

Hendrina South Grid Infrastructure

Over various Portions of the Farms Broodsnyersplaats 25IS,
Bultfontein 187IS, Dunbar189IS, Geluk 26IS, Komati Power
Station 56IS and Wilmansrust 47IS.
Mpumalanga Province.

Environmental Impact Assessment (EIA) Report

Reference Number:
14/12/16/3/3/2/2129

Final Report

Report Date: August 2022

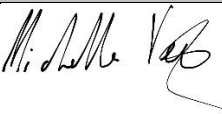



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Executive Summary

ENERTRAG South Africa (Pty) Ltd (the Applicant) proposes the development of the Hendrina Renewable Energy Complex (the Complex), the Complex comprises four separate Projects each of which is the subject of a separate application for Environmental Authorisation. The Projects are:

- Hendrina North Wind Energy Facility (up to 200MW) over 3350ha;
- Hendrina South Wind Energy Facility (up to 200MW) over 2900ha;
- Hendrina North Grid Infrastructure (up to 275kV) – 15km; and
- **Hendrina South Grid Infrastructure (up to 275kV) – 16km (this application).**

This report pertains specifically to the application for Environmental Authorisation for the Hendrina South Grid Infrastructure (the Project). The Project is located in the Steve Tshwete Local Municipality of the Nkangala District Municipality in Mpumalanga Province.

The Project involves the undertaking of Listed Activities identified in the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) and as such requires an Environmental Authorisation in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) before being undertaken.

The primary aim of the proposed Project will be to connect the proposed Hendrina South Wind Energy Facility (WEF)¹ to the Eskom National Grid, via the existing substation at the Komati Power Station, located approximately 15 - 16km from the site. The WEF will form part of the **Renewable Energy Independent Power Producer Programme (REIPPP)** (in line with the Integrated Resource Plan (IRP) – renewable wind energy).

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

As the Project constitutes associated infrastructure to projects related to the IRP, the DFFE is the CA.

Through the EIA Process, the environmental aspects of the site have been identified and assessed through desktop and on-site specialist studies. Various environmental sensitivities have been identified, that informed the project layout along with the practical considerations of Grid design. This effectively represents the first step in the Project's mitigation hierarchy, namely, the avoidance of impacts, by avoiding environmental sensitivities on the site. Specialist walk-downs during the detailed design phase (prior to construction) will further inform micro-siting of project infrastructure, to avoid environmental sensitivities on the project footprint-scale, where possible.

The generic Environmental Management Programme's (EMPr) for powerlines and substation have been appended to this report and also contain site specific sections. The site specific

¹ The South WEF is subject to a separate environmental authorisation process.

sections have been compiled to provide the Applicant and Contractors involved in the Project with detailed instructions on the measures that must be implemented during the pre-construction, construction, operational and decommissioning phases of the Project, to limit impact significance as far as possible, where impacts could not be prevented or avoided entirely.

As summarised above, the potential negative impacts associated with the Project, after the implementation of mitigation measures, that remain Moderate, are as follows:

- (5C): **Avifauna**- Mortality of priority species due to collisions with the power line.

The following additional management/mitigation measures for the development have been identified:

- (5C): **Avifauna**- Once the relevant spans have been identified, Eskom approved Bird flight diverters to be installed for the full span length on the earthwire (according to Eskom guidelines – five metres apart). Light and dark colour devices must be alternated to provide contrast against both dark and light backgrounds respectively.

The following **positive** impacts were identified:

- (8A): **Socio-Economic**- Temporary increase in the Gross Domestic Product (GDP) and production of the national and local economies during construction. Moderate Significance, can be increased to a slightly higher Moderate Significance if measures to enhance the impact are implemented.
- (8B): **Socio-Economic**- Temporary increase employment in the national and local economies. Low Significance, can be increased to Moderate if measures to enhance the impact are implemented.
- (8C): **Socio-Economic**- Contribution to skills development in the country and local economy. Insignificant Significance, can be increased to Low if measures to enhance the impact are implemented.
- (8D): **Socio-Economic**- Temporary increase in household earnings. Moderate Significance, can be increased to a slightly higher Moderate Significance if measures to enhance the impact are implemented.
- (8E): **Socio-Economic**- Temporary increase in government revenue. Low Significance, can be increased to Moderate if measures to enhance the impact are implemented.

Cumulative impacts associated with the Project, that remain Moderate – High after the implementation of mitigation measures, are associated with the impacts on terrestrial ecology. Clearance of vegetation is necessary in the construction phase and loss of habitat will occur. The area lost in total will be small compared to the total area of the vegetation type concerned. Cumulative impacts on SCC is largely associated with residual risks, and this can be reduced by means of final walk-through survey and the implementation of a plant rescue plan. Further to this an alien invasive management plan will minimise the potential spread of alien invasive species.

A comprehensive public participation process, compliant to Regulations 39 to 44 of the NEMA EIA Regulations, 2014, as amended, has been initiated and is ongoing for the Project.

The Draft Environmental Impact Assessment (EIA) Report for the proposed Project, was made available for public comment, for a period of 30 days (from 11 July 2022 until 11 August 2022) at www.cabangaenvironmental.co.za (under the Public Documents Tab) and in hard copy at the Hendrina Public Library (44 Kerk Street, Hendrina) and Komati Public Library (96 Falcon Drive, Komati). All Comments that have been received have been captured in the Comment and Response trail Report (C&R) contained in Appendix G 1. Responses to each comment have also been included.

The EIA concluded that all identified negative impacts are manageable, and in light of the identified positive socio-economic impacts associated with the Project, it is the reasoned opinion of the EAP that the Project be considered for approval.

Table of Contents

1	Introduction	1
1.1	Description of the EIA Process	4
1.1.1	Scoping Phase Summary	5
1.1.2	Draft EIA Phase Summary	17
1.2	Purpose of this Report	23
1.3	Structure of this Report	24
2	Role Players	28
2.1	Project Applicant	28
2.2	Competent Authority	28
2.3	EAP Project Team and Specialists	29
2.4	Expertise of the EAP	31
3	Policy and Legislative Context	31
3.1	National Environmental Management Legislation	32
3.1.1	The National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) ...	32
3.1.2	The EIA Regulations, 2014 (as amended)	32
3.1.3	NEMA Regulations pertaining to Renewable Energy Development Zones and Strategic Transmission Corridors	32
3.1.4	NEMA Regulations pertaining to Generic EMPRs	33
3.1.5	National Environmental Management Waste Act, 2008 (Act No. 59 of 2008)	34
3.1.6	National Water Act, 1998 (Act No. 36 of 1998)	36
3.1.7	National Environmental Management Air Quality Act, 2004 (Act No. 39 of 2004)	37
3.2	Legislation Pertaining to Mining	37
3.3	Legislation Pertaining to Conservation	40
3.4	Legislation and Policy relevant to Electricity Generation and Transmission	41
3.5	Provincial and Local Legislation and Guidelines	42
3.6	Other relevant Legislation	43
3.7	International Environmental and Social Standards	45
4	Project Description	50
4.1	Project Location	51
4.2	Project Components	56
4.2.1	Electrical Components and Connection to Grid	57

4.2.1.1	Switching Station and Substations	57
4.2.1.2	Transmission and Distribution	59
4.2.1.3	Foundations	60
4.2.2	Associated Infrastructure	60
4.2.2.1	Site Access and Service Tracks	60
4.2.2.2	Temporary Construction Camps and Laydown Area	61
4.2.3	Provision of Services	61
4.2.3.1	Water Requirements	61
4.2.3.2	Refuse/Waste Management	61
4.2.4	Transportation of Project Components to Site	62
4.2.5	Employment and Operating Hours.....	62
4.3	Project Phases and Timeframes	62
4.3.1	Pre-construction Phase	62
4.3.2	Construction Phase.....	62
4.3.3	Operational Phase.....	63
4.3.4	Decommissioning Phase	63
4.3.5	Period for which the Environmental Authorisation is required.....	63
4.4	Listed Activities being applied for.....	64
5	Need and Desirability	72
5.1	Realisation of Global and Local Commitments.....	73
5.2	Just Energy Transition	73
5.3	Multiple Land Use.....	75
5.4	Power Generation	75
6	Identification and Evaluation of Alternatives	76
6.1	Process to Identify Alternatives	76
6.2	Process to Assess Alternatives.....	78
6.3	Property or Location	78
6.4	Layout/Routing Alternatives	80
6.5	Design.....	85
6.6	Operational and Scheduling Alternatives	90
6.7	No-Development Option	91
6.8	Alternatives Assessment	92

6.9	Confirmation and Motivation of the Preferred Alternative	95
7	Public Participation	97
8	Existing Site Attributes	98
8.1	Geology, Physiography and Topography	100
8.2	Climate and Meteorology	101
8.3	Land Use, Soils and Agricultural Potential	103
8.4	Hydrogeology (Groundwater)	106
8.5	Hydrology (Surface water)	106
8.6	Freshwater Ecology	108
8.7	Terrestrial Ecology	111
8.8	Avifauna.....	117
8.9	Air Quality and Noise	121
8.10	Visual Resources.....	121
8.11	Socio-Cultural Environment	124
8.12	Sites of Archaeological and Cultural Interest.....	125
8.13	Palaeontology.....	129
8.14	Traffic	129
9	Environmental Sensitivity in Relation to the Project	130
10	Impact Assessment Methodology	132
10.1	Impact Significance	132
10.2	Impact Identification.....	134
10.3	Cumulative Setting	135
11	Impact Assessment	137
11.1.1	Impact(s) of Listed Activities applied for.....	138
11.1.2	Land Use, Soils and Agricultural Potential	140
11.1.2.1	Construction Phase.....	140
11.1.2.2	Operational Phase.....	142
11.1.2.3	Decommissioning Phase	142
11.1.2.4	Cumulative Impacts	142
11.1.3	Water Resources	143
11.1.3.1	Construction Phase.....	143
11.1.3.2	Operational Phase.....	145

11.1.3.3	Decommissioning Phase	147
11.1.3.4	Cumulative Impacts	149
11.1.4	Freshwater Ecology	149
11.1.4.1	Construction Phase.....	149
11.1.4.2	Operational Phase.....	151
11.1.4.3	Decommissioning Phase	153
11.1.4.4	Cumulative Impacts	154
11.1.5	Terrestrial Ecology	155
11.1.5.1	Construction Phase.....	155
11.1.5.2	Operational Phase.....	159
11.1.5.3	Decommissioning Phase	161
11.1.5.4	Cumulative Impacts	162
11.1.6	Avifauna.....	166
11.1.6.1	Construction Phase.....	166
11.1.6.2	Operational Phase.....	167
11.1.6.3	Decommissioning Phase	169
11.1.6.4	Cumulative Impacts	170
11.1.7	Air Quality and Noise	171
11.1.7.1	Construction Phase.....	171
11.1.7.2	Operational Phase.....	173
11.1.7.3	Decommissioning Phase	174
11.1.7.4	Cumulative Impacts	174
11.1.8	Visual	175
11.1.8.1	Construction Phase.....	176
11.1.8.2	Operational Phase.....	177
11.1.8.3	Decommissioning Phase	179
11.1.8.4	Cumulative Impacts	180
11.1.9	Socio-economic.....	180
11.1.9.1	Construction Phase.....	181
11.1.9.2	Operational Phase.....	184
11.1.9.3	Decommissioning Phase	184
11.1.9.4	Cumulative Impacts	184

11.1.10 Archaeology, Palaeontology and Cultural Heritage Resources	185
11.1.10.1 Construction Phase.....	185
11.1.10.2 Operational Phase.....	187
11.1.10.3 Decommissioning Phase	187
11.1.10.4 Cumulative Impacts	187
11.1.11 Transport and Traffic	188
11.1.11.1 Construction Phase.....	188
11.1.11.2 Operational Phase.....	189
11.1.11.3 Decommissioning Phase	189
11.1.11.4 Cumulative Impacts	189
11.1.12 Waste Generation	189
11.1.12.1 Operational Phase.....	191
11.1.12.2 Decommissioning Phase	191
11.1.12.3 Cumulative Impacts	191
11.1.13 Storage and Use of Dangerous Goods / Hazardous Substances	191
11.1.13.1 Operational Phase.....	193
11.1.13.2 Decommissioning Phase	193
11.1.13.3 Cumulative Impacts	193
12 Environmental Impact Statement.....	193
12.1 Reasoned Opinion.....	195
12.2 Specific Aspects to be Included as Conditions of Authorisation.....	196
12.3 Specific Information required.....	197
13 Assumptions, Limitations and Gaps in Knowledge	199
14 Conclusion	201
15 References.....	204

List of Tables

Table 1: DFFE Comments on the FSR and responses thereto	6
Table 2: DFFE Comments on the EIAR, and responses thereto	18
Table 3: Structure of the EIA Report	24
Table 4: Details of the Project Applicant	28

Table 5: Details of the EAP Project Team	29
Table 6: Specialist Field/Study Undertaken and Details of the Specialist Team.....	29
Table 7: Legislated water uses	36
Table 8: Other Relevant legislation and guidelines	43
Table 9: IFC Environmental and Social Performance Standards and the Project	46
Table 10: Project Compliance to the Equator Principles (EPs)	49
Table 11: Affected Farm Portions.....	51
Table 12: Technical details associated with the preferred alternative for the Project	56
Table 13: Listed Activities applied for	64
Table 14: Types of Alternatives	77
Table 15: Summary of Specialist's recommendations in terms of Alternatives	83
Table 16: Assessment of Alternatives	92
Table 17: Site Sensitivity ratings according to the screening tool	99
Table 18: Specialist assessments prescribed by the Screening Tool	99
Table 19: Land Capability (National Screening Tool Report)	104
Table 20: Recharge Values (van Tonder, 2000)	106
Table 21 Plant SCC that could occur on site (Appendix F 6)	115
Table 22: Bird Habitat delineated on the Site	118
Table 23 Overview of population, income and employment profile	124
Table 24: Heritage significance and field ratings	125
Table 25: Heritage Resources Identified during the survey (Beyond Heritage, April 2022)	127
Table 26: Matrix used to determine likelihood	132
Table 27: Matrix used to rate duration	133
Table 28: Matrix used to rate scale.....	133
Table 29: Matrix used to rate Intensity	133
Table 30: Other Renewable Energy Projects in the area	136
Table 31: How the provisions of NEMA Section 24(4)(a) and (b) are addressed in this report	197

List of Figures

Figure 1: EIA Process	4
Figure 2: Simplified Schematic of the IPP-Grid interface	51
Figure 3: Typical Layout of an on-site substation (IPP Portion) (left) and adjoining grid substation/switching station (Operator Portion) (right) (Source: ENERTRAG South Africa (Pty) Ltd)	58
Figure 4: Photograph of the Kouga Wind Energy Facility illustrating the relationship between the on-site substation (IPP Portion) (left) and adjoining grid substation/switching station (Operator Portion)	59
Figure 5: Career Opportunities presented by the Wind Industry	74
Figure 6: Load shedding hours over the years in South Africa	76
Figure 7: Steps undertaken to determine the final location of the proposed substation	81
Figure 8: Route Alternatives	84
Figure 9: 132 kV Intermediate Self-Supporting Double Circuit Monopole (preferred alternative)	85
Figure 10: 132kV In-line or Angle Strain Self-Supporting Double Circuit Monopole structures	86
Figure 11: 132kV In-line or Angle Strain Guyed Double Circuit Monopole	87
Figure 12: 132kV Suspension Self-Supporting Single Circuit Monopole with single conductor	88
Figure 13: 132kV Inline or Angle Strain Self-Supporting Single Circuit Monopole with single conductor	88
Figure 14: 132kV/275kV Powerline Double Circuit Suspension Towers	89
Figure 15: Magnetic field/distance of pylon placement (Gupta, 2020)	90
Figure 16: Meteorological summary for Hendrina (January 2018 - December 2020)	102
Figure 17: Local wind conditions at Hendrina	103
Figure 18: Views of the terrain and character of the area	122
Figure 19: Process Flow Diagram summarising the approach to the Cumulative Impact Assessment	137

List of Plans

Plan 1: Regional Location of the proposed Hendrina Renewable Energy Complex	2
Plan 2: Regional Location of the Project	3
Plan 3: Project in relation to REDZ, Strategic Transmission Corridors and other Renewable Energy Projects	35

Plan 4: The Project and known mineral interests.....	39
Plan 5: Hendrina South Grid Route Alternatives in relation to the Hendrina South WEF Project Area	53
Plan 6: Hendrina South Grid Preferred Alternative (Grid Solution 1, Route Option A) in relation to the Hendrina South WEF Project Area	54
Plan 7: Farms affected by the Project (Land Tenure)	55
Plan 8: Preferred alternative in relation to geographic areas designated in terms of GN R.985 (Listing Notice 3) activities	71
Plan 9: Preferred Layout (Route Option A)	96
Plan 10: Geology of the Site	100
Plan 11: Topography of the Site	101
Plan 12: Landcover classification (data downloaded from https://egis.environment.gov.za/data_egis/data_download/current)	105
Plan 13: Quaternary Catchments and Hydrology	108
Plan 14: NFEPA and Delineated Wetlands.....	110
Plan 15: Project in relation to the MBSP.....	112
Plan 16 Terrestrial Ecology Habitat Units and Sensitivity of the Site (David Hoare Consulting1, 2022)	114
Plan 17: Potential visibility of the proposed Project (SiVEST, April 2022)	123
Plan 18: Identified Heritage Sites in relation to the Project	128
Plan 19: Environmental Sensitivity Map in relation to the preferred alternative (Option A)	131

List of Appendices

Appendix A: Comments on the Draft EIA Report

Appendix B: EAP Declaration of Interest and Undertaking

Appendix C: Specialist Declarations

Appendix D: Curriculum Vitae of EAP and Specialist Team

Appendix E: A3 Maps and Plans

Appendix F: Specialist Studies

Appendix G: Public Participation

Appendix H: Generic EMPr for the Development and Expansion of Overhead Electricity Transmission and Distribution Infrastructure

Appendix I: Generic EMPr for the Development and Expansion of Substation Infrastructure for the Transmission and Distribution of Electricity

Appendix J: Application Form (incl. Screening Tool Report)

Appendix K: Property Details of Preferred Alternative

Specialist Studies (Appendix F)

Appendix F 1: Site Sensitivity Verification and Agricultural Agro-Ecosystem Specialist Assessment

Appendix F 2: Surface Water (Hydrology) Assessment Report

Appendix F 3: Geohydrological Impact Assessment

Appendix F 4: Wetland and Aquatic Ecology Impact Assessment

Appendix F 5: Terrestrial Biodiversity Assessment

Appendix F 6: Terrestrial Plant Species Assessment

Appendix F 7: Terrestrial Animal Biodiversity Assessment

Appendix F 8: Avifaunal Impact Assessment

Appendix F 9: Visual Impact Assessment

Appendix F 10: Socio-Economic Impact Assessment

Appendix F 11: Heritage Impact Assessment

Appendix F 12: Palaeontological Impact Assessment

Appendix F 13: Transport Study

Appendix F 14: Geotechnical Desktop Study

Appendix F 15: Civil Aviation Compliance Statement

Appendix F 16: Site Sensitivity Verification: RFI Theme

Appendix F 17: Site Sensitivity Verification: Defence Statement

Public Participation (Appendix G)

Appendix G 1: Comment and Response Trail Report

Appendix G 2: Pre-application consultation with the Competent Authority (incl. PP Plan and Meeting Minutes)

Appendix G 3: Correspondence with Competent Authority (Including Acceptance of Application; Comments on Draft and Final Scoping Report; Comments on the Draft EIA Report)

Appendix G 4: I&AP Register

Appendix G 5: Background Information Document

Appendix G 6: Notices (Advertisements & Posters)

Appendix G 7: Agenda and minutes of Focus Group Meetings

Appendix G 8: Presentation and minutes of Public Meetings

Appendix G 9: Proof of correspondence with Stakeholders & Organs of State

Appendix G 10: Comments received from Stakeholders & Organs of State

Appendix G 11: Proof of correspondence with I&APs

Appendix G 12: Written comments received from I&APs

Acronyms and Abbreviations

ACRONYM:	DESCRIPTION:
AEL	Atmospheric Emissions License
AIPS	Alien Invasive Plant Species
AQMP	Air Quality Management Plan
ATNS	Air Traffic Navigation Services
BBBEE	Broad-Based Black Economic Empowerment
BESS	Battery Energy Storage System
C&R	Comments and Responses
CA	Competent Authority
CAA	Civil Aviation Authority
CAPEX	Capital Expenditure
CARA	Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983)
CEL	Cost Estimate Letter
<u>CSIR</u>	<u>The Council for Scientific and Industrial Research</u>
<u>CMA</u>	<u>Catchment Management Agency</u>
<u>CMS</u>	<u>Catchment Management Strategy</u>
<u>CVB</u>	<u>Channelled Valley Bottom wetland</u>
DEA(T)	Department of Environmental Affairs (and Tourism)
DFFE	Department of Forestry, Fisheries and Environment
DMRE	Department of Mineral Resources and Energy
DoE	Department of Energy
DSR	Draft Scoping Report
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioner's Association of South Africa
<u>ECA</u>	<u>Environmental Conservation Act, 1989 (Act No 73 of 1989)</u>
<u>EC</u>	<u>Electrical conductivity</u>
ECO	Environmental Control Officer
EIA(R)	Environmental Impact Assessment (Report)
<u>EIS</u>	<u>Ecological Importance and Sensitivity</u>
EMPr	Environmental Management Programme
<u>EPC</u>	<u>Engineering, Procurement and Construction</u>
<u>ERA</u>	<u>Electricity Regulation Act, 2006 (Act No. 4 of 2006) (as amended)</u>
<u>ES</u>	<u>Ecological Services</u>
<u>ESA</u>	<u>Ecologically Strategic Area</u>
<u>ESMS</u>	<u>The Environmental Management System</u>
EWT	Endangered Wildlife Trust
FSR	Final Scoping Report
FTE	Full-time-equivalent

ACRONYM:	DESCRIPTION:
GDP	Gross Domestic Product
<u>GHG</u>	<u>Greenhouse Gases</u>
GN	Government Notice
Ha	Hectares
HAZOP	Hazard and Operability Study
<u>HGM</u>	<u>Hydrogeomorphic</u>
HPA	Highveld Priority Area
<u>IBA</u>	<u>Important Bird Area</u>
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
IRP	Integrated Resource Plan
Km	Kilometre
<u>mbs</u>	<u>Metres below surface</u>
<u>MBSP</u>	<u>Mpumalanga Biodiversity Sector Plan</u>
MHSA	Mine Health and Safety Act, 1996 (Act 29 of 1996)
MPHRA	Mpumalanga Provincial Heritage Resources Agency
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No 28 of 2002)
MRAs	Mining Right Areas
MSDS	Material Safety Data Sheet
MTPA	Mpumalanga Tourism and Parks Agency
NAAQS	National Ambient Air Quality Standards
NDP	National Development Plan
NEMA	National Environmental Management Act, 1998 (Act No 107 of 1998)
NEMAQA	National Environmental Management Air Quality Act, 2004 (Act No 39 of 2004)
NEMBA	National Environmental Management Biodiversity Act, 2004 (Act No 10 of 2004)
NEMPAA	National Environmental Management Protected Areas Act, 2003 (Act No 57 of 2003)
NEMWA	National Environmental Management Waste Act, 2008 (Act No 59 of 2008)
NERSA	National Energy Regulator of South Africa
<u>NFEPA</u>	<u>National Freshwater Ecosystem Priority Areas</u>
NHRA	National Heritage Resources Act, 1999 (Act No 25 of 1999)
NSR	Noise-sensitive Receptor
NTC	National Transmission Company
NWA	National Water Act, 1998 (Act No 36 of 1998)
O&M	Operation and Maintenance
OHSA	Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)
OPEX	Operational Expenditure
<u>PAES</u>	<u>Protected Areas Expansion Strategy PAES</u>
<u>PES</u>	<u>Present Ecological Status</u>

ACRONYM:	DESCRIPTION:
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 10 µm
PM _{2.5}	Particulate matter with an aerodynamic diameter of less than 2.5 µm
PPP	Public Participation Process
PS	Performance Standard (IFC)
RAMS	Mpumalanga Road Asset Management System
REEA	SA Renewable Energy EIA Application Database
REDZ	Renewable Energy Development Zones
REIPPP	Renewable Energy Independent Power Producer Programme
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
<u>SANBI</u>	<u>South African National Biodiversity Institute</u>
SANRAL	South African National Roads Agency Limited
SAPAD	South African Protected Areas Database
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SED	Socio-Economic Development
SMME	Small, Medium and Micro Enterprises
SPLUMA	Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013)
SPV	Special Purpose Vehicle
STLM	Steve Tshwete Local Municipality
TDP	Transmission Development Plan
<u>TDS</u>	<u>Total Dissolved Solids</u>
TS	Transmission System
TSP	Total Suspended Particulates
<u>UNDP</u>	<u>United Nations' Development Programmes</u>
<u>UNFCCC</u>	<u>United Nations Framework Convention on Climate Change</u>
<u>UVB</u>	<u>Unchanneled Valley Bottom Wetlands</u>
<u>WMA</u>	<u>Water Management Agency</u>
WEF	Wind Energy Facility
WTG	Wind Turbine Generator
<u>WRC</u>	<u>Water Research Commission</u>

Key Information relevant to the Proposed Project

Aspect	Description
The Applicant	ENERTRAG South Africa (Pty) Ltd
Project Name	Hendrina South Grid Infrastructure
Activity description	The proposed Project involves the construction and operation of electricity distribution infrastructure , to connect the proposed Hendrina South Wind Energy Facility (WEF) to the existing substation located at the Komati Power Station. The WEF will form part of the Renewable Energy Independent Power Producer Programme (REIPPP) (in line with the Integrated Resource Plan (IRP) – renewable wind energy).
Capacity of facility	The capacity of the powerline and substation will be up to 275kV. <u>Preferred alternative is 132kV.</u>
Project location	Approximately 15km west of Hendrina, 30km north of Bethal, south-east of the Komati Power Station in Ward 3 and 4 of the Steve Tshwete Local Municipality, of the Nkangala District Municipality, Mpumalanga Province
Size of the proposed grid infrastructure and footprints	The sub-station site comprises of 4.5 Hectares (Ha). The proposed powerline to the Komati substation will be approximately 16km long. A 500m corridor along each of the proposed <u>route</u> options (250m from the centre-lines) <u>was assessed to allow for micro-siting of the pylons during the detailed design phase (prior to construction).</u>
Competent Authority (CA) and motivation	Section 24C(2)(a) of NEMA stipulates that the Minister of Forestry, Fisheries and the Environment ("the Minister") must be identified as the CA if the activity has implications for international environmental commitments or relations. GN 779 of 01 July 2016 identifies the Minister as the CA for the consideration and processing of environmental authorisations and amendments thereto for activities related the Integrated Resource Plan (IRP) 2010 – 2030. As the Project constitutes associated infrastructure to projects related to the IRP, the DFFE is the CA. This was confirmed during the Pre-Application Meeting held on 24 August 2021 (Please refer to (Please refer to Appendix G 2 for further detail and proof).
Environmental Assessment Practitioner (EAP) where comments can be submitted and more information obtained	Cabanga Environmental Contact Persons: Michelle Venter-Glanvill or Lelani Claassen michelle@cabangaenvironmental.co.za or info@cabangaenvironmental.co.za Telephone: 011 794 7539 Fax: 011 794 6946

1 Introduction

ENERTRAG South Africa (Pty) Ltd (the Applicant) proposes the development of the Hendrina Renewable Energy Complex (the Complex), the Complex comprises four separate Projects each of which is the subject of a separate application for Environmental Authorisation. The Projects are:

- Hendrina North Wind Energy Facility (up to 200MW) over 3600ha;
- Hendrina South Wind Energy Facility (up to 200MW) over 2900ha;
- Hendrina North Grid Infrastructure (up to 275kV) – 15km; and
- **Hendrina South Grid Infrastructure (up to 275kV) – 16km (this application).**

This report pertains specifically to the application for Environmental Authorisation for the Hendrina South Grid Infrastructure (the Project). The Project is located in the Steve Tshwete Local Municipality of the Nkangala District Municipality in Mpumalanga Province (Plan 1 - Plan 2).

The primary aim of the proposed Project will be to connect the proposed Hendrina South Wind Energy Facility (WEF)² to the Eskom National Grid, via the existing substation located at the Komati Power Station, located approximately 16km from the site. The WEF will form part of the **Renewable Energy Independent Power Producer Programme (REIPPP)** (in line with the Integrated Resource Plan (IRP) – renewable wind energy).

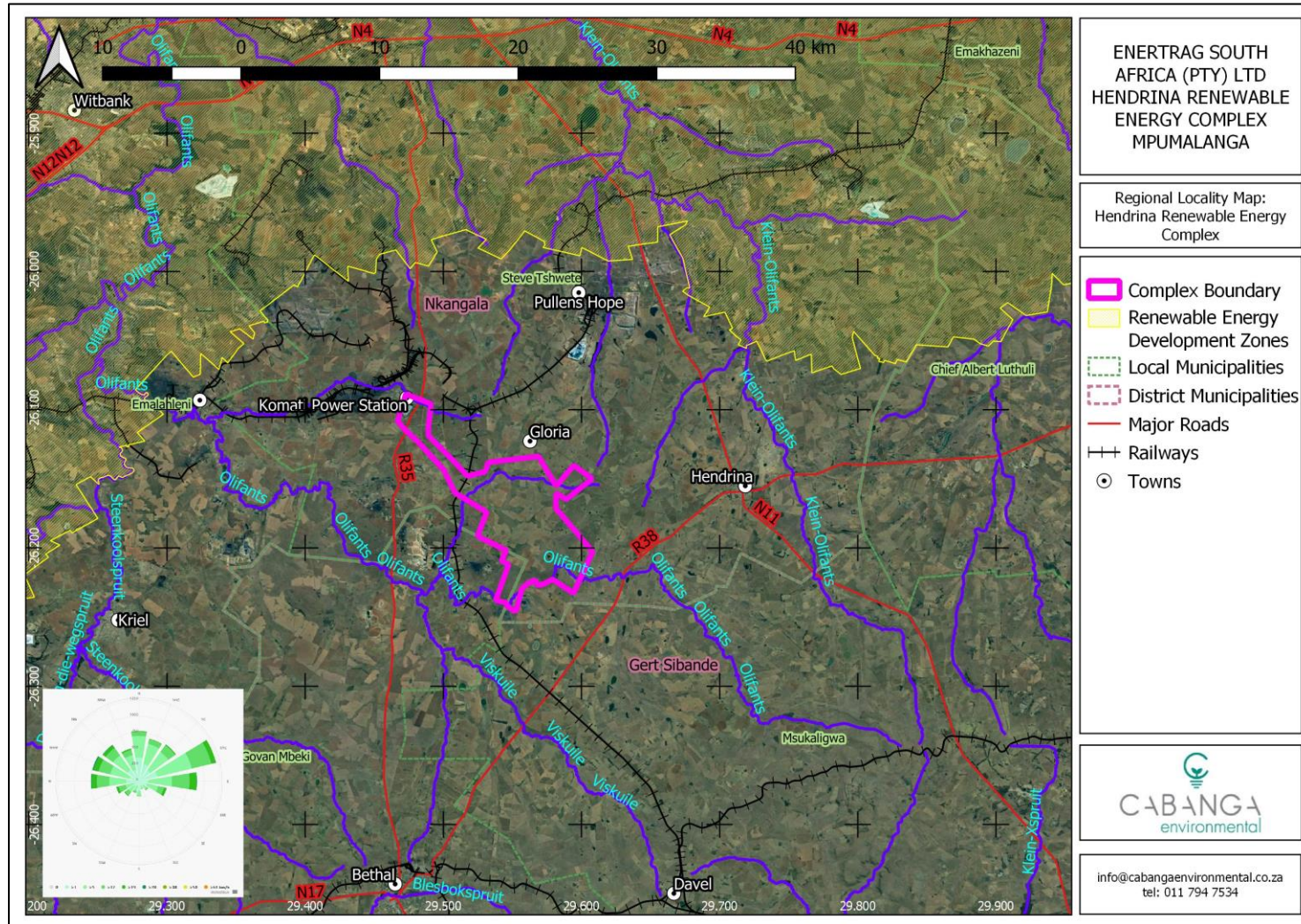
The Project involves the undertaking of Listed Activities identified in the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) and as such require an Environmental Authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) before being undertaken.

Should the approval process outcome be positive, it is the Applicant's intention to bid these projects into future REIPPP bid rounds.

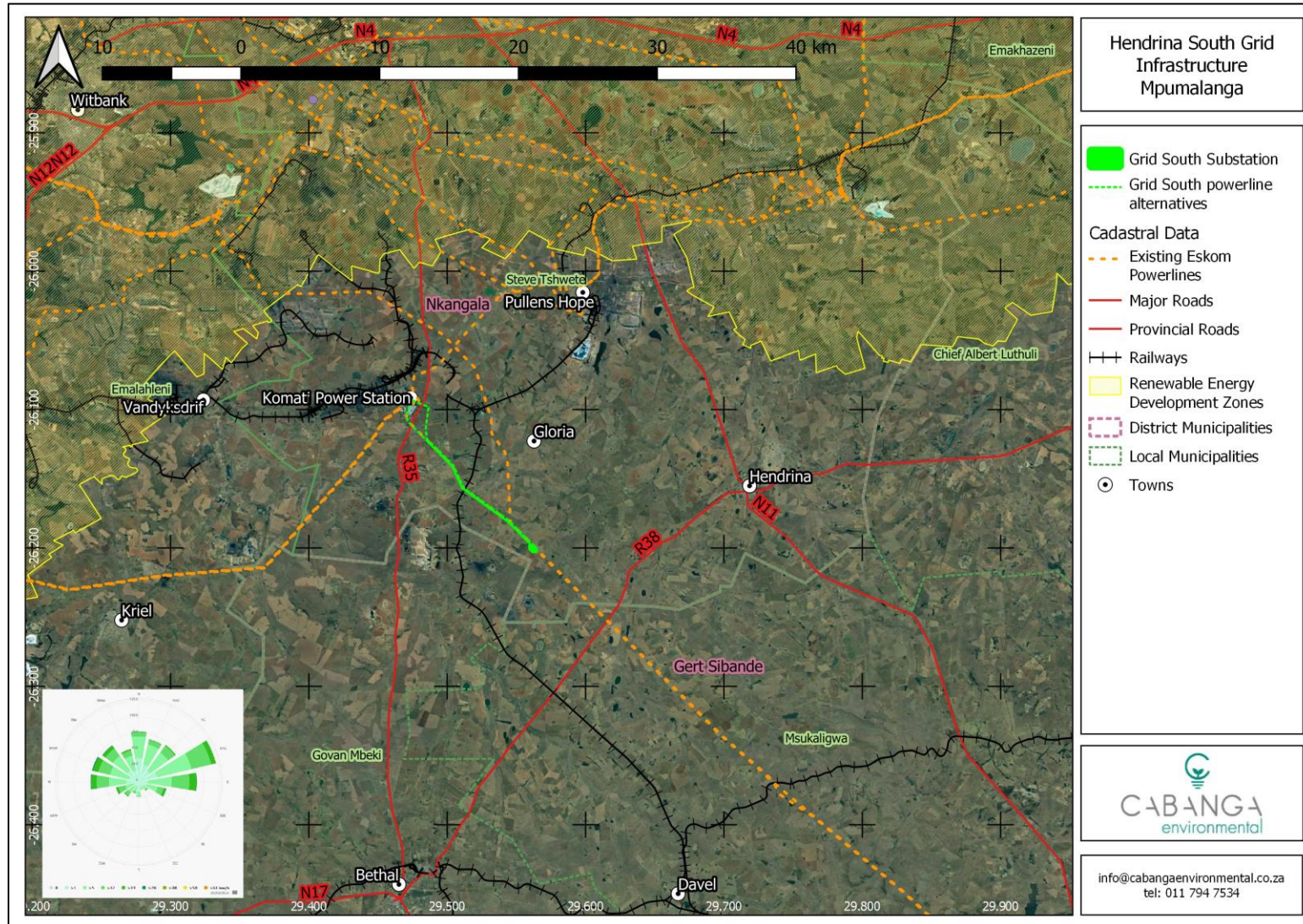
The Draft Environmental Impact Assessment (EIA) Report for the proposed Project, was made available for public comment, for a period of 30 days (from 11 July 2022 until 11 August 2022), at www.cabangaenvironmental.co.za (under the Public Documents Tab) and in hard copy at the Hendrina Public Library (44 Kerk Street, Hendrina) and Komati Public Library (96 Falcon Drive, Komati).

This EIA Report has been updated with all of the comments received during the review period, and is submitted to the Department of Forestry, Fisheries and Environment (DFFE) for decision-making.

² The South WEF is subject to a separate environmental authorisation process.



Plan 1: Regional Location of the proposed Hendrina Renewable Energy Complex



Plan 2: Regional Location of the Project

1.1 Description of the EIA Process

Chapter 4 of the EIA Regulations, 2014 (as amended) sets out the requirements for Applications for Environmental Authorisation in terms of NEMA (depicted in Figure 1). Section 1.1.1 summarises the application process followed for the Project to date.

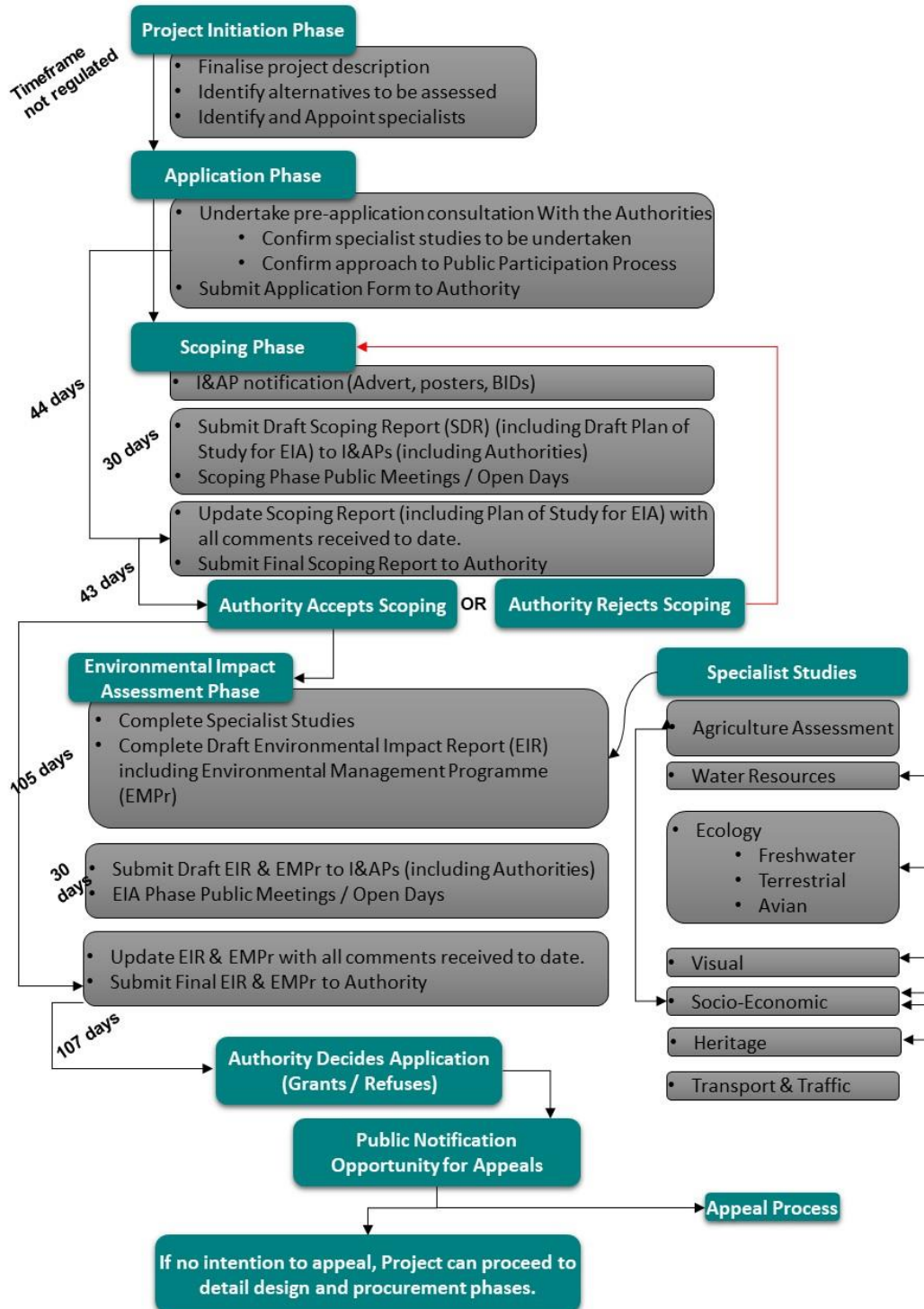


Figure 1: EIA Process

1.1.1 Scoping Phase Summary

A pre-application meeting was held with the Department of Forestry, Fisheries and Environment (DFFE), on 24 August 2021, to discuss the Project and approach to the Application process.

Section 24C(2)(a) of the National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA) stipulates that the Minister of Forestry, Fisheries and the Environment (“the Minister”) must be identified as the Competent Authority (CA) if the activity has implications for international environmental commitments or relations. GN 779 of 01 July 2016 identifies the Minister as the CA for the consideration and processing of environmental authorisations and amendments thereto for activities related the Integrated Resource Plan (IRP) 2010 – 2030.

As the Project constitutes associated infrastructure to projects related to the IRP, the Department of Forestry, Fisheries and Environment (DFFE) is the CA. This was confirmed during the Pre-Application Meeting held on 24 August 2021. Minutes of the pre-application meeting are included in Appendix G 2.

The Application was submitted on 21 February 2022, and acknowledged by the DFFE on 22 February 2022 (Appendix G 3).

The Draft Scoping Report (DSR) was made available to Interested and Affected Parties (I&APs), commenting Authorities and the DFFE for a comment period of 30 days (24 February 2022 to 26 March 2022). The DSR was updated with all comments received and the Final Scoping Report (FSR) was submitted to the DFFE on 07 April 2022. DFFE sent the approval of the FSR on 13 May 2022 (signed 13 May 2022) ([Appendix G 3](#)).

Comments received [from the DFFE](#) on the FSR approval are summarised in [Table 1](#), along with information on where and how these comments have been addressed in this report.

Table 1: DFFE Comments on the FSR and responses thereto

Issues/Questions Raised	Response	Reference in Report
i) Energy Zones		
It is noted that the proposed development does not occur within any REDZ, however, please provide clarity/confirmation in terms of Strategic Transmission Corridors and whether the proposed infrastructure falls within any of these corridors.	Cabanga confirms that the proposed Project falls outside the REDZ and Strategic Transmission Corridors.	Section 3.1.3 and Plan 3
ii) Listed Activities		
a) The EIAR must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for.	Section 11.1.1 of this Report contains a summary of each of the Listed Activities Applied for (detailed in Table 13, Section 4.4), and an assessment of the potential impacts of each Listed Activity applied for, along with mitigation measures.	Table 13, Section 4.4 Section 11.1.1
b) The listed activities represented in the EIAR and the application form must be the same and correct.	Cabanga confirms that the Listed Activities presented in the application form and EIAR are the same and correct.	Appendix J
c) The EIAR must assess the correct sub listed activity for each listed activity applied for.	Each sub-listed activity has been identified (Table 13) and assessed (Section 11.1.1).	Table 13, Section 11.1.1
iii) Public Participation		
a) Please ensure that comments from all relevant stakeholders are submitted to the Department with the EIAR. This includes but is not limited to the provincial Department of Agriculture, the local and district Municipality, the Department of Water and Sanitation (DWS), the South African Heritage Resources Agency (SAHRA), BirdLife SA, the Department of Mineral Resources, the Department of Rural Development and Land Reform, and the	Cabanga confirms that all comments received from the relevant stakeholders has been appended to the EIAR (Appendix G 10). Proof of correspondence/attempts to obtain comments have been included in Appendix G 9	Appendix G 9 and Appendix G 10

Issues/Questions Raised	Response	Reference in Report
Department of Environment, Forestry and Fisheries (DFFE): Directorate Biodiversity and Conservation.		
b) Please ensure that all issues raised and comments received during the circulation of the draft SR and draft EIAR from registered I&APs and organs of state which have jurisdiction in respect of the proposed activity are adequately addressed in the final EIAR. Proof of correspondence with the various stakeholders must be included in the final EIAR. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments.	<p>All comments received to date have been included, verbatim, in the Comments and Response Trail Report (Appendix G 1) along with the EAP's response to each comment received, and a cross-reference to the section of this Report where the comment has been addressed.</p> <p>Where comments have not been received from the relevant Stakeholders and Organs of State proof of correspondence/attempts to obtain comments have been included in Appendix G 9.</p>	<p>Appendix G 1 Appendix G 9 and Appendix G 10 Appendix G 11 and Appendix G 12</p>
c) A Comments and Response trail report (C&R) must be submitted with the final EIAR. The C&R report must incorporate all comments for this development. The C&R report must be a separate document from the main report and the format must be in the table format as indicated in Appendix 1 of this comments letter in chronological order. Please refrain from summarising comments made by I&APs. All comments from I&APs must be copied verbatim and responded to clearly. Please note that a response such as "noted" is not regarded as an adequate response to I&AP's comments.	<p>The C&R Trail Report has been attached as a separate report, in the format provided by the CA and presented in chronological order.</p>	<p>Appendix G 1</p>
d) Comments from I&APs must not be split and arranged into categories. Comments from each submission must be responded to individually.	<p>The C&R Trail Report has been updated, as requested the comments have not been split into categories. Comments received from the CA, relevant Stakeholders, Organs of State and I&APs are all included and arranged into chronological order.</p>	<p>Appendix G 1</p>

Issues/Questions Raised	Response	Reference in Report
e) The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 & 44 of the EIA Regulations, 2014, as amended.	The public participation process has met and exceeded the requirements of the EIA Regulations, and relevant guidelines (DEA, 2017)	Section 7, Appendix G
iv) Alternatives		
Please provide a description of each of the preferred alternative type for the powerline and substation and provide detailed motivation on why it is preferred.	The section on alternatives has been expanded upon, and contains discussions on alternative types that were considered, and the identification of the preferred alternative, with motivation.	Section 6
v. Layout and Sensitivity Maps		
a) The EIAR must provide the four corner coordinate points for the proposed development site (note that if the site has numerous bend points, at each bend point coordinates must be provided) as well as the start, middle and end point of all linear activities. Coordinates must be provided in degrees, minutes and seconds using the Hartebeesthoek94 WGS84 co-ordinate system as per regulation 5(6) of the NEMA EIA Regulations, 2014, as amended.	Coordinates have been provided in Figure 8 and Table 12.	Figure 8 and Table 12.
b) The EIAR must provide the following:		
- Clear indication of the envisioned area for the proposed grid infrastructure for the wind facility.	The proposed grid infrastructure (sub-station and associated powerlines) are depicted in Plan 5. The plan further indicates the 500m corridor along each of the proposed powerline route options (250m from the centre-lines) as included in the assessment.	Plan 5
-Clear description of all associated infrastructure. This description must include, but is not limited to the following:	A detailed project description has been included in Section 4, this includes all associated infrastructure	Section 4

Issues/Questions Raised	Response	Reference in Report
<ul style="list-style-type: none"> • Powerlines; • Internal roads infrastructure; and; • All supporting on-site infrastructure such as laydown area, guard house and control room etc. 	<p>including powerlines, access roads and supporting infrastructure.</p>	
<p>c) A copy of the final preferred route layout map. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g., roads. The layout map must indicate the following:</p> <ul style="list-style-type: none"> • Permanent laydown area footprint; • Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible); • Wetlands, drainage lines, rivers, stream and water crossing of roads and cables indicating the type of bridging structures that will be used; • The location of sensitive environmental features on site e.g., CBAs, heritage sites, wetlands, drainage lines etc. that will be affected by the facility and its associated infrastructure; • Substation(s) and/or transformer(s) sites including their entire footprint; • Location of access and service roads; • Connection routes (including pylon positions) to the distribution/transmission network; • All existing infrastructure on the site, especially railway lines and roads; 	<p>Plan 19 shows the Preferred Layout in relation to the sensitive environmental features.</p> <p>Access/maintenance roads will run the length of the proposed powerline and associated servitude, these will be located directly below the powerline and as such have not been displayed on the maps.</p> <p>Pylon positions have not yet been finalised and will be determined on a final pre-construction walk through during the detailed design phase.</p>	<p>Plan 19</p>

Issues/Questions Raised	Response	Reference in Report
<ul style="list-style-type: none"> • Buffer areas; • Buildings, including accommodation; and • All “no-go” areas. 		
d) An environmental sensitivity map indicating environmental sensitive areas and features identified during the assessment process.	Section 9 details the environmental sensitivity in relation to the project. All environmental sensitivities have been mapped in relation to the Preferred Layout.	Plan 19
e) A map combining the final layout map superimposed (overlain) on the environmental sensitivity map.	Plan 19 includes the Preferred Layout including the sensitive environmental features identified on site by the relevant specialist studies.	Plan 19
vi. Specialist assessments		
a) The EAP must ensure that the terms of reference for all the identified specialist studies must include the following:		
<ul style="list-style-type: none"> • A detailed description of the study’s methodology; indication of the locations and descriptions of the development footprint, and all other associated infrastructures that they have assessed and are recommending for authorisations. 	Each of the specialist studies contain a description of the methodology followed by the Specialist, indications of the development footprint, including associated infrastructure. The reports also contain recommendations of the specialists.	The specialist studies are included as Appendix F.
<ul style="list-style-type: none"> • Provide a detailed description of all limitations to the studies. All specialist studies must be conducted in the right season and providing that as a limitation will not be allowed. 	Each specialist study lists the assumptions, limitations and gaps in knowledge as relevant to each specialist field. The studies were all undertaken in the correct season(s), where seasonality is pertinent to the study.	The specialist studies are included as Appendix F.
<ul style="list-style-type: none"> • Please note that the Department considers a ‘no-go’ area, as an area where no development of any infrastructure is allowed; therefore, no development of associated infrastructure including access roads is allowed in the ‘no-go’ areas. 	The Department’s definition of “no-go” areas has been communicated to the specialist team. No development is proposed in any areas identified as “no-go” areas by the specialists (principally these are	The specialist studies are included as Appendix F. Plan 19 depicts the sensitive environmental features identified on

Issues/Questions Raised	Response	Reference in Report
	the identified graves, and some of the delineated wetlands as indicated in Plan 19.	site by the relevant specialist studies (including the "no-go"areas).
<ul style="list-style-type: none"> Should the specialist definition of 'no-go' area differ from the Department's definition; this must be clearly indicated. The specialist must also indicate the 'no-go' area's buffer if applicable. 	The specialists involved in this application have been made aware of the Department's definition of "no-go" areas and aligned thereto. Where "no-go" areas have been identified by the specialists these have been indicated along with the recommended buffers where applicable.	The specialist studies are included as Appendix F. Plan 19 depicts the sensitive environmental features identified on site by the relevant specialist studies (including the "no-go"areas).
<ul style="list-style-type: none"> All specialist studies must be final, and provide detailed/practical mitigation measures for the preferred alternative and recommendations, and must not recommend further studies to be completed post EA. 	All specialist studies are final and contain detailed mitigation measures (that have been included in the EMPr). No further studies are recommended, apart from the required specialist walk-downs immediately prior to construction commencing.	Appendix F.
<ul style="list-style-type: none"> Should a specialist recommend specific mitigation measures, these must be clearly indicated. 	Mitigation measures have been incorporated into the EMPr (Appendix H and Appendix I) and are discussed throughout Section 11 of this report, as relevant to the different project phases.	Section 11 Appendix H and Appendix I
<ul style="list-style-type: none"> Regarding cumulative impacts: 		
<ul style="list-style-type: none"> - Clearly defined cumulative impacts and where possible the size of the identified impact must be quantified and indicated, i.e., hectares of cumulatively transformed land. 	Cumulative impacts have been assessed in Section 11	Section 11
<ul style="list-style-type: none"> - A detailed process flow to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and 	Cumulative impacts of the proposed Project, in light of all other renewable energy Projects and their Grid Connections are discussed in Section 10.3 of this Report. A process flow diagram has been included therein.	Section 10.3

Issues/Questions Raised	Response	Reference in Report
when the conclusion and mitigation measures were drafted for this project.		
- Identified cumulative impacts associated with the proposed development must be rated with the significance rating methodology used in the process.	Cumulative impacts have been assessed in Section 11, these have been rated using the methodology outlined in Section 10.1	Section 11
- The significance rating must also inform the need and desirability of the proposed development.	The need and desirability of the Project is discussed in Section 5.	Section 5.
- A cumulative impact environmental statement on whether the proposed development must proceed.	A cumulative impact statement has been included in Section 12.	Section 12
b) Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defensible reasons; and where necessary, include further expert advice.	Any contradictions between specialists have been cleared up and no contradictions are contained in this report, or between specialist recommendations. Recommendations as made by the specialists have been included in Section 11.	Section 11
c) It is further brought to your attention that Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation, which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols"), and in Government Notice No. 1150 of 30 October 2020 (i.e. protocols for terrestrial plant and animal species), have come into effect. Please note that specialist assessments must be conducted in accordance with these protocols.	Specialist assessments have been conducted in line with the required protocols. Where no protocols have been published these have been compiled in accordance with Appendix 6 of the EIA Regulations.	The specialist studies are included as Appendix F.
d) The following Specialist Assessments will form part of the EIAR:		

Issues/Questions Raised	Response	Reference in Report
<ul style="list-style-type: none"> Soil, land use and land capability assessment 	<p>The Soil, land use and land capability assessment (entitled "Site Sensitivity Verification and Agricultural Agro-Ecosystem Specialist Assessment") can be found in Appendix F 1. This was undertaken by Johan Lanz Pr. Sci Nat (Soil Science).</p>	<p>Appendix F 1</p>
<ul style="list-style-type: none"> Visual Impact Assessment 	<p>The Visual Impact Assessment was undertaken by SIVEST SA (Pty) Ltd.</p>	<p>Appendix F 9</p>
<ul style="list-style-type: none"> Heritage / Archaeological Impact Assessment 	<p>The Heritage / Archaeological Impact Assessment was completed by Beyond Heritage (Pty) Ltd.</p>	<p>Appendix F 11</p>
<ul style="list-style-type: none"> Palaeontology 	<p>A Palaeontology assessment was undertaken by Prof. M.Bamford - PhD (Palaeobotany).</p>	<p>Appendix F 12</p>
<ul style="list-style-type: none"> Terrestrial Biodiversity Assessment 	<p>The Terrestrial Biodiversity Assessment was completed by David Hoare Consulting (Pty) Ltd, this included a plant species list (Appendix F 6) and animal biodiversity assessment (Appendix F 7)</p>	<p>Appendix F 5 Appendix F 6 Appendix F 7</p>
<ul style="list-style-type: none"> Aquatic Biodiversity Assessment 	<p>The Wetland and Aquatic Ecology Impact Assessment was undertaken by Stephen Burton Pr.Sci.Nat (Ecological Science).</p>	<p>Appendix F 4</p>
<ul style="list-style-type: none"> Avian Impact Assessment 	<p>The Avian Impact Assessment was conducted by Chris van Rooyen Consulting.</p>	<p>Appendix F 8</p>
<ul style="list-style-type: none"> Socio-Economic Assessment 	<p>A Socio-Economic Assessment was completed for the project by Urban-Econ Development Economists.</p>	<p>Appendix F 10</p>
<ul style="list-style-type: none"> Geotechnical Assessment 	<p>SLR Consulting (South Africa) (Pty) Ltd has compiled a desktop geotechnical assessment for the Project.</p>	<p>Appendix F 14</p>

Issues/Questions Raised	Response	Reference in Report
<ul style="list-style-type: none"> Hydrological Impact Assessment 	A hydrological and geohydrological study was completed by Shangoni Aquiscience.	Appendix F 2 Appendix F 3
<ul style="list-style-type: none"> Traffic Impact Assessment 	The Traffic/Transport Impact Assessment can be found in Appendix F 13.	Appendix F 13
e) Please include a table that shows the proposed studies and the relevant specialists carrying out the study. In addition, a summary should be included of the specialist's recommendations in terms of the alternatives that are preferred based on the findings of their study.	Table 6 lists the specialist studies undertaken and the details/qualifications of the specialist team. Table 15 summarises the specialist's recommendations in terms of preferred alternatives.	Table 6 Table 16
vii) General		
a) The EIAR must provide the technical details for the proposed facility in a table format as well as their description and/or dimensions. A sample for the minimum information required is listed under Annexure 2 below.	Technical details are provided in Table 12, with further descriptions provided in Section 4.2	Section 4.2 Table 12
b) Details of the future plans for the site and infrastructure after decommissioning in 20-30 years and the possibility of upgrading the proposed infrastructure to more advanced technologies must be indicated.	Once constructed the grid infrastructure (and associated Environmental Authorisation) will be transferred to Eskom. The anticipated operational phase of the Hendrina South WEF is approximately 20 years after which time the project infrastructure would have to be refurbished / upgraded to extend the life past the 20 years; in which case the South Grid Infrastructure will remain operational. Alternatively if the life of the Hendrina South WEF project is not extended past 20 years the facility will likely be decommissioned and the grid infrastructure will be disconnected and	Section 4.3.4

Issues/Questions Raised	Response	Reference in Report
	<p>dismantled. At which time a separate application for environmental authorisation will be submitted for the decommissioning activities.</p> <p>Eskom (or its successor in title) will be responsible for the decommissioning of the grid infrastructure. The decommissioning phase will comply with the applicable legislation relevant at the time.</p>	
<p>c) Should a Water Use License be required, proof of application for a license needs to be submitted.</p>	<p>Minimal water will be required during the construction phase. Water uses will be limited to activities associated with the river and/or wetland crossings in terms of Section 21(c) and (i) of the National Water Act, 1998 (Act 36 of 1998) (NWA). According to the Wetland and Aquatic Ecology Impact Assessment that was undertaken for the project the proposed powerlines will have a Low impact to the freshwater resources along the proposed routings. Thus the water use is permissible under a General Authorisation subject to the terms outlined in GN509 of the NWA.</p>	<p>Section 3.1.6 outlines water uses as defined in Section 21 of the NWA, and the applicability to the Project.</p>
<p>d) The EAP must provide landowner consent for all farm portions affected by the proposed project, whether the project component is linear or not, i.e., all farm portions where the access road and associated infrastructure is to be located.</p>	<p>Landowner consent forms have been included with the Application Form for Environmental Authorisation, where applicable.</p>	<p>Section 4.1 Appendix J</p>
<p>e) A construction and operational phase EMPr that includes mitigation and monitoring measures must be submitted with the final EIAR. EMPr that includes mitigation and monitoring measures must be submitted with the final EIAR.</p>	<p>The EMPr has been appended to the EIAR.</p>	<p>Appendix H and Appendix I</p>

Issues/Questions Raised	Response	Reference in Report
f) Please note, that a generic EMPr must be submitted for the powerline and the substation i.e., 2 separate EMPr's.	2 x Generic EMPr's have been completed and attached for the Project.	Appendix H and Appendix I

1.1.2 Draft EIA Phase Summary

The Draft EIA Report was made available to I&APs, commenting authorities and the DFFE for a comment period of 30 days (11 July to 11 August 2022). Where comments were received, these have been included in this report submitted to the DFFE for consideration, and decision-making.

Table 2 overleaf summarises the comments received from the DFFE on the Draft EIA report, the response thereto and cross references to the relevant sections of this report.

Table 2: DFFE Comments on the EIAR, and responses thereto

Issues/Questions Raised	Response	Reference in Report	
Specific Comments			
a	<p>1. Provide a separate appendix which includes the GPS coordinates, affected properties and SG codes of the preferred alternative. When providing coordinates as part of the information submitted regarding the location of an activity as part of an application for environmental authorisation, such coordinates must be provided in degrees, minutes and seconds using the Hartebeesthoek94 WGS84 coordinate system as per regulation 5(6) of the NEMA EIA Regulations, 2014, as amended.</p> <p>2. It is noted that the proposed project overlaps with the mineral rights of the Weltevreden Colliery and Koorfontein Mines and the applicant will have to obtain S53 Consent from the Department of Mineral Resources and Energy (DMRE). Please ensure that comments from relevant mining I&AP's are included in the final report.</p> <p>3. The EIAR must provide the technical details for the preferred grid infrastructure in a table format as well as their description, capacity and/or dimensions.</p> <p>4. Ensure that the Final EIR and EMPr speaks to the preferred alternative and the content is specific to the preferred alternative.</p>	<p>Cabanga confirms that a separate appendix has been included in the Final EIA report (Appendix K).</p> <p>This appendix includes farm names and numbers, GPS coordinates and SG codes for the preferred alternative.</p> <p>Coordinates have been provided in degrees, minutes and seconds using the Hartebeesthoek94 WGS84 coordinate system.</p> <p>ENERTRAG has consulted with the Overlooked Colliery (Alpha) Pty Ltd: Weltevreden Colliery and Black Royalty Minerals (Pty) Ltd: Koorfontein Mine. Comments have been received from both parties and are included in Appendix G 1 and Appendix G 12</p> <p>Table 12 has been updated to reflect the technical details of the preferred alternative only.</p> <p>Cabanga confirms that the EIA report and EMPr have been updated to speak to the preferred alternative (Option A).</p>	<p>Appendix K</p> <p>Appendix G 1 and Appendix G 12</p> <p>Table 12</p> <p>Throughout the report.</p>

<u>Issues/Questions Raised</u>	<u>Response</u>	<u>Reference in Report</u>	
Listed Activities			
b	<p>1. Please ensure that all relevant listed activities are applied for, are specific and can be linked to the development activity or infrastructure as described in the project description. Only activities applicable to the development must be applied for and assessed. You are required to provide thresholds for each activity included.</p>	<p>Detailed review has been undertaken by the EAP, and the Applicant, of the aspects of the proposed Project, and the Listed Activities triggered by each. Further to this a meeting was held with the CA on the 28th July 2022 to discuss the applicability of the Listed Activities. This was confirmed in writing by the CA on 29th July 2022.</p> <p>The Listed Activities applied for, along with descriptions of the specific infrastructure that triggers each Listed Activity applied for, and the thresholds for each activity are included in Table 13.</p>	Table 13
	<p>2. If the activities applied for in the application form differ from those mentioned in the final EIAR, a signed amended application form must be submitted.</p>	<p>The listed activities in the final EIAR and application form are the same.</p>	Appendix J
	<p>3. It is imperative that the relevant authorities are continuously involved throughout the environmental impact assessment process as the development property possibly falls within geographically designated areas in terms of numerous GN R. 985 Activities. Written comments must be obtained from the relevant authorities and submitted to this Department. In addition, a graphical representation of the proposed development within the respective geographical areas must be provided.</p>	<p>The relevant authorities, including but not limited to the Mpumalanga Tourism and Parks Agency (MTPA) and the DFFE Biodiversity Directorate, have been continuously engaged throughout this EIA Process, and associated public participation process. Representative of the MTPA attended the Open Day public meeting (See Appendix G 8) and provided comments included in Appendix G 10. The comments</p>	<p>Appendix G 8 Appendix G 10 Plan 8</p>

Issues/Questions Raised	Response	Reference in Report
	<p>received and responses thereto are provided in Appendix G 10.</p> <p>Plan 8 shows the preferred alternative in relation to geographically designated area in terms of GN R.985 Listing Noticed 3.</p>	
Alternatives		
<p>c. <u>1. It is noted that only one (1) feasible location for the placement of the substation has been identified following pre-feasibility analysis. Please provide in the final EIAR the steps you took to get to the only one (1) feasible location.</u></p>	<p>Section 6.4 has been updated to show the steps undertaken to identify the substation location.</p>	<p>Section 6.4</p>
<p><u>2. Furthermore, this Department notes that a preferred alternative for the grid is awaited by the applicant from ESKOM in terms of preference and permissions (section 4.2.1.2) for the final grid solution. Please note, that the final EIR must include the preferred alternative and suitable motivation as required in Appendix 3 of the EIA Regulations, 2014, as amended. The report references route/option A as the preferred alternative for grid solution 1 (Section 6.9). The listed activities and their description must represent the chosen alternative and if necessary, the application form will have to be amended.</u></p>	<p>Eskom has subsequently issued Cost-Estimate-Letters (CELs) for Grid Solution 1 and the LILO solution is not currently supported.</p> <p>The preferred route alternative is Option A.</p> <p>Confirmation and Motivation of the Preferred Alternative is presented in Section 6.9</p>	<p>Section 6.9</p>

<u>Issues/Questions Raised</u>	<u>Response</u>	<u>Reference in Report</u>
<u>Generic Environmental Management Programme</u>		
<p>d Substation and overhead electricity transmission and distribution infrastructure which trigger activity 11 or 47 of the Environmental Impact Assessment Regulations Listing Notice 1 of 2014, as amended, and any other listed and specified activities necessary for the realisation of such facilities, require the submission of a generic Environmental Management Programme as contemplated in Regulations 23(4). Please take note of Part B Section 2 of the generic EMPr requirement which states that:</p> <p><u>"This section must be submitted to the CA together with the final BAR or EIAR. The information submitted to the CA will be incomplete should a signed copy of Part B: section 2 not be submitted. Once approved, this Section forms part of the EMPr for the development and is legally binding."</u></p> <p><u>Ensure that signed versions of the generic EMPrs for the substation and powerline are submitted with the final EIAR.</u></p>	<p><u>A signed generic EMPr for the substation and powerline can be found in Appendix H and Appendix I which are submitted with this report.</u></p>	<p><u>Appendix H</u> <u>Appendix I</u></p>
<u>General</u>		
<p><u>Please also ensure that the final EIAR includes the period for which the Environmental Authorisation is required and the date on which the activity will be concluded as per Appendix 3 of the NEMA EIA Regulations, 2014, as amended. You are further reminded to comply with Regulation 23(1)(a) of the NEMA EIA Regulations, 2014, as amended, which states that: "The applicant must within 106 days of the acceptance of the scoping report submit to the competent authority</u></p> <p><u>=</u></p> <p><u>(a) an environmental impact assessment report inclusive of any specialist reports, an EMPr, a closure plan in the case of a closure activity and where the application is a mining application, the plans, report and calculations contemplated in the Financial Provisioning Regulations, which must have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority."</u></p>	<p><u>The EA is required to be valid for a period of 10 years from the date of issuance of the EA. This is considered a reasonable period to allow the Applicant time to conduct relevant internal processes which can only begin after issuance of the EA</u></p>	<p><u>Section 4.3.5</u></p>

<u>Issues/Questions Raised</u>	<u>Response</u>	<u>Reference in Report</u>
<p><u>Should there be significant changes or new information that has been added to the EIAR or EMPr which changes or information was not contained in the reports or plans consulted on during the initial public participation process, you are required to comply with Regulation 23(1)(b) of the NEMA EIA Regulations, 2014, as amended, which states: "The applicant must within 106 days of the acceptance of the scoping report submit to the competent authority – (b) a notification in writing that the documents contemplated in sub-regulation 1(a) will be submitted within 156 days of acceptance of the scoping report by the competent authority or where regulation 21(2) applies, within 156 days of receipt of the application by the competent authority, as significant changes have been made or significant new information has been added to the documents, which changes or information was not contained in the original documents consulted on during the initial public participation process contemplated in sub-regulation (1)(a), and that the revised documents contemplated in sub-regulation 1(a) will be subjected to another public participation process of at least 30 days".</u></p>	<p><u>There have been no significant changes to the EIA report. All changes have been underlined for ease of reference.</u></p>	<p><u>Throughout the report.</u></p>

1.2 Purpose of this Report

The Project involves the undertaking of Listed Activities identified in the EIA Regulations, 2014 (as amended) and as such require an Environmental Authorisation in terms of the NEMA before being undertaken.

Listed Activities relevant to the Project are identified in Listing Notice 1, 2 and 3 of the EIA Regulations (Please see Table 13), and as such, the application is subject to the Scoping and EIA Process as set out in Part 3 (Regulation 21 to 24) of the EIA Regulations.

This EIA Report was compiled in accordance to the approved Scoping Report Plan of Study for EIA, and Appendix 3 of the EIA Regulations. The Report was made available for a public comment period of 30 days, after which the comments received were captured and addressed in this Final EIA Report that is submitted to the DFFE for consideration.

The objective of the environmental impact assessment process is to, through a consultative process—

- (a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context (See Section 3);
- (b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report (See Section 5);
- (c) identify the location of the development footprint within the approved site as contemplated in the accepted scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment (See Section 6.9 and 10);
- (d) determine the—
 - i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
 - ii) degree to which these impacts—
 - (aa) can be reversed;
 - (bb) may cause irreplaceable loss of resources, and
 - (cc) can be avoided, managed or mitigated; (See Section 11);
- (e) identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment (Section 6.9);
- (f) identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity (Section 11);
- (g) identify suitable measures to avoid, manage or mitigate identified impacts (Section 11, Appendix H and Appendix I); and
- (h) identify residual risks that need to be managed and monitored (Appendix H and Appendix I).

1.3 Structure of this Report

The required content of an EIA Report is prescribed in Appendix 3 of the EIA Regulations, 2014 (As amended). Table 3 presents these requirements and provides cross-references to the various sections of this report where the requirements are addressed.

Table 3: Structure of the EIA Report

Requirement, as per EIA Regulations 2014 (as amended)		Section of this report
(1) An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include—		
(a) details of—	(i) the EAP who prepared the report; and	Table 5
	(iii) the expertise of the EAP, including a curriculum vitae;	Section 2.4
(b) the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including:	(i) the 21-digit Surveyor General code of each cadastral land parcel;	Section 4.1 Table 11
	(ii) where available, the physical address and farm name;	
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
(c) a plan which locates the proposed activities applied for and the associated structures and infrastructure at an appropriate scale,		Plan 9
(d) a description of the scope of the proposed activity, including—	(i) all listed and specified activities triggered and being applied for;	Section 4.4
	(ii) a description of the associated structures and infrastructure related to the development;	Section 4.2
(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;		Section 3
(f) a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;		Section 5
(g) a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;		Section 6.9
(h) a full description of the process followed to reach the proposed development footprint	(i) details of the development footprint alternatives considered;	Section 6.3 and 6.4
	(ii) details of the public participation process undertaken in terms of regulation 41 of the	Section 7 and Appendix G

Requirement, as per EIA Regulations 2014 (as amended)	Section of this report	
<p>within the approved site as contemplated in the accepted scoping report, including:</p>	<p>Regulations, including copies of the supporting documents and inputs;</p>	
	<p>(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;</p>	
	<p>(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;</p>	Section 8
	<p>(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts— (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;</p>	Section 10.2
	<p>(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;</p>	Section 10
	<p>(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;</p>	Sections 11.1.2 to Section 11.1.13
	<p>(viii) the possible mitigation measures that could be applied and level of residual risk;</p>	Section 11
	<p>(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such;</p>	Alternatives were considered – See Section 6
	<p>(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;</p>	Section 6.9

Requirement, as per EIA Regulations 2014 (as amended)	Section of this report	
<p>a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including—</p>	<p>(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and</p>	<p>Sections 11.1.2 to Section 11.1.13.</p>
<p>(j) an assessment of each identified potentially significant impact and risk, including—</p>	<p>(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;</p> <p>(i) cumulative impacts;</p> <p>(ii) the nature, significance and consequences of the impact and risk;</p> <p>(iii) the extent and duration of the impact and risk;</p> <p>(iv) the probability of the impact and risk occurring;</p> <p>(v) the degree to which the impact and risk can be reversed;</p> <p>(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and</p> <p>(vii) the degree to which the impact and risk can be mitigated;</p>	<p>Sections 11.1.2 to Section 11.1.13.</p> <p>Section 11</p>
<p>(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;</p>		<p>Specialist Reports are included in Appendix F. The impact assessments and recommendations have been captured in Sections 11.1.2 to Section 11.1.13.</p>
<p>(l) an environmental impact statement which contains—</p>	<p>i) a summary of the key findings of the environmental impact assessment;</p> <p>(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any</p>	<p>Section 12</p>

Requirement, as per EIA Regulations 2014 (as amended)		Section of this report
	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;	
(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMP as well as for inclusion as conditions of authorisation;		Section 12.2 Appendix H and Appendix I
(n) the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;		Section 6.9
(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;		Section 12.2
(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;		Section 13
(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;		Section 12
(r) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;		N/A – Operational Aspects included (20+ years operational life)
(s) an undertaking under oath or affirmation by the EAP in relation to—	(i) the correctness of the information provided in the reports;	Appendix B
	(ii) the inclusion of comments and inputs from stakeholders and I&APs;	
	(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and	
	(iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	
(t) where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;		N/A – relevant to mining projects in terms of Financial Provision Regulations (GN1147)

Requirement, as per EIA Regulations 2014 (as amended)		Section of this report
(u) an indication of any deviation from the approved scoping report, including the plan of study, including—	(i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and	N/A – no deviation from Scoping Report
	(ii) a motivation for the deviation;	
(v) any specific information that may be required by the competent authority;		Section 12.3
(w) any other matters required in terms of section 24(4)(a) and (b) of the Act.		

2 Role Players

2.1 Project Applicant

The Project Applicant is ENERTRAG South Africa (Pty) Ltd. The Applicant will be responsible for the construction phase of the Project, after which ownership of the grid connection infrastructure (and associated Environmental Authorisation) will be transferred to the Grid Operator, Eskom (or its successor in title).

Details of the Project Applicant are provided in Table 4.

Table 4: Details of the Project Applicant

Project applicant:	ENERTRAG South Africa Pty Ltd
Registration No:	2017/143710/07
Contact person(s):	Sandhisha Jay Narain Mercia Grimbeek
Head-Office Address:	183 Main Road Rondebosch Cape Town
Postal Address:	Suite 104, Albion Springs
Telephone:	+27 11 214 0662
E-mail:	Sandhisha.JayNarain@enertrag.com mercia.grimbeek@enertrag.com

2.2 Competent Authority

Section 24C(2)(a) of the National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA) stipulates that the Minister of Forestry, Fisheries and the Environment (“the Minister”) must be identified as the Competent Authority (CA) if the activity has implications for international environmental commitments or relations. GN 779 of 01 July 2016 identifies the

Minister as the CA for the consideration and processing of environmental authorisations and amendments thereto for activities related the Integrated Resource Plan (IRP) 2010 – 2030.

As the Project constitutes associated infrastructure to projects related to the IRP, the Department of Forestry, Fisheries and Environment (DFFE) is the CA.

2.3 EAP Project Team and Specialists

The details of the persons who prepared this report are provided in Table 5. Details of the Specialist Team are provided in Table 6. CVs are attached as Appendix D.

Table 5: Details of the EAP Project Team

Author and EAP	Michelle Venter
Highest qualification	BSc Hons Geography; BSc Environmental Management & Zoology
Years' experience	10+ years
Professional registration	Registered EAP: 2019/456 (EAPASA) SACNASP: Cert. Sci. Nat. 114447
Co-Author and Review	Lelani Claassen
Highest qualification	BSc Hons Environmental Management
Years' experience	12+ years
Professional registration	Registered Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioner's Association of South Africa (EAPASA). Registration Number 2018/153. SACNASP: Pr. Sci. Nat (Reg. 121645)
Review	Jane Barrett
Highest qualification	BSc Environmental Management & Botany
Professional registration	SACNASP: Cert Sci. Nat. 130485
Years' experience	12+ years
Approval	Ken van Rooyen
Highest qualification	MSc Geography
Years' experience	30+ years
Professional registration	SACNASP: Pr. Sci. Nat (Reg. 400121/93)

Table 6: Specialist Field/Study Undertaken and Details of the Specialist Team

Specialist Undertaken	Field/Study	Details of the Specialist who completed the assessment
Site Sensitivity Verification and Agricultural Agro-Ecosystem Specialist Assessment (Appendix F 1)		Johan Lanz Pr. Sci Nat (Soil Science) Member of the Soil Science Society of South Africa M.Sc. (Environmental Geochemistry) (1997)

Specialist Undertaken	Field/Study	Details of the Specialist who completed the assessment
		B.Sc. Agriculture (Soil Science, Chemistry) (1995)
Surface Water Assessment (Hydrology) Report (Appendix F 2)		Shangoni Management Services (Pty) Ltd - Ockie Scholtz Pr.Sci.Nat. M.Sc Geohydrology
Geohydrological Impact Assessment (Appendix F 3)		Shangoni Aquiscience - Ockie Scholtz Pr.Sci.Nat. M.Sc Geohydrology
Wetland and Aquatic Ecology Impact Assessment (Appendix F 4)		Stephen Burton Pr.Sci.Nat. 117474 MSc
Terrestrial Biodiversity Assessment (Appendix F 5)		David Hoare Consulting (Pty) Ltd - Dr David Hoare Pr.Sci.Nat. 400221/05 (Ecological Science, Botanical Science) PhD Botany
Terrestrial Plant Species Assessment (Appendix F 6)		
Terrestrial Animal Biodiversity Assessment (Appendix F 7)		
Avifaunal Impact Assessment (Appendix F 8)		Chris van Rooyen Consulting - Chris van Rooyen (Bird Specialist) & Albert Froneman (Bird and GIS Specialist) Pr. Sci. Nat (Zoological Science)
Visual Impact Assessment (Appendix F 9)		SiVEST SA (Pty) Ltd - Kerry Schwartz BA, SAGC Registered GIS Technician
Socio-Economic Impact Assessment (Appendix F 10)		Urban-Econ Development Economists - Pierre van Jaarsveld B.TRP HONS (Town and Regional Planning) Member of the Economics Society of South Africa (ESSA)
Heritage Impact Assessment (Appendix F 11)		Beyond Heritage - Jaco van der Walt MA Archaeology ASAPA Accredited
Palaeontological Impact Assessment (Appendix F 12)		Professor Marion Bamford - PhD (Palaeobotany)
Transport Study (Appendix F 13)		JG Afrika (Pty) Ltd - Iris Wink PrEng, MSc Eng (Civil & Transportation)
Geotechnical Desktop Study (Appendix F 14)		SLR Consulting (South Africa) (Pty) Ltd - Muhammad Osman BSc Honours Engineering and Environmental Geology Pr Sci Nat – Registered as Professional Natural Scientist with SACNASP

2.4 Expertise of the EAP

Michelle holds an Honours Degree in Geography from UNISA (2014), which she completed part-time following the successful completion of a BSc Degree in Environmental Management and Zoology (2010).

She has been employed as an Environmental Assessment Practitioner (EAP) at Cabanga Environmental since 2016 working predominantly with mining and development projects. Previously she has worked as an assistant auditor (ISO 14001), public participation officer as well as an Environmental Control Officer (ECO).

Michelle's key experience includes:

- Monitoring (dust, water and noise) and Compliance
- Environmental Performance Assessments
- Water Use License Auditing
- Environmental Impact Assessments
- Environmental Management Programmes
- Rehabilitation and Closure reports (including the assessment of Financial Provision)
- Water Use License Applications and Integrated Water and Waste Management Plans
- GIS Mapwork
- Public Participation and Stakeholder Engagement

Michelle is a Registered EAP (Registration Number 2019/457) with the Environmental Assessment Practitioner's Association of South Africa (EAPASA), the only Registration Authority for EAPs in South Africa in terms of Section 24H of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).

Michelle is also a Certificated Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP) (Environmental Science) (Cert. Sci. Nat. 114447), the legislated regulatory body for natural science practitioners in South Africa in terms of the Natural Scientific Professions Act of 2003.

Michelle's CV has been included hereto as Appendix D.

3 Policy and Legislative Context

The Constitution of the Republic of South Africa, 1996 (Act No 108 of 1996) is the supreme law of the country. Law or conduct inconsistent with the Constitution is invalid, and the obligations imposed by the Constitution must be fulfilled. Section 24 of the Constitution states that:

Everyone has the right to (a) an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that –

- *Prevent pollution and ecological degradation;*
- *Promote conservation; and*
- *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*

To give effect to Section 24 of the Constitution, several laws have been promulgated towards realisation of these rights. The National, Provincial and Local legislation most relevant to the proposed development are discussed herein.

3.1 National Environmental Management Legislation

The most prominent legislation dealing with environmental management and impact assessment are discussed below.

3.1.1 The National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA)

The National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA), as amended was set in place in accordance with Section 24 of the Constitution of the Republic of South Africa. Certain environmental principles under NEMA have to be adhered to, to inform decision making for issues affecting the environment. Section 24 (1)(a) and (b) of NEMA state that the potential impact on the environment and socio-economic conditions of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorising, permitting, or otherwise allowing the implementation of an activity.

3.1.2 The EIA Regulations, 2014 (as amended)

The EIA Regulations, Government Notice (GN) Regulation 982 were published on 04 December 2014 and promulgated on 08 December 2014. Together with the EIA Regulations, the Minister also published GN R 983 (Listing Notice No. 1), GN 984 (Listing Notice No. 2) and GN R 985 (Listing Notice No. 3). The NEMA EIA Regulations, 2014 and Listing Notices have been amended numerous times. The undertaking of Listed Activities in terms of the EIA Regulations requires Environmental Authorisation to be obtained prior to commencement.

There are new Listed Activities associated with the proposed Project, as described in Section 4.4 of this Report. Activities are identified in terms of Listing Notice 1, 2 and 3 of the EIA Regulations 2014 (as amended). The EIA Regulations further set out the requirements for reporting, timeframes, public participation and specialist reports.

A comprehensive Scoping and EIA Process is therefore relevant to the application. The Scoping and EIA Process that is being undertaken in terms of the proposed Project is undertaken in accordance with the Regulations, and the EIA Guideline for Renewable Energy Projects (DEA, 2015).

3.1.3 NEMA Regulations pertaining to Renewable Energy Development Zones and Strategic Transmission Corridors

The Minister of Forestry, Fisheries and Environment identified three additional Geographical Areas of Strategic Importance for the development of Large-scale wind and solar Photovoltaic energy facilities (in addition to those published in Government Notice 114 of 2018) on 26

February 2021 (Government Notice 144). The proposed Project is located approximately 20km south of Renewable Energy Development Zone 9 (Emalahleni).

The Minister further identified specific procedures to be followed when applying for environmental authorisation in terms of NEMA, for electricity transmission and distribution projects when occurring in Renewable Energy Development Zones (REDZs) (Government Notice 145 of 26 February 2021). Government Notice 145 does therefore not specifically apply to the proposed Project.

Government Notice No. 113 of 16 February 2018 identifies 5 strategic transmission corridors important for the planning of electricity transmission and distribution infrastructure and the procedures to be followed when applying for environmental authorisation for electricity transmission and distribution infrastructure when occurring in these corridors.

The proposed project does **not** fall within the REDZ or strategic transmission corridors (Plan 3).

3.1.4 NEMA Regulations pertaining to Generic EMPRs

Section 24(5) of NEMA empowers the Minister to make regulations laying down specific procedures to be followed in applying for Environmental Authorisation. The aforementioned EIA Regulations and Listing Notices are examples of such. Regulation 19(4) and Regulation 23(4) of the EIA Regulations, 2014 (as amended) states:

*“An Environmental Management Programme (EMPr) must contain the information set out in Appendix 4 to these Regulations **or must be a generic EMPr relevant to the application as identified and gazetted by the Minister** in a government notice.”*

Consequently, the Minister published GN 435 on 22 March 2019, which prescribes applications for Environmental Authorisation for substations and overhead powerlines which must use the Generic EMPRs set out in Appendix 1 and 2 of these Regulations. The following extracts from the Generic EMPRs are highlighted:

The template in Part B Section 1 is to be completed by the contractor, with each completed page signed and dated by the holder of the EA prior to commencement of the activity. Where an impact management outcome is not relevant, the words “not applicable” can be inserted in the template under the “responsible persons” column.

Once completed and signed, the template represents the EMPr for the activity approved by the CA and is legally binding. The template is not required to be submitted to the CA as once the generic EMPr is gazetted for implementation, it has been approved by the CA.

To allow interested and affected parties access to the pre-approved EMPr template for consideration through the decision-making process, the EAP on behalf of the applicant /proponent must make the hard copy of this EMPr available at a public location and where the applicant has a website, the EMPr should also be made available on such publicly accessible website.

Part B Section 2 of these Regulations prescribes that a preliminary infrastructure layout be included in the EMPr and a declaration, that the Applicant/holder of the Environmental Authorisation (EA) will comply with the pre-approved EMPr, be included.

Part C of the Regulations speak to site specific sensitivities / attributes, and specific impact management outcomes and actions relevant to aspects not covered in the generic, pre-approved EMPr. The Project site does contain site-specific sensitivities as outlined in this Report.

Two Generic EMPr Reports have been completed for the Project, one for the powerline (Appendix H) and one for the substation (Appendix I). The relevant information as required by Part B and C has been completed, and these reports have been made available for public review and comment.

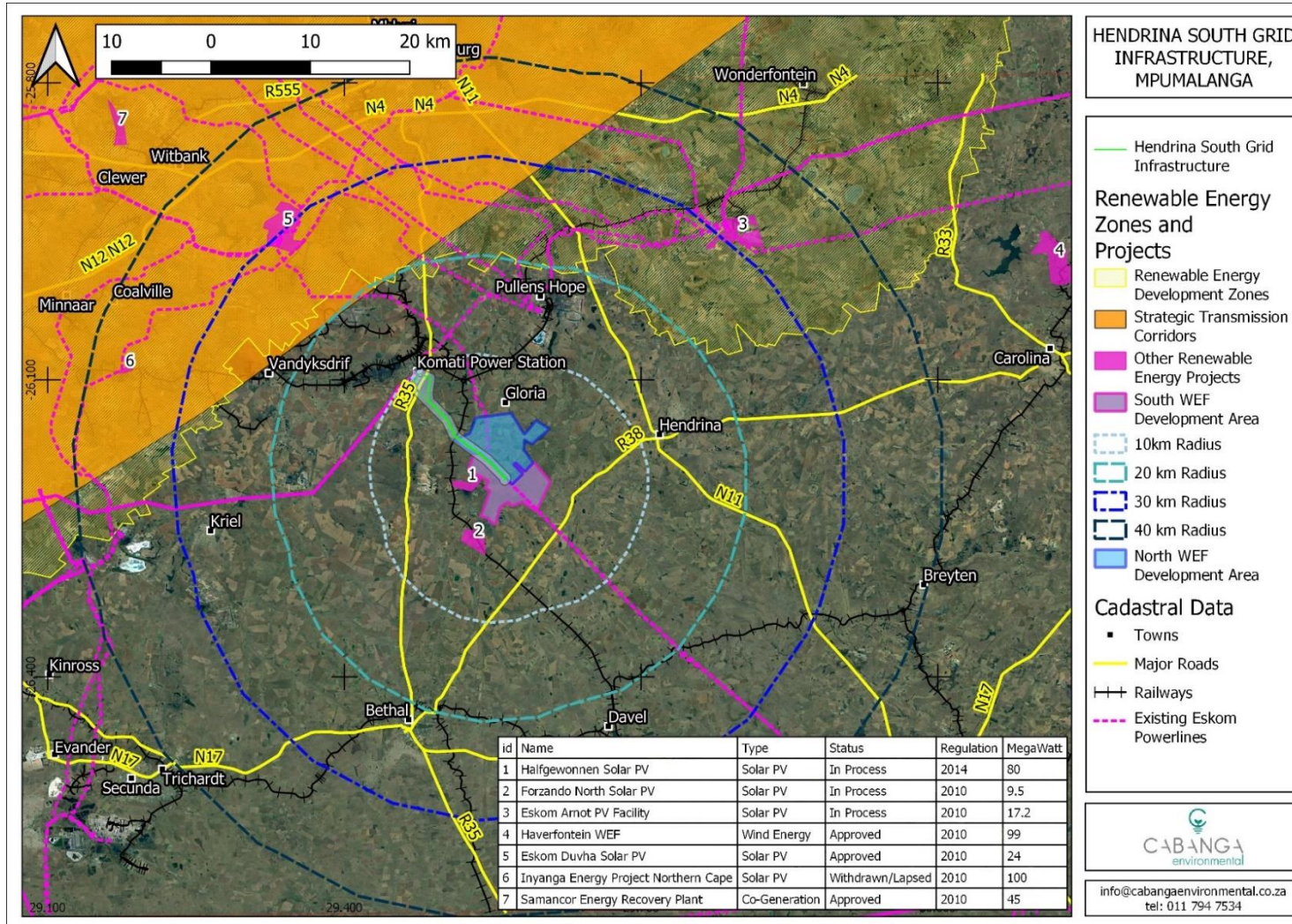
3.1.5 National Environmental Management Waste Act, 2008 (Act No. 59 of 2008)

The National Environmental Management Waste Act, 2008 (Act No. 59 of 2008) (NEMWA) provides for national norms and standards for regulating the management of waste, and the licensing and control of waste management activities.

Regulations to the NEMWA identifies a number of activities which require a Waste Management License (WML) prior to being undertaken.

No Listed Waste Management Activities are relevant to the proposed Project and no WML in terms of NEMWA is required.

The National Norms and Standards for the storage of waste (GN 926 of 29 November 2013) could still be relevant to waste storage during construction of the proposed Project depending on volumes of waste generated. Specifications for the temporary storage and eventual disposal of waste generated at the Project Site are provided in the Environmental Management Programme (EMPr) (Appendix H and Appendix I).



Plan 3: Project in relation to REDZ, Strategic Transmission Corridors and other Renewable Energy Projects

3.1.6 National Water Act, 1998 (Act No. 36 of 1998)

The National Water Act, 1998 (Act 36 of 1998) (NWA) provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest. In general a water use must be licensed unless it is listed in Schedule 1, is an existing lawful use, **is permissible under a general authorisation** or if the responsible authority waives the need for a licence.

“Water Use” is defined in Section 21 of the NWA. Each defined water use, and its possible relevance, to the proposed Project is described in Table 7. The competent authority in respect of water use is the Department of Water and Sanitation (DWS, previously Department of Water Affairs and Forestry, DWAF).

Table 7: Legislated water uses

S 21	Description	Relevance to the proposed project
a	taking water from a water resource.	It is possible that water for construction purposes will be sourced from groundwater abstraction (boreholes). ~20 000 m ³ will be required for construction purposes.
b	storing water.	No water storage dams are applicable to the Project.
c and i	impeding or diverting the flow of water in a watercourse; altering the bed, banks, course or characteristic of a watercourse.	The proposed powerline route will have to cross over the Leeuwfontein Spruit and several identified wetlands. According to the Wetland and Aquatic Ecology Impact Assessment that was undertaken for the project the proposed powerlines will have a Low impact to the freshwater resources along the proposed routings and thus a General Authorisation in terms of GN509 is applicable, as opposed to a water use license.
d	engaging in a stream flow reduction activity contemplated in section 36.	The water use pertains to the use of land for afforestation, and is not relevant to the proposed Project.
e	engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1).	Controlled activities include irrigation of land with wastewater, activities that modify atmospheric precipitation, power generation activities that alter the flow regime of a watercourse and intentional recharging of aquifers with waste water. None of the activities are relevant to the proposed Project.
f	discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit.	The proposed Project will not be allowed to discharge wastewater or any other waste into a water resource, and this water use is not relevant to the proposed Project.

S 21	Description	Relevance to the proposed project
g	disposing of waste in a manner which may detrimentally impact on a water resource.	On-site waste management will be in accordance to the Norms and Standards for the storage of waste, and waste will be removed off site for recycling or disposal by third parties.
h	disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process.	The Project will not result in the generation of waste or wastewater that has been heated in an industrial or power-generation process, the water use is thus not relevant to the proposed Project.
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.	This water use pertains specifically to dewatering of mine workings and is not relevant to the proposed Project.
k	using water for recreational purposes.	The Project will not make use of water for recreational purposes and the water use is not relevant.

3.1.7 National Environmental Management Air Quality Act, 2004 (Act No. 39 of 2004)

According to the National Environmental Management Air Quality Act, 2004 (Act No. 39 of 2004) (NEMAQA) the Department of Environmental Affairs (DEA), the provincial environmental departments and local authorities (district and local municipalities) are separately and jointly responsible for the implementation and enforcement of various aspects of NEMAQA. A fundamental aspect of the approach to the air quality regulation, as reflected in the NEMAQA is the establishment of National Ambient Air Quality Standards (NAAQS) (GN R 1210 of 2009). These standards provide the goals for air quality management plans and also provide the benchmark by which the effectiveness of these management plans are measured.

Activities that are identified in GN 983 require an Atmospheric Emissions License (AEL) to be issued in terms of NEMAQA. No such activities are associated with the proposed Project and an AEL will not be required.

GN1123 declared the Highveld Priority Area (HPA) in terms of the NEMAQA. The HPA Air Quality Management Plan (AQMP) was published in GN144. The proposed project site falls within the HPA and thus must comply with the AQMP. Specific measures are included in the EMPr (Appendix H and Appendix I), along with specific requirements for prevention and management of dust and emissions potentially arising from the construction phase.

3.2 Legislation Pertaining to Mining

The Mineral and Petroleum Resources Development Act, 2002 (MPRDA) (Act No. 28 of 2002) and its Regulations (GNR527, as amended) is the predominant legislation dealing with the acquisition of rights to search for, extract and process mineral resources in South Africa.

Section 53 of the MPRDA provides that persons who intend to use the surface rights of any land in any way which may result in sterilisation of a mineral resource or impede any objects of the MPRDA, has to obtain consent from the Minister of Mineral Resources prior to undertaking such

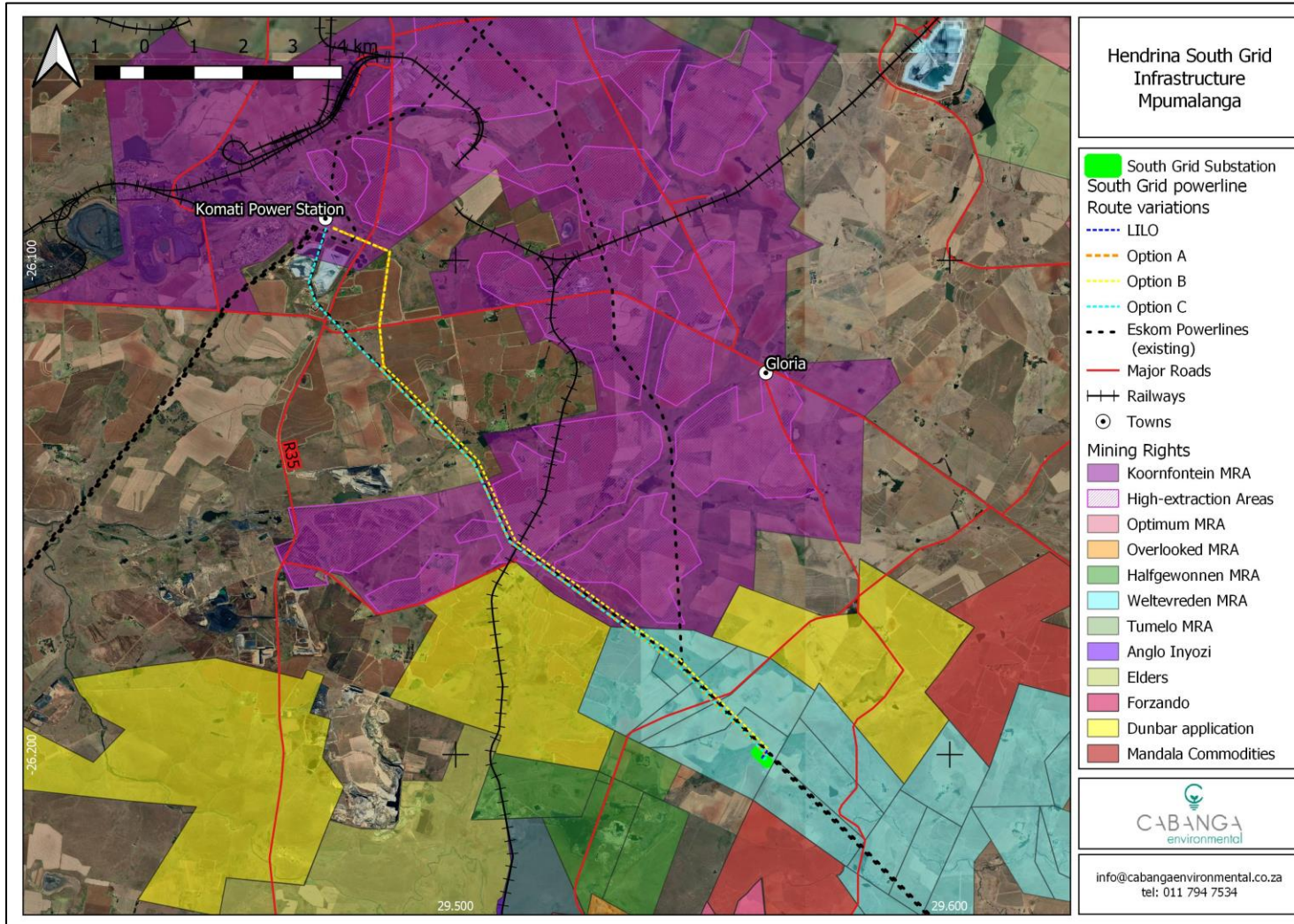
activity or land use. The Project will thus have to obtain a Section 53 consent from the Department of Minerals Resources and Energy (DMRE).

The Project overlaps with the Mineral Rights of the Weltevreden Colliery (held by Overlooked Colliery Alpha (Pty) Ltd), and Koornfontein Mines (status not confirmed, recently in business rescue, re-commencement of activities under Black Royalty Minerals Koornfontein <https://www.miningweekly.com/article/black-royalty-minerals-announces-appointment-of-ceo-for-koornfontein-mine-2020-10-09>). ENERTRAG is consulting with both parties in this regard.

The proposed Project is not in direct conflict with any known active surface-activities associated with the Mines, and it is anticipated that the Project, can co-exist with the existing mining activities. Potential synthesis between the proposed Projects and surrounding mines do exist: The mines have a vested interest in the improvement of reliable electricity supply and the contribution the proposed Projects could make to the Eskom Grid, because the mines need electricity to operate.

Regulation 17(8) of the Mine Health and Safety Act, 1996, (MHSA) Regulations state that "no person may erect, establish or construct any buildings, roads, railways, dams, waste dumps, reserve land, excavations or any other structures whatsoever within a horizontal distance of 100 (one hundred) metres from workings, unless a lesser distance has been determined safe by a professional geotechnical specialist and all restrictions and conditions determined by him or her or by the Chief Inspector of Mines are complied with."

Some of the proposed Project infrastructure traverse areas that may have been undermined, and this must be further investigated during the detailed design phase of the Project where the preferred alternative overlaps with areas of mineral rights (Plan 4).



Plan 4: The Project and known mineral interests

3.3 Legislation Pertaining to Conservation

The following sections provide an overview of the most pertinent legislation relating to conservation of natural and historic resources in South Africa at present.

The National Environmental Management: **Protected Areas Act**, 2003 (Act No 57 of 2003) (NEMPAA) (as amended) provides for the protection and conservation of ecologically viable areas of South Africa's biological diversity, natural landscapes and seascapes. It further provides for the establishment of a register of protected areas (SAPAD).

There are no formally protected areas in the immediate vicinity of the proposed Project, the closest being the Heyns Private Nature Reserve 13km to the north-west of the Komati Power Station. The Middleburg Coal Mine affects the majority of the Designated Nature Reserve.

The National Environmental Management: **Biodiversity Act**, 2004 (Act No. 10 of 2004) (NEMBA) provides for the management and conservation of South Africa's biodiversity within the framework of the NEMA. The Act relates to the protection of species and ecosystems that warrant national protection, among others. Similarly, the National **Forests Act**, 1998 (Act 84 of 1998) allows for the protection of certain tree species.

Certain Fauna and Flora Species of Conservation Concern (SCC) occur on the site, as further discussed in Section 11.1.5 of this Report. The protected plant species that cannot be avoided by the proposed Project, will have to be translocated under the necessary permits.

The Conservation of **Agricultural Resources Act**, 1983 (Act No 43 of 1983) (CARA) provides for control over the utilisation of the natural agricultural resources of the Republic to promote the conservation of soil, water sources and vegetation and the combating of weeds and invader plants.

Weeds and invader plants have already colonised parts of the site, which infestation is likely to be exacerbated by additional ecological disturbance associated with construction activities. It is recommended that the development of the Project be associated with alien invasive species management, as contained in the EMPr (Appendix H and Appendix I).

The **Subdivision of Agricultural Land Act**, 1970 (Act 70 of 1970) controls the subdivision and use of agricultural land. Portions of the development footprint traverse land used for agricultural purposes. Land with high-value agricultural potential should be protected and not sub-divided or fragmented into smaller portions that would threaten the viability of agricultural activities. Sub-division of agricultural land requires the consent of the Minister of Agriculture, and the registration of servitudes over agricultural land also requires Ministerial Consent, except for (Section 6A(1)(a) a "servitude for the conducting of electricity with a width not exceeding 15 metres". Potential impacts of the proposed project on agricultural land are assessed in Section 11.1.2

The National **Heritage Resources Act**, 1999 (Act No. 25 of 1999) (NHRA) aims to promote good management and preservation of the country's Heritage Resources. The NHRA requires (Section 38) that a person who intends to undertake certain types of activities (including developments that will change the character of a site), must notify the responsible Heritage Authority of such development proposal and furnish such information that the Authority may require.

The South African Heritage Resources Agency (SAHRA) and Mpumalanga Provincial Heritage Resources Agency (MPHRA) were notified of the proposed Project via the South African Heritage Resources Information System (SAHRIS) on 24 February 2022, and requested to comment. The Heritage and Palaeontological Impact Assessments (Appendix F 11 and Appendix F 12) have been submitted on SAHRIS and SAHRA has provided statutory comment please see Appendix G 10.

3.4 Legislation and Policy relevant to Electricity Generation and Transmission

South Africa's **National Development Plan, 2030 (NDP)** (NPC, 2011) serves as a road-map for the country's development and sets out national goals and strategies to achieve those goals, that include reducing unemployment and inequality and eliminating poverty so that all South Africans can attain a decent standard of living. Access to affordable and reliable electricity is recognised as one of the core elements of a decent standard of living (DoE, 2019)

The NDP looks to the **Integrated Resource Plan (IRP)** (DoE, 2019) in formulating its vision for the energy sector. The original IRP (published in March 2011) was intended to be a living document undergoing continuous updates by the Department of Energy, in light of ever-changing electricity demand and rapidly developing electricity generation technology world-wide. The latest iteration of the IRP (DoE, 2019) recognises the imminent decommissioning of ageing coal-fired power stations and the resultant need to generate more power. In light of international commitments to reduce emissions and generate cleaner energy, the IRP has confirmed that the installation of renewables has been brought forward to accelerate local industry.

The national regulatory framework for the electricity supply industry was established by the **Electricity Regulation Act, 2006** (Act No. 4 of 2006) (as amended) (ERA) that also makes the National Energy Regulator of South Africa (NERSA) (established by Section 3 of the **National Energy Regulator Act**) the custodian and enforcer thereof. The Act further provides for licences and registration as the manner in which generation, transmission, distribution, reticulation and trading of electricity are regulated (among others).

The Applicant will have to follow the necessary procedures and obtain the necessary approvals from NERSA for the Project. Cabanga Environmental is not involved in these application processes and the Applicant is managing the application(s) internally.

Electricity regulations on new generation capacity (GN R 399 of 4 May 2011) apply to the procurement of new generation capacity, by organs of state active in the energy sector (excluding nuclear power technology) and specifically aims to facilitate planning for the establishment of new generation capacity and the regulation of entry by a buyer (being an organ of state) and a seller (such as an independent power producer, IPP) into a power purchase agreement and the minimum standards for such agreements.

The Applicant must reach suitable agreement to connect the proposed Hendrina Renewable Energy Complex, to the National Grid, through the development of this Project and the South Grid Infrastructure Project (which is the subject of a separate EIA Process).

In general, diversification of the energy mix mitigates numerous risks associated with an expanding power supply system, as confirmed in the **Electricity Regulations on the Integrated**

Resource Plan 2010 - 2030, GN 400 of 6 May 2011. Given that the majority of coal-fired power plants are located in Mpumalanga, decommissioning of these facilities will lead to a significant opportunity for new development, to counteract the effects of imminent decommissioning of ageing infrastructure, and depletion of coal resources in the long-term, inevitably resulting in job losses in the coal mining sector in Mpumalanga.

The **Transmission Development Plan Report 2022-2031** (Eskom, 2022) serves as a response to the Country's energy developments, the expansion of the transmission network is critical to provide capacity and access for the new energy sources. An additional 300MW in the form of IPP coal fired power stations was expected to be integrated into Mpumalanga in 2023 but this project has since been cancelled.

Provinces such as Mpumalanga and Limpopo have lower renewable energy potential when compared to other Provinces such as the Western and Eastern Cape Provinces and thus have historically been avoided for renewable energy development.

A Just Energy Transition can only take place if new investment and development takes place within the provinces that will be negatively impacted on by the moving away from fossil fuels.

The Applicant is thus developing the proposed Project (and associated Projects), to stimulate sustainable investment in Mpumalanga.

3.5 Provincial and Local Legislation and Guidelines

The Mpumalanga Tourism and Parks Agency (MTPA) was established by the **Mpumalanga Tourism and Parks Agency Act** (Act 5 of 2005) which provides for the management and the sustainable development and improvement of the tourism industry in Mpumalanga.

The powers and functions of the MTPA in respect of conservation management of the natural resources of the province include administration of the **Mpumalanga Nature Conservation Act** (Act No. 10 of 1998). The Schedules to the Act list "specially protected game", "protected game", "ordinary game" and "protected wild animals", and makes specific provisions regarding hunting, catching, purchase, donation and sale of such game, including the removal, receipt, handling and conveyance of dead game, and the importing and exporting of wild animals from Mpumalanga.

Chapter 4 of the Mpumalanga Nature Conservation Act deals with problem animals, including black-backed jackal (*Canis mesomels*), Caracal / Red Lynx (*Felis caracal*) and Bush Pig (*Potamochoerus porcus*). The Act also places specific restrictions on the picking, donation, sale, export, removal, purchase and receipt of protected and indigenous plants, and invader weeds and plants (Chapter 6). These provisions have been incorporated into the Environmental Awareness Plan and EMPr for the Project (Appendix H and Appendix I).

The **Mpumalanga Spatial Development Framework** (SDF) (MPSDF, 2018) mentions mining as the predominant Regional Spatial Development Initiative in the area where the site is located. Mining and Energy-related development is identified as one of nine key drivers of the Mpumalanga Vision 2030, and states the following: "Infrastructure investment aimed at enhancing the mining and electricity industry should be consolidated in the western Highveld

of Mpumalanga where the vast majority of coal mines and power stations are located. In areas such as eMalahleni, Steve Tshwete, Standerton and Secunda") (MPSDF, 2018)

The proposed Project site is located in Ward 3 and 4 of the Steve Tshwete Local Municipality, Nkangala District Municipality. The Mpumalanga SDF recognises the proposed development area as a coal mining centre. The prevalence of coal mines in the immediate vicinity is discussed in Section 3.2. However, much of the land is used for agricultural purposes as well.

3.6 Other relevant Legislation

In addition to the Laws and Guidelines discussed above, Table 8 summarises some of the other key legislation and guidelines relevant to this application:

Table 8: Other Relevant legislation and guidelines

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	HOW THIS DEVELOPMENT COMPLIES WITH THE LEGISLATION AND GUIDELINES
NEMA: Public Participation Guidelines (GNR807). Department of Environmental Affairs (2017), Public Participation guideline in terms of NEMA EIA Regulations, Department of Environmental Affairs, Pretoria, South Africa.	Guidelines have and will continue to be followed during the Public Participation Process (PPP).
DEA (2017), Guideline on Need and Desirability, Department of Environmental Affairs (DEA), Pretoria, South Africa	The Guideline was considered in assessing the need and desirability of the Project aspects.
Spatial Land Use and Management Act, 2013 (Act No. 16 of 2013) (SPLUMA)	SPLUMA aims to develop a framework to govern planning permissions and the lawful use of land. In terms of SPLUMA the Applicant should ensure that the surface rights areas where the Project is undertaken, is approved as such.
Restitution of Land Rights Act, 1994, the Land Reform (Labour Tenants) Act, 1996 and the Extension of Security of Tenure Act, 1997.	Consultation with the Land Claims Commissioner has been initiated. <u>No response has been forthcoming to date</u> (See Appendix G 9 for proof of consultation). If it is confirmed that there are land claims on the affected properties the Applicant will consult with the land claimants throughout the project.
Local Government Municipal Systems Act, 2000 (Act No. 32 of 2000) as amended	The Act requires local government to compile a Spatial Development Framework (SDF) which must include the provision of basic guidelines for a land use management system for the municipality. The objectives of an SDF are to promote sustainable functional and integrated human settlements, maximise resource efficiency, and enhance regional identity and unique character of a place. In addition, Municipalities are required to develop Integrated Development Plans (IDPs) which is a government co-ordinated approach to planning

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	HOW THIS DEVELOPMENT COMPLIES WITH THE LEGISLATION AND GUIDELINES
	that seeks to ensure the economic and social enhancement of all within their jurisdiction. It provides a land use framework, considers infrastructure development, and the protection of the environment.
Noise Control Regulations in terms of the Environmental Conservation Act, 1989 (Act No 73 of 1989) (ECA)	Noise Control Regulations were promulgated in terms of the ECA, to set out the powers of local authorities to control noise, define legal prohibitions relating to noisy activities and define and prohibit noise nuisance. Mitigation measures to minimise noise nuisance has been included in the EMPr (Appendix H and Appendix I).
Steve Tshwete Local Municipality Noise By-Law, 2021	The by-law includes (among others) a schedule for the maximum designated sound levels at five (5) categories of facilities. Mitigation measures to minimise noise nuisance has been included in the EMPr (Appendix H and Appendix I).
Development Facilitation Act, 1995 (Act No. 67 of 1995) (DFA)	<p>The Act promotes the integration of the social, economic, institutional and physical aspects of land development and also promotes integrated land development in rural and urban areas in support of each other.</p> <p>The Act encourages the availability of residential & employment opportunities in close proximity to or integrated with each other, while optimising the use of existing resources including such resources relating to agriculture, land, minerals, bulk infrastructure, roads, transportation and social facilities.</p>
Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) (OHS Act)	The OHS Act provides for the health and safety of persons at work and other persons who may be exposed to hazards associated with a workplace, including the use of plant and machinery. The Applicant (or its successor in title) must ensure compliance to the OHS Act for the duration of the Project.
National Road Traffic Act, Act No. 93 of 1996 (NRTA) and National Land Transport Act, Act No. 5 of 2008 (NLTA)	<p>These Acts relate specifically to the planning and development of transport systems and the safe use of roads.</p> <p>Prior to construction, the following permits must be obtained by the transport and logistics company transporting the components to site:</p>

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	HOW THIS DEVELOPMENT COMPLIES WITH THE LEGISLATION AND GUIDELINES
	<ul style="list-style-type: none"> Abnormal load permits, (Section 81 of the NRTA 93 of 1996 and National Road Traffic Regulations, 2000); and Authorisation from Road Authorities to modify the road reserve to accommodate turning movements of abnormal loads at intersections (where applicable).
Hazardous Substances Act, 1973 (Act No 15 of 1973)	<p>The Act provides for the control of hazardous substances (sub-divided into four groups) defined as any substance that by their nature are toxic, corrosive, irritant, flammable, sensitising or pressure generating, which may cause ill-health, injury or death in humans.</p> <p>Minimum requirements for hazardous substances associated with the project are incorporated into the EMPr (Appendix H and Appendix I).</p>
Mine Health and Safety Act, 1996 and its Regulations	<p>Regulation 17(8) of the Mine Health and Safety Act Regulations state that "no person may erect, establish or construct any buildings, roads, railways, dams, waste dumps, reserve land, excavations or any other structures whatsoever within a horizontal distance of 100 (one hundred) metres from workings, unless a lesser distance has been determined safe by a professional geotechnical specialist and all restrictions and conditions determined by him or her or by the Chief Inspector of Mines are complied with." Some infrastructure traverse areas that may have been undermined, and this must be further investigated during the detailed design phase of the Project where the preferred alternative overlaps with areas of mineral rights.</p>
Procedures for the Assessment and Minimum Criteria (National Gazettes, No. 43110 of 20 March, 2020)	Specialist Reports (Appendix F) have been compiled in line with the protocols and minimum requirements.

3.7 International Environmental and Social Standards

Various Development Finance Institutions, including the International Finance Corporation (IFC), African Development Bank, Development Bank of South Africa, to name a few, operate in South Africa and worldwide. These institutions have a responsibility to ensure that the projects they finance are environmentally sustainable and are conducted in accordance with key environmental and social criteria.



The IFC's Environmental and Social Performance Standards (PSs) define IFC clients' responsibilities for managing their environmental and social risks, and applies to all investment

and advisory clients whose projects are subject to the IFCs initial credit review process. (https://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/Sustainability-At-IFC/Policies-Standards/Performance-Standards).

Compliance to the IFC's PSs must be demonstrated by any project that pursues direct investment from the IFC (including project and corporate finance provided through financial intermediaries).

Table 9 provides a brief summary of the PSs, and an explanation of how the Project responds to each.

Table 9: IFC Environmental and Social Performance Standards and the Project

Performance Standard	Explanation ³	Project response
	<p>Assessment and Management of Environmental and Social Risks and Impacts, by the implementation of Management Plans and Systems, to avoid, minimise and compensate for impacts as necessary.</p>	<p>The Project EIA Report (this Report) is the culmination of a thorough EIA Process undertaken in accordance with South African Environmental Law and best practice. The Environmental Management System (ESMS) in conjunction with the EMPr (Appendix H and Appendix I) ensures that potential impacts are monitored, and minimised, throughout the life of the Project.</p> <p>The ESMS will be compiled in the event that the Project is a preferred bidder.</p>
	<p>Labour and Working Conditions: PS2 asks that companies treat their workers fairly, provide safe and healthy working conditions, avoid the use of child or forced labour, and identify risks in their primary supply chain.</p>	<p>The Project will be undertaken with strict implementation of the South African legal framework regarding supply chain, employment, working conditions and management of worker relationships, including the provisions of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) (OHSA) and prohibition on forced labour enshrined in Section 13 of the Bill of Rights, and child labour prohibited in terms of Section 28(1)(e) of the Bill of Rights.</p> <p>Applicable Policies will be compiled in the event that the Project is a preferred bidder.</p>

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https://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/Sustainability-At-IFC/Policies-Standards/Performance-Standards

Performance Standard	Explanation ³	Project response
	<p>Resource Efficiency and Pollution Prevention:</p> <p>PS3 guides companies to integrate practices and technologies that promote energy efficiency, use resources—including energy and water—sustainably, and reduce greenhouse gas emissions.</p>	<p>The aim of the Project is not only to connect the Hendrina South WEF to South Africa's National Grid, but also facilitate resource efficiency and pollution prevention by contributing to the South African green economy.</p> <p>The Project is not greenhouse gas (GHG) emissions intensive therefore the detailed assessment and reporting of emissions is not required.</p> <p>Dust air pollution in the construction phase has been adequately addressed in the EMPr.</p> <p>Potential pollution associated with waste and wastewater is low and mitigation measures have been included in the EMPr.</p> <p>The EMPr and emergency preparedness and response plan identifies anticipated hazardous materials and recommends relevant mitigation and management measures.</p>
	<p>Community Health, Safety, and Security:</p> <p>PS4 helps companies adopt responsible practices to reduce risks related to worksite accidents, hazardous materials, spread of diseases, or interactions with private security personnel, including through emergency preparedness and response, security force management, and design safety measures.</p>	<p>Worksite accidents and hazardous materials are largely regulated by South African legislation that will apply to the Project (Hazardous Substances Act, 1973 (Act No 15 of 1973), Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) (OHSA) etc.). Potential impacts on the socio-economic environment and surrounding communities have been assessed by specialists (Appendix F 10) and relevant measures included in the EMPr (Appendix H and Appendix I).</p>
	<p>When companies seek to acquire land for their business activities, it can lead to relocation and loss of shelter or livelihoods for communities or individual households. Involuntary resettlement occurs when affected people do not have the right to refuse land acquisition and are displaced,</p>	<p>This PS is not relevant to the proposed Project as no resettlement will be required to accommodate the Project, and affected land owners have all agreed to the proposed Development on their Properties.</p>

Performance Standard	Explanation ³	Project response
	which may result in long-term hardship and impoverishment as well as social stress.	
	PS6 recognises that protecting and conserving biodiversity, maintaining ecosystem services, and managing living natural resources adequately are fundamental to sustainable development.	Detailed Biodiversity Specialist studies have been undertaken for the Project (Appendix F 5 to Appendix F 8) and the recommended management measures incorporated into the EMPr (Appendix H and Appendix I). It is believed that adverse ecological impacts potentially caused by the project have been adequately minimised, and residual impacts can be managed effectively.
	PS7 seeks to ensure that business activities minimise negative impacts, foster respect for human rights, dignity and culture of indigenous populations, and promote development benefits in culturally appropriate ways.	The potential vulnerability of Indigenous Peoples is recognised, and all Interested and Affected Parties (I&APs) that could be located in the Project vicinity have been and will continue to be consulted as part of the project development. No displacement or direct impact on communities from placement of project infrastructure applies to this Project.
	Cultural heritage encompasses properties and sites of archaeological, historical, cultural, artistic, and religious significance. PS8 aims to guide companies in protecting cultural heritage from adverse impacts of project activities.	A Heritage Impact Assessment (Appendix F 11) and Palaeontological Assessment (Appendix F 12) have been completed for the Project– the studies concluded that it is extremely unlikely that fossils would be present on site, and that impacts to heritage resources can be managed to acceptable levels, with the necessary permits from the South African Heritage Resources Agency. A Chance-find-protocol included in the EMPr (Appendix H and Appendix I) to prevent impacts to important sites of heritage significance, should they be uncovered on site.

The IFC is a member of the World Bank Group, who have also published a number of Environmental, Health and Safety Guidelines that serve to support the IFC PSs. Projects seeking international funding may be required to adhere to the host country Regulations as well as the relevant international standards.

The Equator Principles (which are based on the IFC's PSs) provide a benchmark to the financial industry for determining, assessing and managing social and environmental risks associated with projects. EP4 is the latest iteration of the Equator Principles and came into effect on 1 October 2020. Table 10 provides a list of the equator principles and a brief summary of how the Project responds to each. It should be noted that Principles 8 and 10 relate to a borrower's code of conduct and are therefore not considered relevant to the EIA process and have not been included in this discussion.

In terms of the IFC Policy on Environmental and Social Sustainability (IFC, 2012), and EP4 (Equator Principles, 2020), the Project will be considered a Category B Project.

Table 10: Project Compliance to the Equator Principles (EPs)

Equator Principle	Project response
Principle 1: Review and Categorisation	Project is a Category B Project (Business activities with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures).
Principle 2: Environmental and Social Assessment	Assessment in progress (this is the Draft EIA Report). The impact assessment comprehensively assesses the key environmental and social impacts and complies with the requirements of the South African EIA Regulations. In addition a generic EMPr has been completed and is included as Appendix H and Appendix I.
Principle 3: Applicable Environmental and Social Standards	This Report meets the standards of NEMA and best practice in the industry. The IFC PS also serves as a framework for this environmental and social assessment.
Principle 4: Environmental and Social Management System and Equator Principles Action Plan	The Environmental Management System (ESMS) in conjunction <u>with the</u> EMPr (Appendix H and Appendix I) ensures that potential impacts are monitored, and minimised, throughout the life of the Project. The ESMS will be compiled in the event that the Project (in association with the Hendrina South WEF) is a preferred bidder.
Principle 5: Stakeholder Engagement	Effective stakeholder engagement in terms of the EIA Process is demonstrated in Section 7 and Appendix G. A stakeholder Engagement plan will be prepared prior to Construction and evolve through the life cycle of the Project.
Principle 6: Grievance Mechanism	The EMPr includes a Grievance Mechanism Process for Public Complaints and Issues. This procedure effectively allows for external communications with members of the public to be undertaken in a transparent and structured manner
Principle 7: Independent Review	Cabanga is an independent environmental consulting firm. Please see Appendix B for the Environmental Assessment Practitioner's declaration of independence. Cabanga has no objection to further due diligence or peer reviews of this assessment. This principle will only become applicable in the event that the project is identified as a preferred bidder.

Equator Principle	Project response
Principle 9: Independent Monitoring and Reporting	Monitoring and Reporting requirements relevant to the Project are detailed in the EMP (Appendix H and Appendix I)

4 Project Description

The Project entails the development of electricity transmission and distribution infrastructure required to connect the proposed Hendrina South WEF to the National Grid via the existing Eskom substation, located at the Komati Power Station. Figure 2 depicts a simplified schematic of the interface. It is important to note that the Project is dependent on the Hendrina South WEF Project, and will only be constructed if the Hendrina South WEF is developed.

The Applicant intends to develop the Project under a self-build agreement with Eskom. Once construction is complete it is anticipated that the Grid Infrastructure, and associated Environmental Authorisation, will be transferred to the Grid Operator (Eskom). Eskom will be the ultimate owner of the Grid Infrastructure and will be responsible for the operation, maintenance and decommissioning (if applicable) thereof.

The Project comprises the following key components:

- 1 x substation/switching station;
- 1 x overhead powerline - either single or double circuit;
- Associated Infrastructure, including but not limited to:
 - Service/access tracks where required (approximately 4-5m wide)
 - Fencing

Two technical grid solutions have been investigated, including a Loop-in-Loop-Out (LILO) connection onto the existing Eskom transmission lines (275-400kV). Eskom has issued Cost-Estimate-Letters (CELs) for Grid Solution 1 and the LILO solution is not currently supported by Eskom.

The proposed powerline to the existing Komati substation will be approximately 16km long. A 500m corridor along the proposed powerline route (250m from the centre-lines) has been assessed in this report to allow for some flexibility in the micro siting of the pylons. The preferred route alternative is largely aligned to existing powerline servitudes, and existing access roads and maintenance tracks will be utilised as far as possible so as to minimise the environmental impacts associated with the Project. The Project will make use of the Hendrina South WEF Project laydown areas and construction camps (subject to a separate application for EA). Plan 5 shows the Project in relation to the development area for the South WEF including the on-site substation (IPP Portion) and associated construction camps and laydown areas.

The subsections that follow discuss the Project location, extent and components in more detail.

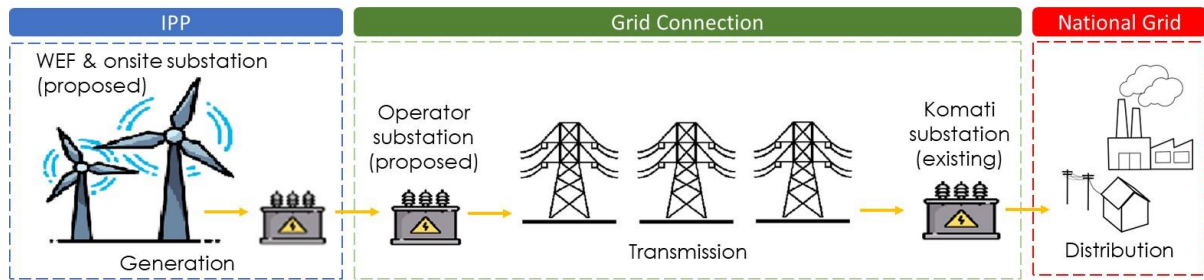


Figure 2: Simplified Schematic of the IPP-Grid interface

4.1 Project Location

The Project is located approximately 15km west of Hendrina, 30km north of Bethal, south-east of the Komati Power Station in Wards 3 and 4 of the Steve Tshwete Local Municipality, of the Nkangala District Municipality, Mpumalanga Province.

The proposed substation will be located on Portion 3 of the Farm Dunbar 189IS. This site was identified as the only alternative due to the substation location needing to be centrally located, its location outside of identified wetlands and critical biodiversity areas, on undeveloped land (not within agriculture land as per land owner request), and the need to be co-located along the existing Eskom Camden-Komati 275kV Powerline.

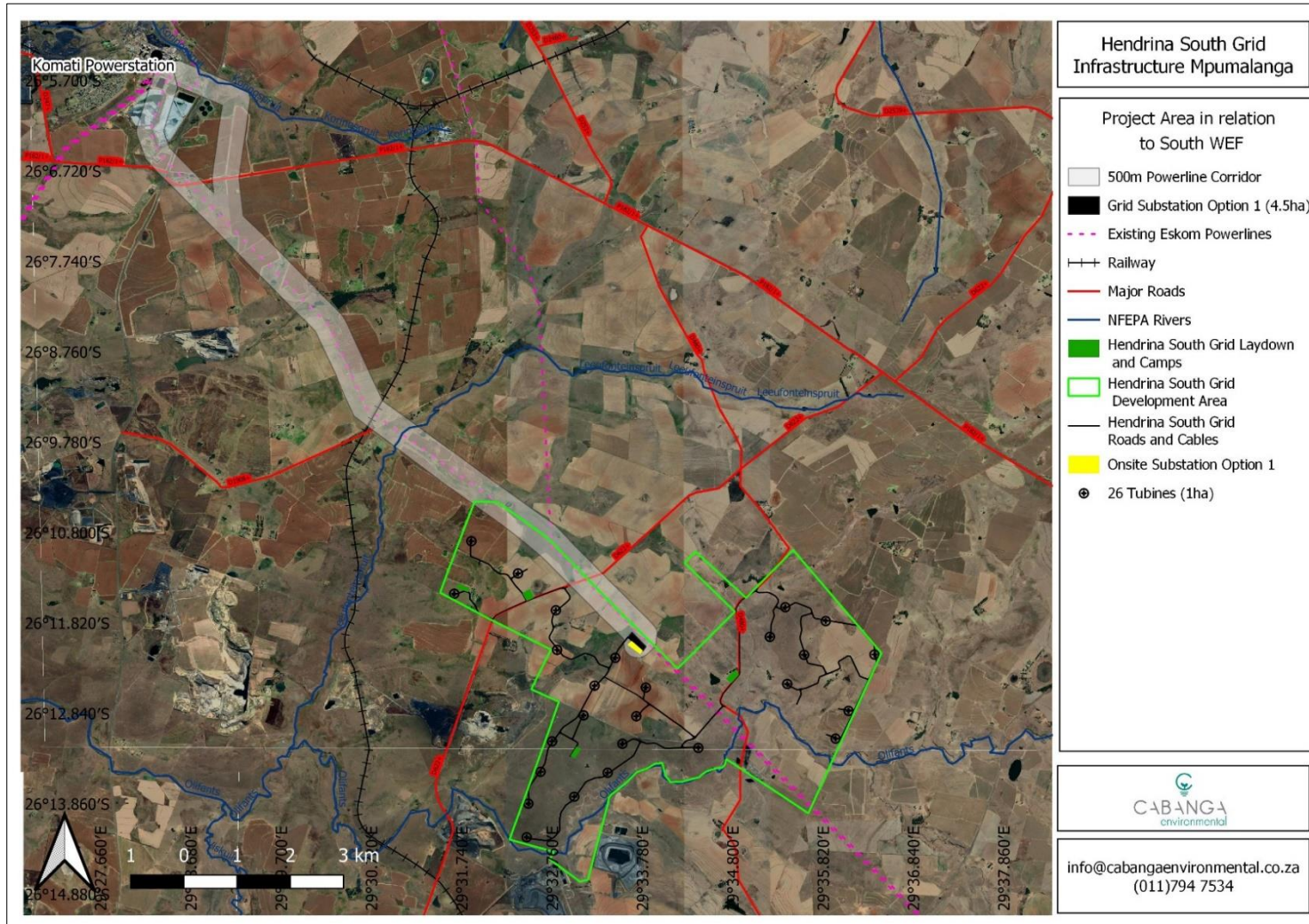
Landowner consent has been obtained for the above-mentioned property affected by the substation, these are included with the Application Form attached as Appendix J.

The farm portions affected by the proposed powerline and route alternatives are indicated in Table 11. The powerline and associated maintenance tracks constitute linear activities and therefore landowner consent for these portions is not required, however servitudes have been negotiated with the landowners and will be confirmed during the detailed design phase. The surface right ownership of the affected properties is indicated in Plan 7.

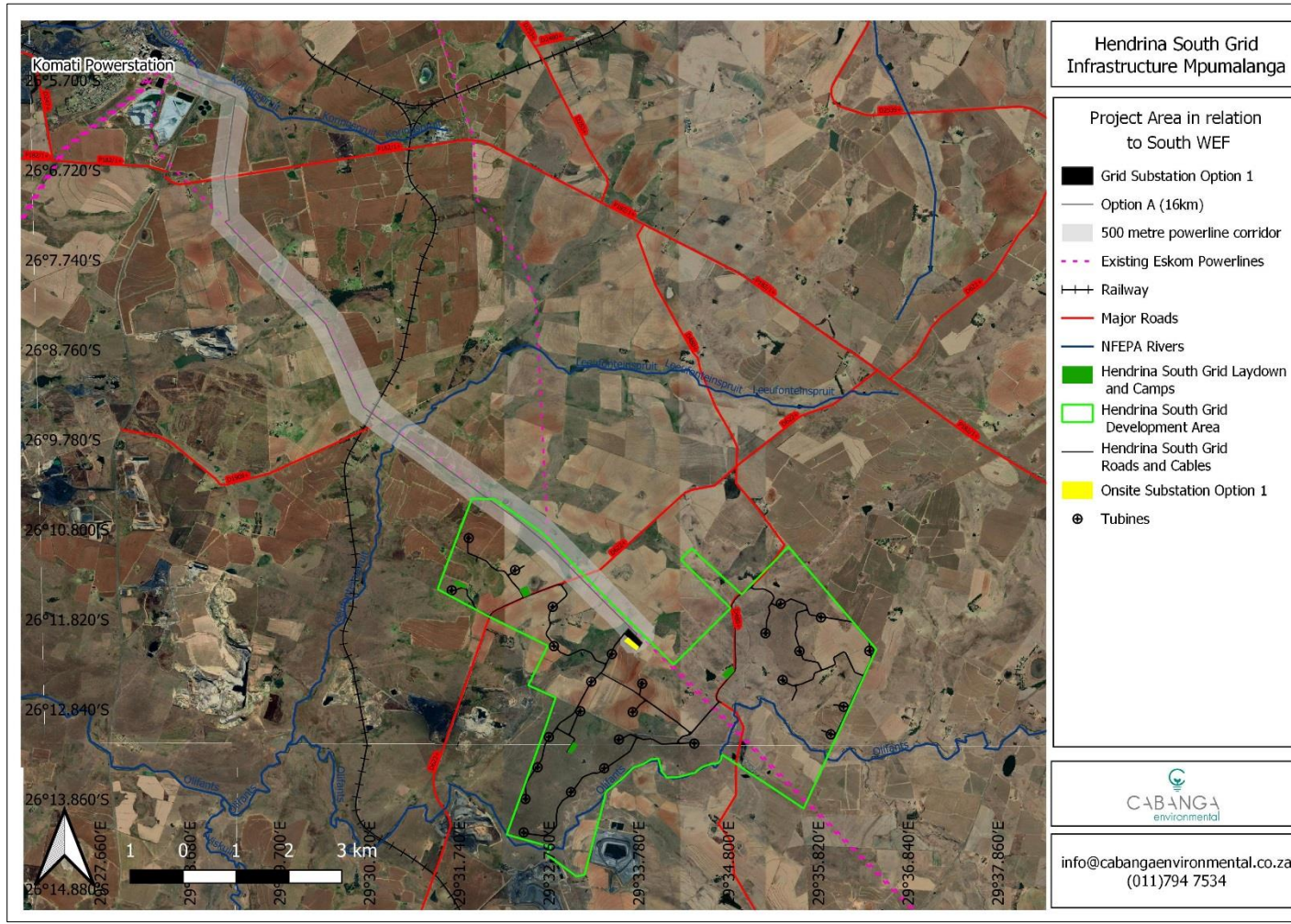
Table 11: Affected Farm Portions

Parent Farm	Farm No	Portion No	SG Code
Broodsnyersplaats	25 IS	7	TOIS00000000002500007
Broodsnyersplaats	25 IS	11	TOIS00000000002500011
Bultfontein	187 IS	2	TOIS00000000018700002
Bultfontein	187 IS	3	TOIS00000000018700003
Bultfontein	187 IS	4	TOIS00000000018700004
Bultfontein	187 IS	6	TOIS00000000018700006
Bultfontein	187 IS	10	TOIS00000000018700010
Bultfontein	187 IS	14	TOIS00000000018700014
Dunbar	189 IS	1	TOIS00000000018900001
Dunbar	189 IS	3	TOIS00000000018900003
Dunbar	189 IS	4	TOIS00000000018900004
Dunbar	189 IS	5	TOIS00000000018900005
Dunbar	189 IS	6	TOIS00000000018900006
Dunbar	189 IS	7	TOIS00000000018900007

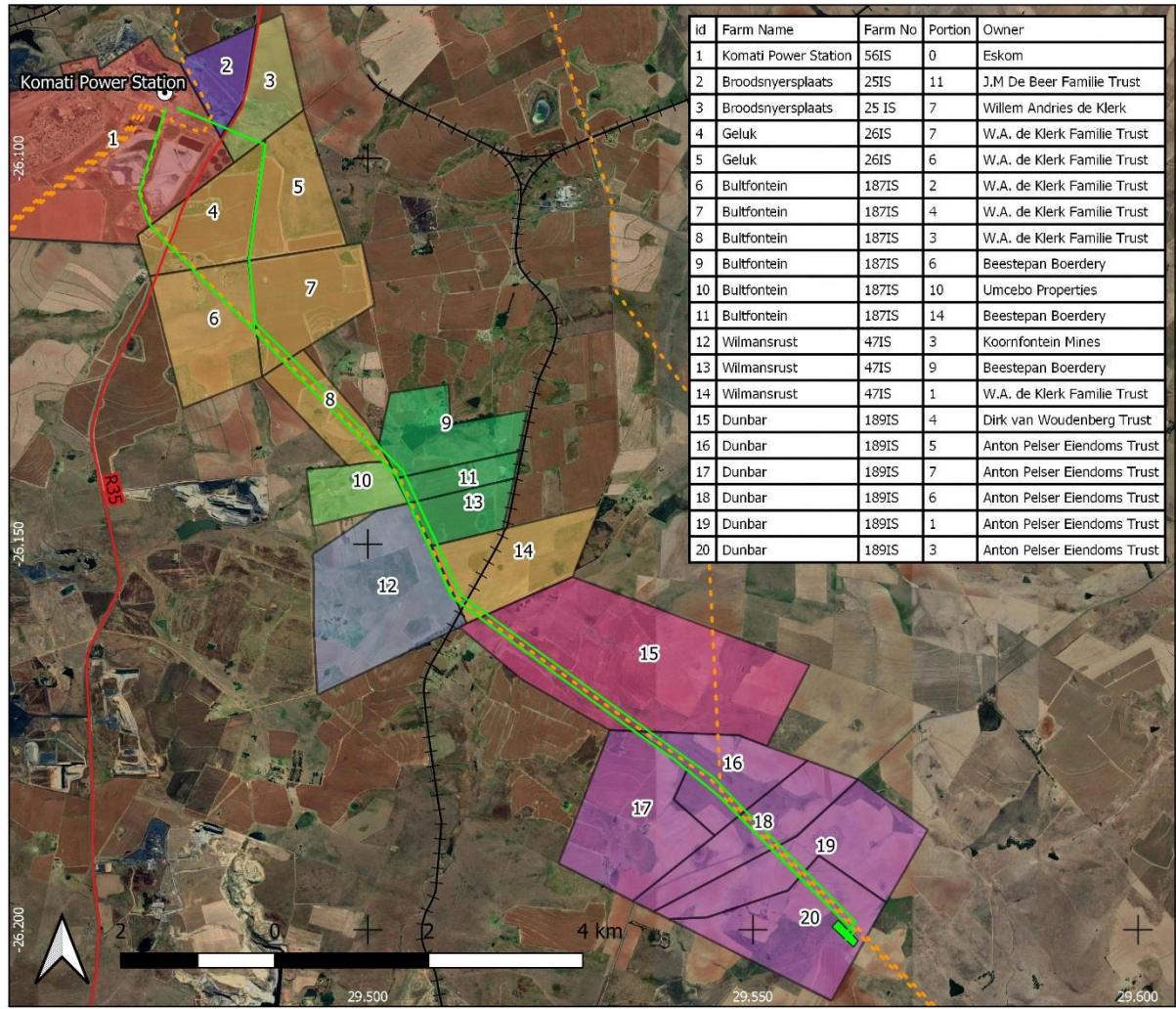
Parent Farm	Farm No	Portion No	SG Code
Geluk	26 IS	6	TOIS0000000000260006
Geluk	26 IS	7	TOIS0000000000260007
Geluk	26 IS	26	TOIS0000000000260026
Komati Power Station	56 IS	0	TOIS0000000000560000
Wilmansrust	47 IS	1	TOIS0000000000470001
Wilmansrust	47 IS	3	TOIS0000000000470003
Wilmansrust	47 IS	9	TOIS0000000000470009



Plan 5: Hendrina South Grid Route Alternatives in relation to the Hendrina South WEF Project Area



Plan 6: Hendrina South Grid Preferred Alternative (Grid Solution 1, Route Option A) in relation to the Hendrina South WEF Project Area



Id	Farm Name	Farm No	Portion	Owner
1	Komati Power Station	561S	0	Eskom
2	Broodsniersplaats	251S	11	J.M De Beer Familie Trust
3	Broodsniersplaats	25 1S	7	Willem Andries de Klerk
4	Geluk	261S	7	W.A. de Klerk Familie Trust
5	Geluk	261S	6	W.A. de Klerk Familie Trust
6	Bultfontein	1871S	2	W.A. de Klerk Familie Trust
7	Bultfontein	1871S	4	W.A. de Klerk Familie Trust
8	Bultfontein	1871S	3	W.A. de Klerk Familie Trust
9	Bultfontein	1871S	6	Beestepan Boerdery
10	Bultfontein	1871S	10	Umcebo Properties
11	Bultfontein	1871S	14	Beestepan Boerdery
12	Wilmansrust	471S	3	Koornfontein Mines
13	Wilmansrust	471S	9	Beestepan Boerdery
14	Wilmansrust	471S	1	W.A. de Klerk Familie Trust
15	Dunbar	1891S	4	Dirk van Wouderberg Trust
16	Dunbar	1891S	5	Anton Pelser Eiendoms Trust
17	Dunbar	1891S	7	Anton Pelser Eiendoms Trust
18	Dunbar	1891S	6	Anton Pelser Eiendoms Trust
19	Dunbar	1891S	1	Anton Pelser Eiendoms Trust
20	Dunbar	1891S	3	Anton Pelser Eiendoms Trust

SOUTH GRID INFRASTRUCTURE AFFECTED FARMS

Hendrina South Grid Infrastructure

- South Grid Substation
- Powerline Route Alternatives
- Major Roads
- Provincial Roads
- Existing Eskom Powerlines
- Railways

Surface Rights Ownership

- Anton Pelser Eiendoms Trust
- Beestepan Boerdery
- Dirk van Wouderberg Trust
- Eskom
- J.M De Beer Familie Trust
- Koornfontein Mines
- Umcebo Properties
- W.A. de Klerk Familie Trust
- Willem Andries de Klerk



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tel: 011 794 7534

Plan 7: Farms affected by the Project (Land Tenure)

4.2 Project Components

Two different grid solutions have been investigated:

- **Grid solution one (new substation and powerline)- preferred alternative:**

The substation site comprises of 4.5 Hectares (Ha).

The proposed powerline to the Komati substation will be approximately 16km long. If this solution is implemented, the preferred pylon and powerline will be 132 kV Intermediate Self-Supporting Double Circuit Monopole.

- **Grid solution two (new substation and Loop-in-Loop-Out):**

LILO connection onto the existing Eskom transmission lines (275-400kV) and construct a new substation (4.5 Ha) at this connection point. This will include a short powerline (275kV) of up to 200m connecting the new substation to the existing transmission line.

Eskom has issued CELs for Grid Solution 1 and the LILO solution is not currently supported by Eskom.

Table 12 summarises the technical details associated with the preferred alternative for the Project, these have been discussed further in the subsections that follow.

Table 12: Technical details associated with the preferred alternative for the Project

Component	Description/dimensions	
Powerline		
Powerline capacity	132 kV (<u>applicable to Grid Solution 1</u>)	
Powerline corridor length	<u>Up to 16km</u>	
Powerline corridors width	500m (250m on either side of centre line) has been assessed	
Powerline pylons	Monopole or Lattice pylons, or a combination of both where required	
Powerline pylon height	Maximum 40m height	
Powerline span	100m – 400m	
Powerline Route Coordinates	<u>Route A (16km) (Preferred Alternative)</u>	
	26°12'1.98"S	29°33'43.43"E
	26°11'59.16"S	29°33'45.61"E
	26°10'58.04"S	29°32'44.50"E
	26°10'40.69"S	29°32'23.46"E
	26° 9'24.63"S	29°30'39.24"E
	26° 8'28.00"S	29°30'13.40"E
	26° 7'18.31"S	29°29'4.80"E
	26° 7'17.13"S	29°29'7.63"E
	26° 6'47.62"S	29°29'4.47"E
	26° 5'53.62"S	29°29'11.86"E
	26° 5'36.56"S	29°28'31.31"E

Component	Description/dimensions	
Substation/Switching Station		
Capacity	132 kV (applicable to Grid Solution 1)	
Area occupied by inverter/transformer stations/substations	4.5 Ha	
Proximity to grid connection	16 km	
Area occupied by both permanent and construction laydown areas	n/a The construction camp and laydown area for the South WEF Project will be utilised.	
Area occupied by buildings	n/a	
Length and Width of internal roads	No formal roads will be constructed. Existing roads and maintenance tracks (Jeep tracks) will be utilised. New access/maintenance tracks will be created where none exist, these will be approximately 4 – 5 m wide and will be located in the powerline servitude.	
Height of fencing	2m (diamond mesh)	
Corner Point Coordinates	Substation (Option 1) (Preferred)	
	26°11'58.77"S	29°33'37.08"E
	26°11'55.49"S	29°33'39.83"E
	26°12'5.12"S	29°33'49.27"E
	26°12'8.17"S	29°33'47.18"E

4.2.1 Electrical Components and Connection to Grid

4.2.1.1 Switching Station and Substations

The substation area will be divided into two separate sections, the on-site substation (IPP Portion)⁴ and the South Grid substation/switching station (Operator Portion).

The on-site substation will act as a collector substation and will receive power generated by the Hendrina South WEF. The voltage will be stepped up in the transformers before being transferred, via overhead powerlines, to the adjacent substation/switching station (Operator Portion). From here electricity will be transmitted to the Grid via the proposed powerline.

The capacity of the substation will be up to 275 kV (however the preferred alternative is 132kV) and will consist of feeder bays, transformers, switching station electrical equipment (bus bars, metering equipment, switchgear, etc.), control building, store room, telecommunication infrastructure etc. The substation will include an area with a subterranean earthing mat onto which a concrete plinth will be constructed. Figure 3 depicts a typical layout, the proposed footprint area is 4.5 ha.

⁴ The on-site substation (IPP Portion) forms part of a separate application for EA along with the Hendrina South WEF, Battery Energy Storage System (BESS), laydown areas, access roads etc.

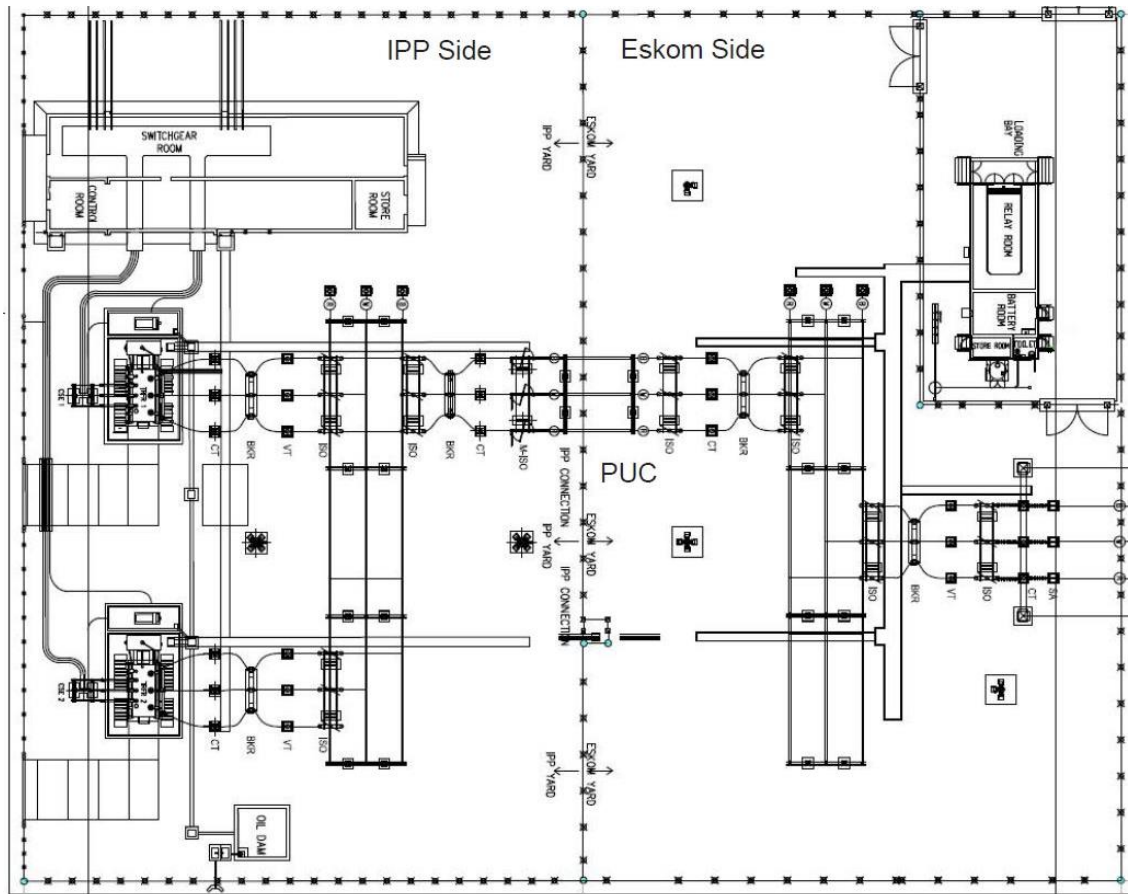


Figure 3: Typical Layout of an on-site substation (IPP Portion) (left) and adjoining grid substation/switching station (Operator Portion) (right) (Source: ENERTRAG South Africa (Pty) Ltd)



Figure 4: Photograph of the Kouga Wind Energy Facility illustrating the relationship between the on-site substation (IPP Portion) (left) and adjoining grid substation/switching station (Operator Portion)

4.2.1.2 Transmission and Distribution

The South Grid Infrastructure will connect the Hendrina South WEF to the National Grid, via the existing substation located at the Komati Power Station.

As mentioned, two different grid solutions were investigated:

1. Grid solution 1 (new substation and powerline)- preferred alternative:

The proposed powerline to Komati Power Station will be approximately 15 to 16km long depending on the exact route option. If this solution is implemented, the preferred pylon and powerline will be 132 kV Intermediate Self-Supporting Double Circuit Monopole.

2. Grid solution 2 (new substation and LILO):

Conduct a Loop-in-Loop-Out (LILO) connection onto the existing Eskom transmission lines (275-400kV) and constructing a new substation at this connection point. This will include a short powerline (275kV) of up to 200m connecting the new substation to the existing transmission line.

Eskom has issued CELs for Grid Solution 1 and the LILO solution is not currently supported by Eskom.

For the Grid solution 1, various route options are considered:

- **Option A (preferred)** runs south of the existing Camden-Komati 275kV that transverses the site, then east of the Ash Dumps associated with the Komati Power Station, to the existing Komati sub-station.
- Option B runs north of the existing Camden-Komati 275kV that transverses the site, then east of the Ash Dumps associated with the Komati Power Station, to the existing Komati sub-station.
- Option C runs south of the existing Camden-Komati 275kV that transverses the site, and between the Ash Dumps associated with the Komati Power Station, to the existing Komati sub-station;

The pylons will be placed on a final walk-through, these will be placed within the 500m wide assessment corridor at 100-400m intervals. The standard servitude width as stipulated by Eskom is 31m (15.5m on either side) for a 132kV line (Eskom, 2022).

4.2.1.3 Foundations

The type of foundation required for each pylon is dependent on the geotechnical conditions on-site. According to the Geotechnical Desktop Study (Appendix F 14) the site is underlain by stratigraphic units of the Eccca Group, Karoo Supergroup; Rooiberg Group of the Transvaal Supergroup and the Lebowa Granite Suite of the Bushveld Complex. Previous studies undertaken in the area indicate that deeply weathered residual soils of a clayey and sandy nature may prevail across the development area (SLR, 2022)

Competent, founding conditions can be anticipated at depths below 3m however this will need to be confirmed in the detailed design phase. Substations, switch-gear buildings and control rooms, are recommended to be founded on an engineered soil raft foundation solution, as it is assumed that these structures will be lightly loaded. Pad and plinth foundations can be considered for the pylons. The pad footings are required to be keyed into a competent horizon, either weathered bedrock or a pre-treated subgrade comprising good quality material (SLR, 2022)

Foundations may be drilled, mechanically excavated, or dug by hand. All foundations will be backfilled and stabilised through compaction and capped with concrete at ground level. A detailed Geotechnical survey will be undertaken in the detailed design phase, this will inform and finalise recommendations of the most effective foundation solution for all structures (SLR, 2022).

4.2.2 Associated Infrastructure

4.2.2.1 Site Access and Service Tracks

The overall project development area can be accessed from the Halfgewonnen Provincial Road (D622). Provincial and Local roads, including existing farm roads will be utilised to access the Project as far as possible. In addition to this, roads associated with the proposed Hendrina South WEF Project will be utilised to access the proposed substation.

The proposed powerline routes are aligned with the existing Camden-Komati 275kV powerline, and thus the existing maintenance tracks/roads will be utilised. New access tracks will only be created where there are no existing roads in place. These roads will be unsurfaced “Jeep” tracks of between 4-5m wide, and will run beneath the powerline within the servitude and are therefore not displayed on the various plans.

4.2.2.2 Temporary Construction Camps and Laydown Area

Two construction camps and two laydown areas are proposed for the Hendrina South WEF Project, and are subject to a separate application for EA. As these are located in close proximity to the proposed substation, it is proposed that these will be used for the duration of the construction phase for the Project (Plan 5). No additional construction camps and/or laydown areas are required.

4.2.3 Provision of Services

4.2.3.1 Water Requirements

During the construction phase a temporary water supply for construction will need to be installed, water will either be trucked in from the local municipality, piped from the Komati Power Station (Usuthu Water Scheme), and/or pumped from boreholes on site subject to the necessary approvals. Exact water supply options will be confirmed by the EPC during the detailed design phase.

It is anticipated The Project will use approximately 20,000m³ of water during the construction phase, 12 months. During construction, water is required for the ablutions, mixing of cement and dust suppression, as well as for potable water supply to construction-phase personnel. It is proposed that 2000l chiller units will be rented to provide drinking water to staff and contractors on-site.

Activities during the operational phase will be limited to maintenance and therefore negligible quantities of water will be required.

4.2.3.2 Refuse/Waste Management

During construction various waste streams will be generated, including hazardous and general waste. A designated waste management area for the temporary storage of waste will be located at the Hendrina South WEF laydown area during the construction phase. Sufficient number of bins and skips to ensure separation of general and hazardous wastes will be provided on site for the duration of the Project. Recycling will be encouraged where possible. Waste will be removed off-site by contracted waste management companies. The EPC will be required to maintain all required waste management documentation, (waste register, waste manifests for all waste streams, and certificate of issue or safe disposal for hazardous waste removed from site).

Sewage waste will be managed in portable chemical toilets during the construction phase and in conservancy tanks during operations. Conservancy tanks and chemical toilets will be serviced by a contracted waste management company on a regular basis. The EPC will be required to retain proof of safe and lawful disposal of sewage for the duration of the Project.

Waste quantities generated by maintenance personnel during the Operational Phase is expected to be minimal. Eskom will be responsible for the removal of waste from site, this will be disposed of at a suitably licensed facility.

4.2.4 Transportation of Project Components to Site

Construction material and components are expected to be locally sourced and transported using National and Regional Roads. It is expected that the components can generally be transported with normal heavy load vehicles, expected abnormal loads are associated with lifting equipment required to off-load and assemble the components (JG Afrika, 2022).

4.2.5 Employment and Operating Hours

During the construction phase employment opportunities are estimated to be 30 project specific full time equivalent (FTE) positions. Once in the operation and maintenance phase employment opportunities will not exist as infrastructure will be handed over to Eskom and they will be required to maintain the infrastructure (Urban-Econ, April 2022).

Ideally construction would take place during daylight hours, however this is not always possible such as when concrete for the foundations is poured. Should construction activities extend into night hours land owners will be notified.

4.3 Project Phases and Timeframes

4.3.1 Pre-construction Phase

The pre-construction phase is associated with the necessary pre-feasibility and feasibility studies undertaken by the Applicant, and applying for the necessary permits and authorisations, including EA, finalisation of access agreements and negotiation of servitudes.

Before construction can commence (if all necessary authorisations including EA are obtained), it is the Applicant's intention to bid the associated WEF project into future REIPPP Rounds. If the Applicant's bid is successful, construction of the Project could commence.

A detailed Geotechnical survey will be undertaken based on the approved layout, prior to construction. Additionally, final site walk-downs by the ecological specialist team must be undertaken for the micro-siting thereof, to ensure the construction of the Project does not affect sensitive or protected plant or animal species within the powerline corridor and substation footprint. No-go areas will be demarcated/pegged and heritage sites flagged.

4.3.2 Construction Phase

The construction phase is anticipated to take 12 months to complete. The construction will overlap with the construction of the South WEF and will include the following activities:

- Vegetation clearance in development areas;

- Stripping of topsoil;
- Excavation of foundations;
- Concrete pouring and steel work for foundations;
- delivery of steel to tower site, and tower assembly,
- erection of towers (by crane),
- Stringing, sagging and tensioning Construction of substation/switching station;
- Testing and commissioning of grid infrastructure;
- Rehabilitation of disturbed areas.

4.3.3 Operational Phase

The Project will have an operational life of a minimum of 20 years. Activities during the operational phase are limited to the operation and maintenance of infrastructure and bush clearing within the servitude as per the relevant Eskom Standard.

4.3.4 Decommissioning Phase

The proposed Project is intended to connect the South WEF project to the National Grid. The anticipated operational phase of the South WEF is approximately 20 years after which time the project infrastructure would have to be refurbished / upgraded to extend the life past the 20 years; in which case the South Grid Infrastructure will remain operational. Alternatively if the life of the South WEF project is not extended past 20 years the facility will be decommissioned and the grid infrastructure will be disconnected and dismantled. Available recycling technologies must be investigated before decommissioning is initiated.

Furthermore, a detailed legal review will have to be undertaken at the time to identify (and comply with) environmental permitting requirements for decommissioning activities.

The decommissioning phase is expected to be comparable to the construction phase in length.

4.3.5 Period for which the Environmental Authorisation is required

The EA is required to be valid for a period of 10 years from the date of issuance of the EA. This is considered a reasonable period to allow the Applicant time to conduct relevant internal processes which can only begin after issuance of the EA.

4.4 Listed Activities being applied for

The Listed Activities in terms of the NEMA EIA Regulations 2014 (as amended) pertaining to the proposed project are provided in Table 13. Plan 8 shows the preferred alternative in relation to geographic areas designated in terms of GN R.985 (Listing Notice 3) activities.

Table 13: Listed Activities applied for

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed Project to which the applicable listed activity relates.
11 (i)	<p>The development of facilities or infrastructure for the transmission and distribution of electricity—</p> <ul style="list-style-type: none"> (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more; <p>excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is—</p> <ul style="list-style-type: none"> (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development. 	<p><u>The Preferred Alternative is Grid Solution 1, the construction of a new substation and powerline with a capacity of 132kV.</u></p> <p><u>The exclusion does not apply as the infrastructure will not be temporary and exceeds 2km in length.</u></p>
12 (ii)(a)(c)	<p>The development of—</p> <ul style="list-style-type: none"> (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; 	<p>Cumulatively, the physical footprint of access roads and electrical cabling related to the Electrical Grid Infrastructure will exceed 100m² within delineated watercourses on site, or within 32m of the outer extent of the delineated watercourses on site.</p>

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed Project to which the applicable listed activity relates.
	<p>where such development occurs—</p> <p>(a) within a watercourse;</p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —</p> <p>excluding—</p> <p>(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;</p> <p>(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</p> <p>(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</p> <p>(dd) where such development occurs within an urban area;</p> <p>(ee) where such development occurs within existing roads, road reserves or railway line reserves; or</p> <p>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of the development and where indigenous vegetation will not be cleared.</p>	
19	<p>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;</p>	<p>The Project will require the erection of tower structures (pylons) and access roads. Tower structures and access roads will traverse watercourses (or drainage line) necessitating removal of material and infill of material from the watercourse, which will exceed 10m³.</p>

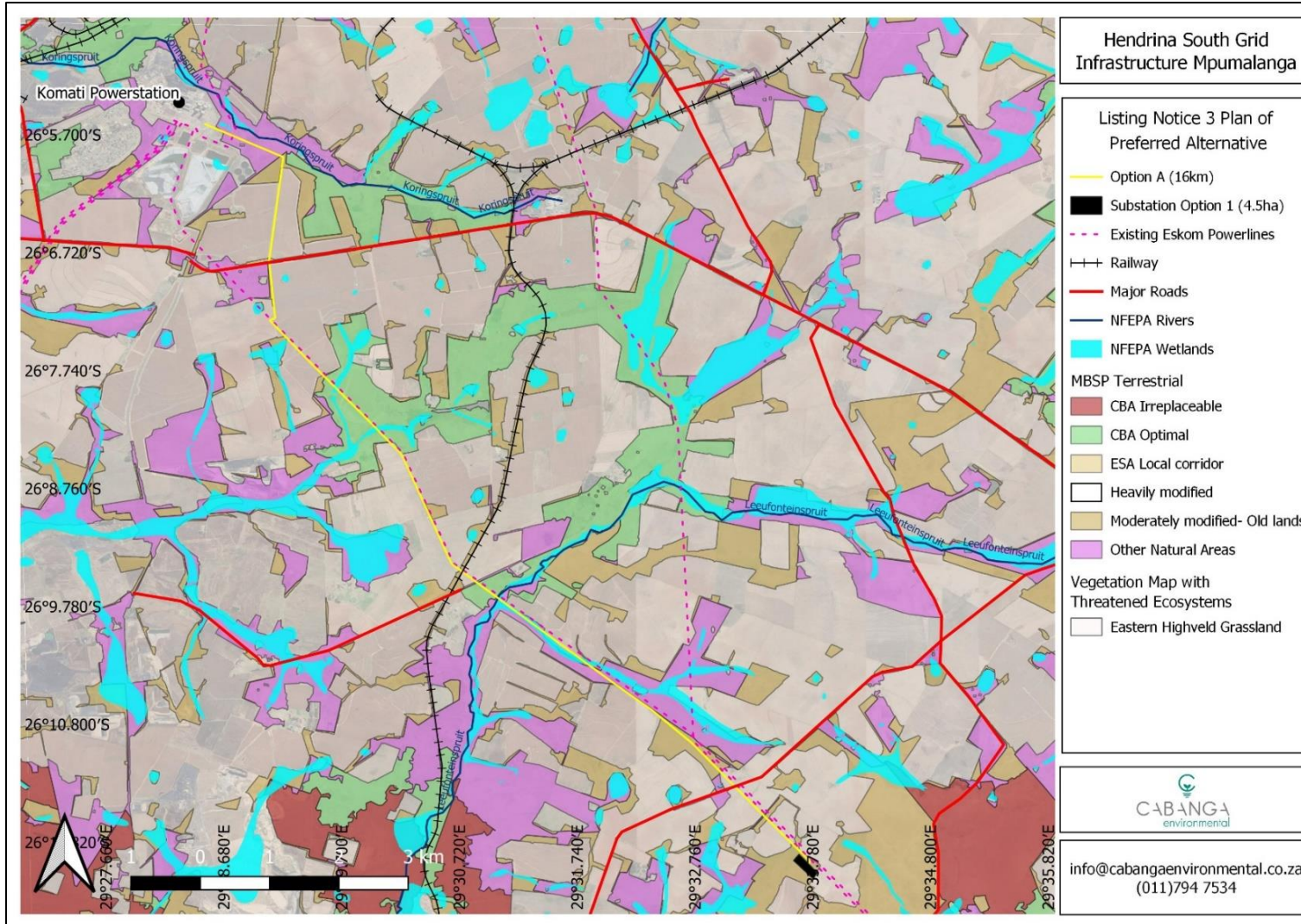
Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed Project to which the applicable listed activity relates.
	<p>but excluding where such infilling, depositing, dredging, excavation, removal or moving—</p> <p>(a) will occur behind a development setback;</p> <p>(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;</p> <p>(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;</p> <p>(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or</p> <p>(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.</p>	
27	<p>The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—</p> <p>(i) the undertaking of a linear activity; or</p> <p>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</p>	<p>The powerlines are a linear activity and therefore this activity is not triggered by the proposed construction of the power lines.</p> <p>However, the construction of the substation will require the clearance of indigenous vegetation of more than 1ha but less than 20 ha.</p>
28 (ii)	<p>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:</p> <p>(i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or</p> <p>(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;</p>	<p>The Project area falls outside an urban area and the total land that will be affected exceeds 1 ha. Powerlines and substations may be regarded as industrial development and parts of the Project site are used for agriculture.</p>

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed Project to which the applicable listed activity relates.
	excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	
Activity No(s):	Provide the relevant Scoping and EIA Activity(ies) as set out in Listing Notice 2 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed Project to which the applicable listed activity relates.
9	The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is — (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.	<p>The Project application needs to cover 'up to' and including 275kV. The Projects will be connected to the Eskom grid by either building a new 132kV powerline (Grid solution 1) to the substation at Komati Power Station or through a loop in loop out connection at the existing 275kV powerline (Grid solution 2), depending on Eskom preferred solution.</p> <p><u>Eskom has subsequently issued CELs for Grid Solution 1 and the LILO solution is not currently supported.</u></p> <p>The exclusion does not apply as the infrastructure will not be temporary and exceeds 2km in length.</p>
Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed Project to which the applicable listed activity relates.
4 (f) (i) (ee)	The development of a road wider than 4 metres with a reserve less than 13,5 metres (f) In Mpumalanga i. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding disturbed areas; (bb) National Protected Area Expansion Strategy Focus areas;	In total, approximately 2km of the Project area overlaps with Critical Biodiversity Areas (CBAs) identified in the Mpumalanga Biodiversity Sector Plan (MBSP). Access and maintenance roads associated with these powerlines will be 4-5m wide and exceed 1km in length to facilitate access. These roads are located outside of urban areas.

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed Project to which the applicable listed activity relates.
	<p>(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</p> <p>(dd) Sites or areas identified in terms of an international convention;</p> <p>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p> <p>(ff) Core areas in biosphere reserves; or</p> <p>(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas, where such areas comprise indigenous vegetation; or</p> <p>ii. Inside urban areas:</p> <p>(aa) Areas zoned for use as public open space; or</p> <p>(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.</p>	
12 (f) (ii)	<p>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.</p> <p>(f) in Mpumalanga</p> <p>i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area</p>	<p>Powerline route alternatives vary in length depending on the Alternative implemented, but will be up to 16km. The powerline corridor width being assessed is 500m wide (250m on either side of the centre line). Vegetation clearance will not span the entire length and width of the corridor. Vegetation clearance for powerline construction is minimal. The proposed substation (up to 3Ha) will also require vegetation clearance but the site alternatives are not located in CBAs. Cumulatively, the construction of the Project will involve the clearance of over 300m² of indigenous vegetation. The Project area</p>

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed Project to which the applicable listed activity relates.
	<p>that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</p> <p>ii. Within critical biodiversity areas identified in bioregional plans; or</p> <p>iii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning or proclamation in terms of NEMPAA.</p>	<p>overlaps with CBAs identified in the MBSP, and is located in Eastern Highveld Grassland (Endangered).</p>
<p>14 (ii) (a) and (c), (f) (i) (ff)</p>	<p>The development of—</p> <p>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or</p> <p>(ii) infrastructure or structures with a physical footprint of 10 square metres or more;</p> <p>where such development occurs—</p> <p>(a) within a watercourse;</p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</p> <p>f. Mpumalanga</p> <p>i. Outside urban areas:</p> <p>(aa) A protected area identified in terms of NEMPAA, excluding conservancies;</p> <p>(bb) National Protected Area Expansion Strategy Focus areas;</p>	<p>The physical footprint of access roads, stormwater control infrastructure and electrical cabling related to the Electrical Grid Infrastructure will exceed 10m² within delineated watercourses on site, or within 32m of the outer extent of the delineated watercourses on site. Wetlands were identified in the National Freshwater Ecosystem Priority Areas (NFEPA) and delineated on site through specialist investigation.</p> <p>The Project area overlaps with CBAs identified in the MBSP.</p>

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed Project to which the applicable listed activity relates.
	<p>(cc) World Heritage Sites;</p> <p>(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</p> <p>(ee) Sites or areas identified in terms of an international convention;</p> <p>(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p> <p>(gg) Core areas in biosphere reserves; or</p> <p>(hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve, where such areas comprise indigenous vegetation; or</p> <p>ii. Inside urban areas:</p> <p>(aa) Areas zoned for use as public open space; or</p> <p>(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose.</p>	



Plan 8: Preferred alternative in relation to geographic areas designated in terms of GN R.985 (Listing Notice 3) activities

5 Need and Desirability

South Africa is experiencing electricity supply challenges, resulting in periodic load shedding, which significantly impacts on the economy and society at large, exacerbated by the impacts of Covid-19, reduced business confidence and national sub-investment downgrades.

South Africa is the world's 14th largest emitter of Greenhouse Gases (GHG), primarily due to a heavy reliance on coal for electricity generation (McSweeney & Timperley, 2018). The Country has announced plans (including the National Development Plan, 2030 (NDP) (NPC, 2011), Integrated Energy Plan (DoE, 2016) and Integrated Resource Plan (IRP) (DoE, 2019) to shift away from fossil fuels, in favour of gas and renewable energy.

The Integrated Resource Plan (IRP) is an electricity capacity plan indicating the country's electricity demand, how the demand will be met and what it will cost to meet the demand. The intention was originally that the Department of Energy would revise the IRP every two years since its initial publication in 2010. As this was not done, the resultant energy mix failed to address the ever-changing supply and demand scenarios in the country and failed to reflect global trends and technologies in the efficient and responsible (sustainable) generation of electricity (Govender, 2019).

On 27 August 2018, the IRP 2019 was promulgated to update the energy forecast until 2030. The IRP (DoE, 2019) includes plans for significant expansion of renewables into the energy mix.

South Africa is also the world's 7th largest coal producer; coal produced 88% of the country's electricity in 2017 (McSweeney & Timperley, 2018). 28% of South African coal production is exported. The coal mining industry is the third-largest employer in the South African mining industry (after Platinum Group Metals and Gold, <http://www.statssa.gov.za/?p=4820>). Coal mining thus remains an important economic activity in the country.

With the inevitable eventual decline of the coal industry due to depletion of coal reserves, and the transition away from coal-fired electricity due to ageing infrastructure and international commitments to reduce emissions, it is important to support the development of renewable energy technology, particularly in the Province(s) currently most active in the coal sector. Notably, Mpumalanga is home to 12 coal-fired power stations and over 100 coal mines. Investment in the province is crucial to alleviate the impact that energy transition away from coal will have on coal-sector jobs in the Province.

Provinces such as Mpumalanga and Limpopo have lower renewable energy potential when compared to other Provinces such as the Western- and Eastern Cape Provinces and thus have historically been avoided for renewable energy development. The Applicant believes that a Just Energy Transition can only take place if new investment and development takes place within the provinces that will be negatively impacted on by the moving away from fossil fuels. The Applicant is thus developing the proposed Hendrina Renewable Energy Complex to stimulate sustainable investment in Mpumalanga.

The proposed development of the Hendrina Renewable Energy Complex directly addresses the need to implement renewable energy technologies in Mpumalanga, and is being developed in the context of the REIPP.

5.1 Realisation of Global and Local Commitments

The Hendrina South WEF (along with this Project, to connect the WEF to the National Grid) will contribute to the countries' efforts to reduce our carbon emissions and play our role as part of various international commitments to combat climate change and promote sustainable development. South Africa is a signatory to the Paris Climate Accord (Paris Agreement), the United Nations' Development Programmes' (UNDP) Sustainable Development Goals (SDGs) and the Kyoto Protocol.

The Paris Agreement is a legally binding international treaty signed by 196 countries at the COP 21 in Paris, on 12 December 2015, to combat climate change. The goal of the Paris Accord is to limit global warming to well below 2 degrees Celsius, compared to industrial levels to avoid catastrophic natural disasters which are driven by the global temperature increase. To achieve this long-term temperature goal, countries aim to reach global peaking of GHG emissions as soon as possible to achieve a climate-neutral world by 2050.

The SDGs were adopted by all member states to the United Nations in 2015 as a universal call to action to end poverty, protect the planet and ensure peace and prosperity of all people by 2030. There are 17 integrated SDGs (recognizing that action in one area will influence other areas).

The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) aims to curb air pollution associated with accelerated global climate change. The South African Government acceded to the Kyoto protocol in July 2012.

The authorisation of the WEF and associated infrastructure to connect it to the National Grid (i.e. this Project) will further align with South Africa's National Climate Response White Paper which outlines the country's efforts to manage the impacts of climate change and to contribute to the global efforts to stabilise the GHG concentrations in the atmosphere.

5.2 Just Energy Transition

The Just Energy Transition is described as the transition towards a low-carbon and climate-resilient economy that maximizes the benefits of climate action while simultaneously improving the welfare of workers and communities.

The Project (in the context of the Hendrina South WEF) will pave the way for the Just Energy Transition in South Africa, specifically in Mpumalanga, which will be hit hardest by the transition away from coal-fired electricity generation (as most of the country's coal mines and power stations are located in Mpumalanga).

Further, the Project will promote the transition from a fossil fuel-based economy to a low carbon economy.

Coal power stations and the coal mining industry play a vital role in the economic and social components of the local Mpumalanga economy. Shifting to a low carbon economy will thus need to offset or exceed the benefits being realized by fossil fuels in the Province. Thus, a key factor to ensuring the success of the Just Energy Transition is not only to focus on the transition from fossil fuels to renewable energy resources in other Provinces, but to simultaneously ensure the Just Transition of jobs and skills within Mpumalanga.

The transition towards renewable energy will improve the socio-economic conditions of the Nkangala District. The total number of unemployed people in Nkangala in 2019 constituted 36% of the total number of unemployed people in Mpumalanga; The Nkangala District Municipality experienced an average annual increase of 5.18% in the number of unemployed people during the reporting period (2009 to 2019) (COGTA, 2019).

The development of the Project (and associated WEF) will aid in solving two of the leading challenges faced by the Nkangala District Municipality, namely the cost of electricity and lack of adequate employment opportunities. The Hendrina WEFs and associated infrastructure will be the first large-scale wind energy project being developed in Mpumalanga. The Applicant foresees this Project as being the catalyst to realising a true Just Energy Transition for Mpumalanga.

Various career opportunities are presented by the wind industry, and these are divided into four pillars that are aligned with the value chain. These four pillars are project development, component manufacturing, construction, and operation and maintenance (Figure 5).

Figure 5 shows that the wind industry will create job opportunities throughout the supply chain. The wind industry will contribute to the Just Energy Transition in South Africa to ensure that there are no job losses but rather job transfers and skill exchange. For these opportunities to arise, renewable energy projects need to be approved in Mpumalanga to ensure that the transition from fossil fuels to renewable energy happens gradually and takes off effectively.

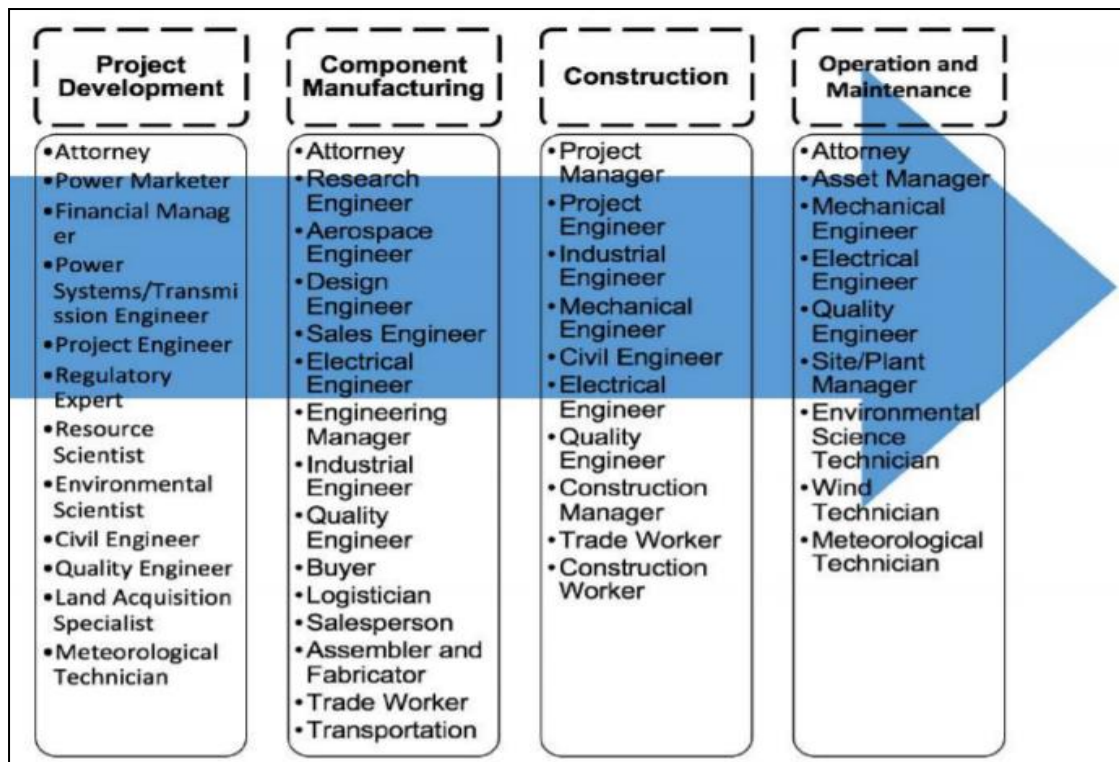


Figure 5: Career Opportunities presented by the Wind Industry⁵

⁵ Source: <https://www.res4africa.org/wp-content/uploads/2020/09/RES4Africa-Foundation-A-Just-Energy-Transition-in-South-Africa.pdf>

5.3 Multiple Land Use

Unlike opencast coal mining, wind energy and powerline developments facilitate multiple land use functions within the development area. As wind turbines are spread out across the development area this allows multiple land use functions such as operating the wind farm in tandem with agricultural activities or even underground coal mining. This will boost the economic activities in the area which will in turn increase job opportunities in that area and help improve the local community's welfare without jeopardising the environment or national food security.

The possibility of multiple land use is evident in existing agricultural activities in the Project area continuing underneath existing powerline development and it is expected that the Project will similarly not impede agricultural development with the exception of substation development comprising a very small footprint.

5.4 Power Generation

The development of the Hendrina South WEF and the Project (to connect the WEF to the National Grid) will also assist in overcoming the power shortages that are currently faced in the country. In 2020, South Africa experienced 859 hours of the year without electricity due to load shedding (Figure 6). 2021 was the worst load-shedding year to date with an estimated 1,136 hours of load shedding⁶.

The South African Government has taken steps in attempts to reduce these power cuts through the implementation of bid Windows in Renewable Energy Independent Power Producer Programme (REIPPPP) and lifting the independent power generation threshold to 100 MW, but it is still expected that the country will undergo more load shedding. Over the years the construction of Wind Energy Facilities has become cheaper, and less time-consuming. Thus, acting as a faster and more efficient method of meeting the ever-growing demand for electricity in the country.

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

Furthermore, four of Eskom's coal-fired power stations (Komati, Camden, Grootvlei, and Hendrina) have been targeted for decommissioning in the short term. Simultaneously Eskom has been looking at options for repurposing these power stations with the core aims of reusing existing power transmission infrastructure, developing new generation capacity, providing ancillary services, and mitigating socio-economic impact.

The Hendrina Renewable Energy Complex is ideally located to form part of this proposed repurposing of the Hendrina power station and will help Eskom achieve its diversification goals.

Development of the Project is required to connect the proposed Hendrina South WEF to the Komati Power Station substation and the National Grid.

⁶ <https://businesstech.co.za/news/energy/563736/shock-load-shedding-forecasts-for-south-africa/>

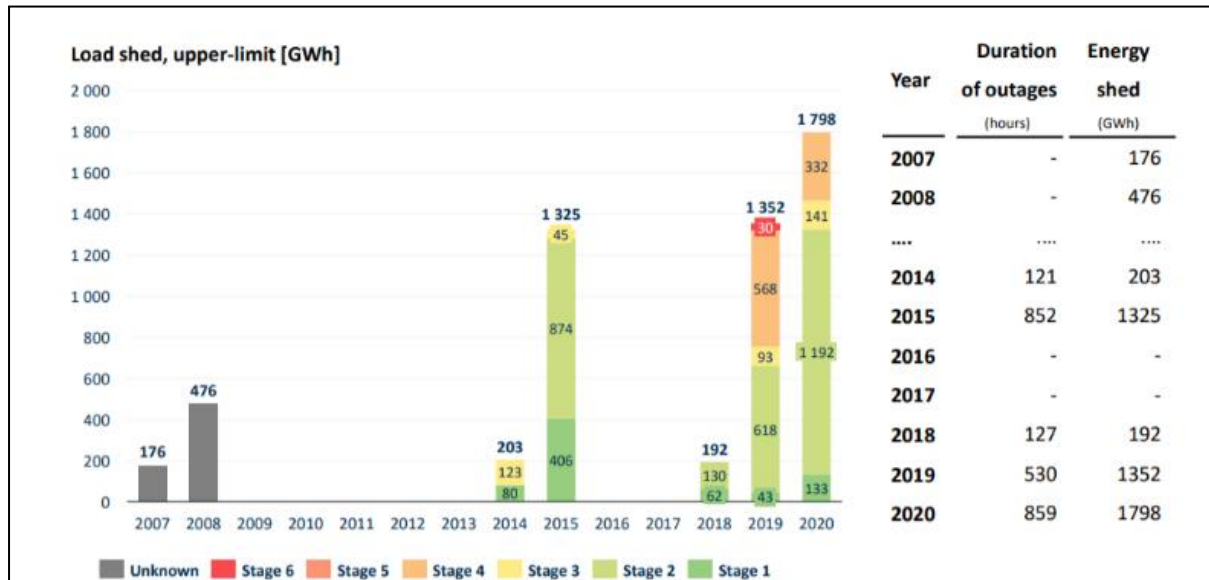


Figure 6: Load shedding hours over the years in South Africa⁷

6 Identification and Evaluation of Alternatives

The concept of alternative can be defined as a possible course of action, in place of another, that would meet the same purpose and need (DEAT, 2004). The term is defined in the EIA Regulations, 2014 (as amended) as “different means of meeting the general purpose and requirements of the activity”.

The desirability (need) for the Project is discussed in Section 5. The proposed Project is required to connect the Hendrina South WEF to the existing substation at Komati Power Station and the National Grid. Alternatives that do not meet the same purpose and address the same need will not be discussed further.

6.1 Process to Identify Alternatives

Consideration of alternatives is one of the most critical elements of the environmental assessment process (DEAT, 2004). In each case, the option of not proceeding with the Project (the no-development option) must also be considered, and weighed against the potential benefits and impacts of a Project.

DEAT (2004) identifies ten potential categories of alternatives, in addition to the no-development option, but not all of these are able to be considered in terms of the Project, as some of these alternatives will not meet the purpose and need of the Project, or are hampered by impracticability. Each of the ten categories of alternatives are listed in Table 14 along with their relevance to the Project. Alternatives that were considered further are discussed below.

⁷ From <https://businesstech.co.za/news/energy/475406/south-africa-spends-10-of-the-year-load-shedding-and-it-could-get-worse/>

Table 14: Types of Alternatives

Alternative Type / category	Discussion and Relevance to the Project
Activity alternatives	<p>Consideration of such alternatives requires a change in the nature of the proposed activity, keeping in mind that the alternative must still meet the purpose and need of the Project proposal (in this case, connecting the Hendrina South WEF to the National Electricity Grid).</p> <p>Transmission lines usually consist of overhead conductors suspended from transmission towers. In many built-up areas, underground cables are used instead of overhead lines. Underground cables are invisible but are much more expensive than overhead conductors. (https://www.eskom.co.za/wp-content/uploads/2021/08/TD-0003-Transmission-and-Distribution-of-electricity-Rev-1.1.pdf) In the Project area underground lines are not considered a feasible alternative to overhead lines and are therefore not discussed further.</p>
Location alternatives	<p>The substation/switching station location is directly associated with the Hendrina South WEF Development Area and the on-site substation alternatives. The substation/switching station (Operator portion) will be constructed adjacent to the on-site substation (IPP portion) and as such are optimally positioned.</p> <p>The overall Development Area was selected based on the outcome of a feasibility assessment undertaken by the Applicant. <u>Various other sites may be considered feasible as well, and this alternative is further discussed in Section 6.8.</u></p>
Process / Technology alternatives	<p>The purpose of considering such alternatives is to include the option of achieving the same goal by using a different method or process.</p> <p>Two technical solutions are being assessed for the Grid connection:</p> <ul style="list-style-type: none"> • Grid solution one (new substation and powerline) (<u>preferred alternative</u>) • Grid solution two (new substation and Loop-in-Loop-Out onto the existing powerline) <p>Technology alternatives have not been discussed separately but are addressed under Layout, Routing and Design Alternatives.</p>
Demand alternatives	<p>Demand alternatives arise when a demand for a certain product or service can be met by some alternative means. Thus, for example, the demand for electricity could be met by supplying more energy or through using energy more efficiently by managing demand.</p> <p>The Project purpose is to connect the Hendrina South WEF to the National Grid thereby supplying more energy, the Applicant is not able to address National Electricity demand. This alternative type is thus not further discussed.</p>

Alternative Type / category	Discussion and Relevance to the Project
Scheduling alternatives	An activity may comprise a number of components, which can be scheduled in a different order or at different times and as such produce different impacts. Scheduling Alternatives are further evaluated in Section 6.6.
Input alternatives	By their nature, input alternatives are most applicable to industrial applications that may use different raw materials or energy sources in their processes. For example, an industry may consider using either high sulphur coal or natural gas as a source of fuel. Input alternatives are not considered further in the context of the proposed Project.
Site layout alternatives	The preferred layout was developed in response to various environmental sensitivities on the development area, identified through specialist investigations, and the feasibility of the Project. Site Layout alternatives for the substation are further discussed in Section 6.4.
Routing alternatives	Various route alternatives have been considered for the overhead powerlines and are discussed further in Section 6.4.
Scale alternatives	Grid solution one (new substation and powerline) will have a capacity of 132 kV (<u>preferred alternative</u>) whilst Grid solution two (new substation and Loop-in-Loop-Out) will have a capacity of 275 kV. Scaling alternatives are not separately discussed further.
Design alternatives	Design alternatives have been considered with regards to the pylon type (Section 6.5).

6.2 Process to Assess Alternatives

Key criteria that must be considered when identifying alternatives are that they should be “practicable, feasible, relevant, reasonable and viable” (DEAT, 2004).

In each category of alternative, the preferred alternative is identified by comparing and evaluating (either qualitatively or quantitatively) which option results in:

- Reduced environmental and social impacts;
- Increased social benefits;
- Increased project efficiency; and
- Reduced project costs.

6.3 Property or Location

The substation location and associated powerline routes are directly associated with the Hendrina South WEF Development Area and the on-site substation alternatives. The overall Development Area was selected based on the outcome of a feasibility assessment undertaken by the Applicant, and is considered suitable for the reasons summarised below.

1. Proximity to Power Stations

Five of Eskom's coal-fired power stations are targeted for decommissioning in the short term. These coal-fired power stations include the Komati, Camden, Grootvlei, Arnot, and Hendrina power stations. Komati Power Station's decommissioning is scheduled to commence between 2020 - 2026. These power stations range between 50 - 60 years of age. According to the 2019 IRP, over an 11-year period Eskom are expected to decommission over 11GW of its coal fired capacity. Eskom recently requested proposals from the market on how to repurpose these power stations in order to support low-carbon growth. The Project site is therefore strategically located such that the power generated from the Hendrina South WEF can replace the power previously generated by the Komati and Hendrina Power Stations should these be decommissioned in the future.

2. Wind Resource and Topography

The Hendrina South WEF Development Area was also selected on the availability of wind resource in the Mpumalanga region. The availability of the wind resource is the main driver of the overall project viability. The Applicant installed a wind measurement mast at the Project site in 2019, the results of which indicate that the average wind speed is sufficient for an economically viable WEF.

Wind speed is affected by topography and elevation. The surrounding landscape has a rolling hill topography which is suitable for the development of a wind project. The Project site itself is located on the highest lying ground near the Komati Power Station and thus has the greatest wind resource within the immediate area.

3. Proximity to the Eskom grid

The Project location is close to the Komati Power Station substation, consequently reducing the length of the powerline that will be required for connection and thus reducing the capital costs, energy losses and environmental impact. In addition, further existing powerlines are located within proximity to the Project site, allowing for potential direct connection to these existing lines where insufficient allocation may be available at the Komati or Hendrina substation, or where Eskom planning indicates different future use. Such direct connection (the LILO option) is dependent on Eskom permissions.

4. Land Availability

The availability of land is a key feasibility criterion in the site selection process for the associated WEF. The Hendrina South WEF Development Area is of a suitable size. The land available for the development extends over approximately 2,900 Ha.

Furthermore, this region is home to some of the biggest coal power stations in the country (Komati and Hendrina among others), and Mineral Rights have been allocated over most land parcels to provide fuel stock supply (coal) to these power stations. Thus, there is very limited land available for the development of renewable energy facilities. The applicant has however secured sufficient land for the development of the proposed Project with landowners within the respective cadastral portions comprising the Hendrina South WEF footprint and associated substations, indicating their support and willingness for the Project to proceed to development via entering into agreement with the Applicant.

The Project is also located over privately owned land which ensures the bankability of the Project.

5. Road and Labour Pool Accessibility

The site is located near to national highways and the towns of Hendrina and Komati, which will benefit construction logistics and provide a labour resource respectively. There is also an existing road that goes through the land parcels to allow for direct access to the Project area.

6. Competition

With regards to renewable energy facilities, there is minimal competition in the area. Should the Hendrina South WEF proceed, it will be the first wind farm in Mpumalanga and will act as one of the pioneering developments and open opportunities for other renewable developments. It will also serve as a case study for wind resource in the Mpumalanga Province, showing that commercially viable wind energy facilities are suitable for certain parts of Mpumalanga.

6.4 Layout/Routing Alternatives

Various alternative layouts have been considered for the Grid Infrastructure throughout the development of the Project and the pre-feasibility phases. Placement of the substation alternatives was influenced by the following factors:

- Technical consideration for placement of the substation in relation to the WEF Project;
- Environmental Sensitivities of the site (wetlands, critical biodiversity areas, agricultural areas etc. that should be avoided wherever possible);
- Access (presence of existing roads and servitudes);
- Distance to the existing Eskom substation located at the Komati Power Station.

Only one feasible site for the substation has been identified in the WEF Development Area, primarily due to the following considerations:

- The substation should avoid areas of higher environmental sensitivity, including delineated wetlands, high-sensitivity avifauna and terrestrial habitat and critical biodiversity areas;
- The substation should be located so as to minimise interference with existing (and ongoing) agricultural and mining activities; and
- Negotiations with the relevant landowners and users.

The process undertaken to determine the final location of substation has been illustrated in Figure 7.

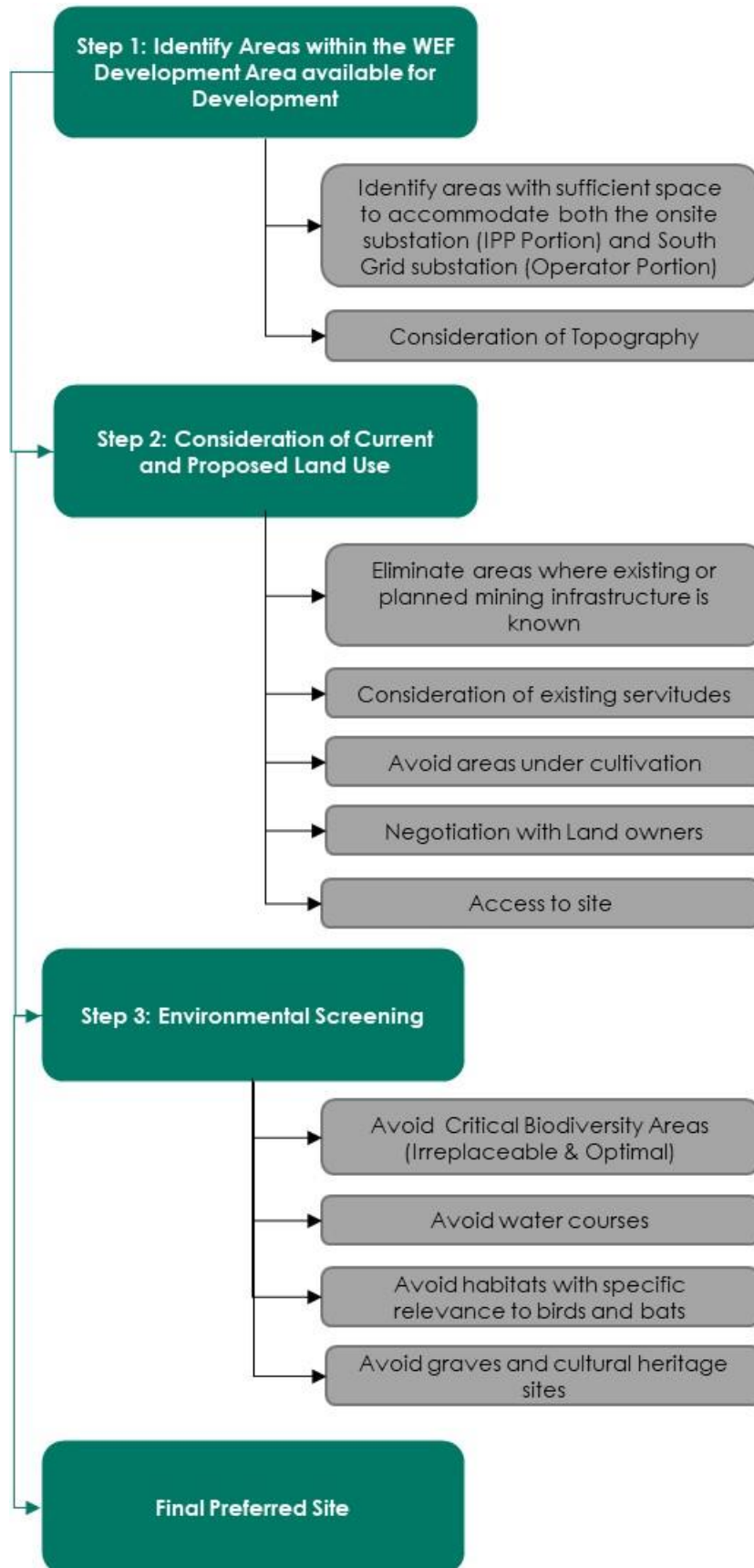


Figure 7: Steps undertaken to determine the final location of the proposed substation

Two technical Grid solutions have been considered. For the Grid solution 1, three powerline route alternatives were assessed:

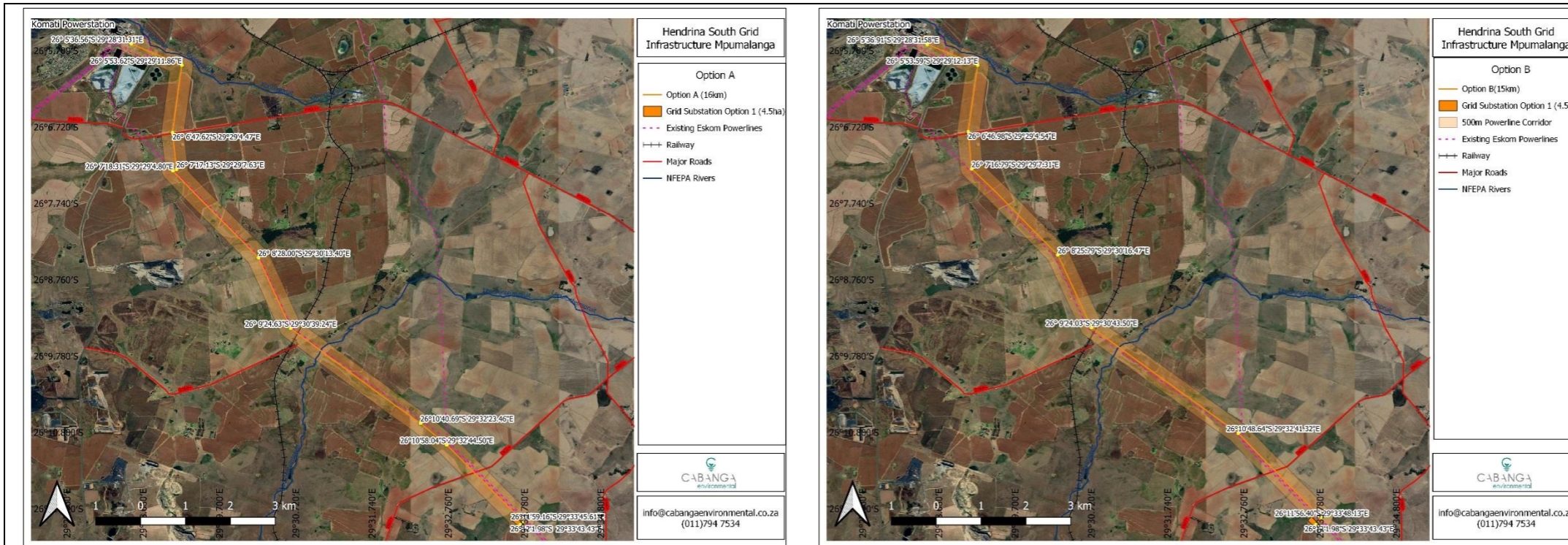
- Option A (preferred) (16km) runs south of the existing Camden-Komati 275kV that transverses the site, then east of the Ash Dumps associated with the Komati Power Station, to the existing Komati sub-station.
- Option B (15km) runs north of the existing Camden-Komati 275kV that transverses the site, then east of the Ash Dumps associated with the Komati Power Station, to the existing Komati sub-station.
- Option C (16km) runs south of the existing Camden-Komati 275kV that transverses the site, and between the Ash Dumps associated with the Komati Power Station, to the existing Komati sub-station.

Grid solution 2 (LILO) will only require the construction of a powerline of approximately 200m and no route alternatives are applicable. Although the LILO is preferred from an environmental sensitivity point of view (Table 15), Eskom has issued CELs for Grid Solution 1 and the LILO solution is not currently supported.

No fatal flaws have been identified for any of the route alternatives associated with Grid solution 1.

Table 15: Summary of Specialist's recommendations in terms of Alternatives

Specialist Field	Recommendation & Reason for Preference
Land Use, Soils and Agricultural Potential	Because of the insignificant agricultural impact of the power lines, there is no material difference between the alternative route options. All proposed alternatives are considered acceptable in terms of the agricultural impact (Lanz, April 2022).
Water Resources and Aquatic Ecology	LILO Option is preferred. Route Options A, B and C all cross water resources, although these follow existing powerline routes.
Terrestrial Biodiversity	There is no ecological difference between Option A and Option B as they cross the same ecological features. At the northern end, Option C is preferred over A or B, because it avoids an area of wetland just to the east of Komati Power Station. Except for this difference, all the powerline options have a similar effect on terrestrial biodiversity and any of the options (A to C) can be used (David Hoare Consulting1, 2022).
Avifauna	The LILO Option is the preferred option from an avifaunal perspective, as it drastically reduces the length of powerline that needs to be constructed. Options A and B are acceptable as they are routed next to an existing high voltage line for the majority of the way however, Option C would be slightly preferred over Options A and B as this is routed next to an existing powerline all the way (Van Rooyen & Froneman, Avifaunal Impact Assessment: Hendrina South Grid, Mpumalanga Province, April 2022).
Visual	No fatal flaws were identified for either of the proposed grid connection alternatives for Hendrina Grid South. LILO is the preferred option while Route Option A was found to be favourable (SiVEST, April 2022).
Cultural Heritage and Palaeontology	All routes are acceptable however, Route A and B will indirectly impact on Waypoints 095 and 096 (Beyond Heritage, April 2022).



Route Option A (top left) (preferred alternative) and Route Option B (top right) follow the same corridor with the exception that Route Option A runs just south of the existing Camden-Komati powerline whilst Route Option B runs just north of the existing line. Route Option C (bottom left) follows the same route as Option A with the exception of the last segment which runs between the Ash Dumps associated with the Komati Power Station. All three options are between 15 – 16km in length and have a capacity of 132 kV.

The LILO option (bottom right) includes a short powerline of 200m connecting the proposed substation to the existing Camden-Komati powerline (275 kV).

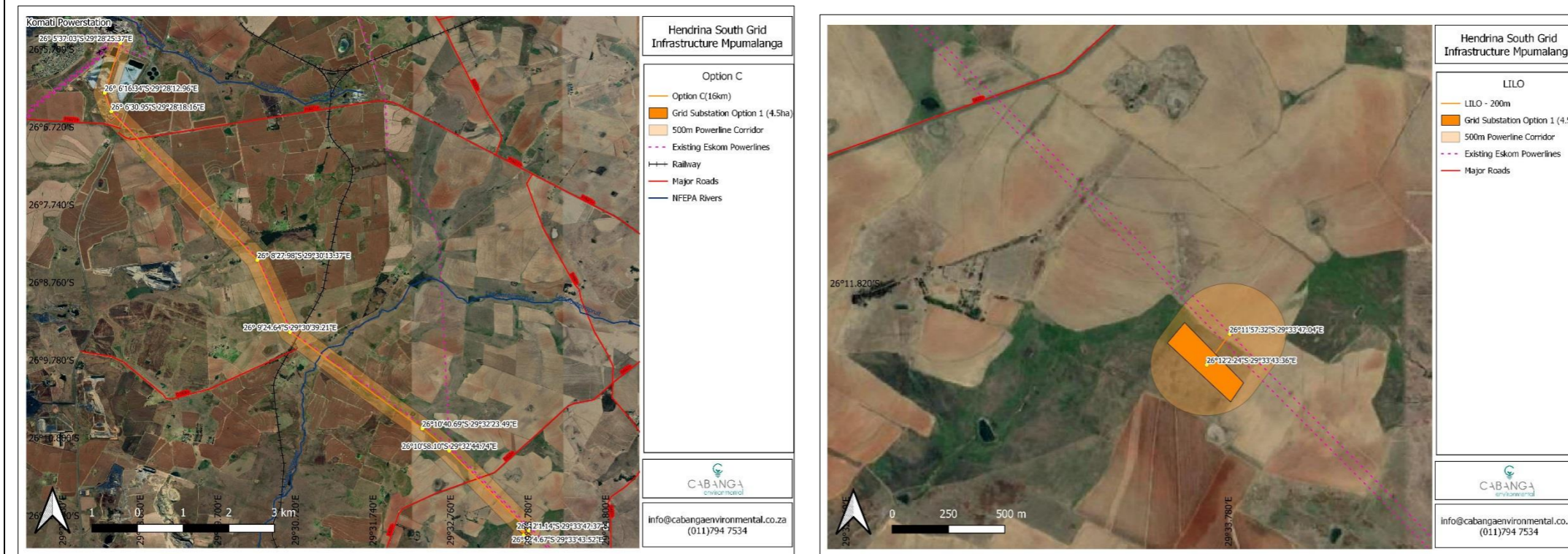


Figure 8: Route Alternatives

6.5 Design

The type of pylon to be used depends on the topography and alignment of the powerline corridor. In general monopole type pylons are used for transmission lines with shorter spans.

132kV Intermediate Self-Supporting Double Circuit Monopole (Figure 9) is the preferred alternative. These are self-supporting galvanised steel Monopole Intermediate or Suspension structures with no stays/anchors. The monopole is designed to support a double electrical circuit with a twin conductor arrangement. The monopole height varies between 26m and 32m.

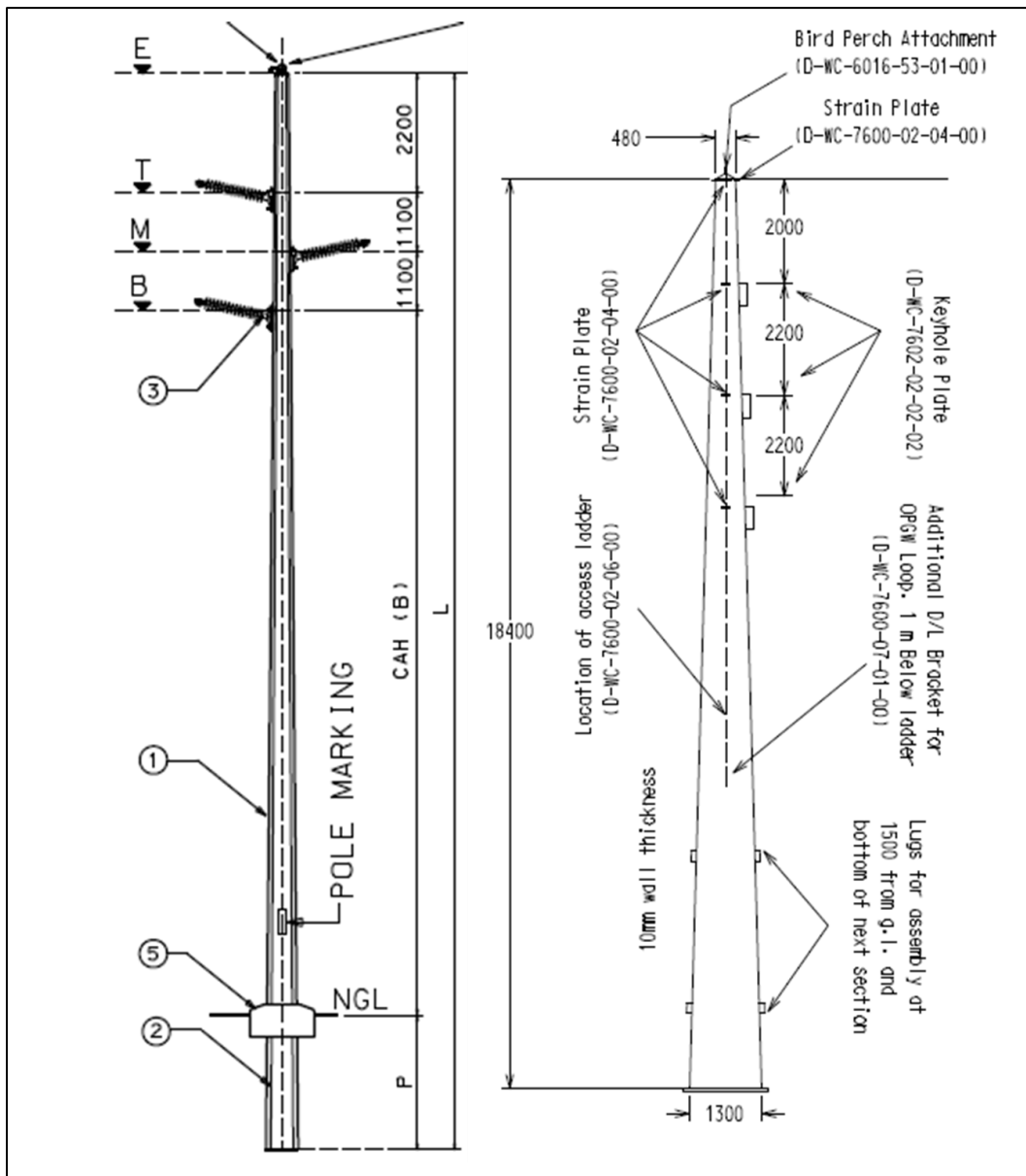


Figure 9: 132 kV Intermediate Self-Supporting Double Circuit Monopole (preferred alternative)

132kV In-line or Angle Strain Self-Supporting Double Circuit Monopole structures (Figure 10) are self-supporting galvanised steel Monopole In-line or Angle Strain structures with no

stays/anchors. The monopole is designed to support a double electrical circuit with a twin conductor arrangement.

This structure is the preferred alternative to be used as the strain structure and will be positioned at the angle points along the line or as an in-line position where a strain point is required due to the ground elevation. The monopole height varies between 26m and 32m.

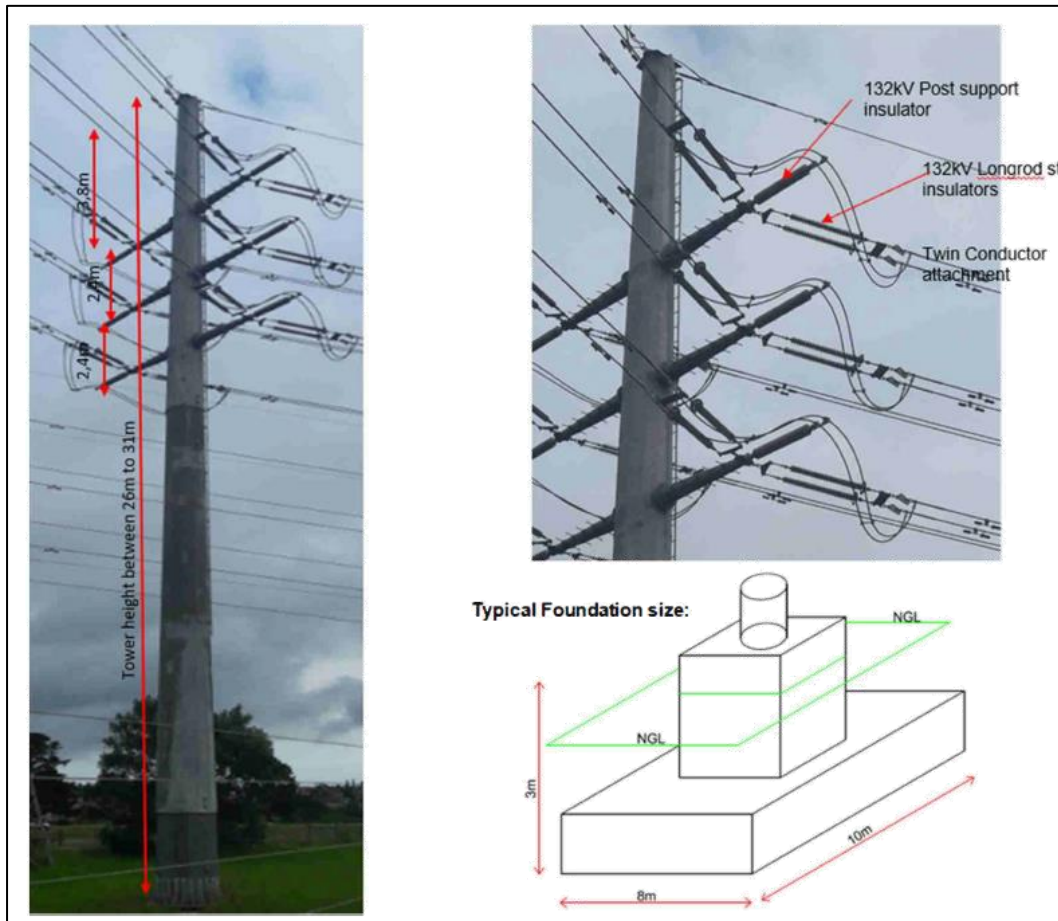


Figure 10: 132kV In-line or Angle Strain Self-Supporting Double Circuit Monopole structures

Alternatives to the preferred tower structures discussed above include:

- 132kV In-line or Angle Strain Guyed Double Circuit Monopole (Figure 11): These are galvanised steel Monopole In-line or Angle Strain structures with anchors/stays for additional structure support. This monopole is similar to the self-supporting monopole but with additional anchor support for conditions where longer span lengths is required with higher conductor tensions. The monopole height varies between 26m and 32m. Depending on the angle strain point up to 4 x anchors.
- 132kV Suspension Self-Supporting Single Circuit Monopole with single conductor (Figure 12) is a self-supporting galvanised steel Monopole Suspension structure with no stays/anchors. The monopole is designed to support a single electrical circuit with a single conductor arrangement. The monopole height varies between 22m and 26m.
- 132kV Inline or Angle Strain Self-Supporting Single Circuit Monopole with single conductor (Figure 13) are Self-supporting galvanised steel Monopole Inline or Angle

Strain structures with no stays/anchors. The monopole is designed to support a single electrical circuit with a single conductor arrangement. The monopole height varies between 24m and 26m. The foundation will consist of a typical pad foundation with bolts inside the concrete foundation.

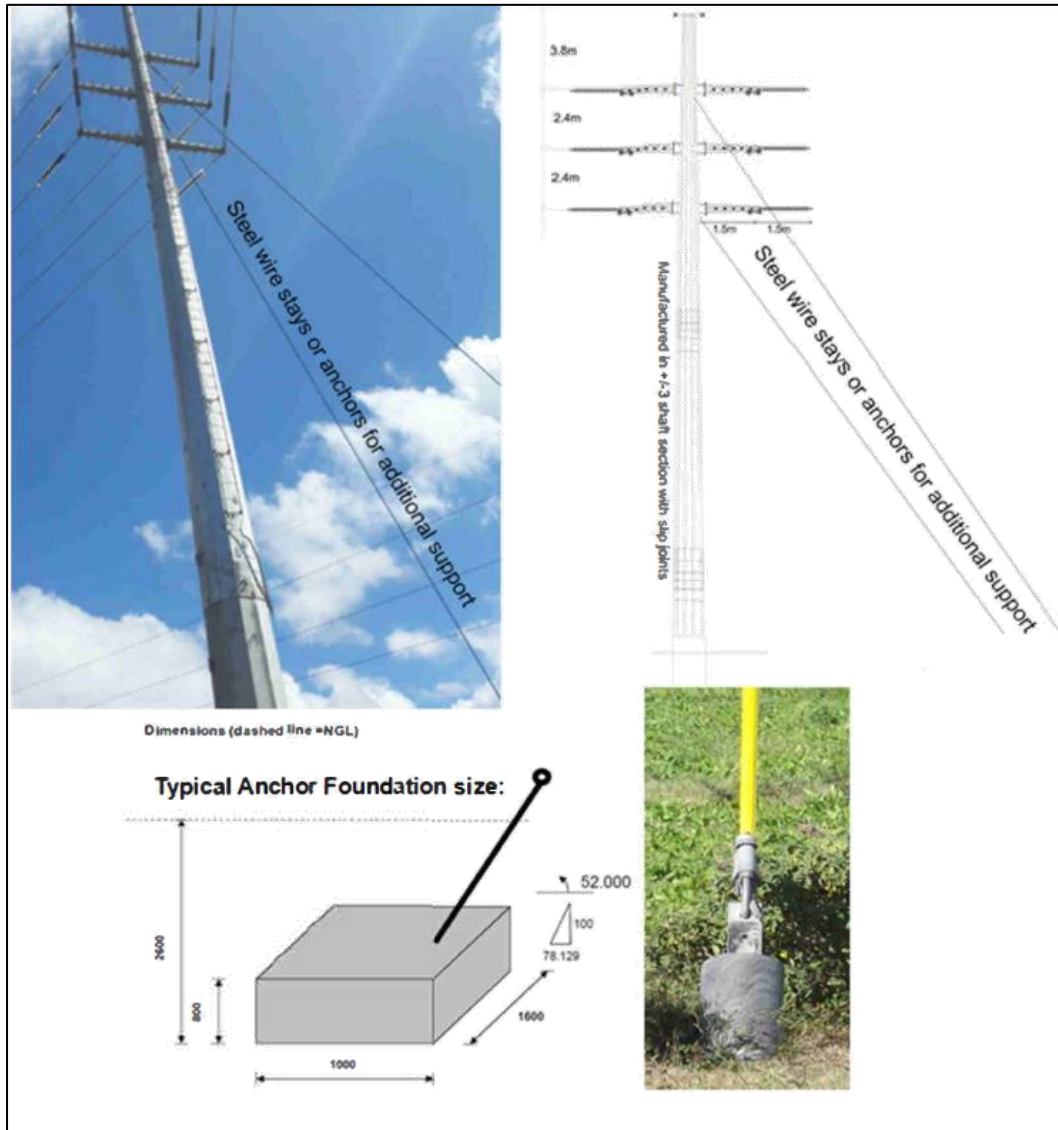


Figure 11: 132kV In-line or Angle Strain Guyed Double Circuit Monopole

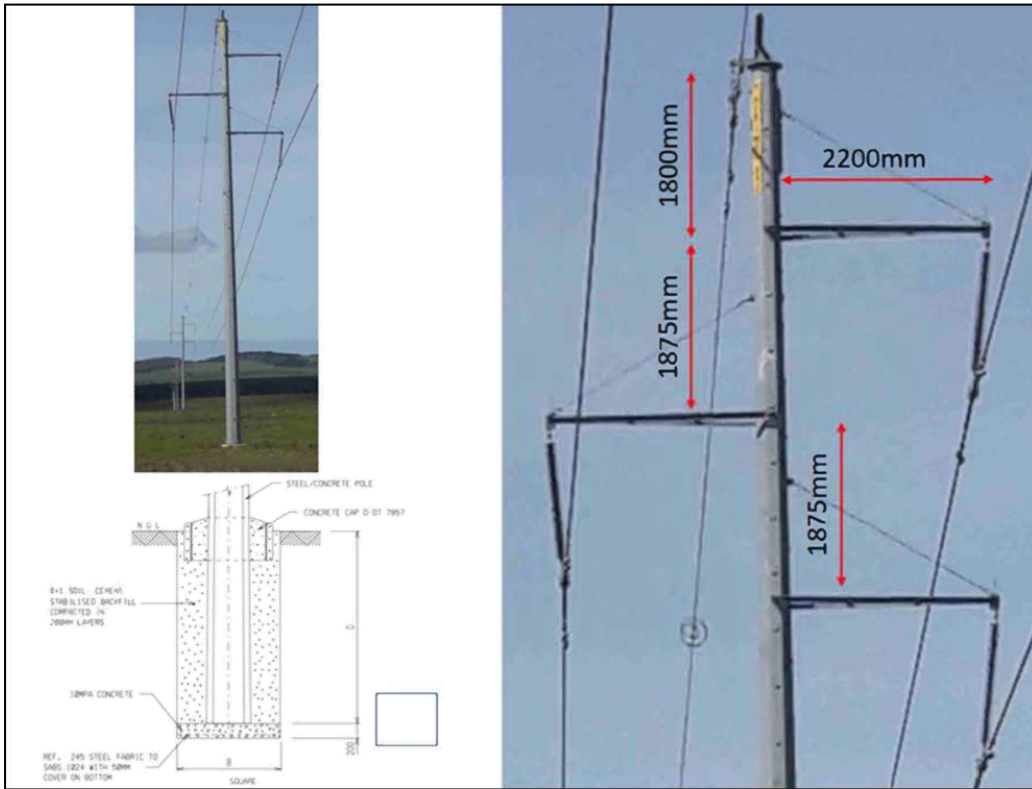


Figure 12: 132kV Suspension Self-Supporting Single Circuit Monopole with single conductor

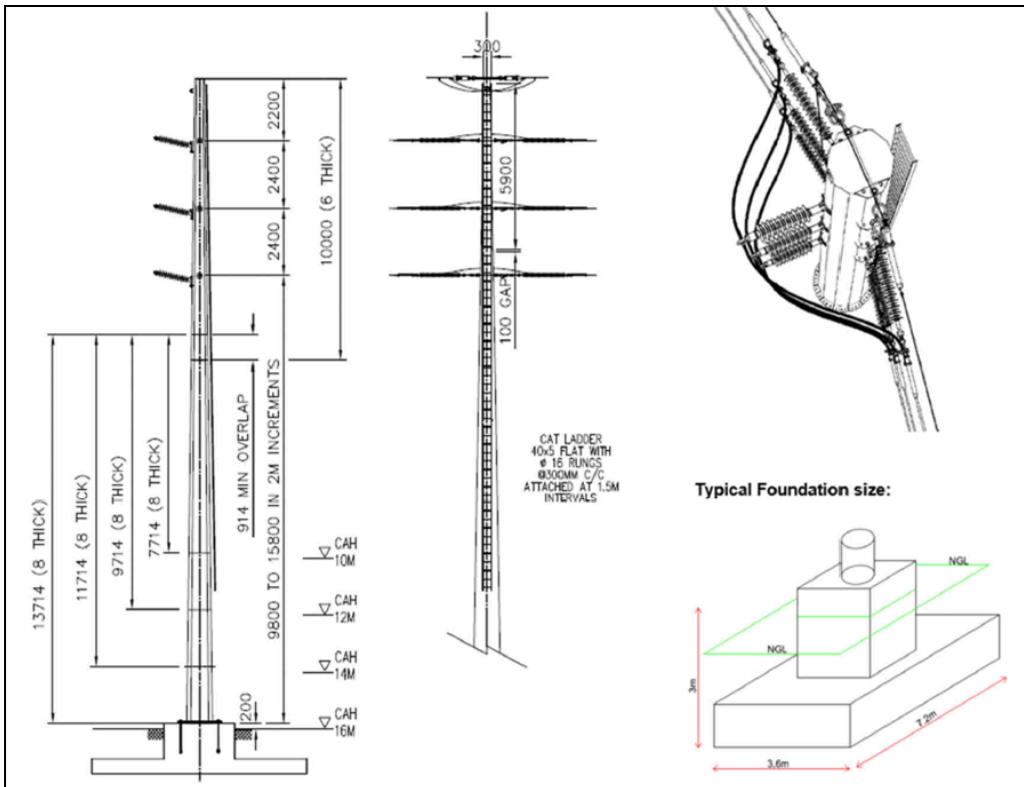


Figure 13: 132kV Inline or Angle Strain Self-Supporting Single Circuit Monopole with single conductor

Consideration is only given to steel lattice-type pylons where long spans (>500m) across valleys and rivers are required. These are typically 132kV/275kV Powerline Double Circuit Suspension Towers that consist of a steel framework of individual structural components that are bolted or welded together. Such tower structures can be designed to carry either one or two electrical circuits, referred to as single-circuit and double-circuit structures. The lattice pylons' height varies between 25m and 40m.



Figure 14: 132kV/275kV Powerline Double Circuit Suspension Towers

The advantages of the monopole is that they take up less space and they are self-supporting. The monopole takes up 1/16th less space than a lattice tower. They have faster assembly and installation as therefore it would make design modifications easier. The monopole requires little maintenance in comparison to the other alternatives. Furthermore the monopole has a significant wind load capacity (Gupta, 2020).

The design layout for placement of pylons depends on several factors. The majority of the powerline route alternatives are associated with a 132 kV overhead powerline (15 – 16 km in length), therefore the spacing alternatives of pylon placement will range from 100 - 400 metres.

As illustrated in Figure 15 pylons can safely be located at a minimum of 100 metres apart due to the magnetic field being virtually zero at 100 metres (Gupta, 2020). The preferred alternative for the spacing of pylons is 200- 400 metres (SiVEST, April 2022).

The placement of the pylons will also depend on several factors such as the topography, surrounding environment and proximity to homesteads. Pylon positions have not yet been finalised and will be determined on a final pre-construction walk through during the detailed design phase.

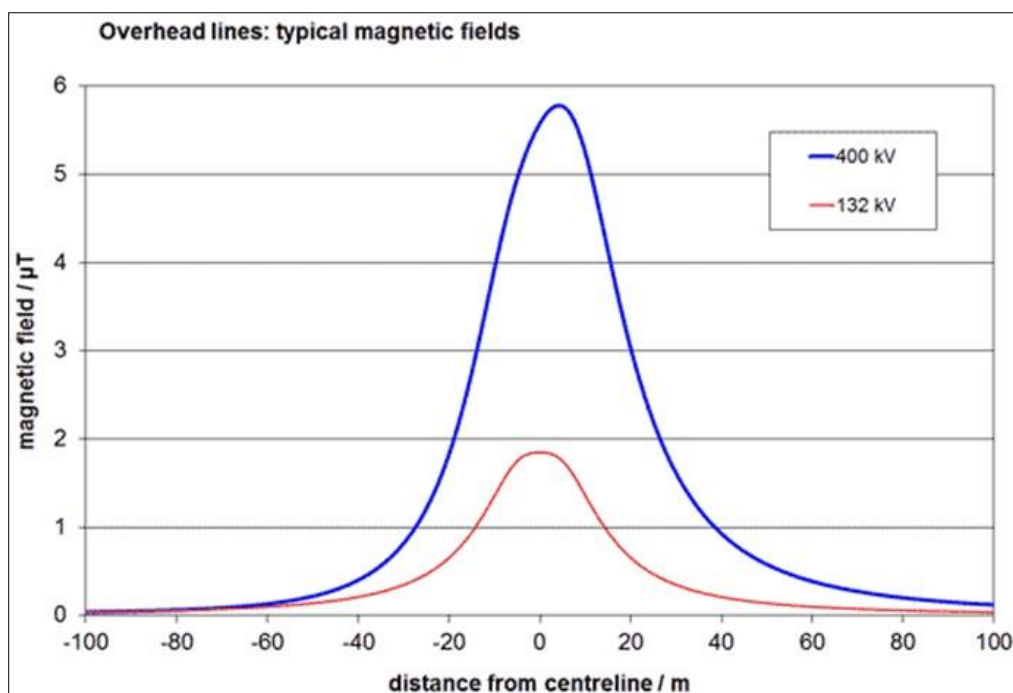


Figure 15: Magnetic field/distance of pylon placement (Gupta, 2020)

6.6 Operational and Scheduling Alternatives

These are dependent on the type of operation but may include:

- Activity hours and designating set times for specific activities.
- Setting specific traffic control mechanisms.

Standard practice will be employed for the construction of the proposed Infrastructure, which typically involves the following “steps”:

- finalisation of access agreements and negotiation of servitudes,
- tower pegging,
- excavation of foundations, concrete pouring and steel work for foundations,
- delivery of steel to tower site, and tower assembly,

- erection of towers (by crane),
- Stringing, sagging and tensioning, and
- Site rehabilitation.

It is proposed to limit construction activities to daylight hours as far as this is practical on site to minimise the impacts of noise resulting from night-time construction activities. It is acknowledged that concrete pouring can continue into the night. Management measures have been proposed in the EMPr, and are not further discussed in the context of Alternatives.

Dust suppression will also have to be implemented during the construction phase.

6.7 No-Development Option

The establishment of the Project is required for the evacuation of power generated at the proposed Hendrina South WEF, and to connect the facility to the National Grid.

The proposed transmission line and substation is essential supporting infrastructure to the wind energy development, which, once developed, will generate power or green products from renewable energy resources. The use of renewable energy technologies, as one of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of Eskom's long-term strategic planning and research process. The proposed Project involves the construction and operation of electricity distribution infrastructure, to connect the proposed Hendrina South WEF to the substation at the Komati Power Station. The WEF will form part of the Renewable Energy Independent Power Producer Programme (REIPPP) (in line with the Integrated Resource Plan (IRP) – renewable wind energy). It must be remembered that wind energy is plentiful, renewable, widely distributed, clean and reduces greenhouse gas emissions when it displaces fossil-fuel derived from electricity. In this light, renewable wind energy can be seen as desirable.

Furthermore, the associated Hendrina Renewable Energy Complex will result in various environmental, economic, political, and social benefits, which has been unpacked in Section 5 of this report. Without the implementation of this Project the Hendrina Renewable Energy Complex cannot move Mpumalanga towards a Just Energy Transition in South Africa. Mpumalanga will be hit hardest by the transition away from coal-fired electricity generation and this cannot change without renewable energy development within the province.

If the Project is not developed, the Hendrina South WEF will not be connected to the National Grid rendering the associated Complex development un-feasible. If the Complex is not developed this will also not result in the realisation of the socio-economic opportunities associated with the Project and also limit the success of Just Transition of jobs and skills within Mpumalanga from fossil fuels to renewable energy resources.

Accordingly, the no-go option is not the preferred option.

6.8 Alternatives Assessment

Table 16 provides a summary of the alternative types that were assessed, along with a brief discussion on the benefits and challenges associated with the preferred alternative(s). Further, the Table identifies whether there are feasible alternatives that may need to be assessed by the Applicant. At this stage of the Project, all feasible alternatives have been assessed and the preferred alternative identified as described in Section 4, and confirmed in Section 6.9.

Table 16: Assessment of Alternatives

Alternative:	Description	Benefits	Challenges
Route Option A (Preferred Option)	South of the existing Camden-Komati 275kV that transverses the site, then east of the Ash Dumps associated with the Komati Power Station, to the existing Komati sub-station Powerline length = 16km	Aligns with existing grid infrastructure that traverses the site. Bisects low sensitivity cultivated areas.	Route does bisect some delineated wetlands and NFEPA wetlands (though already affected by existing powerlines). Close proximity to graves at point 095 and 096 (Beyond Heritage, April 2022).
Route Option B	North of the existing Camden-Komati 275kV that transverses the site, then east of the Ash Dumps associated with the Komati Power Station, to the existing Komati sub-station Powerline length = 15km	Aligns with existing grid infrastructure that traverses the site. Bisects low sensitivity cultivated areas.	Route does bisect some delineated wetlands and NFEPA wetlands (though already affected by existing powerlines). Close proximity to graves at point 095 and 096 (Beyond Heritage, April 2022).
Route Option C	South of the existing Camden-Komati 275kV that transverses the site, and between the Ash Dumps associated with the Komati Power	Aligns with existing grid infrastructure that traverses the site. Bisects low sensitivity cultivated areas.	Route does bisect some delineated wetlands and NFEPA wetlands (though already affected by existing powerlines).

Alternative:	Description	Benefits	Challenges
	Station, to the existing Komati sub-station Powerline length = 16km		Route affected Portion 26 of the Farm Geluk 26 which is the subject of an application in terms of the Labour Tenants Act. The route passes in very close proximity to homes.
LILO Option	On Portion 3 of the Farm Dunbar 189IS, from proposed substation to existing Camden-Komati 275kV Powerline length = 200m	Shorter powerline. Not within 250m of delineated wetlands nor NFEPA wetlands. Bisects low sensitivity cultivated areas.	Feasibility dependent on Eskom.
Pylon Alternatives: Monopole Design	132 kV Intermediate Self-Supporting Double Circuit Monopole (preferred alternative)	Insulated thus reduces voltage loss and time spent cutting vegetation that might come in to contact with the powerline. Back up circuit should one fail.	Insulated wire is more expensive.
	132kV Inline or Angle Strain Guyed Double Circuit Monopole	Back up circuit should one fail. Can cover larger distances.	Occupies more surface area as additional support required. More expensive to construct. Increased danger to avifauna.
	132kV Suspension Self-Supporting Single Circuit Monopole with single conductor	Cost saving as there is one circuit.	Cannot cover long distances.
	132kV Inline or Angle Strain Self-Supporting Single Circuit Monopole with single conductor	Cost saving as there is one circuit. Increased danger to avifauna. Can cover larger distances.	More expensive to construct.

Alternative:	Description	Benefits	Challenges
Pylon Alternatives: Lattice Design	132kV/275kV Powerline Double Circuit Suspension Towers	Back up circuit should one fail.	Occupies more surface area as additional support required.

6.9 Confirmation and Motivation of the Preferred Alternative

Although the LILO is preferred from an environmental sensitivity point of view, Eskom has issued CELs for Grid Solution 1 and the LILO solution is not currently supported.

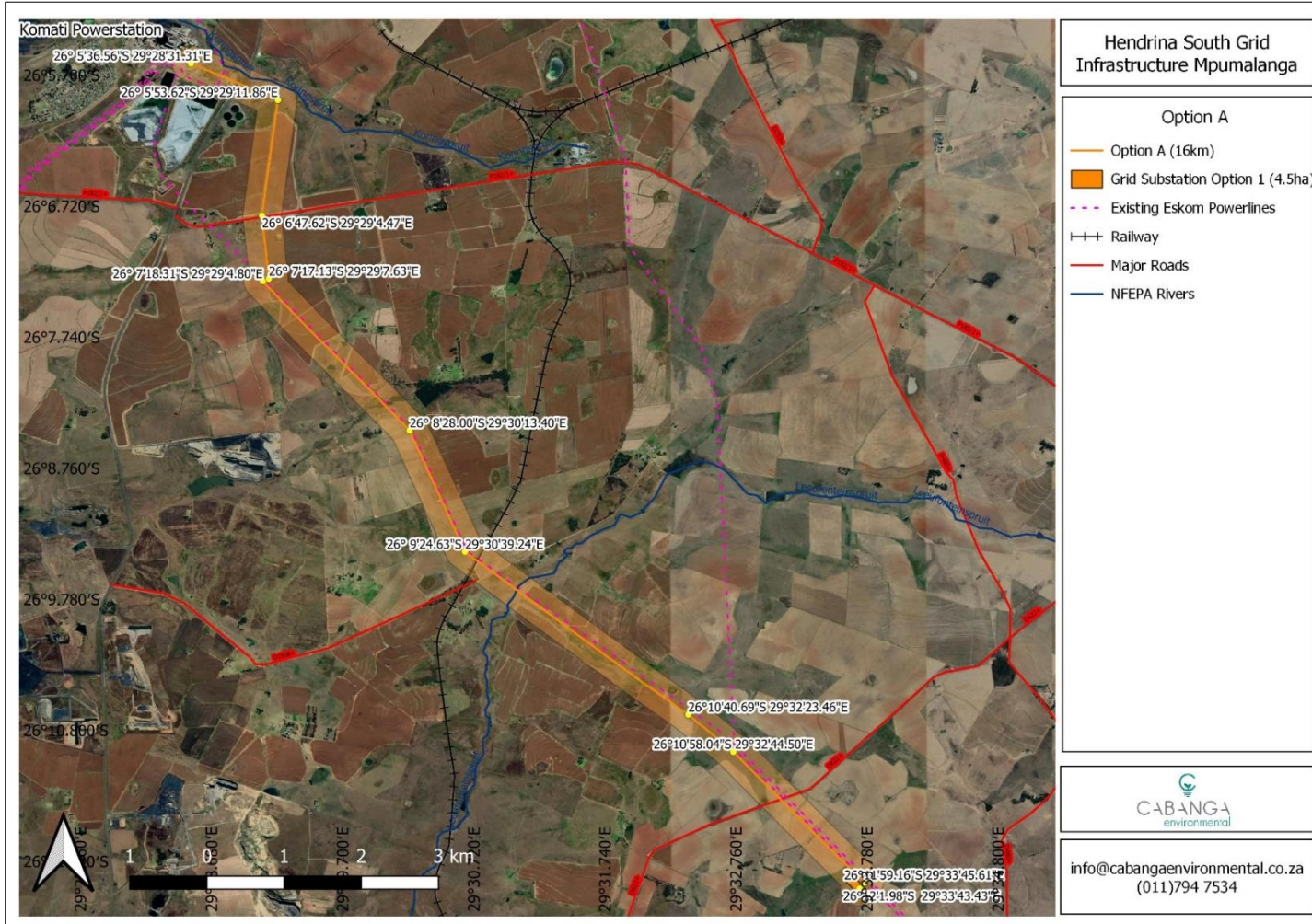
All proposed route alternatives association with Grid Solution 1 are considered acceptable. There is no ecological difference between Option A and Option B as they cross the same ecological features. At the northern end, Option C was slightly preferred by the specialists (Table 15), because it avoids an area of wetland just to the east of Komati Power Station. Option C follows the existing Camden-Komati 275kV, and would run between the Ash Dumps associated with the Komati Power Station. Access and space constraints are associated with Option C (limited space between the existing dumps), Option C also affects Portion 26 of the Farm Geluk 26 which is the subject of an application in terms of the Labour Tenants Act. The route passes in very close proximity to homes.

Route Option A is supported by Eskom as the preferred alternative as this will allow the proposed powerline to connect to the Kudu Substation (132kV), located at the Komati power station.

In light of the above, the preferred alternative is Route Option A as illustrated in Plan 9 overleaf.

The preferred pylon will be 132 kV Intermediate Self-Supporting Double Circuit Monopole, with pylon spacing of 200-400 metres apart.

Please refer to Appendix K: Property Details of Preferred Alternative.



Plan 9: Preferred Layout (Route Option A)

7 Public Participation

The latest Public Participation Guideline in terms of the NEMA was published by the Department of Environmental Affairs in 2017 (DEA, 2017). The NEMA requires the participation of all Interested and Affected Parties (I&APs) in environmental governance (Section (2)(4)) and holds that the beneficial use of environmental resources must serve the public interest. Decisions that may affect the environment, have to include sufficient opportunity for public participation.

The public participation process (PPP) aims to involve the authorities and I&APs in the project process; and determine their needs, expectations and perceptions. An open and transparent process will be followed at all times and is based on the reciprocal dissemination of information.

The PPP is designed to provide sufficient and accessible information to all I&APs in an objective manner to assist them to:

- Raise issues of concern and suggestions for enhanced benefits;
- Contribute local knowledge and experience; and
- Verify that their issues have been and will be captured.

A comprehensive report on the public participation undertaken and planned to be undertaken for this Project is included in Appendix G.

In summary, the following steps comprise the PPP (as per the Public Participation Plan submitted to comply with the Guidelines issued due to the Covid-19 Pandemic, and approved by the DFFE on 29 September 2021 (See Appendix G 2):

- Identification of stakeholders (Appendix G 4)
- Notification of stakeholders:
 - Direct notification via e-mail, post, fax and on-site consultation (Appendix G 5);
 - Publication of newspaper adverts in local publications (Appendix G 7);
 - Display of posters at the proposed development site and other prominent locations in the vicinity of the site (Appendix G 7).
- Stakeholder review of Draft Reports (Scoping Report issued for public comment was made available on the Cabanga website and in hard copy at the Tsiki Naledi English Medium School in Hendrina, and distributed digitally to I&APs who requested copies. A hard copy report was submitted to Mpumalanga Tourism and Parks Agency upon their request (Appendix G 9, Appendix G 10 and Appendix G 11. EIA Report issued for public comment was made available on the Cabanga website and in hard copy at the Hendrina Public Library and Komati Public Library, and distributed digitally to I&APs who requested copies.
- Public Meetings, Focus Group Meetings and/or open days to present the Project and findings of the studies to I&APs (Appendix G 8 and G9).

The abovementioned notification documents present details of the application and EIA process, described the nature and location of the proposed project, described the PPP associated with the applications and gives details of the EAP where further information can be obtained.

The Scoping Report, which was subject to a 30-day public review and comment period and included all comments received from I&APs at the time, was submitted to DFFE on 07 April 2022, and approved by the DFFE on 13 May 2022 (Appendix G 3). The EIA Report was also subject to a 30-day public review and comment period (11 July 2022 to 11 August 2022). All of the issues raised by I&APs to date and the responses thereto are contained in the Comments and Response Trail Report attached as Appendix G 1.

This report and its appendices have been updated with the additional comments received, and submitted to the DFFE for consideration.

Once the DFFE reaches a decision on the EIA and EMPr, and communicates their decision to the Applicant, registered I&APs will be notified of the decision, reasons for the decision, and the appeal process that I&APs may follow if they do not agree with the decision or a part thereof.

The PPP for the projects that comprise the Hendrina Renewable Energy Complex is being undertaken as a single, integrated process, to ensure that the component parts of the Complex are well understood by affected persons, to facilitate the identification of cumulative impacts and to avoid potential stakeholder fatigue anticipated to result from undertaking numerous separate public engagement processes.

Please refer to Appendix G for additional details and proof of the public participation undertaken to date.

8 Existing Site Attributes

This section describes the environmental attributes associated with the site focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.

Just as a project is associated with certain impacts on the environment where it is undertaken, the existing environment can also influence a project in terms of design, location, technology and layout. It is therefore important to define the environmental baseline conditions (*status quo*) and context of a proposed development site.

A variety of resources are available to identify and assess the existing site attributes, in terms of their irreplaceability and potential resilience to change, including literature, Geographic Information Systems (GIS) and the specialist studies completed for the Project.

Additionally, the Department of Environmental Affairs (DEA) has developed a 'National Screening Tool' to enable an applicant who intends to submit an application for an EA under the NEMA to pre-screen the proposed site for environmental sensitivity. The screening Tool results in the generation of a report indicating the expected sensitivities of a site and identifying the potential specialist studies to be completed for the project.

The Screening Tool Report generated for this Project relates to the Application Category: Utilities Infrastructure | Electricity | Distribution and Transmission | Powerline. Table 17 (duplicated from the screening tool) summarises the environmental sensitivities of the site in terms of the identified environmental themes.

Table 17: Site Sensitivity ratings according to the screening tool

Theme	Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low Sensitivity
Agriculture		X		
Animal Species			X	
Aquatic Biodiversity	X			
Archaeology and Cultural Heritage				X
Civil Aviation		X		
Defence				X
Palaeontology	X			
Plant Species			X	
Terrestrial Biodiversity	X			

Table 18 lists the specialist studies prescribed by the screening tool and identifies the assessments that have been undertaken. The table also includes additional studies that were not in the Screening Tool. The table further indicates those studies where a Protocol for the specialist assessment has been published.

These studies assessed a 500m corridor around the various powerline route alternatives and substation location.

Table 18: Specialist assessments prescribed by the Screening Tool

NO	Specialist Assessment	Assessment Protocol	Specialist Assessment Included	Compliance Statement Included
1	Agricultural Impact Assessment	YES	Appendix F 1	-
2	Landscape / Visual Impact Assessment	NO	Appendix F 9	-
3	Archaeological and Cultural Heritage Impact Assessment	NO	Appendix F 11	-
4	Palaeontology Impact Assessment	NO	Appendix F 12	-
5	Terrestrial Biodiversity Impact Assessment	YES	Appendix F 5	-
6	Aquatic Biodiversity Impact Assessment	YES	Appendix F 4	-
7	Avian Impact Assessment	YES	Appendix F 8	-
8	Civil Aviation Assessment	YES	No	-
10	RFI Assessment	NO	No	-
14	Geotechnical Assessment	NO	Appendix F 14	-
16	Plant Species Assessment	YES	Appendix F 6	-
17	Animal Species Assessment	YES	Appendix F 7	-

8.1 Geology, Physiography and Topography

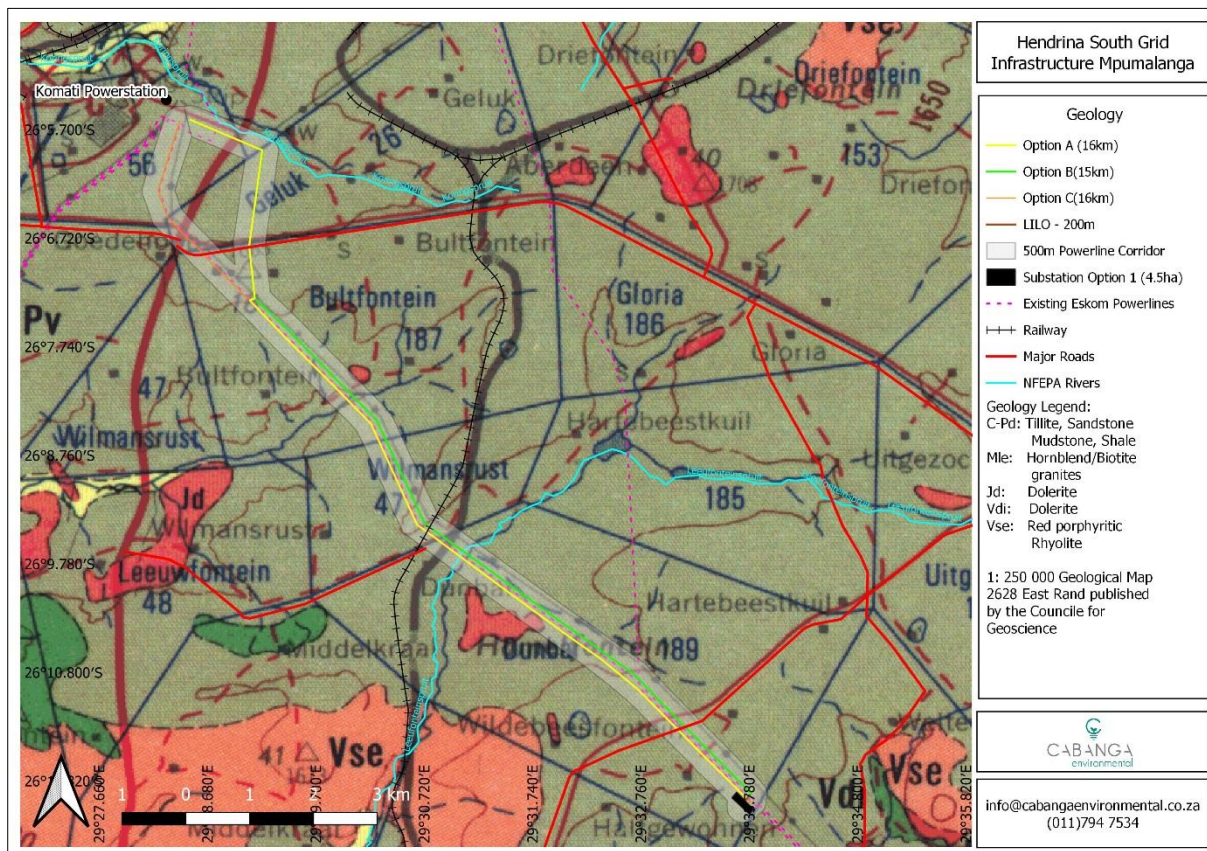
Plan 10 depicts the geology underlying the Project area (according to the 1:250,000 Geological Map 2628 East Rand published by the Council for Geoscience).

The site is underlain by stratigraphic units of the Eccca Group, Karoo Supergroup; Rooiberg Group of the Transvaal Supergroup and the Lebowa Granite Suite of the Bushveld Complex (SLR, 2022)

The regional geology comprises sandstone and shale, with interbedded coal of the Karoo aged Vryheid Formation (Pv). Vaalium aged Selons River rhyolite (Vse), diabase (Vdi) as well as some small Dwyka tillite, sandstone, mudstone and shale outcrops (C-Pd). Alluvial deposits are indicated along sections of the Olifants River and Leeuwfonteinspruit (Shangoni Aquiscience, 2022).

The geological map shows little indication of geological structures such as dykes or other anomalies within the project area.

The project area ranges from 1592- 1677 metres above mean sea level (mamsl) (Plan 11) and is largely located on a plateau where relatively flat to undulating terrain prevails. Slopes across the study area are relatively gentle to moderate, with steeper slopes being largely associated with the more incised river valleys (SiVEST, April 2022).



Plan 10: Geology of the Site

February). Summer temperatures for the region average 19.5°C while winter temperatures average 11.1°C.

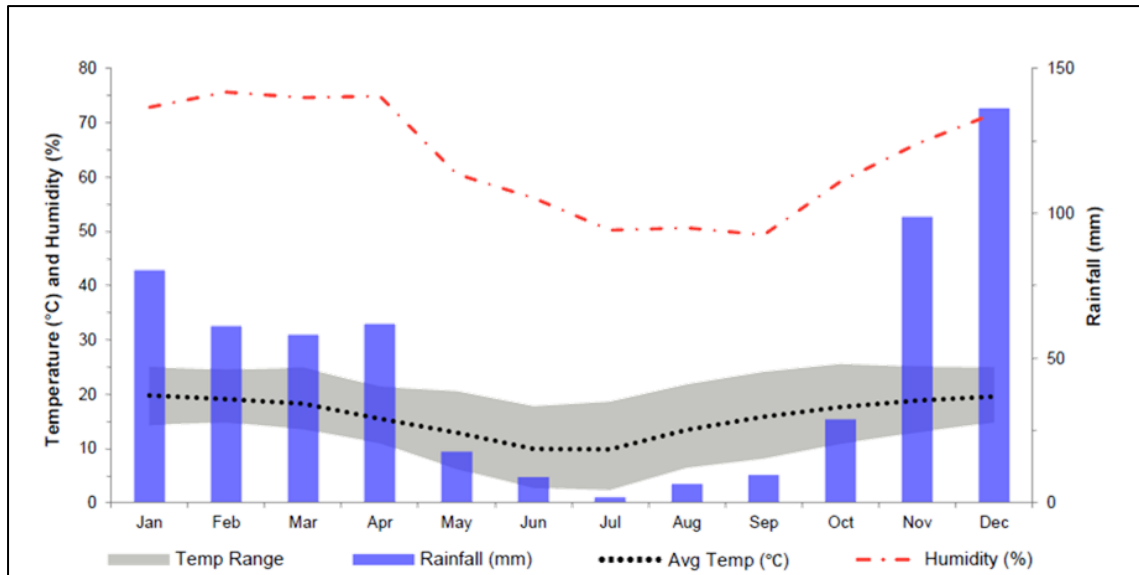


Figure 16: Meteorological summary for Hendrina (January 2018 - December 2020)

Wind roses (Figure 17) show wind speed and directional frequency at a location. Each directional branch on a wind rose represents wind originating from that direction. Each directional branch is divided into segments of colour, representative of different wind speeds.

Wind fields were analysed by WSP using Lakes Environmental WRPlot Freeware (Version 7.0.0) for the full period (January 2018 – December 2020). The following was concluded by WSP:

- Calm conditions (wind speeds <1.0 m/s) occurred 29.89% of the time;
- Light to strong easterlies prevailed in the region;
- Peak wind speeds occurred from the east-northeast (11.2 m/s) and highest average wind speeds occurred from the east (3.0 m/s);
- Easterly winds prevailed during the early morning (00h00-06h00), morning (06h00-12h00) and night-time (18h00-00h00) hours;
- Winds from the west-northwest prevailed in the afternoon (12h00-18h00);
- Diurnal peak (10.3 m/s) and highest average (2.0 m/s) wind speeds occurred during the afternoon;
- Winds from the east prevailed during the spring, summer and autumn months;
- Higher directional variability in the wind field is observed during winter; and
- Seasonal peak (10.4 m/s) wind speeds occur during spring and highest average (1.6 m/s) wind speeds occur during summer and spring.

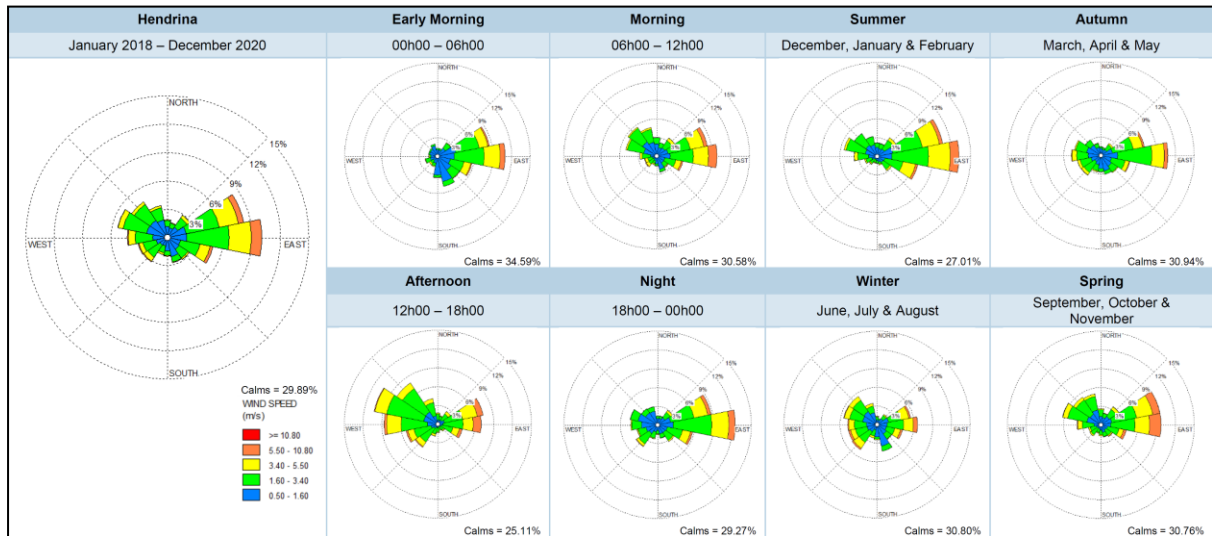


Figure 17: Local wind conditions at Hendrina

8.3 Land Use, Soils and Agricultural Potential

According to the South African National Land Cover dataset much of the Project Area is classified as “Cultivated Land” interspersed with “Grassland” and “Wetlands/Water Courses” (Plan 12). Commercial agriculture (maize cultivation and livestock grazing) is the land use in the area followed by coal mining and power generation. Built form comprises farmsteads, ancillary farm buildings and workers’ dwellings, fences, roads, rail, telecommunications and high voltage electricity infrastructure (SiVEST, April 2022).

The Natural Agricultural Resources Atlas identifies the Project site as falling within the Central Mpumalanga Protected Agricultural Area (Type: Rainfed; Rating B) (<https://ndagis.nda.agric.za/portal/apps/webappviewer/index.html?id=cf56d2431dd8437da173144811d89ef7>). The assigned priority ratings range from A to F, with A being the highest priority for conservation of agricultural resources (DALRRD, 2020)

Almost the entire development area falls within one land type, Bb4 which includes a fairly high proportion of deep, red and yellow, reasonably-drained, loamy soils of the Avalon, Hutton and Glencoe soil forms that are good for crop production, and other soils that have various limitations for crop production, predominantly due to poor drainage or limited depth (Lanz, April 2022).

There are several land capabilities associated within the powerline corridor. As per the Natural Agricultural Resources Atlas (and also the Screening Tool Report which use the same dataset) the range of the project is from land capability 4-10 however predominantly 9, which is an indicator of high agricultural sensitivity. “The small scale differences in land capability across the project area are not very accurate or significant and are more a function of how the land capability data is generated by modelling, than actual meaningful differences in agricultural potential on the ground” (Lanz, April 2022).

The land capability and sensitivity are summarised in Table 19 which has been extracted from the Screening Tool, these sensitivities are applicable to the project.

Table 19: Land Capability (National Screening Tool Report)

Sensitivity	Features
High	Land capability: 9- Moderate-High 10- Moderate-High
High	Annual Crop Cultivation/Planted Pastures Rotation Land capability: 6- Low-Moderate 7- Low-Moderate 8- Moderate
High	Annual Crop Cultivation/Planted Pastures Rotation Land capability: 9- Moderate-High 10- Moderate-High
Medium	Land capability: 6- Low-Moderate 7- Low-Moderate 8- Moderate

Crops in the area include mainly maize and soya beans. Farmers generally utilise all suitable soil as cropland, with the remaining areas used for grazing, which is considered soil not suitable for crop production.

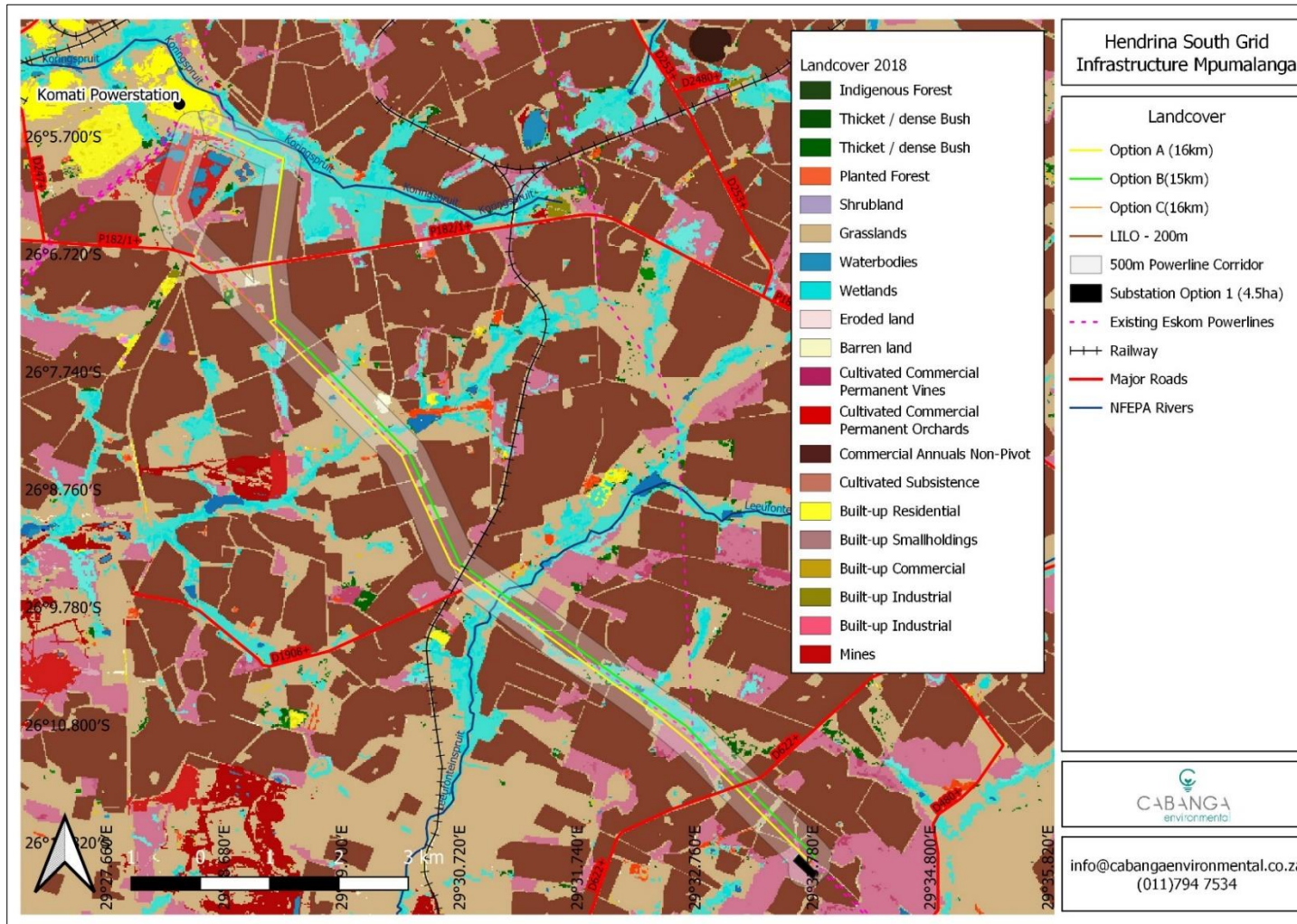
Because of the favourable climate and suitable soils on the croplands, crop yields are fairly high with average maize yields of around 7 to 8 tons per hectare according to the farmers on site (Lanz, April 2022). The long-term grazing capacity of the area is fairly high at 5 hectares per large stock unit (DAFF, 2018).

The socio-economic specialist study for the Project estimated, from data obtained from surveyed landowners, that agricultural operations in the directly affected area employ approximately 112 people, the majority of whom are permanent employees (71 people).

In an agricultural environment like the general area of the site, all the suitable soils are generally cropped, and uncropped soils can therefore fairly reliably be considered to be unsuitable for crop production (Lanz, April 2022). All cropped areas are considered sensitive from a soil, land use and land capability perspective.

Route Options A – C are largely aligned with the Camden-Komati powerline.

The prevalence of coal mining in the immediate vicinity of the project is another important land use impacting on the economy of the region (through employment) but also threatening biodiversity and agricultural land uses. The mineral rights and applications in the vicinity of the project that Cabanga are aware of pertain to coal, and are illustrated in Plan 4.



Plan 12: Landcover classification (data downloaded from https://egis.environment.gov.za/data_egis/data_download/current)

8.4 Hydrogeology (Groundwater)

Three aquifers have been identified in the proposed project area: the perched aquifer, weathered aquifer and fractured aquifer. The boreholes in this region have a yield of 0.1- 0.5 litres a second (Environomics Environmental Consultants, 2009). The recharge values for the proposed project area can be seen in Table 20.

Table 20: Recharge Values (van Tonder, 2000)

Method	Recharge (%)	Recharge (mm/a)
Geology (Sandstone/shale/mudstone)	3.00	22.41
Vegter	4.86	36.30
A cru	4.55	34.0
Harmonic mean	3.95	29.53

Previous hydraulic testing in similar Karoo environments show that the primary aquifers of the Vryheid Formation have a very low permeability with hydraulic conductivities generally ranging between 1×10^{-5} to 1×10^{-2} m/d (Shangoni Aquiscience, 2022).

A hydrocensus survey was undertaken between 2 and 26 August 2021 – 44 boreholes, 2 fountains, 16 dams and 3 rivers were surveyed (Shangoni Aquiscience, 2022). From the Hydrocensus it was determined that the groundwater levels range between artesian and about 50 metres below surface (mbs), with an average water level of 13.17mbs. The majority of boreholes and dams are used for livestock watering purposes while some also functions as domestic sources.

Groundwater quality in the area is generally circum-neutral to slightly alkaline and non-saline. Electrical conductivity (EC) and Total Dissolved Solids (TDS) are generally in the low ranges and mineralisation of major cations and anions are also low (Shangoni Aquiscience, 2022). This possibly indicates that the groundwater environment has not yet been adversely impacted by regional mining activities.

In most boreholes nitrate (NO_3), ammonium (NH_4) and phosphate (PO_4) were low to undetected, with the exception of three boreholes that had high nitrate levels. Trace metal concentrations are generally low to undetected. Fluoride (F) levels were mostly recorded as undetected (Shangoni Aquiscience, 2022).

The groundwater assessment found that the regional fractured aquifer has a medium susceptibility to pollution and a medium level of aquifer protection is therefore required (Shangoni Aquiscience, 2022).

8.5 Hydrology (Surface water)

The proposed Project falls within the Water Management Area 2: Olifants and in the B11A and B11B quaternary catchment. This has been illustrated in Plan 13.

The Olifants Catchment Management Agency (CMA) was officially established by Regulation 168 of 2015 following the evaluation of the CMA business case published by the Department of Water Affairs (DWA, October 2013) At the time of writing this report, no governing board for the Olifants CMA has been appointed and no Catchment Management Strategy (CMS) for

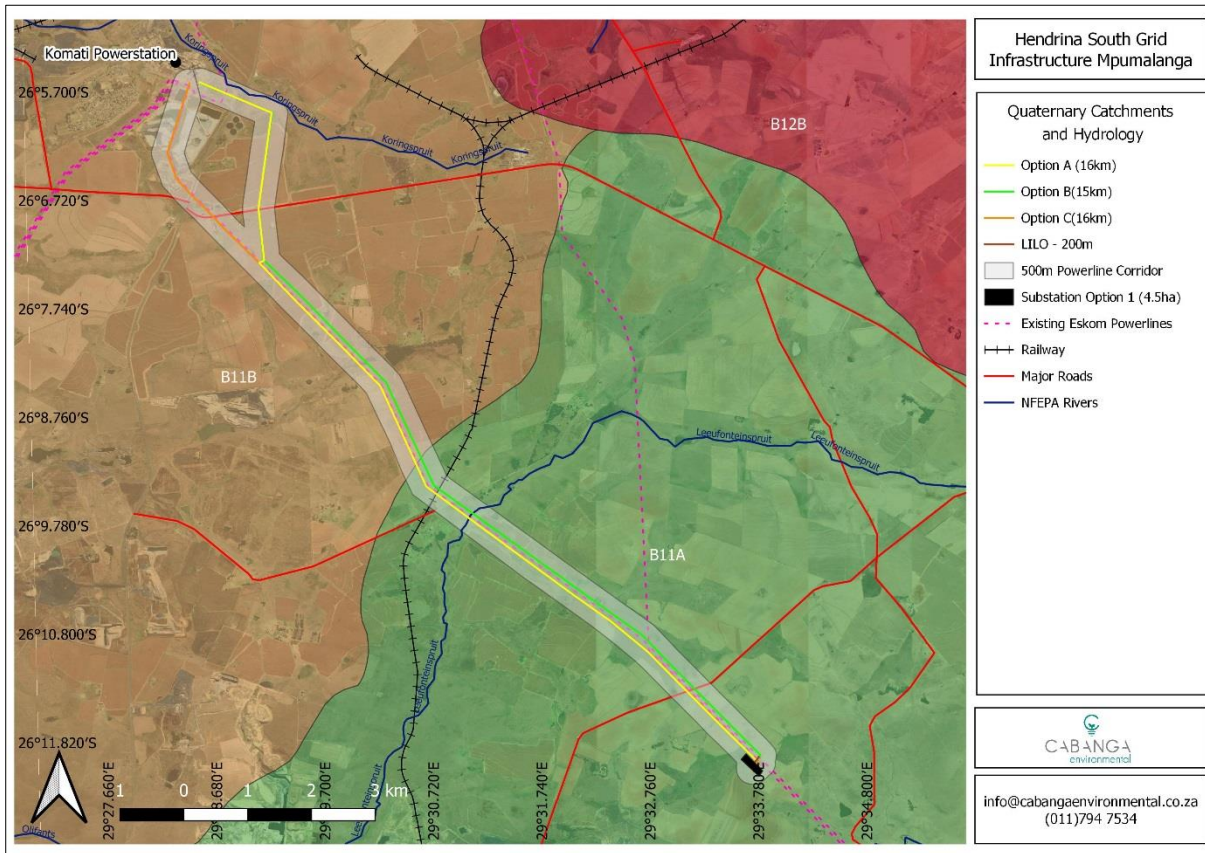
the Olifants WMA has been published. A regional steering committee (Upper Olifants Catchment Technical Working Group) is operational.

The Olifants WMA is located in the north-eastern part of South Africa and includes portions of the Gauteng, Mpumalanga and Limpopo Provinces. The Olifants River, forming the main River in the catchment and flowing from east to west just south of the development site, originates in the far-southern Mpumalanga Highveld Region on the Farm Nooitgedacht 2371S. The Olifants River initially flows roughly north-west, before veering in an easterly direction, eventually flowing through the Kruger National Park and into Mozambique. The Present Ecological Status (PES) of Olifants is Class C: Moderately Modified.

There are numerous surface water resources associated with the study area, the South Grid Infrastructure traverses the Leeufonteinspruit as well as unnamed tributaries. The Present Ecological Status (PES) of the Leeufonteinspruit is Class C: Moderately Modified.

Coal mining and other industrial activities have contributed to poor water quality (high acidity and high dissolved salts) and in-stream conditions within the WMA (Environomics Environmental Consultants, 2009).

Surface water samples taken and analysed during the Hydrocensus (Shangoni Aquiscience, 2022) indicate that the chemical profiles of the surface water can be described as circum-neutral, non-saline and moderately soft to moderately hard. TDS levels are relatively low (between 97 mg/l and 271 mg/l) with little mineralisation. Sulphate (SO_4), the indicator mineral mostly used to indicate coal-mining-related contamination is generally low although some domination of it in terms ion equivalency is evident in some samples, especially recorded in the Koringspruit (ESKOM SW01) north of the Project Site near the Komati Power Station.



Plan 13: Quaternary Catchments and Hydrology

8.6 Freshwater Ecology

The National Freshwater Ecosystems Priority Areas (NFEPA) Project was a collaboration between the CSIR, SANBI, the WRC, DWS and DEA and many other role-players and attempted to map the freshwater ecosystem priority areas, including rivers and wetlands, throughout South Africa.

According to the NFEPA database (**Nel, et al., 2011**), there are several wetlands that traverse the development area, classified as Valley-bottom wetlands (channelled and unchannelled), depression wetlands, flats and seep wetlands. The wetland delineation undertaken on the Project Site (**Burton, April 2022**) (Appendix F 4) identified 36 Hydro-Geomorphic (HGM) Units on the site, based on terrain units, and further grouped these into seven HGM Units based on similarity of land uses and impacts. These Units are illustrated in Plan 14 along with the NFEPA Wetlands to allow for easy comparison.

The delineated Channelled Valley Bottom (CVB) wetlands, Fragmented CBVs and Fragmented Hillslope Seeps were assigned a Present Ecological State (PES) Category of D, while the Unchannelled Valley Bottoms (UVB), Fragmented UVBs, Hillslope Seep Agriculture and Unimpacted Hillslope Seeps were assigned a PES of C. Average Ecological Services scores ranged from 1.3 to 1.9 and all HGM Units are considered to have intermediate ecological services provision importance. Ecological Importance and Sensitivity categories of Moderate (C) and High (B) were determined to be relevant to the various HGM Units. The Fragmented

Hillslope Seeps are considered to have over-all low sensitivity, while the sensitivity of the CVBs, Fragmented CVBs, Hillslope Seeps Agriculture and Unimpacted Hillslope Seeps was rated as Medium, with the UVBs and Fragmented UVBs being considered High Sensitivity.

The following paragraphs discuss each HGM Unit and are extracted from the Specialist Report (Burton, April 2022).

The Channeled Valley Bottoms (PES Category D, Intermediate Ecological Services (ES), Ecological Importance and Sensitivity (EIS) B (High)) have mainly been impacted by agropastoral activities, including cattle grazing, dams, and cultivation. Large dams exist within the CVBs, together with evidence of cattle trampling, erosion, and compaction. This impacted the natural hydrology, ground cover, and resulted in changes to the natural vegetation.

Channeled Valley Bottoms (fragmented) (PES Category D, Intermediate ES, EIS High (B)) include those CVBs that have been fragmented by agropastoral activities and linear infrastructure, including roads, powerlines and fences. Fragmentation of wetlands impacts the natural habitat, functionality, and health of a wetland. Linear infrastructure within wetlands is prone to creating erosion, channeling, drying out of wetlands, and increased Alien Invasive Plants (AIPs).

Unchanneled Valley Bottoms (PES Category C, Intermediate ES, High (B) EIS) in the Project Area are mainly used for cattle grazing. There were no clear signs of channeling, erosion, or extensive cattle trampling. The vegetation was stable with little changes to water inputs to the systems. The systems were in a stable condition, well-functioning, and creating habitat for various fauna and flora species.

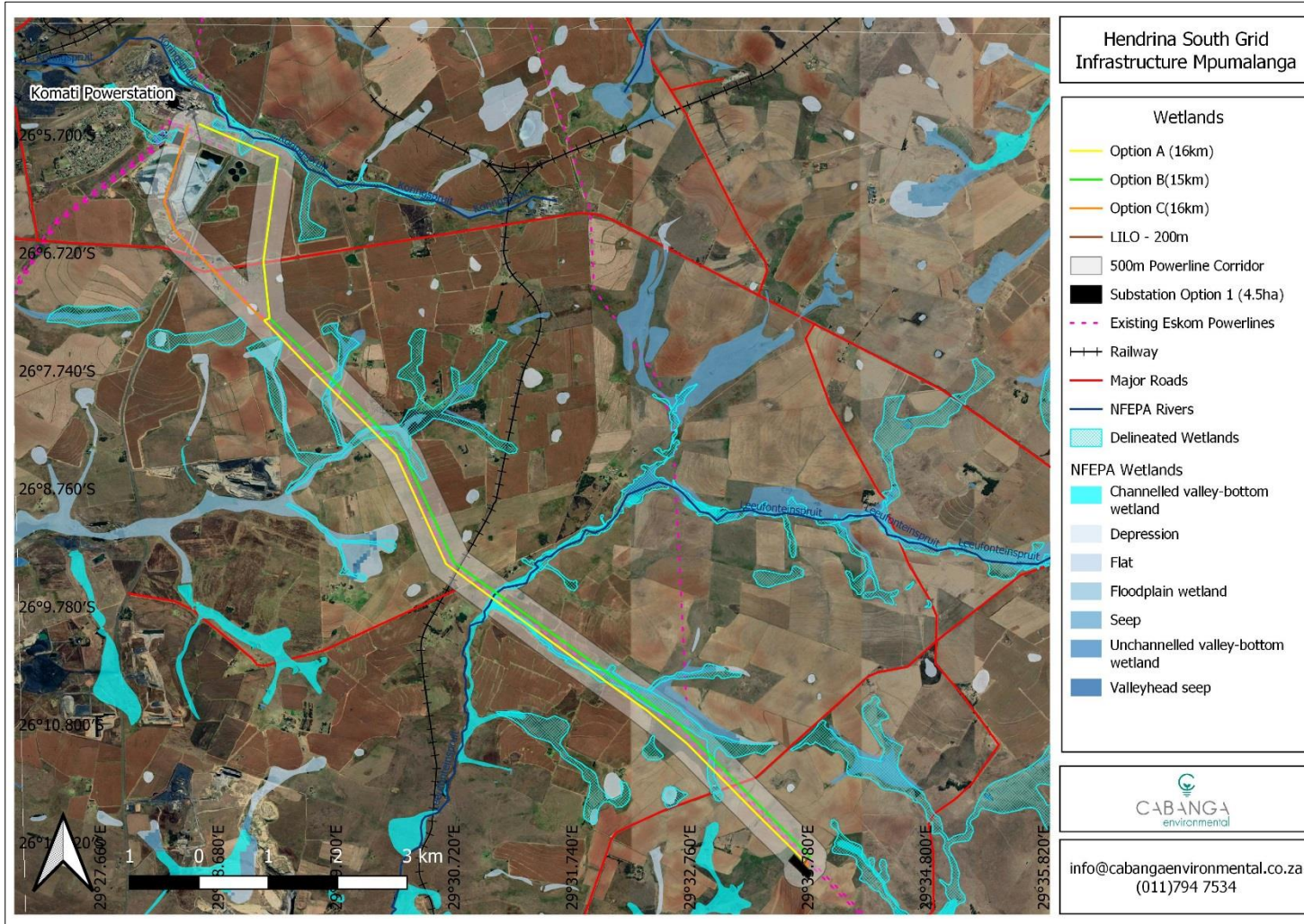
Unchanneled Valley Bottoms (fragmented) (PES Category C, Intermediate ES, Moderate (C) EIS) include those UVBs that are fragmented by agropastoral and linear infrastructure. Dams were also indicated in some of the systems. The fragmentation of the UVBs changes the natural habitat and health of the systems.

Hillslope Seep (Agriculture) (PES Category C, Intermediate ES, Moderate (C) EIS) wetlands were mostly used for agropastoral activities, including cultivation and cattle grazing. The soils within Hillslope Seep wetlands (Hutton, Clovelly) are typically used for cultivation due to the decent water-holding-capacity, fertility, and soil depth. However, cultivation changes the natural vegetation, hydrological functioning as well as the geomorphology by ploughing, ripping, and tillage.

Hillslope Seep (Fragmented) (PES Category D, Intermediate ES, Moderate (C) EIS) refer to the seeps that have been impacted by linear infrastructure, including roads, dams, and powerlines. Some sections of the seeps have almost completely been removed by these activities or completely separated and cut off from the rest of the system.

Hillslope Seep (Unimpacted) (PES Category C, Intermediate ES, High (B) EIS) – Unimpacted Hillslope Seep wetlands were recorded within the Project Area. These wetlands were mainly used for cattle grazing, however, was well regulated and little erosion and impacts on the vegetation and geomorphology were noted.

The construction of the up to 275 kV grid connection powerline and associated substation will require the crossing of a number of wetland systems by conductor for stringing (Plan 14).



Plan 14: NFEPA and Delineated Wetlands

8.7 Terrestrial Ecology

The Screening Tool indicates that the site falls within an area of “Very High” sensitivity in terms of the Terrestrial Biodiversity Theme. Sensitive features identified by the screening tool include Protected Areas Expansion Strategy (PAES), Vulnerable Ecosystem and Critical Biodiversity Areas (CBAs) 1 and 2.

There are no formally protected areas in the vicinity of the site, the closest being the Heyns Private Nature Reserve 13km to the north-west of the Komati Power Station. It is noted from review of aerial photographs that the Middelburg Coal Mine occupies a large portion of this reserve. The National Protected Areas Expansion Strategy (DEA, 2016) identifies priority areas in Mpumalanga based on the Mpumalanga Biodiversity Sector Plan (MTPA, 2014). The South African National Parks (SANParks) spatial dataset (available on <http://bgis.sanbi.org/SpatialDataset>) does not identify any PAES areas in the vicinity of the site.

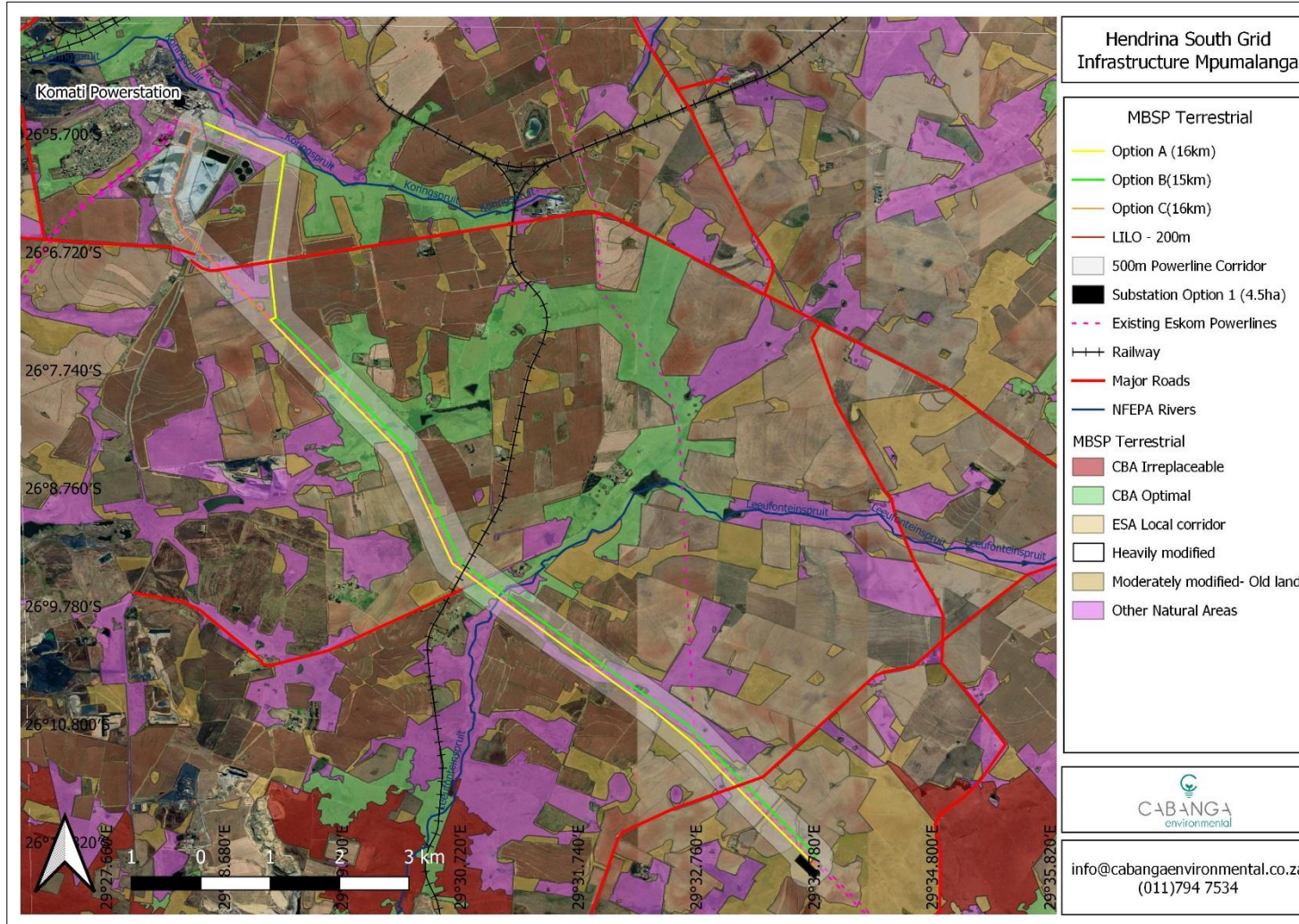
The Regional Vegetation Type is classified by Mucina & Rutherford (2006) as Eastern Highveld Grassland, which is listed as Vulnerable in the National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011). Mucina & Rutherford (2006) classifies this vegetation type as Endangered, with only a very small fraction conserved in statutory reserves and a conservation target of 24%. Some 44% of this vegetation type has already been transformed, primarily by cultivation, plantations, mines, urbanisation and by building of dams. There is an additional vegetation unit nearby areas, the Eastern Temperate Freshwater Wetlands. The vegetation types that would occur are similar to Eastern Highveld Grassland. Mucina & Rutherford (2006) classifies this vegetation type as Least threatened, with only a very small fraction conserved in statutory reserves and a conservation target of 24%. Some 15% of this vegetation type has already been transformed, primarily by cultivation, plantations, mines, urbanisation and by building of dams.

The Mpumalanga Biodiversity Sector Plan (MBSP) (MTPA, 2014) classifies the natural vegetation of the project area according to the following categories:

- Critical Biodiversity Areas (CBA): Optimal, there are two drainage valleys with are in the CBA: Optimal area.
- Heavily Modified (remaining areas of the project area); and
- Other Natural Areas (patches of the project area).

The Project Layout is overlain on the MBSP in Plan 15.

According to the description for the MBSP Terrestrial Assessment categories, Critical Biodiversity Areas are areas that are required to meet biodiversity targets (for biodiversity pattern and ecological process features). The policy is that they should remain in a natural state (David Hoare Consulting¹, 2022).



Plan 15: Project in relation to the MBSP

Six broad habitat types were delineated for the Project (Plan 16) including:

- Grassland (open grassland on undulating plains);
 - Including Secondary grassland (secondary grasslands on old lands);
- Wetlands (seasonal wetlands in drainage valleys);
 - Including Secondary wetlands (cultivated or previously cultivated wetlands);
- Pans (seasonally inundated areas on the river floodplain);
- Cultivation (areas currently cultivated and fallow lands);
- Alien trees (stands of exotic trees); and
- Disturbed areas (disturbed areas with weeds or waste ground).

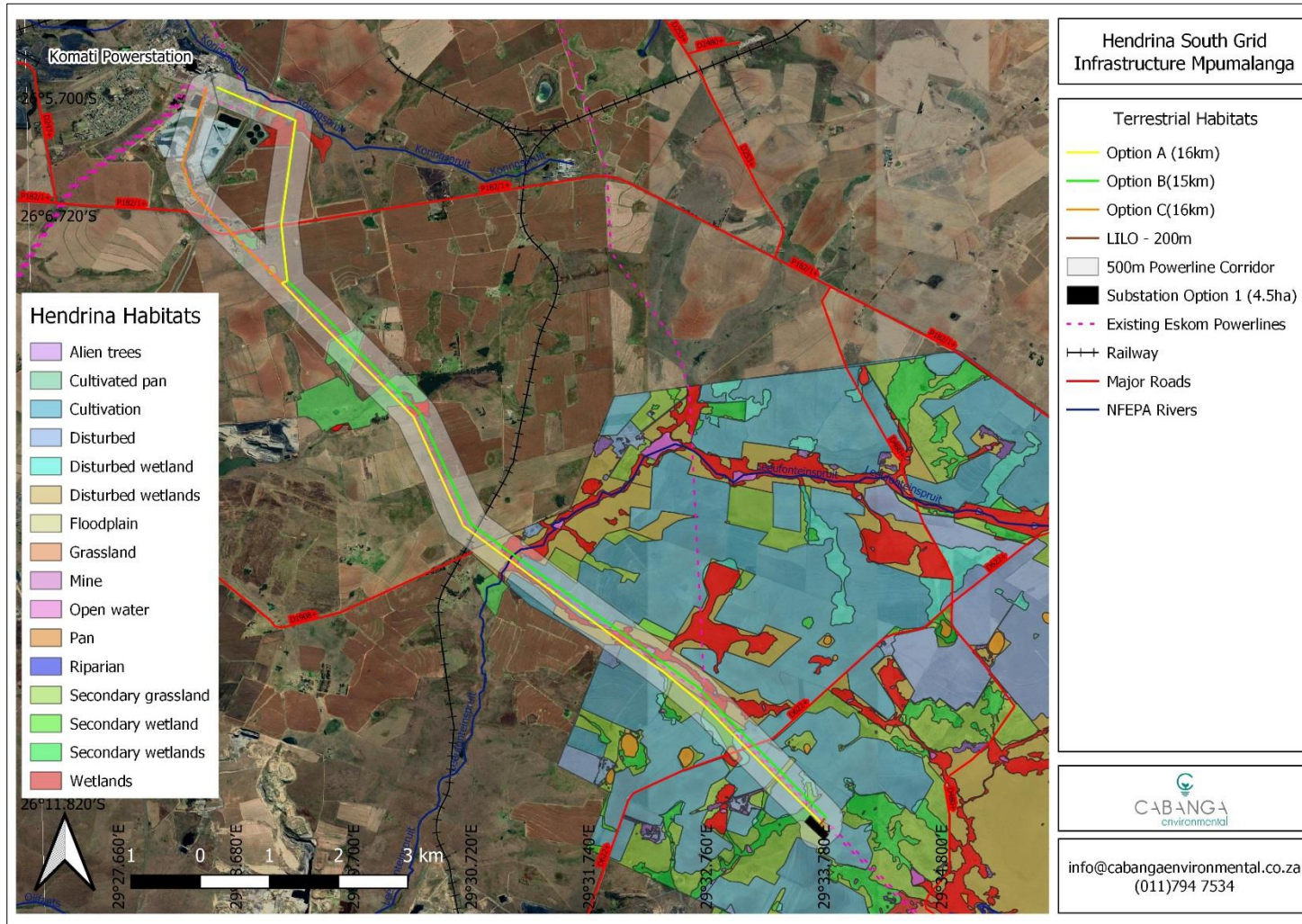
The Cultivated areas, alien trees and disturbed areas are not discussed in detail further as the natural vegetation and habitat within these areas have been completely transformed. This does not mean that these areas cannot still provide valuable habitat to certain species (like bats known to reside in alien trees and the roofs of houses).

The natural vegetation of the study area is characterised by an open **grassland** on undulating hills and plains. It is generally a short to moderate height tussock grassland with closed canopy cover. The soil depth varies, as does the amount of surface rock cover. This was the most widespread vegetation community on site, occurring on all the relatively flat plains areas. These plains are also the area that has been most subject to cultivation (David Hoare Consulting1, 2022). A species¹⁰ was recorded in this grassland that has only been previously recorded in Swaziland, where it is listed as Critically Endangered, but undefined in South Africa. The Provincially protected plant species, *Aloe bergeriana*, *Boophone disticha* and *Habenaria filicornis*, were recorded within this unit. It is also potential habitat for three Vulnerable and two Near Threatened plant species, preferred habitat for three Near Threatened reptiles and five mammals that could occur on site (David Hoare Consulting1, 2022). The Grassland Habitat Unit is considered **High Sensitivity** with the secondary grassland regarded as Medium-Low Sensitivity.

More detail about the **wetlands** on site is provided in Section 8.6. From a terrestrial ecology perspective, the drainage areas and associated wetlands on site are important habitat for animals, providing refuge and shelter, water, when it is available, palatable vegetation when surrounding areas are in drought, and softer and deeper soils for burrowing animals. The habitat is also an important flood-attenuation component of the landscape, and a reservoir for soil water. If it occurs on site, this is the habitat in which the protected Giant Bullfrog would be found. The Animal Species Assessment (Appendix F 7) determined that the Giant Bullfrog has a medium probability of occurring in the study area (David Hoare Consulting1, 2022). The wetlands on site are considered to have a **Medium Sensitivity**, whereas secondary wetlands are considered to have Very Low Sensitivity.

Several small **pans** were recorded within the study area, many of which have been impacted by cultivation and other anthropogenic activities, and in a poor condition. Nevertheless, they are an important hydrological component of the landscape and often contain a flora that is unique to this habitat. The Pans are considered to have a **Medium Sensitivity**.

¹⁰ Will not be named to prevent illegal harvesting of the species.



Plan 16: Terrestrial Ecology Habitat Units and Sensitivity of the Site (David Hoare Consulting1, 2022)

According to the National Web-Based Environmental screening tool, three plant species have been flagged as of concern for the Project area: Sensitive Species 41, Sensitive Species 691 and *Pachycarpus suaveolens*, each discussed below.

- Sensitive species 41¹¹ is a common and widespread geophyte that is very similar to *Gladiolus crassifolius*. The main distribution area is Witbank to Lydenburg, and southwards to Piet Retief and Wakkerstroom. It occurs in wetlands or marshes in high altitude grassland that remain wet throughout the year or dry out for only a short period. This species is listed on the South African Red List with a national assessment of Vulnerable, but is currently not recognized by the IUCN as it is regarded as a synonym of *G. crassifolius*. It flowers from October to January and has a high probability of occurring in wetland areas on the study site. Without flowers, the plant can be recognized as a *Gladiolus*. This species has a MODERATE chance of occurring on the site.
- Sensitive species 691 is a widespread geophyte distributed in Free State, North West, Gauteng, and in Mpumalanga from Belfast and Ermelo to Wolmaransstad. It is found in wetlands in undulating grasslands. The species is currently listed as Vulnerable. It could feasibly be found in wet areas on the site but is quite conspicuous in February when it flowers. It has a MODERATE chance of occurring on the site.
- *Pachycarpus suaveolens* is a very rare plant, usually found as solitary individuals, although widespread due to the wind-dispersal mechanism of its seeds. It is conspicuous and showy when flowering from December to February. It has a MODERATE probability of occurring on the site.

A number of other plant species of conservation concern could potentially occur on the site, these were not flagged in the Screening Tool. Those with a High probability of occurrence include (but are not limited to) (Table 21):

Table 21 Plant SCC that could occur on site (Appendix F 6)

Taxon	Red List status
Alepidea cordifolia APIACEAE	Endangered (SA)
Alepidea longeciliata APIACEAE	Endangered
Aspidoglossum xanthosphaerum APOCYNACEAE	Vulnerable
Bowiea volubilis subsp. volubilis HYACINTHACEAE	Vulnerable (national)
Eucomis pallidiflora subsp. polevansii HYACINTHACEAE	Near Threatened

¹¹ Species are not named, to prevent illegal harvesting

Taxon	Red List status
Gladiolus robertsoniae IRIDACEAE	Near Threatened
Khadia carolinensis AIZOACEAE	Vulnerable
Kniphofia typhoides ASPHODELACEAE	Near Threatened
Merwillia plumbea HYACINTHACEAE	Near Threatened

There are a number of species recorded on site that are protected under the Mpumalanga Nature Conservation Act No. 10 of 1998; for which a permit will be required if any of these are to be affected by the Project. None of the tree species protected under the National Forests Act, 1998 (Act No 84 of 1998) have been previously recorded in the area in which the site is located.

A comprehensive walk-through survey of the final footprint is required to compile a complete list of these protected species.

The Screening Tool for the animal species theme was highlighted as being of Medium sensitivity due the potential presence of the following species:

- *Aves-Tyto capensis* (Medium Sensitivity) (Further discussed in Section 8.8).
- *Mammalia-Crociodura maquassiensis*: The Maquassie Musk Shrew, listed as Vulnerable, is endemic to South Africa, eSwatini and Zimbabwe, where it is found in moist grassland habitats in Savannah and Grassland Biomes. It appears to tolerate a wide range of habitats, although threats to the species have been inferred as being related to loss or degradation of moist, productive areas, such as rank grassland and wetlands. The study area is within the known distribution of this species in the sense that there are records in quarter degree grids throughout the Highveld, although not from the current grid or any nearby grids. It is considered possible that it could occur on site.
- *Mammalia-Hydrictis maculicollis*: The Spotted-necked Otter, listed as Vulnerable, is widely but patchily distributed in the higher parts of the eastern half of South Africa. It is also found in lakes and large rivers throughout much of Africa south of 10°N. They are restricted to areas of permanent fresh water where there is good shoreline cover and an abundant prey base (small fishes). There is potentially suitable habitat for this species on site within the small dams.
- *Mammalia-Ourebia ourebi ourebi*: The Oribi, listed as Endangered in South Africa and Least Concern globally, has a geographical distribution that includes the study area. It is widely distributed in Africa, but the subspecies found in South Africa has a more limited distribution that includes South Africa and Mozambique. The species inhabits savanna woodlands, floodplains and other open grasslands. They reach their highest density on floodplains and moist tropical grasslands, and prefer open grassland in good

condition containing a mosaic of short grass for feeding and tall grass for feeding and shelter. The area is within the overall distribution range of the species, and there is a low likelihood that it could occur on site within any suitable habitat.

Other listed animal species that have a high probability of occurrence in the area include (but are not limited to):

- Black-footed Cat (*Felis nigripes*), listed as Vulnerable
- South African Hedgehog (*Atelerix frontalis*), listed as Near Threatened
- Swamp Musk Shrew (*Crocidura mariquensis*), listed as Near Threatened
- Vlei Rat (Grassland-type) (*Otomys auratus*), listed as Near Threatened

8.8 Avifauna

The study area is not located in an Important Bird Area (IBA). The closest IBA to the study area is the Amersfoort-Bethal-Carolina IBA SA018, which is located approximately 3km to the east of the site.

According to the DFFE national screening tool, the small sections of the habitat within the greater study area is classified as **High** sensitivity according to the Animal Species theme, due to the potential presence of species of conservation concern (SCCs) namely African Grass Owl (Locally Vulnerable) and Yellow-billed Stork (Regionally Endangered), but the majority of the habitat is classified as **Medium** sensitivity linked to African Grass Owl, Caspian Tern *Hydroprogne caspia* (Regionally Vulnerable) and White-bellied Korhaan (*Eupoditis senegalensis*) (Regionally Vulnerable) (Van Rooyen & Froneman, Avifaunal Impact Assessment: Hendrina South Grid, Mpumalanga Province, April 2022).

Due to the close proximity to the IBA it is anticipated that highly mobile priority species which are IBA trigger species might be impacted by the project in the event they forage or breed beyond the IBA borders. Species recorded in the greater area are as following:

- Secretarybird
- Denham's Bustard
- Martial Eagle
- Black Harrier
- African Grass Owl
- Lanner Falcon
- Southern Bald Ibis

Four sets of monitoring surveys were conducted at the proposed site as follows:

- 04 July – 15 July 2020
- 29 October – 03 November 2020
- 09 February, 15 – 19 February, 09 – 11 March 2021
- 30 April – 11 May 2022

The following bird habitat classes were identified in the development area (Table 22) (Van Rooyen & Froneman, Avifaunal Impact Assessment: Hendrina South Grid, Mpumalanga Province, April 2022):

Table 22: Bird Habitat delineated on the Site

Habitat Class	Description	Priority Species expected to use the habitat regularly	Priority Species expected to use the habitat occasionally
Grassland	There are large areas of natural grassland remaining in the project area. The grassland varies from dense stands of relatively high grass to areas of heavily grazed short grass.	African Grass Owl	African Harrier Hawk
		Amur Falcon	Black-chested Snake Eagle
		Black-headed Heron	Greater Kestrel
		Black-winged Kite	Long-crested Eagle
		Blue Korhaan	Martial Eagle
		Common Buzzard	Montagu's Harrier
		Denham's Bustard	Western Barn Owl
		Helmeted Guineafowl	
		Lanner Falcon	
		Marsh Owl	
		Pied Crow	
		Rock Kestrel	
		Secretarybird	
		Southern Bald Ibis	
		Spotted Eagle-Owl	
Western Cattle Egret			
White Stork			
Drainage Lines and Wetlands	There are a number of wetlands in the project areas, most of which are associated with drainage lines.	African Grass Owl	African Black Duck
		African Sacred Ibis	African Swamp Hen
		African Spoonbill	Common Moorhen
		Black-headed Heron	Grey Crowned Crane
		Cape Shoveler	Purple Heron
		Egyptian Goose	Saddle-billed Stork
		Glossy Ibis	Squacco Heron
		Great Egret	White-faced Whistling Duck
		Grey Heron	
		Hadada Ibis	
		Hamerkop	
		Intermediate Egret	
		Little Egret	
		Marsh Owl	
		Red-billed Teal	
Spur-winged Goose			
Yellow-billed Duck			
Agricultural Lands	The project area contains a patchwork of agricultural fields.	Amur Falcon	Grey Crowned Crane
		Black-headed Heron	Martial Eagle
		Common Buzzard	Western Barn Owl
		Egyptian Goose	

Habitat Class	Description	Priority Species expected to use the habitat regularly	Priority Species expected to use the habitat occasionally
	Some fields are lying fallow or are in the process of being re-vegetated by grass.	Hadada Ibis Helmeted Guineafowl Lanner Falcon Pied Crow Southern Bald Ibis Spur-winged Goose Western Cattle Egret	
Alien Trees	The project area contains few trees. Most trees are alien species, particularly Eucalyptus, Australian Acacia (Wattle), and Salix (Willow) species. Trees are often planted as wind breaks next to agricultural lands and around homesteads. Some of the drainage lines also have trees growing in them.	African Sacred Ibis African Spoonbill Amur Falcon Black Sparrowhawk Black-headed Heron Black-winged Kite Common Buzzard Grey Heron Hadada Ibis Helmeted Guineafowl Lanner Falcon Pied Crow Rock Kestrel Secretarybird Southern Bald Ibis Spotted Eagle-Owl Western Cattle Egret White Stork	African Harrier-Hawk African Fish Eagle Black-chested Snake Eagle Greater Kestrel Grey Crowned Crane Long-crested Eagle Martial Eagle
Dams and Pans	The project area contains many earth dams located in drainage lines. There are also a number of small pans which are a potential drawcard for many priority species. Lesser and Greater Flamingos could use pans for	African Spoonbill Cape Shoveler Egyptian Goose Great Crested Grebe Great Egret Grey Heron Hamerkop Intermediate Egret Lanner Falcon Little Egret Little Grebe Red-billed Teal Red-knobbed Coot Reed Cormorant Secretarybird	African Black Duck African Darter African Fish Eagle Black-chested Snake Eagle Black-necked Grebe Cape Teal Common Moorhen Goliath Heron Greater Flamingo Long-crested Eagle Maccoa Duck Martial Eagle Purple Heron Saddle-billed Stork South African Shelduck

Habitat Class	Description	Priority Species expected to use the habitat regularly	Priority Species expected to use the habitat occasionally
	foraging and roosting. Large raptors could use the dams and pans for bathing and drinking.	Southern Pochard	Squacco Heron
		Spur-winged Goose	White-backed Duck
		White-breasted Cormorant	White-faced Whistling Duck
		Yellow-billed Duck	Yellow-billed Stork
High-Voltage lines	The project areas are intersected by two high voltage transmission lines, i.e. Camden Duvha 400kV line and the Camden Komati 275kV, as well as several reticulation lines.	Amur Falcon	Black-chested Snake Eagle
		Black-headed Heron	Greater Kestrel
		Black-winged Kite	Long-crested Eagle
		Common Buzzard	Martial Eagle
		Egyptian Goose	
		Hadada Ibis	
		Helmeted Guineafowl	
		Lanner Falcon	
		Pied Crow	
		Rock Kestrel	
Southern Bald Ibis			
White Stork			

Wetlands and pan/dam edges are important breeding, roosting and foraging habitat for a variety of Red List priority species, most notably for African Grass Owl (SA status Vulnerable), and Grey Crowned Crane (SA status Endangered).

8.9 Air Quality and Noise

The Project site is located in the Highveld Priority Area (HPA) and is regarded as a hot spot for atmospheric pollution, with specific emphasis on Particulate matter (PM₁₀), Ozone (O₃), Sulphur Dioxide (SO₂) and Nitrogen Dioxide (NO₂).

The National Framework for Air Quality Management¹² rates the Nkangala District as having “poor” air quality. The nearest Air Quality Monitoring Station (AQMS) to the study site is the Hendrina station owned and managed by the South African Weather Service (SAWS), approximately 17 km to the east-northeast of the study site. Pollutants measured by this station include PM₁₀, PM_{2.5}, CO, NO₂, SO₂ and O₃.

Existing land use activities that could have significant impacts on air quality in the region, include power generation, coal mining, coal transport and coal processing, vehicle movement on unpaved roads and dust from agricultural activities.

8.10 Visual Resources

Defining the visual character of an area establishes the visual baseline or existing visual environment in which a development is proposed, enabling the determination of the degree to which a development would contrast with, or conform to, the visual character of the surrounding area. The visual sensitivity can then be determined based on the visual character, the economic importance of the scenic quality of the area, inherent cultural value of the area and the presence of visual receptors. (SiVEST, April 2022).

Physical and land use characteristics like topography, vegetation and present land use are considered in determining the visual character of an area. The pastoral landscape and rolling hills in parts of the study area are important features that could increase the visual appeal and visual interest in the area. Broadly speaking, the visual character in much of the area has been significantly transformed and degraded by mining and infrastructural development (SiVEST, April 2022).

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. Visual absorption capacity in the study area is rated as moderate (SiVEST, April 2022).

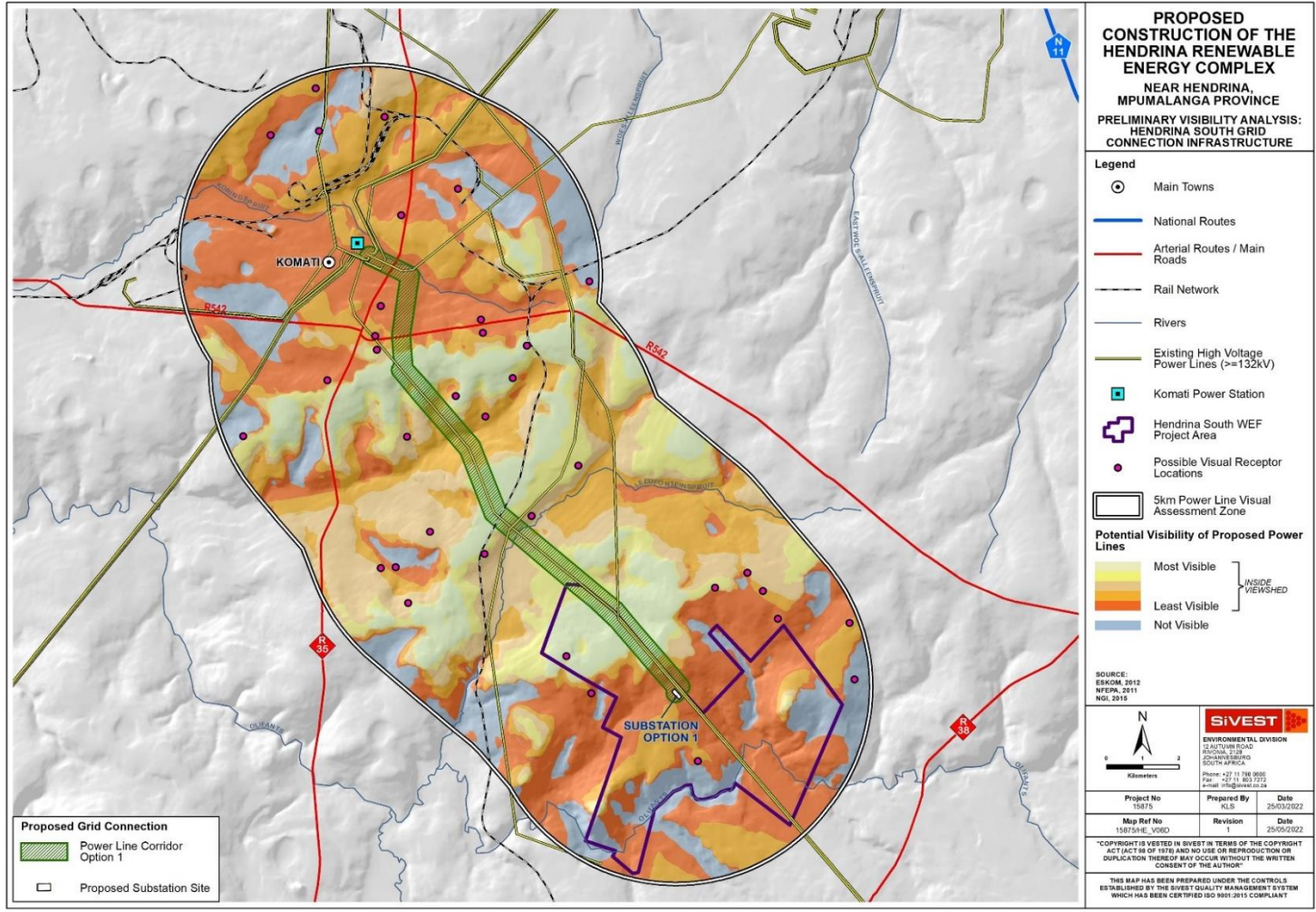
Visual sensitivity is based on the physical characteristics of the area (i.e. topography, landform and land cover), the spatial distribution of potential receptors, and the likely value judgements of these receptors towards a new development (SiVEST, April 2022). The specialist assessment (Appendix F 9) determined that the area has a relatively low visual sensitivity based on the absence of protected areas and leisure-based tourism activities in the area. Individual visual receptors could still be sensitive to alteration of the visual resource in the area.

¹² Department of Environmental Affairs (2018): *The 2017 National Framework for Air Quality Management in the Republic of South Africa* (No.R.1144 of 2018) Government Gazette, 26 October 2018 (No. 41996).

Typical views of the powerline corridor are provided in Figure 18. Potential visibility of the proposed project is illustrated in Plan 17.



Figure 18: Views of the terrain and character of the area



Plan 17: Potential visibility of the proposed Project (SiVEST, April 2022)

8.11 Socio-Cultural Environment

The following information is largely sourced from the specialist report (Appendix F 10) (Urban-Econ, April 2022)

The proposed Project is located within the Steve Tshwete Local Municipality (STLM). The STLM falls within the Nkangala District Municipality (DM) and collectively accounts for 17% of the population, and 18% of the households in the DM. Population growth between 2009 and 2019 was 2,7% year-on-year for the STLM which compared favourably to the DM (2,3%) and Mpumalanga (1,6%) over the same period.

The disposable average monthly income of households in the STLM was R13,297 which was 57% higher than the average for the DM (R8,425) and 95% higher than the average for Mpumalanga.

The review of the employment profile of the STLM indicates that 22% of the economically active population within the municipality is formally unemployed. The unemployment rate and labour force participation rate in the STLM were also notably better than that of the DM (Unemployment rate: 33,3%; Labour force participation rate: 39,3%). The relatively lower unemployment rate and higher labour force participation relative to the district averages suggests that the STLM is subject to inward migration due to the employment opportunities available within the local municipality.

Table 23 Overview of population, income and employment profile

Indicator	Mpumalanga	Nkangala District Municipality	Steve Tshwete Local Municipality
Area (km ²)	76,495	16,758	3,976
Population	4,743,580	1,645,654	284,370
Number of households	1,265,985	451,045	81,034
Population density (km ²)	62	98	71
Average household size	3.8	3.7	3.6
Annual population growth (2009 – 2019)	1.6%	2.3%	2.7%
Average monthly household income	R6,812	R8,425	R13,297
Employed	1,184,438	419,698	100,313
Unemployment rate	33.3%	33.3%	22.4%
Not economically active	1,249,023	438,287	64,215
Labour force participation rate	39.8%	39.3%	51.9%

The GVA (Gross Value Added) of the STLM was R70 million in 2020, which collectively accounts for just over 28% of the district economy's GVA, and 11% of the Mpumalanga's GVA

(<https://www.quantec.co.za/easydata/>). This suggests that, although the STLM is relatively small in terms of its GVA, it is important in the broader District Municipality in terms of economic output.

The growth of the local municipality over the last few years was largely due to the strong performance of the mining, quarrying and manufacturing sectors. Many of these are linked to and service the large mining and manufacturing-based sectors in Middelburg. Any new development would likely greatly increase the contribution of the utilities and construction sectors to the GVA. The mining and quarrying sector employs the most people in the STLM, with a 19,16% contribution in 2020.

Urban Econ Development Economists also engaged directly with land owners in the vicinity of the Project between July 2021 and August 2021. Five of the respondents provided input to the study which confirms the following:

- Four of the five respondents operate as commercial farmers;
- Beef was the largest portion of livestock, approximately 1,150 cattle, followed by sheep, with approximately 30 sheep. One of the farmers indicated that they farm with pigs (10 pigs);
- The average size of property owned was 1,060 ha and ranged between 120 and 2,000 ha;
- The majority of labourers live on the farms they work on with their family members; and
- Livestock animals reared for sale and kept for production of food products include goats, sheep and cattle.

8.12 Sites of Archaeological and Cultural Interest

The screening tool classifies the site as having low sensitivity in terms of the archaeology and cultural heritage theme. The NHRA requires that a Phase 1 Archaeological Impact Assessment be undertaken to verify the presence/absence of heritage resources that could be affected by a development and make recommendations for the appropriate heritage management (or avoidance) of these impacts. Please see Appendix F 11. Heritage finds were limited to burial sites and the demolished remains of residential dwellings (Beyond Heritage, April 2022).

Table 24 provides an explanation of the field ratings that were assigned to the identified heritage resources. Table 25 provides a summary of the sites identified (illustrated in Plan 18), their significance, and their relation to the proposed Project infrastructure.

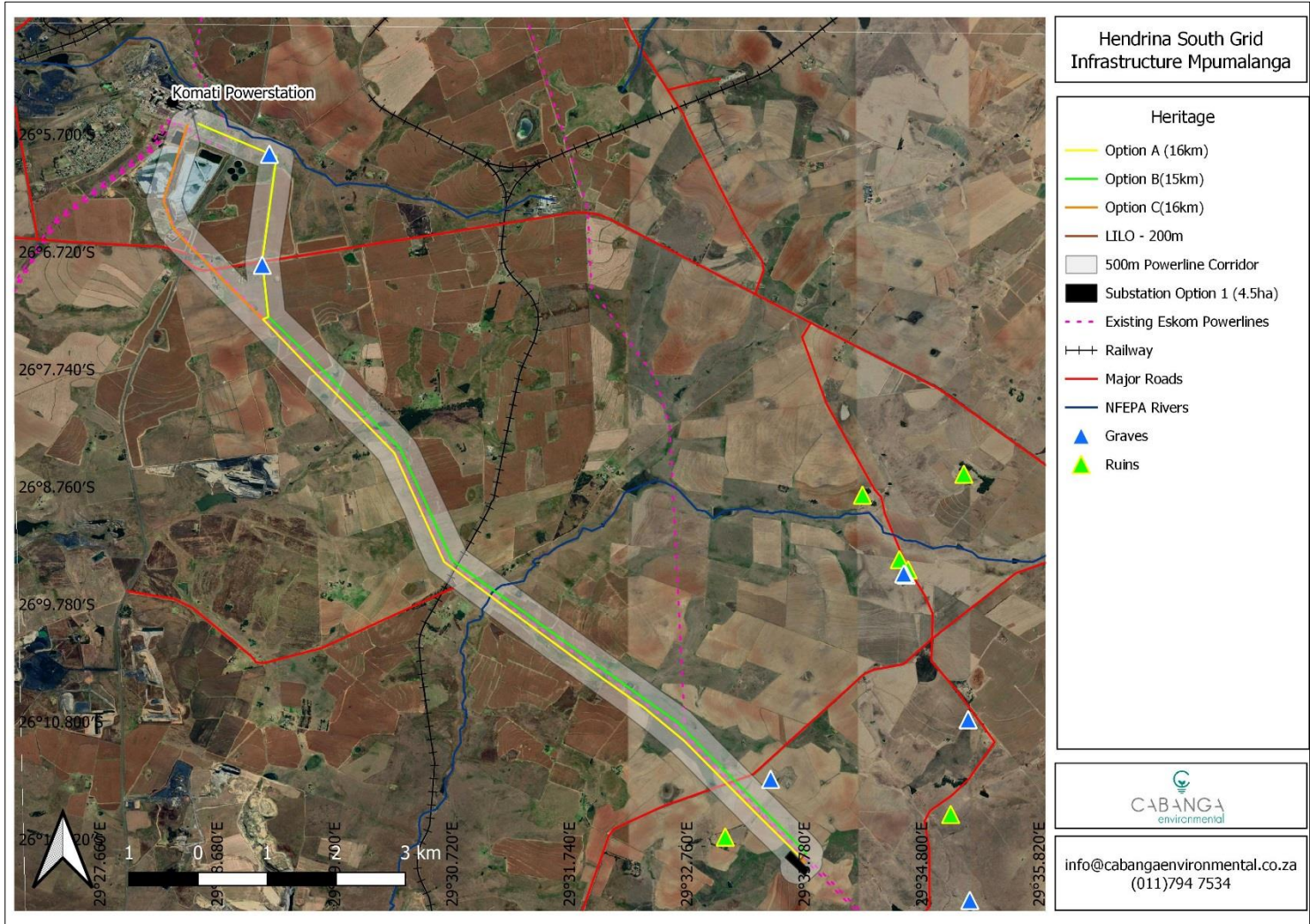
Table 24: Heritage significance and field ratings

Field Rating	Grade	Significance	Recommended Mitigation
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised

Field Rating	Grade	Significance	Recommended Mitigation
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP. A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP. B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

Table 25: Heritage Resources Identified during the survey (Beyond Heritage, April 2022)

Label	Description	Significance and Field Rating	Relation to Project	Recommendation
0095	Two graves situated near the Komati Power Station. The graves are situated directly beneath an existing powerline. Both have granite headstones and grave dressings. The area measured 4m x 2m. The graves date to 1965 and 1975 respectively.	GP A High Social Significance.	15m from Option A 17m from Option B	Sites to be managed <i>in situ</i> , 30m buffer as mitigation measure.
096	Informal cemetery situated next to the main road. The cemetery as recently been cleaned of most vegetation suggesting recent use. The cemetery is partially fence off with a degraded wire fence. Various graves are found within the cemetery including infant and adult graves. Grave dressings consist of packed stone, cement, tiles and granite. The cemetery measures 25m x 15m. Visible dates on the headstones include 1948 and 2011.	GP A High Social Significance.	10m from Option A 14m from Option B	Sites to be managed <i>in situ</i> , 30m buffer as mitigation measure.



Plan 18: Identified Heritage Sites in relation to the Project

8.13 Palaeontology

The Project site lies partly on very highly sensitive rocks according to the SAHRIS palaeo-sensitivity map (<https://sahris.sahra.org.za/map/palaeo>). To address the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the NHRA, a site visit and survey (Phase 2) Palaeontological Impact Assessment (PIA) was completed for the proposed project (Appendix F 12).

The site lies on non-fossiliferous dolerite and on potentially very highly fossiliferous shales of the Vryheid Formation (Ecca Group, Karoo Supergroup) that could have fossil plants of the *Glossopteris* flora above or below the coal seams. The fossils preserved in the Vryheid Formation stratum are plants only and vertebrates are unknown. The plants are those of the *Glossopteris* flora comprising *Glossopteris* leaves, fructifications, wood and roots, and other plants such as lycopods, sphenophytes, ferns and early gymnosperms. Although the Vryheid formation shales and sandstones are potentially fossiliferous, fossils are sporadic and their occurrence is unpredictable. Fossils do not occur in the coal seams as this organic material has been greatly altered by heat and compression to form coal. Soils are weathered products of sediments and do not contain any recognisable fossil material (Prof.M.Bamford, May 2022).

A site visit was conducted on 22nd November 2021 by the appointed palaeontologist to determine if fossils do occur in the project footprint. The geological structures suggest that the rocks are the correct age and type to contain fossils of the *Glossopteris* flora in the Vryheid Formation; however, no fossils were found during the site visit surveys.

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the loose soils and sands of the Quaternary. There is a very small chance that fossils may occur in the shales and siltstones of the early Permian Vryheid Formation, but only more than 5m below the surface (Prof.M.Bamford, May 2022).

8.14 Traffic

The R542 between Komati and Hendrina borders on a portion of the development site to the North. The R38 (Hendrina to Bethal) runs south-east of the site. The R35 (Komati to Bethal) runs west of the site. The R38 and R35 are National Roads.

The R542 will be the main route to the site. The Mpumalanga Road Asset Management System (RAMS) (<http://mp-rams.co.za/rams/rams.html>) confirms the R542 is a Provincial Road (P182) and is classified as a Class 3 District Distributor. RAMS rate the Annual Average Daily Traffic (AADT) of the R542 as Medium (between 1 000 and 2 000 vehicles per day) and rates the percentage of heavy vehicles on the road as Medium (between 20% and 50%) (JG Afrika, April 2022).

The Provincial Road D622 (known as the Halfgewonnen Road) traverses the site. It is classified as a Class 4 District Collector with a Low-Medium (<500 and <1000 vehicles per day) AADT. The percentage of heavy vehicles on this road is also considered Medium between 20% and 50% (<http://mp-rams.co.za/rams/rams.html>).

The Halfgewonnen Road, R542, R38 and R35 are all Eskom Coal Haulage Routes, according to the RAMS. RAMS classifies the roads in the area as being in Very Poor, Poor and Fair Condition.

The extensive coal mines in the surroundings, and resultant heavy vehicle traffic, along with heavy vehicle traffic associated with farming operations, has caused deterioration of local road conditions in many instances.

The Project proposes to upgrade portions of affected roads (including the Provincial Roads D622 and D480) to facilitate project access and development. Permission for these upgrades, including maintenance agreements, must be obtained prior to development.

The existing farm roads in the Development Area are generally dirt roads, established and maintained by individual land owners. Some of these will also be upgraded as part of the Project (details of upgrades and maintenance to be confirmed with land owners in the detailed design phase).

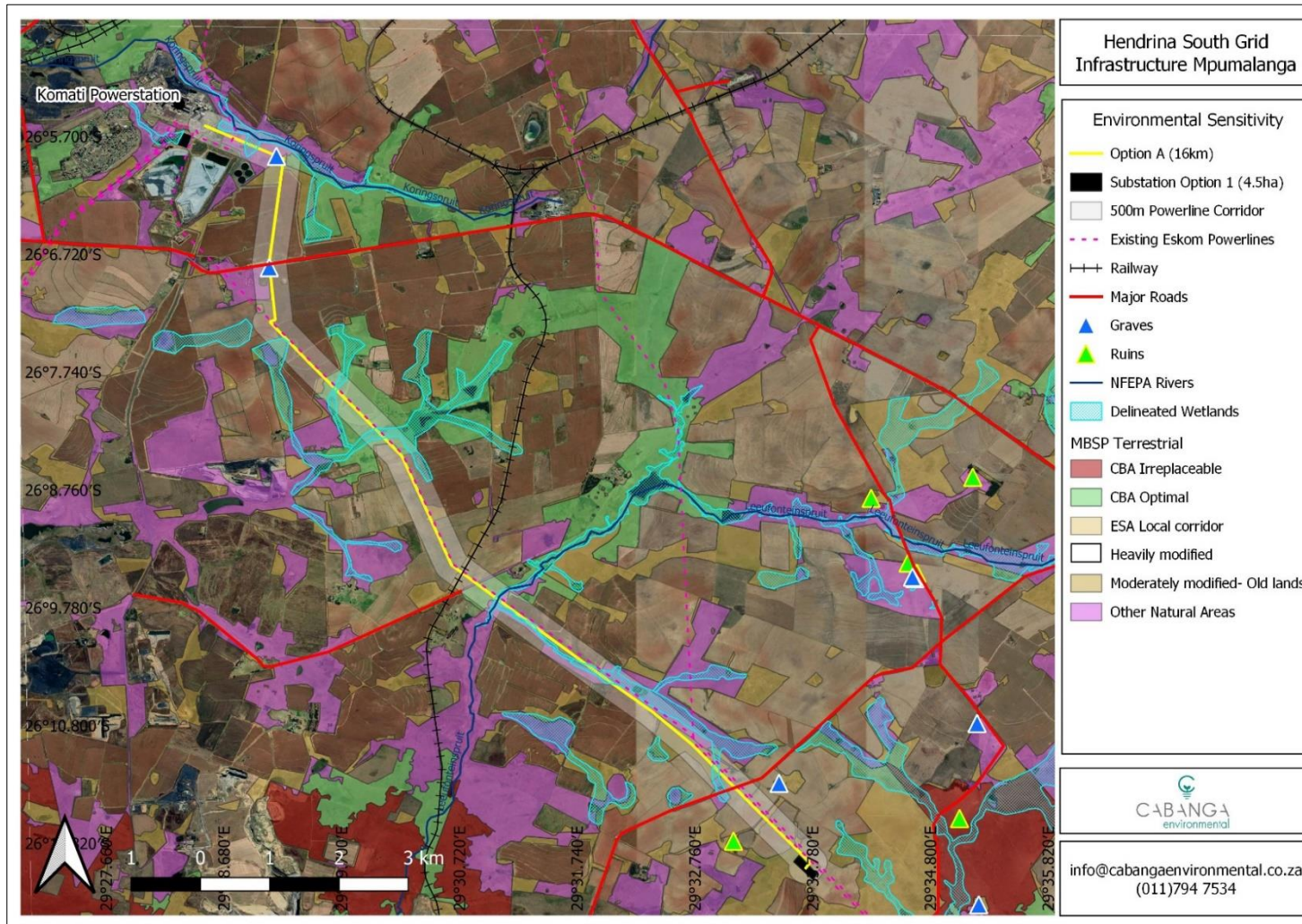
9 Environmental Sensitivity in Relation to the Project

Plan 19 shows the environmental sensitivities identified on the project site and surroundings in relation to the proposed Project Infrastructure (preferred alternative).

The following sensitive environmental features are shown:

- Watercourses;
- Delineated Wetlands (Burton, April 2022);
- NFEPA Rivers (Nel, et al., 2011)
- Heritage Sites (Beyond Heritage, April 2022)¹³;and
- Critical Biodiversity Areas (MTPA, 2014)

¹³ Note: All Identified Heritage Sites are shown, as even the low-sensitivity ruins will require permission in terms of the NHRA before they are impacted.



Plan 19: Environmental Sensitivity Map in relation to the preferred alternative (Option A)

10 Impact Assessment Methodology

The purpose of the impact assessment is to determine the significance of potential impacts, so that those activities that are expected to result in high impacts can be altered, or management measures imposed to lessen the impact significance.

The identification of potential impacts arising from the proposed activities is assisted by a number of inputs including:

- Expertise of the EAP and knowledge of typical impacts associated with the type(s) of development activities proposed;
- Discussions with the applicant and engineering team;
- Consultations with I&APs, including authorities; and
- Inputs from various specialist studies.

10.1 Impact Significance

Impact Significance is calculated by the following formula:

Impact Significance = Consequence x Likelihood

Likelihood refers to the probability that an impact will occur at some time during the project.

The Matrix which is proposed to determine Likelihood is as follows:

Table 26: Matrix used to determine likelihood

Likelihood	Unlikely: Impact could occur in extreme events. Less than 15% chance of the impact ever occurring.	1
	Possible: possibility of impact occurring is very low. 16% - 30% chance of the impact occurring.	2
	Probable: There is a distinct possibility of the impact occurring. 31% to 60% chance.	3
	Highly Probable: The impact is expected to occur. Between 61% and 85 % chance.	4
	Definite: There are sound scientific reasons to expect that the impact will occur	5

Consequence is calculated by considering the **duration**, spatial **scale** and **intensity** of an impact.

Duration relates to the time-frame that an aspect will be impacted upon. For example, any impact to a heritage resource is considered permanent, while the impact of increased traffic related to a construction activity will only last as long as the construction phase. Duration is rated according to the following criteria:

Table 27: Matrix used to rate duration

Duration	Short term: Less than 1 year and is reversible.	1
	Short to medium term: 2 - 3 years	2
	Medium term - 3 to 10 years	3
	Long term: 11-20 years	4
	Permanent: in excess of 20 years	5

Spatial **Scale** relates to the physical extent of the zone of influence of an impact. Where groundwater or air quality impacts, for example, can extend far beyond the footprint of the activity, it is not expected that the impact of vegetation removal should extend beyond the footprint of the activity. Scale is rated according to Table 28:

Table 28: Matrix used to rate scale

Scale / Extent	Isolated: Limited footprint within the site will be affected (less than 50% of the site)	1
	Site Specific: The entire site will be affected	2
	Local: Will affect the site and surrounding areas	3
	Regional: Will affect the entire region / catchment / province	4
	National: Will affect the country, and possibly beyond the borders of the country	5

The **Intensity** of an impact is calculated by considering the **severity of the impact** (how it will change the aspect, will it be destroyed completely, or altered slightly?) and the **sensitivity of the aspect** (is the aspect sensitive to change, and is the aspect important to ecosystem processes or social dynamics?). For example, if the impact is anticipated to completely destroy a local plant population, but the plant population is commonly found and protected in nearby surroundings, the over-all intensity is lowered. If, however, the plant population in question is unique or protected, the intensity increases proportionately.

The Matrix which is proposed to determine Intensity is as follows:

Table 29: Matrix used to rate Intensity

Severity	Slight: Little effect, negligible disturbance / benefit	1
	Slight to Moderate: Effects are observable but natural process continue	2
	Moderate: ecosystem processes / social dynamics are permanently altered, but functioning.	3
	Moderate - High: natural / social processes are altered to the point where function is limited	4
	High: The aspect is affected so that its functioning is compromised and this effect is irreversible	5

Sensitivity	The aspect is not sensitive to change (No irreplaceable loss of resource)	1
	The aspect is not of significant value but is sensitive to change	2
	The affected aspect is of moderate value and is slightly resilient to change	3
	The affected aspect is of significant value and only slightly resilient to change	4
	The affected aspect is valued, irreplaceable and sensitive to change. Irreplaceable loss of significant resource	5

Therefore, considering the formula:

$$\text{Significance} = \text{Consequence} \times \text{Likelihood}$$

Where **Consequence = Duration + Scale + Severity of the Impact + Sensitivity of the Aspect**

The over-all Significance rating can be calculated as a value between 4 and 100. The score is then categorised as follows:

- 4 to 19 = **Insignificant** Impact, no mitigation is required beyond standard best practice;
- From 20 to 39 = **Low** Impact, specific mitigation should be included in the EMP and monitoring should be undertaken;
- From 40 to 59 = **Moderate** Impact, specific mitigation with strict monitoring is required;
- From 60 to 79 = **High** Impact, mitigation should consider alteration of the design or process to reduce the impact significance. Alternatively, it must be shown that positive effects of the projects outweigh the potential impact to the environmental aspect;
- >Higher than 80 (100 max) = The Impact is so **Significant** that the project design must be reconsidered to avoid the impact.

Impacts will be rated as per the abovementioned methodology without consideration of mitigation measures first, however there may be some mitigation already inherent in the design of the Project (i.e. by avoiding identified wetland areas in the layout of the project, by using existing roads instead of constructing a new access road, etc.).

Those impacts that are rated as having a moderate impact or above will be investigated further and management measures identified to attempt to reduce the consequence or likelihood of the impact. These impacts will then be rated again, while considering the mitigation measures that have been imposed.

10.2 Impact Identification

The Scoping Report identified potential impacts to be assessed in the EIA process in addition, the DEA National Screening Tool identified a number of environmental themes as having high-sensitivity in terms of Project. These include:

Impacts Identified in the Scoping Report	High - Very High Sensitivity Themes identified by the Screening Tool
Visual Impacts	Agricultural Theme

Impacts Identified in the Scoping Report	High - Very High Sensitivity Themes identified by the Screening Tool
Noise Impacts	Aquatic Biodiversity Theme, Terrestrial Biodiversity Theme
Land Use, Soils and Land Capability Impacts	Civil Aviation Theme
Impacts on Biodiversity (Terrestrial & Aquatic)	Palaeontology Theme
Impacts on Avifauna	
Air Quality (dust generation)	
Impacts on cultural heritage	
Socio-economic impacts (positive & negative)	
Impacts on Water Resources	
Traffic and Road Safety	
Impacts caused by waste generation	
Impacts caused by the storage & use of hazardous substances & pollutants	

The ways in which the proposed Project specifically could impact on various environmental aspects are rated on a preliminary basis according to the criteria discussed in Section 10.1 and discussed in Section 11.

Potential impacts are grouped according to the environmental aspect being impacted upon, and considered per phase of the Project (Construction, and Operation and Decommissioning). For each aspect, potential impacts are discussed, per phase, followed by an impact rating (without mitigation), a description of mitigation measures relevant to the phase, and a second impact rating taking into consideration the ability of the identified mitigation measures to reduce the likelihood or significance of the impact.

10.3 Cumulative Setting

The cumulative impact of a development is the impact that development will have when its impact is added to the incremental impacts of other past, present or reasonably foreseeable future activities that will affect the same environment (Lanz, April 2022).

The role of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). Therefore, an assessment of the acceptable level of change to an environment is required: If the impact of a proposed project, in the context of other reasonably foreseeable projects, will result in the sum of impacts of all developments causing an unacceptable level of change in the surrounding area, the cumulative impact is considered significant.

Plan 3 shows the Project along with the development boundaries for the proposed Complex, along with all known renewable energy developments and applications in the vicinity, and known existing grid connection infrastructure. These are described in Table 30.

There are no existing Wind Energy Facilities (or applications for WEFs) within 30km of the Site, the closest being the Haverfontein WEF Project, located some 50km from the Project. The Project has received environmental authorisation but has not yet been constructed.

According to available databases there are 3 renewable energy projects within 20km of the proposed Hendrina South WEF. The combined length of the grid connections from these three projects is approximately 30km. The proposed Hendrina South Grid connection will be a maximum of 16km long.

The existing high voltage lines in the 20km radius around the Project totals approximately 111km (counting parallel lines as one). If this Project is approved, the combined length of existing and planned high voltage lines will total approximately 157km, of which this Project will contribute approximately 10%.

Where appropriate the various Specialist Studies have assessed the Cumulative Impacts of the Project. Figure 19 shows how other similar projects were identified and considered.

Table 30: Other Renewable Energy Projects in the area

Map ID (see Plan 3)	Type	Regulation	Status
1	Solar PV	2014	In Process
2	Solar PV	2010	In Process
3	Solar PV	2010	In Process
4	Wind Energy	2010	Approved
5	Solar PV	2010	Approved
6	Solar PV	2010	Withdrawn/Lapsed
7	Co-Generation	2010	In Process

The study area is also associated with various Rights and applications for mineral rights, as discussed in Section 37. While the components of the proposed Project do not directly affect any existing surface activities associated with mining, some infrastructure is proposed in areas that have been approved for underground mining.

The geotechnical stability of areas that have been undermined must be confirmed in the detailed design phase, to prevent risk to Project infrastructure. Additionally, future mine plans must be considered to prevent the risk of subsidence in the Project area in areas approved for underground mining, but that have not been mined yet.

Section 11 discusses how the proposed Project could impact on the various environmental aspects being assessed, and determines whether the cumulative impacts of this project would be acceptable in the context of the other similar projects in the area.

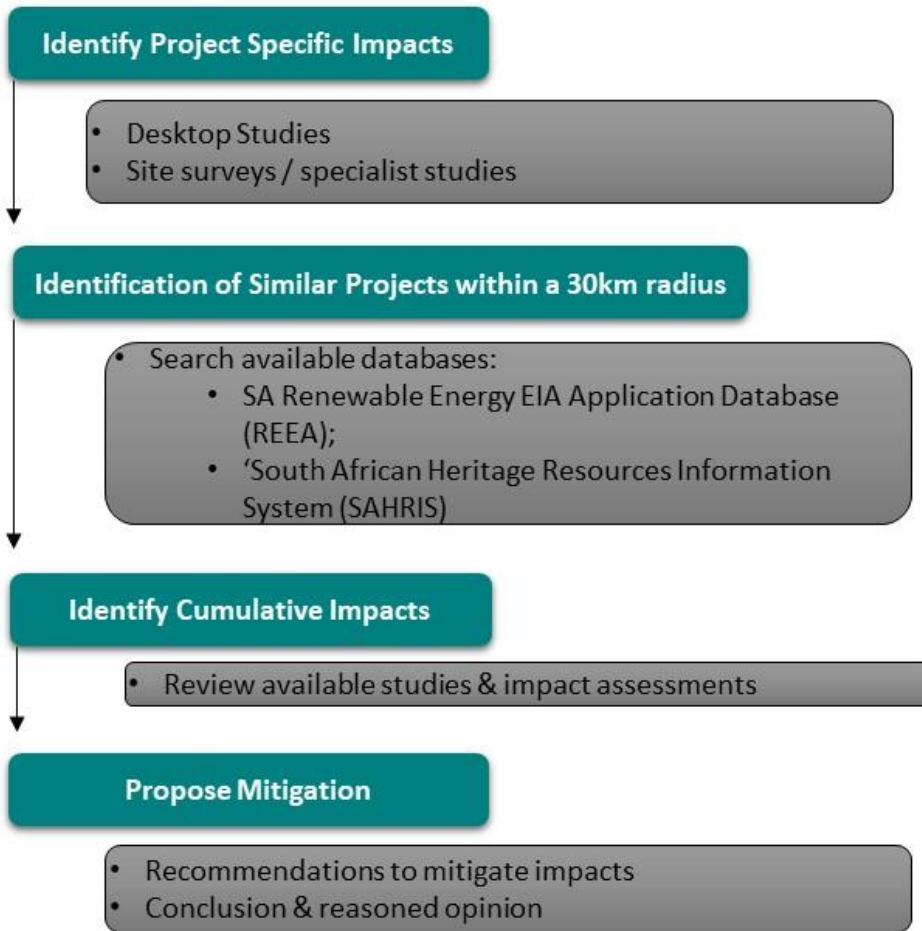


Figure 19: Process Flow Diagram summarising the approach to the Cumulative Impact Assessment

11 Impact Assessment

Comments received from the DFFE (Appendix G 3) require that the EIA Report must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for. This is provided in Section 11.1.1, where the wording of the Listing Notices has not been repeated but rather, the activities have been grouped and described to ensure the accurate identification and evaluation of impacts.

The sections that follow (Section 11.1.2 to 11.1.13) then discuss and evaluate the potential impacts of the project on different environmental aspects of the Site.

11.1.1 Impact(s) of Listed Activities applied for

Listing Notice & Activity Number	General Description and relevance to the Project	Reference to Impact Assessment
Listing Notice 1 Activity 12 (ii) (a) and (c) Activity 19	These Listed Activities relate to construction (for development or expansion) in or near watercourses (including wetlands). Such activities in proximity to water resources pose a higher risk of impacts (including chemical alteration or physical alteration) to water resources, if not mitigated, and thus warrants further investigation and impact assessment, so that appropriate management can be identified.	Please refer to Section 11.1.3 and Section 11.1.4
Listing Notice 3 Activity 14 (ii) (a) and (c) (f) (i) (ff)		
Listing Notice 1 Activity 27	These Listed Activities specifically relate to the clearance of indigenous vegetation. Further assessment of such proposals is required to ensure the clearance does not detrimentally affect the ecological functioning of remaining natural areas.	Please refer to Section 11.1.5
Listing Notice 3 Activity 12(f) (ii)		
Listing Notice 1. Activity 28(ii)	The Activity relates to commercial development on land that is or was used for agriculture. Activities that could have an impact on agricultural productivity of land need to be evaluated to ensure areas with agricultural potential are used for agricultural production.	Please refer to Section 11.1.2
Listing Notice 1. Activity 11(i) Listing Notice 2. Activity 9	The Project will need 275kV powerlines and substations to connect to the Eskom Grid if Eskom approves the LILO option, due to the capacity of the existing lines that traverse the site. Powerlines and substations of this capacity may impact adversely on habitat, avifauna and artefacts of cultural significance and thus require further investigation.	Please refer to Section 11.1.5, Section 8.8, Section 11.1.4 and 11.1.10

Listing Notice & Activity Number	General Description and relevance to the Project	Reference to Impact Assessment
<p>Listing Notice 3. Activity 4(f)(i)(ee)</p>	<p>These Listed Activities relate to construction (for development or expansion) of roads. Linear activities like roads are generally associated with habitat fragmentation which could adversely impact on the quality of habitats, and/or the ability of species to successfully survive in the affected habitat. Such habitat degradation may further impact on the ability of conservation authorities to meet their conservation targets.</p>	<p>Please refer to Section 11.1.5, Section 8.8, Section 11.1.4 and 11.1.10</p>

11.1.2 Land Use, Soils and Agricultural Potential

An agricultural impact is a temporary or permanent change to the future production potential of land. If a development will not change the future production potential of the land, then there is no agricultural impact. The significance of the agricultural impact is directly proportional to the extent of the change in production potential. Furthermore, the exact nature of the different components making up the Project infrastructure has no bearing on the significance of agricultural impacts. All that is of relevance is simply the layout and extent of the total footprint that excludes agricultural land use, whether that footprint comprises a pylon or substation is irrelevant to agricultural impact (Lanz, April 2022).

Regardless of the route and design the proposed Project will have an insignificant agricultural impact. This is because the direct, permanent, physical footprint of a power line and/or substation, that has any potential to interfere with agriculture, is insignificantly small and will not exclude agriculture from the land use (Lanz, April 2022).

Potential for erosion and soil degradation are associated with the Construction and Decommissioning Phases.

11.1.2.1 Construction Phase

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. Loss of topsoil, if it occurs, will be a long-term impact resulting from construction phase activities.
- Hydrocarbon or chemical spillages from construction activities can contaminate soil. Soil degradation will reduce the ability of the soil to support vegetation growth.

Loss of agricultural potential by soil degradation can therefore be caused by construction-phase activities, and is expected to occur if not mitigated. Such degradation can persist in the long term if not ameliorated and pollution impacts can extend to beyond the footprint of the pollution source, unless prevented.

Construction (and decommissioning) activities may cause some nuisance impacts and interference with farming operations, but are highly unlikely to have an impact on agricultural production and therefore does not constitute an agricultural impact as defined above (Lanz, April 2022).

Impact Assessment before mitigation: Construction Phase – Land Use, Soils and Agricultural Potential

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
1A	Use of machinery and hazardous materials i.e. cement, oil fuel	Potential for spills and/or leaks: Loss of agricultural	Negative	3	4	4	2	2	36	Low

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
	and/or grease during construction	potential by soil degradation.								
1B	Grading, vegetation clearing and soil stripping	Loss of agricultural potential by Soil Degradation. Erosion due to disturbance can lead to loss of topsoil and agricultural land capability.	Negative	3	4	4	2	2	36	Low
1C	Construction activity and presence of personnel	Nuisance impacts to farmers and farming operations.	Negative	2	2	2	2	2	16	Insignificant

Impact Assessment after mitigation: Construction Phase – Land Use, Soils and Agricultural Potential

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
1A	Use of machinery and hazardous materials i.e. cement, oil fuel and/or grease during construction	Potential for spills and/or leaks: Loss of agricultural potential by soil degradation.	Negative	2	4	2	2	2	20	Low
1B	Grading, vegetation clearing and soil stripping	Loss of agricultural potential by Soil Degradation. Erosion due to disturbance can lead to loss of topsoil and agricultural land capability.	Negative	2	4	2	2	1	18	Insignificant
1C	Construction activity and presence of personnel	Nuisance impacts to farmers and farming operations.	Negative	1	2	2	2	2	8	Insignificant

Mitigation Measures: Construction Phase – Land Use, Soils and Agricultural Potential

- Ensure that vehicles and equipment are serviced as per specification to prevent leaks that could occur if vehicles and equipment are in disrepair. Supply drip trays in emergency situations to contain leaks.
- Ensure that the use of hazardous chemical substances is controlled – only sufficiently trained personnel may be allowed to access and handle such substances.
- Spill kits must be available, and accessible, in strategic locations throughout the site. Personnel must be trained in the use of spill kits, and accidental spills must be cleaned up as soon as it is safe to do so.
- All construction personnel must receive training on the dangers associated with hazardous chemical substances on site, including the proper handling and storage and disposal requirements for such substances.

- All hazardous chemical substances to be managed according to the Hazardous Substances Act, 1973 (Act No 15 of 1973), and according to the supplier specification. Material Safety Data Sheets (MSDS) to be kept on site.
- Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential downslope erosion.
- Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.
- Do not clear vegetation or topsoil from areas not directly affected by construction activities.
- Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there.
- If an activity will mechanically disturb the soil below surface in any way, then any available topsoil must 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, and then stabilized by facilitating vegetation cover.
- All areas disturbed by construction activities, including access roads, laydown areas, construction platforms etc. must be rehabilitated at the end of the construction phase.

11.1.2.2 Operational Phase

No further loss of agricultural land use occurs in the operational phase.

11.1.2.3 Decommissioning Phase

During the Decommissioning Phase, similar soil degradation is possible as was assessed in the Construction Phase, due to the disturbance of soils and the use of machinery. Mitigation (spill prevention as in the construction phase, and rehabilitation) will be required to ensure that spills and/or leaks do not cause contamination of soils, and that erosion is prevented.

No further impact rating or additional management measures are deemed necessary.

11.1.2.4 Cumulative Impacts

The direct, permanent, physical footprint of a power line and/or substation, that has any potential to interfere with agriculture, is insignificantly small and will not exclude agriculture from the land use. In reality the landscape in this environment could accommodate many more powerlines that exists, or are proposed, and agricultural production could continue largely unaffected. Cumulative impacts are therefore negligible and have not been assessed further (Lanz, April 2022).

11.1.3 Water Resources

In terms of water resources, two types of impacts are typically expected – impacts on water quality and impacts on water quantity. This applies to both surface- and groundwater resources. The Constitutional Right enshrined in Section 27 of the Bill of Rights grants every person the right to have access to “sufficient... water” which implies that water availability in sufficient quantities to meet a person's needs, and of sufficient quality to be fit for purpose, are essential.

11.1.3.1 Construction Phase

All surface water runoff generated upstream is expected to reach the receiving environment as no infrastructure is expected to collect, contain or prevent runoff from flowing downstream. No impacts on surface water quantity are therefore expected.

During the construction phase, the presence of dust, eroded soil, hydrocarbons or other pollutants generated during construction activities, could lead to deterioration of water quality if polluted runoff is allowed to enter surrounding natural environments, or to seep to groundwater (Shangoni Management Services (Pty) Ltd, 2022).

Other possible impacts to the groundwater include increased infiltration to aquifers due to site clearing, removal of topsoil and vegetation along the corridors. In contrast, the compaction of surface areas such as roads will counteract this effect. These impacts are however considered negligible and no further impact rating or management measures are deemed necessary (Shangoni Management Services (Pty) Ltd, 2022).

Impact Assessment before mitigation: Construction Phase – Water Resources

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
2A	Grading, vegetation clearing and soil stripping	Deterioration in surface water quality due to an increase in sediment or other pollutants.	Negative	3	4	1	2	3	30	Low
2B	Use of machinery and hazardous materials i.e. cement, oil fuel and/or grease during construction	Potential for spills and/or leaks. Deterioration of surface water quality due to chemical contamination.	Negative	3	4	1	2	3	30	Low
2C	Use of machinery and hazardous materials during construction (potential for spills and leaks)	Deterioration of groundwater quality: Contamination could arise from mismanagement of materials and waste, incorrect disposal as well as handling of waste, spills (such as oil, diesel and sewage) and contaminated substances being	Negative	3	4	4	3	3	42	Moderate

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)
		disposed of in an unauthorised manner.							

Impact Assessment after mitigation: Construction Phase – Water Resources

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
2A	Grading, vegetation clearing and soil stripping	Deterioration in surface water quality due to an increase in sediment or other pollutants.	Negative	2	4	1	2	3	20	Low
2B	Use of machinery and hazardous materials i.e. cement, oil fuel and/or grease during construction	Potential for spills and/or leaks. Deterioration of surface water quality due to chemical contamination.	Negative	2	4	1	2	3	20	Low
2C	Use of machinery and hazardous materials during construction (potential for spills and leaks)	Deterioration of groundwater quality: Contamination could arise from mismanagement of materials and waste, incorrect disposal as well as handling of waste, spills (such as oil, diesel and sewage) and contaminated substances being disposed of in an unauthorised manner.	Negative	2	4	3	3	3	26	Low

Mitigation Measures: Construction Phase – Water Resources

- Disturbed areas to be limited to the footprint as depicted in the layout plan (to be refined during the detail design phase and specialist walk-downs).
- The laydown areas for the construction site must be kept as small as reasonably possible.
- The design, construction and maintenance of all infrastructure must ensure that the quantity of the groundwater that feeds sensitive receptors (groundwater abstractions and groundwater dependant terrestrial ecosystems) downstream from any infrastructure does not significantly change and the development does not act as a preferential pathway to groundwater flow.
- All vehicle and equipment usage must be limited to designated areas only.
- Small temporary diversion berms to be constructed upstream of all construction sites to prevent runoff from draining through these sites and becoming contaminated (such to be undertaken in consideration of any drainage lines or proximity to water courses).
- Once construction is complete, areas where vegetation was cleared, and soil was stripped must be stabilised by shaping and re-vegetating to prevent erosion.

- Activities that take place within a regulated area of a water course need to be authorised prior to commencement.
- Treat all hydrocarbon spills as hazardous waste and dispose of accordingly.
- Emergency spill kits must be available, and spills must be cleaned up quickly with an absorbent material.
- All mixing practices are to be conducted on impermeable surfaces/batching boards.
- Regular maintenance must be conducted on all vehicles and equipment used during the construction phase to ensure they are always in a good working order and free of leaks.
- Store oil, and other hazardous substances in designated bunded areas able to contain 110% of the storage capacity.
- Diesel storage to be above ground in accordance with SANS 10131.
- Refuelling of vehicles to take place on an impermeable surface fitted with a sump to contain any spillages.
- Effluent from chemical toilets is to be removed by a registered company and disposed of at the nearest sewage facility in accordance with the relevant national legislation.
- Uncontrolled discharges are not to be permitted from the construction camps.
- Onsite staff are to be provided with an appropriate potable water supply, safe and healthy sanitary facilities and protection against exposure to environmentally dangerous or unhealthy situations or conditions.
- Onsite staff should be made aware and encouraged to use water sparingly such that there is no water wastage.

11.1.3.2 Operational Phase

The operational phase is not expected to have a substantial impact on water quality and quantity.

The main anticipated impact on surface water resulting from the operational phase is an increase in erosion along all concrete and / or heavily compacted surface areas where runoff is concentrated, and flow velocity is increased. Increased erosion rates will elevate the sediment load contained in surface water runoff leading to a deterioration in quality. One area where this could occur is around the foundations of the transmission tower pylons and the sub-stations, where there may be an increase in runoff concentration and speed, resulting in higher erosion rates and more sediment being deposited downstream (Shangoni Management Services (Pty) Ltd, 2022).

Groundwater quality related impacts can potentially occur during maintenance. Minor hydrocarbon spills/leaks can occur from maintenance vehicles and improper handling of waste and other materials brought onto site by maintenance personnel (Shangoni Management Services (Pty) Ltd, 2022)

Impact Assessment before mitigation: Operational Phase – Water Resources

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
2D	Operation of the South Grid and Associated Infrastructure	Deterioration in surface water quality due to increased erosion and sedimentation. One area where this impact may occur is around the foundation of the tower pylons and substations, where there may be an increase in runoff concentration and speed resulting in higher erosion rates and more sediment deposited downstream.	Negative	2	4	1	2	3	20	Low
2E	Maintenance of South Grid and Associated Infrastructure	Deterioration of surface and groundwater quality: Contamination could arise from mismanagement of materials and waste, incorrect disposal as well as handling of waste, spills (such as oil, diesel and sewage) and contaminated substances being disposed of in an unauthorised manner.	Negative	4	4	3	3	3	52	Moderate

Impact Assessment after mitigation: Operational Phase – Water Resources

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
2F	Operation of the South Grid and Associated Infrastructure	Deterioration in surface water quality due to increased erosion and sedimentation. One area where this impact may occur is around the foundation of the tower pylons and substations, where there may be an increase in runoff concentration and speed resulting in higher erosion rates and more sediment deposited downstream.	Negative	1	4	1	2	3	10	Insignificant
2E	Maintenance of South Grid and Associated Infrastructure	Deterioration of surface and groundwater quality: Contamination could arise from mismanagement of materials and waste, incorrect disposal as well as handling of waste, spills (such as oil, diesel	Negative	2	4	3	3	3	26	Low

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)
		and sewage) and contaminated substances being disposed of in an unauthorised manner.							

Mitigation Measures: Operational Phase – Water Resources

- Erosion prevention measures such as grassing along surface areas where increased erosion could take place such as substations and transmission tower pylons.
- Areas where there are erosion prevention measures must be included in a maintenance schedule so that erosion is kept minimal.
- The maintenance of infrastructure must ensure that the quality of the groundwater that feeds sensitive receptors (groundwater abstractions and groundwater dependant terrestrial ecosystems) downstream from any infrastructure does not significantly change and the development does not act as a preferential pathway.
- Treat all hydrocarbon spills as hazardous waste and dispose of accordingly.
- Emergency spill kits must be available, and spills must be cleaned up quickly with an absorbent material.
- Regular maintenance must be conducted on all vehicles and equipment used for maintenance during the operational phase to ensure they are always in a good working order and free of leaks.
- Store oil, and other hazardous substances in designated bunded areas able to contain 110% of the storage capacity.
- Diesel storage to be above ground in accordance with SANS 10131.

11.1.3.3 Decommissioning Phase

The decommissioning phase will be associated with the use of machinery on site and thus pose similar impacts as experienced in the construction phase, in terms of risks to surface and groundwater quality if spills/leaks of hydrocarbons and chemicals are allowed to affected surrounding water resources by runoff or seepage.

Additionally, the removal of infrastructure in the decommissioning phase is associated with disturbance of soils potentially leading to increased erosion and resultant sedimentation of downstream surface water resources.

Impact Assessment before mitigation: Decommissioning Phase – Water Resources

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
2F	Dismantling and removal of Infrastructure	Deterioration of groundwater quality: Contamination could arise from mismanagement of materials and waste, incorrect disposal as well as handling of waste,	Negative	3	4	4	3	3	42	Moderate

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
		spills (such as oil, diesel and sewage) and contaminated substances being disposed of in an unauthorised manner.								
2G	Dismantling and removal of Infrastructure	Deterioration in surface water quality due to an increase in sediment or other pollutants.	Negative	3	4	1	2	3	30	Low

Impact Assessment after mitigation: Decommissioning Phase – Water Resources

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
2F	Dismantling and removal of Infrastructure	Deterioration of groundwater quality: Contamination could arise from mismanagement of materials and waste, incorrect disposal as well as handling of waste, spills (such as oil, diesel and sewage) and contaminated substances being disposed of in an unauthorised manner.	Negative	2	4	3	3	3	26	Low
2G	Dismantling and removal of Infrastructure	Deterioration in surface water quality due to an increase in sediment or other pollutants.	Negative	2	4	1	2	3	20	Low

Mitigation Measures: Decommissioning Phase – Water Resources

- Affected areas to be kept as small as reasonably possible.
- All vehicle and equipment usage must be limited to designated areas only.
- Rehabilitate areas where decommissioning has been completed concurrently (i.e. do not wait until all infrastructure has been removed before initiating re-vegetation in a given area).
- The decommissioning of infrastructure must ensure that the quality of the groundwater that feeds sensitive receptors (groundwater abstractions and groundwater dependant terrestrial ecosystems) downstream from any infrastructure does not significantly change and the development does not act as a preferential pathway.

- All waste materials including chemical and sewage waste is to be removed by a registered company (appointed by the Contractor) and disposed of at the nearest permitted facility in accordance with the relevant national legislation.
- Treat all hydrocarbon spills as hazardous waste and dispose of accordingly.
- Emergency spill kits must be available, and spills must be cleaned up quickly with an absorbent material.
- Regular maintenance must be conducted on all vehicles and equipment used during the construction phase to ensure they are always in a good working order and free of leaks.
- Store oil, and other hazardous substances in designated bunded areas able to contain 110% of the storage capacity.
- Diesel storage to be above ground in accordance with SANS 10131.
- Uncontrolled discharges are not to be permitted from the contractor's camps.

11.1.3.4 Cumulative Impacts

In the context of the existing land-uses in the study area (Section 8.3) and the existing state of local water resources (Section 8.4 and 8.5), any additional impacts to surface- or groundwater availability or quality can be regarded as cumulative in nature.

Reasonable and sound water management measures are recommended to reduce the risk to water resources. The impact assessment above indicates that anticipated impacts can be avoided, or managed to be of low significance, this not cumulatively contributing to water resource impacts.

11.1.4 Freshwater Ecology

In total, 1,722.32 ha of wetlands were identified and delineated in the study area. These were grouped into seven (7) Hydrogeomorphic (HGM) units based on similarities and present land use to enable more accurate PES and EIS calculations (Stephen Burton Ecological , April 2022). As certain Project infrastructure unavoidably overlaps with delineated wetlands, impact significance will be influenced by the sensitivity of the affected wetlands.

11.1.4.1 Construction Phase

The most likely construction-related impacts through clearing for access roads and construction of powerline pylons will result in destruction of wetlands where these overlap the development footprint (Stephen Burton Ecological , April 2022). In some instances the powerline crosses over delineated wetlands.

Additionally, potential hydrocarbon and concrete spills from construction activities as well as sewage and waste water spills within wetland areas could potentially impact wetland health and biodiversity (Stephen Burton Ecological , April 2022).

Impact Assessment before mitigation: Construction Phase – Freshwater Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
3A	Clearing for access roads and construction of powerline pylons will result in temporary loss of wetlands where these overlap the development footprint.	Permanent loss of the affected portions of the wetland system if not mitigated, and may lead to the following: Head cut erosion and channel forming from the roads (culverts); Increased erosion and consequently sedimentation potential into wetlands; and Loss of vegetation and habitat.	Negative	3	4	2	5	2	39	Low
3B	Construction activity and the use and storage of potentially hazardous / polluting substances (lubricants, oils, explosives, fuels, etc.) and the presence of sanitation facilities during construction.	Changes to wetland health and biodiversity by pollution: Contamination from Hydrocarbon waste (lubricants, oils, explosives, and fuels); Contamination from sewage and wastewater.	Negative	3	4	4	4	3	45	Moderate

Impact Assessment after mitigation: Construction Phase – Freshwater Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
3A	Clearing for access roads and construction of powerline pylons will result in temporary loss of wetlands where these overlap the development footprint.	Permanent loss of the affected portions of the wetland system if not mitigated, and may lead to the following: Head cut erosion and channel forming from the roads (culverts); Increased erosion and consequently sedimentation potential into wetlands; and Loss of vegetation and habitat.	Negative	2	3	2	5	1	22	Low

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
3B	Construction activity and the use and storage of potentially hazardous / polluting substances (lubricants, oils, explosives, fuels, etc.) and the presence of sanitation facilities during construction.	Changes to wetland health and biodiversity by pollution: Contamination from Hydrocarbon waste (lubricants, oils, explosives, and fuels); Contamination from sewage and wastewater.	Negative	2	4	4	3	2	26	Low

Mitigation Measures: Construction Phase – Freshwater Ecology

- Where impacts to wetlands are unavoidable, disturbance must be minimised and suitably rehabilitated.
- Environmental Compliance Officer (ECO) to be present during vegetation clearing to prevent unnecessary clearing of extensive areas not part of the direct footprint area.
- Bare land surfaces must be vegetated to limit erosion from surface runoff associated with infrastructure areas. Revegetate disturbed areas immediately after construction.
- Stockpiles should be monitored to ensure no runoff, erosion and sedimentation into the adjacent areas, especially the wetlands and freshwater systems.
- A Storm Water Management Plan (SWMP) should be designed and implemented during the construction phase. This should consider wetlands associated with the new developments/infrastructure which should divert stormwater and runoff away from the surface infrastructure and back into natural watercourses to maintain catchment yield as far as possible.
- All vehicle maintenance must occur within designated areas.
- All vehicles must be regularly inspected for leaks.
- All spills must be cleaned up immediately to prevent contaminants to enter the wetlands.
- Chemicals, such as paints and hydrocarbons, should be used in an environmentally safe manner with correct storage as per each chemical's specific storage descriptions.
- Re-fuelling and maintenance must take place on a sealed surface area away from wetlands to prevent the ingress of hydrocarbons into topsoil.
- On-site staff to be provided training as to the no-go and sensitive areas. ECO and Environmental Officer to monitor conformance to this.

11.1.4.2 Operational Phase

No further loss of wetlands is anticipated during the operational phase, although hydrocarbon and chemical spills from maintenance activities could still occur. These could potentially impact wetland health and biodiversity contamination (Stephen Burton Ecological , April 2022)

The presence of roads especially at culverts could lead to head cut erosion, channel forming, increased erosion and consequently sedimentation potential into wetlands and loss of vegetation, habitat and wetland fragmentation (Stephen Burton Ecological , April 2022).

Impact Assessment before mitigation: Operational Phase – Freshwater Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
3C	Use of existing haul roads and vehicle movement	Head cut erosion and channel forming from the roads (culverts); and Increased erosion and consequently sedimentation potential into wetlands; Loss of vegetation and habitat; and Wetland fragmentation.	Negative	3	4	5	4	3	48	Moderate
3D	Hydrocarbon and Waste Spills	Contamination from hydrocarbons and chemicals (lubricants, oils explosives, and fuels) and changes to wetland health and biodiversity.	Negative	3	4	4	4	3	45	Moderate

Impact Assessment after mitigation: Operational Phase – Freshwater Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
3C	Use of existing haul roads and vehicle movement	Head cut erosion and channel forming from the roads (culverts); and Increased erosion and consequently sedimentation potential into wetlands; Loss of vegetation and habitat; and Wetland fragmentation.	Negative	3	4	3	2	2	33	Low
3D	Hydrocarbon and Waste Spills	Contamination from hydrocarbons and chemicals (lubricants, oils explosives, and fuels) and changes to wetland health and biodiversity.	Negative	2	4	4	3	2	26	Low

Mitigation Measures: Operational Phase – Freshwater Ecology

- Road and stormwater infrastructure to be maintained as per the EMPr.
- No vehicle maintenance must occur on site.
- Emergency maintenance must be associated with the use of appropriate drip trays.

- All vehicles must be regularly inspected for leaks.
- All spills must be cleaned up immediately to prevent contaminants to enter the wetlands.
- Re-fuelling and maintenance must take place off site.

11.1.4.3 Decommissioning Phase

During the decommissioning phase, the most likely impacts will again be related to the disturbance of wetland habitat during the spreading, landscaping and re-vegetation. This could result in the possible spillage of chemicals, hydrocarbons and other pollutants into wetland areas (Stephen Burton Ecological , April 2022) as well as uneven surfaces and topographies, causing water ponding and changes to the hydrogeomorphology of the wetlands. Other impacts that could result are alien invasive plants.

Impact Assessment before mitigation: Decommissioning Phase – Freshwater Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
3E	Rehabilitation – rehabilitation mainly consists of spreading and landscaping of the land, and re-vegetation	Uneven surfaces and topographies, causing water ponding and changes to the hydrogeomorphology of the wetlands; The proliferation of AIPs; Exposure of soils and subsequent compaction, erosion, and sedimentation into the wetlands; Deterioration of water quality; and Potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of wetlands.	Negative	3	4	4	3	3	42	Moderate
3F	Post-monitoring and rehabilitation	Failure to implement monitoring and management resulting in wetland degradation.	Negative	3	4	3	2	1	30	Low

Impact Assessment after mitigation: Decommissioning Phase – Freshwater Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
3E	Rehabilitation – rehabilitation mainly consists of spreading and landscaping of the land, and re-vegetation	Uneven surfaces and topographies, causing water ponding and changes to the hydrogeomorphology of the wetlands; The proliferation of AIPs; Exposure of soils and subsequent compaction, erosion, and sedimentation into the wetlands; Deterioration of water quality; and Potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of wetlands.	Negative	3	4	4	2	3	39	Low
3F	Post-monitoring and rehabilitation	Failure to implement monitoring and management resulting in wetland degradation.	Negative	2	4	3	2	1	20	Low

Mitigation Measures: Decommissioning Phase – Freshwater Ecology

- Stormwater must be diverted from decommissioning activities.
- All areas of increased ecological sensitivity should be designated as “No-Go” areas and be off-limits to all unauthorised vehicles and personnel.
- Actively landscape and re-vegetate disturbed areas as soon as possible to avoid loss of soil, organic material, and sedimentation into wetland areas;
- Implement and maintain a Wetland and AIPs Plan for the duration of the decommissioning phase.
- No vehicles or heavy machinery should be allowed to drive indiscriminately within any wetland areas or their buffer areas. All vehicles must remain on demarcated roads.
- Wetland monitoring must be carried out after the decommissioning phase to ensure the success of wetland rehabilitation.

11.1.4.4 Cumulative Impacts

Numerous wetlands in the study area have already been impacted or lost through mining, farming and/or construction of infrastructure including roads and dams. Additional destruction of wetland resources would be considered cumulative in nature.

The construction of the up to 275 kV grid connection powerline and associated substation will require the crossing of a number of wetland systems by conductor for stringing. Although the

route alternatives largely follow the existing powerline and thus no new crossings will be constructed, cumulative impacts to wetlands through pollution and degradation can still occur. These impacts can be managed and mitigated as discussed above.

Impact Assessment before mitigation: Cumulative – Freshwater Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
3G	Construction, operation and decommissioning of powerlines and substation in conjunction with wind farms, agriculture, roads, mining, etc	Wetland degradation (destruction, erosion, sedimentation etc)	Negative	3	4	4	4	4	48	Moderate

Impact Assessment after mitigation: Cumulative - Freshwater Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
3G	Construction, operation and decommissioning of powerlines and substation in conjunction with wind farms, agriculture, roads, mining, etc	Wetland degradation (destruction, erosion, sedimentation etc)	Negative	2	4	3	4	4	30	Low

11.1.5 Terrestrial Ecology

11.1.5.1 Construction Phase

The most likely direct impacts are through clearing of vegetation for the access/maintenance tracks, which will result in the loss and fragmentation of indigenous vegetation, including the faunal habitats. These will also impact on the CBA's and ESA's. Additional indirect impacts would be spread of alien invasives, weeds and erosion (David Hoare Consulting1, 2022).

Impact Assessment before mitigation: Construction Phase – Terrestrial Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
4A	Clearing of natural habitat for construction	Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in permanent local loss of habitat.	Negative	4	4	2	5	1	48	Moderate

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
4B	Impact on integrity of Critical Biodiversity Areas	Impact on integrity of Critical Biodiversity Areas.	Negative	4	4	2	5	1	48	Moderate
4C	Spread of weeds and alien invasives	Establishment and spread of declared weeds and alien invader plants.	Negative	3	2	2	1	2	21	Low
4D	Loss of individuals of plant Species of Conservation Concern due to clearing for construction (general assessment)	The impact will occur due to clearing of indigenous vegetation for the purposes of construction of infrastructure.	Negative	3	2	2	5	2	33	Low
4E	Loss of faunal habitat due to clearing for construction	The impact will occur due to clearing of indigenous vegetation for the purposes of construction of infrastructure.	Negative	4	2	1	5	1	36	Low
4F	Fragmentation of faunal habitat due to clearing for construction	The impact will occur due to clearing of indigenous vegetation for the purposes of construction of infrastructure. Where this intersects with linear systems, it will result in fragmentation that may inhibit normal population processes, including movement.	Negative	2	3	1	5	2	22	Low
4G	Direct loss of individuals of threatened fauna due to various factors	The impact will occur due to presence of traffic and heavy machinery.	Negative	3	4	2	2	1	27	Low
4H	Vegetation Clearance, Earthworks, diggings and levelling	Loss of bat foraging habitat. Bat roost destruction during earthworks of pylons, considering possible underground bat caves. The North	Negative	5	3	3	2	2	50	Moderate

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)
		grid does not traverse across dolomite which is prone to bat cave formation.							

Impact Assessment after mitigation: Construction Phase – Terrestrial Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
4A	Clearing of natural habitat for construction	Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in permanent local loss of habitat.	Negative	4	3	1	4	1	36	Low
4B	Impact on integrity of Critical Biodiversity Areas	Impact on integrity of Critical Biodiversity Areas.	Negative	4	3	1	4	1	36	Low
4C	Spread of weeds and alien invasives	Establishment and spread of declared weeds and alien invader plants.	Negative	2	1	1	1	1	8	Insignificant
4D	Loss of individuals of plant Species of Conservation Concern due to clearing for construction (general assessment)	The impact will occur due to clearing of indigenous vegetation for the purposes of construction of infrastructure.	Negative	1	2	2	5	2	11	Insignificant
4E	Loss of faunal habitat due to clearing for construction	The impact will occur due to clearing of indigenous vegetation for the purposes of construction of infrastructure.	Negative	4	2	1	5	1	36	Low
4F	Fragmentation of faunal habitat due to clearing for construction	The impact will occur due to clearing of indigenous vegetation for the purposes of construction of infrastructure. Where this	Negative	2	3	1	5	1	20	Low

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
		intersects with linear systems, it will result in fragmentation that may inhibit normal population processes, including movement.								
4G	Direct loss of individuals of threatened fauna due to various factors	The impact will occur due to presence of traffic and heavy machinery.	Negative	2	4	1	2	1	16	Insignificant
4H	Vegetation Clearance, Earthworks, diggings and levelling	Loss of bat foraging habitat. Bat roost destruction during earthworks of pylons, considering possible underground bat caves. The North grid does not traverse across dolomite which is prone to bat cave formation.	Negative	4	2	2	2	2	32	Low

Mitigation Measures: Construction Phase – Terrestrial Ecology

- Restrict impact to development footprint only and limit disturbance creeping into surrounding areas.
- As far as possible, locate infrastructure within areas that have been previously disturbed or in areas with lower sensitivity scores.
- Avoid sensitive features and habitats when locating infrastructure.
- Compile a Rehabilitation Plan.
- Compile an Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas.
- Where possible, access roads should be located along existing farm and district roads.
- Access to sensitive areas should be limited during construction.
- Undertake monitoring to evaluate whether further measures would be required to manage impacts.
- Access to sensitive areas should be limited during construction.
- Undertake a detailed walk-through survey of footprint areas that are within habitats where SCC are likely to occur.
- Where significant populations of SCC are found, collect the data for any flora permits or micro-siting of infrastructure that may be required.
- Compile a Plant Search Rescue and Relocation Plan.
- Undertake monitoring to evaluate whether further measures would be required to manage impacts.

- Implement measures that will limit the impact to the immediate footprint of the proposed infrastructure. This will include measures to minimise erosion and runoff effects, control alien invasive plants, and contain damage to footprint areas only. It also includes undertaking effective rehabilitation of disturbed areas.
- Restrict activities to footprint areas only.
- No driving of vehicles off-road outside of construction areas.
- Sensitize staff to presence of SCC and the importance of their protection

11.1.5.2 Operational Phase

Operational impacts would result from activities such as driving off road and fires which could disturb natural faunal habitats and vegetation. Additional indirect impacts include the spread of alien invasives, weeds and erosion (David Hoare Consulting1, 2022).

There exists no evidence of powerlines in South Africa impacting bats during their operational phase, potential impacts on avifauna from the presence of powerlines is discussed in Section 11.1.6.

Impact Assessment before mitigation: Operational Phase – Terrestrial Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
4I	Direct loss of individuals of threatened fauna due to various factors	Direct mortality of fauna through traffic, illegal collecting, poaching and collisions and/or entanglement with infrastructure	Negative	3	4	2	4	1	33	Low
4J	Continued disturbance to natural habitats due to general operational activities and maintenance	Sporadic unforeseen disturbance to natural habitats e.g. accidental fires, driving off-road, dumping etc. during general operational activities and maintenance.	Negative	3	2	2	5	1	30	Low
4K	Spread of weeds and alien invasives	The presence of disturbed surfaces on site creates ecological edges and corridors along which alien species can travel and become established.	Negative	3	1	1	5	3	30	Low
4L	Runoff and erosion due to the presence of hard surfaces that change the infiltration and	Increased runoff and erosion due to clearing of vegetation, construction of hard surfaces and	Negative	3	2	3	5	1	33	Low

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)
	runoff properties of the landscape (Substation only)	compaction of surfaces, leading to changes in downslope areas.							

Impact Assessment after mitigation: Operational Phase – Terrestrial Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
4I	Direct loss of individuals of threatened fauna due to various factors	Direct mortality of fauna through traffic, illegal collecting, poaching and collisions and/or entanglement with infrastructure	Negative	2	4	1	4	1	20	Insignificant
4J	Continued disturbance to natural habitats due to general operational activities and maintenance	Sporadic unforeseen disturbance to natural habitats e.g. accidental fires, driving off-road, dumping etc. during general operational activities and maintenance.	Negative	2	1	1	5	1	16	Insignificant
4K	Spread of weeds and alien invasives	The presence of disturbed surfaces on site creates ecological edges and corridors along which alien species can travel and become established.	Negative	2	1	1	2	2	12	Insignificant
4L	Runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape (Substation only)	Increased runoff and erosion due to clearing of vegetation, construction of hard surfaces and compaction of surfaces, leading to changes in downslope areas.	Negative	3	2	2	5	1	30	Low

Mitigation Measures: Operational Phase – Terrestrial Ecology

- Fences to demarcate activity areas, prevent activities in no-go areas, protocols, education, keep products and items properly stored that could be dangerous to animals, no open pits or holes.
- Restrict impact to development footprint only and limit disturbance creeping into surrounding areas.

- As far as possible, locate infrastructure within areas that have been previously disturbed or in areas with lower sensitivity scores.
- Avoid sensitive features and habitats when locating infrastructure.
- Compile and implement a Rehabilitation Plan.
- Compile and implement an Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas. It must highlight control priorities and areas and provide a programme for long-term control.
- Undertake regular monitoring to detect alien invasions early so that they can be controlled.
- Implement control measures.
- Where possible, access roads should be located along existing farm and district roads.
- Access to sensitive areas should be limited during construction.
- Undertake monitoring to evaluate whether further measures would be required to manage impacts.
- Access to sensitive areas should be limited during construction.

11.1.5.3 Decommissioning Phase

The decommissioning of the project from removal of infrastructure could result in loss and disturbance of vegetation and faunal habitats. Decommissioning disturbance will be from infrastructure removal as well as dust deposition and spread of alien invasives (David Hoare Consulting1, 2022).

Impact Assessment before mitigation: Decommissioning Phase – Terrestrial Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
4M	Loss and disturbance of natural vegetation due to the removal of infrastructure and need for working sites	Decommissioning activities may cause disturbance of natural habitat. This may result in permanent local loss of habitat.	Negative	2	1	1	5	1	16	Insignificant
4N	Continued establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors	Establishment and spread of declared weeds and alien invader plants	Negative	4	1	2	4	2	36	Low

Impact Assessment after mitigation: Decommissioning Phase – Terrestrial Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
4M	Loss and disturbance of natural vegetation due to the removal of infrastructure and need for working sites	Decommissioning activities may cause disturbance of natural habitat. This may result in permanent local loss of habitat.	Negative	2	1	1	5	1	16	Insignificant

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
4N	Continued establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors	Establishment and spread of declared weeds and alien invader plants	Negative	3	1	1	4	1	21	Low

Mitigation Measures: Decommissioning Phase – Terrestrial Ecology

- Restrict impact to infrastructure footprint only and limit disturbance creeping into surrounding areas.
- As far as possible, locate activities within areas that have been previously disturbed or in areas with lower sensitivity scores.
- Avoid sensitive features and habitats during activities.
- Compile a Rehabilitation Plan.
- Implement an Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas.
- Rehabilitate disturbed areas.

11.1.5.4 Cumulative Impacts

The regional terrestrial vegetation type (Eastern Highveld Grassland) is listed as Vulnerable, with a significant portion of the vegetation type having already been transformed by cultivation, plantations, mines, urbanisation and by building of dams (Mucina & Rutherford, 2006).

Loss of habitat will definitely occur for the project, which will be a small area in comparison to the total area of the vegetation type; however, the total loss of habitat due to a number of projects together will be greater than for any single project (David Hoare Consulting1, 2022).

Fragmentation and/or edge effects due to the combination of all projects proposed in the vicinity of the Site (other renewable energy projects and mining as discussed above) may also be significant, more so than gross loss of habitat, measured in hectares. Direct loss of habitat will not result in a change in the conservation status of the vegetation types, but overall degradation due to fragmentation effects may be a greater cause for concern (David Hoare Consulting1, 2022).

On a landscape level, various ecological processes may be affected by the implementation of multiple projects, including migration, pollination and dispersal, but also factors that are more difficult to interpret, such as spatial heterogeneity, community composition and environmental gradients, that can become disrupted when landscapes are disturbed at a high level (David Hoare Consulting1, 2022).

There is also a possibility that alien plants could be introduced to areas within the footprint of the proposed infrastructure from surrounding areas in the absence of control measures. The greater the number of projects, the more likely this becomes, as increased overall disturbance of the landscape will create opportunities and, if new invasions are not controlled, can create

nodes that spread to new locations due to the heightened disturbance levels (David Hoare Consulting1, 2022).

Areas of the site and surrounding sites are identified as CBAs (MTPA, 2014). CBAs are regionally important areas in terms of Conservation Authorities' targets. Thus, if CBAs are affected to a point where they no longer provide the conservation potential necessary, alternative sites to include in future CBAs have to be identified by the authorities, to ensure conservation targets can be met.

At some point, the loss of suitable sites leads to a situation where it is no longer possible to plan effective conservation networks or the cost of doing so increases due to a lack of choice. The higher the density of similar projects in a uniform area, the less chance there is of finding sites suitable for conservation that contain all the attributes that are desired to be conserved, including both ecological processes and ecological patterns. At the current stage there is sufficient CBA that can protect these ecological processes while still allowing development to occur, as a result this cumulative impact is low (David Hoare Consulting1, 2022).

Cumulative Impact Assessment – Terrestrial ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
4O	Clearing of natural habitat for construction	Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in permanent local loss of habitat, multiplied across multiple projects.	Negative	4	1	3	5	4	52	Moderate
4P	Disruption of ecological processes at landscape level	Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in possible regional disruption of ecological processes.	Negative	2	3	3	4	4	28	Low
4Q	Cumulative impacts due to establishment and spread of declared weeds and alien invader plants	Establishment and spread of declared weeds and alien invader plants	Negative	3	3	3	4	4	42	Moderate
4R	Loss of areas within CBAs and ESAs.	Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in possible provincial	Negative	1	5	3	5	4	28	Low

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
		disruption of conservation planning.								
4S	Loss or impact of SCC plant species	Impacts on SCC from construction clearing due to a number of projects.	Negative	4	3	4	5	2	52	Moderate
4T	Loss of faunal habitat due to clearing for construction	Cumulative impacts on SCC from construction clearing due to a number of projects	Negative	5	4	3	5	2	70	High
4U	Fragmentation of faunal habitat due to clearing for construction	Impacts on SCC from construction clearing due to a number of projects	Negative	4	4	3	5	3	60	High
4V	Direct mortality of fauna due to machinery, construction and increased traffic during construction	Cumulative impacts on SCC due to a number of projects	Negative	4	4	2	2	3	44	Moderate
4W	Direct mortality of fauna through traffic, illegal collecting, poaching and collisions and/or entanglement with infrastructure during operations	Cumulative impacts on SCC from construction clearing due to a number of projects	Negative	4	4	2	2	3	44	Moderate

Impact Assessment after mitigation: Cumulative - Terrestrial ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
4O	Clearing of natural habitat for construction	Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in permanent local loss of habitat, multiplied across multiple projects.	Negative	4	1	3	5	4	52	Moderate

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
4P	Disruption of ecological processes at landscape level	Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in possible regional disruption of ecological processes.	Negative	2	3	3	4	4	28	Low
4Q	Cumulative impacts due to establishment and spread of declared weeds and alien invader plants	Establishment and spread of declared weeds and alien invader plants	Negative	3	3	3	4	4	42	Moderate
4R	Loss of areas within CBAs and ESAs.	Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in possible provincial disruption of conservation planning.	Negative	1	5	3	5	4	28	Low
4S	Loss or impact of SCC plant species	Impacts on SCC from construction clearing due to a number of projects.	Negative	4	3	4	5	2	52	Moderate
4T	Loss of faunal habitat due to clearing for construction	Cumulative impacts on SCC from construction clearing due to a number of projects	Negative	5	4	3	5	2	70	High
4U	Fragmentation of faunal habitat due to clearing for construction	Impacts on SCC from construction clearing due to a number of projects	Negative	4	4	3	5	3	60	High
4V	Direct mortality of fauna due to machinery, construction and increased traffic during construction	Cumulative impacts on SCC due to a number of projects	Negative	4	4	2	2	3	44	Moderate
4W	Direct mortality of fauna through traffic, illegal collecting, poaching and collisions and/or entanglement with	Cumulative impacts on SCC from construction clearing due to a number of projects	Negative	4	4	2	2	3	44	Moderate

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)
	infrastructure during operations								

11.1.6 Avifauna

The principal areas of concern with regard to effects of the South Grid and related infrastructure on birds include mortality and displacement (due to electrocution and collisions), and these are discussed in the subsections that follow.

11.1.6.1 Construction Phase

Displacement of priority species is expected to occur due to habitat transformation and fragmentation in the construction phase. Apart from direct habitat destruction, general ecological disturbance associated with construction could result in breeding failure if the disturbance happens during the critical part of the breeding cycle or even permanent abandonment of the nests (Van Rooyen & Froneman, Avifaunal Impact Assessment: Hendrina South Grid, Mpumalanga Province, April 2022).

The following species could be impacted by disturbance during the construction phase: African Grass Owl; Blue Korhaan; Denham's Bustard; Helmeted Guineafowl; Lanner Falcon; Marsh Owl; Secretarybird and Spotted Eagle-Owl.

Impact Assessment before mitigation: Construction Phase – Avifauna

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
5A	Construction activities, including vegetation clearing, soil stripping and use of machinery.	Displacement of priority avifauna due to disturbance associated with the construction of the substation and grid connection power line.	Negative	4	4	3	2	2	44	Moderate
5B	Construction activities, including vegetation clearing, soil stripping and use of machinery.	Displacement of priority avifauna due to habitat transformation associated with the construction of the substation and grid connection power line.	Negative	3	4	3	5	2	42	Moderate

Impact Assessment after mitigation: Construction Phase – Avifauna

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
5A	Construction activities, including vegetation clearing, soil stripping and use of machinery.	Displacement of priority avifauna due to disturbance associated with the construction of the substation and grid connection power line.	Negative	3	4	3	2	2	33	Low
5B	Construction activities, including vegetation clearing, soil stripping and use of machinery.	Displacement of priority avifauna due to habitat transformation associated with the construction of the substation and grid connection power line.	Negative	2	4	3	5	2	28	Low

Mitigation Measures: Construction Phase - Avifauna

- The authorised alignment must be inspected by an avifaunal specialist by means of a “walk-through” inspection i.e. through a combination of satellite imagery supplemented with in situ inspections by vehicle and where necessary, on foot, once the pole positions have been finalised. The objective would be to demarcate the sections of the powerline that need to be fitted with Bird Flight Diverters.
- Conduct a pre-construction inspection to identify Red List species that may be breeding within the project footprint to ensure that the impacts to breeding species (if any) are adequately managed.
- Construction activities must be restricted to the immediate footprint of the infrastructure.
- Access to the remainder of the site will be strictly controlled to prevent unnecessary disturbance of priority species.
- Dust suppression must be administered regularly based on visual inspection by ECO.
- Maximum use should be made of existing access roads and the construction of new roads are to be kept to a minimum.
- Vegetation clearance should be limited to what is absolutely necessary. The mitigation measures proposed by the biodiversity specialist must be strictly enforced.
- Once the relevant spans have been identified, Bird Flight Diverters must be fitted according to the applicable Eskom Engineering Instruction (Eskom Unique Identifier 240 – 93563150: The utilisation of Bird Flight Diverters on Eskom Overhead Lines).

11.1.6.2 Operational Phase

During the Operational Phase the grid connection and associated infrastructure will pose an electrocution and collision risk to avifauna.

Electrocution on powerlines occurs when a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (Van Rooyen 2004). The

electrocution risk of is largely determined by the pole/tower design. In the case of the proposed up to 275kV grid connection, the electrocution risk is envisaged to be negligible because of the clearance distances between the live and earthed components inherent in the design of such powerlines (Van Rooyen & Froneman, Avifaunal Impact Assessment: Hendrina South Grid, Mpumalanga Province, April 2022).

Electrocutions within the proposed substation are also possible but should not affect the more sensitive Red List bird species, as these species are unlikely to use the infrastructure within the substation yard for perching or roosting. Species that are more vulnerable to this impact are corvids, owls and certain species of waterbirds (Van Rooyen & Froneman, Avifaunal Impact Assessment: Hendrina South Grid, Mpumalanga Province, April 2022).

The priority species which could occur regularly in the study area and are potentially vulnerable to electrocution impacts include: African Grass Owl; African Sacred Ibis; Amur Falcon; Black Sparrowhawk; Black-headed Heron; Black-winged Kite; Common Buzzard; Egyptian Goose; Hadada Ibis; Hamerkop; Helmeted Guineafowl; Lanner Falcon; Marsh Owl; Pied Crow; Rock Kestrel; Southern Bald Ibis; Spotted Eagle-Owl and Western Cattle Egret.

Collisions are the biggest threat posed by transmission lines to avifauna. Several factors are thought to influence avian collisions, including the manoeuvrability of the bird, topography, weather conditions and power line configuration. Another important aspect to consider is the visual capacity of birds; i.e. whether they are able to see obstacles such as power lines, and whether they are looking ahead to see obstacles with enough time to avoid a collision (Van Rooyen & Froneman, Avifaunal Impact Assessment: Hendrina South Grid, Mpumalanga Province, April 2022).

The priority species which could occur regularly in the study area and are potentially vulnerable to powerline collision impacts include: African Grass Owl; African Sacred Ibis; African Spoonbill; Black-headed Heron; Blue Korhaan; Cape Shoveler; Denham's Bustard; Egyptian Goose; Glossy Ibis; Great Crested Grebe; Great Egret; Grey Heron; Hadada Ibis; Hamerkop; Intermediate Egret; Little Egret; Little Grebe; Marsh Owl; Red-billed Teal; Red-knobbed Coot; Reed Cormorant; Secretarybird; Southern Bald Ibis; Southern Pochard; Spotted Eagle-Owl; Spur-winged Goose; Western Cattle Egret; White Stork; White-breasted Cormorant and Yellow-billed Duck.

Impact Assessment before mitigation: Operational Phase – Avifauna

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
5C	Operation of the 275kV grid connection powerlines	Mortality of priority species due to collisions with the power line.	Negative	4	4	3	5	3	60	High
5D	Operation of the substation	Mortality of priority species due to electrocutions within the substation.	Negative	2	4	3	5	3	30	Low

Impact Assessment after mitigation: Operational Phase – Avifauna

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
5C	Operation of the 275kV grid connection powerlines	Mortality of priority species due to collisions with the power line.	Negative	3	4	3	5	2	42	Moderate
5D	Operation of the substation	Mortality of priority species due to electrocutions within the substation.	Negative	1	4	3	5	3	15	Insignificant

Mitigation Measures: Operational Phase - Avifauna

- Once the relevant spans have been identified, Eskom approved Bird flight diverters should be installed for the full span length on the earthwire (according to Eskom guidelines – five metres apart). Light and dark colour devices must be alternated to provide contrast against both dark and light backgrounds respectively.
- The hardware within the proposed substation yard is too complex to warrant any mitigation for electrocution at this stage. It is recommended that if on-going impacts are recorded once operational, site specific mitigation (insulation) be applied reactively. This is an acceptable approach because Red List priority species are unlikely to frequent the substation.

11.1.6.3 Decommissioning Phase

Impacts associated with the decommissioning phase are similar to those expected to occur during the construction phase and include displacement of priority avifauna due to disturbance associated with the dismantling of decommissioning of the substation and grid connection power line.

Impact Assessment before mitigation: Decommissioning Phase – Avifauna

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
5E	Dismantling and removal of infrastructure	Displacement due to disturbance associated with the decommissioning of the substation and grid connection power line.	Negative	4	4	3	2	2	44	Moderate

Impact Assessment after mitigation: Decommissioning Phase – Avifauna

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
5E	Dismantling and removal of infrastructure	Displacement due to disturbance associated with the decommissioning of the substation and grid connection power line.	Negative	3	4	3	2	2	33	Moderate

Mitigation Measures: Decommissioning Phase - Avifauna

- Decommissioning activity must be restricted to the immediate footprint of the infrastructure as far as possible.
- Access to the remainder of the site is to be strictly controlled to prevent unnecessary disturbance of priority species.
- Maximum use will be made of existing access roads and the construction of new roads should be kept to a minimum.
- Measures to control noise and dust should be applied according to current best practice in the industry.

11.1.6.4 Cumulative Impacts

The combined length of the grid connections for the Halfgewonnen PV Facility, Hendrina North Grid Infrastructure and this Project is approximately 23km. The proposed PV Facility at the Duvha Power Station will be on the premises of the existing power station. The existing high voltage lines in the 30km radius around the Project runs into hundreds of kilometres. If this Project is approved, the Project's contribution to the total length of high voltage lines within a 30km radius, and by implication to the cumulative impact of all the planned and existing high voltage lines, is low. However, the density of planned and existing high voltage lines within a 30km radius, and by implication the cumulative impact on avifauna, is considered to be **moderate** but the impact could be reduced to some extent if the recommended mitigation is implemented (Van Rooyen & Froneman, Avifaunal Impact Assessment: Hendrina North Grid, Mpumalanga Province, April 2022).

Impact Assessment before mitigation: Cumulative - Avifauna

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
5F	Construction, operation and decommissioning of powerlines and substation in conjunction with wind farms, agriculture, roads, mining, etc	Displacement due to disturbance and mortality of avifauna.	Negative	3	4	4	2	4	42	Moderate

Impact Assessment after mitigation: Cumulative - Avifauna

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
5F	Construction, operation and decommissioning of powerlines and substation in conjunction with wind farms, agriculture, roads, mining, etc	Displacement due to disturbance and mortality of avifauna.	Negative	2	4	4	2	4	28	Low

11.1.7 Air Quality and Noise

Nuisance impacts are associated with the construction and decommissioning phases.

11.1.7.1 Construction Phase

During the construction phase, noise generated by construction vehicles, machinery and equipment and the presence of construction personnel can contribute to ambient noise levels in the area. Drilling and blasting may be required in some areas to facilitate cut- and fill-operations. Concrete mixers and cranes will also generate noise during the construction phase.

Daytime construction noise is expected to be of low significance and no specific mitigation is recommended. Night-time construction activities are considered possible, as the pouring of cement must be concluded once started to prevent the formation of joints.

Atmospheric emissions during construction are associated with dust and emissions from land clearing, drilling, and blasting (if required), ground excavation, cut and fill operations and the movement of heavy construction vehicles on dirt roads. Pollutants associated with construction activities are typically Total Suspended Particulates (TSP), Particulate Matter (PM₁₀ and PM_{2.5}) with lesser contributions from vehicle exhausts.

Impact Assessment before mitigation: Construction Phase – Air Quality and Noise

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
6A	Land clearing, drilling, and blasting, ground excavation (if required), cut and fill operations and the movement of heavy construction vehicles on dirt roads.	Increase in dust and emissions due to movement of vehicles and site clearing during construction.	Negative	4	4	3	1	3	44	Moderate

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
6B	Land clearing, drilling, and blasting, ground excavation (if required), cut and fill operations and the movement of heavy construction vehicles on dirt roads.	Negative changes to the sense of place.	Negative	4	2	4	1	3	40	Moderate
6C	Land clearing, drilling, and blasting, ground excavation (if required), cut and fill operations and the movement of heavy construction vehicles on dirt roads.	Daytime construction activities potentially increasing the existing ambient sound levels.	Negative	3	3	3	1	3	30	Low
6D	Land clearing, drilling, and blasting, ground excavation (if required), cut and fill operations and the movement of heavy construction vehicles on dirt roads.	Night time construction activities potentially increasing the existing ambient sound levels.	Negative	3	3	3	1	3	30	Low

Impact Assessment after mitigation: Construction Phase - Air Quality and Noise

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
6A	Land clearing, drilling, and blasting, ground excavation (if required), cut and fill operations and the movement of heavy construction vehicles on dirt roads.	Increase in dust and emissions due to movement of vehicles and site clearing during construction.	Negative	2	4	2	1	3	20	Low
6B	Land clearing, drilling, and blasting, ground excavation (if required), cut and fill operations and the movement of heavy construction vehicles on dirt roads.	Negative changes to the sense of place.	Negative	3	2	3	1	3	27	Low

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
6C	Land clearing, drilling, and blasting, ground excavation (if required), cut and fill operations and the movement of heavy construction vehicles on dirt roads.	Daytime construction activities potentially increasing the existing ambient sound levels.	Negative	2	3	3	1	3	20	Low
6D	Land clearing, drilling, and blasting, ground excavation (if required), cut and fill operations and the movement of heavy construction vehicles on dirt roads.	Night time construction activities potentially increasing the existing ambient sound levels.	Negative	2	3	3	1	3	20	Low

Mitigation Measures: Construction Phase - Air Quality and Noise

- Make use of dust suppression techniques to minimise dust entrainment along unpaved roads and during periods of high wind speeds.
- Restrict speed limits on unpaved areas and roads.
- Where possible, minimise vehicle weights and the number of vehicles using unpaved roads.
- Ensure trucks transporting sand and other dust generating material are covered with tarpaulins.
- Scheduling of noisy activities such a pile driving, rock breaking and excavation during the daytime period.
- Further the Engineering, Procurement and Construction (EPC) contractor will have to liaise with receptors if construction activity in their proximity cannot be avoided, to ensure receptors are informed of the nature and duration of the disturbance.
- If construction necessitates blasting, inform nearby residences and road users of planned blasting activities ahead of time.
- Ensure regular vehicle maintenance is undertaken, as per supplier specification, to prevent the noise and emissions that can be generated by vehicles and machinery in disrepair.
- Disturbed areas to be limited to the footprint as depicted in the layout plan.
- Do not clear vegetation or topsoil from areas not directly affected by construction activities.
- Do not leave areas bare for extended periods, only clear vegetation as construction progresses.

11.1.7.2 Operational Phase

No atmospheric emissions are associated with the Operational Phase of the grid connection and associated infrastructure.

Substation noises are possible during the Operational Phase. There could be “vibrations” or a “hum” from the substations when the voltage frequency is at 50 Hz, it will take place 100 times per second which will result in a tonal noise of 100 Hz. However, the “vibrations” or “hum” become inaudible at 200 metres away from the substation (EARES, April 2022).

Transmission line noise is called corona noise. Noise occurs when there is a breakdown of the insulation properties of the air that surrounds the conduction wires. Corona noise can be described as “crackling” or “buzzing”, this sound can only be heard during fog or rain. “As such Electrical Service Providers, such as ESKOM, go to great lengths to design power transmission equipment to minimise the formation of corona discharges. In addition, it is an infrequent occurrence with a relatively short duration compared to other operational noises” (EARES, April 2022).

Noise emanating from substations and transmission lines is considered insignificant therefore the impacts have not been rated and no specific mitigation is deemed necessary.

11.1.7.3 Decommissioning Phase

During the Decommissioning Phase, similar impacts with regards to noise and emissions as assessed in the Construction Phase are possible. However, the potential for a noise impact to occur during the decommissioning and closure phase is expected to be much lower than that of the construction phases this is because:

- Decommissioning activities are normally limited to the daytime period, due to the lower urgency associated with the project phase; and
- Decommissioning activities normally use smaller and less equipment, generating less noise than the typical construction or operational phases.

Mitigation measures as outlined in the Construction Phase should be implemented to manage nuisance dust and emissions. No further impact rating or additional management measures are deemed necessary.

11.1.7.4 Cumulative Impacts

Cumulative impacts may be associated with dust and noise generation during the construction phase, if construction of the grid infrastructure is undertaken simultaneously to that of the South WEF, North WEF and North Grid infrastructure. The significance of the impacts are considered to be low with the implementation of mitigation measures.

Impact Assessment before mitigation: Cumulative – Air Quality and Noise

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
6E	Construction, operation and decommissioning of powerlines and substation in conjunction with wind farms, agriculture, roads, mining, etc	Land clearing, drilling, and blasting, ground excavation (if required), cut and fill operations and the movement of heavy construction vehicles on dirt roads causing negative change to sense of place and increase in ambient sound levels.	Negative	4	3	3	2	4	48	Moderate

Impact Assessment after mitigation: Cumulative - Air Quality and Noise

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
6E	Construction, operation and decommissioning of powerlines and substation in conjunction with wind farms, agriculture, roads, mining, etc	Land clearing, drilling, and blasting, ground excavation (if required), cut and fill operations and the movement of heavy construction vehicles on dirt roads causing negative change to sense of place and increase in ambient sound levels.	Negative	2	3	3	2	4	24	Low

11.1.8 Visual

The degree of visibility of an object informs the level and intensity of the visual impact, but factors such as the landscape and aesthetic context of the environment in which the object is placed, as well as the perception of the viewer, also influence the nature of the visual impact (SiVEST, April 2022).

The Project Components are a representation of human (anthropogenic) alteration, and not features of the natural environment, and thus likely to be perceived as visually intrusive when placed in largely undeveloped landscapes. However, significant transformation in parts of the study area has resulted in considerable degradation of the scenic quality of the landscape (SiVEST, April 2022).

11.1.8.1 Construction Phase

During the construction phase, visual impacts are experienced due to the presence of large construction vehicles, equipment, laydown areas and material stockpiles. Site clearance and earthworks create visual scarring of the landscape while dust emissions from construction activities and traffic, and potential littering from construction camps also alter the visual resource negatively. The significance of visual impacts during construction are expected to be Low, but will be further reduced with the implementation of mitigation measures (SiVEST, April 2022).

Impact Assessment before mitigation: Construction Phase – Visual

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
7A	Large construction vehicles, equipment and material stockpiles. Dust emissions and dust plumes from vegetation clearance, stockpiles, bare areas and increased traffic on the gravel roads. Surface disturbance from exposed bare soil resulting in visual scarring. Littering on the construction site.	Potential alteration of the visual character and sense of place Potential visual impact on receptors in the study area. Potential visual impact on the night time visual environment.	Negative	3	2	3	2	2	27	Low

Impact Assessment after mitigation: Construction Phase – Visual

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
7A	Large construction vehicles, equipment and material stockpiles. Dust emissions and dust plumes from vegetation clearance, stockpiles, bare areas and increased traffic on the gravel roads. Surface disturbance from exposed bare soil resulting in visual scarring. Littering on the construction site.	Potential alteration of the visual character and sense of place Potential visual impact on receptors in the study area. Potential visual impact on the night time visual environment.	Negative	3	2	3	2	1	24	Low

Mitigation Measures: Construction Phase - Visual

- Carefully plan to minimise the construction period and avoid construction delays.
- Inform receptors within 500M of the proposed power line of the construction programme and schedules.
- Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.
- Vegetation clearing must take place in a phased manner.
- Position storage / stockpile areas in unobtrusive positions in the landscape, where possible.
- Make use of existing gravel access roads where possible.
- Ensure that dust suppression techniques are implemented:
 - on all access roads;
 - in all areas where vegetation clearing has taken place;
 - on all soil stockpiles.
- Maintain a neat construction site by removing litter, rubble and waste materials regularly.
- Limit the number of vehicles and trucks travelling to and from the construction site, where possible.

11.1.8.2 Operational Phase

Power line towers and pylons are by their nature very large objects and thus highly visible. It is understood that the maximum tower height envisaged for the proposed power line is expected to be 35m and will thus be visible from a considerable distance. Clearing of vegetation from the proposed power line servitude can further increase the visibility and incongruity of the power line (SiVEST, April 2022).

The proposed grid connection infrastructure is intended to connect the South WEF project to the Eskom Grid and as such, will only be built if that project goes ahead. The power lines, substations and switching station are therefore likely to be perceived as part of the greater WEF development and the visual impact will be relatively minor when compared to the visual impact associated with the Complex as a whole. Much of the proposed power line route follows existing power lines, further reducing the visual impact. The following impact zones have been determined for the Project by SiVEST:

- 0 – 500m (high impact zone);
- 500m – 2km (moderate impact zone);
- 2km – 5km (low impact zone).

Of the 35 *potentially* sensitive receptors identified within 5km of the assessment corridor, only 1 potentially sensitive receptor (VR85) is expected to experience high levels of visual impact.

While no mitigation is possible for the visual impacts associated with the presence of the power lines during the Operational Phase, LILLO Corridor Option 1 – (Substation 1 and associated power line corridor) is considered the preferred option. Power Line Corridor Option 1 was found to be favourable (SiVEST, April 2022).

Impact Assessment before mitigation: Operational Phase – Visual

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
7B	Presence of the powerline and substation.	Potential alteration of the visual character and sense of place Potential visual impact on receptors in the study area.	Negative	5	1	1	4	1	35	Low
7C	Security and operational lighting at the substation at night.	Potential alteration of the visual character and sense of place Potential visual impact on receptors in the study area.	Negative	3	2	2	4	2	30	Low

Impact Assessment after mitigation: Operational Phase – Visual

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
7B	Presence of the powerline and substation.	Potential alteration of the visual character and sense of place Potential visual impact on receptors in the study area.	Negative	5	1	1	4	1	35	Low
7C	Security and operational lighting at the substation at night.	Potential alteration of the visual character and sense of place Potential visual impact on receptors in the study area.	Negative	3	2	2	4	1	27	Low

Mitigation Measures: Operational Phase - Visual

- As far as possible, limit the amount of security and operational lighting present on site (applicable to the substation).
 - Light fittings for security at night should reflect the light toward the ground (down hooded) and prevent light spill.
 - Lighting fixtures should make use of minimum lumen or wattage.
 - Mounting heights of lighting fixtures must be limited, or alternatively foot-light or bollard level lights could be used.
 - If possible, make use of motion detectors on security lighting.
- As far as possible, limit the number of maintenance vehicles which are allowed to access the site.

11.1.8.3 Decommissioning Phase

As experienced in the construction phase, the presence of machinery and vehicles associated with the decommissioning phase will cause visual intrusion. Dust emissions from decommissioning activities and traffic will also have a visual impact, along with visual scarring of the landscape as a result of infrastructure removal. Potential visual intrusion of infrastructure remaining on site is also possible.

Impact Assessment before mitigation: Decommissioning Phase – Visual

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
7D	Vehicles and equipment involved in decommissioning. Exposed bare soil. Dust emissions and dust plume. Infrastructure remaining on site after decommissioning.	Visual intrusion caused by vehicles and equipment, dust, and remaining infrastructure.	Negative	3	2	3	2	2	27	Low

Impact Assessment after mitigation: Decommissioning Phase – Visual

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
7D	Vehicles and equipment involved in decommissioning. Exposed bare soil. Dust emissions and dust plume. Infrastructure remaining on site after decommissioning.	Visual intrusion caused by vehicles and equipment, dust, and remaining infrastructure.	Negative	3	2	3	2	1	21	Low

Mitigation Measures: Decommissioning Phase - Visual

- All infrastructure that is not required for post-decommissioning use must be removed.
- Carefully plan to minimize the decommissioning period and avoid delays.
- Maintain a neat decommissioning site by removing rubble and waste materials regularly.
- Position storage / stockpile areas in unobtrusive positions in the landscape, where possible.
- Ensure that dust suppression procedures are maintained on all gravel access roads throughout the decommissioning phase.
- All cleared areas are to be rehabilitated as soon as possible.
- Rehabilitated areas must be monitored post-decommissioning and remedial actions implemented as required.

11.1.8.4 Cumulative Impacts

Combined visual impacts from mining, industrial, infrastructural and renewable energy development in the broader area will alter the sense of place and visual character of the area, and could potentially exacerbate visual impacts on visual receptors.

The significance of visual impacts associated with the grid connection infrastructure are expected to be Moderate, this can be further reduced with the implementation of mitigation measures (SiVEST, April 2022).

Impact Assessment before mitigation: Cumulative – Visual

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
7E	Construction, operation and decommissioning of powerlines and substation in conjunction with wind farms, agriculture, roads, mining, etc	Land clearing, drilling, and blasting, ground excavation (if required), cut and fill operations and the movement of heavy construction vehicles on dirt roads causing negative change to sense of place and increase in ambient sound levels.	Negative	5	2	2	4	3	55	Moderate

Impact Assessment after mitigation: Cumulative - Visual

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
7E	Construction, operation and decommissioning of powerlines and substation in conjunction with wind farms, agriculture, roads, mining, etc	Land clearing, drilling, and blasting, ground excavation (if required), cut and fill operations and the movement of heavy construction vehicles on dirt roads causing negative change to sense of place and increase in ambient sound levels.	Negative	3	2	2	4	3	33	Moderate

11.1.9 Socio-economic

Economic impacts can be defined as the effects (positive or negative) on the level of economic activity in a given area(s). The net economic impact is usually measured as the expansion or contraction of an area's economy, resulting from the changes (i.e., opening, closing, expansion or contraction) of a facility, project, or programme (Urban-Econ, April 2022).

All new projects/interventions have two basic types of investments namely an initial capital injection/expenditure (CAPEX) that are once-off impacts that will only occur for the duration of construction, and operational economic impacts, which are sustainable and thus are calculated as an annual impact based on operational expenditure (OPEX) for a given year (Urban-Econ, April 2022).

The net economic impact of an exogenous change in the economy will be translated according to various direct and indirect economic effects.

11.1.9.1 Construction Phase

The total impact on production/business sales is likely to equate to R 60 million (direct, indirect and induced) for the duration of construction and will largely be spent in Mpumalanga and Gauteng. The total impact on GDP (direct, indirect, and induced) is likely to be R 69,8 million and create 30 full time equivalent (FTE) employment positions over the construction period of 12 months with the total impact on employment being 122 FTE employment positions. These will largely be felt through the construction sector and through the value chains associated with the construction of powerlines and substations (Urban-Econ, April 2022).

Positive impacts during the construction phase relate to the temporary stimulation of the national and local economy, temporary increase in employment, contribution to skills development, temporary increase in household earnings and temporary increase in government revenue.

Negative impacts during construction relate to changes to the sense of place and potential negative impacts associated with visual or noise disruptions. However, due to the current activities in the area and existing powerlines along the majority of the proposed powerline routes, the proposed Project will not have a significant impact on the sense of place.

Additionally, influx of people into the area can result in increased social conflicts and increased pressure on local economic and social infrastructure, as well as increased temporary increase in the level of crime, illicit activity and possibly a deterioration of the health of the local community through the spread of infectious diseases. The impact should be relatively small, as the powerline's construction time is only 12 months with 30 direct people on site (Urban-Econ, April 2022).

Impact Assessment before mitigation: Construction Phase – Socio-economic

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
8A	Construction activities of the Powerline	Temporary increase in the GDP and production of the national and local economies during construction.	Positive	4	1	4	1	5	44	Moderate
8B	Employees need to conduct construction activities	Temporary increase employment in the national and local economies.	Positive	4	1	3	1	4	36	Low

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
8C	Skills learned by employees during construction	Contribution to skills development in the country and local economy.	Positive	2	1	3	1	3	16	Insignificant
8D	Employees' salaries	Temporary increase in household earnings.	Positive	4	1	4	1	4	40	Moderate
8E	Public spending	Temporary increase in government revenue.	Positive	3	2	2	1	4	27	Low
8F	Construction activities of the Powerline	Negative changes to the sense of place as a result of dust and noise generation.	Negative	4	2	3	1	3	36	Low
8G	Construction activities on farms	Impact on the agriculture operations as a result of noise and space.	Negative	2	3	3	1	2	18	Insignificant
8H	Influx of people	Temporary increase in social conflicts.	Negative	3	2	4	1	4	33	Low
8I	Increase in local traffic and migration of construction workers.	Impact on economic and social infrastructure (basic services).	Negative	3	2	3	1	4	30	Low

Impact Assessment after mitigation: Construction Phase - Socio-economic

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
8A	Construction activities of the Powerline	Temporary increase in the GDP and production of the national and local economies during construction.	Positive	4	1	5	1	5	48	Moderate
8B	Employees need to conduct construction activities	Temporary increase employment in the national and local economies.	Positive	4	1	4	1	4	40	Moderate

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
8C	Skills learned by employees during construction	Contribution to skills development in the country and local economy.	Positive	3	1	4	1	3	27	Low
8D	Employees' salaries	Temporary increase in household earnings.	Positive	5	1	5	1	4	55	Moderate
8E	Public spending	Temporary increase in government revenue.	Positive	4	2	4	1	4	44	Moderate
8F	Construction activities of the Powerline	Negative changes to the sense of place as a result of dust and noise generation.	Negative	4	2	2	1	3	32	Low
8G	Construction activities on farms	Impact on the agriculture operations as a result of noise and space.	Negative	2	2	3	1	2	16	Insignificant
8H	Influx of people	Temporary increase in social conflicts.	Negative	3	2	3	1	4	30	Low
8I	Increase in local traffic and migration of construction workers.	Impact on economic and social infrastructure (basic services).	Negative	3	2	2	1	4	27	Low

Mitigation Measures: Construction Phase - Socio-economic

- The developer should encourage the contractor to increase the local procurement practices and promote the employment of people from local communities.
- Co-ordinate with the local municipality and relevant labour unions to inform the local labour force about the project that is planned to be established and the jobs that can potentially be applied for.
- Facilitate a broader skills development programme as part of socio-economic development commitments.
- Recruit local labour as far as feasible to increase the benefits to the local households. Employ labour intensive methods in construction where feasible. Sub-contract to local construction companies where possible.
- Natural areas that are not affected by the footprint should remain as such. Efforts should also be made to avoid disturbing such sites during construction.
- Controlling dust and noise at source by ensuring equipment is well-maintained to prevent noise they would make if in disrepair.

- Ensure that the farm owners are aware of construction activities that will take place on their premises. Assign a dedicated person to deal with complaints and queries.
- Employ locals as far as feasible through the creation of a local skills database.
- Provide adequate signage along the access roads to warn motorists of the construction activities taking place on the site.

11.1.9.2 Operational Phase

Infrastructure during the operational period will be handed over to Eskom and Eskom will need to maintain the powerline and substation. No impacts could be analysed as no employment will be created for the Project from the powerline operations.

Mitigation Measures: Operational Phase - Socio-economic

No mitigation measures necessary.

11.1.9.3 Decommissioning Phase

The Complex is expected to have a lifespan of some 20+ years, after which time the project infrastructure would have to be refurbished / upgraded, to prolong the life of the Project, or disbanded and the site rehabilitated. If the Complex is decommissioned, the grid connection will be disconnected and the associated infrastructure may be decommissioned. Eskom will be responsible for the decommissioning phase. The land will be rehabilitated and returned to pre-project conditions.

The impacts that can occur during decommissioning would be similar to those observed during the construction phase and thus have not been rated again. These impacts would however be experienced over a much shorter period and would be associated with significantly lower gains. Some impacts on the local infrastructure and the lives of the communities in the area could take place, however, they will also be short lived (Urban-Econ, April 2022).

11.1.9.4 Cumulative Impacts

The Project will connect the South WEF to the National Grid. While the Project alone is unlikely to make a large impact on the shortages of electricity in the country, the cumulative impact of all the proposed wind energy products in the country will be substantial. The combined energy production for the Complex will be up to 400 MW which begins to reflect a notable positive injection into the energy generation capacity from the region (Urban-Econ, April 2022).

The project will also contribute to negative direct, secondary and cumulative impacts on the local communities, specifically through (1) the influx of workers and job seekers from outside of the local community and (2) visual and noise disturbances that would be created by the construction activities. The net positive impacts associated with the Project are however expected to outweigh the net negative effects (Urban-Econ, April 2022).

Impact Assessment before mitigation: Cumulative – Socio- Economic

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
8J	Construction, operation and decommissioning of powerlines and substation in conjunction with wind farms, agriculture, roads, mining, etc	The influx of workers and job seekers from outside of the local community and visual and noise disturbances that would be created by the construction activities.	Negative	4	1	4	1	4	40	Moderate

Impact Assessment after mitigation: Cumulative - Socio- Economic

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
8J	Construction, operation and decommissioning of powerlines and substation in conjunction with wind farms, agriculture, roads, mining, etc	The influx of workers and job seekers from outside of the local community and visual and noise disturbances that would be created by the construction activities.	Negative	3	1	4	1	4	30	Low

11.1.10 Archaeology, Palaeontology and Cultural Heritage Resources

The National Heritage Resources Act, 1999 (Act 25 of 1999) (NHRA) defines “heritage resource” as “any place or object of cultural significance”. For the purposes of the impact assessment, these include archaeological and palaeontological resources.

Any impact to a heritage resource will be considered permanent, because such resources are non-renewable. The Magnitude of impacts to heritage resources relate to the degree of destruction / damage to the heritage resource, and the uniqueness or sensitivity thereof.

Based on the nature of the Project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the correct age and type to contain fossils, although NO FOSSILS were found during the site visit surveys. An extremely small chance remains that fossils from beneath soils in the Vryheid Formation may be disturbed if excavations for foundations are deeper than about 5m.

11.1.10.1 Construction Phase

Both powerline Options A and B are located close to identified graves and can potentially have an indirect impact these.

- 095 is located within 15 metres of Option A;
- 095 is located within 17 metres of Option B;
- 096 is located within 10 metres of Option A;

- 096 is located within 14 metres of Option B.

These sites must be preserved *in situ* with a 30m buffer as mitigation, after mitigation the impact will be Low. Any additional effects to subsurface heritage resources and fossils can be successfully mitigated by implementing a Chance Find Procedure.

Impact Assessment before mitigation: Construction Phase – Archaeology, Palaeontology and Cultural

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
9A	Construction of infrastructure	Clearing, levelling and construction activities will permanently destroy unidentified heritage features.	Negative	2	2	3	5	2	24	Low
9B	Construction of infrastructure	Construction activities could permanently destroy heritage features (graves at 095 and 096) (Route Options A and B).	Negative	5	4	5	5	3	85	Significant
9C	Excavation below 5m	Disturbance of fossils.	Negative	2	3	2	5	1	22	Low

Impact Assessment after mitigation: Construction Phase - Archaeology, Palaeontology and Cultural

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
9A	Construction of infrastructure	Clearing, levelling and construction activities will permanently destroy unidentified heritage features.	Negative	1	2	2	5	2	11	Insignificant
9B	Construction of infrastructure	Construction activities could permanently destroy heritage features (graves at 095 and 096).	Negative	3	3	3	5	2	39	Low
9C	Excavation below 5m	Disturbance of fossils.	Negative	1	1	1	1	1	4	Insignificant

Mitigation Measures: Construction Phase - Archaeology and Cultural

- The study area should be subjected to a final heritage walkthrough prior to development to identify and mitigate potential impacts to heritage resources.
- Avoidance of the graves at 095 and 096 and manage these *in-situ* with a 30 m buffer.
- if this is not possible the graves can be relocated adhering to all legal requirements.
- Implement the chance-find procedure during construction.

11.1.10.2 Operational Phase

No impacts to palaeontological resources are foreseen during the operational phase, as no further excavations are envisaged.

Once the disturbance associated with the construction phase is complete, no further disturbance of heritage resources are foreseen.

As no impacts are expected, no mitigation is considered necessary.

11.1.10.3 Decommissioning Phase

No new impacts to palaeontological resources are foreseen during the decommissioning phase, as no additional deep excavations are envisaged outside of footprints already excavated in the construction phase.

Decommissioning phase activities will be limited to the development footprint – if no heritage resources were affected in the construction phase (i.e. by the *in-situ* preservation of the graves and ruins) no further impacts are expected during the decommissioning phase.

As there are no impacts expected, no mitigation is deemed necessary.

The archaeological and palaeontological chance-find procedures will remain relevant during the Decommissioning Phase.

11.1.10.4 Cumulative Impacts

The importance of identifying and assessing cumulative impacts on heritage resources, is that the whole is often greater than the sum of its parts. In the case of this Project, potential impacts to heritage resources can be mitigated to an acceptable level. However, this and other projects in the area can have a negative impact on heritage sites in the area where these sites may have been destroyed unknowingly (Beyond Heritage, April 2022).

Heritage Resources identified on site include graves (high significance) and ruins (low significance). Impacts to the graves must be avoided (preserve these resources *in-situ* with the implementation of an access protocol) with relevant buffers applied. As this Project is not expected to contribute to the destruction of a heritage resource, no cumulative contribution is expected from the Project.

11.1.11 Transport and Traffic

The main route to site is via the R542 located on the northern boundary of the Complex. The access points and internal roads associated with the South WEF project will be used to access the proposed substations and power lines. Existing roads will be used as far as possible however additional tracks may be required to access sections of the power line route.

The Transport Study (JG Afrika, 2022) investigated three main transportation activities associated with the Project:

- Material and component delivery;
- Construction machinery; and
- Site personnel and workers.

11.1.11.1 Construction Phase

Construction material and components are expected to be locally sourced and transported using National and Regional Roads. It is expected that the components can generally be transported with normal heavy load vehicles, expected abnormal loads are associated with lifting equipment required to off-load and assemble the components. Impacts are associated with potential traffic congestion and delays, and associated dust and noise pollution (JG Afrika, 2022).

Impact Assessment before mitigation: Construction Phase – Transport and Traffic

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
10A	Transport of equipment, material and staff to site	Traffic congestion and associated dust and noise generation.	Negative	4	2	3	2	3	40	Moderate

Impact Assessment after mitigation: Construction Phase - Transport and Traffic

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
10A	Transport of equipment, material and staff to site	Traffic congestion and associated dust and noise generation.	Negative	3	2	2	2	3	27	Low

Mitigation Measures: Construction Phase - Transport and Traffic

- Component delivery site must be staggered and trips must be scheduled to occur outside of peak traffic periods.
- Reduce construction period as far as possible.
- Dust suppression on gravel roads during the construction (and decommissioning) phases, as required.
- Regular maintenance of gravel roads by the contractor during the construction (and decommissioning phases).
- Use on-site batching plants and quarries in close proximity to the site would decrease the impact on the surrounding road network.

- Staff and general trips should occur outside of peak traffic periods as far as possible.

11.1.11.2 Operational Phase

The traffic generated during the Operational Phase will be minimal and intermittent (occasional maintenance and security) and will not have any impact on the surrounding road network (JG Afrika, 2022).

No mitigation required.

11.1.11.3 Decommissioning Phase

The Decommissioning Phase will have the same impact as the Construction Phase i.e. traffic congestion, air pollution and noise pollution, as similar trips/movements are expected (JG Afrika, 2022). Mitigation measures as proposed for the construction phase must be implemented.

No further impact rating or additional management measures are deemed necessary.

11.1.11.4 Cumulative Impacts

To assess the cumulative impact, it was assumed that all renewable energy projects (and associated grid connection) in the immediate vicinity of this study area would be constructed at the same time. This is the precautionary approach as in reality; these projects would be subject to a highly competitive bidding process, and only a few projects would be selected to enter into a power purchase agreement with Eskom. Thus, construction is likely to be staggered depending on project-specific issues.

The construction and decommissioning phases are the only significant traffic generators for renewable energy projects. The duration of these phases are short term (i.e., the impact of the generated traffic on the surrounding road network is temporary). Renewable energy facilities, when operational, do not add any significant traffic to the road network. Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable (JG Afrika, April 2022).

11.1.12 Waste Generation

The construction of the Project will be associated with the generation of hazardous- and general waste at the site. General waste will typically include cleared vegetation (biomass), spoil material from excavations, uncontaminated building rubble, and general domestic waste like food waste, paper waste etc. If not handled and disposed of properly, litter is likely and will impact on the visual environment and sense of place, and affect the surrounding environment with particular emphasis on water resources and animals in the area.

Waste generation can also attract problem species (rats, mice) to the area affecting the health of staff and surrounding receptors.

Hazardous waste (including used hydrocarbon containers, oily rags and sewage waste) can be associated with chemical and biological contamination of soil and water resources, and

poisoning of animals, as opposed to the physical contamination caused by general waste if not handled and disposed of correctly.

Impact Assessment before mitigation: Construction Phase – Waste Generation

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
11A	Generation of general and hazardous waste, including sewage waste.	Incorrect waste disposal leading to environmental pollution.	Negative	4	3	3	1	3	40	Moderate

Impact Assessment after mitigation: Construction Phase - Waste Generation

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
11A	Generation of general and hazardous waste, including sewage waste.	Incorrect waste disposal leading to environmental pollution.	Negative	2	3	2	1	3	18	Insignificant

Mitigation Measures: Construction Phase - Waste Generation

- Designated waste area must be established with the placement of skips to contain various waste streams.
- Skips must be covered with a tarp to prevent windblown litter
- A designated and appropriately demarcated and covered hazardous waste storage area or skip must be established on a hard standing area.
- Ensure cognisance of the following SANS codes of practice:
 - SANS 10234: Classification and Labelling of Chemicals
 - SANS 10228: The Identification and Classification of Dangerous Substances
 - SANS 10229: Packing of Dangerous Goods for Road and Rail Transportation
- Ensure that waste manifest documentation (as per the draft Classification and Management Regulations, GNR.614 of 2012) is prepared and maintained for the generation, transportation and disposal of hazardous waste.
- Provide adequate number of waste bins on site throughout construction. Enable the separation of hazardous and general waste at source by providing separate colour-coded or labelled bins in appropriate areas.
- Ensure bins are covered to prevent wind-blown litter.
- Create awareness among construction personnel on the importance of proper waste handling.
- Ensure that waste receptacles are regularly collected by reputable service providers for proper recycling or disposal (as appropriate).
- Ensure portable, chemical toilets are regularly serviced by reputable contractors.
- Keep safe disposal certificates on file for all hazardous waste (including sanitation waste) removed from the site.

11.1.12.1 Operational Phase

Activities during the Operational Phase are limited to maintenance. Waste quantities generated by maintenance personnel is expected to be insignificant, with the resultant potential impacts from waste generation also being considered insignificant and no specific rating or mitigation are considered necessary.

11.1.12.2 Decommissioning Phase

The proposed Project is intended to connect the South WEF project to the National Grid. The anticipated operational phase of the South WEF is approximately 20 years after which time the project infrastructure would have to be refurbished / upgraded to extend the life past the 20 years; in which case the South Grid infrastructure will remain operational. Alternatively if the life of the South WEF project is not extended past 20 years the facility will be decommissioned and the grid infrastructure will be disconnected and dismantled.

During the decommissioning phase, similar waste types and quantities as experienced in the construction phase are anticipated and as such the significance thereof has not be re-assessed. Mitigation measures as proposed for the construction phase must be implemented, additional mitigation measures include:

- Should the infrastructure be decommissioned, all infrastructure must be dismantled and be transported off-site by registered waste transporter.
- Re-use and recycle the components as far as possible.
- Where components cannot be recycled, these must be disposed of at licensed waste management facilities (per type of waste).

11.1.12.3 Cumulative Impacts

The impacts associated with the Project are insignificant (post mitigation) and therefore it follows logically that the cumulative impacts will be low.

In the context of the existing developments in the vicinity of the Project site, insufficient waste management has however led to cumulative impacts on watercourses (notably the Olifants River) and incidents of illegal dumping of waste. The Project must therefore not be allowed to contribute to the existing impacts of waste on the environment.

11.1.13 Storage and Use of Dangerous Goods / Hazardous Substances

Hydrocarbons, chemicals and cement will be stored and used on the site during the construction phase. Releases of these materials into the environment would lead to soil, surface- and groundwater pollution.

Releases referred to could be as a result of an accidental spill, a deliberate release if construction personnel are not educated in the disposal of such materials, leaky equipment or as a result of failure of containment systems.

Impact Assessment before mitigation: Construction Phase – Dangerous Goods/Hazardous Substances

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
12A	Dangerous Goods	Incorrect storage and Use of Dangerous Goods / Hazardous Substances leading to environmental pollution.	Negative	3	3	3	3	3	36	Low

Impact Assessment after mitigation: Construction Phase - Dangerous Goods/Hazardous Substances

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
12A	Dangerous Goods	Incorrect storage and Use of Dangerous Goods / Hazardous Substances leading to environmental pollution.	Negative	2	3	3	3	3	24	Low

Mitigation Measures: Construction Phase - Dangerous Goods/Hazardous Substances

- Develop and implement a procedure for the management of all hydrocarbon spillages.
- Ensure that the use of hazardous chemical substances is controlled – only sufficiently trained personnel may be allowed to access and handle such substances.
- Spill kits must be available, and accessible, in strategic locations throughout the site. Personnel must be trained in the use of spill kits, and accidental spills must be cleaned up as soon as it is safe to do so.
- Develop and implement a procedure for the storage and handling of chemicals, hydrocarbon materials and hazardous substances onsite. The procedure must ensure adherence to Hazardous Substances Act, 1973 (Act No 15 of 1973), and according to the supplier specification.
- All site personnel must receive training on the dangers associated with hazardous chemical substances on site, including the proper handling and storage and disposal requirements for such substances.
- Material Safety Data Sheets (MSDS) to be kept on site.
- Indicate the location of the fuel and chemical storage area on the layout plans.
- Securely fence and lock the storage areas to accommodate all hazardous substances such as fuel, oils and chemicals. The storage area must be covered and the floor must be an impermeable surface and suitably bunded as per the requirements outlined in SANS 10089-1 (2008).
- Maintain oil traps or interceptors on a regular basis and maintain records.
- Label all liquids (chemicals and hydrocarbons) stored onsite for easy identification. Material Safety data sheets (MSDS) for onsite chemicals, hydrocarbon materials and hazardous substances must be readily available. SDSs must include mitigation measures to ameliorate potential environmental impacts which may result from a spill, incorporating health and safety mitigation measures.

- Keep fuels, oils or other chemicals used outside of the bunded area to a minimum and use suitable secondary containment in the form of drip trays.
- Display “no smoking” and “no naked flame” signs in and around the project area, as well as near the hazardous material store.
- Strategically place the correct types of fire extinguishers onsite and near the hazardous material store. Train key personnel on basic firefighting skills.
- Ensure that vehicles and equipment are serviced as per specification to prevent leaks that could occur if vehicles and equipment are in disrepair. Scheduled servicing and maintenance of vehicles to be undertaken off-site. Supply drip trays in emergency situations to contain leaks until repairs can be concluded.

11.1.13.1 Operational Phase

No dangerous goods / hazardous substances will be stored on site during the operational phase.

11.1.13.2 Decommissioning Phase

During the decommissioning phase, hydrocarbons and chemicals types and quantities as experienced in the construction phase, and thus similar impacts are anticipated, these have not been rated again. The same mitigation measures that applied during the construction phase will also be relevant to the decommissioning phase.

11.1.13.3 Cumulative Impacts

The existing developments in the vicinity of the site including mines and farms are also associated with the storage and use of potentially polluting substances, the proposed Project must be prevented from contributing to any existing impacts.

12 Environmental Impact Statement

Based on the impact assessment that has been undertaken (Section 11), the following potential negative impacts were rated as **High or Significant**, before the implementation of mitigation measures:

- (5C): **Avifauna**- Mortality of priority species due to collisions with the power. With mitigation, impact significance is reduced to Moderate.
- (9D): **Heritage**- Construction activities could permanently destroy heritage features (graves at 095 and 096) (Route Options A and B).With mitigation, impact significance is reduced to Low.

The following potential negative impacts were rated as **Moderate**, before the implementation of mitigation measures:

- (2E): **Water Resources**- Deterioration of groundwater quality: contamination could arise from mismanagement of materials and waste, incorrect disposal as well as handling of waste, spills (such as oil, diesel and sewage) and contaminated substances being disposed of in an unauthorised manner. With mitigation, impact significance is reduced to Low.

- (2H): **Water Resources**- Deterioration of surface and groundwater quality: Contamination could arise from mismanagement of materials and waste, incorrect disposal as well as handling of waste, spills (such as oil, diesel and sewage) and contaminated substances being disposed of in an unauthorised manner. With mitigation, impact significance is reduced to Low.
- (3B): **Aquatic Ecology**- Changes to wetland health and biodiversity by pollution: Contamination from Hydrocarbon waste (lubricants, oils, explosives, and fuels); Contamination from sewage and wastewater. With mitigation, impact significance is reduced to Low.
- (3C): **Aquatic Ecology**- Head cut erosion and channel forming from the roads (culverts); and increased erosion and consequently sedimentation potential into wetlands; loss of vegetation and habitat; and wetland fragmentation. With mitigation, impact significance is reduced to Low.
- (3D): **Aquatic Ecology**- Contamination from hydrocarbons and chemicals (lubricants, oils explosives, and fuels) and changes to wetland health and biodiversity. With mitigation, impact significance is reduced to Low.
- (3E): **Aquatic Ecology**- Uneven surfaces and topographies, causing water ponding and changes to the hydrogeomorphology of the wetlands; the proliferation of ALPs; exposure of soils and subsequent compaction, erosion, and sedimentation into the wetlands; deterioration of water quality; and potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of wetlands. With mitigation, impact significance is reduced to Low.
- (4A): **Terrestrial Ecology**- Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in permanent local loss of habitat. With mitigation, impact significance is reduced to Low.
- (4B): **Terrestrial Ecology**- Impact on integrity of Critical Biodiversity Areas.
- (5A): **Avifauna**- Displacement of priority avifauna due to disturbance associated with the construction of the substation and grid connection power line. With mitigation, impact significance is reduced to Low.
- (5B): **Avifauna**- Displacement of priority avifauna due to habitat transformation associated with the construction of the substation and grid connection power line. With mitigation, impact significance is reduced to Low.
- (5E): **Avifauna**- Displacement due to disturbance associated with the decommissioning of the substation and grid connection power line. With mitigation, impact significance is reduced to Low.
- (6A): **Air Quality**- Increase in dust and emissions due to movement of vehicles and site clearing during construction. With mitigation, impact significance is reduced to Low.
- (6B): **Air Quality and Noise**- Negative changes to the sense of place. With mitigation, impact significance is reduced to Low.
- (10A): **Transport and Traffic**- Traffic congestion and associated dust and noise generation. With mitigation, impact significance is reduced to Low.
- (11A): **Waste Management**- Incorrect waste disposal leading to environmental pollution. With mitigation, impact significance is reduced to Insignificant.

The following **positive** impacts were identified:

- (8A): **Socio-Economic**- Temporary increase in the GDP and production of the national and local economies during construction. Moderate Significance, can be increased to a slightly higher Moderate Significance if measures to enhance the impact are implemented.
- (8B): **Socio-Economic**- Temporary increase employment in the national and local economies. Low Significance, can be increased to Moderate if measures to enhance the impact are implemented.
- (8C): **Socio-Economic**- Contribution to skills development in the country and local economy. Insignificant Significance, can be increased to Low if measures to enhance the impact are implemented.
- (8D): **Socio-Economic**- Temporary increase in household earnings. Moderate Significance, can be increased to a slightly higher Moderate Significance if measures to enhance the impact are implemented.
- (8E): **Socio-Economic**- Temporary increase in government revenue. Low Significance, can be increased to Moderate if measures to enhance the impact are implemented.

12.1 Reasoned Opinion

As summarised above, the potential negative impacts associated with the Project, after the implementation of mitigation measures, that remain Moderate, are as follows:

- (5C): **Avifauna**- Mortality of priority species due to collisions with the power line.

None of these potential negative impacts, after mitigation, exceed a significance rating of Moderate. The following additional management/mitigation, and further motivation for the development are identified:

- (5C): **Avifauna**- Once the relevant spans have been identified, Eskom approved Bird flight diverters to be installed for the full span length on the earthwire (according to Eskom guidelines – five metres apart). Light and dark colour devices must be alternated to provide contrast against both dark and light backgrounds respectively.

Cumulative impacts associated with the Project, that remain Moderate – High after the implementation of mitigation measures, are associated with the impacts on terrestrial ecology. Clearance of vegetation is necessary in the construction phase and loss of habitat will occur. The area lost in total will be small compared to the total area of the vegetation type concerned. Cumulative impacts on SCC is largely associated with residual risks, and this can be reduced by means of final walk-through survey and the implementation of a plant rescue plan. Further to this an alien invasive management plan will minimise the potential spread of alien invasive species.

Considering that all identified negative impacts are manageable, and in light of the identified positive socio-economic impacts associated with the Project, it is the reasoned opinion of the EAP that the Project be considered for approval.

Granting of the Environmental Authorisation must be subject to compliance with the EMPr and the specific conditions stipulated below.

12.2 Specific Aspects to be Included as Conditions of Authorisation

- Hydrology report- It is recommended that small temporary diversion berms be constructed upstream of all construction sites to prevent runoff from draining through these sites and becoming contaminated. (Such to be undertaken in consideration of any drainage lines or proximity to water courses).
- Erosion prevention measures (e.g. grassing) should be implemented along all concrete surface areas (including the foundations of the transmission tower pylons and the substations) where there may be an increase in erosion and sediment being deposited downstream.
- Implementation of the ENERTRAG Heritage Chance Find Procedure for the project (Refer to the Heritage Impact Assessment Appendix F 11);
- Pre-construction heritage walkdown of final pylon positions;
- Avoidance of burial sites (095 & 096) with a 30 meter buffer;
- All known or suspected burial sites must be clearly demarcated and monitored for the duration of the construction
- The walk down report must be submitted to SAHRA for comment prior to construction. No construction may commence without come from SAHRA in this regard.
- Conduct a pre-construction inspection (walk-through) to identify Red List Avifauna species that may be breeding within the project footprint to ensure that the impacts on breeding species (if any) are adequately managed
- The Appointed EPC Contractor must compile a Rehabilitation Plan prior to the commencement of construction;
- The Appointed EPC Contractor must compile (prior to construction commencing) and implement (during construction) an alien invasive plant management plan, which highlights control priorities and areas and provides a programme for long-term control of alien invasive plants and weeds. The Plan included as an Appendix to the EMP_r can be used as the basis.
- During the detailed design phase of the project, design and implement a stormwater management plan based on the principles contained in the EMP_r Appendix. The stormwater management plan must, as a minimum, prevent erosion, and prevent stormwater that is potentially contaminated from entering downstream environments.
- Undertake a pre-construction walk-through of the final approved footprint areas to be affected by the Project, to identify any protected plant and animal species that may occur on these footprints. These plants may not be relocated or in any way damaged until a permit is obtained from the relevant conservation authorities.
- Community involvement must continue throughout all the phases of the Project. The Applicant must implement a line of communication (i.e., a help line where complaints could be lodged), and respond to complaints timeously.
- Throughout all Project Phases, local procurement should be prioritized whenever possible. Additionally, the Applicant must implement skills development programmes in the local communities.

- Component delivery to/ removal from the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- Any low hanging overhead lines (lower than 5.1m) e.g. Eskom and Telkom lines, along the proposed routes will have to be moved or raised to accommodate the abnormal load vehicles.

12.3 Specific Information required

The EIA report must also address the matters referred to in section 24(4)(a) and (b) of the NEMA. The provisions of this section, and how these are addressed in this report are shown in Table 31:

Table 31: How the provisions of NEMA Section 24(4)(a) and (b) are addressed in this report

Provision of NEMA	Relevance to this application and report
<i>(4) Procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment – (a) must ensure, with respect to every application for an environmental authorisation—</i>	
<i>(i) coordination and cooperation between organs of state in the consideration of assessments where an activity falls under the jurisdiction of more than one organ of state;</i>	<p>The DFFE has been identified as the competent authority in terms of the application.</p> <p>DWS is included in the public participation process and will be engaged as the competent authority pertaining to authorisations in terms of the NWA, in due course.</p> <p>The relevant conservation authorities and infrastructure / service delivery organs of state are also included in the consultation process.</p>
<i>(ii) that the findings and recommendations flowing from an investigation, the general objectives of integrated environmental management laid down in this Act and the principles of environmental management set out in section 2 are taken into account in any decision made by an organ of state in relation to any proposed policy, programme, process, plan or project;</i>	<p>It is assumed that the decision-making authorities will take the provisions of Section 2 of the NEMA into account when evaluating the project.</p>
<i>(iii) that a description of the environment likely to be significantly affected by the proposed activity is contained in such application;</i>	<p>Please see the baseline description in Section 8 of this Report.</p>

Provision of NEMA	Relevance to this application and report
<i>(iv) investigation of the potential consequences for or impacts on the environment of the activity and assessment of the significance of those potential consequences or impacts; and</i>	Please refer to Section 10 of this Report.
<i>(v) public information and participation procedures which provide all interested and affected parties, including all organs of state in all spheres of government that may have jurisdiction over any aspect of the activity, with a reasonable opportunity to participate in those information and participation procedures; and</i>	Please see Section 7 of this Report for a summary of the public participation process, and refer to Appendix G for detailed information and evidence of the process undertaken thus far.
(b) must include, with respect to every application for an environmental authorisation and where applicable—	
<i>(i) investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity;</i> <i>(ii) investigation of mitigation measures to keep adverse consequences or impacts to a minimum;</i>	Please refer to Section 6 for a discussion on Alternatives. Table 16 provides an assessment of the Alternatives considered. Mitigation measures are summarised in Section 10 and presented in detail in the EMPr (Appendix H and Appendix I).
<i>(iii) investigation, assessment and evaluation of the impact of any proposed listed or specified activity on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999), excluding the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act;</i>	A Heritage Impact Assessment has been completed for the Project (Appendix F 11) and sites included in the national estate (as defined in the NHRA, Section 3(2)) present on the site include graves and burial grounds, these were assessed to be of high social significance- GPA). Please refer to the impact assessment in Section 11
<i>(iv) reporting on gaps in knowledge, the adequacy of predictive methods and underlying assumptions, and uncertainties encountered in compiling the required information;</i>	Please see Section 13 of this report.
<i>(v) Investigation and formulation of arrangements for the monitoring and</i>	Please refer to the EMPr (Appendix H and Appendix I).

Provision of NEMA	Relevance to this application and report
<i>management of consequences for or impacts on the environment, and the assessment of the effectiveness of such arrangements after their implementation;</i>	
<i>(vi) consideration of environmental attributes identified in the compilation of information and maps contemplated in subsection (3); and</i>	Please refer to the Maps in Plan 19, as well as the Maps included in the Screening Tool Report appended to the Application Form (Appendix J)
<i>(vii) provision for the adherence to requirements that are prescribed in a specific environmental management Act relevant to the listed or specified activity in question.</i>	Provisions of the NEMWA, NHRA and NWA and other relevant legislation are included in this report, and, where relevant, the EMPr (Appendix H and Appendix I).

13 Assumptions, Limitations and Gaps in Knowledge

Any EIA will inevitably be associated with some level of uncertainty, due to the predictive nature of impact assessment. The impact predictions are, however, made with due consideration of available information, and previous experience of the impacts of comparable activities undertaken in comparable environments. The degree of confidence is therefore high.

Specific assumptions, limitations and gaps in knowledge encountered during the compilation of this Report and Specialist Studies (Appendix F) are summarised below (detailed assumptions and limitations are also included in each specialist study).

- Section 8 and Section 11, in certain segments, has been extracted from the various specialist studies.
- This study made the basic assumption that the sources of information used (as referenced) are reliable and accurate.
- The most recent known datasets were used by the EAP and Specialist Team to compile the desktop-level information provided in this report.
 - Where economic data was derived from the National Census data (most reliable data source), this information is considered outdated (from 2011 with the current 2022 census being underway). More recent data from other sources may be less reliable than Stats SA.
 - The MBSP data (MTPA, 2014) was compiled on a provincial scale in 2014. The situation on the ground may not be in keeping with the biodiversity data obtained from the MBSP in all instances.
- Conclusions in this study are based on experience of these and similar species in different parts of South Africa. Bird behaviour can never be entirely reduced to formulas that will be valid under all circumstances.

- Subsurface and geotechnical conditions have been inferred at a desktop level from the available information, past experience in the project area and professional judgement. The information and interpretations are given as a guideline only and there is no guarantee that the information given is totally representative of the entire area in every respect. The information must be verified by the undertaking of a detailed geotechnical site investigation, in the detailed design phase.
- Due to the nature of heritage resources and pedestrian surveys, the possibility exists that some features or artefacts may not have been discovered/recorded and the possible occurrence of graves and other cultural material cannot be excluded. This limitation is successfully mitigated with the implementation of a chance find procedure and pre-construction walkdown
- Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and do contain fossil plant, insect, invertebrate and vertebrate material. The sands of the Quaternary period would not preserve fossils. It is not known if there are fossils below the ground surface.
- Wetlands situated within the 500 m zone of regulation were assessed on a desktop level with very limited ground-truthing and some discrepancies within this zone may occur.
- Noise and visual impacts are associated with personal perception in most cases. The Impact Assessment undertaken cannot possibly account for every potential I&APs personal emotion and preference. The impact assessment thus attempts to apply a weighted rating system to impacts in an attempt to reduce uncertainty associated with personal preference of various receptors.
- The terrestrial ecology assessment (including plant species assessment and animal species assessment) is based on field work undertaken on 3 – 7 February 2020. The time spent on site was adequate for understanding general patterns across affected areas. The seasons in which the fieldwork (peak summer flowering period) was conducted was ideal for assessing the composition and condition of the vegetation (David Hoare Consulting¹, 2022).
- Compiling the list of species for the terrestrial assessment that could potentially occur on site is limited by the paucity of collection records for the area. The list of plant and animal species that could potentially occur on site was therefore taken from a wider area and from literature sources that may include species that do not occur on site and may miss species that do occur on site.
- Information on the proposed grid connections of renewable energy projects within a 30km radius around the project was sourced from public documents available on the internet. In some instances information was not readily available, or specifications may have changed, therefore the confidence in the information is moderate.
- The Socio-economic impact assessment (Appendix F 10) made various assumptions in terms of the construction scheduling, consideration of local expenditure and employment for the purposes of modelling. Results of the study are based on best available information and specialist experience.
- The potential visual impact at each sensitive visual receptor location was assessed using a matrix developed for this purpose. Receptor locations were identified on a desktop level and were not all verified on the ground. Therefore, a number of broad

assumptions have been made in terms of the likely sensitivity of the receptors to the Project, and in most instances, all identified receptors have been included in the receptor assessment, even though some of these locations may not be sensitive to the Project at all, or may even be abandoned.

- The viewshed / visibility analysis does not take into account any existing vegetation cover or built infrastructure which may screen views of the proposed development.
- In compiling this Report, the precautionary principle was applied where information or scientific certainty were lacking.

14 Conclusion

ENERTRAG South Africa (Pty) Ltd (the Applicant) proposes the development of the Hendrina Renewable Energy Complex (the Complex), the Complex comprises four separate Projects each of which is the subject of a separate application for Environmental Authorisation. The Projects are:

- Hendrina North Wind Energy Facility (up to 200MW) over 3350ha;
- Hendrina South Wind Energy Facility (up to 200MW) over 2900ha;
- Hendrina North Grid Infrastructure (up to 275kV) – 15km; and
- **Hendrina South Grid Infrastructure (up to 275kV) – 16km (this application).**

This report pertains specifically to the application for Environmental Authorisation for the Hendrina South Grid Infrastructure (the Project). The Project is located in the Steve Tshwete Local Municipality of the Nkangala District Municipality in Mpumalanga Province.

The primary aim of the proposed Project will be to connect the proposed Hendrina South Wind Energy Facility (WEF)¹⁴ to the Eskom National Grid, via the existing substation at the Komati Power Station, located approximately 15 - 16km from the site. The WEF will form part of the **Renewable Energy Independent Power Producer Programme (REIPPP)** (in line with the Integrated Resource Plan (IRP) – renewable wind energy).

Section 24C(2)(a) of the National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA) stipulates that the Minister of Forestry, Fisheries and the Environment (“the Minister”) must be identified as the Competent Authority (CA) if the activity has implications for international environmental commitments or relations. GN 779 of 01 July 2016 identifies the Minister as the CA for the consideration and processing of environmental authorisations and amendments thereto for activities related the Integrated Resource Plan (IRP) 2010 – 2030.

As the Project constitutes associated infrastructure to projects related to the IRP, the DFFE is the CA, as confirmed during the Pre-Application Meeting held on 24 August 2021.

The Applicant submitted an application for Environmental Authorisation in terms of the NEMA for certain Listed Activities associated with the proposed Project.

This EIA/EMPr was prepared according to the provisions of the NEMA and EIA Regulations, and aims to:

¹⁴ The South WEF is subject to a separate environmental authorisation process.

- (i) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context (See Section 3);
- (j) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report (See Section 5);
- (k) identify the location of the development footprint within the approved site as contemplated in the accepted scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment (See Section 6.9 and 10);
- (l) determine the—
 - i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
 - ii) degree to which these impacts—
 - (aa) can be reversed;
 - (bb) may cause irreplaceable loss of resources, and
 - (cc) can be avoided, managed or mitigated; (See Section 11)
- (m) identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment (Section 6.9);
- (n) identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity (Section 11);
- (o) identify suitable measures to avoid, manage or mitigate identified impacts (Section 11, Appendix H and Appendix I); and
- (p) identify residual risks that need to be managed and monitored (Appendix H and Appendix I).

The EIA rated impacts before, and after mitigation, for the following aspects:

- Soils;
- Water Resources;
- Terrestrial Ecology;
- Air Quality;
- Noise;
- Visual;
- Socio-Economic;
- Heritage;
- Palaeontology;
- Transport and Traffic;
- Waste Management; and
- Dangerous Goods.

Eskom has issued CELs to ENERTRAG in support of the development of a new substation and powerline (capacity of 132kV) – Grid Solution 1. The preferred powerline route alternative is

Option A. No fatal flaws were identified for the project and/or preferred alternative. Most of the potential impacts were either low, or insignificant, after mitigation with the exception of the following impact that was moderate after mitigation. These impacts were as follows:

- Mortality of priority species due to collisions with the power line.

Measures to manage impacts for the above mentioned aspects have been discussed in the EMP. It is the reasoned opinion of the EAP that the Project be considered for approval.

This report, the Environmental Impact Assessment (EIA) Report for the proposed Project, was made available for public comment, for a period of 30 days (from 11 July 2022 until 11 August 2022) at www.cabangaenvironmental.co.za (under the Public Documents Tab) and in hard copy at the Hendrina Public Library (44 Kerk Street, Hendrina) and Komati Public Library (96 Falcon Drive, Komati). This report and its appendices have been updated with the additional comments received, and submitted to the DFFE for consideration.

15 References

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Appendix A: Comments on the Draft EIA Report

Appendix B: EAP Declaration of Interest and Undertaking

Appendix C: Specialist Declarations

Appendix D: Curriculum Vitae of EAP and Specialist Team

Appendix E: A3 Maps and Plans

Appendix F: Specialist Studies

Appendix F 1: Site Sensitivity Verification and Agricultural Agro-Ecosystem Specialist Assessment

Appendix F 2: Surface Water (Hydrology) Assessment Report

Appendix F 3: Geohydrological Impact Assessment

Appendix F 4: Wetland and Aquatic Ecology Impact Assessment

Appendix F 5: Terrestrial Biodiversity Assessment

Appendix F 6: Terrestrial Plant Species Assessment

Appendix F 7: Terrestrial Animal Biodiversity Assessment

Appendix F 8: Avifaunal Impact Assessment

Appendix F 9: Visual Impact Assessment

Appendix F 10: Socio-Economic Impact Assessment

Appendix F 11: Heritage Impact Assessment

Appendix F 12: Palaeontological Impact Assessment

Appendix F 13: Transport Study

Appendix F 14: Geotechnical Desktop Study

Appendix F 15: Civil Aviation Compliance Statement

Appendix F 16: Site Sensitivity Verification: RFI Theme

Appendix F 17: Site Sensitivity Verification: Defence Statement

Appendix G: Public Participation

Appendix G 1: Comment and Response Trail Report

Appendix G 2: Pre-application consultation with the Competent Authority (incl. PP Plan and Meeting Minutes)

Appendix G 3: Correspondence with Competent Authority (Including Acceptance of Application; Comments on Draft and Final Scoping Report; Comments on the Draft EIA Report)

Appendix G 4: I&AP Register

Appendix G 5: Background Information Document

Appendix G 6: Notices (Advertisements & Posters)

Appendix G 7: Agenda and minutes of Focus Group Meetings

Appendix G 8: Presentation and minutes of Public Meetings

Appendix G 9: Proof of correspondence with Stakeholders & Organs of State

Appendix G 10: Comments received from Stakeholders & Organs of State

Appendix G 11: Proof of correspondence with I&APs

Appendix G 12: Written comments received from I&APs

Appendix H: Generic EMPr for the Development and Expansion of Overhead Electricity Transmission and Distribution Infrastructure

Appendix I: Generic EMPr for the Development and Expansion of Substation Infrastructure for the Transmission and Distribution of Electricity

Appendix J: Application Form (incl. Screening Tool Report)

Appendix K: Property Details of Preferred Alternative