated that the wetlands are moderately (C) to seriously modified (E) whilst the aquatic macroinvertebrates indicated that the aquatic ecosystems are largely (D) to seriously/critically (E/F) modified. Therefore, the wetland and aquatic ecosystems surrounding the study site do not conform to the DWS desktop assessment and are more impacted than expected.

Based on the field assessments, the wetland delineation and buffer indicate that the current layout encroaches on the wetlands as well as their respective buffer areas. Although the wetland and aquatic ecosystems are impacted, they still fulfil important ecosystem services and also form part of national and provincial conservation targets. Ideally a walk down should be done on site once the location of each pylon is available to ensure the footprints remain outside of watercourses as far as possible, and the overhead power line spans across sensitive aquatic features and their buffer areas.

Although the wetland and aquatic ecosystems are impacted, they still fulfil important ecosystem services and also form part of national and provincial conservation targets. The specialist, therefore, recommended that the wetlands, aquatic ecosystems and the buffer areas as indicated in Figure B.10 and

Table B.7 are considered of high sensitivity with the exception of one artificial wetland area in proximity to the Mukondeleli switching station F scored as low.

FEPAs or water catchments were not flagged by the screening tool. However, the entire study site is situated within an upstream river FEPA. Based on his site assessment of the vegetation, the Terrestrial Biodiversity specialist rated most of the area mapped as upstream river FEPA as having a low or medium sensitivity, with only the drainage lines having a high sensitivity.

B.3.6 Terrestrial Biodiversity

Various resources, such as, but not limited to, Google Earth satellite imagery, the SANBI BGIS, SANBI NewPOSA, International Union for Conservation of Nature (IUCN) Red List and the University of Cape Town (UCT) Animal Demography Unit, as well as national and provincial biodiversity spatial data and species lists, have been used to define the regional vegetation, watercourses, fauna and anticipated ecological sensitivity of the study area. Details pertaining to the terrestrial environment and its ecology is provided in the Terrestrial Biodiversity and Species Impact Assessment (which is included in Appendix D.4 of this BA Report).

B.3.6.1 General Context

The study site is located within the Soweto Highveld Grassland (Gm8) vegetation type of the Mesic Highveld Grassland Bioregion. This vegetation type covers 14 513 km2 of Mpumalanga and Gauteng (and to a very small extent also in the neighbouring Free State and North-West provinces) and occurs at an altitude ranging from 1420 m to 1760 m a.s.l. Although the conservation status of this vegetation type was listed as “Endangered” by Mucina & Rutherford (2006) it is listed as “Vulnerable” by NEMA (2011) and the National Biodiversity Assessment (Skowno et al. 2019). Very few statutorily conserved areas occur in this vegetation type and almost half of it has been transformed, mostly by cultivation, plantations, mining, and urbanisation.

B.3.6.2 Biodiversity Conservation Planning

Protected Areas and National Protected Areas Expansion Strategy

According to the latest South African Protected Areas Database (SAPAD) and the South African Conservation Areas Database (SACAD) databases, Quarter 3 (2020), the proposed study area does not form part of any formally protected areas, nor does it form part of the National Protected Area Expansion Strategy (NPAES) (2010). It is also not earmarked in the 5-year plan of the Mpumalanga PAES.

The closest protected area is the Devon Protected Environment, which was proclaimed in 2019 and is located approximately 44 km away to the northeast of the proposed power line corridor.

Critical Biodiversity Areas and Ecological Support Areas

Further to the aquatic ESAs discussed in Section B.3.5.2, CBAs and ESAs are separated further into CBA 1 and 2 as well as ESA 1 and 2, respectively. It is important to note that CBA 1 show areas in a natural condition and those that are potentially degraded or represent secondary vegetation are considered to be CBA 2. Similarly, a distinction is made between ESAs that are likely to be functional (i.e. in a natural, near-natural or moderately degraded condition – ESA 1), and ESAs that are likely severely degraded or have no natural cover remaining and therefore require restoration where feasible i.e. ESA 2. The ESAs are not considered essential from a

conservation perspective for meeting biodiversity targets; however, they may offer some ecological services. ONAs are not identified as a priority to meet biodiversity targets, but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions.

As shown in Figure B.12, the proposed power line corridor traverses mostly moderately to heavily modified areas, including disturbed grassland and old croplands, all with a low sensitivity rating. It is assumed that the terms 'CBA irreplaceable' in the MBSP is equivalent of a CBA 1 and a 'CBA optimal' refers to a CBA 2. The CBA map in Figure B.12 indicates the presence of a CBA 1 (CBA irreplaceable) and CBA 2 (CBA optimal) along portions of the power line site. The main reasons provided for the mapping of the CBAs were (data provided by M. Lötter, MTPA):

- Soweto Highveld Grassland
- Mesic Highveld Grassland (wetlands)
- African bullfrog *Pyxicephalus adspersus*
- African Grass Owl *Tyto capensis*
- Climate change land facets
- Critical linkages
- Core and supporting corridor

It should be noted that these reasons are applicable to the entire Mpumalanga planning units wherein the Vhuvhili gridline site is located and not necessarily applicable to the site.

There are no Local or Landscape corridors demarcated within the proposed Vhuvhili power line site (Figure B.12; MBSP 2014; biodiversityadvisor.sanbi.org) and the development will thus not impact on them.

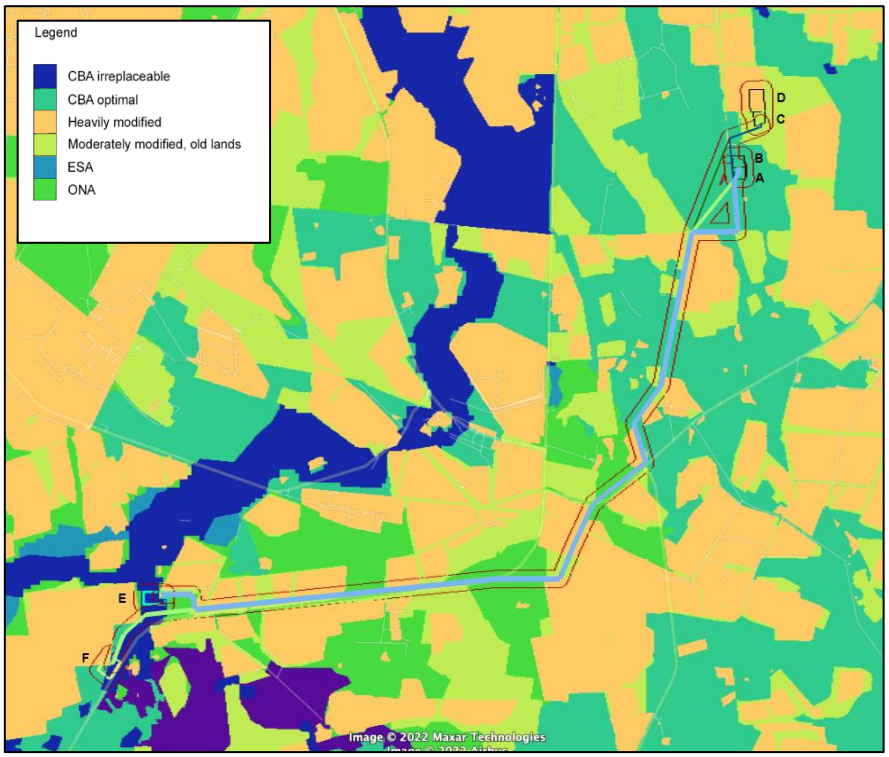


Figure B.12: CBAs, ONAs, moderately and heavily modified areas of the Vhuvhili gridline site and environs (MBSP 2014; biodiversityadvisor.sanbi.org). A-B = On-site substation hub Start Alt 1 & 2; C-D = On-site substation hub Start Alt 3 & 4; E = Switching station End Alt 1 & 3; F = Switching station End Alt 2 & 4; Blue line = Alt 1 & 3; Yellow line = Alt 2 & 4.

Critically Endangered and Threatened Ecosystems

The site is located in the Soweto Highveld Grassland vegetation type which is classified as "Vulnerable".

B.3.6.3 Terrestrial Ecosystems

As indicated above, the proposed study area falls in the Soweto Highveld Grassland (Gm8) vegetation type of the Mesic Highveld Grassland Bioregion. This vegetation type covers 14 513 km2 of Mpumalanga and Gauteng (and to a very small extent also in the neighbouring Free State and North-West provinces). As highlighted above, the conservation status of this vegetation type is listed as “Vulnerable” by NEMA (2011) and the National Biodiversity Assessment (Skowno et al. 2019). Very few statutorily conserved areas occur in this vegetation type and almost half of it has been transformed, mostly by cultivation, plantations, mining, and urbanisation.

Looking at the combined area encompassing the proposed power line corridor (all alternatives), four habitat (plant communities) were distinguished, described and mapped within the Vhuvhili gridline corridor (Figure 5). A further three units were also distinguished, i.e. croplands, disturbed areas and dams.

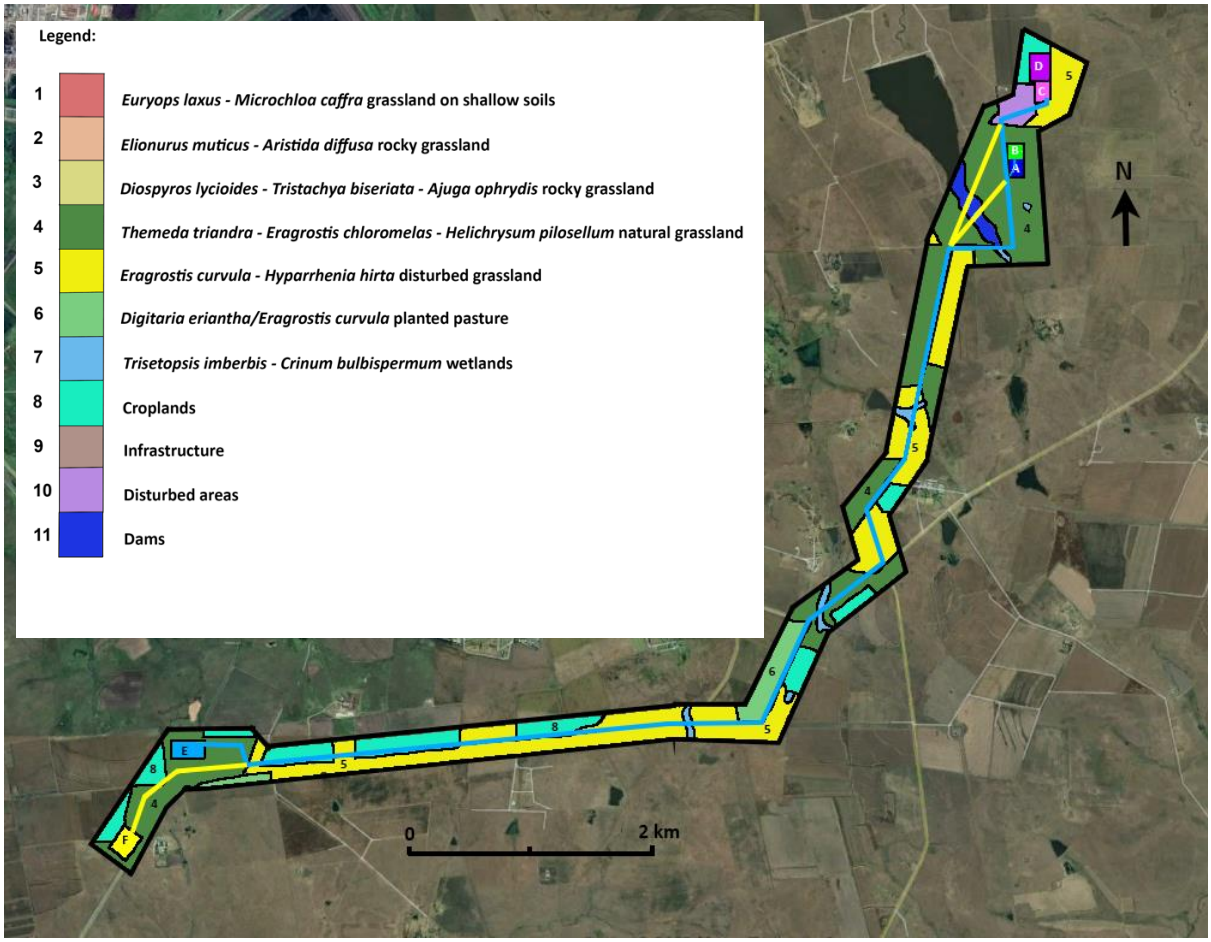


Figure B.13: Vegetation mapping of the proposed power line corridor (Source: Van Rooyen, 2022).

Habitat 4. *Themeda triandra - Eragrostis chloromelas - Helichrysum pilosellum* natural grassland

This natural grassland occurs on the plains and gentle foot slopes and covers sections of the proposed gridline route (see Figure B.13). This plant community is dominated by grass species, covering approximately 88% of the area, followed by herbaceous species covering approximately 8% of the area.

Habitat 5. *Eragrostis curvula - Hyparrhenia hirta* disturbed grassland

This mixture of degraded natural grassland and old abandoned croplands cover most of the southern half and eastern sections of the gridline route. It is found on the plains, foot slopes and midslopes of the undulating countryside. This plant community is dominated by grass species, covering approximately 83% of the area, followed by herbaceous species covering approximately 14% of the area.

Habitat 6. *Digitaria eriantha*/*Eragrostis curvula* planted pasture

This planted pasture is found on the plains consisting mostly of Digitaria eriantha or Eragrostis curvula pasture. This plant community is dominated by grass species, covering approximately 90% of the area, followed by herbaceous species covering approximately 3% of the area.

Habitat 7. *Trisetopsis imberbis - Crinum bulbispermum* wetlands

These streams, wetlands, vleis and floodplains occur at a few sites along the Vhuvhili gridline. This plant community is dominated by grass species, covering approximately 90% of the area, followed by herbaceous species covering approximately 10% of the area.

Habitat 8. Cropland

These croplands are currently utilised mainly for maize production.

Habitat 9. Infrastructure

These include farm houses, business sites, roads, substation and conveyor belt. It was not recorded along the gridline.

Habitat 10. Disturbed areas

These sites include areas that are used for ground-working activities, diggings, demolished building sites and areas disturbed by farming activities.

Habitat 11. Dams

This includes a large dam in proximity to the start of the power line corridor at the proposed Vhuvhili SEF on-site substation hub alternatives in the northwest of the study site (see Figure B.13).

The Terrestrial Biodiversity specialist assessment (Appendix D.4) found that, the drainage lines and dams (high sensitivity, Habitat 7) were more sensitive than Habitats 4 & 5 (low sensitivity). Habitats 6, 8, 9 & 10 are man-made habitats with a low sensitivity rating, e.g. cropland, planted pasture, plantations, wind breaks and diggings (see Figure B.14).

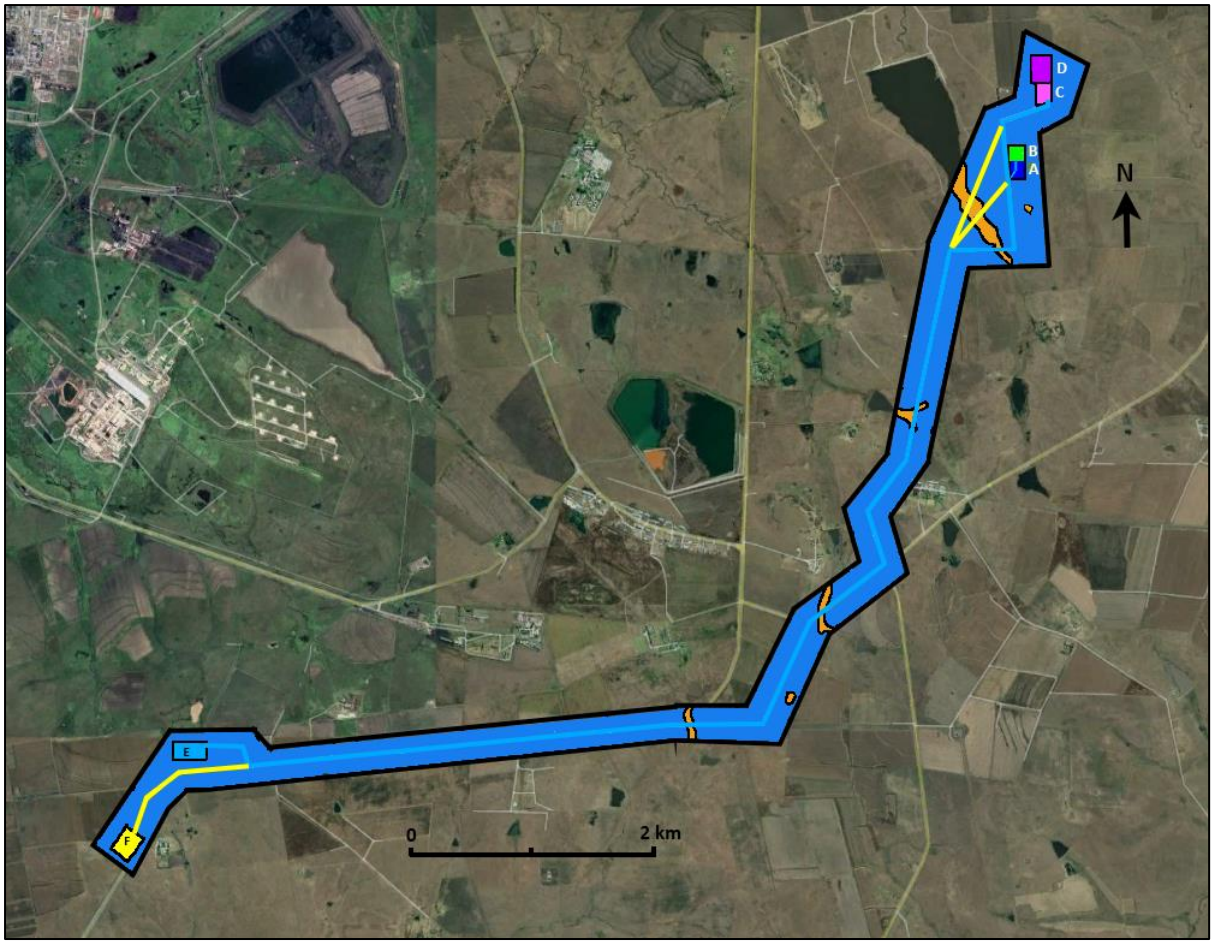


Figure B.14: Sensitivity map of the Vhuvhili gridline site. Orange polygons = high sensitivity; Blue polygons = low sensitivity. A-B = On-site substation hub Start Alt 1 & 2; C-D = On-site substation hub Start Alt 3 & 4; E = Switching station End Alt 1 & 3; F = Switching station End Alt 2 & 4; Blue line = Alt 1 & 3; Yellow line = Alt 2 & 4.

Sections of the gridline fall in a CBA 2, nevertheless, the site location is acceptable in terms of the specialist sensitivity findings, being of low sensitivity.

Along the high sensitivity watercourses and seeps (Habitat 7; Figure B.14), buffers are applicable to the proposed power line development as recommended by the aquatic specialist (see Section B.3.5.3, above). As noted in Section B.3.5.5, ideally an on-site walk down should be undertaken by the aquatic specialist once the location of each pylon is available to ensure the footprints remain outside of watercourses and respective buffer areas as far as possible.

B.3.6.4 Terrestrial Species

Terrestrial plant species

The landscape is gently to moderately undulating on the Highveld plateau, supporting dense tufted grassland dominated by *Themeda triandra*. Other common grass species include *Elionurus muticus, Eragrostis racemosa, Heteropogon contortus* and *Tristachya leucothrix*. In undisturbed places, scattered wetlands, narrow stream alluvia, pans and occasional ridges interrupt the grassland cover. Frost and frequent grass fires during winter play an important role in limiting the occurrence of trees and shrubs in the region.

The most prominent grass species include *Andropogon appendiculatus, Brachiaria serrata, Cymbopogon pospischilii, Cynodon dactylon, Elionurus muticus, Eragrostis capensis, Eragrostis chloromelas, Eragrostis curvula, Eragrostis plana, Heteropogon contortus, Setaria sphacelata, Themeda triandra* and *Tristachya leucothrix.* The forb layer is characterised by *Hermannia depressa, Acalypha angustata, Berkheya setifera, Dicoma anomala, Haplocarpha scaposa, Helichrysum nudifolium, Helichrysum rugulosum*, *Justicia anagalloides, Selago densiflora, Senecio coronatus, Hilliardiella elaeagnoides* and *Wahlenbergia undulata.*

The SCC listed for the region are:

Argyrolobium campicola	NT
Gladiolus robertsoniae	NT
Habenaria barbertoni	NT
Khadia beswickii	VU
Kniphofia typhoides	NT
Nerine gracilis	VU
Stenostelma umbelluliferum	NT

No terrestrial plant SCC were recorded on the power line site.

A total of thirty (30) plant species are listed as Schedule 11 Protected plant species in the region according to the MNCA (1998) (Appendix B). Most of these species are members of the Amaryllidaceae and Orchidaceae. Seven protected species were recorded on the proposed Vhuvhili SEF site but not recorded within the power line corridor:

Aloe ecklonis
Boophone disticha
Crinum bulbispermum
Cyrtanthus stenanthus
Eucomis autumnalis
Gladiolus crassifolius
Haemanthus humilis

Another five species are listed on the Mpumalanga Red list (Lötter 2015) although not included in the MNCA (1998) list for Mpumalanga:

Drimia angustifolia	LC
Hypoxis hemerocallidea	LC (recorded on the Vhuvhili SEF site)
Khadia beswickii	VU
Nerine gracilis	VU
Trachyandra erythrorrhiza	NT

No endemic plant species were listed for the Soweto Highveld Grassland Vegetation Type (Mucina & Rutherford 2006).

Terrestrial animal species

The specialist noted that in terms of fauna, provided that the recommended mitigation measures are implemented, the impacts of the proposed power line on fauna will be temporary and therefore the impacts are insignificant. Details pertaining to the terrestrial animal SCC and protected species

that are listed for the region or have been recorded during the field survey of the study area are provided in the Terrestrial Biodiversity and Species Impact Assessment, Section 8 (which is included in Appendix D.4 of this BA Report).

B.3.6.5 Screening Tool Descriptions and Site Verification

Figure B.15 to Figure B.17 below indicate the results of the Screening Tool in terms of terrestrial plant species, terrestrial animal species, and the terrestrial biodiversity combined sensitivity

Figure B.15*:* Map indicating Terrestrial Plant Species sensitivity for the proposed Vhuvhili power line corridor (all four alternatives) and surrounds (Source: DFFE Screening Tool, 2022).

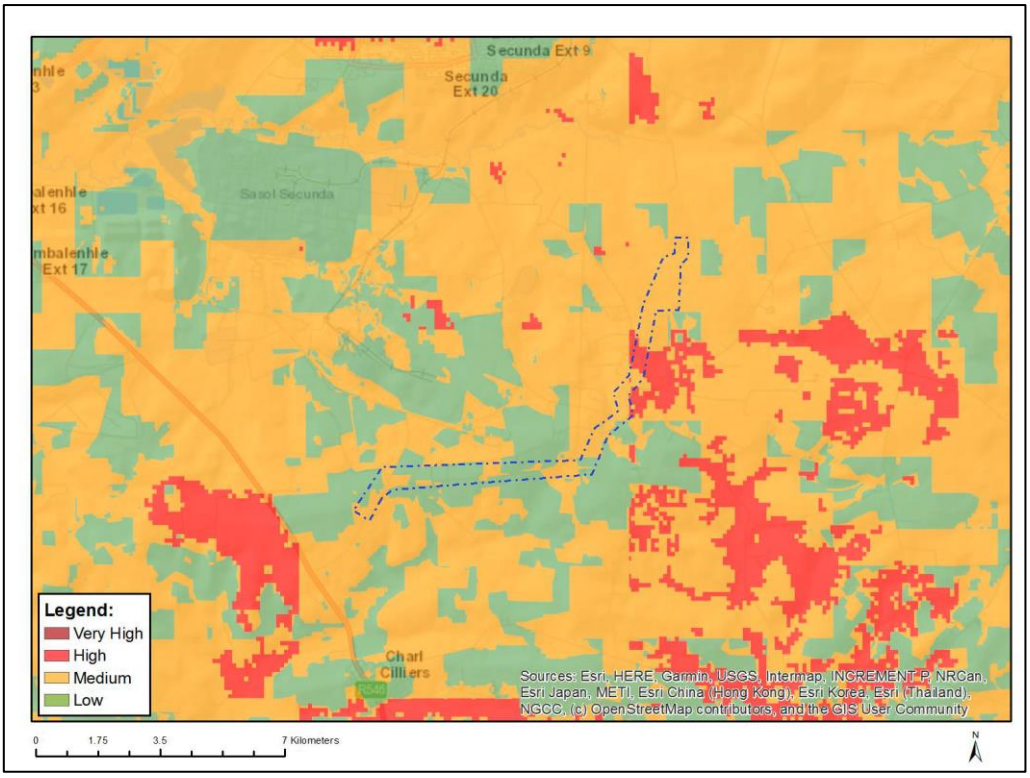


Figure B.16: Map indicating Terrestrial Animal Species sensitivity for the proposed Vhuvhili power line corridor (all four alternatives) and surrounds (Source: DFFE Screening Tool, 2022).

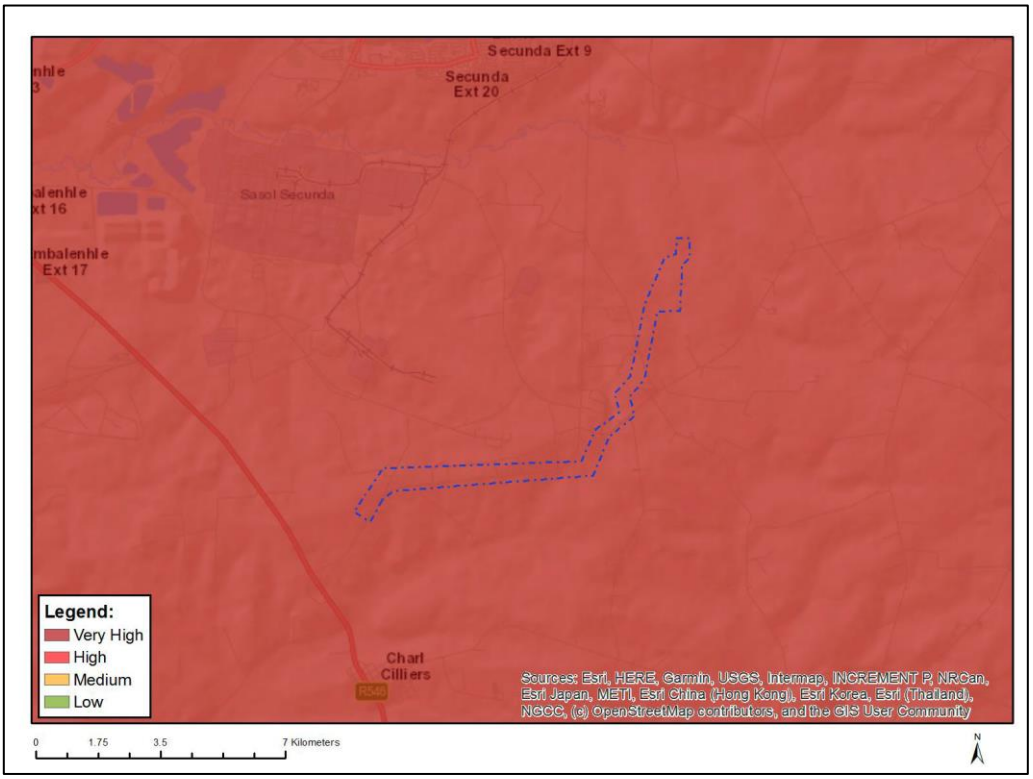


Figure B.17: Map indicating Terrestrial Biodiversity Combined sensitivity for the proposed Vhuvhili power line corridor (all four alternatives) and surrounds (Source: DFFE Screening Tool, 2022).

Based on the above, the Screening Tool notes that floral significance or sensitivity is deemed to be of medium significance (Figure B.15), suggesting that there may be some occurrence of important botanical communities, but this is not of a high probability. The Screening Tool highlighted three species as being of concern (i.e. Species 1252, Species 691 and *Pachycarpus suaveolens*). Findings from the Site Sensitivity Verification confirmed that none of the mentioned species were encountered along proposed power line corridor that is the subject of this BA Report. Furthermore, none of the species were in the NewPOSA database for the region. Only one of the three species was listed in the Mpumalanga database for the vicinity (data supplied by M. Lötter). The findings from the Terrestrial Biodiversity Assessment recommends that the Plant Species Theme be downgraded to a low sensitivity.

The Screening Tool shows that faunal populations are deemed to be of low to high ecological sensitivity (Figure B.16). Excluding avifauna which will be addressed in the following section, the Screening Tool listed two faunal SCC (*Lepidochrysops procera* and *Crocidura maquassiensis*). However, *Lepidochrysops procera* (Lepidoptera) was not listed in the ADU database, the MNCA (1998) provincial species lists or the NEMBA (2007c) ToPS lists. *Lepidochrysops procera* was not recorded on site and is unlikely to occur there because its host plant (*Ocimum obovatum*) was not present on site. The Maquassie Musk Shrew (*Crocidura maquassiensis*) was not listed in the ADU mammal species list or the MNCA (1998) lists for the Mpumalanga province. It was not recorded on site during the survey. The Maquassie Musk Shrew depends on wetlands as suitable habitat in savanna and grasslands. Although it has a wide inferred extent of occurrence, it appears to be patchily distributed. The main threats to shrews are the loss or degradation of moist, productive areas such as wetlands and rank grasslands within suitable habitat. *Crocidura maquassiensis* has not been reported from Mpumalanga Province post-1999 and thus there is a very low probability for it to occur on site. The findings from the Terrestrial Biodiversity Assessment recommends that the sensitivity of the Animal Species Theme (avifauna excluded) should be downgraded to a low sensitivity. If the suggested mitigation measures are followed the animal SCC should not be negatively affected.

In terms of the terrestrial biodiversity combined sensitivity layer on the Screening Tool, the entirety of the study area is shown to have a very high ecological sensitivity (see Figure B.17), mainly due to the vulnerable status of the Soweto Highveld Grassland vegetation type. However, the specialist site verification confirmed that large portions of the power line corridor traverses heavily modified landscapes. If the development is thus contained within the heavily or moderately modified areas it would not affect the status of the vegetation type since these modified areas were already considered for the allocation of a vulnerable status of the vegetation type. Although the Screening Tool indicated very high sensitivity in terms of PAES, it was verified that the study area is not located in a protected area nor does it fall in an area earmarked for the NPAES (NPAES 2010) or the 5-year plan of the Mpumalanga PAES (data supplied by M. Lötter, MTPA). Although portions of the power line corridor are mapped as CBA 1 and CBA 2 areas, the specialist sensitivity analysis rated most of these areas as being of low sensitivity due to the existing disturbance of the landscape. The corridor does not intercept any terrestrial ESAs and there are no Local or Landscape corridors demarcated within the study site (MBSP 2014; biodiversityadvisor.sanbi.org) and the development will thus not impact on them. Although portions of the corridor are *mapped* as CBA, the specialist's ground-truthed verification of the site conditions indicated that a large proportion of the site is degraded and under cropland or abandoned cropland. Therefore, it was recommended that the Relative Terrestrial Biodiversity Theme be downgraded to a medium sensitivity.

B.3.7 Avifauna

A detailed description of the avifauna species encountered within the study area during the site monitoring, and the potential impact of the proposed power line development on these bird species is provided in the Avifauna Impact Assessment (Appendix D.6 of this BA Report).

Whilst the distribution and abundance of the bird species in the broader area are mostly associated with natural vegetation, it is also necessary to examine the few external modifications to the environment that have relevance for birds.

The following avifaunal-relevant anthropogenic habitat modifications were recorded within the 2 km Project Area of Impact (PAOI) zone around the proposed power line:

- **Dams:** There are several small dams mostly associated with the Klipspruit River and its tributaries. There is one moderately large dam in the north of the PAOI.
- **Agriculture:** Agricultural activity present within the PAOI comprises cultivated commercial annuals non-pivot cropland, predominately dedicated towards maize production.
- **Alien trees:** Alien trees are present PAOI as windbreaks either between agricultural fields or between homesteads.

The PAOI does not fall within any of the Important Bird Areas (IBA). The closest IBAs are the Amersfoort-Bethal-Carolina IBA SA018 – approximately 23km east of the PAOI, and the Devon Grasslands IBA SA130 – approximately 32km west of the PAOI. It is not envisaged that the proposed power line will impact on avifauna in the IBAs due to the distance from the PAOI.

The results of an integrated pre-construction avifauna monitoring programme conducted between November 2020 and January 2022 were used to inform the Avifaunal Impact Assessment undertaken for the proposed power line. The South African Bird Atlas Project 2 data indicates that a total of 186 bird species could potentially occur within the PAOI. Of these, 66 species are classified as power line sensitive species and 8 of these are South African Red List species. Of the power line sensitive species, 49 are likely to occur regularly at the PAOI and immediate surrounding area, and another 17 could occur sporadically.

Table B.8: Power line sensitive species recoded during field surveys that could occur within the PAOI, with regional status (Source: Van Rooyen, 2022) NT = Near threatened VU = Vulnerable EN = Endangered H = High M = Medium L = Low

Species name	Scientific name	Regional status	Recorded during surveys	Likelihood of regular occurrence in the PAOI
African Black Duck	*Anas sparsa*	-		M
African Darter	*Anhinga rufa*	-	x	H
African Fish Eagle	*Haliaeetus vocifer*	-		L
African Marsh Harrier	*Circus ranivorus*	EN		L
African Openbill	*Anastomus lamelligerus*	-		L
African Sacred Ibis	*Threskiornis aethiopicus*	-	x	H
African Spoonbill	*Platalea alba*	-	x	H
African Swamphen	*Porphyrio madagascariensis*	-		M
Amur Falcon	*Falco amurensis*	-	x	H
Black Heron	*Egretta ardesiaca*	-		L
Black Sparrowhawk	*Accipiter melanoleucus*	-	x	M
Black-crowned Night Heron	*Nycticorax nycticorax*	-		L
Black-headed Heron	*Ardea melanocephala*	-	x	H

Species name	Scientific name	Regional status	Recorded during surveys	Likelihood of regular occurrence in the PAOI
Black-winged Kite	*Elanus caeruleus*	-	x	H
Blue Crane	*Grus paradisea*	NT	x	M
Blue Korhaan	*Eupodotis caerulescens*	LC	x	M
Blue-billed Teal	*Spatula hottentota*	-		L
Cape Crow	*Corvus capensis*	-	x	M
Cape Shoveler	*Spatula smithii*	-	x	H
Cape Teal	*Anas capensis*	-		L
Common Buzzard	*Buteo*	-	x	M
Common Moorhen	*Gallinula chloropus*	-		H
Egyptian Goose	*Alopochen aegyptiaca*	-	x	H
Fulvous Whistling Duck	*Dendrocygna bicolor*	-		L
Glossy Ibis	*Plegadis falcinellus*	-		H
Goliath Heron	*Ardea goliath*	-		M
Great Crested Grebe	*Podiceps cristatus*	-		L
Great Egret	*Ardea alba*	-		M
Greater Flamingo	*Phoenicopterus roseus*	NT	x	M
Greater Kestrel	*Falco rupicoloides*	-	x	M
Grey Heron	*Ardea cinerea*	-	x	H
Hadada Ibis	*Bostrychia hagedash*	-	x	H
Hamerkop	*Scopus umbretta*	-		M
Helmeted Guineafowl	*Numida meleagris*	-	x	H
Intermediate Egret	*Ardea intermedia*	-		H
Jackal Buzzard	*Buteo rufofuscus*	-		M
Knob-billed Duck	*Sarkidiornis melanotos*	-		L
Lanner Falcon	*Falco biarmicus*	VU	x	M
Little Egret	*Egretta garzetta*	-	x	H
Little Grebe	*Tachybaptus ruficollis*	-	x	H
Long-crested Eagle	*Lophaetus occipitalis*	-		M
Maccoa Duck	*Oxyura maccoa*	NT		L
Mallard	*Anas platyrhynchos*	-		M
Marsh Owl	*Asio capensis*	-	x	H
Northern Black Korhaan	*Afrotis afraoides*	-	x	L
Pallid Harrier	*Circus macrourus*	NT		M
Pied Crow	*Corvus albus*	-	x	H
Purple Heron	*Ardea purpurea*	-		M
Red-billed Teal	*Anas erythrorhyncha*	-	x	H
Red-footed Falcon	*Falco vespertinus*	NT		L
Red-knobbed Coot	*Fulica cristata*	-	x	H
Reed Cormorant	*Microcarbo africanus*	-	x	H
Rock Kestrel	*Falco rupicolus*	-	x	L
Secretarybird	*Sagittarius serpentarius*	VU	x	M
South African Shelduck	*Tadorna cana*	-	x	M
Southern Pochard	*Netta erythrophthalma*	-	x	M
Spotted Eagle-Owl	*Bubo africanus*	-	x	M
Spur-winged Goose	*Plectropterus gambensis*	-	x	H
Squacco Heron	*Ardeola ralloides*	-		M
Western Barn Owl	*Tyto alba*	-		L
Western Cattle Egret	*Bubulcus ibis*	-	x	H
White Stork	*Ciconia ciconia*	-	x	L
White-backed Duck	*Thalassornis leuconotus*	-		L
White-breasted Cormorant	*Phalacrocorax lucidus*	-	x	H
White-faced Whistling Duck	*Dendrocygna viduata*	-		H
Yellow-billed Duck	*Anas undulata*	-	x	H

The Avifauna specialist concluded that the entire PAOI is high sensitivity based on the confirmed occurrence of several power line sensitive SCC. The birds move randomly across the whole PAOI, therefore no specific areas can be delineated as being more sensitive than others.

B.3.7.1 Screening Tool Descriptions and Site Verification

In terms of the Screening Tool, the PAOI is classified as Low (subject to confirmation), Medium and High sensitivity for terrestrial animals according to the Terrestrial Animal Species (Figure B.18). The High classification is linked to the potential occurrence of African Marsh Harrier (Globally Least Concern, Regionally Endangered), Secretarybird (Globally Endangered, Regionally Vulnerable) and Caspian Tern (Regionally Vulnerable).

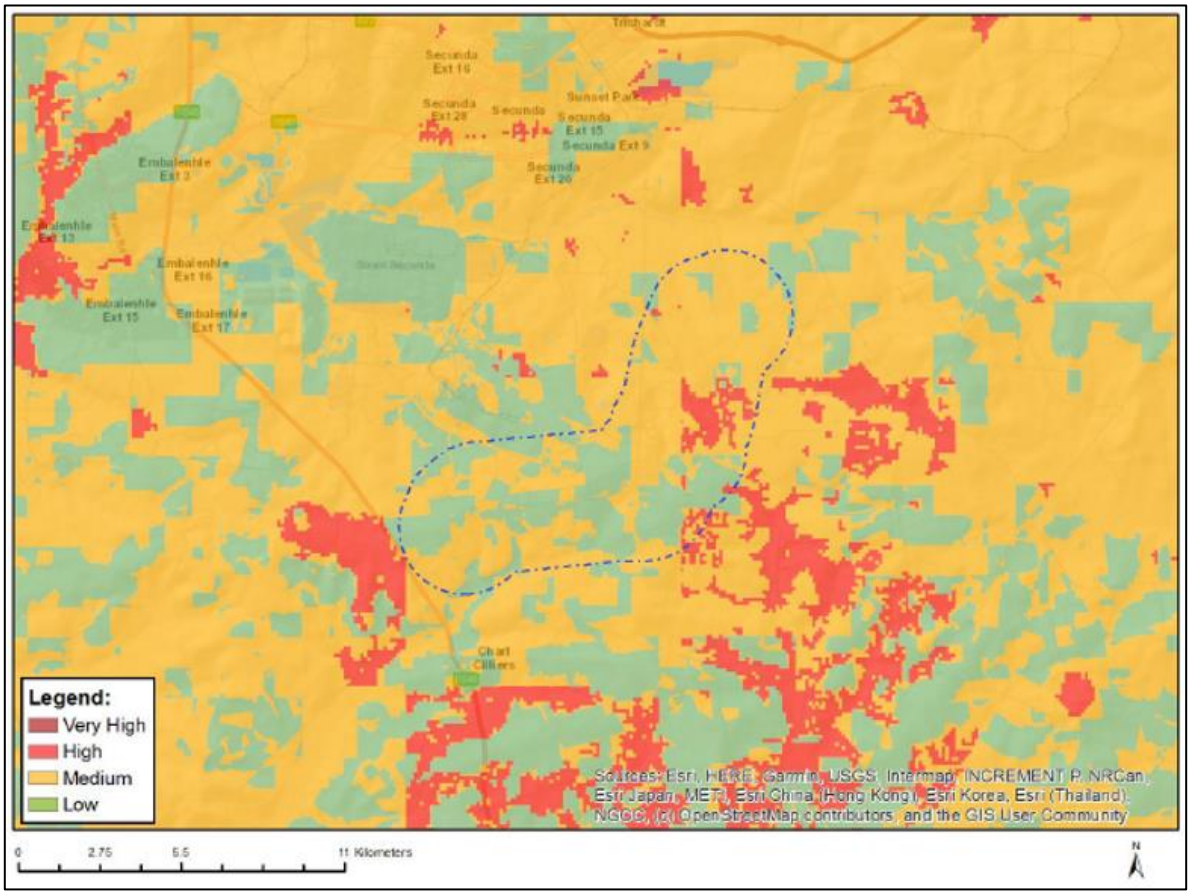


Figure B.18: Map indicating 2 km PAOI Animal sensitivity for the proposed Vhuvhili power line corridor (all four alternatives) and surrounds (Source: DFFE Screening Tool, 2022).

Site sensitivity verification and pre-construction avifauna monitoring surveys were undertaken between November 2020 and January 2022, as detailed in Table B.9 below.

Table B.9: Pre-construction avifauna monitoring surveys.

Date of Site Visit	▪ 19 – 21 November 2020 ▪ 23 – 30 July 2021 and 01 - 04 August 2019 ▪ 13 - 28 September 2021 and 01 October 2021 ▪ 15 – 22 November 2021 and 04 December 2021 ▪ 05 – 10 January 2022
Supervising Specialist Name	Albert Froneman
Professional Registration Number	400177/09
Specialist Affiliation / Company	Chris van Rooyen Consulting

The Avifaunal specialist found that the PAOI contains confirmed habitat for these SCC. The occurrence of SCC in the PAOI was confirmed during the surveys that were conducted between November 2020 and January 2022. The following SCC were highlighted by the Screening Tool and were recorded during the field survey:

- Black-winged Pratincole (Regionally Near-threatened)
- Blue Crane (Regionally Near-threatened, Globally Vulnerable)
- Blue Korhaan (Globally Near-threatened)
- Greater Flamingo (Regionally Near-threatened)
- Lanner Falcon (Regionally Vulnerable)
- Secretary bird (Globally Endangered, Regionally Vulnerable)
- Pallid Harrier (Globally and Regionally Near-threatened)

Therefore, the classification of High sensitivity for avifauna in the screening tool is suggested for the proposed development area.

B.3.8 Visual Aspects and Sensitive Receptors

A detailed description of the landscape and sensitive receptors of the proposed power line corridor is provided in the Visual Impact Assessment (Appendix D.2 of this BA Report).

The Visual Assessment reported that mining / quarrying and industrial development in the area have already resulted in large scale visual impacts, especially to the north and north-west of the Vhuvhili power line study area. These developments have significantly altered the sense of place and visual character in the broader region.

The sensitive visual receptors identified within the proposed power line corridor and surrounds include multiple farmsteads and residences within the 5km visual assessment zone. These farmsteads and residences are considered as ***potentially*** sensitive visual receptors as the proposed development could potentially alter natural or semi-natural vistas experienced from these locations. At this stage however, local sentiments towards the proposed development are not known. Other visually sensitivity receptors include travellers on the R546 Nain Road which traverses the eastern sector of the study area, linking Standerton to the south with the N17 National Route and Kinross to the North. The section of this road traversing the study area is not however considered part of a designated scenic route, although the route is an important link and is likely to be utilised, to some extent, by tourists en route to other parts of Mpumalanga Province. As a result, it is considered to be a potentially sensitive receptor road. The potentially sensitive visual receptor locations identified within the study area for the proposed Vhuvhili power line are indicated in Figure B.19.

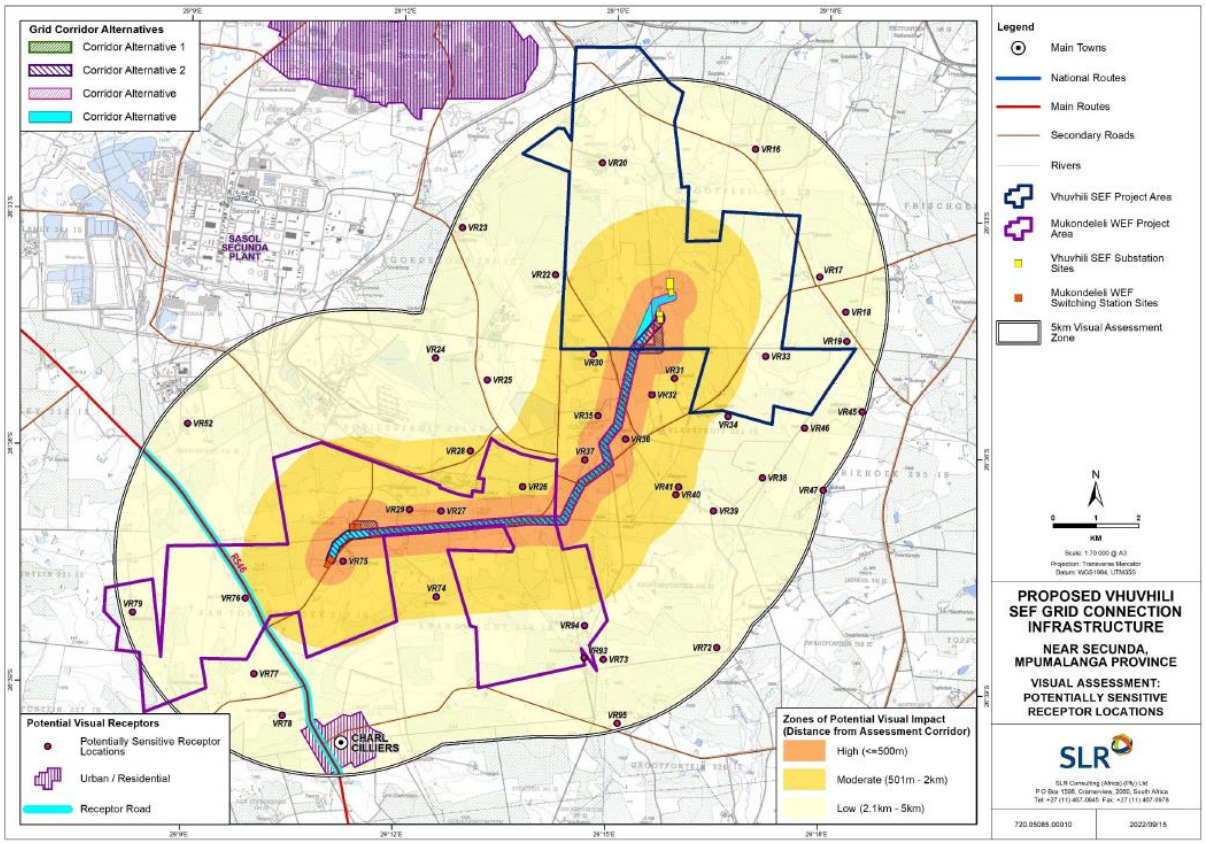


Figure B.19: Potentially sensitive receptor locations (Source: Schwartz, 2022)

Within the 500 m zone of potential visual sensitivity, a total of six (6) receptors were found, although three (3) of these are located within the Mukondeleli WEF project area. Accordingly, the landowners at these locations are not expected to perceive the associated EGI development negatively. The remaining three receptors (i.e. farmsteads) are located on Portions 2, 3 and 10 of the Farm Vlakspruit No 292 (see Figure B.20). At this stage however, the sentiments of the respective landowners are not known, and the zones of potential sensitivity should be viewed as zones where visual impacts may occur.

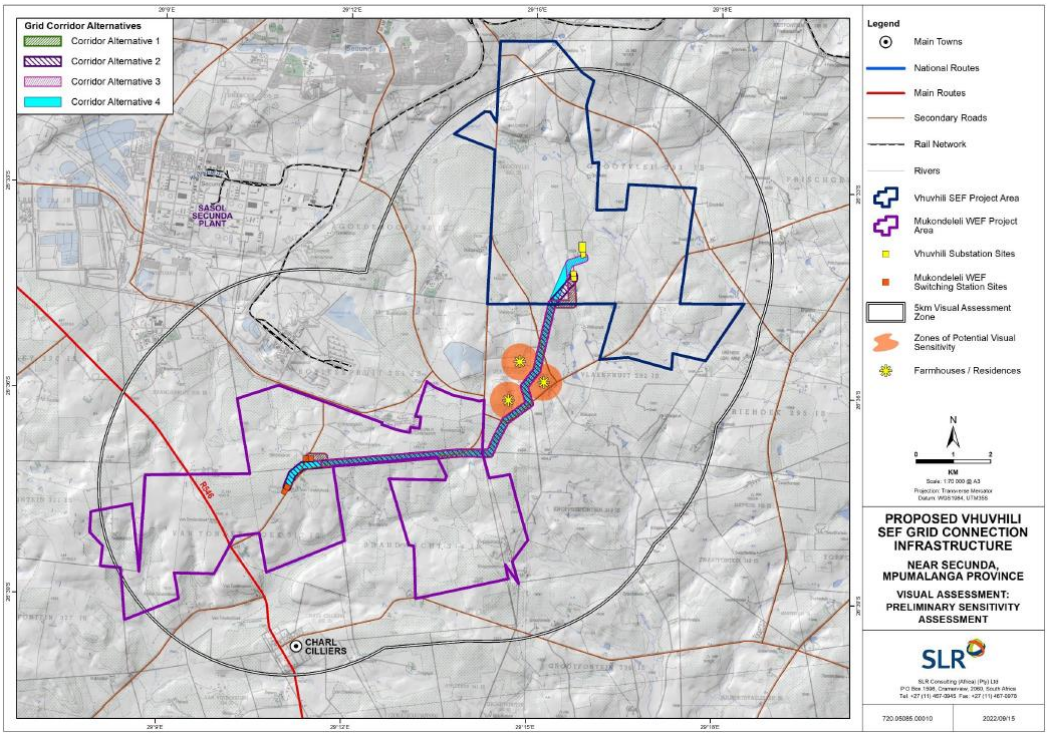


Figure B.20: Potentially sensitive visual receptors within 500 m of the proposed Vhuvhili power line corridor (Source: Schwartz, 2022)

Overall, the visual assessment rated the study area as having a low visual sensitivity which means that the introduction of a new development would likely not be perceived to be negative. It should be stressed however that the concept of visual sensitivity has been utilised indicatively to provide a broad-scale indication of whether the landscape is likely to be sensitive to visual impacts and is based on the physical characteristics of the study area, economic activities and land use that predominates.

B.3.8.1 Screening Tool Descriptions and Site Verification

The Screening Tool report did not include a map to show the proposed power line corridor as it relates to potential Landscape or Visual Sensitivity. Visual absorption capacity is the ability of the landscape to absorb a new development without any significant change in the visual character and quality of the landscape. The level of absorption capacity is largely based on the physical characteristics of the landscape (topography and vegetation cover) and the level of transformation present in the landscape. The higher the visual absorption capacity, the more enhanced the ability of the landscape to absorb new visual intrusions.

The very nature of the vegetation in the study area (Soweto Highveld Grassland vegetation type) is low growing which does not provide much visual screening. Although the vegetation is not overly sensitive to the power line development it does not assist in reducing the visual exposure of the overhead power lines. The broader area surrounding the proposed Vhuvhili power line corridor is characterised by a mix of flat to undulating plains intersected by shallow river valleys. As shown in Figure B.21, areas of slightly higher elevation have a greater visibility of the proposed power line. Although the undulating topography in the study area and the areas of cultivation and grassland would reduce the visual absorption capacity, this would be offset considerably by the presence of existing urban/industrial, mining and infrastructural development in the vicinity of the proposed power line. Visual absorption capacity in the study area is, therefore, rated as moderate and the visual sensitivity is rated as low.

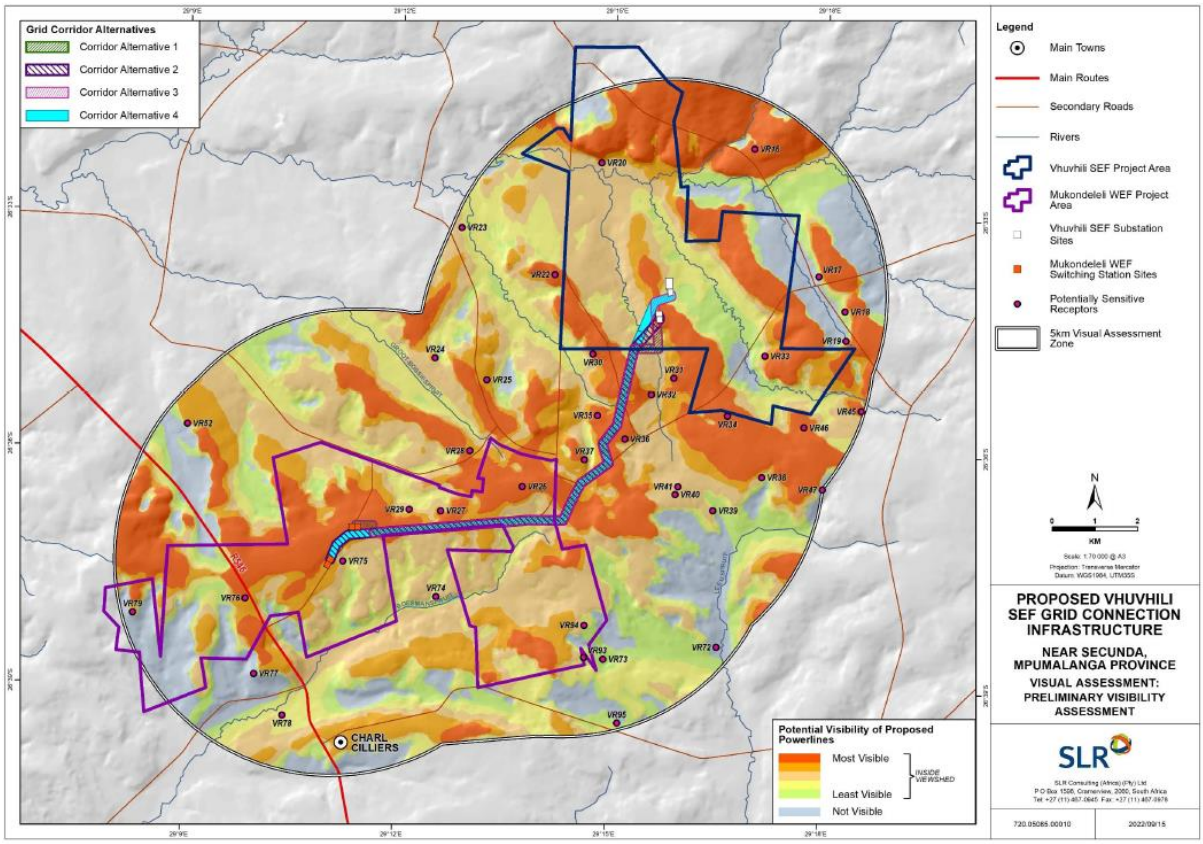


Figure B.21: Potential visibility of the proposed Vhuvhili power line (Source: Schwartz, 2022)

B.3.9 Heritage: Archaeology and Cultural Landscape

A detailed description of the archaeological features and cultural landscape within the proposed power line site is provided in the Heritage Impact Assessment, which integrates Archaeology, Palaeontology and Cultural Landscape (Appendix D.3 of this BA Report). The corridor itself has not been specifically studied in the field but the solar and wind farms on either end have been surveyed on 10, 11, 12 and 17 November 2021, and 24 and 25 March and 01 April 2022.

Section 38(3)(b) of the NHRA requires an assessment of the significance of all heritage resources. In terms of Section 2(vi), ‘‘cultural significance’’ means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. The reasons that a place may have cultural significance are outlined in Section 3(3) of the NHRA (see Section A.10.1.7, above). Section 7 of the NHRA provides for the grading of heritage resources into those of National (Grade 1), Provincial (Grade 2) and Local (Grade 3) significance. Grading is intended to allow for the identification of the appropriate level of management for any given heritage resource.

Palaeontological resources are likely to be largely of low cultural significance and graded IIIC. A small chance exists, however, of material Grade IIIB or possibly even IIIA being found. The archaeological resources are deemed to have low to very low cultural significance at the local level for their scientific value and can be graded NCW. It is possible, however, that resources of up to grade IIIC could be found within the corridor.

Table B.10 lists the heritage finds in the study area, with waypoints illustrated in Figure B.22, Figure B.23 and Figure B.24.

Table B.10: List of heritage finds recorded during the field surveys (waypoints as per Figure B.22, Figure B.23 and Figure B.24).

Waypoint	Location	Nature	Grade	Sensitivity
179	26° 34' 12.57" S 29° 15' 34.82" E	Graves	IIIA	Very high
182	26° 34' 30.94" S 29° 15' 22.54" E	Graves	IIIA	Very high
183	26° 34' 28.24" S 29° 15' 15.88" E	Archaeological – stone feature	GPB	Low
Post-1968	26° 35' 06.55" S 29° 15' 11.80" E	Recent feature, looks like cement floors – not heritage	---	---
Ruins	26° 35' 32.72" S 29° 15' 10.19" E	Ruins visible on aerial photography, not visited	GPA	Low-Medium
Post-1968	26° 36' 15.26"S 29° 14' 46.43"E	Recent feature, possibly foundations of farm workers' village – not heritage	---	---
MD006	26° 37' 31.22" S 29° 11' 38.34" E	Well-spaced stone piles along fence (likely cleared from fields) – not heritage	---	---
MD007	26° 36' 53.29" S 29° 10' 57.93" E	Ruins (farmstead)	GPA	Medium

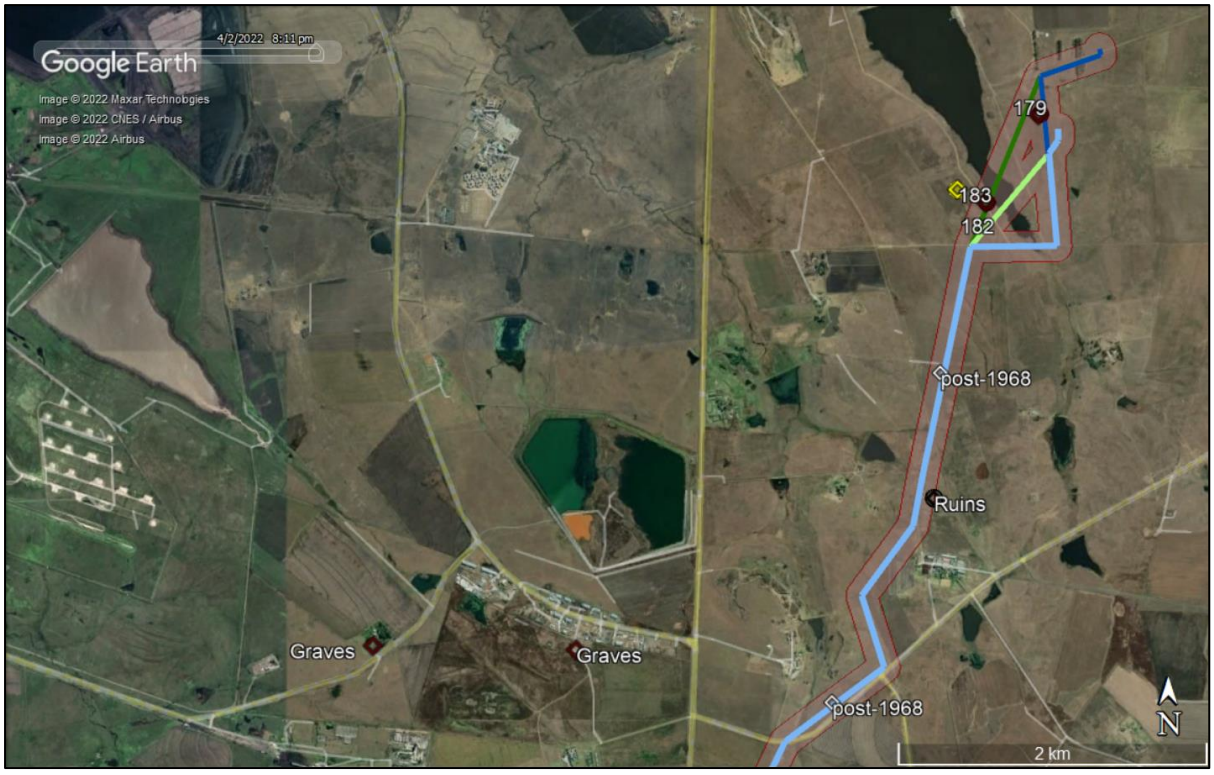


Figure B.22: Aerial view of the north-eastern part of the study area showing the locations of the recorded heritage resources. Here and on Figure B.22 dark red symbols = Grade IIIA (includes two grave sites from Hardwick et al. 2019[13]), red = Grade IIIB, yellow = GPB. Features identified from aerial photography as post-dating 1968 are marked by white symbols and are not heritage, while potential heritage resources also identified from aerial photography are ringed in black (Source: Orton, 2022).

[13] Locations estimated as co-ordinates were not provided.

Figure B.23: ***Aerial view of the north-eastern part of the study area showing the locations of the recorded heritage resources.*** **Here and on Figure B.25 dark red symbols = Grade IIIA (includes two grave sites from Hardwick et al. 2019[14]), red = Grade IIIB, yellow = GPB. Features identified from aerial photography as post-dating 1968 are marked by white symbols and are not heritage, while potential heritage resources also identified from aerial photography are ringed in black (Source: Orton, 2022).**

[14] Locations estimated as co-ordinates were not provided.

Figure B.24: Sensitivity map showing the archaeological and cultural heritage sensitivity as determined by the Heritage Impact Assessment (dark red = very high, orange = medium-low, yellow = low). The finds are mapped with 50 m buffers (Source: Orton, 2022).

The field surveys revealed three archaeological remnants of old stone-built features which are classified as heritage. No Stone Age or Iron Age archaeological materials such as stone artefacts or pottery were seen during the field survey. It is noted from an examination of historical and current aerial photography that a large proportion of the route has been cultivated in the past which may have led to a loss of heritage artefacts. The identified archaeological resources are deemed to have low-medium to low cultural significance at the local level for their scientific and possibly historical values. They are graded GPA or lower and will not make significant contributions to our understanding of the area's heritage.

Graves are deemed to have high cultural significance at the local level for their social value. Two sets of graves that represent reburials were recorded in the study area. The graves are rated with a grade of High - IIIA.

The cultural landscape is largely an agricultural one characterised by grazing lands (grass) and arable croplands. The landscape is extensive and is punctuated by towns and coal mines. It is not a particularly sensitive cultural landscape with the majority of its development having taken place during the 20th century. It is compromised by the very large Sasol facility located 6 km west of the study area, and several coal mines in the surrounding landscape. These add a modern industrial layer to the landscape.

There are no scenic routes in the area, although the N17 runs west to east about 8.5 km north of the north-eastern end of the proposed power line. Given the visual intrusions of the industrial features in the area, the scenic landscape is of no further concern. It is rated as having low cultural significance at the local level.

B.3.9.1 Screening Tool Descriptions and Site Verification

Figure B.25 indicates the archaeological and heritage sensitivity as captured on the Screening Tool. It can be derived from the Screening Tool that the sensitivity is low throughout the entire proposed power line corridor. The site visit undertaken largely confirmed a low sensitivity in terms of archaeological and cultural heritage, with a few areas where graves and some stone features occur are deemed to be very high and medium sensitivity respectively (see Figure B.22, Figure B.23 and Figure B.24). A photographic record and description of the relevant heritage resources from within the corridor are contained within the Heritage Impact Assessment report (Appendix D.3 of this BA Report).

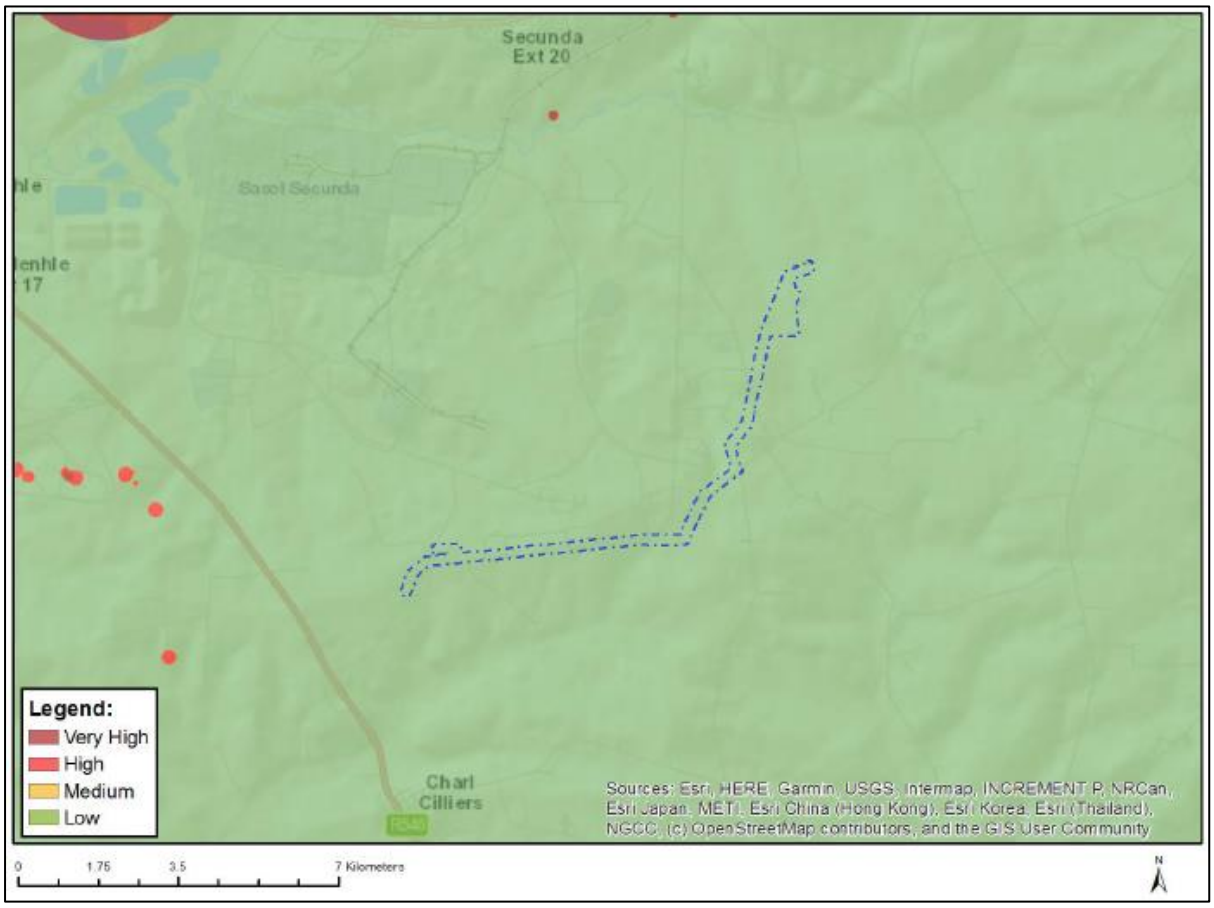


Figure B.25: The Screening Tool map for Archaeology and Cultural Heritage Combined Sensitivity for the proposed Vhuvhili power line corridor (Source: DFFE Screening Tool, 2022).

B.3.10 Palaeontology

A detailed description of the palaeontological features within the proposed power line corridor and recommended mitigation measures is provided in the Palaeontology Impact Assessment (Appendix D.3 of this BA Report), which forms part of the Heritage Impact Assessment (Appendix D.3 of this BA Report).

The proposed 132 kV power line corridor (including all four alternatives) is on non-fossiliferous dolerite of the Jurassic so there is no impact on the palaeontology. The north-eastern start-portion of the power line and the proposed Vhuvhili on-site substation hubs (both alternatives) are on potentially very highly sensitive rocks of the Vryheid Formation (Ecca Group, Karoo Supergroup) associated with the coal seems that could preserve fossil plants of the *Glossopteris* flora. No fossils

are likely to occur in the overlying soils but might occur below ground in undisturbed shales that would only be discovered once excavations commence. Mitigation would be the removal of any fossils found once excavations commence.

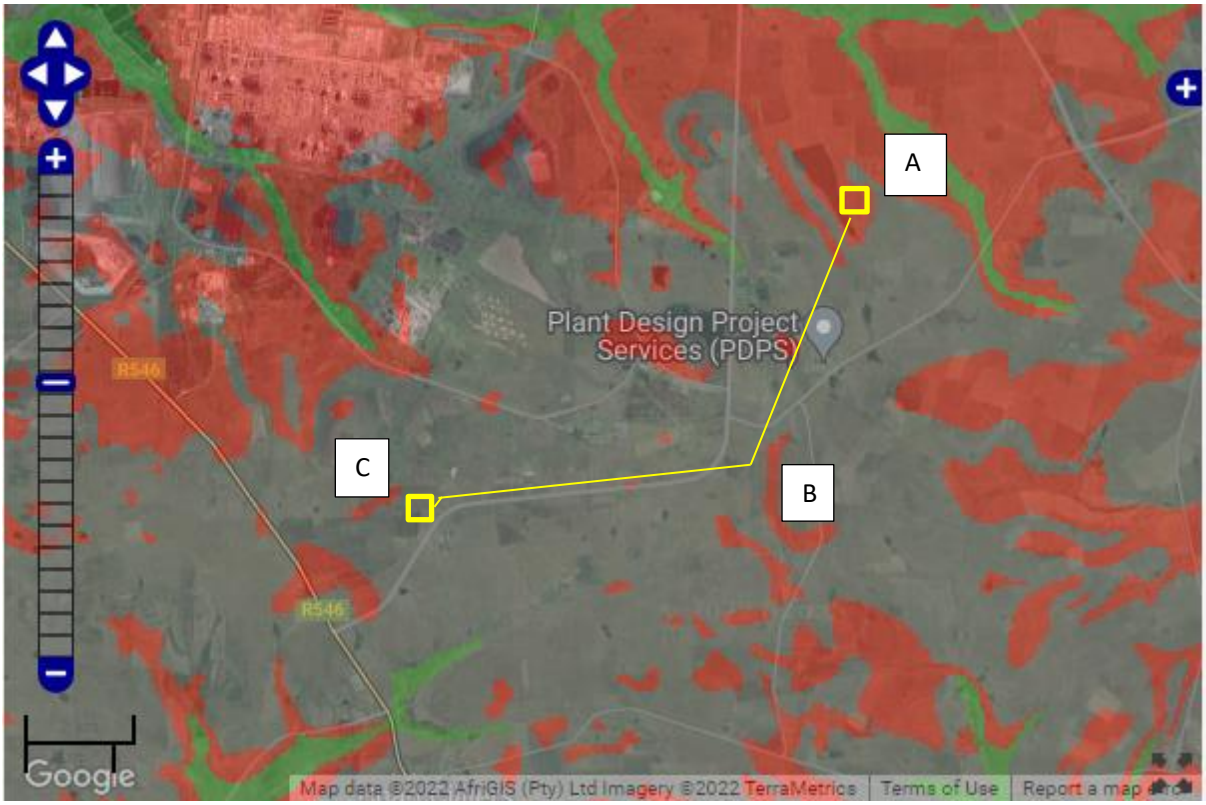


Figure B.26: SAHRIS palaeosensitivity map for the proposed Vhuvhili power line shown by the yellow outlines. A = grid connections from Vhuvhili on-site Substation to the main OHLP; B = main OHPL route; C = grid connections to the Mukondeleli switching station. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

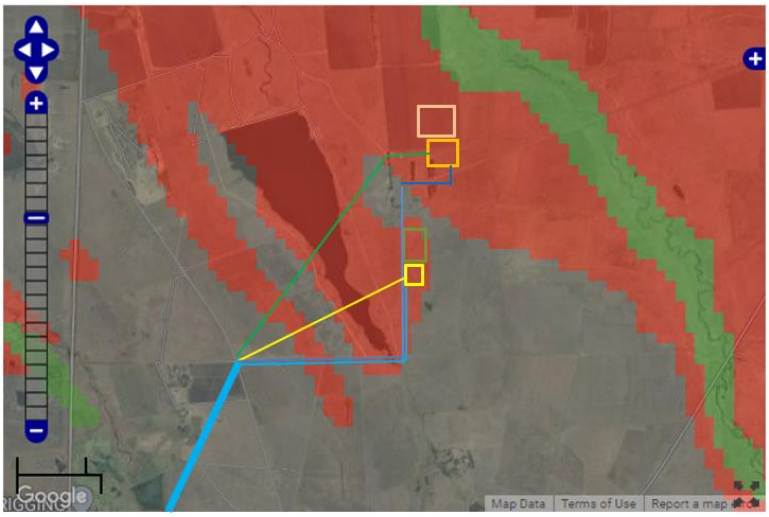


Figure B.27: SAHRIS palaeosensitivity map for the proposed Vhuvhili power line routes and on-site substation hub alternates 1 and 2.

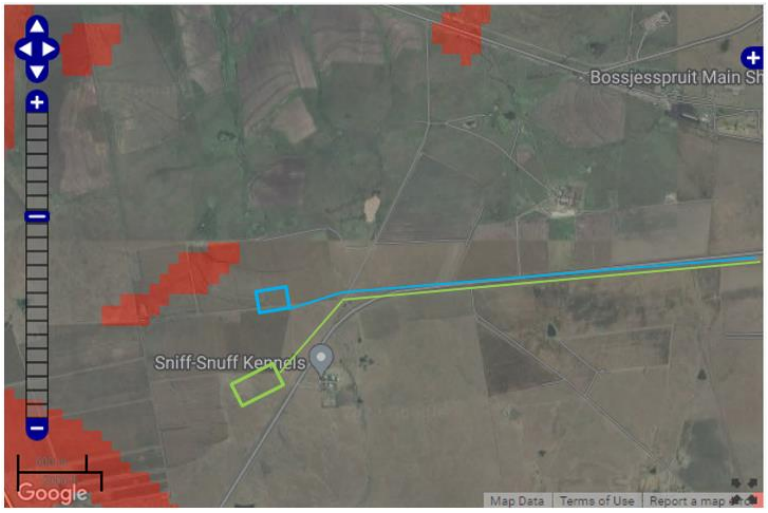


Figure B.28: SAHRIS palaeosensitivity map for the proposed Vhuvhili power line routes and Mukondeleli switching station alternatives E and F.

B.3.10.1 Screening Tool Descriptions and Site Verification

Figure B.25 indicates the palaeontology sensitivity as captured on the Screening Tool. It can be derived from the Screening Tool that the sensitivity is medium for the majority of the proposed power line corridor, with the exception of very high sensitivity areas around the Vhuvhili on-site substation hubs (both alternatives).

The specialist assessment found that the portions of the power line corridor indicated as medium sensitivity by the screening tool are underlain by non-fossiliferous Jurassic dolerite dykes. The volcanic origin of these rocks means that they do not preserve any fossils. Therefore, the area mapped as medium sensitivity is rated with an insignificant/zero palaeontological sensitivity by the specialist and is confirmed by SAHRIS palaeosensitvity mapping (see Figure B.26 to Figure B.28)

The north-eastern start-portion of the power line and the proposed Vhuvhili on-site substation hubs (both alternatives) are confirmed to be on potentially very highly sensitive rocks of the Vryheid Formation (Ecca Group, Karoo Supergroup) associated with the coal seems that could preserve fossil plants of the *Glossopteris* flora. No fossils are likely to occur in the overlying modern soils but might occur below ground in undisturbed shales. Potential fossils would only be discovered during excavations of the pylon and substation foundation in this area. No areas of High Palaeosensitivity or No-Go Areas have been identified within the proposed corridor. Most – indeed probably all – fossil sites could be mitigated in the construction phase with the application of the Chance Fossil find protocol.

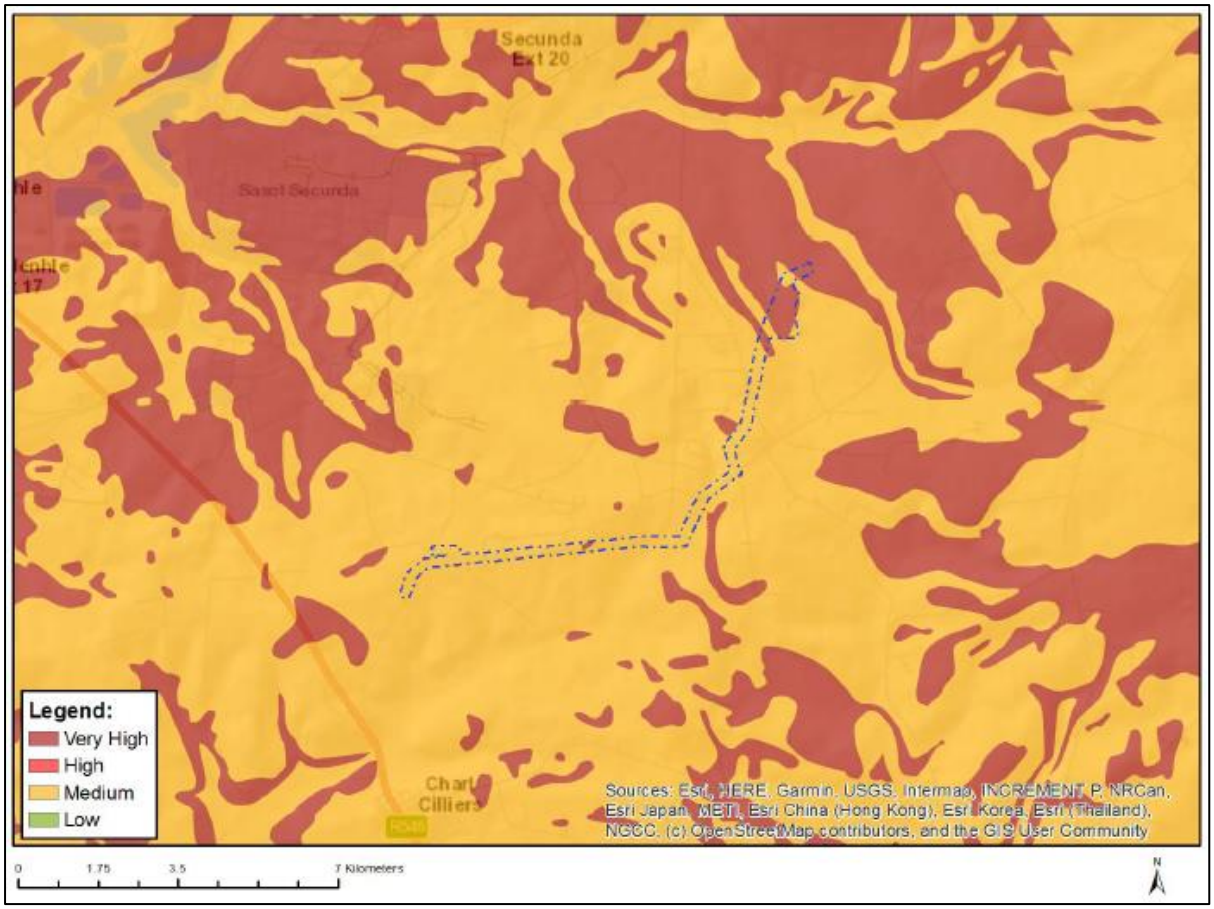


Figure B.29*:* The Screening Tool map for Palaeontology Combined Sensitivity for the proposed power line corridor (Source: DFFE Screening Tool, 2022).

B.4 Tourism Activities

A detailed description of the cultural landscape features within the proposed power line corridor is provided in the Visual Impact Assessment (Appendix D. 2 of this BA Report).

A broad-scale assessment of landscape sensitivity, based on the physical characteristics of the study area, economic activities and land use that predominates, determined that the area would have a low tourism sensitivity. No formal protected areas or leisure-based tourism activities were identified in the study area, thus confirming the low level of tourism sensitivity.

The closest protected area is the Devon Protected Environment, which was proclaimed in 2019 and is located approximately 44 km away to the northeast of the proposed power line corridor. The closest national park is the Golden Gate highlands National Park (declared 1963) located approximately 203 km southwest in the Free State province, and the Kruger National Park (declared 1926) located approximately 240 km northeast of the power line corridor (at its closest point) in the Mpumalanga Province. These protected areas will not be directly impacted by the proposed power line development due to their respective distances (>40 km) from the proposed Vhuvhili power line corridor.

B.5 Civil Aviation and Defence

As required by GN R320, a Civil Aviation Compliance Statement was undertaken for this proposed power line project. The Screening Tool has indicated the proposed power line corridor to be of 'high' sensitivity relating to Civil Aviation (Figure B.30). The high sensitivity relates to the proposed power line corridor being located within 8 km of the mapped Petrusrus airfield. However, following site verification conducted on 19 October 2022, the 'high' sensitivity identified by the Screening Tool in the western portion of the proposed Vhuvhili power line corridor was refuted, as it was found that the mapped Petrusrus Airfield seems non-operational, lacks any civil aviation infrastructure, and instead appears to be a two-track gravel road located in between existing crop fields. Subsequently, it was concluded that this portion of the project site is of 'medium' sensitivity, since this specific portion of the EGI corridor lies between 8 and 15 km of the Secunda Airfield.

Based on existing databases followed by a site visit to the Secunda Airfield, it was determined and verified that the remainder of the EGI assessment corridor is of 'Medium' sensitivity as it relates to civil aviation, as the assessment corridor is situated between 8 to 15 km of the Secunda Airfield. Based on this finding, in terms of GN R320, a Compliance Statement is required for the Vhuvhili EGI assessment corridor (i.e., this Report).

It should be noted that the location and structure of the power line corridor is not likely to impact negatively on civil aviation installations or air traffic associated with the OR Tambo Airport Controlled Airspace Controlled Airspace (FAOR CTA) or the Johannesburg Flight Information Service (FAJA FIS) region. The Civil Aviation Compliance Statement is included in Appendix D.7 of this BA Report.

As required by GN R320, a Defence Site Sensitivity Verification was undertaken for the proposed power line corridor. The Screening Tool has indicated the proposed power line corridor to be of 'low' sensitivity relating to Defence (Figure B.31). Based on a site visit and existing databases, this low sensitivity was verified and confirmed by the EAP during the BA process. Therefore, in line with GN R320, no further requirements are applicable, i.e. a Defence Compliance Statement is not required. The Defence Site Sensitivity Verification Report is included in Appendix D.8 of this BA Report.

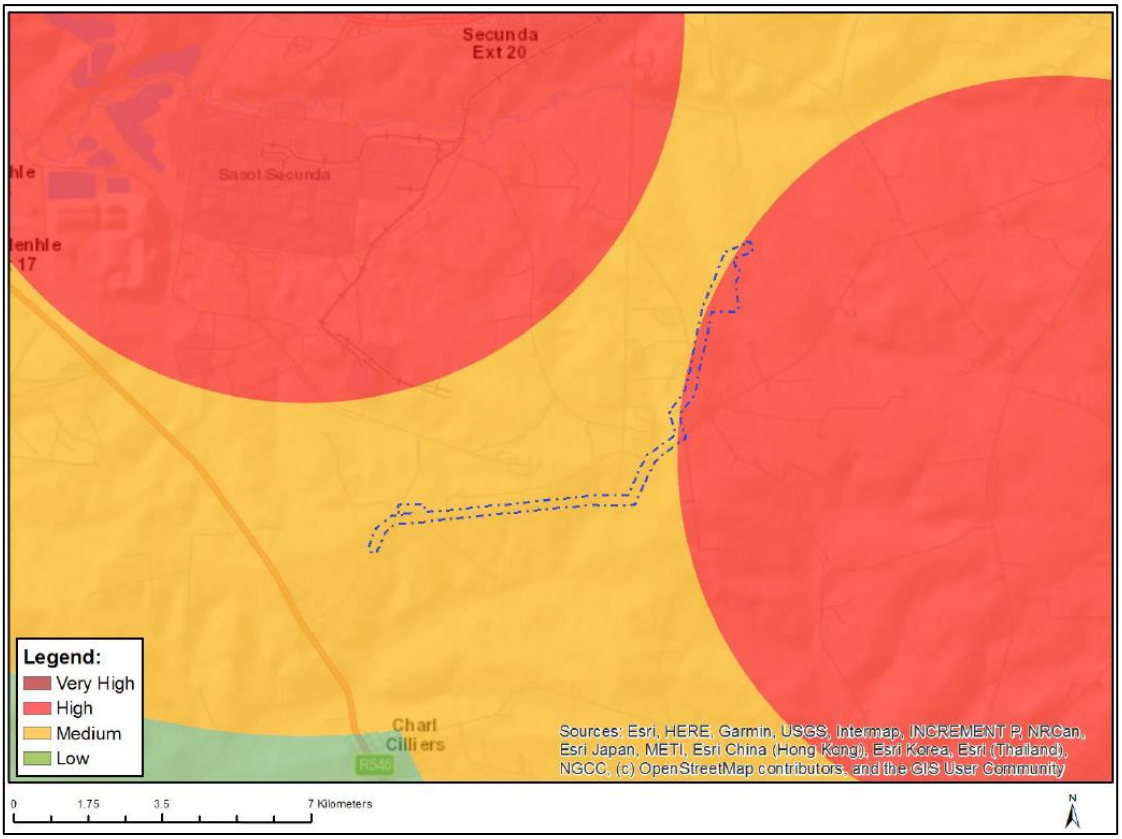


Figure B.30: Map showing the proposed Vhuvhili power line corridor as it relates to Civil Aviation sensitivity (Source: DFFE Screening Tool, 2022)

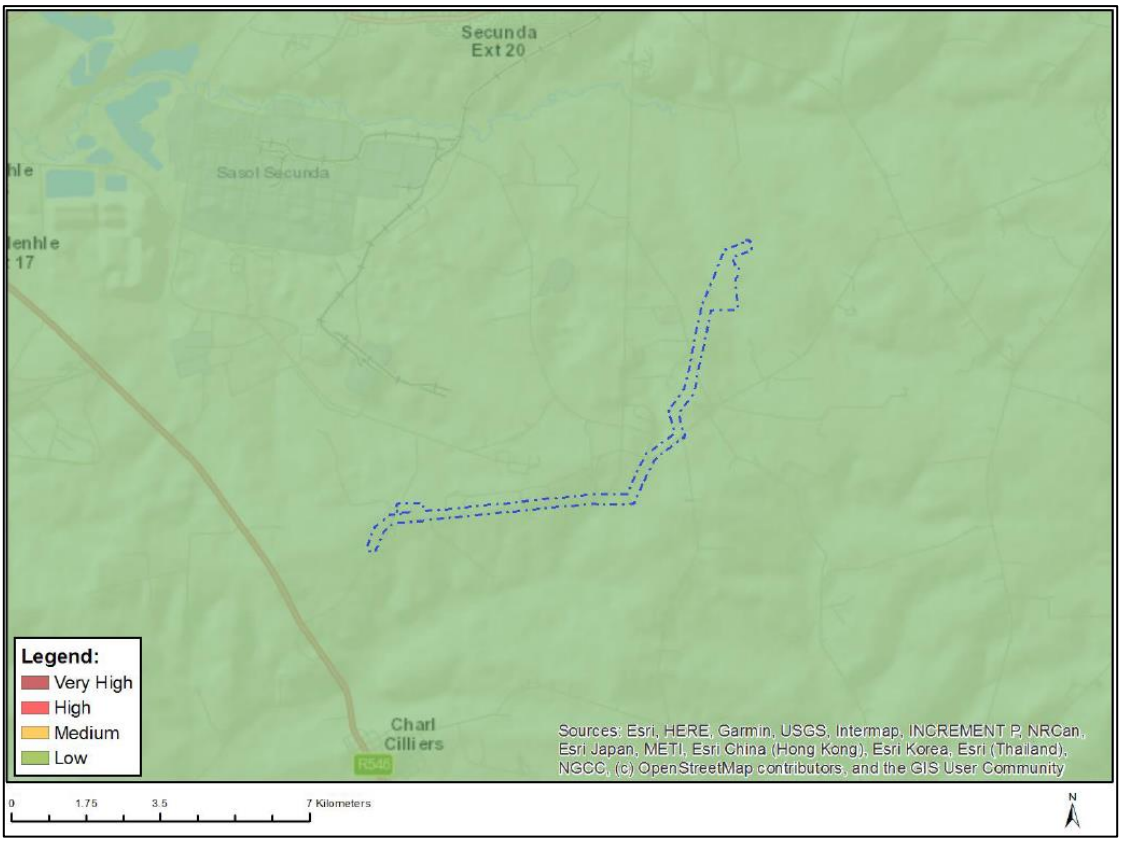


Figure B.31: Map showing the proposed Vhuvhili power line corridor as it relates to Defence sensitivity (Source: DFFE Screening Tool, 2022)

SECTION C: PUBLIC PARTICIPATION

C.1 Introduction to the Public Participation Process

This section provides an overview of the tasks undertaken during the Basic Assessment (BA), with a particular emphasis on providing a clear record of the Public Participation Process (PPP) that was followed. Separate PPP are being undertaken for the Vhuvhili Power line BA Process and the Vhuvhili SEF EIA Process. The PPP for the proposed Vhuvhili Power line BA will ensure that all public participation documents (such as newspaper advertisements, site notices, notification letters, emails etc.) serve to notify Interested and Affected Parties (I&APs), Stakeholders and Organs of State of the joint availability of reports for the project and provide I&APs with an opportunity to comment on the Draft BA Report and supporting appendices.

The PPP for this BA Process is driven by a stakeholder engagement process that includes inputs from authorities, I&APs, technical specialists and the project proponent. 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 EA 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 CA 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 CA 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 healthy, 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 written submissions or direct contact with members of the BA 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, public participation aims to generate issues that are representative of societal sectors, not each individual. Hence, the PPP will be designed to be inclusive of a broad range of sectors relevant to the proposed project.
- The PPP will aim to raise a diversity of perspectives and will not be 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 will aim 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 project.

The Department of Environmental Affairs (2017), Public Participation guideline in terms of NEMA EIA Regulations was also considered during this BA Process.

The key steps in the PPP for the BAs are described below. 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). Various mechanisms have been undertaken to provide notice to all potential and registered I&APs of the proposed projects, as described below.

Preparation for the BA Process commenced in 2021 whereby the specialist studies were commissioned, and the Draft BA Report compilation commenced in August 2022. The Draft BA Report is currently being released to I&APs, Stakeholders and Organs of State (including the National DFFE) for a 30-day comment period. The Application for EA will be submitted to the Mpumalanga DARDLEA at the same time as the Draft BA Report.

C.2 Requirement for a Public Participation Plan

On 5 June 2020, the Minister of Forestry, Fisheries and the Environment issued Directions in terms of regulation 4 (10) of the Regulations issued by the Minister of Cooperative Governance and Traditional Affairs in terms of section 27(2) of the Disaster Management Act, 2002 (Act 57 of 2002). These Directions were published in Government Gazette 43412, GN 650 on 5 June 2020, regarding measures to address, prevent and combat the spread of COVID-19 relating to national environmental management permits and licences.

Regulation 5.1 of GN 650 states that Authorities responsible for the processing of applications contemplated in the EIA Regulations, will be receiving such applications from 5 June 2020 and will receive and process applications and issue decisions in the manner as set out in Annexure 2 of GN 650. Regulation 5.2 of GN 650 states that Annexure 3 includes additional requirements in respect of the provision, supporting or obtaining of services contemplated in Regulation 5.1.

Annexure 3 of GN 650 states that an EAP must:

- Prepare a written public participation plan, containing proposals on how the identification of and consultation with all potential Interested and Affected Parties (I&APs) will be ensured in accordance with Regulation 41(2)(a) to (d) of the 2014 NEMA EIA Regulations (as amended) or proposed alternative reasonable methods as provided for in regulation 41(2)(e), for purposes of an application and submit such plan to the competent authority; and
- Request a meeting or pre-application discussion with the competent authority to determine the reasonable measures to be followed to identify potential I&APs and register IA&Ps for purposes of conducting public participation on the application requiring adherence to Chapter 6 of the 2014 NEMA EIA Regulations (as amended) as set out in the public participation plan and obtain agreement from the competent authority on the public participation plan.

GN R650 is applicable to Alert Level 3 and was repealed by GN R970. GN R970, published on 9 September 2020, contains directions regarding measures to address, prevent and combat the spread of COVID-19 relating to national environmental management permits and licences, and it applied for the period of the national state of disaster.

On 22 March 2022, the withdrawal of various directions regarding measures to address, prevent and combat the spread of COVID-19 (including GN R650 and GN R970) was published in Government Gazette 46075, and provides the following schedule and extent of the repeals of the Government Notices and Gazette Numbers relevant under the COVID-19 lockdown regulations:

Table C.1. Extent of withdrawal of various directions regarding measures to address, prevent and combat the spread of COVID-19 (Source: Extracted from Government Gazette 46075, 2022)

Government Notice and Gazette Number	Title	Extent of repeal
Government Gazette Notice No.650 in Government Gazette No. 43412 of 5 June 2020	Directions regarding measure to address, prevent and combat the spread of COVID-19 relating to national environment management permits and licenses	Repeal of the whole
Government Gazette Notice No.970 in Government Gazette No. 43696 of 9 September 2020	Directions regarding measure to address, prevent and combat the spread of COVID-19 relating to national environment management permits and licenses	Repeal of the whole
Government Gazette Notice No.649 in Government Gazette No. 43411 of 5 June 2020	Directions for Alert Level 3 regarding measure to address prevent and combat the spread of Covid-19 relating to the forestry sector	Repeal of the whole

Following the repeal of the above discussed Regulations and the associated requirement for a public participation plan, a public participation plan was not compiled for this study. However, it is understood that even though GN R650 is repealed, it may be used as a guideline to inform the public participation process.

C.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".

Given that the proposed Vhuvhili power line project constitutes a linear activity, written consent was not required to be obtained and thus was not obtained from the landowners of the land on which the linear activity is proposed to be located. However, landowners were informed of the proposed project via site notices along the power line route and newspaper advertisements.

The Project Developer (i.e., ENERTRAG South Africa) has or is in the process of securing a servitude with the landowners of the relevant affected land portions.

C.4 Notice Boards

One specific mechanism of informing I&APs of the proposed project 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 BA 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 and isiZulu languages were placed at the start, middle and end of the power line corridor of the proposed project, as well as at other strategic locations, and government and public facilities in Secunda. The site notice boards were placed on 19 October 2022. Table C.2 provides a breakdown of the locations at which the site notice boards were placed.

Table C.2. Site Notice Board Placement for the Proposed Project

#	Locality/ Description	Co-ordinates
1	On the fence at the entrance to Remaining Extent of Grootvlei Farm No.584, along the D823 secondary road which is also a proposed access point to the Vhuvhili SEF.	26°34'41.27"S; 29°14'17.40"E
2	On the fence at the entrance to farm Portion 13 of Vlakspruit Farm No. 292, along the D619 secondary road which is also a proposed access point to the Vhuvhili SEF.	26°35'29.66"S; 29°16'2.01"E
3	On the fence along the D619 secondary road, approximately at the mid-point of the power line corridor for Alternative 3.	26°36'9.27"S; 29°14'57.88"E

#	Locality/ Description	Co-ordinates
4	On the fence along the D823 secondary road, approximately at the mid-point of the power line corridor for Alternatives 1, 2 and 4.	26°36'52.15"S; 29°13'52.09"E
5	On the fence along the D823 secondary road, approximately at the end-point of the power line corridor for Alternatives 1 and 3.	26°37'10.34"S; 29°11'19.35"E
6	On the fence along the D823 secondary road, approximately at the end-point of the power line corridor for Alternatives 2 and 4.	26°37'27.14"S; 29°11'5.14"E
7	Notice board inside the Secunda Public Library on 1 Louwrens Muller St, Secunda.	26°30'14.17"S; 29°11'5.05"E
8	Notice Board inside the Govan Mbeki Local Municipal Offices on Horwood Street, Secunda.	26°30'16.84"S; 29°11'5.18"E
9	Notice board inside Secunda Central shopping mall on the Corner of Walter Sisulu Road and Oliver Tambo Drive, Secunda.	26°30'20.65"S; 29°10'57.33"E

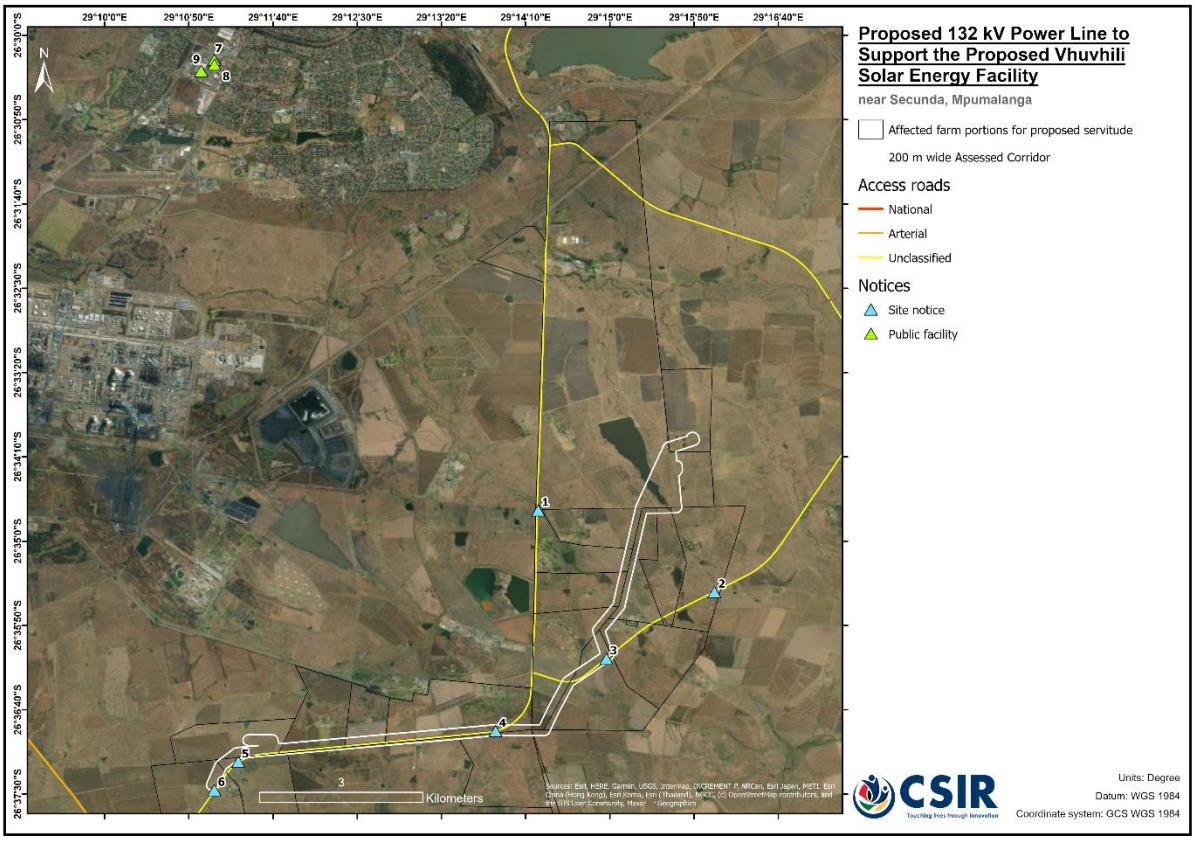


Figure C.1: Placement of notice boards at the proposed site and public facilities in Secunda for the proposed 132 kV power line project.

Site notice boards were placed in English, Afrikaans and isiZulu; and included the following, in compliance with Regulation 41 (3) of the 2014 NEMA EIA Regulations (as amended):

- The details of the proposed project that are subjected to public participation;
- Explanation that a BA procedure is applicable to the proposed project;
- The nature and location of the proposed project;
- Details on where further information on the BA project can be obtained; and
- The manner in which and the person to whom representations in respect of the BA Project can be made.

Refer to Appendix F.1 of this BA Report for copies and proof of placement of the site notice boards.

C.5 Newspaper Advertisement

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 project, and to invite I&APs to register on the project database, as well as to inform I&APs of the release of the Draft BA Report for comment, an advertisement was placed in one local newspaper (i.e., Ridge Times) at the commencement of the 30-day comment period for the Draft BA Report. The content of the newspaper advertisement complies with Regulation 41 (3) of the 2014 NEMA EIA Regulations (as amended). The newspaper advertisement also included the details of the project website wherefrom information available on the proposed project can be downloaded. Refer to Appendix F.2 of this BA Report for a copy of the content of the newspaper advertisement.

At this stage, there are 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).

C.6 Determination of Appropriate Measures

Refer to the section below which provides a detailed outline of the measures taken to include all potential I&APs, stakeholders and Organs of State in the BA Process. If during the BA Process, persons are identified as desiring but unable to participate due to illiteracy, disability or any other disadvantage, then the EAP will contact the I&AP to discuss the proposed projects and provide assistance, where needed.

In line with Regulation 41 (2) (b) of GN R326 and prior to the commencement of the BA Processes (and advertising the EA Process in the local print media), an initial database of I&APs (including key stakeholders and Organs of State) was developed for the BA Process. This was undertaken based on research. Appendix E of this BA Report includes a copy of the I&AP Database, which indicates interaction with I&APs, key stakeholders and all I&APs that have been added to the project database.

In line with Regulation 41 (2) (b) of GN R326, the database includes the details of the following:

- Landowners of the affected farm portions;
- Occupiers of the affected farm portions;
- Landowners of the neighbouring adjacent farm portions;
- The municipal councillor of the ward in which the proposed project will be undertaken (Ward 5 of the Govan Mbeki Local Municipality);
- The municipality which has jurisdiction in the area (i.e. Govan Mbeki Local Municipality and the Gert Sibande District Municipality);
- Relevant Organs of State that have jurisdiction in respect of any aspect of the activity; and
- Any other party as required by the competent authority.

The I&AP database contains, as a minimum the competent authority (Mpumalanga DARDLEA); relevant provincial and national state departments; and relevant organs of state. In addition to potential and registered I&APs (e.g. landowners, neighbours etc.), the following authorities have been identified for this BA PPP Process:

- Birdlife South Africa;
- Department of Agriculture, Land Reform and Rural Development (DALRRD);
- Department of Forestry, Fisheries and the Environment (DFFE);
- Department of Mineral Resources & Energy (DMRE);
- Department of Water and Sanitation; (DWS)
- DFFE: Biodiversity and Conservation Directorate;
- EarthLife Africa;
- Endangered Wildlife Trust;
- Eskom Holdings SOC Ltd;
- Gert Sibande District Municipality;
- Govan Mbeki Local Municipality;
- Independent Communications Authority of South Africa (ICASA);
- Mpumalanga DARDLEA;
- Mpumalanga Provincial Heritage Resource Authority (MPHRA);
- Mpumalanga Tourism and Parks Agency (MTPA);
- National Energy Regulator of South Africa (NERSA);
- South African Civil Aviation Authority (CAA);
- South African Heritage Resources Agency (SAHRA);
- South African Local Government Association (SALGA) (Mpumalanga);
- South African National Parks (SANParks);
- South African National Roads Authority (SANRAL);
- South African Radio Astronomy Observatory (SARAO);
- Square Kilometer Array (SKA) office;
- Transnet SOC Ltd; and
- Wildlife and Environmental Society of South Africa (WESSA).

The above stakeholders, Organs of State and I&APs have accordingly received written notification of the commencement of the BA Processes and release of the Draft BA Report for comment. 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 is ongoing for the

duration of the study. Stakeholders from a variety of sectors, geographical locations and/or interest groups are 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 GN 326, in terms of the electronic database, I&AP details are captured and automatically updated as and when information is 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 BA Process will remain on the project database throughout the process and will be kept informed of all opportunities to comment and will only be removed from the database by request.

C.7 Approach to the PPP

In terms of Regulation 41 (6) of GN R326 the section below outlines the PPP for this assessment in order to provide potential I&APs, Stakeholders and Organs of State access to information on the project and the opportunity to comment at the various stages of the assessment process.

C.7.1 BA Report Phase - Review of the Draft BA Report

The PP 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 will be undertaken to provide notice to all potential and registered I&APs of the proposed project, as described below.

As noted above, the Draft BA Report for the proposed project is currently being released to I&APs, Stakeholders and Organs of State for a 30-days comment period extending from 14 November 2022 to 14 December 2022, excluding public holidays. The Application for EA was submitted to the Mpumalanga DARDLEA at the same time as the Draft BA Report.

The section below summarises the PPP undertaken for the review of the BA Report.

Relevant stakeholders, Organs of State and I&APs will be informed of the review period in the following manner:

- **Database Development and Maintenance**: In line with Regulation 41 (2) (b) of GN R326, an initial database of potential I&APs was developed for the BA Process and will be updated throughout the process.
- **Site Notice Board**: As noted in Section C (5) above, notice boards were placed for the proposed project. A copy of the notice boards is included in Appendix F.1 of this BA Report.
- **Advertisements to Register Interest:** An advertisement announcing the commencement of the 30-day comment period for the Draft BA Report has been released in Afrikaans and English

in one local newspaper i.e. Ridge Times on 11 November 2022. A copy of the content of the advertisement is included in Appendix F.2 of this BA Report.

- **Submission of the Application Form and Draft BA Report to the Mpumalanga DARDLEA**: The Application Form for EA and Draft BA Report were submitted to the Mpumalanga DARDLEA via couriered hard-copy.
- **Letter 1 to I&APs (Commencement of the BA Process)**: Written notification of the availability of the BA Reports (i.e. Letter 1) was sent to all I&APs and Organs of State (including landowners and adjacent landowners) included on the project database (at the time of releasing the Draft BA Report for comment) via email, where email addresses were available. This letter was sent at the commencement of the 30-days review period of the Draft BA Report and includes information on the proposed projects and notification of the release and availability of the reports. Letter 1 was written in the English language. Proof of email, as well as copies of the Letter 1 and emails sent will be included in the Final BA Reports that will be submitted to Mpumalanga DARDLEA for decision-making.
- **Executive Summaries of the BA Reports**: Executive Summaries of the BA Reports were also emailed to I&APs on the database together with Letter 1 and uploaded to the project website and Google Drive.
- **Text Messaging**: SMS texts were also sent to all I&APs on the database (at the time of releasing the Draft BA Report for comment), where cell phone numbers were available, to inform them of the proposed project and how to access the Draft BA Report.
- **Local Networks**: Where possible, communication will be made with the Ward Councillors to request that they send notifications of the projects, availability of the reports and executive summaries via their local networks (such as WhatsApp groups, Neighbourhood Watch groups, other social media mechanisms etc.).
- **30-days Comment Period**: As noted above, potential I&APs, including authorities and Organs of State, were notified via Letter 1, of the 30-day comment and registration period within which to submit comments on the BA Reports and/or to register on the I&AP database.
- **Availability of Information:** The Draft BA Report is currently being made available for a 30-day comment period and distributed to ensure access to information on the project and to communicate the outcome of specialist studies. The Draft BA Report will be uploaded to the project website (i.e., https://www.csir.co.za/environmental-impact-assessment) for I&APs to access it. As a supplementary mechanism, the Draft BA Report will also be uploaded to an alternative web-platform (i.e., Google Drive). Proof of upload of the Draft BA Report to the project website and Google Drive will be included in the Final BA Report. Hard copies of the Final Scoping Report were couriered to:
    - Mpumalanga DARDLEA;
    - Gert Sibande District Municipality;
    - Govan Mbeki Local Municipality; and
    - Secunda Library where it is available for public viewing.

  If an I&AP could not access the report via the project website, via the alternative web-platforms such as Google Drive, or via the available hard copies, and if additional information is required (other than what is provided in the Executive Summaries), then the I&AP could contact the EAP, who would then make an electronic or hard-copy available (where feasibly possible).

C.7.2 Compilation of Final BA Report for Submission to DARDLEA

Following the 30-days commenting period of the Draft BA Report and incorporation of all the comments into the report, the Final BA Report will be submitted to Mpumalanga DARDLEA in line with Regulation 19 (1) (a) of the 2014 NEMA EIA Regulations (as amended), for decision-making.

In line with best practice, I&APs on the project database will be notified via Letter 2 via email (where email addresses are available) of the submission of the Final BA Report to DARDLEA for decision-making. To ensure ongoing access to information, a copy of the Final BA Report that have been submitted for decision-making and the Comments and Responses Report (detailing comments received during the BA 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 BA Report will also be uploaded to other alternative web-platforms such as Google Drive.
The Final BA Reports that will be submitted for decision-making to DARDLEA will include proof of the PPP that was undertaken to inform Organs of State, Stakeholders and I&APs of the availability of the BA Reports for the 30-day review (as explained above).

DARDLEA will have 57 days (from receipt of the Final BA Report) to either grant or refuse EA (in line with Regulation 20 (1) of the 2014 NEMA EIA Regulations (as amended). In line with best practice, I&APs on the project database will be notified via Letter 3 (Release of Environmental Authorisation and Notification of Opportunity to Appeal) via email (where email addresses are available) of the outcome of the decision-making on the Final BA Report.

C.7.3 Environmental Decision-Making and Appeal Period

Subsequent to the decision-making phase, if an EA is granted by DARDLEA for the proposed project, all registered I&APs, Organs of State and stakeholders on the project database will receive notification of the issuing of the EA and the associated appeal period. The 2014 NEMA EIA Regulations (as amended) (i.e. Regulation 4 (1)) states that after the CA has a reached a decision, it must inform the 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 and associated appeal period within 14 days of the date of the decision. All registered I&APs will be informed of the outcome of the EA and the appeal procedure, as well as the respective timelines.

The distribution of the EA (should such authorisation be granted by DARDLEA), as well as the notification of the appeal period, will include a letter (i.e. Letter 3 (Release of Environmental Authorisation and Notification of Opportunity to Appeal)) to be sent via email to all registered I&APs, Stakeholders and Organs of State on the 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. A copy of the EA will be emailed with Letter 3. The EA will also be uploaded to the project website (i.e. https://www.csir.co.za/environmental-impact-assessment). 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 (should it be granted).

C.8 Consultation with Mpumalanga Provincial Heritage Resources Authority

Mpumalanga Provincial Heritage Resource Authority (MPHRA; for built environment and cultural landscapes) and the South African Heritage Resources Agency (SAHRA; for archaeology and palaeontology) are required to provide comment on the proposed project. An integrated Heritage Impact Assessment (HIA) including archaeology, palaeontology and cultural landscape (as described in Section B of this report), was undertaken. These relevant specialist assessments are released to I&APs for comment with the Draft BA Report. The integrated Heritage Impact Assessment (Archaeology, Cultural Landscape and Palaeontology) was submitted to SAHRA and MPHRA for consideration and comment. The Draft BA Report was uploaded onto SAHRIS during the 30-day review period which extended from 14 November 2022 to 14 December 2022. All comments submitted by SAHRA and/or MPHRA will be captured in the Comments and Responses Report and will be addressed as part of the Final BA Report.

Once a final comment has been issued by the heritage authorities, the recommendations should be included in the conditions of the EA (should such authorisation be granted). This will essentially give ‘permission’ from the heritage authorities to proceed.

SECTION D: IMPACT ASSESSMENT

This section includes a summary and anticipated significance of the potential direct, indirect and cumulative impacts that are likely to occur as a result of the construction phase, operational phase, and decommissioning phase, in line with the requirements of the 2014 NEMA EIA Regulations (as amended).

D.1 Approach to the BA: Methodology of the Impact Assessment

The identification of potential impacts includes impacts that may occur during the construction, operational and decommissioning phases of the proposed 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 project is well understood so that the impacts associated with the project 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 impact assessment methodology has been aligned with the requirements for BA Reports as stipulated in Appendix 1 (3) (1) (j) of the 2014 NEMA EIA Regulations (as amended), which states the following:

“A BA 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”.

As per the then Department of Environmental Affairs and Tourism (DEAT) Guideline 5: Assessment of Alternatives and Impacts, the following methodology is applied to the prediction and assessment of impacts and risks. Potential impacts and risks have been rated in terms of the direct, indirect and cumulative:

- **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.

The cumulative impacts have been assessed by identifying other renewable energy projects and other applicable (and relevant) projects, such as construction and upgrade of electricity generation, and electrical transmission or distribution infrastructure in the local area (i.e. within 50 km of the proposed Vhuvhili power line corridor). Other than the proposed Vhuvhili SEF and Mukondeleli WEF, there are two renewable energy projects being investigated in the local area that are at different stages of planning. The Forzando North Coal Mine SEF is in process of EA application, and the Tutuka SEF has obtained EA.

The approach for this BA is that the assessment includes all renewable energy and EGI projects within 50 km that have received an EA at the time of starting this BA (i.e., by September 2022). The information was collected from the National DFFE Renewable Energy EIA Application (REEA) database, 2022 Quarter 2; as well as from the Eskom's Generation Connection Capacity Assessment (GCCA) (2022). Table D.1 and Table D.2 provides more details; and Figure D.1 provides an illustration of the projects considered in the cumulative impact assessment.

A summary of the process flow followed in the cumulative impact assessment is provided below:

- A list of authorised Renewable Energy and its associated electricidal grid infrastructure projects within a 50 km radius were identified based on research, DFFE REEA and the Eskom GCCA.
- This resulted in two Renewable Energy Projects, both of which are solar energy projects. Thirty-nine existing power lines and six planned power line projects based on the Eskom GCCA were also identified.
- Considering all of the above, the cumulative impacts were then clearly defined, and where possible the size of the identified impact was quantified and indicated, i.e. hectares of cumulatively transformed land. With regards to the levels of transformation, the current state of the affected area was also taken into consideration. In most cases however the actual development footprint of the nearby Renewable Energy developments could not be easily quantified or accessed spatially. For example, the REEA database contains land parcels, and not the footprints. Hence the land parcels were considered, which took into account the worst case. This typically allowed the determination of the following aspects (or similar aspects) in the **relevant** specialist assessments:
    - The total affected land parcel area taken up by authorised renewable energy projects and their grid connections, where relevant, within the 50 km radius.
    - Combined land parcel area affected by renewable energy developments within the 50 km radius around the proposed power line project.
    - The total area within the 50 km radius around the proposed power line project.
- Therefore, the assessment of cumulative impacts was based on the specialist and EAP's knowledge of similar approved Renewable Energy and EGI projects in the 50 km radius. In some cases, the specialists involved in this BA process were also involved in some of the other Renewable Energy Projects within the 50 km radius, thus being well aware of the type of impacts and mitigation measures recommended. The specialists assessed such impacts

based on their expertise and knowledge of similar projects and management actions. However, it should be noted that 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. For example, from a heritage point of view, it is also about other heritage resources, the type of locations they could occur in, and any other developments that may have impacted on heritage resources.

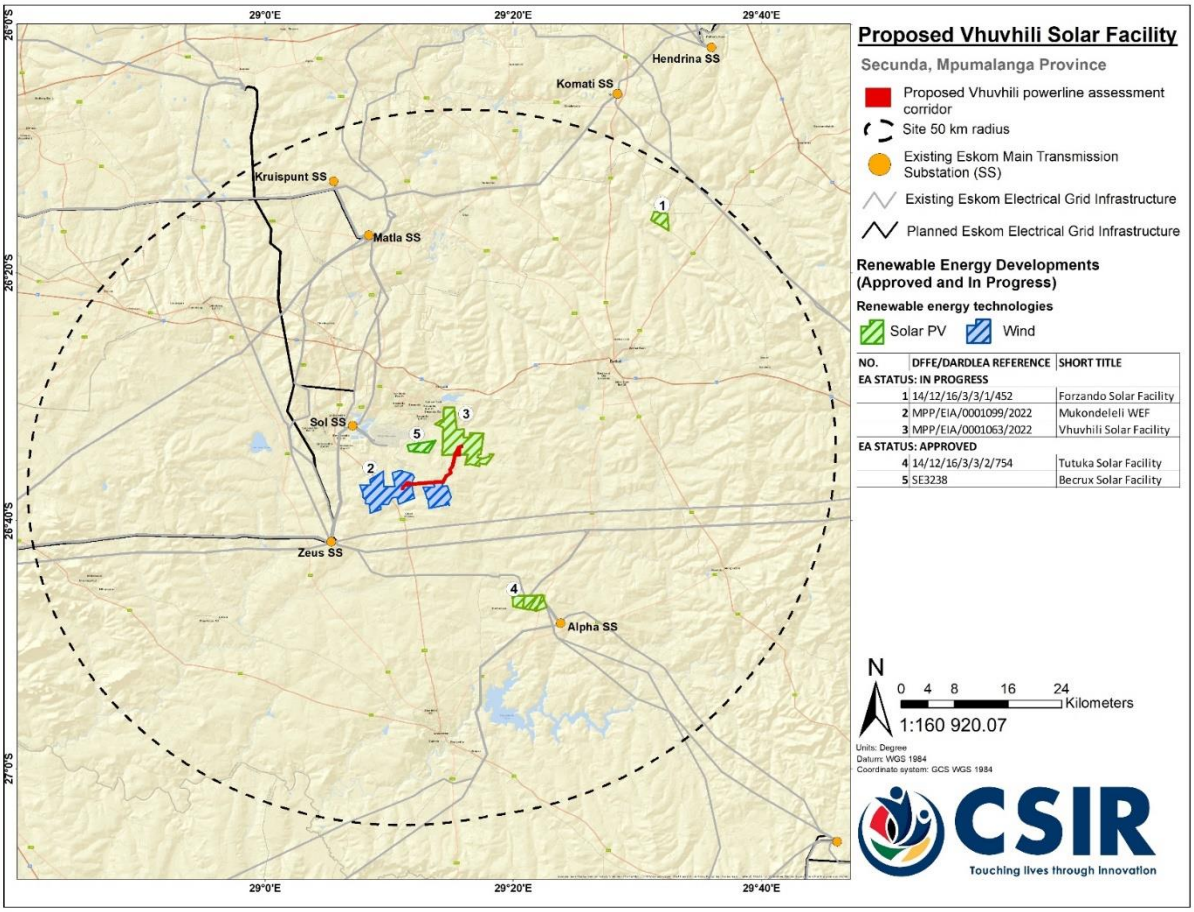


Figure D.1: Projects within the 50 km radius considered for the Cumulative Impact Assessment.

Table D.1: Proposed and existing EGI projects within 50 km of the proposed project (Source: Eskom GCCA, 2022)

EGI PROJECTS (EXISTING AND PLANNED) – SOURCE: ESKOM GCCA 2022			
Status / Layer Source	**GP Project**	**Label/Name**	**Capacity (kV)**
Tx Existing Lines	EXISTING	Alpha Beta 1	765
Tx Existing Lines	EXISTING	Alpha Beta 2	765
Tx Existing Lines	EXISTING	Arnot Kruispunt 1	275
Tx Existing Lines	EXISTING	Camden Duvha 1	400
Tx Existing Lines	EXISTING	Camden Komati 1	275
Tx Existing Lines	EXISTING	Camden Sol 1	400
Tx Existing Lines	EXISTING	Camden Sol 2	400
Tx Existing Lines	EXISTING	Camden Tutuka 1	400
Tx Existing Lines	EXISTING	Duvha Matla 1	400

EGI PROJECTS (EXISTING AND PLANNED) – SOURCE: ESKOM GCCA 2022			
Status / Layer Source	**GP Project**	**Label/Name**	**Capacity (kV)**
Tx Existing Lines	EXISTING	Grootvlei Matla 1	400
Tx Existing Lines	EXISTING	Grootvlei Zeus 1	400
Tx Existing Lines	EXISTING	Grootvlei Zeus 2	400
Tx Existing Lines	EXISTING	Hendrina Kriel 1	400
Tx Existing Lines	EXISTING	Kendal Tutuka 1	400
Tx Existing Lines	EXISTING	Komati Kruispunt 1	275
Tx Existing Lines	EXISTING	Komati Kruispunt 2	275
Tx Existing Lines	EXISTING	Kriel Sol 1	400
Tx Existing Lines	EXISTING	Kriel Sol 2	400
Tx Existing Lines	EXISTING	Kriel Tutuka 1	400
Tx Existing Lines	EXISTING	Kriel Zeus 1	400
Tx Existing Lines	EXISTING	Majuba Alpha 1	400
Tx Existing Lines	EXISTING	Majuba Tutuka 2	400
Tx Existing Lines	EXISTING	Matla Benburg 1	275
Tx Existing Lines	EXISTING	Matla Esselen 1	275
Tx Existing Lines	EXISTING	Matla Glockner 1	400
Tx Existing Lines	EXISTING	Matla Glockner 2	400
Tx Existing Lines	EXISTING	Matla Kruispunt 1	275
Tx Existing Lines	EXISTING	Matla Nevis 1	275
Tx Existing Lines	EXISTING	Matla Nevis 2	275
Tx Existing Lines	EXISTING	Matla Zeus 1	400
Tx Existing Lines	EXISTING	Mercury Zeus 1	765
Tx Existing Lines	EXISTING	Sol Sasol 2 1	132
Tx Existing Lines	EXISTING	Sol Sasol 2 2	132
Tx Existing Lines	EXISTING	Sol Sasol 3 1	132
Tx Existing Lines	EXISTING	Sol Sasol 3 2	132
Tx Existing Lines	EXISTING	Tutuka Alpha 1	400
Tx Existing Lines	EXISTING	Tutuka Alpha 2	400
Tx Existing Lines	EXISTING	Tutuka Alpha 3	400
Tx Existing Lines	EXISTING	Tutuka Pegasus 1	400
Tx Planned Lines	GPP0020	Matla-Jupiter B 1st and 2nd 400 kV line (operated at 275 kV)	275
Tx Planned Lines	GPP0130	Kendal-Zeus 1st 400 kV line	400
Tx Planned Lines	GPP0116	Turn in Kriel-Tutuka 400 kV line into Mulalo substation	400
Tx Planned Lines	GPP0253	Zeus-Perseus 1st 765 kV line	765
Tx Planned Lines	GPP0674	Kendal-Zeus 2nd 400 kV line	400
Tx Planned Lines	GPP0118	Turn in Kriel-Zeus 400 kV line into Mulalo substation	400

Table D.2: Proposed renewable energy that have received EA or are in the process of applying for EA within 50 km of the proposed project (Source: DFFE REEA, 2022, Quarter 2)

Renewable Energy Projects – Source: DFFE REEA, 2022, Quarter 2								
DFFE REFENCE	**EA PROCESS**	**PROJECT TITLE**	**APPLICANT**	**EAP**	**PROVINCE**	**TECHNOLOGY**	**MW**	**STATUS**
14/12/16/3/3/2/754	S&EIA	65.9 MW Tutuka Photovoltaic (PV) Energy Facility and Its associated Infrastructure on portion 4, 10, 11 and 12 of the Farm Pretorius Vley 374 is near Standerton within Lekwa, Mpumalanga Province	Eskom Holdings SOC Limited	Savannah Environmental (Pty) Ltd	Mpumalanga	Solar PV	66	Approved
14/12/16/3/3/1/452	BAR	Proposed Forzando North Coal Mine photovoltaic solar facility in Emalahleni Local Municipality, Mpumalanga Province	Total Coal South Africa	GCS (Pty) Ltd	Mpumalanga	Solar PV	9.5	In process
1/3/1/16/1G-236	BAR	Becrux Solar Photovoltaic (PV) Energy Facility, Mpumalanga Province	Becrux Solar PV Project One (Pty) Ltd	Savannah Environmental (Pty) Ltd	Mpumalanga	Solar PV	19	Approved
Projects proposed by the Project Developer ('ENERTRAG')								
MPP/EIA/0001063/2022	S&EIA	Proposed Vhuvhili Solar Photovoltaic Energy (PV) Facility near Secunda in the Mpumalanga Province	Vhuvhili Solar RF (Pty) Ltd	CSIR	Mpumalanga	PV Solar	300	In process
MPP/EIA/0001099/2022	S&EIA	Proposed Mukondeleli Wind Energy Facility	Mukondeleli Wind RF (Pty) Ltd	WSP	Mpumalanga	Wind Energy	300	In process

In addition to the above, the impact assessment methodology includes the following aspects:

Nature of impact/risk - The type of effect that a proposed activity will have on the environment.

Status - Whether the impact/risk on the overall environment 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 not be affected.

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);
- National; or
- International (e.g. Greenhouse Gas emissions or migrant birds).

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)).

Consequence – The anticipated consequence of the risk/impact:
- Extreme (extreme alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they permanently cease);
- Severe (severe alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
- Substantial (substantial alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
- Moderate (notable alteration of natural systems, patterns or processes, i.e. where the environment continues to function but in a modified manner); or
- Slight (negligible alteration of natural systems, patterns or processes, i.e. where no natural systems/environmental functions, patterns, or processes are affected).

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).

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).

Using the criteria above, the impacts are further assessed in terms of the following:

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).

To determine the significance of the identified impact/risk, the consequence is multiplied by probability (qualitatively as shown in Figure D.2). This 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, and very high) against a predefined set of criteria (i.e. probability and consequence):

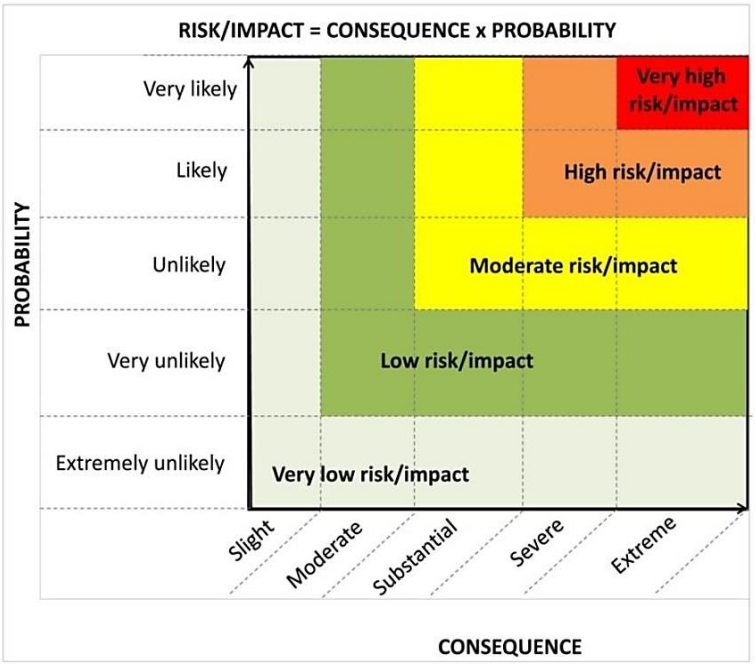


Figure D.2: Guide to assessing risk/impact significance as a result of consequence and probability

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 will be ranked as follows in terms of significance (based on Figure D.2):

- Very low = 5;
- Low = 4;
- Moderate = 3;
- High = 2; and
- Very high = 1.

Confidence – The degree of confidence in predictions based on available information and specialist knowledge:

- Low;
- Medium; or
- High.

Impacts have been collated into the EMPr (Appendix G of the BA Report) and these include the following:

- Quantifiable standards for measuring and monitoring mitigatory measures and enhancements (as applicable). This includes a programme for monitoring and reviewing the recommendations to ensure their ongoing effectiveness.
- Identifying negative impacts and prescribing mitigation measures to avoid or reduce negative impacts. Where no mitigatory measures are possible this is stated.
- Positive impacts and augmentation measures have been identified to potentially enhance positive impacts where possible.

Other aspects to be taken into consideration in the assessment of impact significance are:

- Impacts are evaluated for the construction and operational phases of the development. The assessment of impacts for the decommissioning phase is 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 have been 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 has, where possible, taken into consideration the cumulative effects associated with this and other facilities/projects which are either developed or in the process of being developed in the local area; and
- The impact assessment attempts to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are used as a measure of the level of impact.

D.2 Assessment of Environmental Risks and Impacts

The issues and impacts presented in this Section have been identified via the environmental *status quo* of the receiving environment (environmental, visual and heritage features present on site - as discussed in Section B of this BA Report) and input from specialists that form part of the project team. The impact assessments of the specialist studies undertaken to inform this BA have been summarised in this section. It should be noted that unless otherwise stated, impacts identified, and their associated significance are deemed to be negative.

Refer to Appendix D of this report for the full specialist studies undertaken (including the Terms of Reference for each study). All proposed mitigation measures, as relevant, have been carried over into the EMPr, included in Appendix G of this report.

D.2.1 Agriculture

The Agriculture Compliance Statement was undertaken by Johann Lanz to inform the outcome of this BA from an agricultural and soils perspective. The complete Agriculture Compliance Statement is included in Appendix D.1 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Agriculture Compliance Statement. The information below is extracted from Lanz (2022) (Appendix D.1 of the BA Report).

D.2.1.1 Approach and Methodology

An Agricultural Compliance Statement was required and undertaken in terms of the requirements of the *Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources*, gazetted on 20 March 2020 in GN R320 (in terms of Sections 24(5)(A) and (H) and 44 of NEMA, 1998). As per the requirement of the Protocol in GN R320, the assessment was based on a desktop analysis of existing soil and agricultural potential data for the power line corridor. Various information and desktop sources of information were used.

D.2.1.2 Relevant Project Aspects relating to Agricultural Impacts

For agricultural impacts, the exact nature of the different infrastructure within a development has very little bearing on the significance of impacts. What is of most relevance is simply the occupation of the land and whether it is being occupied by a power line, a road, a building or a substation makes no difference. What is of most relevance and addressed in this assessment, therefore, is simply the total footprint of the pylons that excludes agricultural land use or impacts agricultural land, which in this case is considered insignificant. As an agricultural impact is a temporary or permanent change to the future production potential of land, the significance of the agricultural impact is directly proportional to the extent of the change in production potential. If a development will not change the future production potential of the land, then there is no agricultural impact.

D.2.1.3 Potential Impacts

The proposed EGI has insignificant agricultural impact for two reasons:

The proposed overhead power lines have negligible agricultural impact, regardless of their route and design and the agricultural potential of the land they traverse. All agricultural activities can continue completely unhindered underneath the power lines. This is because their direct, permanent, physical footprint that has any potential to interfere with agriculture (pylon bases and servitude track, where it is needed), is insignificantly small and the pylons can easily be located outside of or on the edges of cropland where they do not interfere with crop production. There will therefore be no reduction in future agricultural production potential underneath the power lines.

Two potential negative agricultural impacts have been identified. These impacts are described below and apply to the proposed power line project, and other associated infrastructure:

- Minimal disturbance to agricultural land use activities - This impact is relevant mainly in the construction and decommissioning phases. No further disturbance of agricultural land use occurs in the operational phase.
- Soil degradation - Soil can be degraded by impacts in three different ways: erosion; topsoil loss; and contamination. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads. Loss of topsoil can result from poor topsoil management during construction related excavations. Hydrocarbon spillages from construction activities can contaminate soil. Soil degradation will reduce the ability of the soil to support vegetation growth. This impact is relevant only during the construction and decommissioning phases.

The potential cumulative agricultural impact of importance is a regional loss of agricultural land, with a consequent decrease in agricultural production. There are a number of non-agricultural developments leading to loss of agricultural production potential in the area. However, because this overhead power line itself leads to insignificant leads to insignificant loss of production potential, its cumulative impact must also logically be insignificant. It therefore does not make sense to conduct a more formal assessment of the development's cumulative impacts as per DFFE requirements for cumulative impacts. Many times more EGI than currently exists, or is currently proposed, can be accommodated before acceptable levels of change in terms of loss of production potential are exceeded. In reality the landscape in this environment could be covered with power lines and agricultural production potential would not be affected.

Due to the considerations discussed above, the cumulative impact of loss of future agricultural production potential can confidently be assessed as not having an unacceptable negative impact on the area. In terms of cumulative impact, the proposed development is therefore acceptable and it is therefore recommended that it be approved.

D.2.1.4 Concluding Statement

An Agricultural Compliance Statement is not required to formally rate agricultural impacts. It is only required to indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site. It must provide a substantiated statement on the acceptability, or not, of the proposed development and a recommendation on the approval, or not of the proposed development.

The conclusion of this assessment is that the proposed development will have negligible agricultural impact and will therefore be acceptable in terms of its impact on the agricultural production capability of the site. All proposed route alternatives are considered equally acceptable in terms of agricultural impact. This is substantiated by the facts that

- all agricultural activities that are viable in this environment, can continue completely unhindered underneath the power line and there will therefore be no loss of agricultural production potential underneath it.
- the only potential source of impact is minimal disturbance to the land (erosion and topsoil loss) during construction (and decommissioning). This impact can be completely mitigated with standard, generic mitigation measures that are included in the EMPr.

Therefore, from an agricultural impact point of view, it is recommended that this proposed overhead power line development be approved, subject to the condition that the pylon locations minimize agricultural impacts by being located, wherever possible, outside of or on the edges of cropland so that they do not interfere with crop production. Pylon locations should be assessed and approved by an agricultural specialist during the detailed engineering design phase that occurs after EA is received and prior to construction. A desktop assessment of the pylon positions using satellite imagery will be adequate for this purpose.

D.2.2 Visual Impact Assessment

The Visual Impact Assessment was undertaken by Kerry Schwartz, of SLR Consulting, to inform the outcome of this BA from a visual perspective. The complete Visual Impact Assessment is included in Appendix D.2 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Visual Impact Assessment. The information below is extracted from Schwartz (2022) (Appendix D.2 of the BA Report).

D.2.2.1 Approach and Methodology

The methodology of the Visual Impact Assessment involved a number of standard procedures including those in the “Guideline for Involving Visual and Aesthetic Specialists” (Oberholzer, 2005), including the following steps:

- A baseline desktop analysis of the physical characteristics such as topography, vegetation and land use of the study area was undertaken.
- Visual receptor locations and routes that are potentially sensitive to the visual intrusion of the proposed development were mapped.
- A two-day site visit was undertaken between the 25th and 26th of January 2022 to verify the landscape characteristics of the desktop analysis, conduct a photographic survey of the study area, verify the sensitivity of visual receptor locations, and identify any additional visual receptor locations.
- The viewshed, the area within which the proposed project can be visible, was determined using digital topographic maps analysed by the Geographic Information System (GIS), and mapped to determine the zones of visual influence as well as those areas in a view shadow.
- The zone of visual influence mapping of the proposed power line provided a quantitative measure of visual impact intensity.

- Existing vegetation cover, land uses, topographic features and general intactness of the landscape, along with the overall "sense of place" provided a qualitative measure of visual impact intensity.
- An Impact Assessment rating matrix was used to provide an objective evaluation of the significance of the potential visual impacts associated with the proposed development, both before and after implementing mitigation measures. The matrix is based on three parameters, namely the distance of an identified visual receptor from the proposed development, the presence of screening factors and the degree to which the proposed development would contrast with the surrounding environment.
- Mitigation measures were identified (where possible) to minimise the potential visual impact of the proposed development.

Various base data was used in the assessment.

D.2.2.2 Relevant Project Aspects relating to Visual Impacts

Components of the proposed project that are relevant in terms of visual aspects are those typically associated with such developments. These aspects were addressed in detail in Section B.3.8.

D.2.2.3 Potential Impacts

The potential visual impacts resulting from the proposed power line project on landscape features and receptors are listed below for each of the project phases, including cumulative impacts. The potential visual impacts would be identical for each of the four alternative power line routings.

Construction Phase:

- Large construction vehicles and equipment will alter the natural character of the study area and expose visual receptors to impacts associated with construction.
- Construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings.
- Dust emissions and dust plumes from increased traffic on the gravel roads serving the construction site may evoke negative sentiments from surrounding viewers.
- Surface disturbance during construction would expose bare soil (scarring) which could visually contrast with the surrounding environment.
- Temporary stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.
- Litter on the construction site may result in visual pollution.

Operational Phase:

- The power line may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings.
- The proposed power line will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts.
- Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke negative sentiments from surrounding viewers.

Decommissioning Phase:

- Vehicles and equipment required for decommissioning will alter the natural character of the study area and expose visual receptors to visual impacts.
- Decommissioning activities may be perceived as an unwelcome visual intrusion.

- Dust emissions and dust plumes from increased traffic on the gravel roads serving the decommissioning site may evoke negative sentiments from surrounding viewers.
- Surface disturbance during decommissioning would expose bare soil (scarring) which could visually contrast with the surrounding environment.
- Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.
- Decommissioned infrastructure left on the site may be visually intrusive.

Cumulative Impacts:

- Additional renewable energy and associated grid connection infrastructure developments in the broader area will alter the natural character of the study area towards a more industrial landscape and expose a greater number of receptors to visual impacts.
- Visual intrusion of multiple renewable energy developments may be exacerbated, particularly in more natural undisturbed settings.
- Additional REFs in the area would generate additional traffic on gravel roads thus resulting in increased impacts from dust emissions and dust plumes.

D.2.2.4 Impact Assessment

The table below includes an assessment of the potential **direct and cumulative impacts** identified for the proposed Vhuvhili overhead transmission power line (all four alternatives) and supporting infrastructure for the construction, operational and decommissioning phases.

Impact	*Impact Criteria*		*Significance and Ranking (Pre-mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-mitigation)*	*Confidence Level*
DIRECT – CONSTRUCTION PHASE						
▪ Large construction vehicles and equipment will alter the natural character of the study area and expose visual receptors to impacts associated with construction. ▪ Construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. ▪ Dust emissions and dust plumes from increased traffic on the gravel roads serving the construction site may evoke negative sentiments from surrounding viewers. ▪ Surface disturbance during construction would expose bare soil (scarring) which could visually contrast with the surrounding environment. ▪ Temporary stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.	***Status***	***Negative***	Moderate (3)	▪ Carefully plan to minimise the construction period and avoid construction delays. ▪ Restrict construction activities to daylight hours to negate or reduce the visual impacts associated with lighting. ▪ Position storage/stockpile areas in unobtrusive positions in the landscape, where possible. ▪ Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. ▪ Vegetation clearing should take place in a phased manner. ▪ Make use of existing gravel access roads where possible. ▪ Limit the number of vehicles and trucks travelling to and from the construction site, where possible. ▪ Ensure that suitable dust suppression techniques are implemented: o on all access roads; o in all areas where vegetation clearing has taken place; o on all soil stockpiles.	*Low (4)*	*Medium*
	Spatial Extent	***Local***				
	Duration	***Short Term***				
	Consequence	***Substantial***				
	Probability	***Very Likely***				
	Reversibility	***High***				
	Irreplaceability	***Low***				

Impact	*Impact Criteria*		*Significance and Ranking (Pre-mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-mitigation)*	*Confidence Level*
▪ Litter on the construction site may result in visual pollution.				▪ Maintain a neat construction site by removing litter, rubble and waste materials regularly.		
DIRECT – OPERATIONAL PHASE						
▪ The power line may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. ▪ The proposed power line will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts. ▪ Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke negative sentiments from surrounding viewers. ▪	***Status***	***Negative***	Low (4)	▪ Where possible, limit the amount of security and operational lighting associated with the power line development. ▪ Where possible, avoid placing lights on pylon structures. ▪ As far as possible, limit the number of maintenance vehicles using access roads. ▪ Ensure that suitable dust suppression techniques are implemented on all gravel access roads. ▪ Non-reflective surfaces should be utilised where possible.	*Low (4)*	*Medium*
	Spatial Extent	***Local***				
	Duration	***Long term***				
	Consequence	***Moderate***				
	Probability	***Very Likely***				
	Reversibility	***High***				
	Irreplaceability	***Low***				
DIRECT – DECOMMISSIONING PHASE						
▪ Vehicles and equipment required for decommissioning will alter the natural character of the study area and expose visual receptors to visual impacts. ▪ Decommissioning activities may be perceived as an unwelcome visual intrusion. ▪ Dust emissions and dust plumes from increased traffic on the gravel roads serving the decommissioning	***Status***	***Neutral***	Moderate (3)	▪ All infrastructure that is not required for post-decommissioning use should be removed. ▪ Carefully plan to minimize the decommissioning period and avoid delays. ▪ Position storage/stockpile areas in unobtrusive positions in the landscape, where possible	*Low (4)*	*Medium*
	Spatial Extent	***Local***				
	Duration	***Short term***				
	Consequence	***Substantial***				
	Probability	***Very Likely***				
	Reversibility	***High***				
	Irreplaceability	***Low***				

Impact	*Impact Criteria*		*Significance and Ranking (Pre-mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-mitigation)*	*Confidence Level*
site may evoke negative sentiments from surrounding viewers. ▪ Surface disturbance during decommissioning would expose bare soil (scarring) which could visually contrast with the surrounding environment. ▪ Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact. ▪ Decommissioned infrastructure left on the site may be visually intrusive.				▪ Maintain a neat decommissioning site by removing rubble and waste materials regularly. ▪ Ensure that dust suppression procedures are maintained on all gravel access roads throughout the decommissioning phase. ▪ All cleared areas should be rehabilitated as soon as possible.		
CUMULATIVE – CONSTRUCTION PHASE						
▪ Additional renewable energy and associated grid connection infrastructure developments in the broader area will alter the natural character of the study area towards a more industrial landscape and expose a greater number of receptors to visual impacts. ▪ Visual intrusion of multiple renewable energy developments may be exacerbated, particularly in more natural undisturbed settings. ▪ Additional REFs in the area would generate additional traffic on gravel	***Status***	***Negative***	Moderate (3)	▪ Carefully plan to minimise the construction period and avoid construction delays. ▪ Where possible, restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting. ▪ Position storage/stockpile areas in unobtrusive positions in the landscape, where possible. ▪ Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.	*Moderate (3)*	*Medium*
	Spatial Extent	***Local***				
	Duration	***Short Term***				
	Consequence	***Substantial***				
	Probability	***Very Likely***				
	Reversibility	***High***				
	Irreplaceability	***Low***				

Impact	*Impact Criteria*		*Significance and Ranking (Pre-mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-mitigation)*	*Confidence Level*
roads thus resulting in increased impacts from dust emissions and dust plumes.				▪ Vegetation clearing should take place in a phased manner. ▪ Make use of existing gravel access roads where possible. ▪ Limit the number of vehicles and trucks travelling to and from the proposed sites, where possible. ▪ Ensure that suitable dust suppression techniques are implemented: o on all access roads; o in all areas where vegetation clearing has taken place; and o on all soil stockpiles. ▪ Maintain a neat construction site by removing litter, rubble and waste materials regularly.		
CUMULATIVE – OPERATIONAL PHASE						
▪ Additional renewable energy and associated grid connection infrastructure developments in the broader area will alter the natural character of the study area towards a more industrial landscape and expose a greater number of receptors to visual impacts. ▪ Visual intrusion of multiple renewable energy developments may be exacerbated, particularly in more natural undisturbed settings. ▪ Additional REFs in the area would generate additional traffic on gravel	***Status***	***Negative***	Moderate (3)	▪ Where possible, limit the amount of security and operational lighting associated with the power line development. ▪ Where possible, avoid placing lights on pylon structures. ▪ As far as possible, limit the number of maintenance vehicles which using access roads. ▪ Ensure that suitable dust suppression techniques are implemented on all gravel access roads.	*Moderate (3)*	*Medium*
	Spatial Extent	***Local***				
	Duration	***Long term***				
	Consequence	***Substantial***				
	Probability	***Very Likely***				
	Reversibility	***Moderate***				
	Irreplaceability	***Low***				

Impact	*Impact Criteria*		*Significance and Ranking (Pre-mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-mitigation)*	*Confidence Level*
roads thus resulting in increased impacts from dust emissions and dust plumes.				▪ Buildings on the site should be painted with natural tones that fit with the surrounding environment. ▪ Non-reflective surfaces should be utilised where possible.		
CUMULATIVE – DECOMMISSIONING PHASE						
▪ Additional renewable energy and associated grid connection infrastructure developments in the broader area will alter the natural character of the study area towards a more industrial landscape and expose a greater number of receptors to visual impacts. ▪ Visual intrusion of multiple renewable energy developments may be exacerbated, particularly in more natural undisturbed settings. ▪ Additional REFs in the area would generate additional traffic on gravel roads thus resulting in increased impacts from dust emissions and dust plumes.	***Status***	***Negative***	Low (4)	▪ All infrastructure that is not required for post-decommissioning use should be removed. ▪ Carefully plan to minimize the decommissioning period and avoid delays. ▪ Position storage/stockpile areas in unobtrusive positions in the landscape, where possible ▪ Maintain a neat decommissioning site by removing rubble and waste materials regularly. ▪ Ensure that dust suppression procedures are maintained on all gravel access roads throughout the decommissioning phase. ▪ All cleared areas should be rehabilitated as soon as possible.	*Low (4)*	*Medium*
	Spatial Extent	***Local***				
	Duration	***Short term***				
	Consequence	***Moderate***				
	Probability	***Very Likely***				
	Reversibility	***High***				
	Irreplaceability	***Low***				

D.2.2.5 Concluding Statement

The impact assessment was undertaken for only the main components of the project i.e. the overhead transmission power line and supporting infrastructure. The study excluded ancillary components such as lay-down areas and construction camps. This study evaluated the visual impact of the project with a view to assessing its severity based on the visual specialist's experience, expert opinion and accepted techniques.

The description of the visual impacts of the phases of construction and decommissioning are not considered as significant visual impacts since the period of activity is of relatively short duration and of a primary impact (localized, of short duration and easily mitigated at the end of the phase). The fact that disturbed areas, e.g. camps / lay-down areas will be rehabilitated also reduces the impacts of these phases.

Although the operational phase represents a longer-term impact, the impact significance is low. This is due primarily to the industrial transformation associated with mining, the Sasol Secunda facility and existing extensive power line networks in the study area which collectively reduce the level of contrast that the proposed project will have with the surrounding landscape.

Based on the field observations and subsequent impact assessment, it is the specialist's opinion that the potential visual impacts associated with the proposed Vhuvhili EGI are negative and of moderate significance. Given the absence of sensitive receptors and the significant level of human transformation and landscape degradation in areas near the proposed Vhuvhili EGI, the project is deemed acceptable from a visual perspective and the EA should be granted. The specialist is of the opinion that the impacts associated with the construction, operation and decommissioning phases can be mitigated to acceptable levels provided the recommended mitigation measures are implemented.

D.2.3 Heritage Impact Assessment (Archaeology and Cultural Landscape)

The Heritage Impact Assessment was undertaken by Dr Jayson Orton to inform the outcome of this BA from an archaeology and cultural landscape perspective. As noted above, an integrated Heritage Impact Assessment containing Archaeology, Cultural Landscape and Palaeontology has been undertaken for the project. However, for ease of reference, this section only deals with the Archaeology and Cultural Landscape. The complete Heritage Impact Assessment is included in Appendix D.3 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Heritage Impact Assessment. The information below is extracted from Orton (2022) (Appendix D.3 of the BA Report).

D.2.3.1 Approach and Methodology

A Heritage Impact Assessment is a means of identifying any significant heritage resources before development begins so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. The Heritage Impact Assessment aims to fulfil the requirements of the heritage authorities such that a comment can be issued by them for consideration by the Mpumalanga DARDLEA. The Heritage Impact Assessment outlines any management and/or mitigation requirements that will need to be complied with from a heritage point of view and that should be included in the conditions of authorisation should this be granted. The methodology of the Heritage Impact Assessment involved a literature review, field survey, impact assessment and grading of the sites found on site.

D.2.3.2 Relevant Project Aspects relating to Heritage Impacts

All aspects of the proposed development are relevant since excavations for foundations may impact on archaeological and/or palaeontological remains, while the above-ground aspects create potential visual (contextual) impacts to the cultural landscape and any significant heritage sites that might be visually sensitive.

D.2.3.3 Potential Impacts

The potential impacts identified during the Heritage Impact Assessment for the proposed power line project include:

Construction Phase
- Potential impacts to archaeological resources
- Potential impacts to graves
- Potential visual impacts to the cultural landscape

Operational Phase
- Potential visual impacts to the cultural landscape

Decommissioning Phase
- Potential visual impacts to the cultural landscape

Cumulative impacts
- Potential impacts to archaeological resources and graves
- Potential impacts to the cultural landscape

No indirect impacts are anticipated for the Heritage Impact Assessment.

D.2.3.4 Impact Assessment

The table below includes an assessment of the potential **direct and cumulative impacts** identified for the proposed Vhuvhili overhead transmission power line and supporting infrastructure for the construction, operational and decommissioning phases.

Impact		*Impact Criteria*		*Significance and Ranking (Pre-mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-mitigation)*	*Confidence Level*
DIRECT – CONSTRUCTION PHASE							
Damage or destruction of archaeological materials		Status	Negative	Low (4)	▪ Preconstruction survey of final alignment. ▪ Micro-siting of infrastructure where possible to minimise impacts. ▪ Report any chance finds to determine the best way forward.	Very low (5)	High
		Spatial extent	Site-specific				
		Duration	Permanent				
		Consequence	Moderate				
		Probability	Very unlikely				
		Reversibility	Non-reversible				
		Irreplaceability	High				
ALT. 1 & 2	**Damage or destruction of graves**	Status	Negative	Very Low (5)	▪ Preconstruction survey of final alignment. ▪ Micro-siting of infrastructure to avoid impacts to known graves and potential graves. ▪ Report any chance finds, protect *in situ*, and appoint archaeologist to exhume.	Very low (5)	High
		Spatial extent	Site specific				
		Duration	Permanent				
		Consequence	Extreme				
		Probability	Extremely unlikely				
		Reversibility	Non-reversible				
		Irreplaceability	High				
ALT. 3 & 4	**Damage or destruction of graves**	Status	Negative	High (2)	▪ Preconstruction survey of final alignment. ▪ Micro-siting of infrastructure to avoid impacts to known graves and potential graves. ▪ Before construction starts, the graveyard must be fenced with a farm-style wire fence with a pedestrian gate to facilitate public access. The fence must be placed a minimum of 5 m away from all graves. The power line and associated service track must be located at least 50 m from the graves. ▪ Report any chance finds, protect *in situ*, and appoint archaeologist to exhume.	Low (4)	High
		Spatial extent	Site specific				
		Duration	Permanent				
		Consequence	Extreme				
		Probability	Likely				
		Reversibility	Non-reversible				
		Irreplaceability	High				

Intrusion of facility and equipment into the landscape	Status Spatial extent Duration Consequence Probability Reversibility Irreplaceability	Negative Local Short term Moderate Very likely High Low	Low (4)	▪ Minimise duration of construction period. ▪ Make use of existing tracks where possible for final alignment. ▪ Ensure effective rehabilitation of areas not needed during operation.	Very Low (5)	High
DIRECT – OPERATIONAL PHASE						
Intrusion of facility into the landscape	Status Spatial extent Duration Consequence Probability Reversibility Irreplaceability	Negative Local Long term Slight Very likely High Low	Very low (5)	▪ Ensure that all maintenance vehicles and activities stay within designated areas.	Very low (5)	High
DIRECT – DECOMMISSIONING PHASE						
Intrusion of facility and equipment into the landscape	Status Spatial extent Duration Consequence Probability Reversibility Irreplaceability	Negative Local Short term Moderate Very likely High Low	Low (4)	▪ Minimise duration of decommissioning period. ▪ Ensure effective rehabilitation of all areas after completion.	Very low (5)	High
CUMULATIVE IMPACTS						
Impacts to archaeology and graves	Status Spatial extent Duration Consequence Probability Reversibility Irreplaceability	Negative Regional Permanent Moderate Unlikely Non-reversible High	Low (4)	▪ Micro-siting of infrastructure where possible to minimise impacts, but this is not mandatory due to the low cultural significance. ▪ Report any chance finds to determine the best way forward.	Very low (5)	High
Intrusion of facility and equipment into the landscape	Status Spatial extent Duration Consequence Probability Reversibility	Negative Regional Long term Slight Very likely High	Very low (5)	▪ Minimise duration of construction period. ▪ Minimise cut-and-fill and landscape scarring in general. ▪ Ensure effective rehabilitation of areas not needed during operation.	Very low (5)	High

D.2.3.5 Concluding Statement

The vast majority of the proposed corridors is likely to be of low sensitivity but two areas within the Alternatives 3 and 4 corridors are of high sensitivity because of known graves. Despite their 50 m buffers being wholly within the corridors, these areas should still be readily avoided through spanning of the power line and, if they are, there is no reason why the development should not be allowed to proceed with Alternatives 3 or 4. Alternatives 1 and 2 have no significant concerns. It is thus the opinion of the heritage specialist that the proposed power line should be authorised in its entirety with any alternative, but it is noted that Alternatives 1 and 2 are strongly preferred.

D.2.4 Palaeontology Impact Assessment

The Palaeontology Impact Assessment was undertaken by Prof. Marion Bamford to inform the outcome of this BA from a palaeontological perspective. As noted above, an integrated Heritage Impact Assessment containing Archaeology, Cultural Landscape and Palaeontology has been undertaken for the project. However, for ease of reference, this section only deals with the Palaeontology. The complete Heritage Impact Assessment is included in Appendix D.3 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Palaeontology input to the Heritage Impact Assessment. The information below is extracted from Bamford (2022) (Appendix D.3 of the BA Report).

D.2.4.1 Approach and Methodology

The approach to this palaeontological heritage study can be briefly summarized as follows. The likelihood of fossils and the fossil types associated with the rock types occurring in the affected areas was determine from geological maps, literature, palaeontological databases, published and unpublished records. Sources included records housed at the Evolutionary Studies Institute at the University of the Witwatersrand and SAHRA databases. Based on this data as well as field examination of representative exposures of all major sedimentary rock units present across the entire power line corridor, both within and in the vicinity of the project footprint, the impact significance, including cumulative impacts, of the proposed power line development was assessed. Recommendations for any further studies or mitigation were also outlined for inclusion within the EMPr.

D.2.4.2 Relevant Project Aspects relating to Palaeontological Impacts

All aspects of the proposed development are relevant since excavations for foundations may impact on archaeological and/or palaeontological remains.

D.2.4.3 Potential Impacts

The potential impacts identified during the Palaeontology Impact Assessment are the same for all four proposed alternative power line routings.

The key impacts on local palaeontological heritage resources considered are direct and relate to the potential disturbance, damage, destruction or sealing-in of scientifically-important and legally-protected fossils preserved beneath the surface of the ground due to construction phase excavations (e.g. pylon foundations).

The north-eastern start-portion of the proposed power line corridor and the proposed Vhuvhili on-site substation hubs (both alternatives) are on potentially very highly sensitive rocks of the Vryheid Formation (Ecca Group, Karoo Supergroup) associated with the coal seems that could preserve fossil plants of the *Glossopteris* flora. No fossils are likely to occur in the overlying soils but might occur below ground in undisturbed shales. Potential fossils would only be discovered once excavations commence for foundations for pylons, substations and infrastructure. Therefore, the impacts identified only apply to the construction phase of the proposed developments since further significant impacts on fossil heritage during the operational and decommissioning phases of the power lines are not anticipated.

Monitoring of the rocks excavated by the responsible person, then mitigation in the form of rescuing and collection of fossils means they will not all be destroyed but will be preserved for future generations and scientific research. Residual negative impacts from inevitable loss of some fossil heritage would be partially offset by an improved palaeontological database for the study region as a direct result of appropriate mitigation. This is a positive outcome because any new, well-recorded and suitably-curated fossil material would constitute a useful addition to scientific understanding.

Construction Phase

- Disturbance, damage or destruction of fossils within the development footprint due to excavations.

Cumulative impacts

- Disturbance, damage or destruction of fossils within the development footprint due to excavations.

No indirect impacts were identified for the Palaeontology Impact Assessment.

D.2.4.4 Impact Assessment

The table below includes an assessment of the potential **direct and cumulative impacts** identified for the proposed Vhuvhili overhead transmission power line corridor and supporting infrastructure for the **construction phase** as no impacts are anticipated for the operational and decommissioning phases.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
CONSTRUCTION PHASE						
Vhuvhili on-site substation connections: Damage or destruction of palaeontological materials in excavations	*Status*	Neutral	Low (4)	▪ During excavations the rocks and discard must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone or trace fossils) should be put aside in a suitably protected place. This way the project activities will not be interrupted. ▪ Monitoring for fossil remains on an on-going basis by Environmental Site Officer (ESO) during the construction phase. ▪ Application of Chance Fossil Finds Protocol.	Very low (5)	High
	Spatial Extent	Site specific				
	Duration	Very short				
	Consequence	Moderate				
	Probability	Very likely				
	Reversibility	Non-reversible				
	Irreplaceability	Moderate				
Power line corridor between Vhuvhili SEF and Mukondeleli WEF: Damage or destruction of palaeontological materials in excavations	*Status*	Neutral	None		None	High
	Spatial Extent	Site specific				
	Duration	Very short				
	Consequence	Moderate				
	Probability	Very unlikely				
	Reversibility	Non-reversible				
	Irreplaceability	Moderate				
Mukondeleli switching station connections: Damage or destruction of palaeontological materials in excavations	*Status*	Neutral	None		None	High
	Spatial Extent	Site specific				
	Duration	Very short				
	Consequence	Moderate				
	Probability	Very unlikely				
	Reversibility	Non-reversible				
	Irreplaceability	Moderate				

D.2.4.5 Concluding Statement

The north-eastern portion of the power line corridor (four alternatives) is on potentially fossiliferous Vryheid Formation rocks, but no fossils would occur on the ground surface. However, potential fossils might occur below ground. Therefore, the Chance Fossil find protocol appended to the EMPr (Appendix F of the EMPr, that is included in Appendix G of this BA Report) should be followed. The overhead power line route between the proposed Vhuvhili on-site substations hubs and the Mukondeleli switching stations is on non-fossiliferous dolerite so no impact on fossils is expected.

No areas of High Palaeosensitivity or No-Go Areas have been identified within the proposed corridor. Most – indeed probably all – fossil sites could be mitigated in the construction phase with the application of the Chance Fossil find protocol. The impact would only be during the construction phase. The impact before mitigation is **low**, and the impact post-mitigation is **very low**.

The following palaeontological mitigation and monitoring is recommended for the proposed power line project under consideration here, and are included in the EMPr:

- Once the final power line routing is determined and confirmed, a specialist palaeontological survey or “walk down” of the north-eastern portion of the corridor, situated on potentially fossiliferous rock, should be undertaken by a qualified palaeontologist in the pre-construction phase, post-EA. The walk down would focus on potentially-sensitive, previously unsurveyed sectors of the power line footprint, such as areas of extensive mudrock exposure along drainage lines, erosion gullies and bedrock ridges. Previously recorded as well as any new fossil sites of scientific or conservation value within the corridor should be mitigated through recording and collection / sampling of fossil material and associated geological data. The palaeontologist responsible will need to submit beforehand a Work Plan for approval by MHRA. The ensuing mitigation report should make recommendations for any further palaeontological input (if any) in the Pre-construction and Construction Phases. The fossil material collected must be curated in an approved repository (museum / university collection). Standards for palaeontological reporting and mitigation have been established SAHRA (2013); and
- During the Construction Phase of the power line project, a standard Chance Fossil Finds Protocol will apply, to be implemented by the ECO / ESO and, where necessary, a palaeontological specialist (see Appendix F of the EMPr, that is included in Appendix G of this BA Report). The ECO / ESO responsible for the development should be made aware of the possibility of fossil remains (fossil plants, vertebrates, invertebrates or trace fossils etc.) being found or unearthed during the construction phase of the development. Monitoring for fossil material of all excavations by the ESO on an on-going basis during the construction phase is therefore recommended. Significant fossil finds should be safeguarded and reported at the earliest opportunity to the MHRA for recording and sampling by a professional palaeontologist.

There are no identified fatal flaws and no objections on palaeontological heritage grounds to authorisation of the proposed power line project (all four alternative routings) on condition that (i) the recommended mitigation measures and (ii) the Chance Fossil Finds Protocol as discussed above, are implemented in full during the Construction Phase.

D.2.5 Terrestrial Biodiversity and Species

The Terrestrial Biodiversity and Species Assessment was undertaken by Dr Noel van Rooyen and Prof. Gretel van Rooyen to inform the outcome of this BA from a terrestrial biodiversity, terrestrial plant species and animal species perspective. The avifaunal (animal species) component is excluded from this assessment and addressed by the avifaunal specialist as discussed in Section D.2.7. The complete Terrestrial Biodiversity and Species Assessment is included in Appendix D.4 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Terrestrial Biodiversity and Species Assessment. The information below is extracted from Van Rooyen & Van Rooyen (2022) (Appendix D.4 of the BA Report).

D.2.5.1 Approach and Methodology

The approach and methodology adopted in the Terrestrial Biodiversity and Species Assessment is described in this section.

The study commenced as a desktop study, followed by field-based surveys in December 2021. October to March is the main rainy season when about 86% of the annual rainfall occurs. The site was thus assessed during favourable environmental conditions.

The focus of the site visit was:

- to undertake a site sensitivity verification in order to confirm the current land use and environmental sensitivity as identified in the screening tool; and
- to conduct surveys (fauna and flora) of the Vhuvhili SEF and gridline sites to identify sensitive habitats, to classify the vegetation into habitats (or plant communities), compile species lists and to search for SCC. According to SANBI's (SANBI 2020) definition of SCC, these are species that have a high conservation importance in terms of preserving South Africa's high floristic and faunal diversity and include not only threatened species, but also those classified as Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare, Declining, Data Deficient - Insufficient Information (DDD) and Data Deficient – Taxonomic (DDT) (www.redlist.SANBI.org).

Hard copy and digital information from spatial databases, such as SANBI's BGIS for maps of Critical Biodiversity Areas, Protected Areas, NPAES, FEPAs; the geological survey maps (2628 East Rand); land type maps (2628 East Rand); topo-cadastral maps (2629CA SECUNDA and 2629CB BAANBREKER 1:50 000 maps); vegetation types of SANBI (2006 – 2018); NewPOSA database of SANBI; and databases of the Animal Demography Unit, University of Cape Town, as well as literature were sourced to provide information on the environment and biodiversity of the study area.

Satellite images (Google Earth) were used to stratify the area into relatively homogeneous terrain/vegetation units. The vegetation survey consisted of visiting the mapped units and systematically recording plant species on site, and estimating their canopy cover. A total of 26 sample plots were surveyed on the Vhuvhili site. However, a further 54 sample plots were surveyed on the Mukondeleli and Impumelelo sites in the nearby region and the total of 80 sample plots were used to compile a differential table (Appendix A) to identify the habitats (or plant communities) for the region. Physical habitat features were also noted. During the site visit, digital photographs were taken and representative photographs of the different habitats are included in the report. The site was also surveyed for rare, threatened and/or endemic plant species during the site visit.

The animal site survey was limited to day-time visual assessments on site. Animal species presence on site was mainly attained by means of direct or indirect sighting methods (animals, spoor, burrows, scats, sounds), whilst traversing the site by vehicle or on foot. Red-listed species are generally uncommon and/or localised and the survey may have been insufficient to record their presence at or near the proposed development. Furthermore, the owners of the participating farms were consulted regarding sightings of especially mammals species on the properties. Please note the avifauna was assessed in the avifaunal specialist assessment.

D.2.5.2 Relevant Project Aspects relating to Terrestrial Biodiversity and Species Impacts

The development of an overhead transmission power line and supporting infrastructure within the study area will by necessity, be undertaken on land that meets a number of criteria including, inter-alia, level or gradual falls, generally suitable founding conditions and avoidance of areas that may be inundated by flooding. As a consequence, the proposed power line project will avoid all riverine and wetland environments. The implementation of the proposed development will result in insignificant change to the prevailing catchment associated with the river systems in the area, primarily on account of the construction phase, as well as the long-term operational stage.

The commencement of construction on site will entail low to insignificant alteration of the prevailing habitat, depending upon the final design and layout of the power line routing. While the construction phase will see temporary disturbances and transformation to the environment, these impacts on the prevailing ecology are of short temporal extent, and likely to be of low to very low significance in terms of impact as the construction project rolls out and a stability arises on the site.

D.2.5.3 Potential Impacts

A number of direct, indirect and cumulative impacts on the localised and broader ecology of the region can be identified as a consequence of the implementation of the proposed project. Direct impacts are those that are directly attributable to the implementation and operation of the project, while indirect impacts are consequential effects of the proposed project that may not be directly attributable to the development. Cumulative impacts are those externalities that arise from the proposed development and compound existing effects or influences on the ecology of the region. These potential impacts occur during the construction, operational and decommissioning phases, as relevant, and are listed below.

Construction Phase:

- Direct Impacts
    - The clearing of natural vegetation
    - The loss of threatened, protected, CITES listed and/or endemic plants/animals
    - Loss of faunal habitat
    - Direct faunal mortalities due to construction and increased traffic
    - Increased dust deposition
    - Increased human activity and associated increased noise levels.
- Indirect Impacts
    - Establishment of alien vegetation

Operational Phase:

- Direct Impacts
    - Refer to avifaunal assessment, if applicable
- Indirect Impacts
    - Establishment of alien vegetation

Decommissioning Phase:

- Direct Impacts
    - Direct faunal mortalities
    - Increased dust deposition.
- Indirect Impacts
    - Establishment of alien vegetation

Cumulative Impacts:

The cumulative assessment considers all the proposed Vhuvhili power line, and three other renewable energy projects including its associated EGI that have received EA or are in the EA application process within 50 km of the assessed power line corridor. The cumulative impact assessment also considers other proposed, approved and existing power lines within the 50 km radius.

Given the above, cumulative impacts arising from the implementation of this project and other land use changes in the region are likely to exhibit the following:

- Cumulative impact 1: Vegetation loss and habitat destruction
- Cumulative impact 2: Compromising integrity of CBA, ESA and NPAES
- Cumulative impact 3: Reduced ability to meet conservation obligations and targets
- Cumulative impact 4: Loss of landscape connectivity and disruption of broad-scale ecological processes.

D.2.5.4 Impact Assessment

The table below includes an assessment of the potential **direct and indirect impacts** identified for the Vhuvhili overhead transmission power line and supporting infrastructure for the **construction phase**.

Impact	*Impact Criteria (after mitigation)*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
DIRECT – CONSTRUCTION PHASE						
The clearing of natural vegetation	Status	Negative	Low (4)	▪ Vegetation clearance should be confined to the footprint of the development and unnecessary clearance should be avoided. The severity of the vegetation clearance can be mitigated if only a service road would be cleared and a vegetative ground layer would be retained in the rest of the servitude. ▪ Construction crew, in particular the drivers, should undergo environmental training (induction) to increase their awareness of environmental concerns. This includes awareness as to remaining within demarcated construction areas, no littering, handling of pollution and chemical spills, avoiding fire hazards and minimising wildlife interactions. ▪ Ensure that all temporary use areas e.g. laydown areas and construction camp, are located in areas of low sensitivity. ▪ Footprints of the pylons, roads and substation locations should be clearly demarcated. ▪ Water courses and wetlands should be avoided by placing pylons outside their buffer zones (see Figure D.5). ▪ All vehicles are to remain on demarcated roads and no driving through the veld should be allowed.	Low (4)	Medium
	Spatial Extent	Site specific				
	Duration	Medium term				
	Consequence	Moderate (considering entire site)				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				

Impact	*Impact Criteria (after mitigation)*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
				▪ The ECO is to provide supervision on vegetation clearing activities and other activities that may cause damage to the environment. ▪ No plants may be translocated or otherwise uprooted or disturbed without express permission from the ECO.		
The loss of threatened, protected & endemic plant and animal species	Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Negative Site specific Long-term Slight Unlikely Low Moderate	Very Low (5)	▪ Placement of infrastructure should be done in such a way as to minimise the impact on protected species. ▪ The construction crew should undergo environmental training (induction) to make them aware of the importance of protected species.	Very Low (5)	Medium
Loss of faunal habitat	Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Negative Site-specific Long-term Moderate Likely Moderate Moderate	Low (4)	▪ Vegetation clearance should be confined to the smallest possible footprint of the development and unnecessary clearance should be avoided. ▪ Construction crew should undergo environmental training (induction) to increase their awareness of environmental concerns. ▪ Speed limits should be set on all roads on site and strictly adhered to. ▪ Development should avoid wetlands and drainage channels and buffer zones along drainage lines should be observed. ▪ Proper waste management procedures should be in place to avoid waste lying around and to remove all waste material from the sites. ▪ Observe buffer zones along drainage lines as mapped in Figure D.5.	Very low (5)	Medium
Direct faunal mortalities	Status Spatial Extent Duration Consequence Probability Reversibility	Negative Site specific Short-term Slight Likely Low	Low (4)	▪ Construction crew, in particular the drivers, should undergo environmental training to increase their awareness of environmental concerns in order to reduce the number of kills during construction and on roads. The crew	Very low (5)	Medium

Impact	***Impact Criteria (after mitigation)***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
	Irreplaceability	Moderate		should also be made aware of not harming or collecting species such as snakes, tortoises and owls. ▪ Proper waste management procedures should be in place to avoid litter, food or other foreign material from lying around and all waste material should be removed from the site. ▪ Speed limits should be set on all roads on site and strictly adhered to. ▪ Personnel should not be allowed to roam into the veld. ▪ Ensure that cabling and electrical infrastructure at the site are buried sufficiently deep to avoid being excavated by fauna and that where such infrastructure emerges above-ground that it is sufficiently protected from gnawing animals. ▪ Any dangerous fauna (e.g. snakes, scorpions) that are encountered during construction should not be handled or molested by construction staff and the ECO (or other suitably qualified person) should be contacted to remove the animals to safety. ▪ If there is any part of the site that needs to be lit at night for security reasons, then appropriate lighting should be installed to minimise negative effects on nocturnal animals. ▪ Should electrical fences be erected it must be done according to the norms and standards of the Nature Conservation Authorities in Mpumalanga. ▪ Access to the site should be regulated to reduce the opportunities for poaching.		

Impact	***Impact Criteria (after mitigation)***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
Increased dust deposition	Status	Negative	Very low (5)	▪ Excessive dust can be reduced by spraying water onto the roads or other disturbed areas during construction activities.	Very low (5)	High
	Spatial Extent	Site specific				
	Duration	Short-term				
	Consequence	Slight				
	Probability	Unlikely				
	Reversibility	High				
	Irreplaceability	-				
Increased human activity and noise	Status	Negative	Moderate (3)	▪ The SANS standards should be adhered to in terms of noise levels. ▪ No construction should be done at night. ▪ Appropriate lighting should be installed to minimise negative effects on nocturnal animals.	Low (4)	High
	Spatial Extent	Site specific				
	Duration	Short-term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	-				
INDIRECT – CONSTRUCTION PHASE						
Establishment of alien vegetation	Status	Negative	Low (4)	▪ Implement a monitoring program for the early detection of alien invasive plant species. ▪ A control program should be employed to combat declared alien invasive plant species in the most environmentally friendly manner that does not result in undesirable secondary impacts. ▪ Herbicides for the control of alien species should be applied according to the relevant instructions and by appropriately trained personnel. ▪ No alien species should be used in rehabilitation or landscaping. ▪ Use only plants and seed collected on-site for revegetation. ▪ Cleared areas may need to be fenced-off during rehabilitation to exclude livestock and wildlife. ▪ Material brought onto site e.g. building sand should be regularly checked for the germination of alien species.	Very low (5)	Medium
	Spatial Extent	Local				
	Duration	Long-term				
	Consequence	Slight				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				

The Terrestrial Biodiversity specialist referred to the Specialist Avifaunal Assessment for direct impacts identified for the Vhuvhili overhead transmission power line and supporting infrastructure for the operational phase. The table below includes an assessment of the potential **indirect impacts** identified for the Vhuvhili overhead transmission power line and supporting infrastructure for the **operational phase**.

Impact	*Impact Criteria (after mitigation)*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
INDIRECT – OPERATIONAL PHASE						
Establishment of alien vegetation	Status	Negative	Low (4)	▪ Implement a monitoring program for the early detection of alien invasive plant species and a control program to combat declared alien invasive plant species should be employed. ▪ No alien species should be used for landscaping, rehabilitation or any other purpose. ▪ Clearing of alien species should be done on a regular basis.	Very low (5)	Medium
	Spatial Extent	Local				
	Duration	Long-term				
	Consequence	Slight				
	Probability	Likely				
	Reversibility	Moderate				
	Irreplaceability	Low				

The table below includes an assessment of the potential **direct and indirect impacts** identified for the Vhuvhili overhead transmission power line and supporting infrastructure for the **decommissioning phase**.

Impact	*Impact Criteria (after mitigation)*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
DIRECT – DECOMMISSIONING PHASE						
Increased dust deposition	Status	Negative	Very low (5)	▪ Excessive dust can be reduced by spraying water onto the roads or other disturbed areas during construction activities.	Very low (5)	High
	Spatial Extent	Site specific				
	Duration	Short-term				
	Consequence	Slight				
	Probability	Unlikely				
	Reversibility	High				
	Irreplaceability	-				
Direct faunal mortalities	Status	Negative	Very low (5)	▪ Decommissioning crew should undergo environmental training to increase their awareness of environmental concerns. ▪ Speed limits should be adhered to.	Very low (5)	Medium
	Spatial Extent	Site specific				
	Duration	Short-term				
	Consequence	Slight				
	Probability	Unlikely				
	Reversibility	Moderate				

	Irreplaceability	Low		▪ Proper waste management procedures should be in place and no material should be left on site in order to prevent instances of ensnarement or ingestion of foreign material.		
INDIRECT – DECOMMISSIONING PHASE						
Establishment of alien vegetation	Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Negative Local Long-term Slight Likely Moderate Low	Low (4)	▪ Implement a monitoring program for at least three years after decommissioning to document vegetation recovery and alien infestation across the site. ▪ A control program to combat declared alien invasive plant species should be employed. ▪ Areas where infrastructure are removed, must be revegetated with indigenous plant species. ▪ No alien species should be used for rehabilitation/revegetation or any other purpose.	Very low (5)	Medium

The table below includes an assessment of the potential **cumulative impacts** identified for the Vhuvhili overhead transmission power line and supporting infrastructure for the **construction and operational phases**.

Impact	***Impact Criteria (after mitigation)***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
Loss of vegetation, habitat and threatened species	Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Negative Regional Long-term Substantial Likely Moderate Low	Moderate (3)	▪ All projects should adhere to the site-specific recommendations of the ecologists to ensure that impacts are mitigated where possible. ▪ Placement of infrastructure should be done in such a way that no SCC are affected, and CBAs avoided. ▪ Location of the pylons in the most environmentally responsible manner is crucial.	Low (4)	Medium

Compromising integrity of CBA, ESA and NPAES	Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Negative Regional Long-term Moderate Likely Low to Moderate Low	Moderate (3)	▪ Placement of infrastructure should strive to avoid CBAs. ▪ Minimise the development footprint as far as possible. ▪ Maintain a vegetation ground layer in the gridline servitude. ▪ Stringent construction-phase monitoring of activities at the site to ensure that mitigation measures are adhered to and that the overall ecological impact of the development is maintained at a low level. ▪ Align roads and other infrastructure so that transformation within the CBAs is minimised. ▪ The use of structures which may inhibit movement of fauna, e.g. mesh or electric fencing should be avoided, where feasible.	Moderate (3)	Medium
Reduced ability to meet conservation obligations & targets	Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Negative Regional Long-term Moderate Likely Moderate Low	Moderate (3)	▪ Minimise the development footprint as far as possible. ▪ Avoid highly sensitive habitats (wetlands) and CBAs as mapped in Figure D.7 and Figure D.8).	Low (4)	Medium
Loss of landscape connectivity and disruption of broad-scale ecological processes	Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Negative Regional Long-term Moderate Unlikely Moderate Low	Low (4)	▪ Minimising the development footprint wherever possible. ▪ Revegetation of all cleared and bare areas created by the facility with local plant species. ▪ Fences and other structures which impede faunal movement should be avoided. ▪ Roads should not have steep curbs.	Low (4)	Medium

D.2.5.5 Concluding Statement

The overall impact significance (with the implementation of mitigation measures) associated with the proposed power line project was rated as **low to medium**. In summary, the following:

- Since the development footprint is expected to be relatively small, the loss of habitat within the Soweto Highveld Grassland vegetation type will be fairly small. However, the terrestrial biodiversity impact assessment was based on the assumptions (i) only a service road would be cleared and a vegetative ground layer would be retained beneath the rest of the servitude; and (ii) where the vegetation was destroyed at the pylon sites during construction, that it will be rehabilitated and allowed to recover.
- **From an ecological point of view, large portions of the site have been heavily modified (compared to the CBA map, see Figure B.12)** and not prime examples of the Soweto Highveld Grassland. If the development is thus contained within the heavily modified areas it would not affect the status of the vegetation type since these modified areas were already considered in the allocation of a vulnerable status.
- The wetland habitat was rated as highly sensitive in the current assessment (see Figure B.14). The gridline pylons should not be positioned in this habitat.
- Most of the habitats covered by the proposed infrastructure were rated as having a low sensitivity.
- None of the SCC highlighted by the screening tool were encountered on site, thus the impact on populations of threatened or protected species will be negligible if all mitigation measures are applied.

Provided the positioning of gridline infrastructure takes the sensitive habitats, CBAs and Highveld Wetlands into consideration, the resulting **low sensitivity rating and low impact significance** for many of the habitats means the project could go ahead, provided all mitigation measures and management actions proposed to conserve protected fauna and flora on the site, are taken into consideration. The specialist thus recommended authorisation of the project provided all mitigation measures are implemented.

D.2.6 Aquatic Biodiversity

The Aquatic Biodiversity Impact Assessment was undertaken by Lorainmari den Boogert to inform the outcome of this BA from an aquatic biodiversity perspective. The complete Aquatic Biodiversity Assessment is included in Appendix D.5 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Aquatic Biodiversity Assessment. The information below is extracted from den Boogert (2022) (Appendix D.5 of the BA Report).

D.2.6.1 Approach and Methodology

Prior to the site visit, the sampling points for the aquatic assessment were selected based on hydrology, the area of influence as well as current land use and site access. Two sets of data are required in order to interpret the results of biomonitoring surveys, namely data from a reference condition site, where habitat conditions are expected to be relatively undisturbed, and data from an affected condition site (or affected site), where the influences resulting from a land-use is expected to have created stressors in the habitats of the aquatic biota. A total of five (5) sampling points were selected for the 2022 baseline aquatic assessment positioned upstream and downstream of the proposed power line corridor.

Following a desktop assessment highlighting wetland areas to be ground-truthed in the field, soil and vegetation sampling on site informed a fine scale delineation. With regards to large study areas selective points are surveyed using fine scale techniques and extrapolation is used for the rest of the wetland sections and in some instances where survey was limited to external conditions extrapolation is also used for areas where surveys could not be conducted. Information is also drawn from previous work in the area, and any additional reports or information available

The site visit was conducted in the week of the 1st to the 4th of February 2022 by the wetland specialist, Rudi Bezuidenhoudt. The aquatic specialist, Andre Strydom, conducted the site visits in January 2022 (3rd to 7th) but not all sites could be sampled due to access issues. An additional site visit was conducted on 3-5th of February 2022 but the aquatic ecosystems were in flood and hence the survey aborted. The final site visit was conducted on the 22nd to 24th of February 2022. The surveys were therefore conducted in the summer or high flow season. No dry season surveys were conducted as part of the assessment.

A smartphone was used to capture GPS co-ordinates in the field. 1:50 000 cadastral maps and available GIS data were used as reference material for the mapping of the preliminary watercourse boundaries. These were converted to digital image backdrops and delineation lines and boundaries were imposed accordingly after the field survey.

All data collected in the field and considered during desktop assessments of existing freshwater ecosystem information for the study area and surrounding catchments, as well as by a more detailed assessment of the freshwater features on the various farm portions that comprise the study area, was evaluated and interpreted in order to provide an understanding of the nature of the prevailing environment at a landscape and habitat level, together with specific evaluation of data relating to habitat form and structure. The following techniques and methodologies were utilised to undertake the assessments:

- The wetland delineation method documented by the DWS in their document “Updated manual for identification and delineation of wetlands and riparian areas” (DWAF, 2008), as well as the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems (Ollis et al., 2013) was followed throughout the field survey.
- The present ecological condition of the watercourses and wetlands was determined using the national River Health Programme and Wet-Health methodologies;
- The ecological importance and ecological sensitivity (EI&ES) assessment of the wetlands and watercourses was conducted according to the guidelines as developed by DWAF (1999), and using the WetEcoServices guidelines, (Water Research Commission, 2006). The assessment of potential impacts follows the 2014 NEMA regulations (as amended);
- Recommendations made concerning the adoption of buffer zones within the site were based on watercourse and wetland functioning and site characteristics.
- The potential impacts to aquatic biodiversity and freshwater features by the proposed power line development have been assessed based on the criteria and impact assessment methodology provided in Section D.1.

D.2.6.2 Relevant Project Aspects relating to Aquatic Biodiversity Impacts

The development of an overhead transmission power line and supporting infrastructure within the study area will by necessity, be undertaken on land that meets a number of criteria including, inter-alia, level or gradual falls, generally suitable founding conditions and avoidance of areas that may

be inundated by flooding. As a consequence, the proposed power line routing will avoid all riverine and wetland environments. The proposed project will not alter the nature of the immediate catchment associated with such riverine environments through both the construction and operational phases. Limited change could arise primarily from changes in the rate of flow of surface water and possible alteration of the edaphics or soils within the power line corridor, as well as, to a minor extent, water chemistry and perhaps, more indirectly, the biotic components of the riverine system.

The commencement of construction on site will entail low to insignificant alteration of the prevailing aquatic habitat, depending upon the final design and layout of the power line routing. While the construction phase will see temporary disturbances and transformation to the environment, these impacts on the prevailing ecology are likely to be of low significance post-mitigation.

D.2.6.3 Potential Impacts

A number of direct and cumulative impacts on the localised and broader ecology of the region can be identified as a consequence of the implementation of the proposed project. These impacts occur during the construction, operational and decommissioning phases, as relevant, and are listed below.

Construction Phase:

- Alteration in flow regime;
- Changes in sediment regimes;
- Introduction and spread of alien vegetation;
- Loss and disturbance of riparian/watercourse habitat and vegetation;
- Alteration in water quality due to pollution; and
- Loss of aquatic biota.

Operational Phase:

- Alteration in flow regime;
- Changes in sediment regimes;
- Introduction and spread of alien vegetation;
- Loss and disturbance of riparian/watercourse habitat and vegetation;
- Alteration in water quality due to pollution; and
- Loss of aquatic biota.

Decommissioning Phase:

- Alteration in flow regime;
- Changes in sediment regimes;
- Introduction and spread of alien vegetation;
- Loss and disturbance of riparian/watercourse habitat and vegetation;
- Alteration in water quality due to pollution; and
- Loss of aquatic biota.

Cumulative Impacts:

- Alteration in flow regime;

D.2.6.4 Impact Assessment

The table below includes an assessment of the potential **direct impacts** identified for the Vhuvhili overhead transmission power line and supporting infrastructure for the **construction phase**.

Impact	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
DIRECT – CONSTRUCTION PHASE						
Changes in water flow regime	Status	Negative	Moderate (3)	▪ The proposed layout should be reviewed during the detailed designed phase (post-EA, but prior to construction), by an environmental professional (e.g. EAP, ECO or ecological specialist) to confirm that the pylon structures have been placed outside of the delineated wetland and wetland buffer zones (as mapped in Figure D.7). ▪ A temporary fence or demarcation must be erected around the working corridors or sites prior to any construction taking place to prevent disturbance to adjacent No-Go Areas, i.e. watercourse and watercourse buffers (as mapped in Figure D.7). ▪ Where development activities are located upslope from wetlands, effective stormwater management should be a priority during both construction and operational phase. High energy stormwater input into the watercourses should be prevented. This should be monitored as part of the EMPr (Appendix G of the BA report). ▪ Effective culverts should be incorporated into the design of access roads.	Low (4)	Medium
	Spatial Extent	Regional				
	Duration	Long term				
	Consequence	Moderate				
	Probability	Very likely				
	Reversibility	Low				
	Residual Impact/Risk	Low				
	Irreplaceability	Moderate				
Changes in sediment entering and exiting the system	Status	Negative	Moderate (3)	▪ The proposed layout should be reviewed during the detailed designed phase (post-EA, but prior to construction), by an environmental professional (e.g. EAP, ECO or ecological specialist) to confirm that the pylon structures have been placed outside of the delineated wetland and wetland buffer zones (as mapped in Figure D.7). ▪ A temporary fence or demarcation must be erected around the working corridors or sites prior to any construction taking place to prevent disturbance to	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Medium term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Low				
	Residual Impact/Risk	Low				

Impact	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
	Irreplaceability	High		adjacent No-Go Areas, i.e. watercourse and watercourse buffers (as mapped in Figure D.7). ▪ Where development is located upslope from wetlands, effective stormwater management including sediment barriers should be a priority during both construction and operational phase. This should be monitored as part of the EMPr. ▪ Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/earthworks in that area. ▪ Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas. ▪ Monitoring should be done to ensure that sediment pollution is timeously dressed.		
Introduction and spread of alien vegetation	Status	Negative	Moderate (3)	▪ The proposed layout should be reviewed during the detailed designed phase (post-EA, but prior to construction), by an environmental professional (e.g. EAP, ECO or ecological specialist) to confirm that the pylon structures have been placed outside of the delineated wetland and wetland buffer zones (as mapped in Figure D.7). ▪ Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish. ▪ Undertake an Alien Plant Control Plan which specifies actions and measurable targets ▪ Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/earthworks in that area and returning it where possible afterwards. ▪ Long-term monitoring for the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish, as specified in the Alien Vegetation Management Plan.	Low (4)	Medium
	Spatial extent	Local				
	Duration	Medium term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Low				
	Residual Impact/Risk	Low				
	Irreplaceability	Low				

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
				▪ Rehabilitate or revegetate disturbed areas.		
Loss and disturbance of watercourse habitat and fringe vegetation	Status	Negative	Moderate (3)	▪ The proposed layout should be reviewed during the detailed designed phase (post-EA, but prior to construction), by an environmental professional (e.g. EAP, ECO or ecological specialist) to confirm that the pylon structures have been placed outside of the delineated wetland and wetland buffer zones (as mapped in Figure D.7). ▪ Monitor the establishment of alien invasive species within the areas affected by the construction and take immediate corrective action where invasive species are observed to establish. ▪ Monitor rehabilitation and the occurrence of erosion twice during the rainy season for at least two years and take immediate corrective action where needed. ▪ Operational activities should not take place within watercourses or buffer zones, nor should edge effects impact on these areas. ▪ Operational activities should not impact on rehabilitated or naturally vegetated areas.	Low (4)	Medium
	Spatial extent	Local				
	Duration	Long term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Non-reversible				
	Residual Impact/Risk	Low				
	Irreplaceability	High				
Changes in water quality due to pollution	Status	Negative	Moderate (3)	▪ Provision of adequate sanitation facilities for personnel; these sanitation facilities must be located outside of the watercourse or its associated buffer zone. ▪ Implementation of appropriate stormwater management around the excavation to prevent the ingress of run-off into the excavation and to prevent contaminated runoff into the watercourse. ▪ The construction area must be fenced off (i.e. clearly demarcated) from the watercourses and no related impacts may be allowed into the watercourse i.e. water runoff from cleaning of equipment, vehicle access etc.	Low (4)	Medium
	Spatial extent	Local				
	Duration	Medium term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Low				
	Residual Impact/Risk	Low				

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
	Irreplaceability	Low		▪ Maintenance of construction vehicles/equipment should not take place within the watercourse or watercourse buffer. ▪ Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects. ▪ Control of waste discharges and do not allow dirty water from operational activities to enter the watercourse. ▪ Regular independent water quality monitoring should form part of operational procedures in order to identify pollution. ▪ Treatment of pollution identified should be prioritized according to best practice guidelines. ▪ Develop norms and practices for the treatment of spills such as oil or hydraulic fluid. Ensure that the required equipment is available on hand to contain any spills. ▪ Appoint a reliable contractor for the removal of refuse during the construction phase.		
Loss of aquatic biota	Status	Negative	Moderate (3)	▪ This impact is not easily mitigated. Further loss in diversity can be minimised by following the mitigation measures mentioned above	Low (4)	Medium
	Spatial extent	Local				
	Duration	Medium term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Low				
	Residual Impact/Risk	Low (4)				
	Irreplaceability	Low				

The table below includes an assessment of the potential **direct impacts** identified for the Vhuvhili overhead transmission power line and supporting infrastructure for the **operational phase**.

Impact	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
DIRECT – OPERATIONAL PHASE						
Changes in water flow regime	Status	Negative	Moderate (3)	▪ Where development activities are located upslope from wetlands, effective stormwater management should be a priority during both construction and operational phase. This should be monitored as part of the EMPr. ▪ Effective culverts should be incorporated into the design of access roads.	Low (4)	Medium
	Spatial Extent	Regional				
	Duration	Long term				
	Consequence	Moderate				
	Probability	Very likely				
	Reversibility	Low				
	Residual Impact/Risk	Low				
	Irreplaceability	Moderate				
Changes in sediment entering and exiting the system	Status	Negative	Moderate (3)	▪ Where development is located upslope from wetlands, effective stormwater management including sediment barriers should be a priority during both construction and operational phase. This should be monitored as part of the EMPr. ▪ Monitoring should be done to ensure that sediment pollution is timeously dressed.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Medium term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Low				
	Residual Impact/Risk	Low				
	Irreplaceability	High				
Introduction and spread of alien vegetation	Status	Negative	Moderate (3)	▪ Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish. ▪ Undertake an Alien Plant Control Plan which specifies actions and measurable targets ▪ Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/earthworks in that area and returning it where possible afterwards.	Low (4)	Medium
	Spatial extent	Local				
	Duration	Medium term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Low				
	Residual Impact/Risk	Low				

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
	Irreplaceability	Low		▪ Long-term monitoring for the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish, as specified in the Alien Vegetation Management Plan.		
Loss and disturbance of watercourse habitat and fringe vegetation	Status	Negative	Moderate (3)	▪ Monitor the establishment of alien invasive species within the areas affected by the construction and take immediate corrective action where invasive species are observed to establish. ▪ Monitor rehabilitation and the occurrence of erosion twice during the rainy season for at least two years and take immediate corrective action where needed. ▪ Operational activities should not take place within watercourses or buffer zones, nor should edge effects impact on these areas. ▪ Operational activities should not impact on rehabilitated or naturally vegetated areas.	Low (4)	Medium
	Spatial extent	Local				
	Duration	Long term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Non-reversible				
	Residual Impact/Risk	Low				
	Irreplaceability	High				
Changes in water quality due to pollution	Status	Negative	Moderate (3)	▪ Provision of adequate sanitation facilities for personnel; these sanitation facilities must be located outside of the watercourse or its associated buffer zone. ▪ Maintenance of construction vehicles/equipment should not take place within the watercourse or watercourse buffer. ▪ Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects. ▪ Control of waste discharges and do not allow dirty water from operational activities to enter the watercourse.	Low (4)	Medium
	Spatial extent	Local				
	Duration	Medium term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Low				
	Residual Impact/Risk	Low				

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
	Irreplaceability	Low		▪ Regular independent water quality monitoring should form part of operational procedures in order to identify pollution. ▪ Treatment of pollution identified should be prioritized according to best practice guidelines. ▪ Develop norms and practices for the treatment of spills such as oil or hydraulic fluid. Ensure that the required equipment is available on hand to contain any spills. ▪ Appoint a reliable contractor for the removal of refuse during the operational phase.		
Loss of aquatic biota	Status	Negative	Moderate	▪ This impact is not easily mitigated. Further loss in diversity can be minimised by following the mitigation measures mentioned above	Low	Medium
	Spatial extent	Local				
	Duration	Long term				
	Consequence	Moderate Negative				
	Probability	Likely				
	Reversibility	Low				
	Residual Impact/Risk	Low (4)				
	Irreplaceability	Low				

The table below includes an assessment of the potential **direct impacts** identified for the Vhuvhili overhead transmission power line and supporting infrastructure for the **decommissioning phase**.

Impact	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
DIRECT – DECOMMISSIONING PHASE						
Changes in water flow regime	Status	Negative	Moderate (3)	▪ Do not increase hardened surfaces and compaction of the soils after the removal of the solar panels and related infrastructure. ▪ Rehabilitation of exposed soil surfaces should commence as soon as practical after completion of removal of removal of the solar panels and related infrastructure. ▪ Culverts must remain in place and must not removed if the given road is not removed during the decommissioning phase. ▪ Vehicle movement should be restricted to designated decommissioning areas to prevent the increase in hardened surfaces an subsequent increase in runoff.	Low (4)	Medium
	Spatial Extent	Regional				
	Duration	Long term				
	Consequence	Moderate				
	Probability	Very likely				
	Reversibility	Low				
	Residual Impact/Risk	Low				
	Irreplaceability	Moderate				
Changes in sediment entering and exiting the system	Status	Negative	Moderate (3)	▪ Vehicle movement should be restricted to the minimum that is required for decommissioning. Unnecessary movement of vehicles will increase the degradation of paths and dirt roads leading to increased erosion risk. ▪ Progressive rehabilitation must occur. Rehabilitation has to be take place as soon as decommissioning commences to prevent soil erosion. ▪ Monitoring should be done to ensure that sediment pollution is timeously dressed.	Low (4)	Medium
	Spatial Extent	Local				
	Duration	Medium term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Low				
	Residual Impact/Risk	Low				
	Irreplaceability	High				
Introduction and spread of alien vegetation	Status	Negative	Moderate (3)	▪ Monitor the establishment of alien invasive species within the areas affected by the decommissioning and take immediate corrective action where invasive species are observed to establish. ▪ Undertake an Alien Plant Control Plan which specifies actions and measurable targets	Low (4)	Medium
	Spatial extent	Local				
	Duration	Medium term				
	Consequence	Moderate				

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
	Probability	Likely		▪ Retain vegetation and soil in position for as long as possible, removing it immediately ahead of decommissioning /earthworks in that area and returning it where possible afterwards. ▪ Rehabilitation must occur concurrently with decommissioning. ▪ The mixture of vegetation seed must be used during rehabilitation. The mix must include: Annual and perennial species, pioneer species, species which are indigenous to the area to ensure there is no ecological imbalance in the area. ▪ Long-term monitoring for the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish, as specified in the Alien Vegetation Management Plan.		
	Reversibility	Low				
	Residual Impact/Risk	Low				
	Irreplaceability	Low				
Loss and disturbance of watercourse habitat and fringe vegetation	Status	Negative	Moderate (3)	▪ Vehicle movement should be restricted to the minimum that is required for decommissioning. ▪ Rehabilitation of decommissioned areas must commence concurrently with decommissioning. ▪ Monitor the establishment of alien invasive species within the areas affected by the decommissioning and take immediate corrective action where invasive species are observed to establish. ▪ Monitor rehabilitation and the occurrence of erosion twice during the rainy season for at least two years and take immediate corrective action where needed. ▪ Decommissioning activities should not impact on rehabilitated or naturally vegetated areas.	Low (4)	Medium
	Spatial extent	Local				
	Duration	Long term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Non-reversible				
	Residual Impact/Risk	Low				
	Irreplaceability	High				
Changes in water quality due to pollution	Status	Negative	Moderate (3)	▪ Provision of adequate sanitation facilities for personnel; these sanitation facilities must be located outside of the watercourse or its associated buffer zone.	Low (4)	Medium
	Spatial extent	Local				

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
	Duration	Medium term		▪ Maintenance of construction vehicles/equipment should not take place within the watercourse or watercourse buffer. ▪ Ensure that no decommissioning activities impact on the watercourse or buffer area. This includes edge effects. ▪ Control of waste discharges and do not allow dirty water from decommissioning activities to enter the watercourse. ▪ Regular independent water quality monitoring should form part of decommissioning procedures in order to identify pollution. ▪ Treatment of pollution identified should be prioritized according to best practice guidelines. ▪ Develop norms and practices for the treatment of spills such as oil or hydraulic fluid. Ensure that the required equipment is available on hand to contain any spills. ▪ Appoint a reliable contractor for the removal of refuse during the operational phase.		
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Low				
	Residual Impact/Risk	Low				
	Irreplaceability	Low				
Loss of aquatic biota	Status	Negative	Moderate (3)	▪ This impact is not easily mitigated. Further loss in diversity can be minimised by following the mitigation measures mentioned above	Low (4)	Medium
	Spatial extent	Local				
	Duration	Long term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	Low				
	Residual Impact/Risk	Low				
	Irreplaceability	Low				

The table below includes an assessment of the potential **cumulative impacts** identified for the Vhuvhili overhead transmission power line and supporting infrastructure for the **construction and operational phases**.

Impact	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
CUMULATIVE – CONSTRUCTION PHASE						
Changes in water flow regime	Status	Negative	Moderate (3)	▪ Environmental specialist should be consulted in the planning phase to ensure footprint layout excludes sensitive or no-go areas. ▪ The proposed Vhuvhili SEF, Mukondeleli WEF and the associated grid solutions should avoid or limit the footprint within watercourses as well as associated buffer areas. ▪ Access roads should be planned to use existing tracks or roads to limit stream crossings, ▪ Monitoring of the aquatic biodiversity as well as watercourses should be conducted on a catchment level to address the cumulative impacts of the GRIDLINE, WEF and grid solution. ▪ Ensure that connectivity in the landscape remains.	Low (4)	Medium
	Spatial Extent	Regional				
	Duration	Medium term				
	Consequence	Moderate Negative				
	Probability	Very likely				
	Reversibility	Low				
	Residual Impact/Risk	Low				
CUMULATIVE – OPERATIONAL PHASE						
Changes in water flow regime	Status	Negative	Moderate (3)	▪ The proposed Vhuvhili SEF, Mukondeleli WEF and the associated grid solutions should avoid or limit the footprint within watercourses as well as associated buffer areas. ▪ Monitoring of the aquatic biodiversity as well as watercourses should be conducted on a catchment level to address the cumulative impacts of the proposed Vhuvhili SEF, Mukondeleli WEF and the associated grid solution.	Low (4)	Medium
	Spatial Extent	Regional				
	Duration	Long term				
	Consequence	Moderate				
	Probability	Very likely				
	Reversibility	Low				
	Residual Impact/Risk	Low				

D.2.6.5 Concluding Statement

The majority of the proposed route is located directly adjacent to roads and the impact will thus be limited in extent. Eight wetlands were recorded within the proposed power line corridor (refer to Figure B.10 in Section B). The specialist calculated and recommended the following buffer zones for the wetlands:

- Seepage with Artificial Characteristics historical trenches – 42 m
- Valley Bottom Wetlands – 79m
- Seepage Wetland – 61 m
- Seepage Wetland – 31 m
- Valley Bottom Wetlands – 79m
- Valley Bottom Wetlands – 61m
- Seepage Wetland – 37 m
- Dammed section of Floodplain Wetland – 37 m

Prior to the proposed mitigation measures most impacts rated moderate and post-mitigation they ranked **low** in both the construction and operational phase provided that the proposed power line infrastructure avoids the delineated aquatic features as well as the recommended buffer areas (as shown in Figure B.10 in Section B). A review of the detailed design by an environmental specialist (and possible walk-through) is recommended once the final position of the pylons is known to ensure they are not placed within high sensitivity aquatic features or watercourse buffer zones.

It is recommended that monitoring in terms of wetland PES as well as biomonitoring be conducted to consider the cumulative impacts of the proposed Vhuvhili Gridline, Vhuvhili SEF, Mukondeleli WEF and Mukondeleli Grid (subject to separate applications). Monitoring should be conducted in both the construction and operational phases of the project. It is imperative that an Alien Invasive Species (AIS) plant management plan be developed, prior to the construction phase. Clearing and/treatment of these species occurs prior to any construction activities which will curb the spread of AIS plants due to the disturbance events caused by construction.

The majority of the proposed route is located directly adjacent to roads and the impact will thus be limited in extent. There are no identified fatal flaws of the proposed power line project (all four alternative routings). The aquatic specialist prefers power line Alternative 4 based on its offtake an end substations being located in more favourable aquatic environments. Alternative 4's offtake at Vhuvhili on-site substation hub Alternative 2 is located on an area currently farmed (cropland) and outside the 500 m regulated watercourse area and is, therefore, considered to be less sensitive. Power line Alternative 4's end point at Mukondeleli switching station F is located within an artificial wetland buffer (low sensitivity) and near a road, which is preferred over switching station E that is located within a seep wetland buffer (high sensitivity). It should be noted that the Agricultural Impact Assessment undertaken for the proposed Vhuvhili SEF (NEAS: MPP/EIA/0001063/2022) noted very high sensitivity of the cropland area where substation hub Alternative 2 is located. Furthermore, the assessed 100 m buffer around the Mukondeleli switching station E makes it viable to micro-site the switching station outside the seep wetland's buffer.

In the case of all four alternatives, it is possible to span the watercourses where the proposed power line needs to cross them. The potential aquatic ecosystem impacts of the proposed power line are thus likely to be low in terms of any potential impact on aquatic ecosystem integrity for all phases of the proposed development as the proposed works will avoid the delineated aquatic features as well as the recommended buffer areas. Based on the findings of this specialist assessment, there is no reason from a freshwater perspective, why the proposed activity (with the implementation of the above-mentioned mitigation measures) should not be authorized.

D.2.7 Avifauna Impact Assessment

The Avifauna Impact Assessment was undertaken by Chris van Rooyen and Albert Froneman to inform the outcome of this BA from an avifaunal perspective. The complete Avifauna Impact Assessment is included in Appendix D.6 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Avifauna Impact Assessment. The information below is extracted from van Rooyen and Froneman (2022) (Appendix D.6 of the BA Report).

D.2.7.1 Approach and Methodology

The Avifauna Impact Assessment (Appendix D.6 of the BA Report) employed the following methods:

- The PAOI was defined as a 2km zone around the proposed grid connection.
- Power line sensitive species were defined as species which could potentially be impacted by power line collisions or electrocutions, based on their morphology. Larger birds, particularly raptors and vultures, are more vulnerable to electrocution as they are more likely to bridge the clearances between electrical components than smaller birds. Large terrestrial species and certain waterbirds with high wing loading are less manoeuvrable than smaller species and are therefore more likely to collide with overhead lines.
- Bird distribution data of the Southern African Bird Atlas Project 2 (SABAP 2) was obtained from the University of Cape Town, as a means to ascertain which species occurs within the broader area i.e. within a block consisting of six pentad grid cells each within which the proposed projects are situated. A pentad grid cell covers 5 minutes of latitude by 5 minutes of longitude (5'× 5'). Each pentad is approximately 8 × 7.6 km. From 2011 to date, a total of 82 full protocol lists (i.e. surveys lasting a minimum of two hours each) have been completed for this area. In addition, 34 ad hoc protocol lists (i.e. surveys lasting less than two hours but still yielding valuable data) have been completed. The SABAP2 data is regarded as a reliable reflection of the avifauna which occurs in the area and is supplemented with data collected at the proposed Vhuvhili SEF and Mukondeleli WEF during the 12 months pre-construction monitoring.
- A classification of the habitat in the development area was obtained from the Southern African Bird Atlas Project 1 (SABAP 1) and the National Vegetation Map (SANBI 2018).
- The national threatened status of all power line SCC was determined with the use of the most recent edition of the Red Data Book of Birds of South Africa, Lesotho and Swaziland (Taylor et al. 2015), and the latest authoritative summary of southern African bird biology (Hockey et al. 2005).
- The global threatened status of all power line sensitive species was determined by consulting the latest (2021.3) IUCN Red List of Threatened Species (http://www.iucnredlist.org/).
- The Important Bird and Biodiversity Areas of South Africa (Marnewick et al. 2015; http://www.birdlife.org.za/conservation/important-bird-areas) was consulted for information on potentially relevant Important Bird Areas (IBAs).
- Satellite imagery (Google Earth © 2022) was used in order to view the broader area on a landscape level and to help identify bird habitat on the ground.
- The Department of Forestry Fisheries and the Environment (DFFE) National Screening Tool was used to determine the assigned avian sensitivity of the PAOI (September 2022).
- Guidelines for the Implementation of the Terrestrial Flora (3c) & Terrestrial Fauna (3d) Species Protocols for EIAs in South Africa produced by the SANBI on behalf of the DFFE (2020) were used to assist with the interpretation of the relevant protocol.
- The results of an integrated pre-construction programme conducted over 12-months at the proposed Vhuvhili SEF and Mukondeleli WEF sites, which is also relevant to the current PAOI, from November 2020 to January 2022 were used to inform the current study.

D.2.7.2 Relevant Project Aspects relating to Avifaunal Impacts

Negative impacts on avifauna by electricity infrastructure generally take two (2) main forms, namely electrocution and collisions with the high voltage cables. Displacement due to habitat destruction and disturbance associated with the construction of the electricity infrastructure and other associated infrastructure is another impact that could potentially impact on avifauna.

D.2.7.3 Potential Impacts

The potential impacts identified in the Avifauna Impact Assessment include collisions with the 132 kV grid connections during the operational phase. This is rated as a direct and cumulative impact. No indirect impacts were identified. The direct and cumulative impacts include:

Construction Phase:

- Displacement due to disturbance associated with the construction of the 132kV power line and supporting infrastructure.
- Displacement due to habitat transformation associated with the construction of the 132kV power line and supporting infrastructure.

Operational Phase:

- Mortality of power line sensitive due to collisions with the 132 kV power line (high voltage cables).

Decommissioning Phase:

- Displacement due to disturbance associated with the decommissioning of the 132 kV power line.

Cumulative Impacts:

- Displacement due to disturbance associated with the construction and decommissioning of the 132kV power line.
- Displacement due to habitat transformation associated with the 132kV power line and supporting infrastructure.
- Collisions with the 132kV overhead power line.

D.2.7.4 Impact Assessment

The table below includes an assessment of the potential **direct impacts** identified for the proposed Vhuvhili power line and supporting infrastructure for the **construction phase**.

Impact	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
DIRECT – CONSTRUCTION PHASE						
Displacement due to disturbance associated with the construction of the 132kV grid connection and associated service roads	Status	Negative	Moderate (3)	▪ Activity should be restricted to a working corridor as close as possible to the footprint of the infrastructure. ▪ Measures to control noise and dust should be applied according to current best practice in the industry. ▪ Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum as far as practical. ▪ Access to the rest of the property must be restricted. ▪ The recommendations of the ecological and botanical specialist studies must be strictly implemented, especially as far as limitation of the construction footprint is concerned.	Low (4)	High
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Substantial				
	Probability	Very likely				
	Reversibility	High				
	Irreplaceability	Low				
Displacement due to habitat transformation associated with the construction of the 132kV grid connection and associated substations	Status	Negative	Low (4)	▪ Vegetation clearance should be limited to what is absolutely necessary. ▪ The mitigation measures proposed by the vegetation specialist must be strictly enforced.	Low (4)	High
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Moderate				
	Probability	Unlikely				
	Reversibility	High				
	Irreplaceability	Low				

The table below includes an assessment of the potential **direct impacts** identified for the proposed Vhuvhili power line and supporting infrastructure for the **operational phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT – OPERATIONAL PHASE						
Collision mortality of power line sensitive species due to the 132kV grid connections.	Status	Negative	High (2)	▪ Bird Flight Diverters must be fitted to the entire grid connection according to the applicable Eskom Engineering Instruction (Eskom Unique Identifier 240 – 93563150: The utilisation of Bird Flight Diverters on Eskom Overhead Lines).	Moderate (3)	Medium
	Spatial Extent	Local				
	Duration	Long term				
	Consequence	Severe				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Low				

The table below includes an assessment of the potential **direct impacts** identified for the proposed Vhuvhili power line and supporting infrastructure for the **decommissioning phase**.

Impact	**Impact Criteria**		**Significance and Ranking (Pre-Mitigation)**	**Potential mitigation measures**	**Significance and Ranking (Post-Mitigation)**	**Confidence Level**
DIRECT – DECOMMISSIONING PHASE						
The noise and movement associated with the activities at the PAOI will be a source of disturbance which would lead to the displacement of avifauna from the area.	Status	Negative	Moderate (3)	▪ Activity should be restricted to a working corridor as close as possible to the footprint of the infrastructure. ▪ Measures to control noise and dust should be applied according to current best practice in the industry. ▪ Maximum use should be made of existing access roads during the decommissioning phase and the construction of new roads should be kept to a minimum as far as practical.	Low (4)	High
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Substantial				
	Probability	Very likely				
	Reversibility	High				
	Irreplaceability	Low				

				▪ The recommendations of the ecological and botanical specialist studies must be strictly implemented, especially as far as limitation of the activity footprint is concerned		

The table below includes an assessment of the potential **cumulative impacts** identified for the proposed Vhuvhili power line and supporting infrastructure for the construction, operational and decommissioning phases.

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
CUMULATIVE – CONSTRUCTION PHASE						
Displacement due to disturbance associated with the construction of the 132kV grids and associated infrastructure	Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Negative Site specific Short term Moderate Very likely High Low	Low (4)	▪ Activity should be restricted to a working corridor as close as possible to the footprint of the infrastructure. ▪ Measures to control noise and dust should be applied according to current best practice in the industry. ▪ Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum as far as practical. ▪ Access to the rest of the property must be restricted. ▪ The recommendations of the ecological and botanical specialist studies must be strictly implemented, especially as far as limitation of the construction footprint is concerned.	Low (4)	High
Displacement due to disturbance associated with the construction of the 132kV grids and	Status Spatial Extent Duration Consequence Probability	Negative Regional Long term Moderate Likely	Low (4)	▪ Vegetation clearance should be limited to what is absolutely necessary.	Low (4)	High

associated infrastructure	Reversibility Irreplaceability	High Low		▪ The mitigation measures proposed by the vegetation specialist must be strictly enforced.		
CUMULATIVE – OPERATIONAL PHASE						
Collision mortality of power line sensitive species due to the 132kV grid connections.	Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Negative Regional Long term Substantial Unlikely High Low	Moderate (3)	▪ Bird Flight Diverters must be fitted to the entire grid connection according to the applicable Eskom Engineering Instruction (Eskom Unique Identifier 240 – 93563150: The utilisation of Bird Flight Diverters on Eskom Overhead Lines).	Low (4)	Medium
CUMULATIVE – DECOMMISSIONING PHASE						
The noise and movement associated with the activities at the study area will be a source of disturbance which would lead to the displacement of avifauna from the area	Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Negative Site specific Short term Moderate Very likely High Low	Low (4)	▪ Activity should be restricted to a working corridor as close as possible to the footprint of the infrastructure. ▪ Measures to control noise and dust should be applied according to current best practice in the industry. ▪ Maximum use should be made of existing access roads during the decommissioning phase and the construction of new roads should be kept to a minimum as far as practical. ▪ The recommendations of the ecological and botanical specialist studies must be strictly implemented, especially as far as limitation of the activity footprint is concerned	Low (4)	

D.2.7.5 Concluding Statement

The expected impacts of the proposed Vhuvhili SEF 132kV grid connection, near Secunda in the Mpumalanga Province, were rated to be negative and of Low to High significance pre-mitigation. However, with appropriate mitigation, the overall post-mitigation significance of all the identified impacts should be reduced to **Low** for all phases of the project, except the operational phase, which will be reduced to Moderate. The impacts associated with all four alternative alignments will be practically similar in nature and magnitude, although Alternative 1, being the shortest route, has a marginal benefit in reducing bird collision risk. Any of the alternatives will be acceptable, and the choice of a preferred alternative should therefore be decided based on technical issues, and not avifaunal related impacts. It is therefore recommended that the activity is authorised, on condition that the proposed mitigation measures as detailed in the Impact Assessment Tables and the EMPr are strictly implemented.

D.2.8 Civil Aviation

The Civil Aviation Compliance Statement was undertaken by Lizande Kellerman to inform the outcome of this BA from a civil aviation perspective. The complete Civil Aviation Compliance Statement is included in Appendix D.7 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Agriculture Compliance Statement. The information below is extracted from Lanz (2022) (Appendix D.1 of the BA Report).

D.2.8.1 Approach and Methodology

In terms of the requirements set out in the Civil Aviation Protocol (Government Gazette 43110, GN R320 of 20 March 2020), the Site Sensitivity Verification Process and Report has been compiled based on the following methodology:

- Existing spatial databases were used to determine the location of civil aviation installations in relation to the proposed project area, and to identify preliminary areas of concern in terms of impacts to civil aviation installations;
- The proposed project site and development footprint was plotted on the Screening Tool to identify the sensitivity allocated;
- A site visit was undertaken to confirm the current land-use and the environmental sensitivity as it relates to Civil Aviation;
- Additional research was undertaken to substantiate the Site Sensitivity Verification process; and
- A Compliance Statement and Site Sensitivity Verification Report was compiled

D.2.8.2 Concluding Statement

The Screening Tool has indicated the proposed power line corridor to be of ‘high’ sensitivity relating to Civil Aviation (Figure B.30). The high sensitivity relates to the proposed power line corridor being located within 8 km of the mapped Petrusrus airfield. However, following site verification conducted on 19 October 2022, the ‘high’ sensitivity identified by the Screening Tool in the western portion of the proposed Vhuvhili power line corridor was refuted, as it was found that the mapped Petrusrus Airfield lacks any civil aviation infrastructure, and instead appears to be a two-track gravel road located in between existing crop fields. Subsequently, it was concluded that this portion of the project site is of ‘medium’ sensitivity, since this specific portion of the power line corridor lies between 8 and 15 km of the Secunda Airfield.

Based on existing databases followed by a site visit to the Secunda Airfield, it was determined and verified that the entire power line corridor is of 'medium' sensitivity as it relates to civil aviation, as the corridor lies between 8 to 15 km of the Secunda Airfield. Based on this finding, in terms of GN R320, a Compliance Statement is required for the Vhuvhili power line corridor.

It should be noted that the location and structure of the power line corridor is not likely to impact negatively on civil aviation installations or air traffic associated with the OR Tambo Airport Controlled Airspace Controlled Airspace (FAOR CTA) or the Johannesburg Flight Information Service (FAJA FIS) region. Provided that any potential future recommendations from the civil aviation authorities are incorporated into the project design (post-EA, should the EA be granted) prior to construction, it is recommended that the power line project receive EA in terms of the 2014 NEMA EIA Regulations (as amended).

D.2.9 Defence

As required by GN R320, a Defence Site Sensitivity Verification was undertaken for the proposed power line corridor. The Screening Tool indicated the proposed power line corridor to be of 'low' sensitivity relating to Defence (see Section B.5). Based on a site visit and existing databases, this low sensitivity was verified and confirmed by the EAP during the BA process. No defence installations are located within proximity to the proposed development corridor Therefore, in line with GN R320, no further requirements are applicable, i.e. a Defence Compliance Statement is not required. The Defence Site Sensitivity Verification Report is included in Appendix D.8 of this BA Report. From a Defence perspective, there is no reason why the proposed development should not be authorised.

D.2.10 Environmental Sensitivity Mapping

Based on the impact assessment undertaken and the relevant environmental sensitivities identified, the site layout and preliminary power line route have been identified and shown in Figure D.3 to Figure D.9, as well as Appendix C of this BA Report. Based on the specialist studies, the key environmental features that have been avoided in terms of the layout of the facilities are listed below.

- **Agriculture**
  - The agricultural protocol requires confirmation that all reasonable measures have been taken through micro-siting to minimize fragmentation and disturbance of agricultural activities. However, in the context of the development of overhead power line, almost no land can be considered to have high sensitivity for impacts on agricultural resources. The specialist recommended that, wherever possible, pylons should be located outside of or on the edges of cropland so that they minimise interference with crop cultivation.
  - The protocol requires confirmation in the case of a linear activity, that the land can be returned to the current state within two years of completion of the construction phase. It is hereby confirmed that the land under the overhead power line route can be returned to the current state within two years of construction.
- **Visual**
  - Based on the height and scale of the project, the distance intervals determined for the zones of visual impact are as follows:
    - High impact zone: 0 – 500 m
    - Moderate impact zone: 500 m – 2 km
    - Low impact zone: 2 km – 5 km

- A 500m zone of potential visual sensitivity has been delineated around the three (3) potentially sensitive farmsteads that are located on Portions 2, 3 and 10 of the Farm Vlakspruit No 292.
- Refer to Figure D.3 for visual sensitivity map.

- **Heritage (Archaeology and Cultural Landscape)**
  - The vast majority of the proposed corridor (all four alternatives) is likely to be of very low sensitivity. The only areas considered to be of low and low-medium sensitivity were one stone feature and two ruins, respectively; while two areas along the north-eastern portion of Alternatives 3 and 4 corridors are of very high sensitivity because of known graves (refer to Table B.10 in Section B).
  - Buffers of at least 50 m should be maintained around these graves.
  - The overhead power line infrastructure should not encroach or span over the identified graves and recommended 50 m buffer by micro-siting the final power line alignment within the authorised corridor, should such authorisation be granted (see Figure D.9).
  - The only other concern is the cultural landscape, but it has already been compromised by the Sasol facility just to the north of the study area and, in the surrounding area, coal mines (effectively adding an industrial layer). As such, the proposed project will make a relatively small contribution to landscape impacts.
  - Refer to Figure D.4 for the heritage and palaeontology sensitivity map.

- **Palaeontology**
  - Provisional palaeosensitivity mapping of the proposed Vhuvhili power line corridor (all four alternatives) found that the majority of the corridor between Vhuvhili SEF and Mukondeleli WEF will have no impact on fossils. This portion of the corridor is located on non-fossiliferous dolerite dykes of Jurassic age.
  - However, the north-eastern portion of the power line corridor (four alternatives), situated at the Vhuvhili SEF substation, is on potentially very highly sensitive fossiliferous Vryheid Formation rocks, but no fossils would occur on the ground surface. However, potential fossils might be discovered below ground when excavations commence.
  - Refer to Figure D.4 for the heritage and palaeontology sensitivity map.

- **Terrestrial Biodiversity and Species**
  - The Terrestrial Biodiversity specialist assessment (Appendix D.4) found six highly sensitive drainage lines and dam features within the power line corridor (refer to Figure B.14 in Section B). Along the high sensitivity aquatic features, buffers as delineated by the aquatic specialist should be observed when planning the power line infrastructure. The proposed overhead power line should span these aquatic features and no pylons should be located within the buffer zones.
  - Overall, all other habitat types identified by the terrestrial biodiversity specialist (i.e. natural and disturbed grassland, planted pasture, cropland, and infrastructure) have a low sensitivity.
  - Sections of the gridline fall in a CBA 2 (refer to Figure B.12 in Section B), nevertheless, the site location is acceptable in terms of the specialist's ground-truthed sensitivity findings, being of low sensitivity.
  - Refer to Figure D.5 for the terrestrial ecology sensitivity map.

- **Aquatic Biodiversity**
  - The majority of the proposed route is located directly adjacent to roads and the impact will thus be limited in extent. Eight wetlands were recorded within the proposed power line corridor. The specialist calculated and recommended the following buffer zones for the wetlands:
    - Seepage with Artificial Characteristics historical trenches – 42 m
    - Valley Bottom Wetlands – 79m
    - Seepage Wetland – 61 m
    - Seepage Wetland – 31 m
    - Valley Bottom Wetlands – 79m
    - Valley Bottom Wetlands – 61m
    - Seepage Wetland – 37 m
    - Dammed section of Floodplain Wetland – 37 m
  - The specialist, therefore, recommended that the wetlands, aquatic ecosystems and the buffer areas are considered of high sensitivity with the exception of one artificial wetland area in proximity to the Mukondeleli switching station F scored as low.
  - Refer to Figure D.5 for the aquatic ecology sensitivity map.
  - The overhead power line infrastructure (pylons) should avoid the delineated aquatic features and recommended buffer areas by spanning across these areas or, where possible, micro-siting the final power line alignment within the authorised corridor, should such authorisation be granted (see Figure D.9).
  - In terms of Government Notice 509 of 2016, where power line infrastructure (e.g. pylons, etc.) is to be located within the 500 m regulated area of a watercourse (as delineated in Figure D.8) a General Authorisation will need to be obtained by the Applicant for the section 21(i) water use activity as provided in the National Water Act (Act 36 of 1998), as amended,

- **Avifauna**
  - The following avifaunal-relevant anthropogenic habitat modifications were recorded within the 2 km PAOI:
    - Dams: There are several small dams mostly associated with the Klipspruit River and its tributaries. There is one moderately large dam in the north of the PAOI.
    - Agriculture: Agricultural activity present within the PAOI comprises cultivated commercial annuals non-pivot cropland, predominately dedicated towards maize production.
    - Alien trees: Alien trees are present in the PAOI as windbreaks either between agricultural fields or between homesteads.
  - However, the avifaunal specialist found that the PAOI contains confirmed habitat for power line sensitive SCC.
  - The avifauna specialist concluded that the entire PAOI is high sensitivity based on the confirmed occurrence of several power line sensitive SCC (avifauna which could potential be impacted by power line collisions). The birds move randomly across the whole PAOI, therefore no specific areas can be delineated as being more sensitive than others. The specialist recommended that Bird Flight Diverters must be fitted to the entire power line according to the applicable Eskom Engineering Instruction (Eskom Unique Identifier 240 – 93563150: The utilisation of Bird Flight Diverters on Eskom Overhead Lines) to mitigate the impact on power line sensitive SCC.
  - In terms of habitat transformation impact, it was found that the available habitat in the study area is quite extensive from a bird impact perspective, and many of the service roads will be existing roads that will be widened. The loss of a relatively small quantity of the habitat for the power line servitude due to direct habitat transformation

associated with the construction of the proposed 132kV overhead power line and associated roads is likely to be low.
    - The impacts associated with all four alternative alignments will be practically similar in nature and magnitude, although Alternative 1, being the shortest route, has a marginal benefit in reducing the collision risk. However, any of the alternatives will be acceptable, and the choice of a preferred alternative should therefore be decided based on technical issues, and not avifaunal related impacts.
    - Refer to Figure D.6 for the avifauna sensitivity map.

- **Civil Aviation**
    - No civil aviation related sensitivities were identified.

- **Defence**
    - No defence related sensitivities were identified.

Key sensitivity features have been annotated in Figure D.3 to Figure D.9 (i.e. sensitivity and feature maps). For detailed feature maps, refer to the Specialist Assessments (Appendix D of the BA Report).

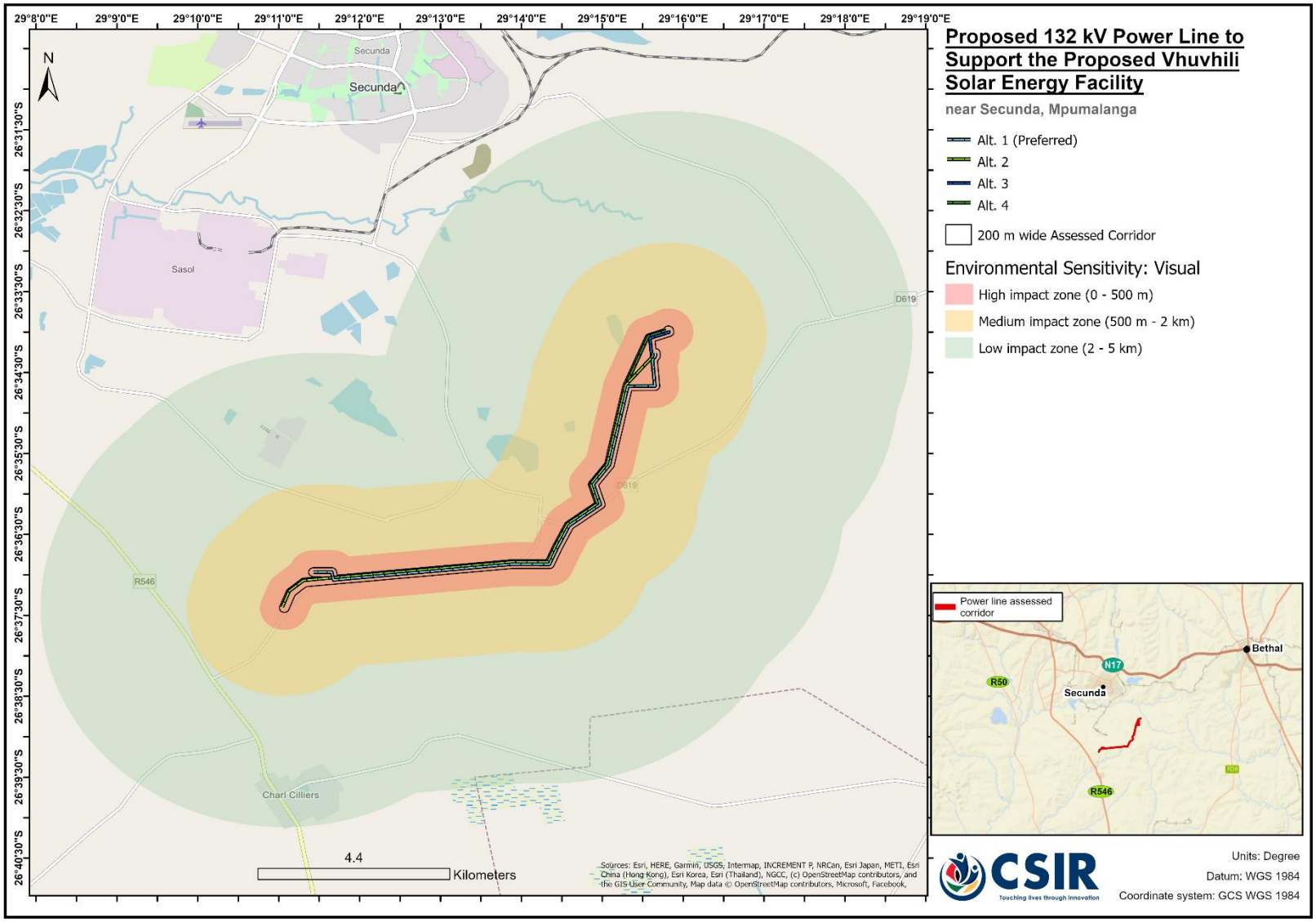


Figure D.3: Sensitivity Map for Zones of Visual Sensitivity

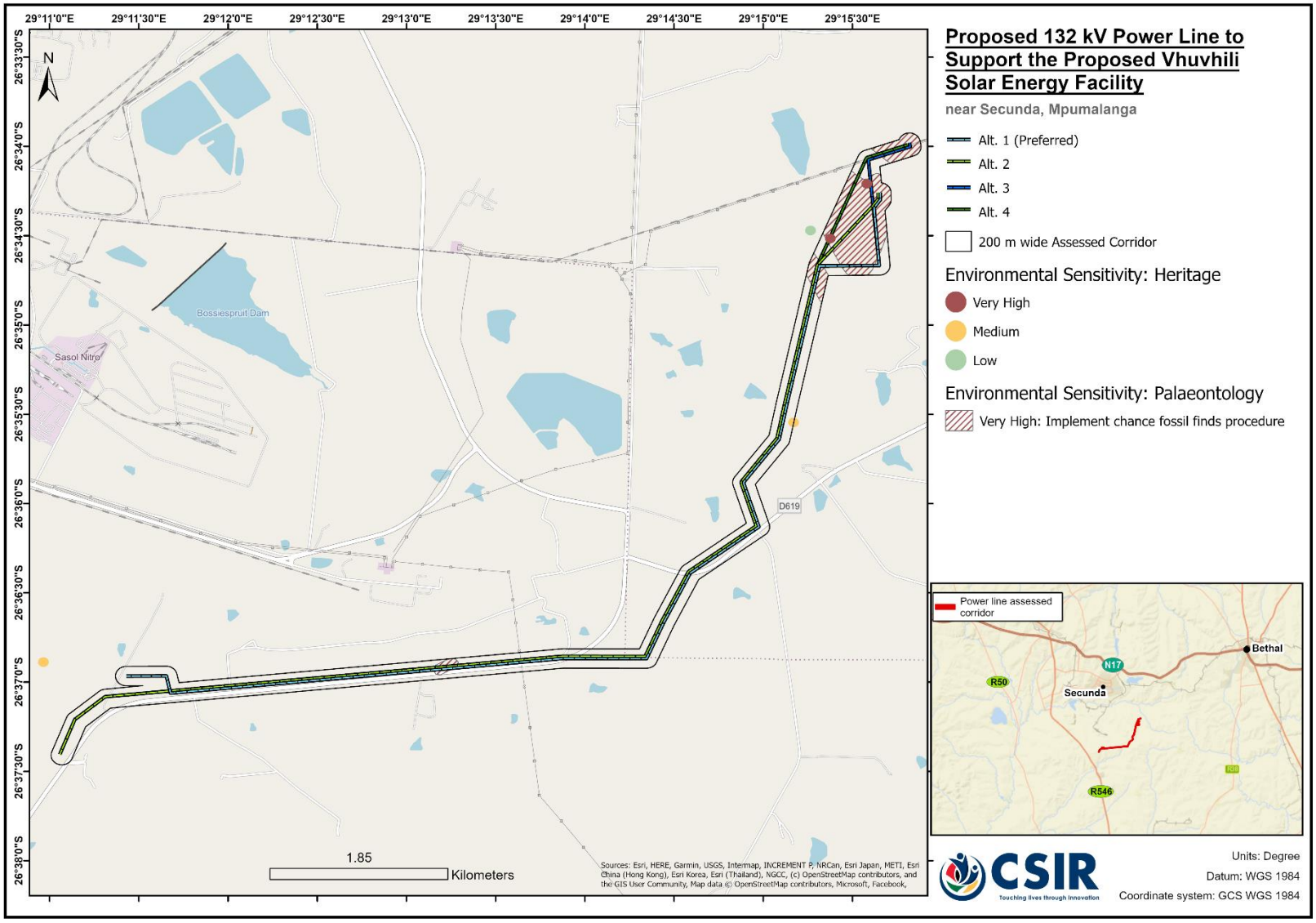


Figure D.4: Sensitivity Map for Heritage and Palaeontology

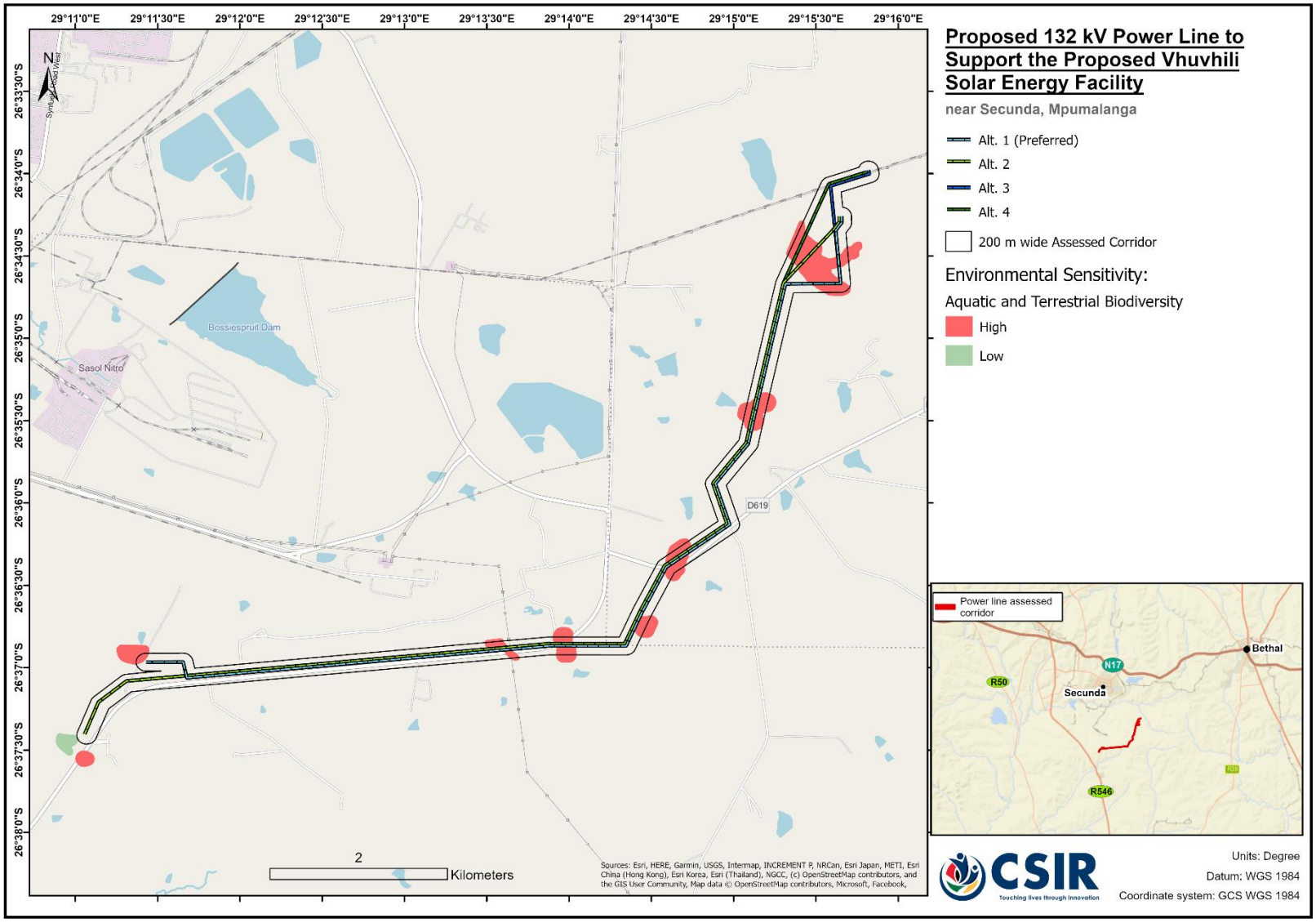


Figure D.5: Sensitivity Map for Aquatic and Terrestrial Biodiversity

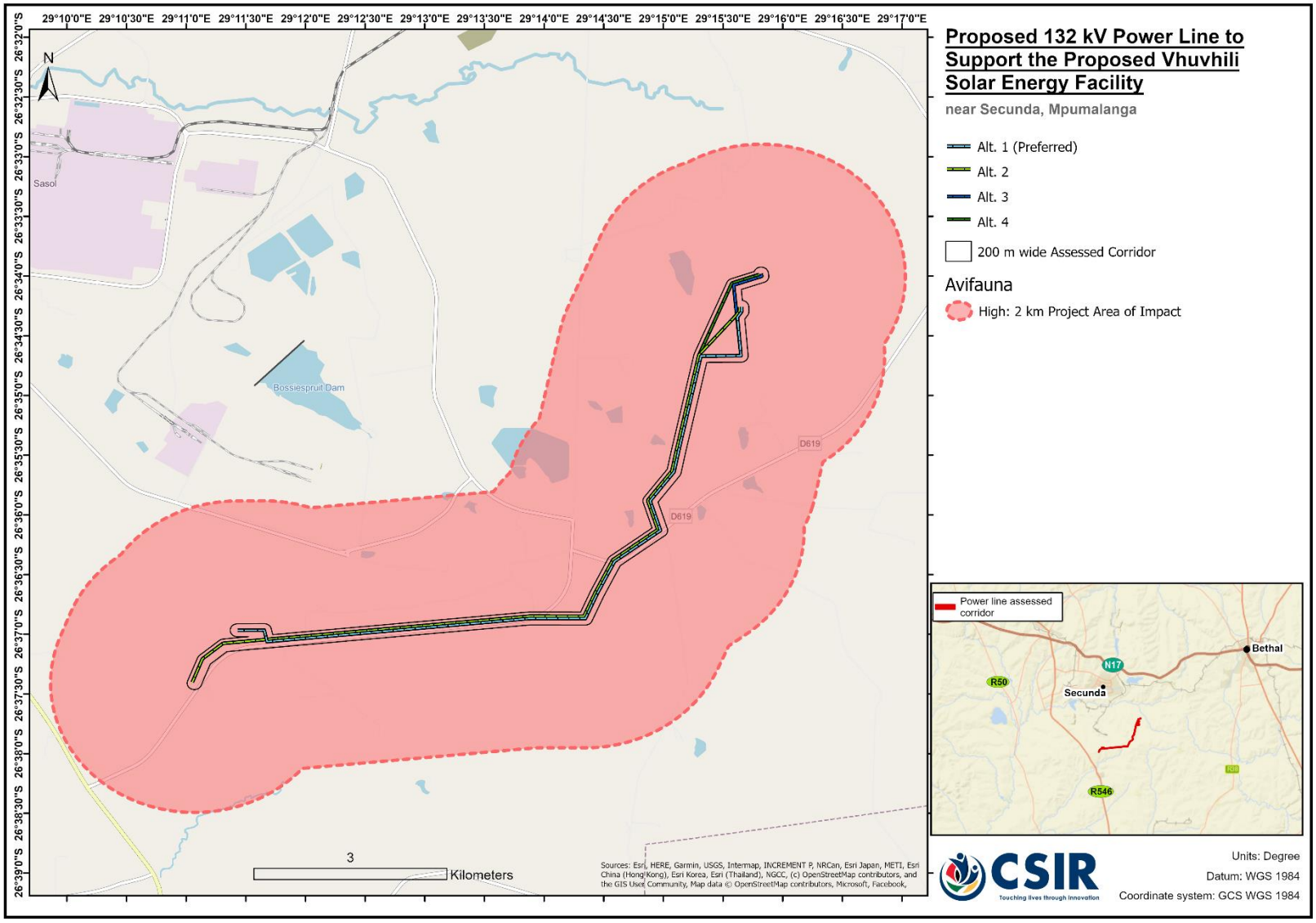


Figure D.6: Sensitivity Map for Avifauna

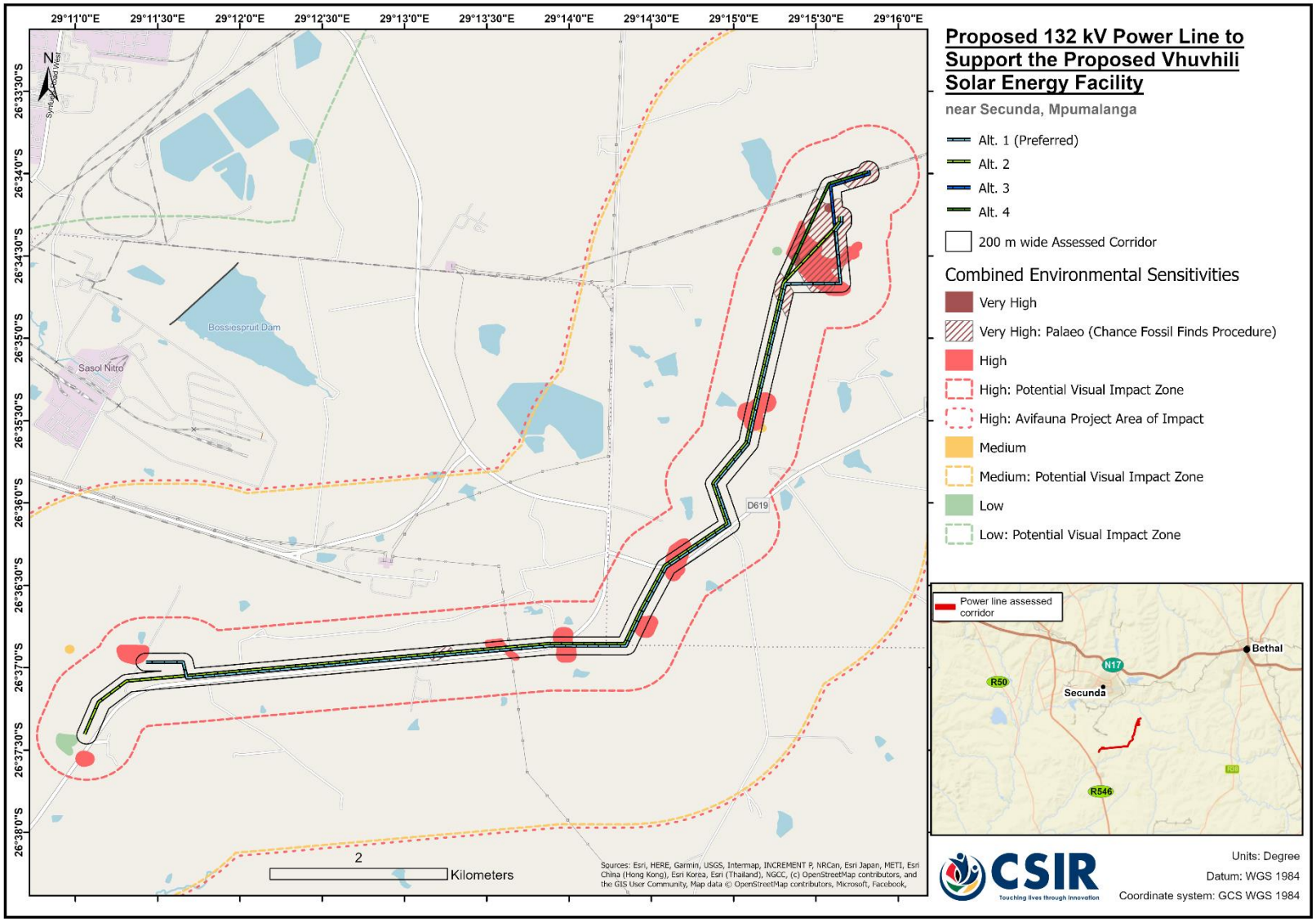


Figure D.7: Combined Sensitivity Map for the proposed project

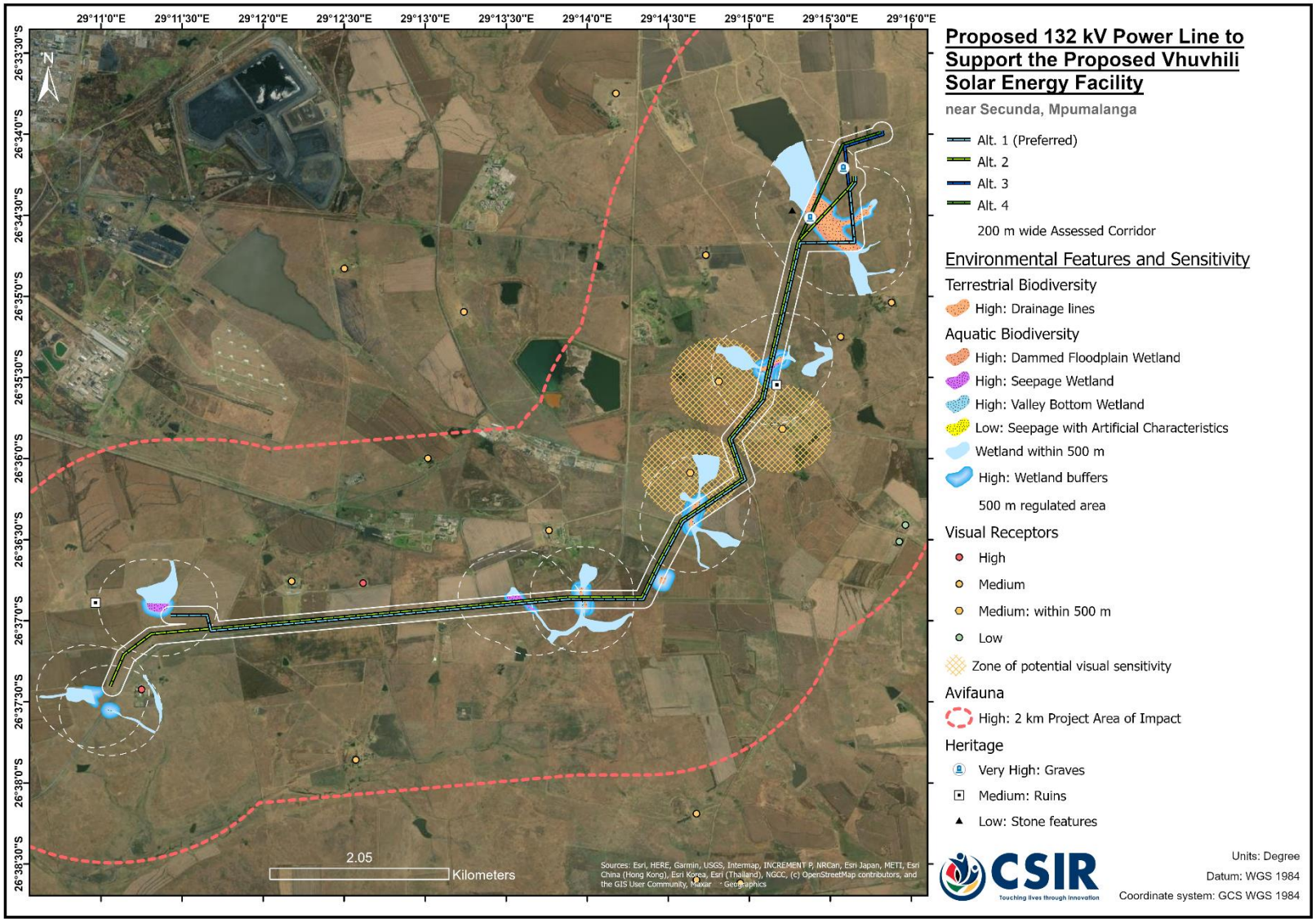


Figure D.8: Combined Sensitivity and Key Features Map for the proposed project

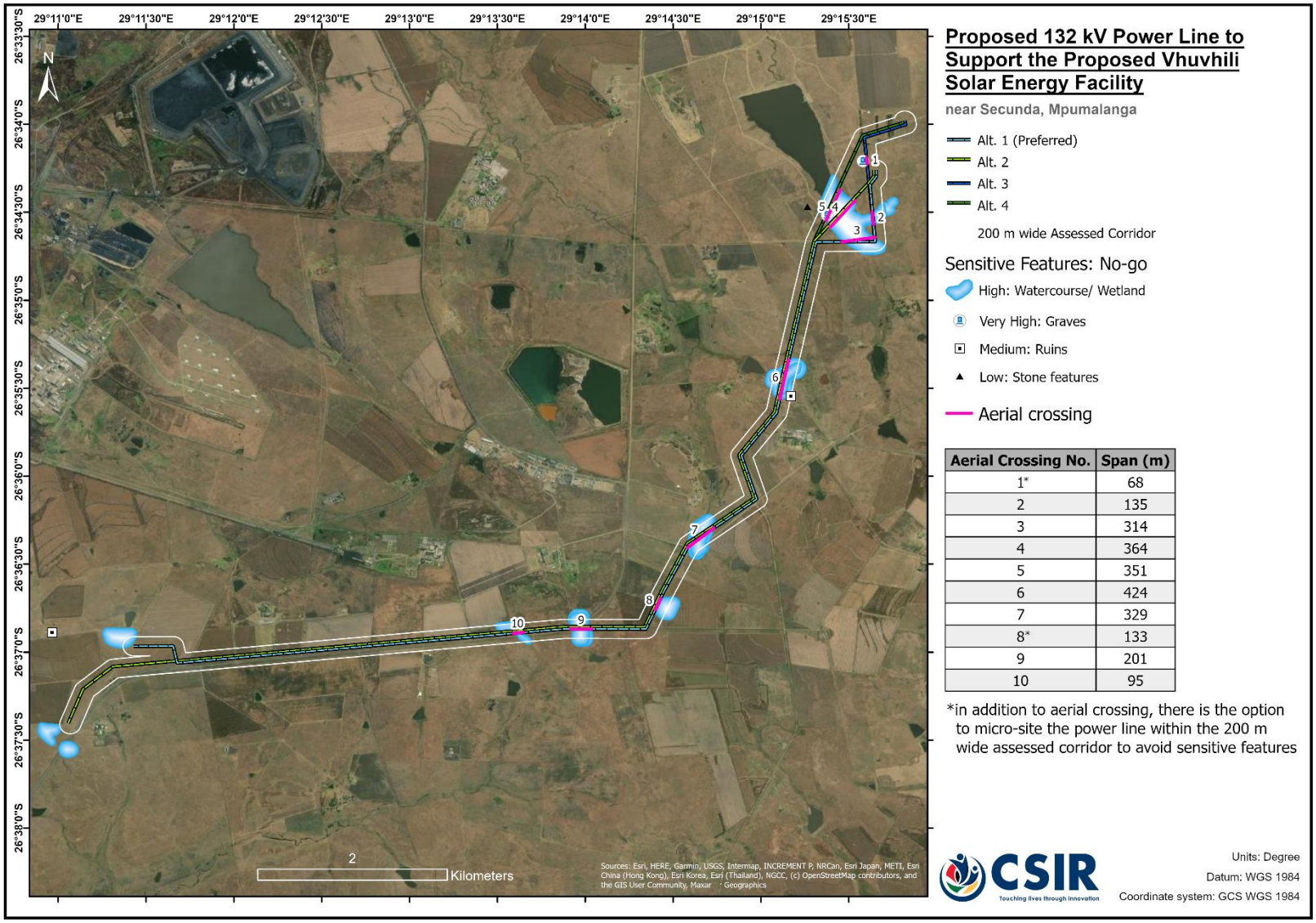


Figure D.9: Aerial Crossing Required to mitigate impact on Aquatic and Terrestrial Biodiversity Features, and Heritage Features.

SECTION E: RECOMMENDATION OF PRACTITIONER & ENVIRONMENTAL IMPACT STATEMENT

This BA Report investigated and assessed the significance of potential positive and negative direct, indirect and cumulative impacts associated with the proposed power line project that will support the proposed Vhuvhili SEF and associated infrastructure, near Secunda in the Mpumalanga Province. No negative impacts have been identified within this BA that, in the opinion of the EAP who has conducted this BA process, should be considered "fatal flaws" from an environmental perspective, and thereby necessitate substantial re-design or termination of the project.

Section 24 of the Constitution of the Republic of South Africa (Act 108 of 1996) 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 BA was undertaken to ensure that these principles are met through the inclusion of appropriate management and mitigation measures. 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 EMPr in Appendix G of this BA Report).

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

Alternatives

As noted above, in Section A of this BA Report, the preferred activity was determined to be the development of a 132 kV overhead transmission power line to facilitate the connection of the proposed Vhuvhili SEF project to the proposed Mukondeleli WEF switching station wherefrom the electricity will be evacuated to Sasol's Secunda facility for the production of green hydrogen and green aviation fuel (preferred offtake scenario) or into the national grid via bidding into future rounds of South Africa's REIPPPP. The EGI assessed in this BA is essential to the operation of the proposed Vhuvhili SEF project.

In terms of the preferred routing of the power line, four alternatives were assessed, and based on specialist input on nine different environmental sensitivity themes. All specialists assessed a 200 m wide corridor and respective potential areas of impact around the corridor in order to find the best routing for the power line and supporting infrastructure. The specialists considered desktop data, field work, existing literature and the National Web-based Environmental Screening Tool to inform the identification of sensitivities. Based on this, **power line routing Alternative 1** – which is also the shortest routing (~11 km versus ~12 km for Alternative 4) – was **determined to be the preferred alternative as it would have the least possible overall environmental impact**. This routing will avoid the sensitive features including assigned buffer areas, as explained in Section B and Section D of this BA Report. It should be noted that the detailed specialist assessments (Appendix D of the BA report) all concluded that the project can proceed, with **no fatal flaws** or unacceptable impacts identified **for either of the four power line route alternatives**.

Should the preferred transmission line receive EA from Mpumalanga DARDLEA, and following on from successful servitude negotiations with landowners, the final delineation of the centreline for the distribution line and co-ordinates of each bend in the line will be determined. Optimal tower sizes and positions will be identified and verified during the final detailed design phase prior to construction and pre-construction ground survey of the preferred route as required by respective specialists (see Section D) will be undertaken. These positions and design specifications will be reflected, and appropriate management actions incorporated, into the continuously and periodically updated EMPr (Appendix G of the BA report).

Need and Desirability of the Proposed Project

For development to be sustainable, it is important that the BA process ascertain whether the proposed development will meet the needs of people, and whether it will be socially, economically, and ecologically desirable. The need for renewable energy is becoming increasingly apparent, in both local and international contexts, with South Africa's international climate commitments obligating it to transition from its substantial (90%) dependence on a fossil fuel-based energy system to a sustainable, clean, and affordable energy system based on renewable resources and low carbon-emitting technologies. Given that South Africa receives among the highest levels of solar radiation on earth, it is clear that solar power generation should feature prominently in efforts to decarbonise the country's complement of energy sources in order to mitigate human-induced climate change. As recognised by the National Energy Act (Act 34 of 2008) and the NDP: Vision 2030, the clean energy transition can be a critical enabler of inclusive (just) and transformational economic development that is contained within the limits of surrounding socio-ecological systems.

The proposed Vhuvhili 132 kV power line project will evacuate electricity generated at the proposed Vhuvhili SEF into the EGI at Mukondeleli WEF wherefrom the electricity will be fed via another 132 kV power line into Sasol's Secunda Synfuels facility for the production of green hydrogen and green aviation fuel. The conversion of renewable energy into green fuels, represents a more (or possibly the only) viable option to decarbonise heavy industry and long-distance cargo transportation in South Africa which are ubiquitously difficult to abate with direct renewable energy and existing battery technologies. The proposed project supports South Africa's pathway to invest R319 billion in developing and commercialising a green hydrogen sector, as articulated in South Africa's Just Energy Transition Investment Plan, 2023-2027.

On a municipal planning level, the proposed project aligns with the strategic objectives of the Govan Mbeki Local Municipality (2021) and the Gert Sibande District Municipality (2021) as articulated in their respective IDPs. The municipal area is attractive for renewable energy facilities and supporting EGI due to the significant solar and wind energy resources. In the SWOT analysis undertaken as part of the local municipality's IDP process, it identifies the closure of the Mining and the Petro-chemical industry due to exhausting coal deposits as a threat which could see Govan Mbeki "become a ghost town with very high unemployment, poverty and poor living conditions" (Govan Mbeki IDP, 2022-2027). According to the Govan Mbeki Municipal Economic Development Strategy (2014), renewable energy developments represent a key side linkage to complement the coal mining and fuel production economic activities of the municipality. It is recognised that such side linkages, or diversification of the local economy, will provide catalytic opportunities for downstream economic development in the municipality. The proposed project represents a move by Sasol to transition to the production of greener energy sources, which will increase business resilience, local economic resilience, securing existing jobs in the petro-chemical sector while also providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area. In this manner, should the proposed development be authorised, it will pave the way for a Just Energy Transition in Mpumalanga.

Summary of Key Impact Assessment Findings

Based on the findings of the specialist assessments, the proposed power line project is considered to have an overall **Low to Very Low** negative environmental impact (with the implementation of respective mitigation and enhancement measures). Table E.1 below provides a summary of the impact assessment for the proposed project post-mitigation for direct negative impacts. Table E.2 provides the same information for the cumulative impacts. These overall impact ratings are applicable to all four alternative power line routings.

As indicated in Table E.1, it is clear that all of the direct negative impacts were rated with a **Low to Very Low** post-mitigation impact significance for the construction phase. In terms of the operational phase, the majority of the direct negative impacts were rated with a **Low to Very Low** post-mitigation impact significance, with only the Avifaunal impacts being rated as **Moderate**. All of the direct negative impacts were rated with a **Low to Very Low** post-mitigation impact significance for the decommissioning phase. Agricultural, Civil Aviation and Defence direct negative impacts are rated as **Insignificant** for all development phases.

The cumulative impacts were assessed by all the specialists on the project team. The cumulative assessment included approved renewable energy projects within a 50 km radius of the power line corridor, and existing and planned transmission lines, as well as the currently proposed Mukondeleli WEF and proposed Vhuvhili SEF projects. Based on Table E.2, the majority of the cumulative negative impacts were rated with a **Low** post-mitigation impact significance for the construction phase, with the Heritage impacts (Archaeology and Cultural) and Palaeontology impacts rated as **Very Low** and the Visual impacts rated **Moderate**. A similar trend is applicable to the operational phase, with the majority of cumulative impacts rated **Low**, while Heritage impacts are rated as **Very Low,** and Palaeontology impact rated **Insignificant**, and Visual impacts rated **Moderate**. During the decommissioning phase, the same ratings apply as in the operational phase, with the exception of the Visual Impacts which are rated **Low**. Agricultural, Civil Aviation and Defence cumulative negative impacts are rated as **Insignificant** for all development phases.

Table E.1: Overall Impact Significance with the Implementation of Mitigation Measures for DIRECT Negative Impacts for the Vhuvhili Power Line and Supporting Infrastructure Project

Specialist Assessment	Construction Phase	Operational Phase	Decommissioning Phase
DIRECT NEGATIVE IMPACTS			
Agriculture	**Insignificant**	**Insignificant**	**Insignificant**
Visual	**Low**	**Low**	**Low**
Heritage (Archaeology and Cultural Landscape)	**Low**	**Very Low**	**Very Low**
Palaeontology	**Very Low**	**Insignificant**	**Insignificant**
Terrestrial Biodiversity and Species	**Low**	**Very Low**	**Very Low**
Aquatic Biodiversity	**Low**	**Low**	**Low**
Avifauna	**Low**	**Moderate**	**Low**
Civil Aviation	**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**
Defence	**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**

Table E.2: Overall Impact Significance with the Implementation of Mitigation Measures for CUMULATIVE Negative Impacts for the Vhuvhili Power Line and Supporting Infrastructure Project

Specialist Assessment	Construction Phase	Operational Phase	Decommissioning Phase
CUMULATIVE NEGATIVE IMPACTS			
Agriculture	**Insignificant**	**Insignificant**	**Insignificant**
Visual	**Moderate**	**Moderate**	**Low**
Heritage (Archaeology and Cultural Landscape)	**Very Low**	**Very Low**	**Very Low**
Palaeontology	**Very Low**	**Insignificant**	**Insignificant**
Terrestrial Biodiversity and Species	**Low**	**Low**	**Low**
Aquatic Biodiversity	**Low**	**Low**	**Low**
Avifauna	**Low**	**Low**	**Low**
Civil Aviation	**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**
Defence	**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**

NOTE: no fatal flaws in terms of direct negative impacts and cumulative negative impacts were identified for any of the proposed power line routing alternatives, and **all of the specialists have recommended that the proposed project receives EA** in terms of the 2014 EIA Regulations promulgated under NEMA (Act 107 of 1998), provided that the recommended mitigation measures are implemented.

Overall Environmental Impact Statement

Taking into consideration the findings of this BA process, including the specialists' assessment findings, it is the opinion of the EAP, that the project benefits outweigh the costs and that the project will make a positive contribution to sustainable infrastructure development in the Govan Mbeki Local Municipality, Gert Sibande District Municipality, Mpumalanga Province, and in South Africa. **Although no fatal flaws were identified for either of the four power line routing alternatives**, this BA process determined that **power line routing Alternative 1** – which is also the shortest routing (~11 km versus ~12 km for Alternative 4) – **is the preferred alternative as it would have the least possible overall environmental impact**. It is recommended that, should the EA be granted, it should approve a 100 m wide corridor to enable the final power line alignment to avoid the sensitive features identified by the specialists in the 200 m wide assessed corridor. **Provided that the specified mitigation measures are applied effectively, it is recommended that the proposed preferred (Alternative 1) 132 kV overhead power line project receive EA in terms of the 2014 EIA Regulations (as amended) promulgated under NEMA (Act 107 of 1998).** It is recommended that the EA be valid for a period of 10 years.

Conditions to be included in the EA

In order to ensure the effective implementation of the mitigation and management actions, an EMPr has been compiled and is included in Appendix G of this BA Report. The mitigation measures necessary to ensure that the proposed projects are planned and carried out in an environmentally responsible manner are listed in the EMPr. The EMPr includes the mitigation measures noted in this report and the specialist studies. The EMPr is a dynamic document that should be updated as

required and provides clear and implementable measures for the proposed project. The frequency of monitoring and auditing compliance with the conditions of the EA (should such an authorisation be granted) and EMPr, is recommended in the EMPr. The compliance monitoring ranges from weekly to bi-monthly to monthly. It is recommended that regular monitoring be undertaken, as specified in the EMPr. It is further recommended that the submission of compliance reports to the Competent Authority be undertaken quarterly.

It is recommended that, should the EA be granted, it should approve a 100 m wide corridor to enable the final power line alignment to avoid the sensitive features identified by the specialists in the 200 m wide assessed corridor. Avoidance of the sensitive features identified in the BA process is conditioned in the EMPr. Therefore, it is recommended that the EMPr (Appendix G of this BA Report) be accepted and approved as the final EMPr for implementation on site by the EA holder.

Listed below are the **main** recommendations that should be considered for inclusion in the EA (should such authorisation be granted by the DARDLEA). These main recommendations as well as additional recommendations are included in the EMPr and BA Report.

- **Agriculture Impacts**
  - The conclusion of the Agricultural Compliance Statement is that the proposed power line project is acceptable and the recommendation for its approval is not subject to any conditions, provided that the generic mitigation measures the generic mitigation measures that are included in the EMPr are implemented.

- **Visual Impacts:**
  - The conclusion of the Visual Impact Assessment is that the proposed power line project is acceptable and the recommendation for its approval is not subject to any conditions, provided that the recommended mitigation measures are implemented as per the EMPr.

- **Heritage Impacts (Archaeology and Cultural Landscape):**
  - If Alternatives 3 or 4 are used, then the graves in the Alternative 3 and Alternative 4 corridors must be avoided and protected if either of these corridors are used. The power line and associated service track must be located at least 50 m from the graves.
  - If Alternatives 3 or 4 are used then, before construction starts, the relevant graveyard in the Alternative 3 and Alternative 4 corridors must be fenced with a farm-style wire fence with a pedestrian gate to facilitate public access. The fence must be placed a minimum of 5 m away from all graves.
  - The overhead power line infrastructure should not encroach or span over the identified graves and recommended 50 m buffer by micro-siting the final power line alignment within the authorised corridor.
  - An archaeologist must conduct a pre-construction survey of the final alignment once the final detailed design is completed so as to determine whether there are any further areas requiring avoidance or mitigation.
  - 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.

- **Palaeontological Impacts**
  - The ECO should be made aware of the possibility that fossil remains (e.g. plants and bones, etc.) may be unearthed during excavations in the north-eastern portion of the corridor as delineated in the EMPr.
  - Photographs of similar fossils must be provided to the construction contractor (as included in the EMPr) and must be incorporated into the training, environmental awareness, and induction programme for construction personnel.
  - When the final power line route has been determined based on other specialist inputs, and excavations for pylon foundations have commenced, and only if fossils are found in the delineated potential fossiliferous rock, then the Chance Fossil Finds Protocol (as incorporated into the EMPr) must be implemented, photographs must be sent to a palaeontologist for a preliminary assessment and if deemed necessary a palaeontologist should visit the site. Any fossils found by the palaeontologist should be removed under the appropriate SAHRA permit and all fossil material collected must be properly curated in an approved repository.

- **Terrestrial Biodiversity and Species Impacts**
  - The conclusion of the Terrestrial Biodiversity and Species Impact Assessment is that the proposed power line project is acceptable and the recommendation for its approval is not subject to any conditions, provided that the recommended mitigation measures and management actions are implemented as per the EMPr.

- **Aquatic Biodiversity Impact**
  - Monitoring of the Present Ecological State of wetlands as well as biomonitoring of cumulative impacts should be conducted in both the construction and operational phases of the project.
  - An Alien Invasive Species plant management plan must be developed, prior to the construction phase. Clearing and/treatment of these species within the construction footprint must be undertaken prior to any construction activities which will curb the spread of alien invasive plants due to the disturbance events caused by construction.
  - The existing road infrastructure should be utilised as far as possible to minimise the overall disturbance created by the proposed project.
  - The overhead power line infrastructure should avoid the delineated aquatic features and recommended buffer areas by spanning across these areas or, where possible, micro-siting the final power line alignment within the authorised corridor.
  - In terms of Government Notice 509 of 2016, where the final detailed design locates power line infrastructure (e.g. pylons, etc.) within the 500 m regulated area of a watercourse, a General Authorisation must be obtained by the EA holder for the relevant section 21 water use activity as provided in the National Water Act (Act 36 of 1998), as amended,
  - Proper site management must be undertaken during construction to address on-site prevention of pollution measures from any potential pollution sources during the construction activities such as hydrocarbon spills.
  - An Environmental Control Officer or a specialist with knowledge and experience of the local flora should be appointed during the construction phase to be able to make clear recommendations with regards to the revegetation of disturbed areas.
  - Any disturbed areas should be rehabilitated and monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth. Invasive alien plant growth and signs of erosion should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with invasive alien plants. Should any erosion features develop, they should be stabilised as soon as possible.

- Any water supply, sanitation services as well as solid waste management services that should be required for the site should preferably be provided by an off-site and appropriately registered service provider.
- During decommissioning, disturbance to the freshwater ecosystems should be limited as far as possible. Disturbed areas may need to be rehabilitated and revegetated. Mitigation and follow-up monitoring of residual impacts (alien vegetation growth and erosion) may be required.

- **Avifauna Impacts**

  - Bird Flight Diverters must be fitted to the entire overhead power line according to the applicable Eskom Engineering Instruction (Eskom Unique Identifier 240 – 93563150).
  - Prevent unnecessary displacement of avifauna by ensuring that the rehabilitation of transformed areas is implemented, where possible, following completion of power line construction by an appropriately qualified rehabilitation specialist.

- **General**
  - Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion and alien plant invasion.
  - 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.

References:

Refer to detailed reference lists included in each Specialist Assessment in Appendix D of this Draft BA Report. In addition to each of the Specialist Assessments chapters referred to in the text above, as well as various footnotes, below is a list of the key references used.

Council for Scientific and Industrial Research (CSIR). 2017. *Protecting South Africa's strategic water source areas*. [https://www.csir.co.za/protecting-south-africa%E2%80%99s-strategic-water-source-areas]

Department of Environment Forestry and Fisheries (DFFE). 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.

Department of Environment, Forestry and Fisheries (DFFE). 2019. *Strategic Environmental Assessment for the Expansion of Electricity Grid Infrastructure Corridors in South Africa*. CSIR Report Number: CSIR/SPLA/EMS/ER/2019/0076/B. ISBN Number: ISBN 978-0-7988-5648-5. Stellenbosch and Durban.

Department of Environmental Affairs (DEA). 2015. *Strategic Environmental Assessment for wind and solar photovoltaic energy in South Africa*. CSIR Report Number: CSIR/CAS/EMS/ER/2015/0001/B. Stellenbosch.

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

Department of Forestry, Fisheries and the Environment (DFFE). N.d. *South African delegation meets climate envoys ahead of CoP26*, Media release, [https://www.environment.gov.za/mediarelease/cop26climateenvoysmeeting]

Department of Forestry, Fisheries, and the Environment (DFFE). 2022. *Renewable Energy EIA Application (REEA) database, 2022 Quarter 2*. [https://sfiler.environment.gov.za:8443/ssf/s/readFile/folderEntry/52810/8afbc1c77f1bb7ca0182f45db4f2004c/1661932060488/last/REEA_OR_2022_Q2.zip]

Department of Science and Innovation (DSI). 2021. *Hydrogen Society Roadmap for South Africa 2021: Securing A Clean, Affordable and Sustainable Energy*. [https://www.dst.gov.za /index.php/resource-center/strategies-and-reports/3574-hydrogen-society-roadmap-for-south-africa-2021]

Eskom Holdings (SOC) Ltd. 2022. *Generation Connection Capacity Assessment (GCCA) Spatial Data*. [https://www.eskom.co.za/wp-content/uploads/2021/08/Shapefiles-1.zip]

Gert Sibande District Municipality. 2022. *Summary Amended Integrated Development Plan, 2021-2022*. [https://www.gsibande.gov.za/Information/statutory_documents]

Govan Mbeki Local Municipality. 2014. *Local Economic Development Strategy, 2014 and beyond*. [https://www.govanmbeki.gov.za/wp-content/reports/final_%20idp_2022_2027.pdf]

Govan Mbeki Local Municipality.2022. *Integrated Development Plan: Fifth Generation, 2022-2027*. [https://www.govanmbeki.gov.za/wp-content/reports/final_%20idp_2022_2027.pdf]

Ritchie, H. & Roser, M. 2020. *South Africa: CO_2 Country Profile*. [https://ourworldindata.org/co2-and-other-greenhouse-gas-emission]

Roos, T and Wright, J., 2021, *Powerfuels and Green Hydrogen* (public version). European Union.

Roos, T.H. 2021. *The cost of production and storage of renewable hydrogen in South Africa and transport to Japan and EU up to 2050 under different scenarios*. Available: https://www.sciencedirect.com/science/article/pii/S0360319921034406

Strambo, Claudia, Jesse Burton, and Aaron Atteridge.2019, *The End of Coal? Planning a 'Just Transition' in South Africa*. Stockholm Environment Institute.

The Presidency of the Republic of South Africa. 2022. *South Africa's Just Energy Transition Investment Plan, 2023-2027*. [https://www.thepresidency.gov.za/download/file/fid/2644]