CABANGA environmental

Telephone: +27 11 794 7534
Fax: +27 11 794 6946
E-mail: info@cabangaenvironmental.co.za

Hendrina South Wind Energy Facility and Associated Infrastructure

On various Portions of the Farms Dunbar 189 IS, Halfgewonnen 190 IS, and Weltevreden 193 IS, Mpumalanga Province.

Environmental Impact Assessment (EIA) Report

Issued for Public Comment

Reference Number:
14/12/16/3/3/2/2131

Report Date: July 2022

Unit 5 & 6 Beyers Office Park, Bosbok Road, Randpark Ridge
Postnet Suite 470, Private Bag X3, Northriding, 2162 • www.cabangaenvironmental.co.za
Members: K.C. van Rooyen • J. Barrett •

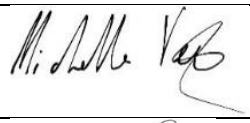
Prepared for:		Completed by independent EAP	
Company	Hendrina South Wind Energy Facility (RF) Pty Ltd	Company	Cabanga Concepts cc t/a Cabanga Environmental
Site	Hendrina South Wind Energy Facility	Author	Lelani Claassen
Contact Person	Sandhisha Jay Narain	Review	Michelle Venter Jane Barrett
Telephone	011 214 0662	Telephone	011 794 7534
E-Mail	Sandhisha.JayNarain@enertrag.com	E-Mail	info@cabangaenvironmental.co.za

DISCLAIMER

This report has been prepared by Cabanga with all reasonable skill, care and diligence within the terms of the contract with the client and taking into account of the resources devoted to it by agreement with the client. We disclaim any responsibility to the client and any other in respect of any matters outside the scope of the project.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such parties rely on the report at their own risk.

DOCUMENT CONTROL

Role	Name	Signature	Document Version	Date
Author:	Lelani Claassen Pr. Sci. Nat Registered EAP		Issued for Public Review	07/07/2022
Internal Review:	Michelle Venter Cert. Sci. Nat Registered EAP		Internal Review	06/07/2022
Internal Review:	Jane Barrett Cert. Sci. Nat		Internal Review	04/06/2022
Internal Approval	Ken van Rooyen Pr. Sci. Nat		Internal Approval	07/07/2022

Executive Summary

ENERTRAG South Africa (Pty) Ltd (the Developer) proposes the development of the Hendrina Renewable Energy Complex (the Complex), comprising of the Hendrina North WEF, Hendrina North Grid Infrastructure, Hendrina South WEF and Hendrina South Grid Infrastructure.

This report pertains specifically to the application for Environmental Authorisation for the **Hendrina South Wind Energy Facility (WEF)** (The Project). The Developer has established a Special Purpose Vehicle (SPV), who will be the Applicant for this Project, namely Hendrina South Wind Energy Facility (RF) Pty Ltd (The Applicant).

The Project comprises up to 26 wind turbines with a generation capacity of up to 200MW of electricity, and supporting infrastructure, including a substation with battery energy storage system (BESS), Operations and Maintenance (O&M) Building, temporary construction camps with cement batching plants, temporary laydown areas and internal roads and cables.

The Project will feed into the National Power Grid at the existing substations at the Komati Power Station, via the Hendrina South Grid Infrastructure Project which is subject to a separate application process.

The Project involves the undertaking of Listed Activities identified in the EIA Regulations, 2014 (as amended) and as such requires an Environmental Authorisation in terms of the NEMA before being undertaken. A Scoping and Environmental Impact Assessment Process is relevant to the Application. Should the outcome of the approval process be positive, it is the Applicant's intention to bid the project into future Renewable Energy Independent Power Producer Programme (REIPPP) rounds, in line with the Integrated Resource Plan (IRP) – renewable wind energy. 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 to the Integrated Resource Plan (IRP) 2010 – 2030. As such, the Department of Forestry, Fisheries and Environment (DFFE) has been identified as the Competent Authority for the Application.

The Project will assist in overcoming the power shortages that are currently faced by the country, by contributing additional electricity to the National Grid. Additionally, by the generation of renewable energy, the Project is aligned to various global and local commitments that have been made to combat climate change, and bring about the transition from the current, coal-based energy sector in South Africa, to include renewable energy, in line with National policies and plans, and international commitments. Mpumalanga is home to 12 coal-fired power stations and over 100 coal mines, and plays a pivotal role in the coal-based electricity sector in South African currently. A Just Energy Transition can only be achieved if the transition from coal to renewable energy resources is also associated with the Just Transition of jobs and skills within the economies currently contributing to the country's energy generation, notably Mpumalanga. The Project will contribute to jobs and skills transfer in Mpumalanga, effectively addressing the Just Transition.

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 Wind Farm 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.

A comprehensive site- and project-specific Environmental Management Programme (EMPr) has 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.

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

- 4A: Loss and/or fragmentation of indigenous natural vegetation, due to clearance for construction.
- 4B: Impact on integrity of CBAs, due to development in CBAs.
- 6C: Bat mortalities due to collisions with turbine blades, or due to barotrauma, during operations.
- 7A: Displacement of priority avifauna due to disturbance associated with construction.
- 7C: Avifauna mortality due to collisions with turbine blades.
- 7F: Displacement of priority avifauna due to disturbance associated with the dismantling of the wind turbines and associated infrastructure.
- 10B: Visual impacts due to the presence of the Wind Turbines and Associated Infrastructure, and security and operational lighting at night.

None of these potential negative impacts, after mitigation, exceed a significance rating of Moderate. Additional operational monitoring, pre-construction walk-downs, and detailed design measures are proposed to further reduce impact significance.

The following positive impacts were identified:

- (1E): Increased financial security for farming operations as a result of reliable diversified income (Insignificant);
- (1F): Improved security at affected farms (Insignificant);
- (11A and 11K): Increase in the GDP and production of the national and local economies during construction and operation (High Significance);
- (11B and 11L): Increase employment in the national and local economies during the construction and operation phases (Moderate Significance, can be increased to High if measures to enhance the impact are implemented);
- (11C and 11M): Contribution to skills development in the country and local economy (Low significance, can be increased to Moderate Significance with the implementation of enhancement measures);
- (11D and 11N): Temporary increase in household earnings, due to employees' salaries during construction, and improved standards of living for benefiting households for the operational phase. Moderate Significance, can be increased to High if measures to enhance the impact are implemented;
- (11E and 11O): Increase in government revenue (Low impact significance in construction phase, but High in operational phase).

- (11P): Local economic and social development benefits derived from the project's operations (High Significance);
- (11Q): Sustainable rental revenue for farms where the wind farm is located (Moderate);
- (11R): Sustainable increase in electricity available for the local region and South Africa (High Significance).

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.

This report is the Draft Environmental Impact Assessment (EIA) Report for the proposed Project, and is being 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).

Please provide any comments on the Report or proposed Project to Cabanga, at the contact details provided herein.

Cabanga Environmental
Contact Persons: Lelani Claassen and Michelle Venter
info@cabangaenvironmental.co.za
Telephone: 011 794 7539
Fax: 011 794 6946

The impact assessment concluded that the socio-economic benefits of the Project outweigh the potential environmental risks, provided the management measures stipulated in the EMPr are implemented.

It is therefore the opinion of the Environmental Assessment Practitioner, that the Project be considered for approval, once this report is updated with comments received from the Public Participation Process, responses to each of the comments received, and submitted to the DFFE for consideration.

Table of Contents

1 Introduction 18

1.1 Description of the EIA Process 20

1.1.1 Scoping Phase Summary 20

1.2 Purpose of this Report 28

1.3 Structure of this Report 29

2 Role Players 32

2.1 Project Developer 32

2.2 Project Applicant 32

2.3 Competent Authority 32

2.4 EAP Project Team and Specialists 33

2.5 Expertise of the EAP 34

3 Policy and Legislative Context 35

3.1 National Environmental Management Legislation 35

3.1.1 The National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) 35

3.1.2 The EIA Regulations, 2014 (as amended) 35

3.1.3 NEMA Regulations pertaining to Renewable Energy Development Zones and Strategic Transmission Corridors 36

3.1.4 National Environmental Management Waste Act, 2008 (Act No. 59 of 2008) 36

3.1.5 National Water Act, 1998 (Act No. 36 of 1998) 38

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

3.2 Legislation Pertaining to Mining 39

3.3 Legislation Pertaining to Conservation 40

3.4 Legislation relevant to Electricity Generation and Distribution 41

3.5 Provincial and Local Legislation and guidelines 43

3.6 Other relevant Legislation 45

3.7 International Environmental and Social Standards 46

4 Project Description 51

4.1 Project Location and Extent 51

4.2 Project Components 54

4.2.1 General Description of Wind Energy Facility and Turbine Technology 57

4.2.2 Electrical Components and Connection to Grid 58

4.2.2.1 Battery Energy Storage System (BESS) 58
4.2.2.2 Onsite Substation 59
4.2.2.3 Transmission and Distribution 60
4.2.3 Associated Infrastructure 61
4.2.3.1 Site Access and Internal Service Roads 61
4.2.3.2 Temporary Construction Camps and Laydown Area 61
4.2.3.3 Hardstand Areas 62
4.2.3.4 Security and Fencing 62
4.2.3.5 Operations and Maintenance (O&M) Buildings 62
4.2.4 Provision of Services 62
4.2.4.1 Power Supply 62
4.2.4.2 Water Requirements 63
4.2.4.3 Waste Management 63
4.2.5 Transportation of Project Components to Site 64
4.2.6 Employment and Operating Hours 66
4.3 Time-frames for implementation of the Activity 66
4.3.1 Pre-construction Phase 66
4.3.2 Construction Phase 66
4.3.3 Operational Phase 66
4.3.4 Decommissioning Phase 67
4.4 Listed Activities being applied for 68
5 Need and Desirability 78
5.1 Realisation of Global and Local Commitments 78
5.2 Just Energy Transition 79
5.3 Multiple Land Use 80
5.4 Power Generation 80
5.5 Green Economy 81
6 Identification and Evaluation of Alternatives 83
6.1 Process to identify alternatives 83
6.2 Process to Assess Alternatives 84
6.3 Property or Location 84
6.4 The type of activity 86

6.5 Design and/or Layout 87
6.6 Technology 87
6.7 Operational and Scheduling Alternatives 89
6.8 No-Development Option 90
6.9 Alternatives Assessment 91
6.10 Confirmation of the preferred alternative 94
7 Public Participation 94
8 Existing Site Attributes 96
8.1 Geology, Physiography and Topography 97
8.2 Climate and Meteorology 99
8.3 Land Use, Soils and Agricultural Potential 100
8.4 Hydrogeology (Groundwater) 104
8.5 Hydrology (Surface water) 104
8.6 Freshwater Ecology 105
8.7 Terrestrial Ecology 108
8.8 Bats 117
8.9 Avifauna 123
8.10 Air Quality 126
8.11 Noise 126
8.12 Visual Resources 128
8.13 Socio-Cultural Environment 130
8.14 Sites of Archaeological and Cultural Interest 131
8.15 Palaeontology 135
8.16 Traffic 135
9 Environmental Sensitivity in Relation to the Project 136
10 Identification of Potential Impacts 138
10.1 Impact Assessment Methodology 138
10.2 Impact Identification 140
10.3 Impact Assessment 140
10.3.1 Impact(s) of Listed Activities applied for 141
10.3.2 Land Use, Soils and Agricultural Potential 143
10.3.2.1 Construction Phase 143

10.3.2.2 Operational Phase 146
10.3.2.3 Decommissioning Phase 146
10.3.3 Water Resources 147
10.3.3.1 Construction Phase 147
10.3.3.2 Operational Phase 149
10.3.3.3 Decommissioning Phase 150
10.3.4 Freshwater Ecology 151
10.3.4.1 Construction Phase 152
10.3.4.2 Operational Phase 154
10.3.4.3 Decommissioning Phase 155
10.3.5 Terrestrial Ecology 157
10.3.5.1 Construction Phase 157
10.3.5.2 Operational Phase 158
10.3.5.3 Decommissioning Phase 159
10.3.6 Bats 161
10.3.6.1 Construction Phase 161
10.3.6.2 Operational Phase 161
10.3.6.3 Decommissioning Phase 163
10.3.7 Avifauna 163
10.3.7.1 Construction Phase 163
10.3.7.2 Operational Phase 165
10.3.7.3 Decommissioning Phase 166
10.3.8 Air and Noise 166
10.3.8.1 Construction Phase 166
10.3.8.2 Operational Phase 168
10.3.8.3 Decommissioning Phase 170
10.3.9 Wake Effect Assessment 170
10.3.10 Visual 170
10.3.10.1 Construction Phase 170
10.3.10.2 Operational Phase 172
10.3.10.3 Decommissioning Phase 173
10.3.11 Socio-economic 174

10.3.11.1 Construction Phase 174
10.3.11.2 Operational Phase 176
10.3.11.3 Decommissioning Phase 178
10.3.12 Archaeology, Palaeontology and Cultural Heritage Resources 179
10.3.12.1 Construction Phase 179
10.3.12.2 Operational Phase 181
10.3.12.3 Decommissioning Phase 181
10.3.13 Transport and Traffic 181
10.3.13.1 Construction Phase 181
10.3.13.2 Operational Phase 183
10.3.13.3 Decommissioning Phase 183
10.3.14 Waste Generation 183
10.3.14.1 Construction Phase 183
10.3.14.2 Operational Phase 184
10.3.14.3 Decommissioning Phase 185
10.3.15 Storage and Use of Dangerous Goods / Hazardous Substances 185
10.3.15.1 Construction Phase 185
10.3.15.2 Operational Phase 186
10.3.15.3 Decommissioning Phase 186
10.4 Cumulative Impact Assessment 187
10.4.1 Soils, Land Use and Land Capability (Agriculture) 188
10.4.2 Water Resources 188
10.4.3 Freshwater Ecology 188
10.4.4 Terrestrial Ecology 188
10.4.5 Bats 190
10.4.6 Avifauna 190
10.4.7 Air Quality and Noise 190
10.4.8 Visual 191
10.4.9 Socio-Economic 191
10.4.10 Archaeology, Palaeontology and Heritage 191
10.4.11 Transport and Traffic 192
10.4.12 Waste Generation 192

10.4.13 Dangerous Goods 192
11 Environmental Impact Statement 193
11.1 Reasoned Opinion 196
11.2 Specific Aspects to be Included as Conditions of Authorisation 197
11.3 Specific Information required 198
12 Assumptions, Limitations and Gaps in Knowledge 200
13 Conclusion 202
14 References 204

List of Tables

Table 1: DFFE Comments on the FSR, and responses thereto 22
Table 2: Structure of the EIA Report 29
Table 3 Details of the Project Applicant 32
Table 4: Details of the EAP Project Team 33
Table 5: Details of the Specialist Team 33
Table 6: Legislated water uses 38
Table 7: Objectives of the Integrated Energy Plan 42
Table 8: Maximum permissible designated sound levels for the General Environment (STLM Noise by-law) 44
Table 9: Other Relevant legislation and guidelines 45
Table 10: IFC Environmental and Social Performance Standards and the Project 47
Table 11: Project Compliance to the Equator Principles 50
Table 12 Affected Farm Portions 51
Table 13: Other Renewable Energy Projects and their status 53
Table 14: Project Extent 54
Table 15: Project Components and technical details 54
Table 16: Listed Activities applied for 68
Table 17: Types of Alternatives 83
Table 18: Assessment of Alternatives 92
Table 19: Site Sensitivity ratings according to the screening tool 96
Table 20: Specialist assessments prescribed by the Screening Tool 97
Table 21: Land Capability (Scotney, Ellis, Nott, Taylor, v Niekerk, Verster & Wood, 1987) 101

Table 22 Recharge Values (van Tonder, G. and Xu, Y., 2000) 104
Table 23: Project Components in relation to MBSP 110
Table 24 Bat species occurring, or likely to occur on site (Animalia, April 2022) 118
Table 25: The significance of sensitivity map categories for each infrastructure component 121
Table 26: Bird Habitat delineated on the Site 123
Table 27 Overview of population, income and employment profile 130
Table 28: Heritage significance and field ratings 131
Table 29: Heritage Resources Identified during the survey 132
Table 30: Matrix used to determine likelihood 138
Table 31: Matrix used to rate duration 138
Table 32: Matrix used to rate scale 139
Table 33: Matrix used to rate Intensity 139
Table 34 Other Renewable Energy Projects in the area 187
Table 35: How the provisions of NEMA Section 24(4)(a) and (b) are addressed in this report 198

List of Figures

Figure 1: EIA Process 21
Figure 2: Typical components of a Wind Turbine 58
Figure 3: Typical Battery Modules in a BESS with the Separated Sections (Tesla MegaPack - Safety Overview) 59
Figure 4: Example of an On-site Substation (Operator portion) (left) and adjoining Wind Facility substation (IPP portion) (right) on the Kouga Wind Facility 60
Figure 5: 132 kV Intermediate Self-Supporting Double Circuit Monopole (preferred alternative) 61
Figure 6: Example - transporting the Nacelle (JG Afrika, April 2022) 65
Figure 7: Example of blade transport (JG Afrika, April 2022) 65
Figure 8: Example - transport of tower sections (JG Afrika, April 2022) 65
Figure 9 Career Opportunities presented by the Wind Industry 80
Figure 10: Load shedding hours over the years in South Africa 81
Figure 11 Types of Commercially available Wind Turbines 89
Figure 12: Meteorological summary for Hendrina (January 2018 - December 2020) 99
Figure 13: Local wind conditions at Hendrina 100

Figure 14: Views of the veld at the WTG10 Site, showing the coal conveyor in the background (left) and signs of over-grazing (bankrupt bush) 111
Figure 15: Site condition at WTG15 (graves in photograph on the right) 112
Figure 16: General Site Condition at WTG25 112
Figure 17: Views of the terrain and character of the area (SiVEST, April 2022) 128
Figure 18: Effect of distance between wind turbines - potential cumulative noise (EARES, April 2022) 191

List of Plans

Plan 1: Regional Project Location 19
Plan 2: Project in relation to REDZ, Strategic Transmission Corridors and other Renewable Energy Projects 37
Plan 3: Project Site Coordinates, affected farm portions and land tenure 52
Plan 4: South WEF Layout Map 56
Plan 5 Geology of the Site 98
Plan 6 Topography of the Site 98
Plan 7: Cropland areas in relation to the Project Footprint 102
Plan 8: Known Mining and Prospecting Rights and Applications 103
Plan 9: NFEPA and Delineated Wetlands 107
Plan 10: Development area in relation to the MBSP 109
Plan 11: Terrestrial Ecology Habitat Units and Sensitivity of the Site 115
Plan 12: Bat Sensitivity in relation to Project Layout 122
Plan 13: Avifauna site sensitivity in relation to proposed project 125
Plan 14: Potential Noise-sensitive receptors and distance to proposed turbines 127
Plan 15: Potential visibility of the proposed Project (SiVEST, April 2022) 129
Plan 16: Identified Heritage Sites in relation to the Project 134
Plan 17: Environmental Sensitivity Map 137

List of Appendices

Appendix A: Approval of and Comments on Final Scoping Report 208
Appendix B: EAP Declaration of Interest and Undertaking 208

Appendix C: Specialist Declarations 208
Appendix D: Curriculum Vitae of EAP and Specialist Team 208
Appendix E: A3 Maps and Plans 208
Appendix F: Specialist Studies 208
Appendix G: Public Participation 209
Appendix H: Environmental Management Programme 209
Appendix I: Generic EMPr (GN R 435) for the development and expansion of substation infrastructure for the transmission and distribution of electricity 209
Appendix J: Application Form 209

Specialist Studies (Appendix F)

Appendix F 1: Site Sensitivity Verification and Agricultural Agro-Ecosystem Specialist Assessment 208
Appendix F 2: Surface Water Assessment Report 208
Appendix F 3: Geohydrological Impact Assessment 208
Appendix F 4: Wetland and Aquatic Ecology Impact Assessment 208
Appendix F 5: Terrestrial Biodiversity Assessment 208
Appendix F 6: Terrestrial Plant Species Assessment 208
Appendix F 7: Terrestrial Animal Biodiversity Assessment 208
Appendix F 8: 12-Month Pre-Construction Bat Environmental Impact Assessment 208
Appendix F 9: Avifaunal Impact Assessment 208
Appendix F 10: Environmental Noise Impact Assessment 208
Appendix F 11: Visual Impact Assessment 208
Appendix F 12: Socio-Economic Impact Assessment 208
Appendix F 13: Heritage Impact Assessment 208
Appendix F 14: Palaeontological Impact Assessment 208
Appendix F 15: High-Level Safety, Health and Environmental Risk Assessment 208
Appendix F 16: Transport Study 208
Appendix F 17: Geotechnical Desktop Study 208
Appendix F 18: Wake Effect Statement 208
Appendix F 19: Civil Aviation Compliance Statement 208
Appendix F 20: Defence Compliance Statement 208

Appendix F 21: Site Sensitivity Verification: RFI Theme 208

Public Participation (Appendix G)

Appendix G 1: Comment and Response Trail Report 209

Appendix G 2: Pre-application consultation with the Competent Authority (incl. PP Plan and Meeting Minutes) 209

Appendix G 3: Correspondence with Competent Authority (Including Acceptance of Application; Comments on Draft Scoping Report) 209

Appendix G 4: I&AP Register 209

Appendix G 5: Background Information Document 209

Appendix G 6: Newspaper Advert 209

Appendix G 7: Notices 209

Appendix G 8: Agenda and minutes of Focus Group Meetings 209

Appendix G 9: Presentation and minutes of Public Meetings 209

Appendix G 10: Proof of correspondence with Commenting Authorities 209

Appendix G 11: Comments received from Commenting Authorities 209

Appendix G 12: Proof of correspondence with I&APs 209

Appendix G 13: Written comments received from I&APs 209

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
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
ECO	Environmental Control Officer
EIA(R)	Environmental Impact Assessment (Report)
EMPr	Environmental Management Programme
EWT	Endangered Wildlife Trust
FSR	Final Scoping Report
FTE	Full-time-equivalent
GDP	Gross Domestic Product
GN	Government Notice
Ha	Hectares
HAZOP	Hazard and Operability Study
HPA	Highveld Priority Area
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
MHSA	Mine Health and Safety Act, 1996 (Act 29 of 1996)

ACRONYM:	DESCRIPTION:
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
NHRA	National Heritage Resources Act, 1999 (Act No 25 of 1999)
NSR	Noise-sensitive Receptor
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
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)
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
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
TSP	Total Suspended Particulates
WEF	Wind Energy Facility
WTG	Wind Turbine Generator

Key Information relevant to the Proposed Project

Aspect	Description
The Applicant	Hendrina South Wind Energy Facility (RF) Pty Ltd
Project name	Hendrina South Wind Energy Facility and Associated Infrastructure
Activity description	The proposed Project involves the development of a Wind Energy Facility (WEF) comprising up to 26 Wind Turbines with a combined generation capacity of up to 200MW. Associated infrastructure will involve temporary construction camps and laydown areas, operation and maintenance (O&M) Building, electrical cables, substation and roads.
Capacity of facility	Up to 200MW
Project location	The Farm Dunbar 189 IS, part of Portion 1, Part of Portion 3, Part of Portion 5, Part of Portion 6 and Portion 7 The Farm Halfgewonnen 190 IS, Portion 11, Portion 14 and Portion 15 The Farm Weltevreden 193 IS, Remaining extent, Portion 2, Portion 10, Portion 11, Portion 12, Portion 13, Part of Portion 14, Part of Portion 15, Part of Portion 16, Part of Portion 17 and Portion 18. Steve Tshwete Local Municipality, Nkangala District Municipality, and Govan Mbeki Local Municipality, Gert Sibande District Municipality, Mpumalanga Province.
Size of the proposed infrastructure and foot prints	The development area extends over 2,900 hectares (Ha). The total buildable area is 200Ha. Each turbine will affect 1 Ha during construction, and 0.5Ha during operations. The O&M Building will comprise 200m², with a workshop area (150m²) and stores (150m²). Construction camps (x2) will each comprise 3Ha (6Ha total). Laydown areas (x2) will be up to 2Ha each (4Ha total). Internal roads will be 8 to 10m wide, increasing to 15m for turning circles / bypass areas to allow for larger component transport. Total length of internal roads is up to 40km.
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 relates to the IRP, the DFFE is the CA. This was confirmed during the Pre-Application Meeting held on 24 August 2021 (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: Lelani Claassen and Michelle Venter info@cabangaenvironmental.co.za Telephone: 011 794 7539 Fax: 011 794 6946

1 Introduction

ENERTRAG South Africa (Pty) Ltd (the Developer) 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; (this application)**
- Hendrina North Grid Infrastructure (up to 275kV) – 15km; and
- Hendrina South Grid Infrastructure (up to 275kV) – 16km.

This report pertains specifically to the application for Environmental Authorisation for the Hendrina South Wind Energy Facility (WEF) (The Project).

The Developer has established a Special Purpose Vehicle (SPV), who will be the Applicant for this Project, namely Hendrina South Wind Energy Facility (RF) Pty Ltd (The Applicant).

The Project comprises up to 26 wind turbines with a combined generation capacity of up to 200MW of electricity, and supporting infrastructure. The Project will feed into the National Power Grid via the existing substations at the Komati Power Station. The Grid connection will be achieved through the Hendrina South Grid Infrastructure Project which is subject to a separate application process. The Project is located in the Steve Tshwete Local Municipality of the Nkangala District Municipality, and the Govan Mbeki Local Municipality of the Gert Sibande District Municipality in Mpumalanga Province (Plan 1).

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 No. 107 of 1998) (NEMA) before being undertaken.

Should the outcome of the approval process be positive, it is the Applicant's intention to bid the project into future Renewable Energy Independent Power Producer Programme (REIPPP) rounds, in line with the Integrated Resource Plan (IRP) – renewable wind energy.

This report is the Draft Environmental Impact Assessment (EIA) Report for the proposed Project, and is being 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).

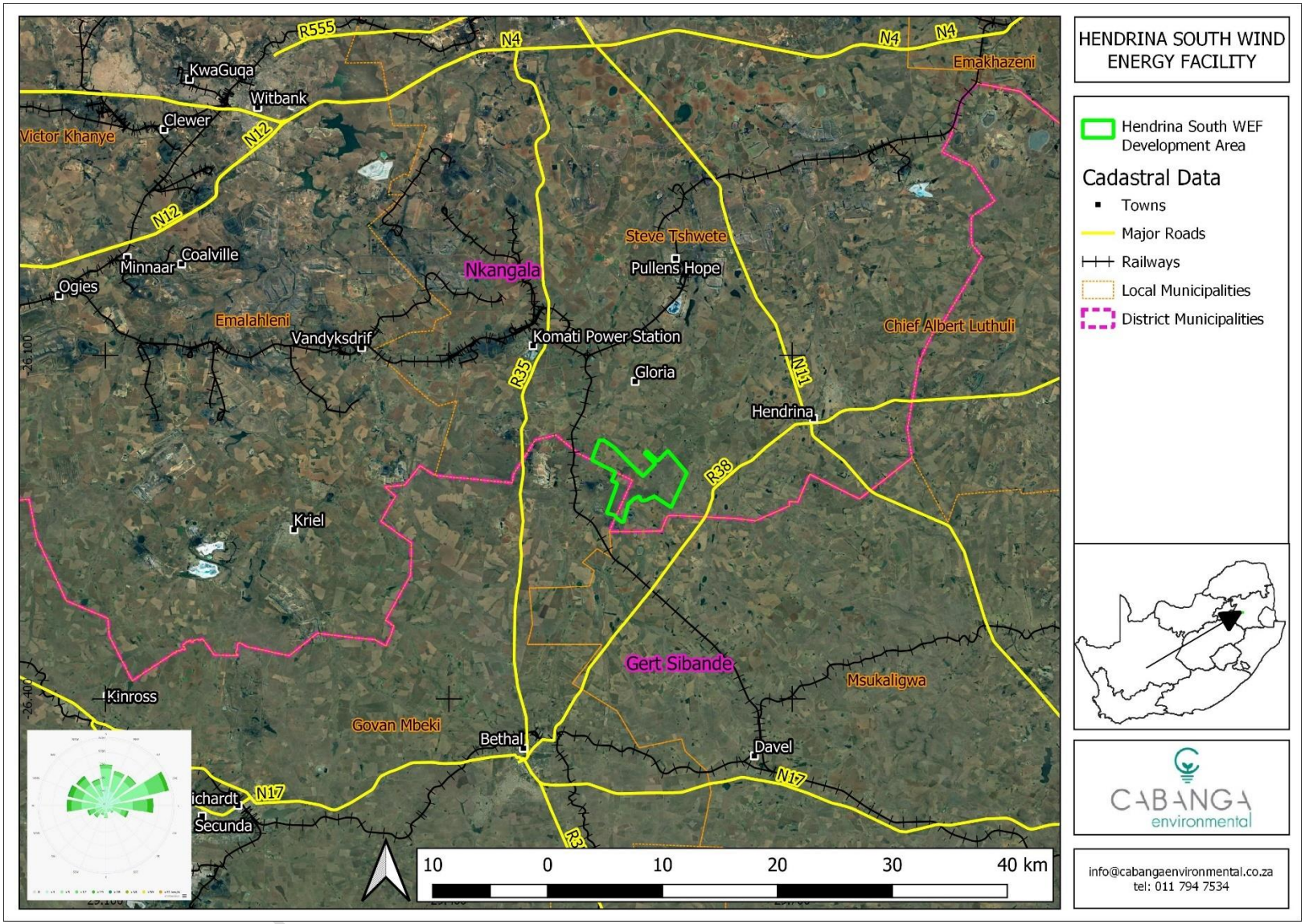
Please provide any comments on the Report or proposed Project to Cabanga, at the contact details provided herein.

Cabanga Environmental

Contact Person: Lelani Claassen

lelani@cabangaenvironmental.co.za or info@cabangaenvironmental.co.za

Telephone: 011 794 7539 Fax: 011 794 6946



Plan 1: Regional Project Location

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. Figure 1 illustrates the application process undertaken for this Project. Section 1.1.1 provides a summary of the process undertaken thus far.

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 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 of Environmental Affairs 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 such, The DFFE is the competent authority in respect of this application, as the Project will form part of the REIPPP in line with the IRP (Renewable Wind Energy).

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 16 May 2022 (signed 12 May 2022) (Appendix A).

Comments received on the FSR approval are summarised in Table 1, along with information on where and how these comments have been addressed in this Draft EIA Report.

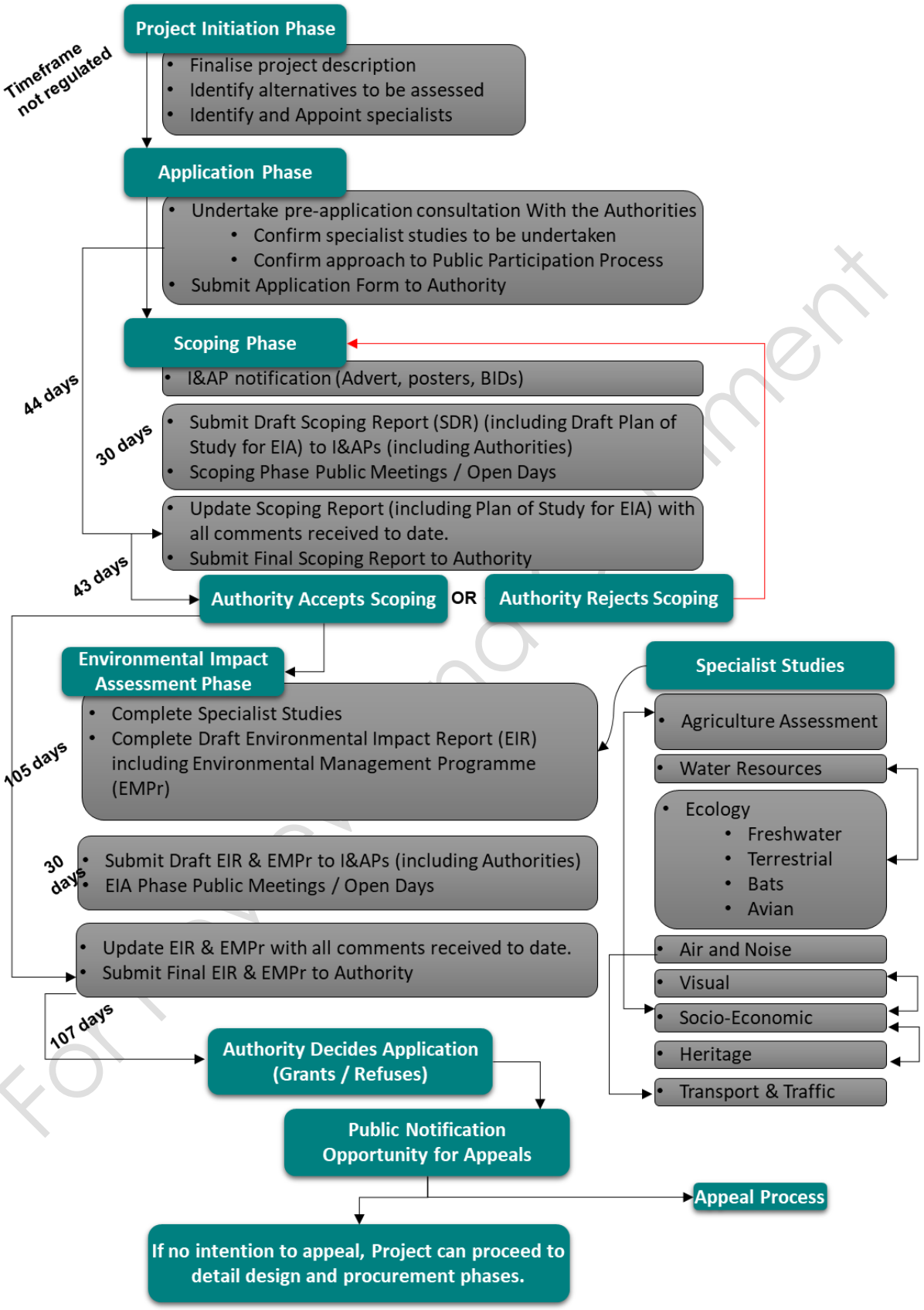


Figure 1: EIA Process

Table 1: DFFE Comments on the FSR, and responses thereto

Issues/Questions Raised	Response	Reference in Report
(a) Listed Activities		
(i) The Department **reiterates to ensure that only the relevant listed activities are applied for**, are specific and can be linked to the development activity or infrastructure as described in the project description. The EAP must ensure the listed activities are correctly listed as per the applicable Listing Notices of the NEMA EIA Regulations, 2014, as amended. The application form indicates that most of the activities listed will be confirmed once final designs have been provided and based on the findings of the specialist studies. The applicable listed activities **must** be final and confirmed during the Draft Environmental Impact Assessment phase.	Detailed review has been undertaken by the EAP, and by the Developer and Applicant, of the aspects of the proposed Project, and the Listed Activities triggered by each. 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.	Table 16
(ii) The EAP is urged to revisit the applicability of the listed activities as the applicability of some of the listed activities is questioned. The threshold of the listed activities including sub-listing must be provided. Please refrain from the use of the words such as, ***are expected, potentially, will most likely and maybe***, etc when describing the listed activities. Listed activities are not based on a precautionary approach. The EAP/Applicant must be certain why listed activities are being triggered to enable the competent authority to apply its mind to all the assessed listed activities during decision making.	The EAP, in consultation with the Developer and Applicant, has updated the activities, wording and descriptions in Table 16 of this Report, providing more accurate Project detail than what was available in the Scoping Phase. The Application Form has also been updated (See Appendix J).	Table 16 Appendix J
(iii) The EIAR must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for.	Section 10.3.1 of this Report contains a summary of each of the Listed Activities Applied for (detailed in Table 16, Section 4.4), and an assessment of the potential impacts of each Listed Activity applied for, along with mitigation measures.	Section 10.3.1
(iv) The EIAR must assess the correct sub listed activity for each listed activity applied for.	Each sub-listed activity has been identified (Table 16) and assessed (Section 10.3.1)	Section 10.3.1 and Table 16
(v)The listed activities represented in the EIAR and the application form must be the same and correct. An updated application form with the correct listed activities and sub-listing activities must be submitted to the Department with the draft EIAR.	The application form has been attached to this Report as Appendix J. The wording of the Listed Activities applied for has been updated as more accurate project specific information has become available.	Appendix J
(b) Public Participation		
(i) **A Comments and Response Report was referenced as being included on table 3 of the Public Participation Report, attached as Appendix 2, however, the Comments and Response Report was not**	Appendix 2 of the FSR contained Table 3: Comments and Response Table, which detailed the comments received, response to each comment, and reference to	Appendix G 1

Issues/Questions Raised	Response	Reference in Report
attached. A Comments and Response trail report (C&R) must be submitted with the draft and 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. Please refrain from summarising comments made by I&APs. All comments from I&APs must be copied verbatim and responded to adequately. Please note that a response such as "noted" is not regarded as an adequate response to I&APs' comments. Failure to submit the C&R will result in a refusal of the project.	the report section where each comment had been addressed. This Table has been updated with additional comments received since, and is now presented as a separate Appendix (as opposed to a Table in the Report). Please see Appendix G 1. The Format of the Comments and Response Trail Report has also been updated as per the comment received from DFFE.	
(ii) Please ensure that comments from all relevant stakeholders are submitted to the Department with the EIAR. This includes but is not limited to the relevant Provincial Departments, SANRAL, Local Municipalities, the District Municipalities, the Department of Human Settlements, Water and Sanitation, the South African Heritage Resources Agency (SAHRA), the Endangered Wildlife Trust (EWT), BirdLife SA, SANParks, the Department of Mineral Resources and Energy, the Department of Rural Development and Land Reform, the Department Transport and Public Works – Roads, South African Astronomical Observatory and the Department of Forestry, Fisheries and the Environment: Directorate Biodiversity and Conservation.	All correspondence has been appended to this Report.	Appendix G 10 and Appendix G 11
(iii) Please ensure that all issues raised and comments (including all objections) received during the circulation of the draft SR and draft EIAR from all registered I&APs and organs of state which have jurisdiction in respect of the proposed activity are adequately addressed in the draft and 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.	Please see Appendix G 12 and Appendix G 13, where correspondence with I&APs, and comments received from I&APs have been included. Each comment received to date has been duplicated in the Comment and Response Table (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.	Appendix G 1 Appendix G 12 and Appendix G 13
(iv) The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 & 44 of the NEMA 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
(c) Alternatives		
(i) Please ensure that a description of each of the preferred alternative type is provided 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, as described in Section 4.	Section 6

Issues/Questions Raised	Response	Reference in Report
(ii) The applicant must determine the need for decommissioning of lines. This information must inform whether there is a need to update the application form and/or to amend the terms of reference for the specialist studies.	The Project life is 20+ years. At this stage it is assumed that the powerlines will not be decommissioned after 20+ years but will continue to be used by Eskom.	Section 4.2.2.3
(d) Layout & Sensitivity Maps		
(i) The EIAR must provide 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 on Maps (Plan 3) and in the Report (Section 4.1)	Section 4.1 Plan 3
(ii) All preferred turbine positions must be clearly numbered. The turbine position numbers must be consistently used in all maps to be included in the EIAR.	The preferred turbine locations have been numbered on the layout map in this Report.	Plan 4
(iii) The EIAR must provide the technical details of the proposed facility in a table format as well as their description and/or dimensions.	Technical details are provided in Table 15, with further descriptions provided in Section 4.2	Section 4.2 Table 15
(iv) A copy of the final layout map must be submitted with the EIAR. 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: a) The envisioned area for the wind energy facility, i.e., placing of wind turbines and all associated infrastructure should be mapped at an appropriate scale. b) All supporting onsite infrastructure such as laydown area, control room, and buildings, including accommodation etc. c) All necessary details regarding all possible locations and sizes of the proposed BESS, the onsite substation and internal power lines. d) All existing infrastructure on the site, especially internal road infrastructure.	A map of the preferred layout is provided in Plan 4. This layout has been updated with applicable environmental sensitivities as provided by the respective specialists. The plan shows all supporting infrastructure and existing roads, roads to be upgraded and new roads associated with the Project, as well as the feasible locations for the BESS and on-site substation.	Plan 4
(v) Please provide an environmental sensitivity map which indicates the following: a) The location of sensitive environmental features on site, e.g., CBAs, protected areas, heritage sites, wetlands, drainage lines etc. that will be affected by the facility and its associated infrastructure; b) Buffer areas; and c) All "no-go" areas.	Please refer to Plan 17	Plan 17

Issues/Questions Raised	Response	Reference in Report
(vi) The above layout map must be overlain with the sensitivity map and a cumulative map which shows neighbouring energy developments and existing grid infrastructure.	The Project in relation to other renewable energy projects at varying distances is illustrated in Plan 2. Plan 17 presents the site sensitivity map in relation to the proposed Project Infrastructure. Known existing grid infrastructure is also shown on the relevant maps.	Plan 2 and Plan 17
(e) Specialist Assessments		
(i) A Wake Effect Assessment must be included as part of the specialist assessments to be conducted during the draft EIA phase.	A Wake Effect Statement prepared by the Developer has been included in Appendix F 18, as there are no other WEF Projects or applications in proximity to the site, the closest being the Haverfontein WEF, located some 50km from the Project, and the Hendrina North WEF application, pursued by the same developer.	Appendix F 18
(ii) Should there be any other similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts must be refined to indicate the following: • Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, i.e., hectares of cumulatively transformed land. • Detailed process flow and proof must be provided, 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 when the conclusion and mitigation measures were drafted for this project. • The cumulative impacts significance rating must also inform the need and desirability of the proposed development. • A cumulative impact environmental statement on whether the proposed development must proceed.	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 Haverfontein Project has received environmental authorisation but has not yet been constructed. Cumulative impacts of the proposed Project, in light of all other renewable energy Projects in the vicinity and other known development applications (predominantly mining applications) are discussed in Section 10.4 of this Report. As mentioned, there are no similar developments (other wind farms) in the vicinity and no process flow has been included. The need and desirability of the Project is discussed in Section 5. A Cumulative Impact Statement is included in Section 11.	Section 10.4 Plan 2 Section 5 Section 11.
(iii) The final EIAR and all the attached specialist studies must indicate and adequately assess a consistent number of turbines.	South WEF comprises up to 26 Turbines, as indicated on the Relevant maps in this report, and the specialist studies.	Plan 4 Appendix F
(iv) The EAP must ensure that the terms of reference for all the identified specialist studies must include the following: a) A detailed description of the study's methodology; indication of the locations and descriptions of the development footprint, and all	Each of the specialist studies (Appendix F) contain a description of the methodology followed by the Specialist, indications of the development footprint,	All of the specialist reports contained in Appendix F

Issues/Questions Raised	Response	Reference in Report
other associated infrastructures that they have assessed and are recommending for authorisation.	including associated infrastructure. The reports also contain recommendations of the specialists.	
b) 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 limitations of the specialist studies have also been summarised in Section 12 of this Report.	All of the specialist reports contained in Appendix F. Section 12
c) 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 identified graves, some of the delineated wetlands, turbine exclusion zones identified by the Avifauna Specialist and the High-Sensitivity areas identified by the Bat Specialist as indicated in Plan 17.	Plan 17
d) 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.	Plan 17
e) **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.
f) Should a specialist recommend specific mitigation measures, these must be clearly indicated.	Mitigation measures have been incorporated into the EMPr (Appendix H) and are discussed throughout Section 10.3 of this report, as relevant to the different project phases.	Section 10.3 Appendix H
g) Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and were necessary, include further expertise advice.	The terrestrial biodiversity assessment (Hoare, May 2022) (Appendix F 5) has identified areas of "Wetland" Habitat on the site that do not correlate with the Wetlands delineated by the Wetland Specialist (Burton, May 2022) (Appendix F 4). The most reasonable recommendation in terms of the wetland delineation is put forward by the Wetland Specialist, who used all of the indicators (terrain, soil and vegetation) to delineate the wetlands on site, as opposed to the terrestrial biodiversity specialist who only referenced vegetation. The EAP has clearly indicated	Section 8.6 and 8.7 (baseline) and Section 10.3.4 and 10.3.5 (impact assessment).

Issues/Questions Raised	Response	Reference in Report
	the most reasonable recommendation and substantiated this with defendable reasons and expert advice, refer to section8.6 and 8.7	
(f) General		
(i) When uploading reports online, the Appendices must correspond with the relevant reports and must be clearly labelled for easy reference. If, for example, Appendix 2: Background Information Document and Proof of Delivery, then Appendix 2 must be labelled as such and only contain the relevant reports/documents.	Appendices have been re-maned and split up for ease of reference and to enable the Department (and other parties) to easily find each appended document.	Appendices are contained at the end of this report.
(ii) The applicant's name reflected as Hendrina South Wind Energy Facility (RF) (Pty) Ltd, must be used throughout the reporting. No other applicant names can be used interchangeably.	The Applicant is Hendrina South Wind Energy Facility (RF) (Pty) Ltd, the special-purpose vehicle created by the Developer (ENERTRAG SA) to act as the Applicant in this application. No other Applicant name is used, though, where relevant, the Developer and/or EPC Contractor are identified as the responsible parties for certain management measures.	Section 2.2
(iii) The EAP must provide landowner consent for all the farm portions affected by the proposed project, whether the project component is linear or not, i.e., all farm portions where the access road, wind turbines and associated infrastructure is to be located.	Landowner consent forms are included as Appendix 3 to the Application Form, Appendix J to this Report.	Landowner consent forms are included as Appendix 3 to the Application Form, Appendix J to this Report.
(iv) A construction and operational phase EMPr that includes mitigation and monitoring measures must be submitted with the final EIAR.	An EMPr has been compiled and is included as Appendix H hereto. The EMPr will be updated as necessary following the public review and comment period. As the Project also involves the development of substations and overhead powerlines, the Generic EMPr published by the Department have also been appended hereto.	Appendix H Appendix I

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 16), 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 is the Draft EIA Report, compiled in accordance to the approved Scoping Report Plan of Study for EIA, and Appendix 3 of the EIA Regulations. The Report is made available for a public comment period of 30 days, after which the comments received will be captured and addressed in the Final EIA Report to be 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 6.10 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 10.3)
(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 6.10);
(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 10.3);
(g) identify suitable measures to avoid, manage or mitigate identified impacts (Section 10.3 and Appendix H); and
(h) identify residual risks that need to be managed and monitored (Appendix H).

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 2 presents these requirements and provides cross-references to the various sections of this report where the requirements are addressed.

Table 2: 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	Section 2.4
	(iii) the expertise of the EAP, including a curriculum vitae;	Section 2.5
(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 12
	(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 4
(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 6.10
(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including:	(i) details of the development footprint alternatives considered;	Section 6.3 and 6.5
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 7 and Appendix G
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	
	(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 8
	(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—	Section 10.2

Requirement, as per EIA Regulations 2014 (as amended)		Section of this report
	(aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Section 10.1
	(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;	Sections 10.3.2 to 10.3.15
	(viii) the possible mitigation measures that could be applied and level of residual risk;	Sections 10.3.2 to 10.3.15
	(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such;	Alternatives were considered – See Section 6
	(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	Section 6.10
a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including—	(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and	Sections 10.3.2 to 10.3.15
	(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;	Sections 10.3.2 to 10.3.15
(j) an assessment of each identified potentially significant impact and risk, including—	(i) cumulative impacts;	Section 10.4
	(ii) the nature, significance and consequences of the impact and risk;	
	(iii) the extent and duration of the impact and risk;	
	(iv) the probability of the impact and risk occurring;	
	(v) the degree to which the impact and risk can be reversed;	
	(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and	
	(vii) the degree to which the impact and risk can be mitigated;	
(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;		Specialist Reports are included in Appendix F. The impact assessments and recommendations have been captured

Requirement, as per EIA Regulations 2014 (as amended)		Section of this report
		in Sections 10.3.2 to 10.3.13
(l) an environmental impact statement which contains—	i) a summary of the key findings of the environmental impact assessment:	Section 11
	(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and	Plan 17
	(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 EMPr as well as for inclusion as conditions of authorisation;		Section 11.2 and Appendix H
(n) the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;		Section 6.10
(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;		Section 11.2
(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;		Section 12
(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;		Section 11
(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)
(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 11.3
(w) any other matters required in terms of section 24(4)(a) and (b) of the Act.		

2 Role Players

2.1 Project Developer

ENERTRAG South Africa (Pty) Ltd (the Developer) is a subsidiary of the German-based ENERTRAG AG, a hydrogen and renewable energy developer founded in 1992. ENERTRAG AG has an established track-record of renewable energy projects around the world, comprising over 100 wind turbines with an installed capacity of over 760MW, and over 500 employees. Current Projects are located in Germany, United Kingdom, France, Poland, Bulgaria and Belarus.

The Developer was established in 2017, with the intention to investigate and develop renewable energy projects in South Africa.

The Developer currently has numerous wind measurement campaigns throughout South Africa and owns the Darling Wind Farm in the Western Cape, and was the first Independent Power Producer (IPP) to commence with a wind measurement campaign in Mpumalanga. Data from the Developer's wind measurement mast located near Hendrina has shown that the wind resource is viable for wind farm development in the region.

2.2 Project Applicant

The proposed Project will be applied for under a Special Purpose Vehicle (SPV), and the Project Applicant is therefore Hendrina South Wind Energy Facility RF (Pty) Ltd.

Thus, the Developer and Applicant initiated the studies and applications associated with the Project, with the intention to eventually bid the Project and associated Projects into future rounds of the Renewable Energy Independent Power Producer Programme (REIPPP) (in line with the Integrated Resource Plan (IRP) – renewable wind energy).

Details of the Project Applicant are provided in Table 3.

Table 3 Details of the Project Applicant

Project applicant:	Hendrina South Wind Energy Facility (RF) Pty Ltd
Registration No:	2022/381753/07
Contact person:	Mercia Grimbeek/ Sandhisha Jay Narain
Head-Office Address:	Suite 104, Albion Springs | 183 Main Road | Rondebosch | Cape Town | 7700
Postal Address:	Suite 104, Albion Springs | 183 Main Road | Rondebosch | Cape Town | 7700
Telephone:	+27 21 207 2181
E-mail:	mercia.grimbeek@enertrag.com Sandhisha.JayNarain@enertrag.com

2.3 Competent Authority

The Competent Authority is the Department of Forestry, Fisheries and Environment (DFFE), as the Project will from part of REIPPP (in line with the IRP – renewable wind energy) and contribute electricity to the National Grid. Should the application process outcome be positive, it is the Applicant's intention to bid the project into future REIPPP bid rounds.

Section 24C(2)(a) of the 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 to the Integrated Resource Plan (IRP) 2010 – 2030.

2.4 EAP Project Team and Specialists

The details of the persons who prepared this report are provided in Table 4. Details of the Specialist Team are provided in Table 5. CVs are attached as Appendix D.

Table 4: Details of the EAP Project Team

Author and EAP	**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)
Co-Author and Review	**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
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 5: Details of the Specialist Team

Specialist Field	**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) M.Sc. (Environmental Geochemistry) (1997) B.Sc. Agriculture (Soil Science, Chemistry) (1995)
Surface Water Assessment Report (Appendix F 2)	Shangoni Management Services (Pty) Ltd Shangoni Aquiscience - Ockie Scholtz Pr. Sci. Nat. M.Sc Geohydrology
Geohydrological Impact Assessment (Appendix F 3)	
Wetland and Aquatic Ecology Impact Assessment (Appendix F 4)	Stephen Burton MSc Pr. Sci. Nat. 117474
Terrestrial Biodiversity Assessment (Appendix F 5)	David Hoare Consulting (Pty) Ltd - Dr David Hoare PhD Botany Pr. Sci. Nat. 400221/05 (Ecological Science, Botanical Science)
Terrestrial Plant Species Assessment (Appendix F 6)	
Terrestrial Animal Biodiversity Assessment (Appendix F 7)	
12-Month Pre-Construction Bat Environmental Impact Assessment (Appendix F 8)	Animalia Consultants - Werner Marais, Diane Smith & Caroline Bell Werner Marais: Zoologist and Ecologist MSc Biodiversity & Conservation

Specialist Field	Details of the Specialist who completed the assessment
	Pr. Sci. Nat. – SACNASP registration no. 400169/10 (Zoological Science)
Avifaunal Impact Assessment (Appendix F 9)	Chris van Rooyen Consulting - Chris van Rooyen (Bird Specialist) & Albert Froneman (Bird and GIS Specialist) Pr. Sci. Nat (Zoological Science)
Environmental Noise Impact Assessment (Appendix F 10)	Enviro Acoustic Research - Morne de Jager B.Ing (Chemical Engineering)
Visual Impact Assessment (Appendix F 11)	SiVEST SA (Pty) Ltd - Kerry Schwartz BA, SAGC Registered GIS Technician
Socio-Economic Impact Assessment (Appendix F 12)	Urban-Econ Development Economists - Pierre van Jaarsveld B.TRP HONS (Town and Regional Planning)
Heritage Impact Assessment (Appendix F 13)	Beyond Heritage - Jaco van der Walt MA Archaeology. ASAPA Accredited
Palaeontological Impact Assessment (Appendix F 14)	Professor Marion Bamford - PhD (Palaeobotany)
High-Level Safety, Health and Environmental Risk Assessment (Appendix F 15)	iSHEcon Chemical Process Safety Engineers - Debra Mitchell
Transport Study (Appendix F 16)	JG Afrika (Pty) Ltd - Iris Wink Pr.Eng, MSc Eng (Civil & Transportation)
Geotechnical Desktop Study (Appendix F 17)	SLR Consulting (South Africa) (Pty) Ltd - Muhammad Osman BSc Honours Engineering and Environmental Geology Pr Sci Nat 115558 (Geological Science)
Wake Effect Statement (Appendix F 18)	Provided by Developer

2.5 Expertise of the EAP

Lelani Claassen started her career as an environmental consultant in 2008. She holds an Honours degree in Environmental Management from UNISA, which she completed whilst working as an environmental consultant following the successful completion of a BSc Degree in Landscape Architecture from the University of Pretoria. She has also successfully completed the SABS Short-course: Environmental Legal Requirements for ISO 14001 compliance.

Her project experience is extensive in scope and covers various aspects of development including residential developments, filling stations and depots, infrastructure and mining projects. Lelani's experience includes environmental authorisation processes, concept (Fatal Flaw), Pre-Feasibility and Feasibility Studies, environmental compliance audits and environmental-legal compliance assessments. She also has experience as an Environmental Control Officer on construction projects.

Lelani is a Registered EAP (Registration Number 2018/153) 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). Lelani is also a Registered Scientist with the South African Council for Natural Scientific Professions (SACNASP) (Environmental Science) (Pr. Sci. Nat 121645), the legislated regulatory body for natural science practitioners in South Africa in terms of the Natural Scientific Professions Act of 2003.

Lelani'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, as it is not located within any of the Renewable Energy Development Zones. The Department published Guidelines for EIAs pertaining to renewable energy projects (DEA, 2015) which were consulted during the compilation of this report.

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 2).

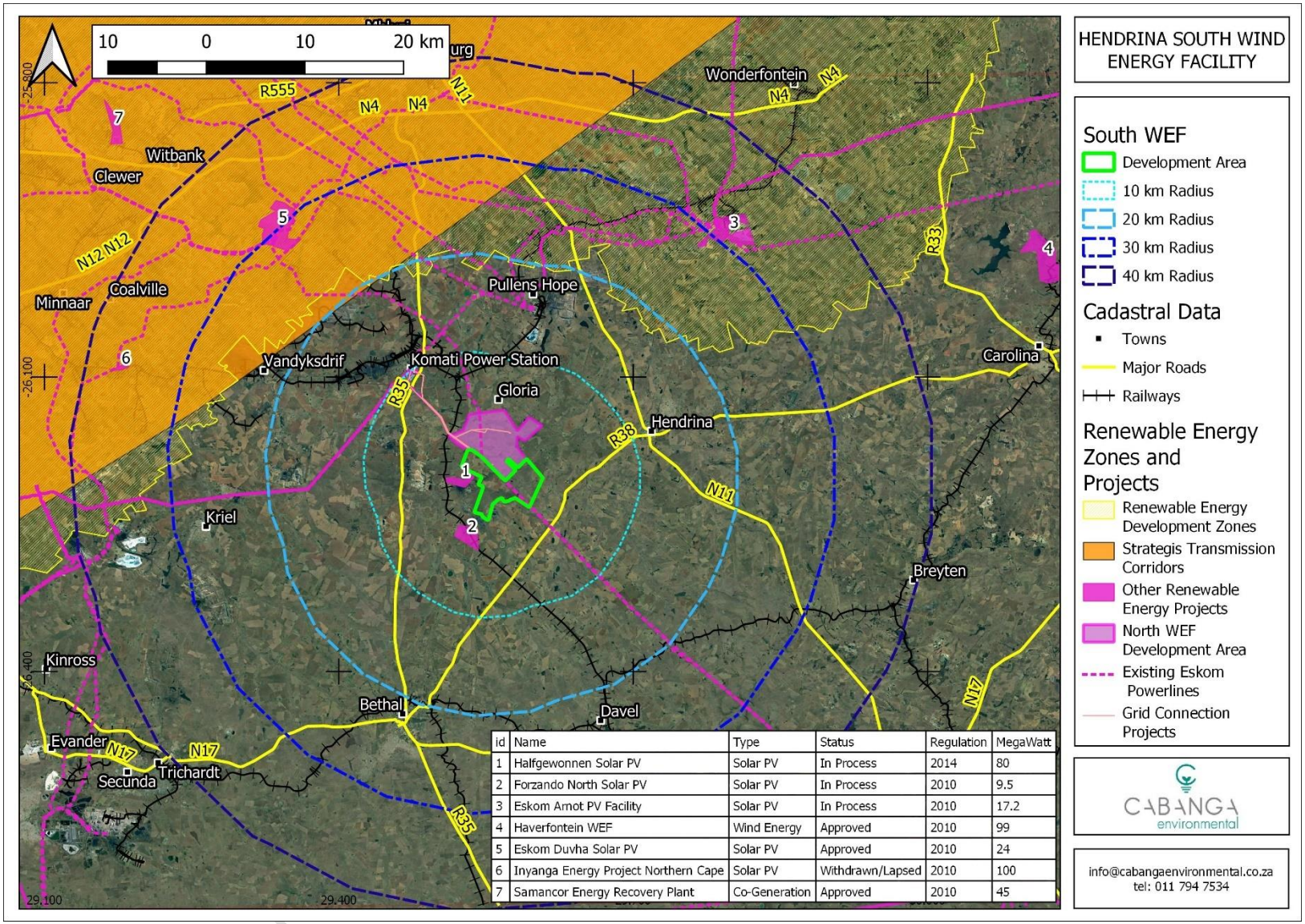
3.1.4 National Environmental Management Waste Act, 2008 (Act No. 59 of 2008)

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).



Plan 2: Project in relation to REDZ, Strategic Transmission Corridors and other Renewable Energy Projects

3.1.5 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, and that a person is only entitled to use water, without a license, if the use is permissible in terms of Section 22 of the NWA.

Water Use Authorisation will have to be obtained prior to the development being undertaken, as there are water uses relevant to the Project: "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 6. The competent authority in respect of water use licenses is the Department of Water and Sanitation (DWS, previously Department of Water Affairs and Forestry, DWAF).

Table 6: 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. Alternative sources include the Usuthu water scheme (Komati Power Station). If water is to be abstracted from a water resource, licensing in terms of the NWA will be required.
b	storing water.	Storage of water in excess of 50,000m³ or in a dam where the dam wall exceeds 5 metres in height, requires a WUL. It is very unlikely that the proposed projects will be associated with such high volumes of water storage.
c and i	impeding or diverting the flow of water in a watercourse; altering the bed, banks, course or characteristic of a watercourse.	The design of the Project makes every effort to avoid development within Regulated Zones of watercourses, however some project infrastructure, notably roads and cables, unavoidably traverse wetlands and streams, and authorisation in terms of Section 21 (c) and 21(i) will be required.
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.
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. No part of the Project is considered a facility designed for the disposal of waste.

S 21	Description	Relevance to the proposed project
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.

3.1.6 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), along with specific requirements for prevention and management of dust and emissions potentially arising from the proposed development, and monitoring and reporting requirements.

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 area where the Project is proposed, overlaps with several existing (active), abandoned and proposed Mining Right Areas (MRAs) and Prospecting Right Areas, as further discussed in Section 8.3. 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.

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.

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 8.6 to 8.9 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).

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 10.3.2.

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 13 and Appendix F 14) have been submitted on SAHRIS and statutory comment is pending.

3.4 Legislation relevant to Electricity Generation and Distribution

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 Developer and 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 Project to the National Grid. This is planned through the development of the proposed Hendrina South Grid Infrastructure Project, which is subject to a separate application for Environmental Authorisation.

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 is in the coal mining sector in Mpumalanga.

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

The White Paper on the Energy Policy (Department of Minerals and Energy, 1998) identified Integrated Energy Planning as the most suitable base from where future energy planning in the Country would be launched. The subsequent publication of the **Integrated Energy Plan** (GN 1430 of 25 November 2016) confirmed the need to reduce reliance on a single or few primary energy sources, but states that wind energy is limited to windy areas on the coast. Based on the data gathered by the Developer, the Hendrina area is viable for wind farm development and should not be overlooked.

The Integrated Energy Plan lists 8 objectives, which are all to some extent addressed by the proposed Project, as follows:

Table 7: Objectives of the Integrated Energy Plan

Objective of the Integrated Energy Plan (GN 1430)	How the Project addresses the objective
Ensure security of energy supply	The Project will contribute to the National Grid, thereby reducing uncertainty and shortages currently experienced.
Minimise cost of energy	As new technology is developed, the cost of renewable energy is falling significantly. The International Renewable Energy Agency (IRENA) reports that renewables are now significantly undercutting fossil fuels as the world's cheapest source of energy[1]

[1] https://www.weforum.org/agenda/2021/07/renewables-cheapest-energy-source/

Objective of the Integrated Energy Plan (GN 1430)	How the Project addresses the objective
Promote job creation and localisation	The imminent decommissioning of coal-fired power plants will inevitably be associated with job losses in Mpumalanga, where the proposed Project will generate employment (See Appendix F 12).
Minimise negative environmental impact by the energy sector	Renewable energy, specifically wind energy, is associated with far lesser environmental impacts than, for example, coal mining and coal-fired electricity generation.
Minimise water consumption	The Project will not consume significant water in the operational phase and, unlike conventional coal mining in the region, is not associated with significant impacts on water quality.
Diversify supply sources and primary energy carriers	The current primary energy supply in South Africa is reliant on coal. Development of renewables such as the proposed Project therefore presents diversification of the energy mix.
Improve energy efficiency (reduce energy intensity of the economy)	The Project will not reduce the energy intensity of the economy but does present an opportunity to generate electricity, which stimulates the economy, in a reliable and sustainable way.
Promote energy access	Access to energy on a National Scale is reliant on the Eskom distribution network, but also on the ability to provide electricity through said network, which has recently been erratic and unreliable as demonstrated through lad-shedding. The Project will contribute electricity to the National Grid, improving electricity supply.

The **White Paper on the Renewable Energy Policy of the Republic of South Africa** (GN 513 of November 2003) mentions that "It is imperative for South Africa to supplement its existing energy supply with renewable energies to combat Global Climate Change which is having impacts on our planet".

Thus, it is concluded from the review of various policy documents and legislation that the development of renewable energy, including wind, is in line with the National objectives and the country's international obligations. It is further concluded that the development of renewable energy projects, including wind, should not be limited to the coastal areas of South Africa, but also focus on those geographical areas where the bulk of current electricity generation in South Africa occurs, notably, 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)

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, and in Ward 15 of the Govan Mbeki Local Municipality of the Gert Sibande 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 8.3. However, much of the land is used for agricultural purposes as well.

Noise Control Regulations were promulgated in terms of the **Environmental Conservation Act, 1989 (Act No 73 of 1989) (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. The **Steve Tshwete Local Municipality (STLM) Noise By-Law, 2021** includes (among others) a schedule for the maximum designated sound levels at five (5) categories of facilities. The classifications are as follows:

Table 8: Maximum permissible designated sound levels for the General Environment (STLM Noise by-law)

No	Facility	Daytime Noise Limit (dB (A) (L_{eq})	Night time Noise Limit (dB (A) (L_{eq})
A	Any building used as hospital, convalescence home, home for the aged, sanatorium and institutes of higher learning, conference rooms, public library, environmental or recreation sites	45	35
B	Residential Buildings	50	35
C	Mixed residential (with some commercial and entertainment)	55	45
D	Residential and industry or small-scale production and commerce	60	50
E	Industrial	70	60

Govan Mbeki Local Municipality has published a **nuisance bylaw** which (among others) prohibits noise disturbance, but does not set out specific noise limits[2].

Based on the existing ambient sound levels monitored in the development area (See Section 8.10 and Appendix F 10), the noise character is typical of a rural noise district (similar to "A" in Table 8), although the actual existing land use classification is probably more aligned to "C".

[2] http://www.govanmbeki.gov.za/wp-content/Bylaws/bylaw_nuisance.pdf

The STLM Noise by-law 2021 allows for exemption from its provisions by application; however, the Noise Impact Assessment (Appendix F 10) has indicated that anticipated noise levels will be acceptable. See Section 10.3.8 for further discussion.

3.6 Other relevant Legislation

In addition to the Laws and Guidelines discussed above, Table 9 summarises some of the other key legislation and guidelines relevant to the Project:

Table 9: 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 and will continue to be considered in assessing the need and desirability of the Project aspects.
Spatial Planning and Land Use 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 must 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 (See Appendix G 10 for proof of consultation). If it is confirmed that there are land claims on the affected properties, the Claimants will be included in the I&AP database and 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 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.
Development Facilitation Act, 1995 (Act No. 67 of 1995) (DFA)	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. 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.
Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) (OHSA)	The OHSA provides for the health and safety of persons at work and other persons who may be exposed to hazards

Applicable legislation and guidelines used to compile the report	How this development complies with the legislation and guidelines
	associated with a workplace, including the use of plant and machinery. The Developer and Applicant must ensure compliance to the OHSA 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). National Ports Act, 2005 (Act No 12 of 2005)	These Acts relate specifically to the planning and development of transport systems and the safe use of roads. Prior to construction, the following permits must be obtained by the transport and logistics company transporting the components to site: • Abnormal load permits, (Section 81 of the NRTA 93 of 1996 and National Road Traffic Regulations, 2000); • Port permit (Guidelines for Agreements, Licenses and Permits in terms of the National Ports Act) • Authorisation from Road Authorities to modify the road reserve to accommodate turning movements of abnormal loads at intersections.
Hazardous Substances Act, 1973 (Act No 15 of 1973)	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. Minimum requirements for hazardous substances associated with the project are incorporated into the EMPr (Appendix H) and will be fully implemented on site.
South African Civil Aviation Authority (CAA) Guidelines: • Development Around Aerodromes • Objects Affecting Airspace • Obstacle Surface Identification	Air Traffic and Navigation Services (ATNS) has been appointed as the Obstacle application Service Provider for Wind farms from 1 May 2021. Prior to construction the Developer and Applicant must obtain permission from ATNS. The CAA "Development Around Aerodromes" Information document pertains specifically to developers planning developments around aerodromes to ensure safety of aircraft and people. The nearest aircraft landing strip to the site is that associated with the Koornfontein Mines, which has been in disuse for many years. The potential height of turbine infrastructure could render this infrastructure an "obstacle" in terms of the CAA Guidelines.
Air Traffic and Navigation Services (ATNS) Guidelines: • Wind Farm Obstacle Lighting	
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 10 provides a brief summary of the PSs, and an explanation of how the Project responds to each.

Table 10: IFC Environmental and Social Performance Standards and the Project

Performance Standard	Explanation[3]	Project response
	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.	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 project design has already managed to avoid various impacts (i.e. by placement of project infrastructure outside of sensitive environmental features and their buffer zones). The Environmental Management System (ESMS) in conjunction with the EMPr (Appendix H) 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 is a preferred bidder.
	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.	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. Applicable Policies will be compiled in the event that the Project is a preferred bidder.

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

	Resource Efficiency and Pollution Prevention: PS3 guides companies to integrate practices and technologies that promote energy efficiency, use resources—including energy and water—sustainably, and reduce greenhouse gas emissions.	The aim of the Project is not only to generate renewable energy and contribute to South Africa's National Grid, but also facilitate resource efficiency and pollution prevention by contributing to the South African green economy. Renewable energy technologies, such as this Project, are not greenhouse gas (GHG) emissions intensive therefore the detailed assessment and reporting of emissions is not required. Dust air pollution in the construction phase has been adequately addressed in the EMPr (Appendix H). Potential pollution associated with waste and wastewater is low and mitigation measures have been included in the EMPr. The EMPr and emergency preparedness and response plan identify anticipated hazardous materials and recommends relevant mitigation and management measures.
	Community Health, Safety, and Security: 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.	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 12) and relevant measures included in the EMPr (Appendix H).
	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, which may result in long-term hardship and impoverishment as well as social stress.	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.

	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; Appendix F 8; Appendix F 9) and the recommended management measures incorporated into the Project design (Plan 4) and EMPr (Appendix H). 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 13) and Palaeontological Assessment (Appendix F 14) 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 has been included in the EMPr (Appendix H) 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 11 provides a list of the equator principles and a brief summary of how the Project responds to each. 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 11: Project Compliance to the Equator Principles

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	The 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, an EMPr has been compiled and is included in Appendix H.
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 with the EMPr (Appendix H) 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 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 by the Applicant prior to Construction and evolve though 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.
Principle 9: Independent Monitoring and Reporting	Monitoring and Reporting requirements relevant to the Project are detailed in the EMPr (Appendix H)

4 Project Description

The proposed Project involves the development of the Hendrina South Wind Energy Facility (WEF) and associated infrastructure, including sub-station (IPP Portion) and Battery Energy Storage System (BESS), Operations and Maintenance (O&M) Building, Roads and Cables and temporary construction camps and laydown areas.

The Project is being developed in the context of the REIPPP, in line with the IRP – Renewable Wind Energy, and will connect to the National Grid via the Hendrina South Grid Infrastructure Project which is the subject of a separate application.

4.1 Project Location and Extent

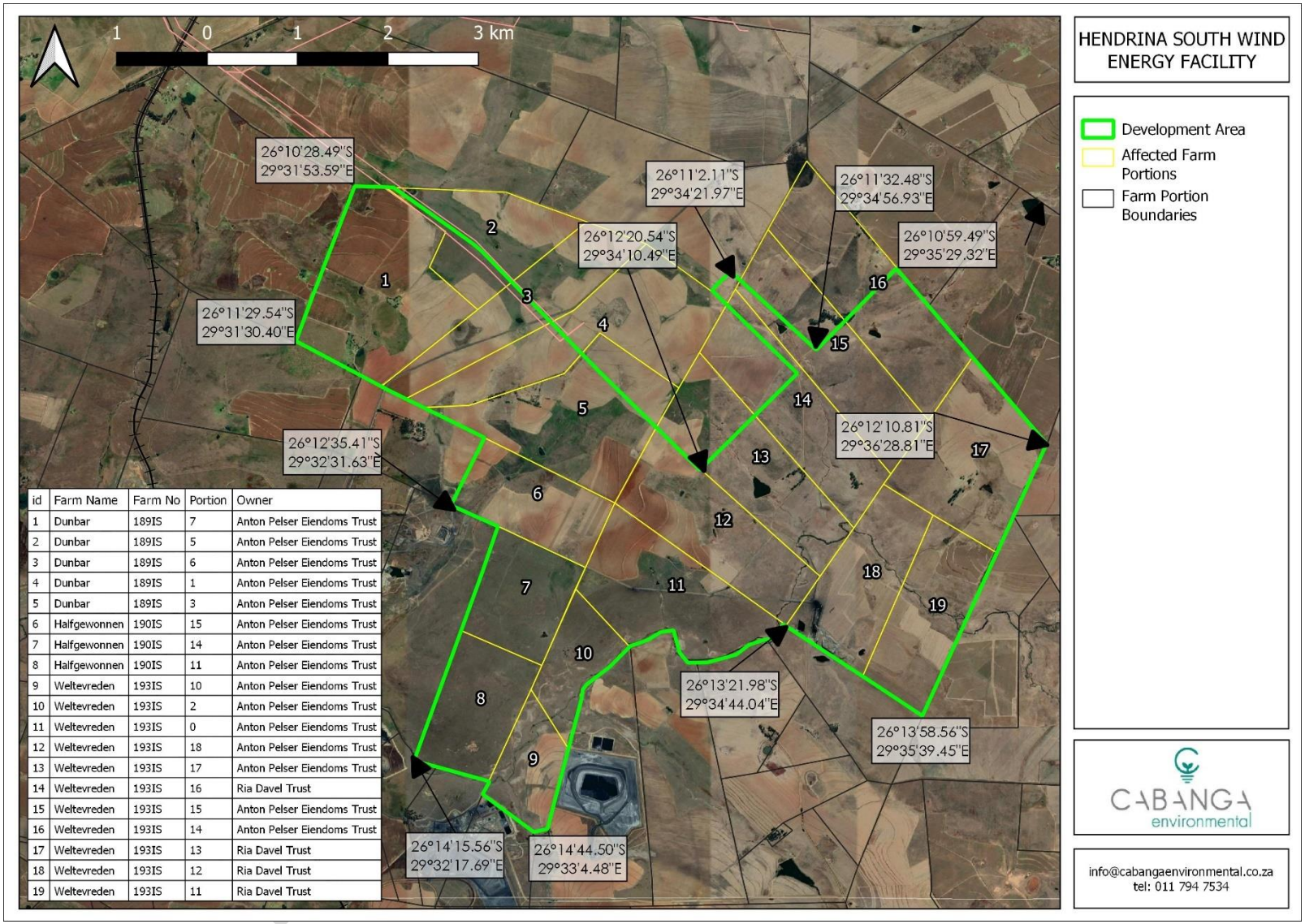
The Project is located within the Steve Tshwete Local Municipality, of the Nkangala District Municipality (majority of proposed infrastructure) and in the Govan Mbeki Local Municipality of the Gert Sibande District Municipality (seven turbines, approximately 7km of internal roads, and one proposed temporary laydown area (2Ha)), in the Mpumalanga Province (Plan 1).

The site is approximately 12 kilometres south-west of Hendrina and 11 km south-east of Komati, Mpumalanga and extends over approximately 2,900 hectares. The affected farm portions and surface rights ownership are reflected in Plan 3, with property details provided in Table 12.

Table 12 Affected Farm Portions

Parent Farm	Farm No	Portion No	SG Code
Dunbar	189 IS	Part of Portion 1	T0IS00000000018900001
Dunbar	189 IS	Part of Portion 3	T0IS00000000018900003
Dunbar	189 IS	Part of Portion 5	T0IS00000000018900005
Dunbar	189 IS	Part of Portion 6	T0IS00000000018900006
Dunbar	189 IS	7	T0IS00000000018900007
Halfgewonnen	190 IS	11	T0IS00000000019000011
Halfgewonnen	190 IS	14	T0IS00000000019000014
Halfgewonnen	190 IS	15	T0IS00000000019000015
Weltevreden	193 IS	0	T0IS00000000019300000
Weltevreden	193 IS	2	T0IS00000000019300002
Weltevreden	193 IS	10	T0IS00000000019300010
Weltevreden	193 IS	11	T0IS00000000019300011
Weltevreden	193 IS	12	T0IS00000000019300012
Weltevreden	193 IS	13	T0IS00000000019300013
Weltevreden	193 IS	Part of Portion 14	T0IS00000000019300014
Weltevreden	193 IS	Part of Portion 15	T0IS00000000019300015
Weltevreden	193 IS	Part of Portion 16	T0IS00000000019300016
Weltevreden	193 IS	Part of Portion 17	T0IS00000000019300017
Weltevreden	193 IS	18	T0IS00000000019300018

The affected land owners have been extensively consulted by the Developer, and have signed Land Owner Consent Forms for the EIA process to be undertaken on their properties. These are appended to the Application Form (Appendix J).



id	Farm Name	Farm No	Portion	Owner
1	Dunbar	189IS	7	Anton Pelser Eiendoms Trust
2	Dunbar	189IS	5	Anton Pelser Eiendoms Trust
3	Dunbar	189IS	6	Anton Pelser Eiendoms Trust
4	Dunbar	189IS	1	Anton Pelser Eiendoms Trust
5	Dunbar	189IS	3	Anton Pelser Eiendoms Trust
6	Halfgewonnen	190IS	15	Anton Pelser Eiendoms Trust
7	Halfgewonnen	190IS	14	Anton Pelser Eiendoms Trust
8	Halfgewonnen	190IS	11	Anton Pelser Eiendoms Trust
9	Weltevreden	193IS	10	Anton Pelser Eiendoms Trust
10	Weltevreden	193IS	2	Anton Pelser Eiendoms Trust
11	Weltevreden	193IS	0	Anton Pelser Eiendoms Trust
12	Weltevreden	193IS	18	Anton Pelser Eiendoms Trust
13	Weltevreden	193IS	17	Anton Pelser Eiendoms Trust
14	Weltevreden	193IS	16	Ria Davel Trust
15	Weltevreden	193IS	15	Anton Pelser Eiendoms Trust
16	Weltevreden	193IS	14	Anton Pelser Eiendoms Trust
17	Weltevreden	193IS	13	Ria Davel Trust
18	Weltevreden	193IS	12	Ria Davel Trust
19	Weltevreden	193IS	11	Ria Davel Trust

Plan 3: Project Site Coordinates, affected farm portions and land tenure

The proposed Project in relation to other renewable energy projects in the immediate vicinity has been shown in Plan 2. The Projects are briefly discussed below:

Table 13: Other Renewable Energy Projects and their status

ID (See Plan 2)	Name	Distance from the edge of this Project	Description and discussion
	Hendrina North WEF	Immediately adjacent to the North	WEF with up to 27 Turbines and up to 200MW generation capacity. Associated with this Project (ENERTRAG is also the developer) and Hendrina North Grid Infrastructure Project, to connect to substations at Komati power station. Application in process in terms of the EIA Regulations 2014.
1	Halfgewonnen Solar PV	Immediately adjacent to the south-west	Solar PV with up to 80MW Generation Capacity. Application (Appeal) in process in terms of the EIA Regulations 2014.
2	Forzando North Solar PV	1.8km to the south	Project initiated by the Mine in terms of the 2010 EIA Regulations. Surface Rights ownership has since changed hands. It is highly unlikely that this Project will be pursued further by the new Mine owners of the Forzando North Coal Mine. Regulatory time frames have lapsed.
3	Eskom Arnot PV	30km to the north-east	Solar PV with up to 17.2MW generation capacity. Initiated in terms of the 2010 EIA Regulations – according to the DFFE database, the Project is "in process". Regulatory timeframes have most likely lapsed.
4	Haverfontein WEF	55km to the north-east	Approved wind farm about 55km from the proposed site. Total Generation Capacity 99MW. Construction has not yet commenced.
5	Eskom Duvha Solar PV	30km to the north-west	Approved Solar PV Facility, up to 24MW Generation Capacity associated with the Duvha Power Station.
6	Inyanga Energy Project Northern Cape	35km to the west	Application has been withdrawn / lapsed.
7	Samancor Energy Recovery Plant	50km to the north-west	Approved co-generation project, up to 45MW generation capacity. Associated with the SAMANCOR industrial activities.

The development area comprises of 2,900ha, with the total buildable area comprising approximately 200ha. The total extent of the proposed Project is calculated in Table 14.

Table 14: Project Extent

Component	Area per component	Number of components	Total area of development
Turbines:	1Ha	26	26Ha
Operations and Maintenance (O&M) building:	200m² (0.02Ha)	1	0.02Ha
Workshop:	150m² (0.015Ha)	1	0.015Ha
Stores:	150m² (0.015Ha)	1	0.015Ha
Construction Camps:	5000m² (0.5Ha)	2	1Ha
Laydown Areas:	30,000m² (3Ha)	2	6Ha
Internal Roads:	10m wide, 40km long = 400000m²		40Ha
On-site substation and battery energy storage system (BESS):	3Ha	1	3Ha
Total physical footprint of the Project			76.5 Ha

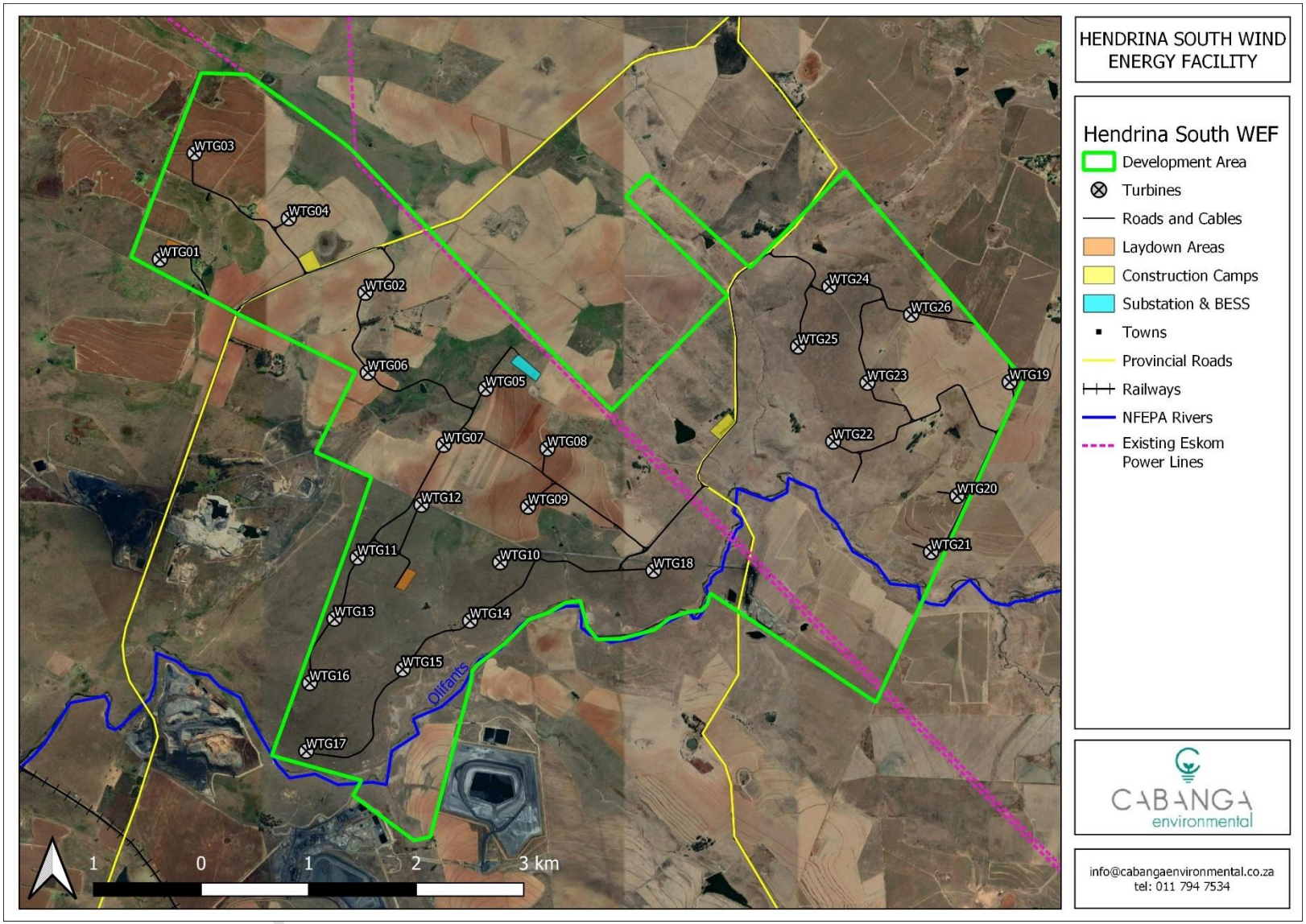
4.2 Project Components

The project components are summarised in Table 15 and the preliminary layout is illustrated in Plan 4.

Table 15: Project Components and technical details

Facility Name:	Hendrina South Wind Energy Facility and Associated Infrastructure
Applicant:	Hendrina South Wind Energy Facility (RF) Pty Ltd
Municipalities:	Steve Tshwete Local Municipality of the Nkangala District Municipality, Govan Mbeki Local Municipality of the Gert Sibande District Municipality
Extent:	2,900 ha
Buildable area:	Approximately 200 ha
Capacity:	Up to 200MW
Number of turbines:	Up to 26
Turbine hub height:	Up to 200m
Rotor Diameter:	Up to 200m
Foundation:	Approximately 25m^2 diameter x 3m deep – 500 m^3 – 650m^3 concrete. Excavation approximately 1000m^2, in sandy soils due to access requirements and safe slope stability requirements.
Operations and Maintenance (O&M) building footprint:	Located in close proximity to the substation. Conservancy tanks with portable toilets. Typical areas include: - Operations building – 20m x 10m = 200m^2 - Workshop – 15m x 10m = 150m² - Stores - 15m x 10m = 150m²
Construction camps:	Typical area 100m x 50m = 5000m^2. Sewage: Conservancy tanks and portable toilets.
Temporary laydown or staging areas:	Typical area 220m x 100m = 22000m². Laydown area could increase to 30 000m² for concrete towers, should they be required. Will include diesel, cement and chemical storage, as well as a small workshop area.

Cement batching plants (temporary):	Gravel and sand will be stored in separate heaps whilst the cement will be contained in a silo. The footprint will be up to 0.5ha. Maximum height of the silo will be 20m.
Internal Roads:	Internal roads will have a width of 8 - 10m, increasing up to 15m for turning circle/bypass areas to allow for larger component transport. Length of internal road – Up to 40km.
Cables:	The medium voltage collector system will comprise of cables up to and including 33kV that run underground, except where a technical assessment suggests that overhead lines are required, connecting the turbines to the onsite substation (IPP Portion).
On-site substation and battery energy storage system (BESS):	Total footprint will be up to 3ha in extent. The up to 275kV substation will consist of feeder bays, transformers, switching station electrical equipment (bus bars, metering equipment, switchgear, etc), control building, workshop, telecommunication infrastructure, and access roads. The substation will include an area with a subterranean earthing mat onto which a concrete plinth will be constructed. The associated BESS storage capacity will be up to 100MW/400MWh with up to four hours of storage. It is proposed that solid state batteries will be used. Solid state batteries consist of multiple battery cells that collectively form modules. Modules are assembled within shipping containers and delivered to the Project site. The main components of the BESS include the batteries, power conversion system and transformer which will all be stored in various rows of containers.



Plan 4: South WEF Layout Map

4.2.1 General Description of Wind Energy Facility and Turbine Technology

The Office of Energy Efficiency and Renewable Energy in the United States Department of Energy (DoE) reports that wind-energy technology is one of the fastest-growing energy sources in the world (https://www.energy.gov/eere/wind/advantages-and-challenges-wind-energy).

Due to the rapidly developing technology, specification of the exact turbine technology may only be finalised during the detailed design phase once the Engineering, Procurement and Construction (EPC) Contractor is appointed, after all necessary permits and permissions (including EA, if granted) has been obtained.

In essence, a wind turbine is a machine that converts mechanical energy, from blades rotated by moving air, to electricity. Individual wind turbines grouped together are commonly referred to as a Wind Farm, or Wind Energy Facility (WEF). This includes the supporting and ancillary infrastructure needed to operate and maintain the WEF, and distribute the electricity that is generated to consumers.

In the common Horizontal-Axis Wind Turbine, the turbine blades face the wind direction so the wind can rotate the blades. Each turbine is associated with a yaw drive to enable the turning of the rotor so the turbine can face the wind even when the wind direction changes. The rotating blades spin a shaft attached to a generator via a series of gears to increase the rotational speeds from about 30 to 60 rotations per minute (rpm) in the low-speed or turbine shaft, to about 1,200 rpm in the high-speed or generator shaft, housed in the Nacelle. The generator houses a magnet with copper coils. The rotational energy produced by the shaft spins the copper coils in the magnet, exciting the electrons in the wire and producing electricity. The quantity of electricity depends on various factors, including how fast the shaft can spin in the magnetic field, the strength of the magnetic field, and the quantity and arrangement of the copper coils. (https://www.epa.gov/sites/default/files/2019-08/documents/wind_turbines_fact_sheet_p100il8k.pdf).

These typical components of a Wind Turbine are illustrated in Figure 2.

The proposed Project will consist of up to 26 Wind Turbines. These are connected to an on-site substation (IPP Portion) via underground cables; however, the on-site circumstances may require above-ground cables in certain areas (to be determined during the detailed design phase). The Cable alignment follows that of the internal road network and is aligned to existing roads where feasible.

From the on-site substation (IPP Portion), the electricity will be fed to the National Grid via the Hendrina South Grid Infrastructure Project (substation and powerlines), which will connect this Project to the existing substations at Komati Power Station. The Grid Infrastructure is the subject of a separate application for EA, as these components will be handed over to Eskom for the operational phase of the Project.

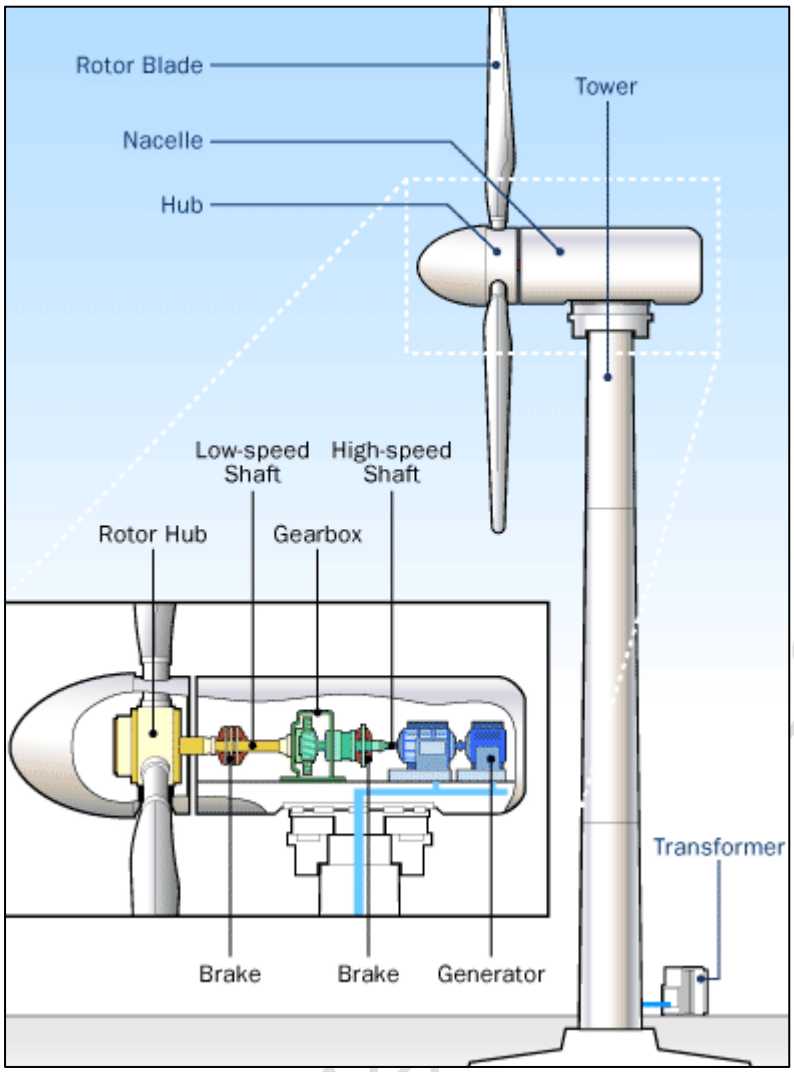


Figure 2: Typical components of a Wind Turbine[4]

4.2.2 Electrical Components and Connection to Grid

The grid connection will be achieved through the Hendrina South Grid Infrastructure Project, which is subject to a separate application for EA.

4.2.2.1 Battery Energy Storage System (BESS)

The BESS is required to store and dispatch stored electricity, to ensure contribution to the Grid can continue, even in times of intermittent wind (and resultant reduced electricity generation at the Project).

The BESS will be up to 3ha in extent with a capacity of up to 100MW/400MWh, with up to four hours of storage. The BESS technology (to be confirmed during the detailed design phase) will most likely involve solid state batteries comprising multiple battery cells, collectively forming modules, pre-assembled (off site) in shipping containers and delivered to site.

[4] https://www.the-tech-addict.com/how-does-a-wind-turbine-work/

Lithium Solid State Batteries are the most likely technology (to be confirmed during the detailed design phase). Typical battery modules in the BESS facility are illustrated in Figure 3.

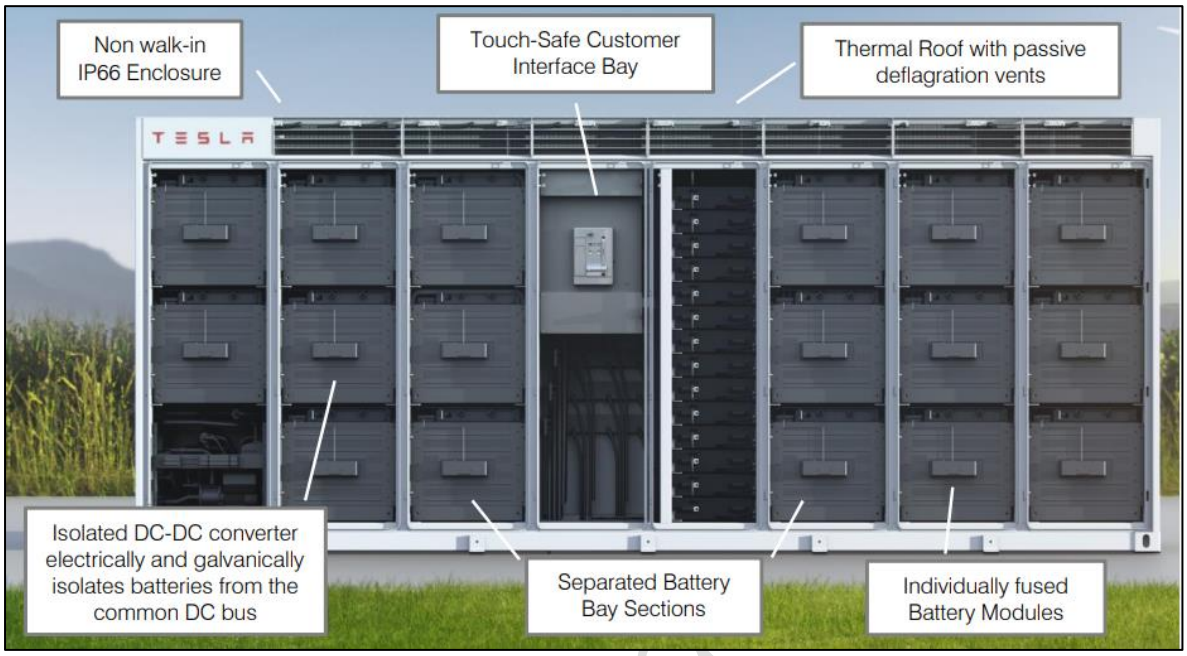


Figure 3: Typical Battery Modules in a BESS with the Separated Sections (Tesla MegaPack - Safety Overview[5])

4.2.2.2 *Onsite Substation*

The on-site substation (IPP Portion), adjacent to the BESS, will have a capacity up to 275kV (to facilitate the LILO-connection to the existing Eskom 275kV powerline that traverses the site, should Eskom approve this alternative). The substation will include an area with a subterranean earthing mat onto which a concrete plinth will be constructed. Further, the substation will consist of feeder bays, oil-filled transformers in a bund wall[6], switching station electrical equipment (bus bars, metering equipment, switchgear, etc), control building, workshop, telecommunication infrastructure, and access roads.

A photograph of the substations at the Kouga Wind Facility is included as Figure 4, to illustrate the relationship between the IPP substation (forming part of this Project) and the operator substation (forming part of the Hendrina South Grid Infrastructure Project).

[5] https://www.greenburghny.com/DocumentCenter/View/7245/PB-20-18-Eagle-Energy---Tesla-Safety-Data-Sheet

[6] Bund wall around the transformer will cater for 110% of the transformer oil volume and comply to the requirements set out in SANS 10089-1:2008

Figure 4: Example of an On-site Substation (Operator portion) (left) and adjoining Wind Facility substation (IPP portion) (right) on the Kouga Wind Facility

4.2.2.3 Transmission and Distribution

The proposed Project is closely associated with the Hendrina South Grid Infrastructure Project, which is subject to a separate EIA Process to facilitate hand-over of the Grid Infrastructure to Eskom in the operational phase.

The South Grid Infrastructure Project will connect this Project to the National Grid, via the substations at the Komati Power Station, approximately 16km from the site.

Two different grid solutions are being investigated:

1. **Grid solution 1 (new substation and powerline):**
   The proposed powerline to Komati Power Station will be approximately 16km long depending on the exact route options. A 500m corridor along the proposed route (250m from the centre-line) is included in the assessments. 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 250m connecting the new substation to the existing transmission line. The LILO solution feasibility depends on Eskom permissions.

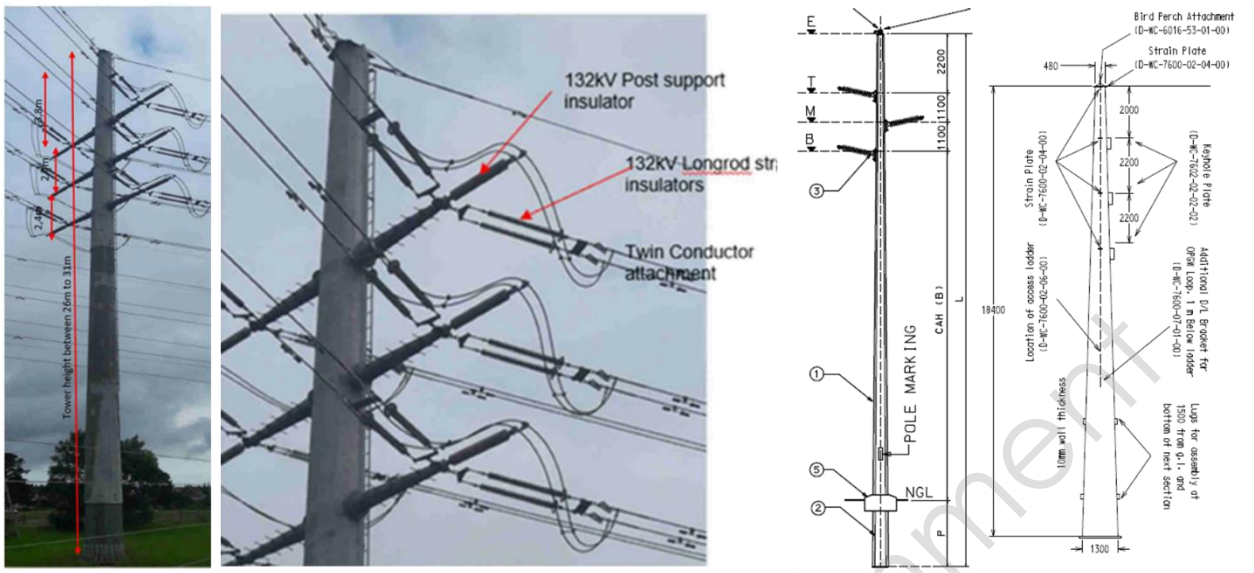


Figure 5: 132 kV Intermediate Self-Supporting Double Circuit Monopole (preferred alternative)

4.2.3 Associated Infrastructure

4.2.3.1 Site Access and Internal Service Roads

The Project site will be accessed via the R542, which runs north of the site, between the towns of Hendrina and Komati. From here, The Provincial Halfgewonnen Road (D622) traverses the Site. Provincial and Local roads, including existing farm roads will be utilised, to access the Project components as far as possible. Where required, the roads will be upgraded to meet the Project requirements. New internal access roads will be required to access certain project components. Internal roads will be between of 8 - 10m wide, increasing to 15m in places for turning circle/bypass areas to allow for larger component transport. The length of the internal road network will be up to 40km.

4.2.3.2 Temporary Construction Camps and Laydown Area

During the construction phase, two construction camps (including concrete batching plants) and two temporary laydown areas will be required. The Construction camps each comprise up to 3Ha, while the laydown areas each will be up to 2Ha.

Each construction camp will typically be fenced off and access-controlled (security office and boom gate), and will contain a site office / meeting room (containerised), canteen / eating area, ablutions, change room and storage areas for equipment, construction materials, fuel, oil, machinery etc. a small workshop and concrete batching plant.

In this area, the following specifications are important:

- Cement storage must be on an impervious surface and under a roof, preferably inside a container or similar facility to prevent wind-blown cement loss and water damage to cement being stored on site;

- Empty cement bags must be contained in a designated area, where they are prevented from blowing away, for disposal by the EPC contractor as hazardous waste, or may be re-used if the EPC can guarantee no cement-residues will be dispersed.
- All hazardous chemical substances (HCS) must be labelled, packaged, transported and stored as per the OHSA: Regulations for Hazardous Chemical Substances. Only authorised personnel who are trained to work with HCS are able to do so and access and/or dispense HCS.
- Diesel fuel storage tanks should be above ground on an impermeable concreted surface in a bunded area in accordance to SANS 10131: Above-ground storage tanks for petroleum products.

The laydown areas will similarly be fenced for security purposes but will not contain significant other infrastructure (except chemical toilets and small security office / guard huts where necessary), as these areas are primarily used for the storage of materials, equipment, machinery and components as they are delivered to site.

4.2.3.3 Hardstand Areas

Each turbine will require a hardstand area including a crane platform, storage area and crane boom area, to enable offloading and storage of parts and construction materials during the construction phase, and the cranes to assemble the turbine components. The hardstand areas will be approximately 1Ha each for the construction phase, reduced to 0.5ha for the operational phase of the Project.

4.2.3.4 Security and Fencing

Fencing will be installed at the construction lay down area, O&M building and onsite substation.

Security personnel will work in shifts to ensure 24-hour safeguarding of the Project. Security of the site during construction will be the responsibility of the EPC.

4.2.3.5 Operations and Maintenance (O&M) Buildings

The O&M building is required to support the operational phase of the Project, to accommodate the personnel and activities associated with daily operations and maintenance of the WEF. The O&M Building will be in close proximity to the substation and comprise an operations building (200m²), workshop (150m²) and stores (150m²). The O&M area will be fenced and access-controlled.

4.2.4 Provision of Services

During both construction and operational phases, a number of supporting services will be required, as described below:

4.2.4.1 Power Supply

During construction diesel-powered generators will be used to supply electricity to the construction camps. Vehicles used for the construction phase will be petrol/diesel powered.

Once in operation the O&M buildings will receive power from the National Grid.

The Project will be connected to the National Grid through the proposed South Grid Infrastructure (which is the subject of a separate EIA Process) via the existing substations at the Komati Power Station.

4.2.4.2 ***Water Requirements***

The Project will use approximately 80,000m³ of water per year in the construction phase (24 months) and 250m³ of water per year during the Operational phase (20+ years).

During construction, water is required for the ablutions, establishment of access roads, concrete foundations and dust suppression, as well as for potable water supply to construction-phase personnel.

During the operational phase, water is required for domestic and potable use and possibly for dust suppression on internal roads. Quantities are thus minimal.

Water will 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.

The amount of potable water needed will depend on the number of workers during each project phase. It is proposed that 2000*l* chiller units will be rented to provide potable water to all site personnel.

The construction phase will be associated with temporary stormwater diversion berms to divert stormwater flow around the construction areas and release the stormwater back to the environment. Stormwater management infrastructure will also be constructed at the Turbine bases, O&M Buildings and substation to ensure effective management of stormwater (pollution prevention) and release of the runoff to the environment, without causing erosion. Suitable erosion control will be established at points of concentrated flow and/or increased flow velocity.

Stormwater management infrastructure including drains and culverts at the road network will be confirmed during the detailed design phase, but will similarly ensure that runoff is controlled, and that watercourses and aquatic biota are not impeded during the operational phase where internal roads cross over watercourses.

4.2.4.3 ***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 laydown area during the construction phase, and at the O&M building during operations. 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 and O&M Contractor 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. The chemical toilets will be placed at the

construction camps and temporary laydown areas during the construction phase, while it proposed that conservancy tanks be installed at the O&M building for use during in the operational phase.

Conservancy tanks and chemical toilets will be serviced by a contracted waste management company on a regular basis. The EPC and O&M Contractors will be required to retain proof of safe and lawful disposal of sewage for the duration of the Project.

4.2.5 Transportation of Project Components to Site

Wind turbine components can be transported in a number of ways with different truck / trailer combinations and configurations (JG Afrika, April 2022). The exact number and types of trucks and trailers to be used will depend on the transport contractor appointed and can only be confirmed during the detailed design phase, and when the transport contractor applies for the necessary permits for abnormal vehicles and loads.

It is assumed that the wind turbine components will be imported to South Africa via the Port of Richards Bay, in KwaZulu Natal, some 543km travel distance from the Site.

For abnormal vehicles, the preferred route from the Port travels north on the N2 to Ermelo, then north-east on the N11 to Hendrina, and the R542 via the R38 to the site. This route makes use of higher-order roads (i.e. National Routes) and is this the preferred transport route.

Despite the higher-order roads being used for much of the transport route, it is anticipated that some road modifications may be required to enable the abnormal load vehicles to reach the site. It is critical that the transport contractor undertake a "dry-run" prior to the transport of any turbine components, to ensure the vehicles will be able to move safely and without obstruction.

The Nacelle is the heaviest component of a wind turbine. Nacelle transport is illustrated in Figure 6.

Turbine blades will also have to be transported to site individually. Given the length of the blades proposed for this Project (100m), suitable trucks for the transport of the blades will also have to be sourced from overseas and shipped to South Africa, as there are no suitable abnormal load trucks available in South Africa to transport such large blades. Typical blade transport is illustrated in Figure 7.

With a hub-height of 200m, ten tower sections per turbine will be required (steel towers typically come in 20m long sections). These will also be transported to site individually, typically on a low-bed trailer, as shown in Figure 8.

The turbine hub and rotary units' components need to be transported separately due to their weight. Cranes for turbine assembly on site will also need to be transported to site.

In addition to transporting the specialised lifting equipment, the normal civil engineering construction materials, plant and equipment will need to be brought to the site (e.g. sand, stone, cement, concrete batching plant, gravel for road building purposes, excavators, trucks, graders, compaction equipment, cement mixers, transformers in the sub-station, cabling, transmission pylons etc.). Other components, such as electrical cables, pylons and substation transformers, will also be transported to site during construction. The transportation of these items will generally be undertaken with normal heavy load vehicles (JG Afrika, April 2022).

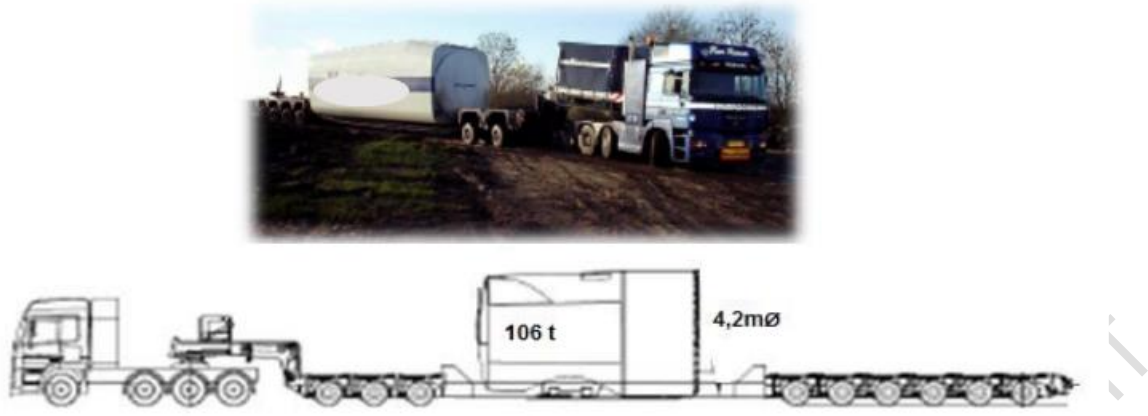


Figure 6: Example - transporting the Nacelle (JG Afrika, April 2022)

Figure 7: Example of blade transport (JG Afrika, April 2022)

Figure 8: Example - transport of tower sections (JG Afrika, April 2022)

4.2.6 Employment and Operating Hours

The construction of the Project will create an estimated 300 project-specific full time equivalent (FTE) employment positions, (including foreign FTE positions) over the period of construction (estimated at 24 months). These positions will become redundant after construction is complete.

The operation of the Project will create an estimated 25 FTE employment (including foreign FTE positions) positions annually (for 20 years) for the lifetime of the operation of the Project (20+ years). The operational phase is associated with far fewer employment opportunities than the construction phase, but these are considered permanent positions.

Construction will be scheduled to take place during daylight hours; however, activities like pouring of cement or raising of the nacelle and blades must be concluded once commenced and such activities may extend into the night.

Once operational, Turbines will be operational 24/7 except in extreme weather conditions, during maintenance activities or if a mechanical breakdown occurs, in which case repairs must be implemented timeously.

Employees (except for security personnel and emergency night-shift personnel) will work during daylight hours unless there has been an emergency and work runs into night time.

4.3 Time-frames for implementation of the Activity

4.3.1 Pre-construction Phase

The pre-construction phase is associated with the necessary pre-feasibility and feasibility studies undertaken by the Developer, and applying for the necessary permits and authorisations, including EA, by the Applicant.

Before construction can commence (if all necessary authorisations including EA are obtained), it is the Applicant's intention to bid the 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 EIA-Phase approved layout, prior to finalising the exact footprints and locations of infrastructure. Additionally, final site walk-downs by the specialist team must be undertaken to ensure the construction of the Project does not affect sensitive or protected plant or animal species within the footprints of the proposed development.

4.3.2 Construction Phase

The construction phase is anticipated to last up to 24 months (2 years).

Commencement of the construction phase is highly dependent on the outcome of the REIPPP bidding process, and/or the processes to obtain funding for the Project.

4.3.3 Operational Phase

The Project will have an operational life of a minimum of 20 years.

4.3.4 Decommissioning Phase

Following the operational phase, the Applicant will consider the continued economic viability of the Project and re-furbish project components rather than decommissioning, to extend the life of the Project. Detailed legal review will have to be undertaken at the time to identify (and comply with) environmental permitting requirements for such refurbishing (or decommissioning) at the time.

If it is found that the Project must be decommissioned, this will involve the dis-assembly of Project components (where relevant) and recycling or disposal of these. Available recycling technologies must be investigated before decommissioning is initiated.

The decommissioning phase is expected to be comparable to the construction phase in length, though this phase is often associated with less urgency and may thus be extended somewhat.

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 16.

Table 16: Listed Activities applied for

Activity No(s):	The Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	The portion of the proposed project to which the applicable listed activity relates.
11 (i)	**The development of facilities or infrastructure for the transmission and distribution of electricity**— (i) **outside urban areas** or industrial complexes **with a capacity of more than 33 but less than 275 kilovolts**; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more; excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is— (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.	The Project will require the development of an on-site substation (IPP Portion) to connect the Project to the National Grid: Two Gird Connection Options are being investigated: - Loop In Loop Out of the existing 275kV powerline that traverses the site, which would triger Activity 9 of Listing Notice 2, but depends on Eskom approvals; OR - New substation (IPP Portion and Operator Portion) and new Powerline (132kV) subject to a separate EIA Process. Thus, unless Eskom approves the LIO Option, the Project will involve the development of a substation for the transmission and distribution of electricity, outside urban areas, exceeding 33 but not exceeding 175kV.
12 (ii) (a) and (c)	**The development of—** (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or **(ii) infrastructure or structures with a physical footprint of 100 square metres or more;** **where such development occurs—** **(a) within a watercourse;** (b) in front of a development setback; or **(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —** excluding— (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;	The combined development footprint of all structures and infrastructure will comprise almost 80Ha (See Table 14). Some of the turbines, internal access roads, laydown areas and construction camps, fall within 32m of wetlands that have been delineated on site. Some of the internal roads and cables cross wetlands and drainage lines on the site (See Plan 17). Therefore, the Project involves the development of infrastructure or structures with a physical footprint exceeding 100m², and the development will occur within watercourses (including drainage lines and wetlands) and within 32m of watercourses.

	(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of the development and where indigenous vegetation will not be cleared.	
14	**The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.**	"Dangerous Goods" is defined in the EIA Regulations as "goods containing any of the substances as contemplated in South African National Standard No. 10234, supplement 2008 1.00: designated "List of classification and labelling of chemicals in accordance with the Globally Harmonized Systems (GHS)" published by Standards South Africa, and where the presence of such goods, regardless of quantity, in a blend or mixture, causes such blend or mixture to have one or more of the characteristics listed in the Hazard Statements in section 4.2.3, namely physical hazards, health hazards or environmental hazards;" Storage of Chemicals associated with the construction and maintenance of the Project will include diesel, cement, paints, lubricants, grease, oils, cleaning products etc. classified as flammable or combustible. Chemicals associated with the construction and operation of the facility, will exceed 80m³ collectively but not exceed 500m³, and many of these chemicals contain substances that are listed in SANS10234 (2008 supplement).
19	**The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse**; but excluding where such infilling, depositing, dredging, excavation, removal or moving— (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or	Upgrade of existing roads, and construction of new access roads and underground cables associated with the project, will require the infilling and excavation of material exceeding 10m³ from watercourses, where the road alignments cross over wetlands and drainage lines.

	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.	
24 (ii)	**The development of a road**— (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or **where no reserve exists where the road is wider than 8 metres**; but excluding a road— (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.	Internal access roads will be 8m to 10m wide, increasing to 15m to allow for large component transport in specific locations. No road reserve exists on the site.
26	Residential, retail, recreational, tourism, **commercial** or institutional **developments of 1 000 square metres or more**, **on land previously used for mining** or heavy industrial purposes; excluding — (i) where such land has been remediated in terms of part 8 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; or (ii) where an environmental authorisation has been obtained for the decommissioning and closure of such an industry in terms of this Notice or any previous NEMA notice; or (iii) where a closure certificate has been issued in terms of section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) for such land.	The Project is regarded as a commercial development (the term is not defined in the Regulations). Portions of the development site have been / are being undermined (thus the land was previously used for mining).
28 (ii)	Residential, mixed, retail, **commercial**, industrial or institutional **developments where such land was used for agriculture**, game farming, equestrian purposes or afforestation on or after 01 April 1998 **and where such development**: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or (ii) **will occur outside an urban area, where the total land to be developed is bigger than 1 hectare**; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	The Project is considered a commercial development (the term is not defined in the Regulations). Parts of the development site are used for agriculture (dryland crops and livestock grazing). The development is outside of an urban area, and the total land to be developed is bigger than 1 Ha (see Table 14).

30	**Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act**, 2004 (Act No. 10 of 2004).	Section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) empowers the Minister to, by notice in the Gazette, identify any process or activity in a listed ecosystem as a threatening process. Section 53(2) of NEMBA states that "a threatening process identified in terms of subsection (1) must be regarded as a specified activity contemplated in section 24(2)(b) of the National Environmental Management Act and a listed ecosystem must be regarded as an area identified for the purpose of that section." Section 24(2)(b) of NEMA, in turn, refers to the identification of "geographical areas based on environmental attributes, and as specified in spatial development tools adopted in the prescribed manner by the Minister or MEC, with the concurrence of the Minister, in which specified activities may not commence without environmental authorisation from the competent authority;" In light of the legislation mentioned in the above paragraphs, the Project site falls within the Eastern Highveld Grassland, which is listed as Vulnerable in the National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011), published under the NEMBA. Furthermore, as identified in this Table, the Project involves Activities identified in Listing Notice 3 of the EIA Regulations (with specific reference to the geographical areas identified in terms of 24(2)(b) of NEMA). Therefore, development of the project involves the undertaking of listed activities in specified geographical areas, and is thus regarded an activity identified in terms of section 53(1) of the NEMBA.
48 (i) (a) and (c)	The **expansion** of— (i) **infrastructure or structures where the physical footprint is expanded by 100 square metres or more**; or (ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more; **where such expansion occurs**— (a) **within a watercourse**; (b) in front of a development setback; or (c) if no development setback exists, **within 32 metres of a watercourse**, measured from the edge of a watercourse; excluding—	Transport of large infrastructure components related to the Project will require the expansion of existing access and/or internal roads, culverts or similar drainage crossing infrastructure collectively exceeding 100m² or more beyond existing roads and road reserves. Some of the roads that are to be expanded cross or fall within 32m of wetlands or drainage lines that have been delineated on site. Thus, the project involves the expansion of existing road infrastructure, by more than 100m², within watercourses (wetlands and drainage lines) and within 32m of watercourses.

	(aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 23 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such expansion occurs within an urban area; or (ee) where such expansion occurs within existing roads, road reserves or railway line reserves.	
56 (i) and (ii)	**The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre**— (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, **where the existing road is wider than 8 metres**;	Roads associated with the Project will have a width of 8- 10m, increasing up to 15m on bends and to allow for the transport of large components to the site. Several farm roads and existing provincial roads that are used to access the Project have no existing road reserves, are presently wider than 8m, and will require widening to 15m in places (total widening of 7m). Some of the existing roads will also require lengthening of more than 1km to connect the various turbines project components.
Activity No(s):	**The relevant Scoping and EIA Activity(ies) as set out in Listing Notice 2 of the EIA Regulations, 2014 as amended**	**The portion of the proposed project to which the applicable listed activity relates.**
1	**The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more**, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs — (a) within an urban area; or (b) on existing infrastructure.	The Project will involve generation of up to 200MW electricity from a renewable resource (wind) outside of an urban area. The exclusions do not apply.
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	The Project will have cables up to and including 33kV that run underground (except where a technical assessment suggest that overhead lines are required) within the Project connecting the turbines to the onsite substation (up to and including 275kV). The consideration of the LILO Grid Connection Option makes the capacity of 275kV an essential project element. If Eskom allows the LILO connection, this would be associated with a far shorter powerline construction, and resultant lowered environmental impacts and capital costs. The LILO option feasibility depends on Eskom, and thus

	(d) will be removed within 18 months of the commencement of development.	provision must be made for the construction of a new powerline as well, which is being assessed as part of a separate EIA process. Activity 11 of Listing Notice 1 will apply if new 132kV powerlines are constructed, along with a substation, while this Activity 9 of Listing Notice 2 will apply if Eskom approves the LILO connection alternative. This area is considered as being outside an urban area and is not in an industrial area.
15	**The clearance of an area of 20 hectares or more of indigenous vegetation**, excluding where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The Project footprint (Table 14) is almost 80Ha, with various turbines, laydown areas and construction camps being proposed on areas where the topsoil has not been lawfully disturbed during the preceding ten years, and containing vegetation occurring naturally in the area (definition of indigenous vegetation, as per the EIA Regulations, 2014). Based on the current layout, the total development footprint that will affect indigenous vegetation is approximately 25Ha (more than 20Ha). The exclusion does not apply to the development of turbines, construction camps, laydown areas and buildings, as these are not linear infrastructures. The activity is a new development, not undertaken for maintenance purposes and the second exclusion also does not apply.
Activity No(s):	**The relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended**	**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. 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; (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; (dd) Sites or areas identified in terms of an international convention;	Roads associated with the Project will be 8-10m wide, increasing up to 15m on bends and to allow for transport of large project components. The road design aligned with existing on-site roads as far as possible, but the development of new roads to access certain portions of the site is also planned. The development site is in Mpumalanga and outside an urban area. The Mpumalanga Biodiversity Sector Plan (MBSP) (MTPA, 2014) identifies Critical Biodiversity Areas on the site, that will be affected by the Project (Refer to Plan 10).

	(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; or (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 ii. Inside urban areas: (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.	
10 (f) (i) (ee) (hh)	**The development and related operation of facilities or infrastructure for the** storage, or **storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres**. f. **Mpumalanga** i. **Outside urban areas**: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (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; (dd) Sites or areas identified in terms of an international convention; (ee) **Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans**; (ff) Core areas in biosphere reserves; (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, where such areas comprise indigenous vegetation; or (hh) **Areas within a watercourse or wetland, or within 100 metres of a watercourse or wetland**; or ii. Inside urban areas: (aa) Areas zoned for use as public open space; or	Diesel, cement, and chemical storage for the Project will exceed 30m³. The facilities for the storage and handling of dangerous goods (as identified in SANS 10234: 2018 supplement) will be temporary, for the construction phase, at the construction camps, and permanent at the O&M Buildings (workshop and stores) during the operational phase. The Project infrastructure is located in Mpumalanga, outside of urban areas and within Critical Biodiversity Areas and delineated Wetlands and/or their 100m regulated zones. The combined capacity of the chemicals that are located within the CBAs or within 100 m from a watercourse or wetland, associated with the construction and operation of the facility on site, will not exceed 80m³.

	(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.	
12 (f) (i) and (ii)	**The clearance of an area of 300 square metres or more of indigenous vegetation** except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. **f. Mpumalanga** **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 that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;** **ii. Within critical biodiversity areas identified in bioregional plans;** or 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.	The Project footprint (Table 14) is almost 80Ha, with various turbines, laydown areas and construction camps being proposed on areas where the topsoil has not been lawfully disturbed during the preceding ten years, and containing vegetation occurring naturally in the area (definition of indigenous vegetation, as per the EIA Regulations, 2014). Based on the current layout, the total development footprint that will affect indigenous vegetation is approximately 25Ha (i.e. more than 300m²). The exclusion does not apply as the activity is a new development, not undertaken for maintenance purposes. The site is located in Mpumalanga, within Eastern Highveld Grassland vegetation type and CBAs identified in the MBSP (MTPA, 2014).
14 (ii) (a) (c) (f)(i)(ff)	**The development of—** (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or **(ii) infrastructure or structures with a physical footprint of 10 square metres or more;** **where such development occurs—** **(a) within a watercourse;** (b) in front of a development setback; or (c) if no development setback 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. f**. Mpumalanga** i. **Outside urban areas**: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) World Heritage Sites;	The proposed Project will involve the development of infrastructure and structures exceeding 10m² in size. Parts of the development will occur within wetlands and drainage lines (for road and cable crossings) and within 32m of drainage lines and wetlands delineated on the site. The Project is in Mpumalanga and falls outside of urban areas. Areas of the Site have been identified as CBAs in terms of the MBSP (MTPA, 2014). This, the project will involve the development of infrastructure and structures exceeding 10m² in footprint, which infrastructure affects and occurs within 32m of watercourses in Mpumalanga, outside of urban areas and in CBAs.

	(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; (ee) Sites or areas identified in terms of an international convention; (ff) **Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans**; (gg) Core areas in biosphere reserves; or (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 ii. Inside urban areas: (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose.	
18 (f)(i) (ee)	**The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.** **f. Mpumalanga** **i. Outside urban areas:** (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (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; (dd) Sites or areas identified in terms of an international convention; (ee) **Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans**; (ff) Core areas in biosphere reserves; or (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 area of a biosphere reserve, where such areas comprise indigenous vegetation; or ii. Inside urban areas: (aa) Areas zoned for use as public open space; or	Roads associated with the Project will have a width of 8- 10m, increasing up to 15m on bends and to allow for the transport of large components to the site. Several existing farm roads and existing provincial roads that are needed to access the Project will require widening to 15m in places (total widening of more than 4m). Some of the existing roads will also require lengthening of more than 1km to connect the various project components. The Project is in Mpumalanga and outside of urban areas, and contains areas identified as CBAs in the MBSP (MTPA, 2014).

	(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.	
23 (ii) (a) (c) and (f) (i) (ee)	**The expansion of**— (i) dams or weirs where the dam or weir is expanded by 10 square metres or more; or (ii) **infrastructure or structures where the physical footprint is expanded by 10 square metres or more**; **where such expansion occurs—** **(a) within a watercourse**; (b) in front of a development setback adopted in the prescribed manner; or (c) if no development setback has been adopted, **within 32 metres of a watercourse,** measured from the edge of a watercourse; excluding the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **f. Mpumalanga** **i. Outside urban areas:** (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (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; (dd) Sites or areas identified in terms of an international convention; (ee) **Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans**; (ff) Core areas in biosphere reserves; (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 area of a biosphere reserve, where such areas comprise indigenous vegetation; or ii. Inside urban areas: (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.	Transport of large infrastructure components related to the Project will require the expansion of existing access and internal roads, culverts and similar drainage crossing infrastructure collectively exceeding 10m^2 or more beyond existing roads or road reserves. Areas of the Site have been identified as CBAs in terms of the MBSP (MTPA, 2014). Some of this infrastructure, specifically where roads are required to cross wetlands and/or drainage lines, or pass in close proximity to these features, will result in the expansion of infrastructure, within a watercourse or within 32m of a watercourse, in Mpumalanga, outside urban areas and within CBAs.

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 seventh highest coal producer in the world with approximately 88% of the country's electricity generated from coal in 2017 (McSweeney & Timperley, 2018). South Africa is also the world's 14th largest emitter of Greenhouse Gases (GHG), and the highest GHG emitter in Africa (Africa Check, 2021) primarily attributed to the country's energy-intensive economy that largely relies on coal-based electricity generation.

This large dependence on coal and its use has also resulted in a variety of negative impacts on the environment, including the contribution to climate change.

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.

Renewable energy development is important to meet International and National targets of reducing reliance on fossil fuels, such as coal, which contribute towards greenhouse gas (GHG) emissions and resultant climate change.

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 Mpumalanga.

The proposed Project 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 Project will contribute to the global efforts to reduce global warming to below 2°C, compared to industrial levels, in accordance with the signed treaty, The Paris Agreement (signed on 12 December 2015), the United Nations' Development Programmes (UNDP) Sustainable Development Goals (SDGs) and the Kyoto Protocol. The treaty aims to have a climate neutral world by 2050. The authorisation of the Project will further align with South Africa's National Climate Response White Paper which outlines the 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.

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 (recognising that action in one area will influence other areas).

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

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 development of the Hendrina Renewable Energy Complex (including the Project) 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 Mpumalanga. 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 District[7]. 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 between 2009 and 2019 (COGTA, 2019). In Govan Mbeki Local Municipality, the unemployment rate was 26.2% (StasSA 2011), but there was a slow increase in employment between 2014 and 2017, with the Mining and Manufacturing sectors being the highest contributors (GMLM, 2020/2021).

The Project will aid in solving two of the leading challenges faced by the Nkangala District and Gert Sibande District municipalities, namely the cost of electricity and lack of adequate employment opportunities. The Renewable Energy Complex (of which this Project forms part) will be the first large-scale wind energy facilities 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 9).

Figure 9 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

[7] Note, this predominantly relates to the Nkangala District, as the majority of Project Components are located in the Steve Tshwete Local Municipality of the Nkangala District Municipality. It is acknowledged that some turbines, roads and one temporary laydown area fall in the Govan Mbeki Local Municipality, of the Gert Sibande District Municipality.

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.

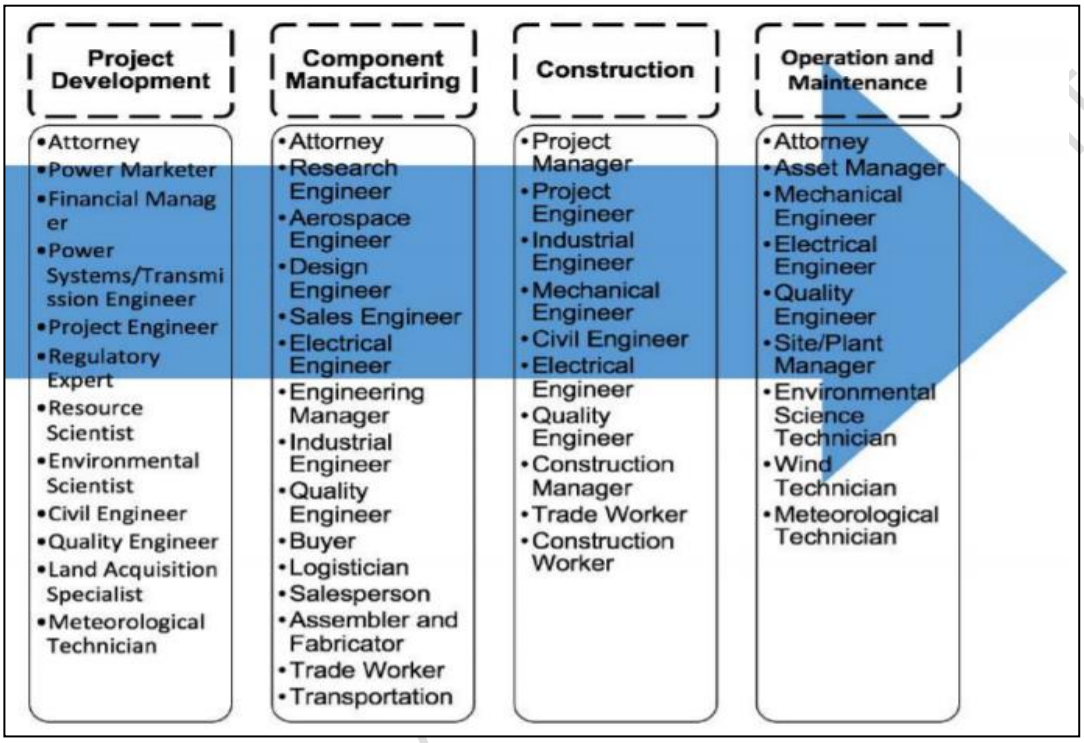


Figure 9 Career Opportunities presented by the Wind Industry[8]

5.3 Multiple Land Use

Unlike opencast coal mining, the Project facilitates multiple land use functions within the Project area. Wind turbines are spread out across the Project area allowing multiple land use functions such as operating the Project 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 the area and help improve the local community's welfare without jeopardizing the environment or food security.

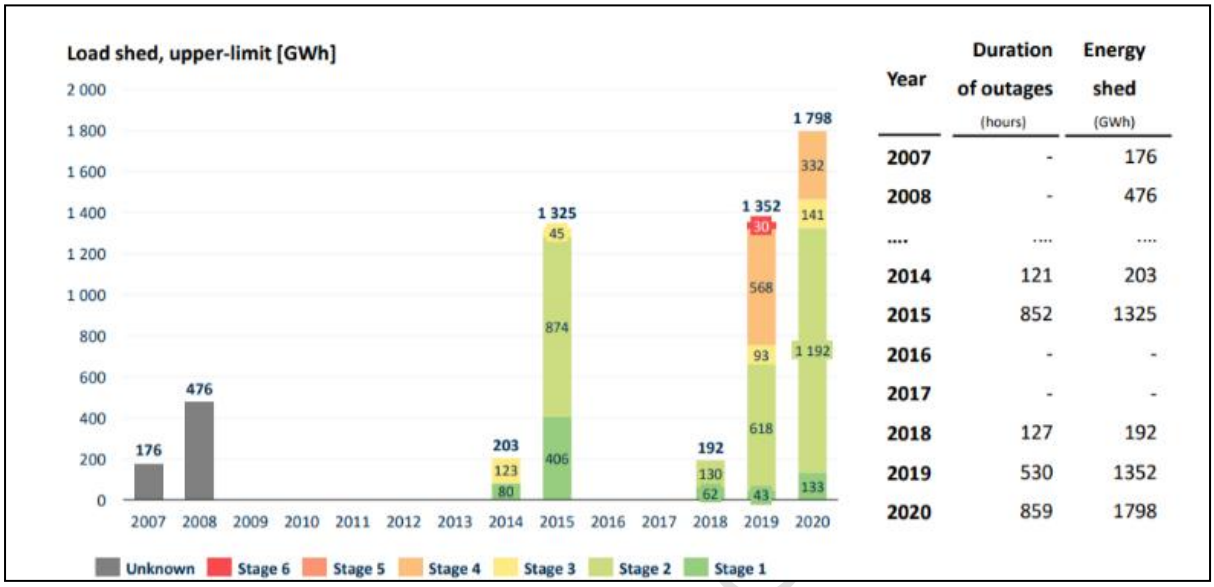
5.4 Power Generation

The Project will also assist in overcoming the power shortages that are currently faced by the country. In 2020, South Africa witnessed 859 hours of load shedding (Figure 10). In 2021, the country experienced 1,130 hours of load shedding[9]. The South African Government has taken strides to try reduce these power cuts through the implementation of bid Windows in the REIPPP and lifting the independent power generation threshold to 100 MW, but it is still expected that

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

[9] https://www.news24.com/fin24/economy/south-africa/2021-brings-unprecedented-load-shedding-and-its-likely-to-continue-in-the-new-year-20211216

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.



Year	Duration of outages (hours)	Energy shed (GWh)
2007	-	176
2008	-	476
....	....	....
2014	121	203
2015	852	1325
2016	-	-
2017	-	-
2018	127	192
2019	530	1352
2020	859	1798

Figure 10: Load shedding hours over the years in South Africa

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 contributing electricity to the National Grid, thereby reducing strain on Eskom and aiding in the prevention of further load shedding in the future.

Furthermore, four of Eskom's coal-fired power stations have been targeted for decommissioning in the short term: Komati, Camden, Grootvlei, and Hendrina. Eskom is looking to decommission 5400 MW of electricity from coal generation in the near future, increasing to 10500 MW by 2030 and 35000 MW by 2050. Simultaneously Eskom has been looking at options for repurposing these power stations with the core aims of reusing existing power transmission infrastructure, developing new generation capacity, providing ancillary services, and mitigating socio-economic impact. The Project is ideally located to form part of this proposed repurposing of the Komati power station and will help Eskom achieve its diversification goal.

5.5 Green Economy

In October 2021, at the second Sustainable Infrastructure Development Symposium, President Cyril Ramaphosa described renewable energy development as one of the "new frontiers of infrastructure development" and stated that "green" energy had the potential to drive industrialisation and establish a whole new industrial reality. [10]

Some emphasis is placed not only on the potential of renewable energy technology to contribute to electricity generation and address the country's energy demand, but also on the potential of renewable energy to support other emerging technologies, such as the

[10] https://www.engineeringnews.co.za/print-version/ramaphosa-moots-possible-hydrogen-partnership-with-namibia-as-he-punts-boegoebaai-export-hub-2021-10-07

production of green hydrogen and related technologies (green ammonia, green methanol etc.). The potential for South Africa to become a major contributor to production and exports of green hydrogen was not overlooked, with the President stating that "We stand ready to be a major exporter in this market, to use hydrogen to rapidly decarbonise our existing industries, and attract industrial investment from across the globe seeking to meet new standards of green power in the production process". (https://www.engineeringnews.co.za/print-version/ramaphosa-moots-possible-hydrogen-partnership-with-namibia-as-he-punts-boegoebaai-export-hub-2021-10-07).

The production of green hydrogen requires a large renewable energy input. This Project (and associated Complex) can thus in future facilitate towards the production of green hydrogen, and resultant increase in production and exports from South Africa.

It is estimated that with the growth of the green hydrogen industry half a million jobs in the solar and wind industry will be created. Furthermore, in South Africa, green hydrogen has been identified by the Presidency as the first of the five "Big Frontier" strategic investment opportunities and will be involved in the finalization of the much anticipated 'Hydrogen Strategy and investor Roadmap'. It has been estimated that the green hydrogen industry in South Arica will be producing more than 3.8-million tonnes per annum and reducing the country's greenhouse gas emissions by 75%- by 2050 and could support the creation of around 370,000 additional direct and indirect jobs.

Studies have shown that the manufacturing and use of hydrogen, using the available low-carbon technologies, will substantially support South Africa to progress to deeper decarbonization than current policies envisage. The production of green hydrogen will support greater domestic decarbonization and allow the country to meet its international obligations by (not limited to):

- Reforming carbon dioxide emissions in coal- and gas-to-liquids synthetic fuels refineries in Mossel Bay and Secunda and potentially supporting the use of biogenic, non-fossil, or direct-air-capture sources of CO_2 to be used to source sustainable synthetic fuels;
- Replacing the use of coking and other coal in steel production;
- Displacing the existing unabated gas use for chemicals and refinery hydrogen;
- Supporting the roll-out of fuel cells for remote and heavy-duty vehicles where battery solutions are not viable; and
- Fuelling industrial processes where electrification cannot meet the specific combustion or heat needs.

With South Africa's being ranked in the top ten globally for its wind and solar potential- there is high potential for the production of green hydrogen and related products. South Africa has excellent resources of land, wind, and sun that are fundamental to the large-scale development of renewable electricity— and are also the key inputs for green hydrogen production.

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).

Viable alternatives must meet the same purpose and need of a development proposal. The purpose of the Project is to generate renewable energy, to supplement supply to the National electricity Grid. The desirability (need) for the Project is discussed in Section 5 of this Report.

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 17 along with their relevance to the Project. Alternatives that were considered further are discussed below.

Table 17: Types of Alternatives

Alternative Type / category	Discussion and Relevance to the Project
Activity alternatives	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, contribution of renewable energy to the National Electricity Grid). Activity alternatives could involve the development of Solar PV facilities or other forms of renewable energy Projects. Considering the extensive agricultural activity in the development area, it is preferable to develop renewable energy associated with a smaller physical footprint, to enable multiple land use (see Section 5.3). Activity alternatives are thus not considered further.
Location alternatives	The Project site was selected based on the outcome of a feasibility assessment undertaken by the Developer. Various other sites may be considered feasible as well, and this alternative is further discussed in Section 6.3.
Process alternatives	Also referred to as Technology Alternatives, or equipment alternatives. The purpose of considering such alternatives is to include the option of achieving the same goal by using a different method or process. Technology alternatives are further discussed in Section 6.6.
Demand alternatives	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. The Project purpose is to supply more energy, and the Applicant is not able to address National Electricity demand. This alternative type is thus not further discussed.
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 6.7.

Alternative Type / category	Discussion and Relevance to the Project
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 further considered in the context of the proposed WEF (where the most notable input is Wind).
Routing alternatives	This alternative type generally applies to linear activities including powerlines and roads. This aspect has been discussed further in Section 6.5 (Layout alternatives).
Site layout alternatives	The preferred layout (Plan 4) was developed in response to various environmental sensitivities on the development area, identified through specialist investigations, and the feasibility of the Project. Placement of wind turbines must consider a variety of complicated factors in terms of technical feasibility of the Project as well. Site Layout alternatives are further discussed in Section 6.5.
Scale alternatives	Scale alternatives were considered by the Developer, who opted for the development of this Project (up to 200MW) and the development of the Hendrina North WEF (up to 200MW), as opposed to developing the Project as one massive 400MW renewable energy project. Scaling the projects reduces commercial risk to the projects and Developer, and enables the simultaneous assessment of project impacts and risks, individually and cumulatively, in the context of two smaller development areas to ensure the accurate identification of environmental sensitivities of the sites which could be overlooked on a single, larger site. Scaling alternatives are not separately discussed further, though the scale of the turbines is discussed in Section 6.6.
Design alternatives	Design alternatives are usually incorporated for aesthetic purposes, and not discussed further in detail, due to the technology available (Section 6.6) and technical safety specifications relevant to the Project.

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 Project site was selected based on the outcome of a feasibility assessment undertaken by the Developer, and is considered suitable for the reasons summarised overleaf, as provided by the Developer.

Alternative properties may be available in other parts of the country or even in Mpumalanga, however, as the site is ideally suited to host the proposed Project, no other Location Alternatives have been assessed in detail.

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 Project can replace the power previously generated by the Komati and Hendrina Power Stations should theses be decommissioned in the future.

2. Wind Resource and Topography

The Project site was also selected on the availability of wind resource in the Mpumalanga region. The availability of the wind resource is the main driver of project viability. The Developer 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 proposed Project requires connection to the Eskom grid to transmit the generated electricity. As such, the location of the Project would benefit from being close to an existing substation (such as the existing substations at Komati and/or Hendrina Power Stations). 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. The Project site is of a suitable land size for the Project. The land available for the development of the Project extends over approximately 2,900 Ha, providing a suitable amount of land for the Project.

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 Project footprint, 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 Project 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 The type of activity

Renewable Energy alternatives include:

- Solar Energy;
- Geothermal Energy;
- Biomass;
- Hydropower; and
- Wind.

Solar Energy typically requires large tracts of land, and are less able to accommodate multiple land use. The development of Solar Energy Facilities at the Project site may be feasible from a solar resource point of view, but would likely render the existing farming operations un-feasible due to loss of land.

Geothermal energy comes from heat within the earth. Most geothermal resources are near the boundaries of the earth's tectonic plates, where most volcanoes are also located. There are no known geothermal reservoirs in proximity to the site and the energy source cannot be considered further.

Biomass is organic material from plants and/or animals, and can be burned directly for heat, or converted to renewable fuels through various processes. To generate electricity from biomass, the biomass is burned in a boiler to produce steam, which is passed over turbine blades, causing rotation and driving a generator in much the same way as a wind turbine generates electricity. The wind resource in the Project area has been confirmed. Further study would be required to confirm the amount of biomass available in the area, however combustion is not considered optimal, especially in the context of the Highveld Priority Area where the project is located.

"The best location for a hydroelectric station should be along the path of a river. It should be at least at the river canyon or at the place where the river narrows" (Loise Kinyanjui, n.d.). The rivers in the proposed project area are not large enough to support hydroelectric stations, and often run dry during the winter months, rendering such technology un-feasible in the Project area.

The proposed Project (Renewable Wind Energy) is thus identified as the preferred activity type.

6.5 Design and/or Layout

The preferred layout alternative is presented in Plan 4.

Various alternative layouts have been considered throughout the development of the Project and the pre-feasibility phases. Placement of infrastructure is influenced by the following factors:

- Technical consideration for wind turbine placement;
- Environmental Sensitivities of the site (wetlands, critical biodiversity areas etc. that should be avoided wherever possible);
- Agriculturally productive land, which should be considered in turbine placement to ensure compliance to the Protocol, and minimal disruption to existing agricultural activities;
- Access (presence of existing farm roads to access each infrastructure component location); and
- Land availability, and landowner consent.

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

- The substation and BESS should be close to the existing high-voltage line that traverses the site, to facilitate the LILO connection Alternative (if Eskom allows this option), and reduce the environmental impacts of a new powerline over areas previously unaffected by transmission infrastructure;
- The substation and BESS should avoid areas of higher environmental sensitivity, including delineated wetlands, high-sensitivity bat habitat, high-sensitivity avifauna habitat and critical biodiversity areas; and
- The substation and BESS should be located so as to minimise interference with existing (and ongoing) agricultural activities on the site.

There are no fatal flaws associated with the proposed substation and BESS Site and thus no need for identification of alternative sites.

The road layout that has been designed, has optimised the use of existing roads, and upgrade of these will be required, as opposed to the development of new roads. However, the project is associated with construction of some new roads as well. These have been designed to take the shortest possible route to the infrastructure that needs to be accessed, with consideration of turning circle requirements and terrain limitations.

Alternatives for the transport of components to site from the Port of Richard's Bay have been considered in the Transport study, which found that the use of higher-order roads will be preferred.

6.6 Technology

The technology associated with the Project is largely dependent on the most suited technology available at the time. Technology for wind energy facilities is ever changing and improving.

1. Wind speed and turbine type

The average annual wind speed for the Project was considered sufficient to ensure the economic viability of a wind energy facility. This viable wind resource ensures the best value for money is gained from the project, allowing for competitive pricing and maximum generation potential, with the resulting indirect benefits for the South African economy. Wind speed is a key factor that determines the final turbines class, rotator diameter and hub height.

There are two types of wind turbines in use when referring to wind energy, as indicated in Figure 11, the horizontal and the vertical axis wind turbines. The length of the blade is the biggest factor in determining the amount of electricity a wind turbine can generate.

Vertical-axis turbines are typically small wind turbines which have blades that are attached to the top and the bottom of a vertical rotor, similar to an egg beater. Axis rotation is perpendicular to the ground, and as a result can operate independent of the wind direction. However, as only one blade of the wind turbine works at a time, efficiency is very low. The main disadvantage of a vertical-axis turbine is it generally creates drag when rotating into the wind.

The horizontal-axis turbines commonly have three blades, similar to that of an airplane propeller, which faces the wind perpendicularly so that wind turbine blades turn following an aerodynamic lift. Additionally, they usually have a rotation drive to adjust the blades to the wind direction. Horizontal-axis turbines generate electricity through the full rotation of their blades making them more efficient in electricity generation. Due to the tall tower base, horizontal axis wind turbines are able to access stronger winds. Disadvantages associated with the horizontal-axis turbine include logistics and installation challenges, as well as visual impacts, due to the size of the blades.

The horizontal-axis turbine has been identified as the preferred turbine type for the proposed Project. Vertical-axis turbines are not able to generate enough electricity to meet the Project Need.

Wind turbine tower sections can be constructed out of reinforced concrete or steel. Hybrid tower sections consisting of both concrete and steel are also available. Concrete towers offer greater opportunity for local job creation as these are constructed on site. The steel tower offers greater employment within tower manufacturing facilities. The final tower design will be based on the most suitable technology for the Project site and based on the geotechnical investigations. This can only be determined during the detailed design phase.

Alternative technologies are available for the BESS, two of which were evaluated in more detail as part of this EIA:

- Solid State Lithium (SSL) BESS or
- Vanadium Redox Flow (VRF) BESS.

At a large facility, without installation of the state-of-the art battery technology that includes protective features, there can be significant risks to employees and first responders. The latest battery designs include preventative and mitigative measures to reduce these risks to tolerable levels (iSHEcon, May 2022).

The risk assessment that was undertaken found that with suitable preventative and mitigative measures in place, and using the latest technologies, no fatal flaws were found with either SSL

or VRF BESS technologies, and none of the identified risks were found to be excessively high (Appendix F 15).

From a safety and health point of view, the risk assessment (Appendix F 15) shows that risks posed by VRF systems may be slightly lower than those of SSL facilities, particularly with respect to fire and explosion risks. From an environmental spill and pollution point of view the VRF systems present higher short-term risks than the SSL systems. However, the above conclusions may be due to the fact that the VRF technology is not as mature as SSL technology and therefore there is not as much operating experience and accident information available for the VRF batteries.

The preferred alternative BESS involves containerised SSL batteries, due to the availability of risk management information and impact-prevention technologies.

The design will be subject to a full Hazard and Operability Study (HAZOP) prior to commencement of procurement.

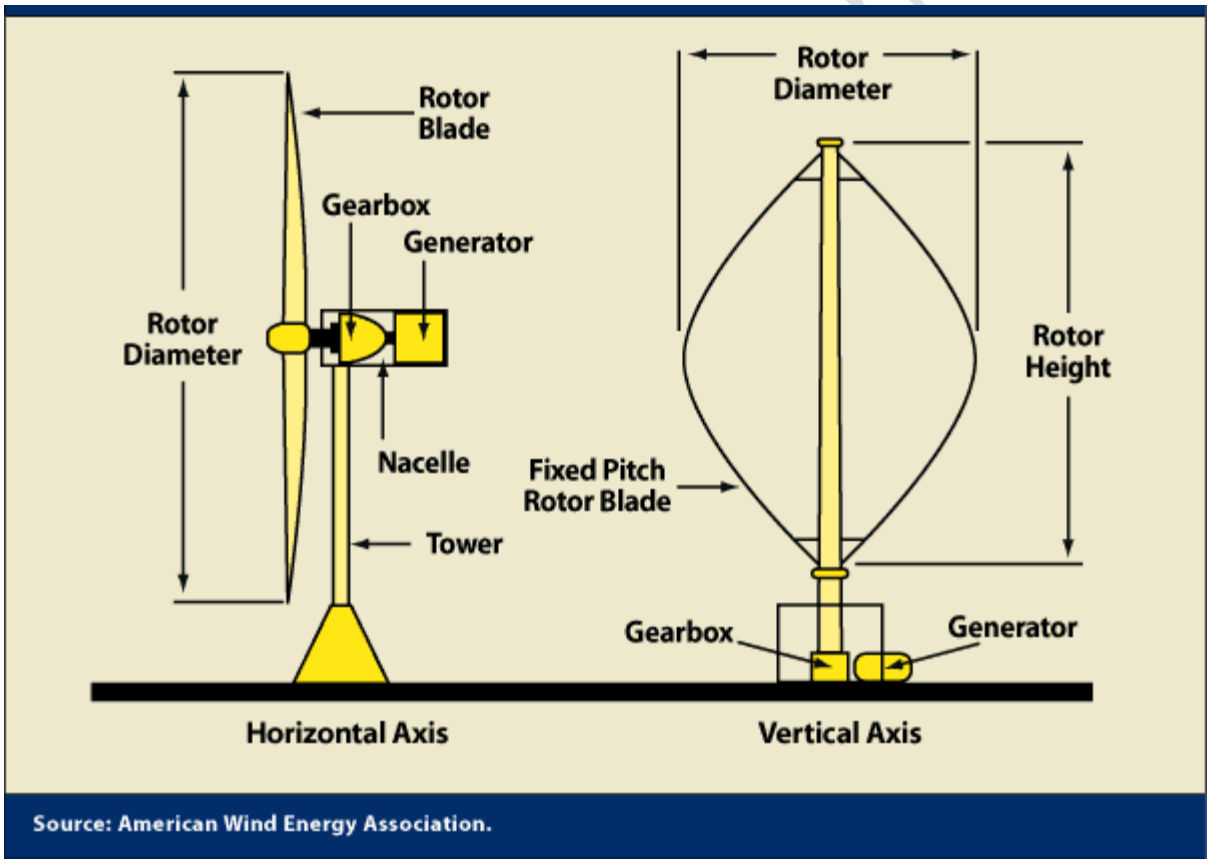


Figure 11 Types of Commercially available Wind Turbines

6.7 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.

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 and raising of turbine blades can continue into the night. Specific management measures have been proposed by the Noise Specialist (EARES, April 2022) (Appendix F 10) that are considered impact mitigation, and not further discussed in the context of Alternatives.

Specific traffic control mechanisms must be specified during the construction phase, and for maintenance activities. The staggering of component delivery to the site, for example and as recommended by the Transport Study (JG Afrika, April 2022) (Appendix F 16) is similarly considered mitigation and not further discussed in the context of Alternatives.

6.8 No-Development Option

The no-development option will result in the continued use of the land for agriculture and mining, with remnant natural areas not being impacted by the Project.

If the no-development option is implemented, the Project will not be able to contribute renewable energy to the National Grid.

As discussed in Section 5.4, the country is facing significant power shortages, and the situation is expected to deteriorate in future, unless it is pro-actively addressed by the implementation of projects that can contribute additional electricity to the National Grid.

Further to the need for electricity generation in general, Section 5.1 describes a few of the Global and Local Commitments that South Africa has made as a country towards reducing carbon emissions and addressing the effects of climate change. Renewable energy technologies are key inputs to the realisation of these goals. However, with increasing emphasis on renewable energy technology and the associated benefits, the importance of a Just Energy Transition cannot be over-emphasised, especially in the context of the Country's unemployment statistics, and the current energy mix which is focussed around coal, and largely based in Mpumalanga.

A Just Energy Transition can only be achieved if investment into renewable energy projects is made in the Province(s) currently contributing to the electricity generation and supply in South Africa, notably in Mpumalanga.

As discussed in Section 3.4, the National Development Plan (NPC, 2011) sets out national goals and strategies to achieve those goals. One of those goals involve 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).

South Africa is experiencing electricity supply shortages (discussed in Section 5.4) but also seeing increased electricity costs.

Energy prices are heavily influenced by international commodity costs, which in turn are affected by geopolitical strife and upheavals. The World Bank has warned[11] that the war in

[11] https://www.theguardian.com/business/2022/apr/26/ukraine-war-food-energy-prices-world-bank

Ukraine will result in expensive food and energy for the next three years, intensifying fears that the global economy is heading for a rerun of the weak growth and high inflation of the 1970s.

Local production of renewable energy (through the proposed Project) would be less affected by international geopolitical crises and associated price spikes or sudden disruptions in the supply chain, addressing reliance on energy supply from diesel.

In summary, the no-development option will be associated with a missed opportunity to:

- address the need for increase in energy generation, discussed in Section 5.4.
- address the need for increase in renewable energy, discussed in Section 5.1 and
- enable a Just Energy Transition, as discussed in Section 5.2.

Not implementing the Project 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.

Consequently, the no-development option is not preferred.

6.9 Alternatives Assessment

Table 18 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 6.10.

Table 18: Assessment of Alternatives

Alternative Type	Benefits of the preferred alternative	Challenges associated with the preferred alternatives	Feasible Alternatives?
Property / Location	- Proximity to existing power stations - Proximity to existing Eskom Grid - Favourable wind resource and topography - Land Availability and land-owner buy-in - Site accessibility (existing roads) - Labour Pool accessibility (proximity to towns) - Absence of significant competition (no similar projects in the region).	- Significant agricultural activity in the region – challenge of siting turbines and remain compliant to the agriculture protocol - Wetlands and critical biodiversity areas in the remainder of the site (not yet under cultivation) - Mining Rights and applications throughout the area, potentially threatening project infrastructure (undermined areas) or conflicting with the use of land.	Alternative properties and locations do exist, but were not assessed further as part of this EIA, due to the proven suitability of the site, as discussed in Section 6.3. Challenges associated with the site are all manageable, as shown in this EIA.
Type of Activity	Wind Energy is the preferred alternative, and associated with numerous benefits unpacked in Section 5. Principle benefits of Wind Energy Technology include the ability of the Project to address the country's Local and Global Commitments to climate change prevention, contribute to the Just Energy Transition, enable multiple land use, contribute to power generation and stimulate the green economy.	Wind Energy technology is developing rapidly and it is challenging to identify and confirm the exact turbine specification that may be available by the time construction commences. Thus, it is challenging to confirm at this stage the turbine specification and other technical project detail as improved technology is expected to become available in the near future.	Solar Energy, Geothermal Energy, Biomass and Hydropower are alternative renewable energy technologies, but none of these are feasible on the site except for potentially Solar, and Solar is associated with greater land requirements, that are not available in the Project site due to existing and ongoing agricultural activities.
Design / Layout	The road layout has been developed to optimise the use (and upgrade, where required) of existing roads. Infrastructure placement has avoided sensitive habitats identified by the Bat and Avifauna Specialists, and avoided wetland habitats and CBAs wherever possible. Further, the layout is compliant to the Agricultural Protocol, as confirmed by the Specialist (Appendix F 1).	Many challenges had to be overcome by the Applicant, in reaching the proposed layout, including considerations of environmental sensitivities and technical considerations. The proposed layout is the most optimal based on available knowledge, but may be further refined during specialist walk-downs in the detailed design phase.	Various constraints (existing agricultural activities, environmental sensitivities, technical considerations) informed the development of the current layout, which may be refined during the specialist walk-downs in the detailed design phase.
BESS Technology	Preferred BESS Technology is Solid State Lithium (SSL) containerised BESS.	Typical risks of SSL BESS include: - Thermal decomposition	Vanadium Redox Flow (VRF) BESS is also feasible, but associated with increased

Alternative Type	Benefits of the preferred alternative	Challenges associated with the preferred alternatives	Feasible Alternatives?
	One major benefit of the SSL BESS, is that the components are pre-assembled off site, and delivered to site in containers, reducing the risks associated with on-site assembly. The technology is well-known and understood.	- Propagation - Electrolyte leaks. It is also difficult to identify and confirm the preferred alternative at this stage of the Project, due to the rapidly developing technology. The Applicant should be allowed to consider, and use, the best available BESS technology at the time of detailed design and construction.	environmental spill and pollution risks in the short term. Further, VRF Technology is not as mature as SSL technology.
No-Development	The site will not be subject to any negative impacts arising from this Project. This does not preclude the possibility of other future projects (such as the Mining Projects on and in close proximity to the site) would not be developed, and result in ecological and social impacts on the site.	None of the potential benefits associated with the Project will be realised if the no-development option is implemented.	The no-development option is not considered optimal, given the significant potential benefits associated with the Project, and thus is not preferred.

6.10 Confirmation of the preferred alternative

The preferred layout is illustrated in Plan 4.

The preferred turbine technology is the horizontal-axis turbine, due to its generation capacity far surpassing the alternative vertical-axis turbines.

The preferred BESS technology is Solid State Lithium Batteries (pre-assembled and delivered to site in containers). Due to the rapidly-developing technology associated with Wind turbines, the exact wind turbine model to be implemented will be determined during the detailed design phase.

Route alternatives for component transport to site have been considered – it is preferred to use higher order roads from the port of entry (Richard's Bay) to the site. This will however be confirmed during the detailed design phase by the transport contractor.

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 10, Appendix G 11 and Appendix G 12.
- Public Meetings, Focus Group Meetings and/or open days to present the Project and findings of the studies to I&APs (Appendix G 8and Appendix G 9).

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). 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 is being 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).

In-person consultations with the public are scheduled as follows:

- Focus Group Meetings with the Ward Councillors and members of the local municipality;
- Public engagement in Hendrina; and
- Public Open Day in Komati.

Once the public review and comment period comes to an end, this report and its appendices will be 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 – Generation – Renewable – Wind. Table 19 (duplicated from the screening tool) summarises the environmental sensitivities of the site in terms of the identified environmental themes.

Table 19: 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
Avian				X
Bats		X		
Civil Aviation			X	
Defence				X
Flicker	X			
Landscape	X			
Palaeontology	X			
Noise	X			
Plant Species			X	
RFI		X		
Terrestrial Biodiversity	X			

Table 20 lists the specialist studies prescribed by the screening tool and identifies the assessments that have been undertaken. The Table further indicates those studies where a Protocol for the specialist assessment has been published.

Table 20: 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 11	-
3	Archaeological and Cultural Heritage Impact Assessment	NO	Appendix F 13	-
4	Palaeontology Impact Assessment	NO	Appendix F 14	-
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 9	-
8	Civil Aviation Assessment	YES	-	Appendix F 19
9	Defence Assessment	YES	-	Appendix F 20
10	RFI Assessment	NO	-	Appendix F 21
11	Noise Impact Assessment	YES	Appendix F 10	-
12	Flicker Assessment	NO	Appendix F 11	-
13	Traffic Impact Assessment	NO	Appendix F 16	-
14	Geotechnical Assessment	NO	Appendix F 17	-
15	Socio-Economic Assessment	NO	Appendix F 12	-
16	Plant Species Assessment	YES	Appendix F 6	-
17	Animal Species Assessment	YES	Appendix F 7	-

8.1 Geology, Physiography and Topography

Plan 5 depicts the geology underlying the Project area (according to the 1:250,000 Geological Map 2628 East Rand published by the Council for Geoscience).

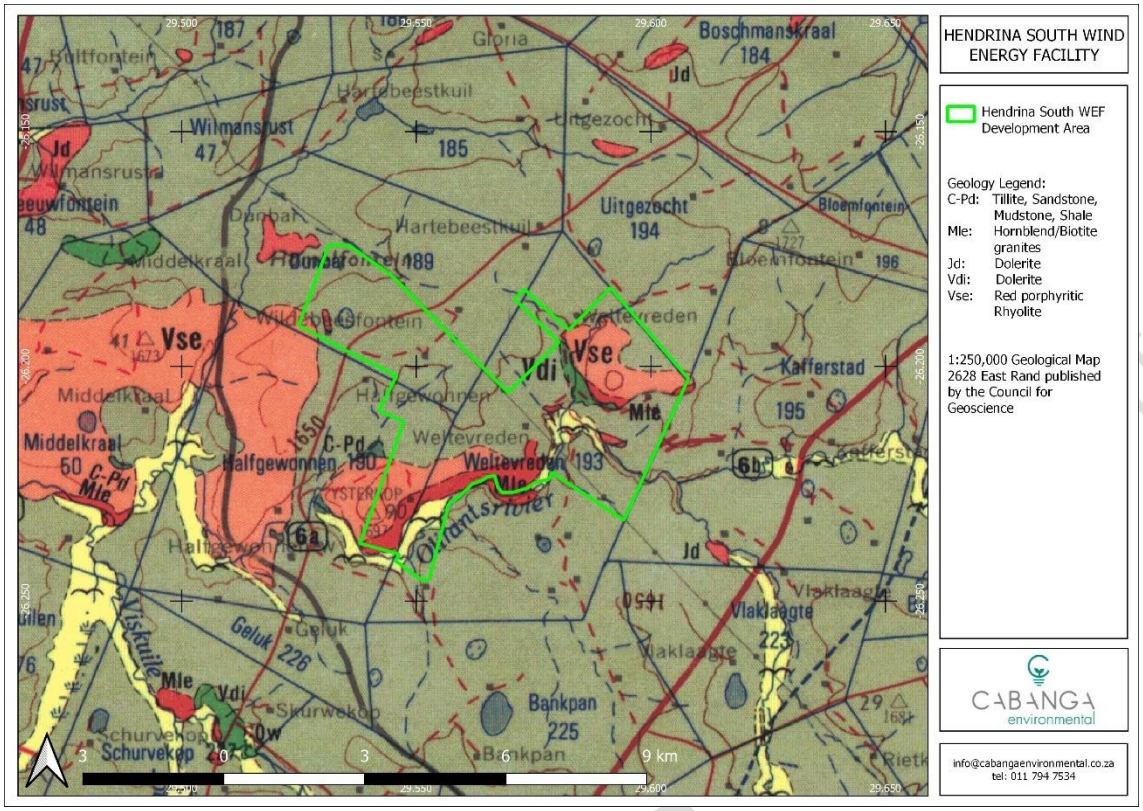
The site is underlain by stratigraphic units of the Ecca Group, Karoo Supergroup; Rooiberg Group of the Transvaal Supergroup and the Lebowa Granite Suite of the Bushveld Complex (SLR, 2022).

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 Leeufonteinspruit (Shangoni AquiScience, May 2022).

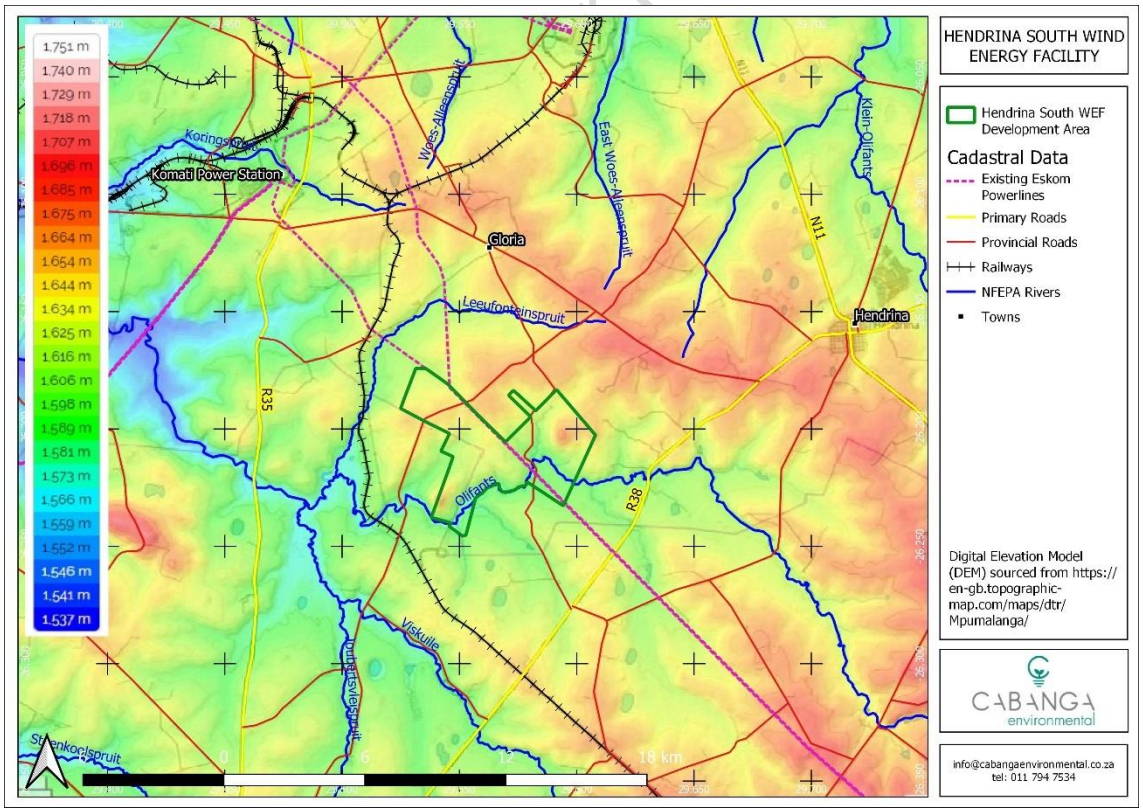
The geological map shows little indication of geological structures such as dykes or other anomalies within the project area.

The project area ranges from 1592 - 1677 metres above mean sea level (mamsl) (Plan 6) 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).

The southern portion of the Development Area contains a topographical high point known locally as "Ysterkop".



Plan 5 Geology of the Site



Plan 6 Topography of the Site

8.2 Climate and Meteorology

The regional climate is characterised by strong seasonal summer rainfall with dry winters typical of the highveld region.

Meteorological data, including hourly temperature, rainfall, humidity, wind speed and wind direction, were obtained by WSP[12] from the nearest ambient air quality monitoring (AAQM) station[13] located in the north of Hendrina town at -26.151200°S; 29.716484°E at an altitude of 1,675m. The station is owned and managed by the South African Weather Service (SAWS) and was analysed for the period January 2018 - December 2020. A summary of meteorological conditions is shown in Figure 12.

The data shows that Hendrina received on average 570mm of rainfall each year, with approximately 49% of rainfall experienced in the summer months (December, January and February). Summer temperatures for the region average 19.5°C while winter temperatures average 11.1°C.

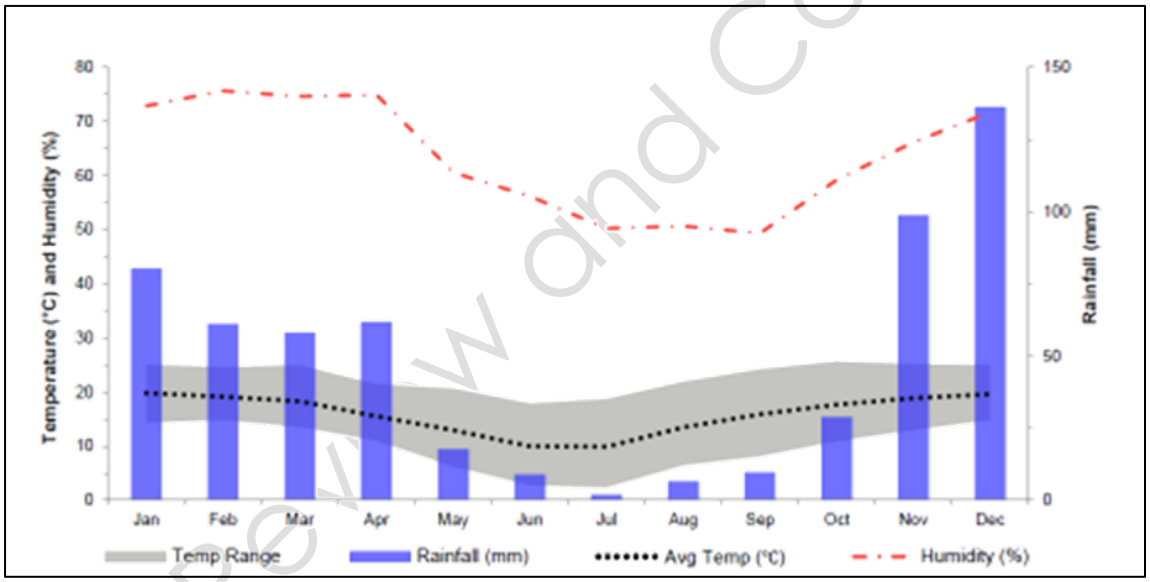


Figure 12: Meteorological summary for Hendrina (January 2018 - December 2020)

Wind roses (Figure 13) 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;

[12]WSP was appointed to undertake an Air Quality Impact Assessment for the proposed Green Hydrogen and Ammonia Plant, which originally formed part of the Hendrina Renewable Energy Complex. As the Green Hydrogen and Ammonia Project cannot be included into the REIPPP, the Application process has been suspended and the specialist report has not been completed. The WSP data remains useful to this baseline assessment.

[13]The nearest standalone South African Weather Service (SAWS) meteorological station is Witbank (over 50 km to the north-northwest of the development site) and thus not representative of site conditions. The station used in this study is mainly used to measure ambient air pollution but it also measures an array of meteorological parameters.

- 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.

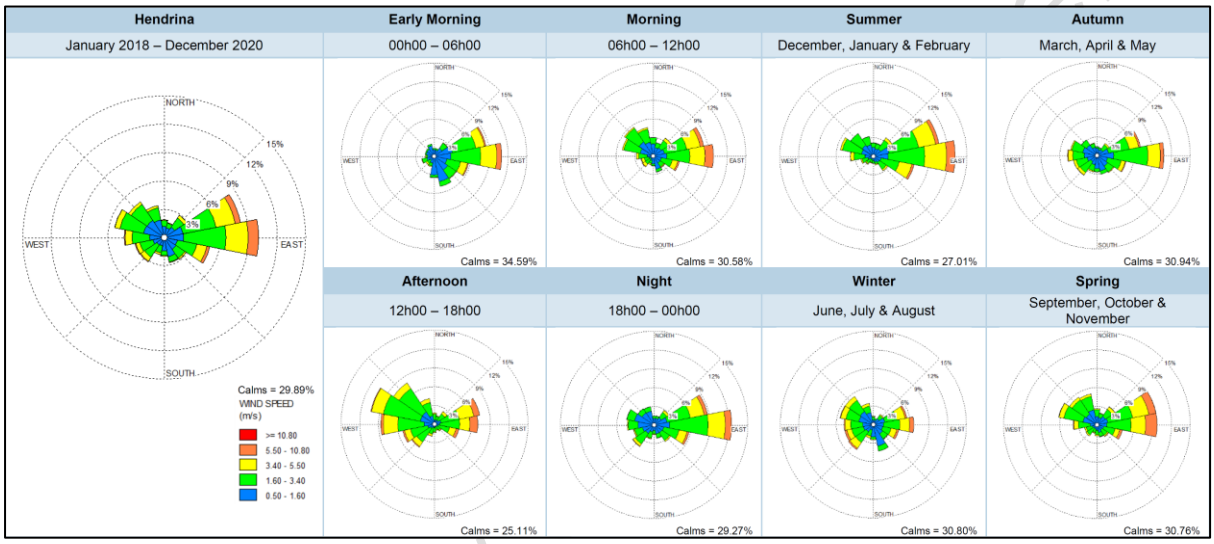


Figure 13: Local wind conditions at Hendrina

8.3 Land Use, Soils and Agricultural Potential

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 site 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 within the boundaries of the project Site, shown in Table 21 with those classes applicable to the site highlighted in green.

Table 21: Land Capability (Scotney, Ellis, Nott, Taylor, v Niekerk, Verster & Wood, 1987)

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

W- Wildlife	**F- Forestry**	**LG- Light Grazing**
MG- Moderate Grazing	**IG- Intensive Grazing**	**LC- Light cultivation**
MC- Moderate Cultivation	**IC- Intense Cultivation**	**VIC- Very Intense Cultivation**

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.

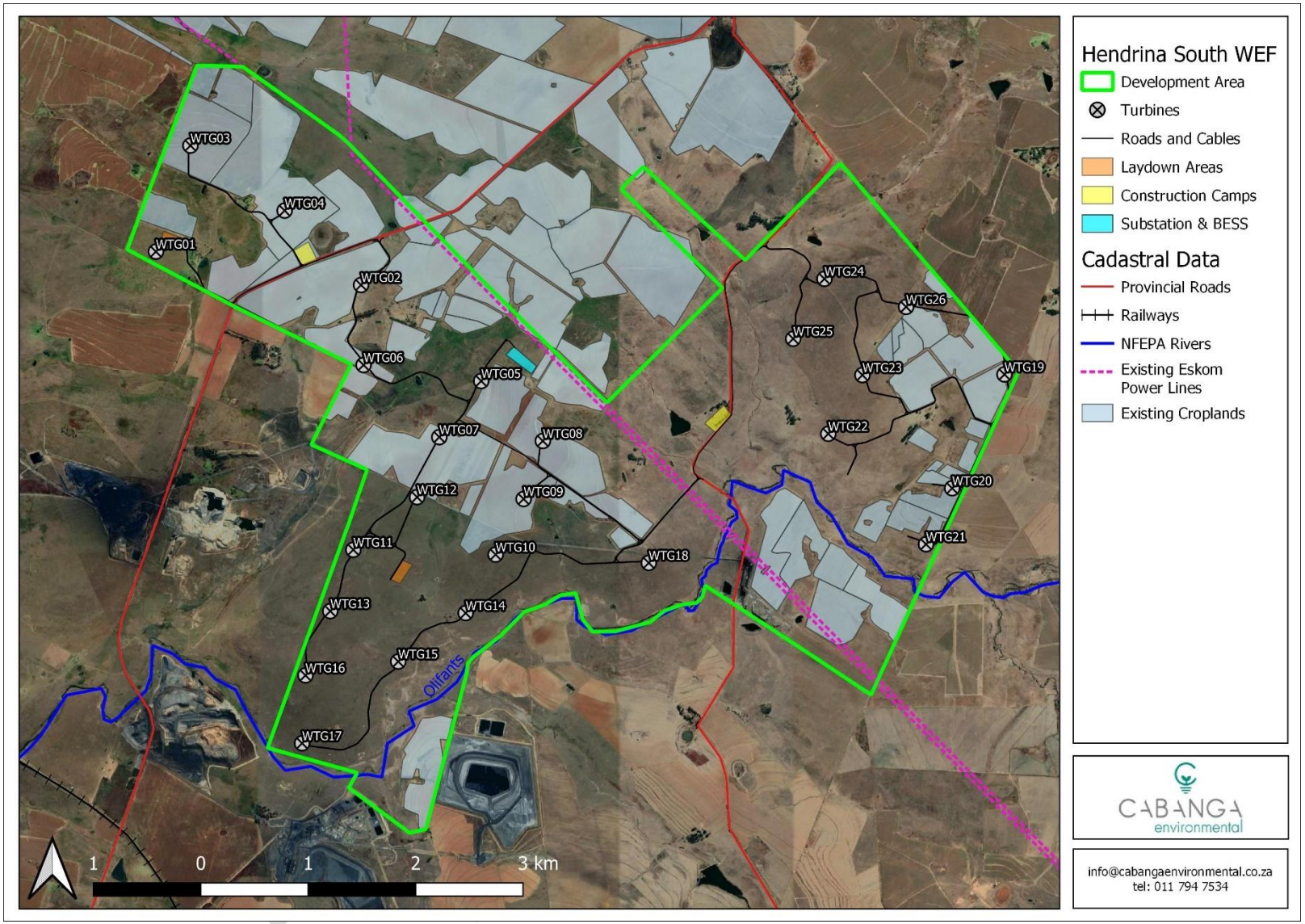
Because of the favourable climate and suitable soils on the croplands, crop yields are fairly high with average maize yields of around 7 to 8 tons per hectare according to the farmers on site (Lanz, April 2022). The long-term grazing capacity of the area is fairly high at 5 hectares per large stock unit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

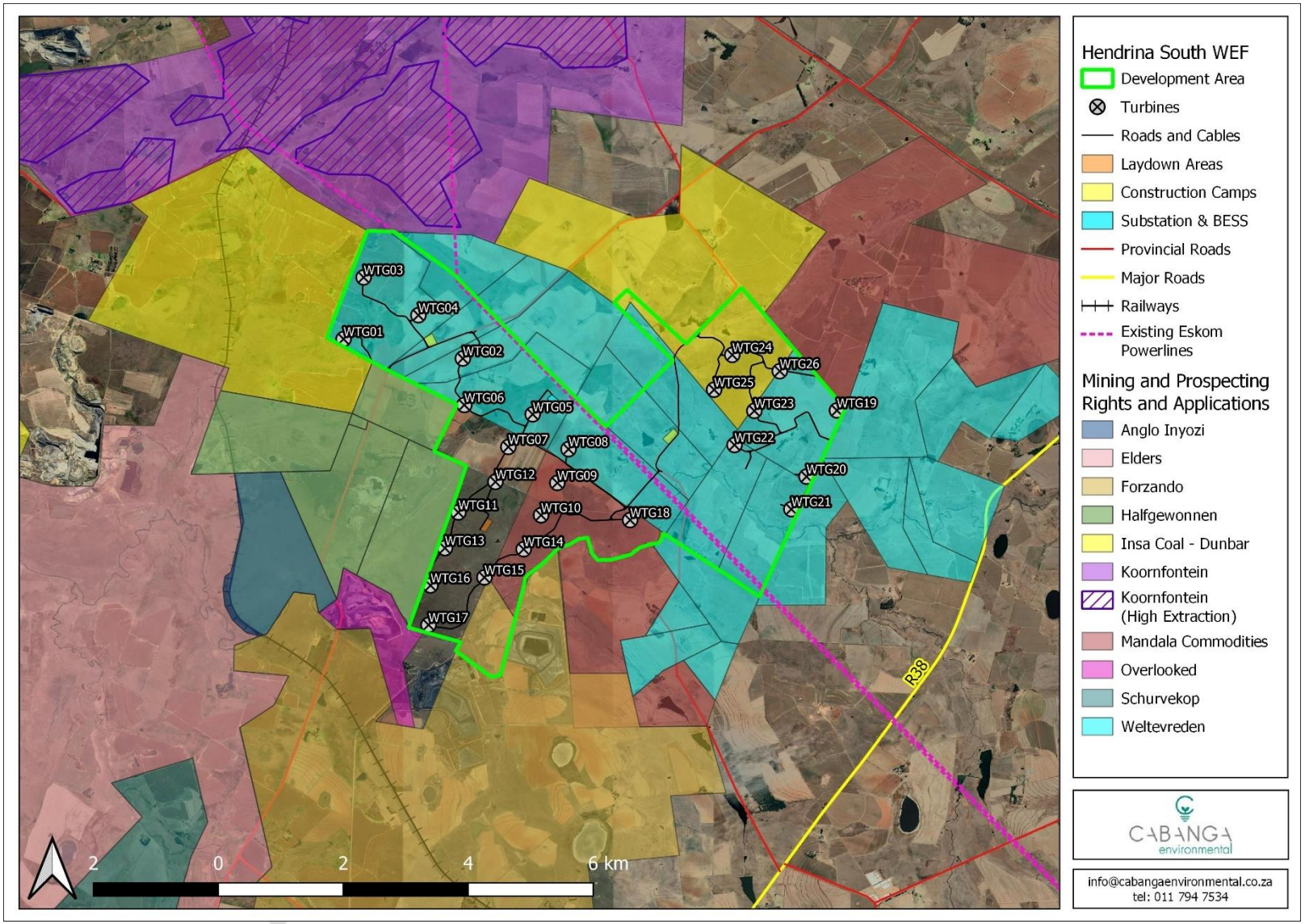
In an agricultural environment like the general area of the site, all the suitable soils are generally cropped, and uncropped soils can therefore fairly reliably be considered to be unsuitable for crop production (Lanz, April 2022). All cropped areas are considered sensitive from a soil, land use and land capability perspective. Cropped areas in relation to proposed project infrastructure are shown in Plan 7.

Other land uses and infrastructure in the Development Area include homesteads, roads, fences, telecommunication infrastructure and electricity distribution infrastructure. The development area is bisected by two high voltage powerlines, namely the Camden Duvha 1 400kV line and the Camden Komati 1 275kV transmission lines.

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 8.



Plan 7: Cropland areas in relation to the Project Footprint



Plan 8: Known Mining and Prospecting Rights and Applications

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, December 2009). The recharge values for the proposed project area can be seen in Table 22.

Table 22 Recharge Values (van Tonder, G. and Xu, Y., 2000)

Method	Recharge (%)	Recharge (mm/a)
Geology (Sandstone/shale/mudstone)	3.00	22.41
Vegter	4.86	36.30
Acru	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 $1x10^{-5}$ to $1x10^{-2}$ m/d (Shangoni AquiScience, May 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, May 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, May 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, May 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, May 2022).

8.5 Hydrology (Surface water)

The proposed Project falls within the Water Management Area 2: Olifants and in the B11A quaternary catchment.

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 237IS. The Olifants River initially flows roughly north-west, before veering in an easterly direction, eventually flowing through the Kruger National Park and into Mozambique.

There are numerous surface water resources associated with the study area, the Olifants River forming the southern boundary of the site and Leeufonteinspruit north of the site being the primary Rivers. The Present Ecological Status (PES) of Olifants and the Leeufonteinspruit are 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, December 2009).

Surface water samples taken and analysed during the Hydrocensus (Shangoni, May 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.

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 unchanneled), depression wetlands, flats and seep wetlands. The wetland delineation undertaken on the Project Site (Burton, May 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 9, 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 Unchanneled 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, May 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).

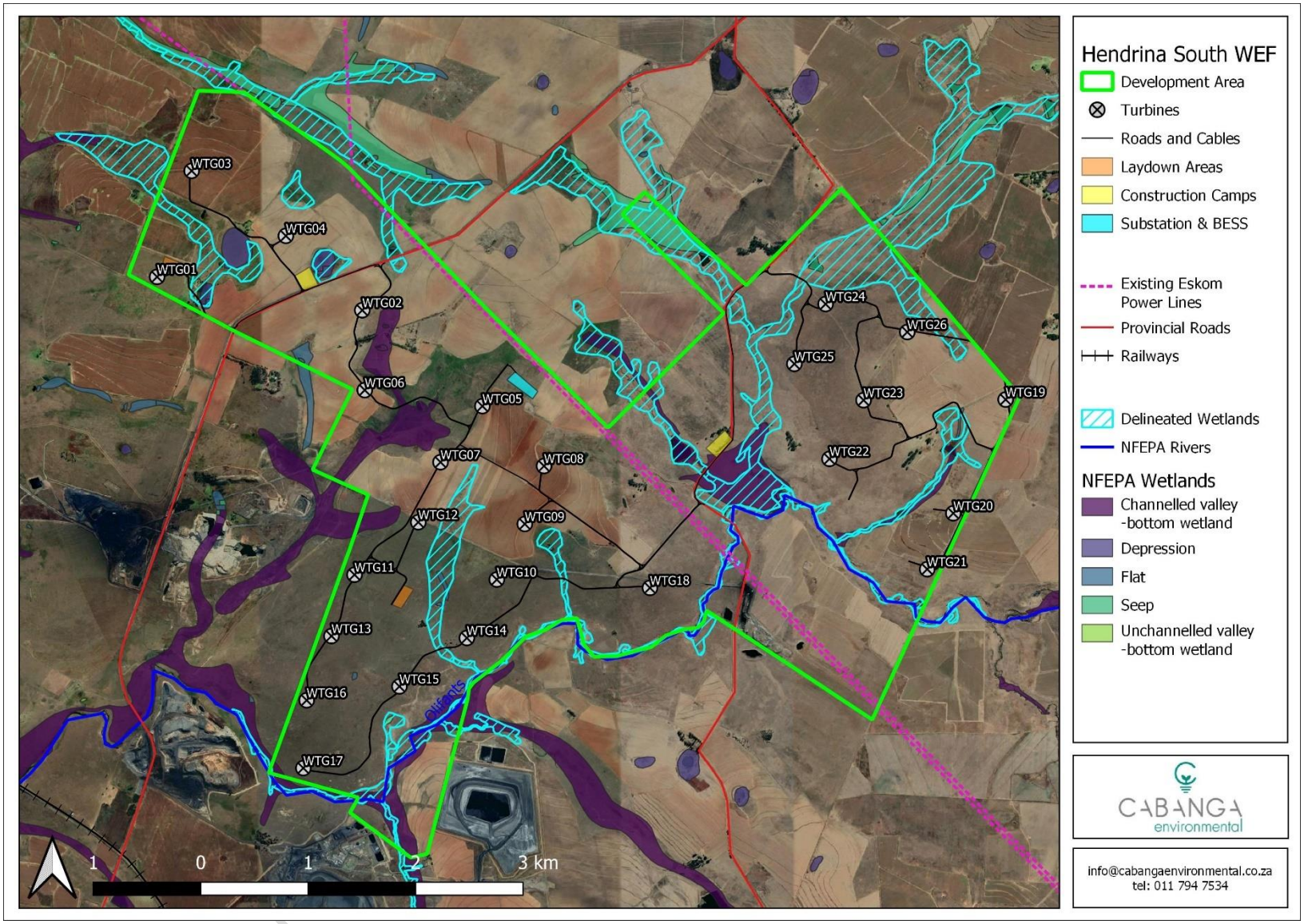
Unchanneled Valley Bottoms (PES Category C, Intermediate ES, High (B) EIS) in the Project Area are mainly used for cattle grazing. There were no clear signs of channeling, erosion, or extensive cattle trampling. The vegetation was stable with little changes to water inputs to the systems. The systems 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 do 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.



Plan 9: 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, Ecological Support Area (Local Corridor) 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 (some 25km north-west of the site). 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.

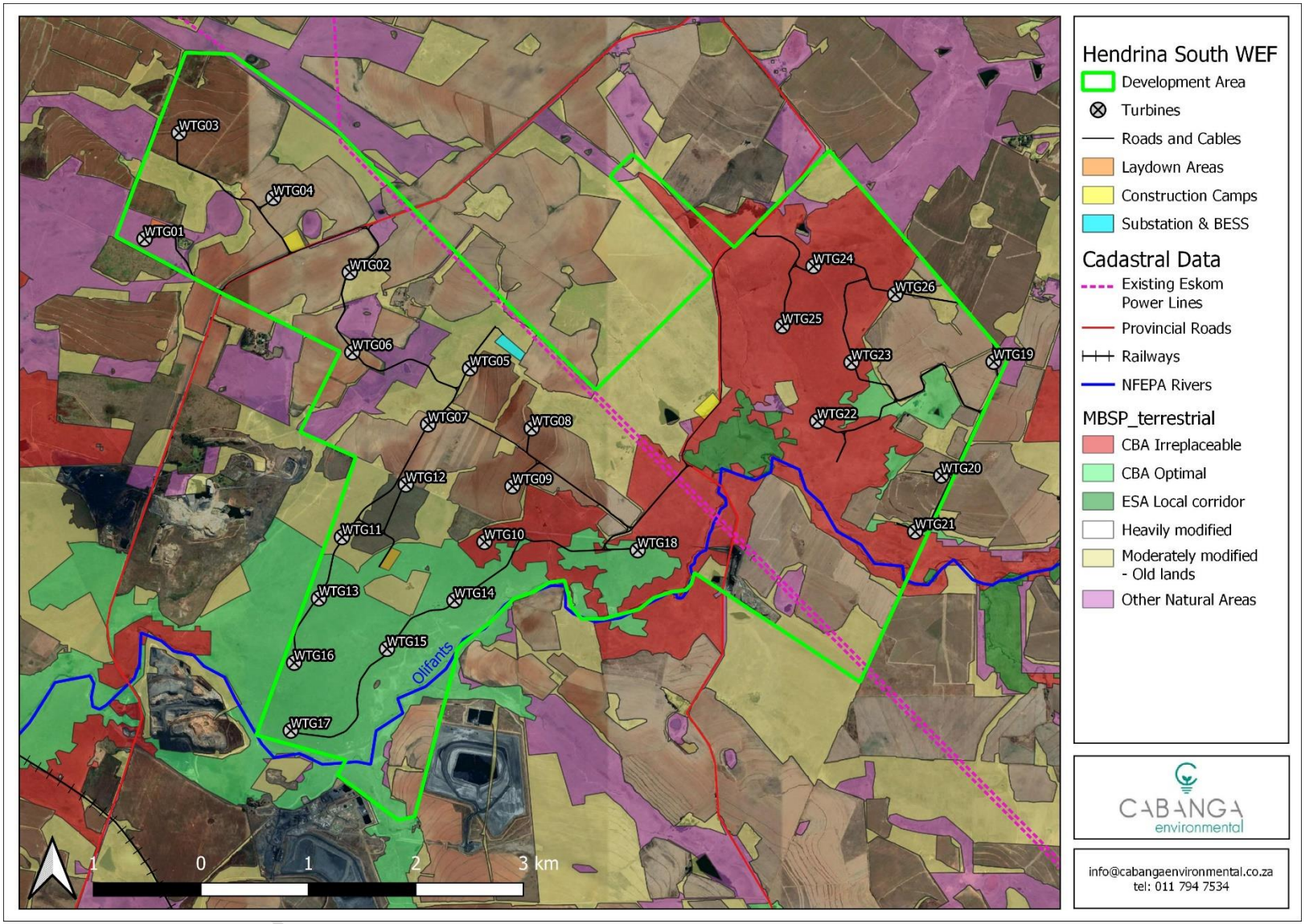
The Mpumalanga Biodiversity Sector Plan (MBSP) (MTPA, 2014) classifies the natural vegetation of the Province according to the following categories:

- Critical Biodiversity Areas (CBA):
  - Irreplaceable CBA and
  - Optimal CBA;
- Ecological Support Area (ESA):
  - ESA Landscape Corridor (none within the Project area);
  - ESA Local Corridor;
  - ESA Protected Area Buffer; (none within the Project area) and
  - ESA Species Specific (none within the Project area).
- Heavily Modified (Large Parts of the Project area);
- Moderately Modified (Parts of the Project area);
- Other Natural Areas (Parts of the Project area);
- Protected Areas:
  - National Parks and Nature Reserves (none within the Project area);
  - Protected Environment: Natural (none within the Project area); and
  - Protected Environment: Modified (none within the Project area).

The Project Layout is overlain on the MBSP in Plan 10.

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 (Hoare, May 2022).

The proposed layout of the Project Components in relation to the MBSP is summarised in Table 23 and discussed with reference to the on-site conditions.



Plan 10: Development area in relation to the MBSP

Table 23: Project Components in relation to MBSP

Project Component	MBSP Area Affected?
WTG1	Other Natural Areas
WTG2	On Edge between Moderately Modified – Old Lands, and Heavily Modified
WTG3	Agricultural Field – Heavily Modified
WTG4	Agricultural Field – Heavily Modified
WTG5	On Edge between Moderately Modified – Old Lands, and Heavily Modified
WTG6	Agricultural Field – Heavily Modified
WTG7	Agricultural Field – Heavily Modified
WTG8	Agricultural Field – Heavily Modified
WTG9	Agricultural Field – Heavily Modified
WTG10	CBA - Irreplaceable
WTG11	Moderately Modified – Old Lands
WTG12	Heavily Modified
WTG13	CBA Optimal
WTG14	CBA Optimal
WTG15	CBA Optimal
WTG16	CBA Optimal
WTG17	CBA Optimal
WTG18	CBA Optimal
WTG19	On edge – Other Natural Areas, Heavily Modified and Moderately Modified – Old Lands
WTG20	On edge – Heavily Modified and Moderately Modified – Old Lands
WTG21	On edge – CBA Optimal, CBA Irreplaceable and Moderately Modified – Old Lands
WTG22	CBA - Irreplaceable
WTG23	CBA - Irreplaceable
WTG24	CBA - Irreplaceable
WTG25	CBA - Irreplaceable
WTG26	Moderately Modified – Old Lands
Substation & BESS	Moderately Modified – Old Lands
Laydown area 1	Other Natural Areas
Laydown Area 2	CBA Optimal
Construction Camp 1	Heavily Modified
Construction Camp 2	Moderately Modified – Old Lands

Those infrastructure components affecting CBAs are further discussed hereunder:

- **WTG10** – Located within CBA Irreplaceable, and high-sensitivity grassland identified by the Avifauna Specialist. However, this site is immediately adjacent to an existing farm road (track) and about 100m south of an old field. The Site is also just 200m from the coal conveyor between Weltevreden and Halfgewonnen Collieries. The landscape in this location is shown in Figure 14.
  The Terrestrial Biodiversity Assessment (Hoare, May 2022) (Appendix F 5) recommends the micro-siting of WTG10 a further 100m south-east, to ensure avoidance of a population of *Ocimum motjaneanum* reportedly recorded about 100m north-west of the turbine location. The species is listed as critically endangered in Eswatini but has not been evaluated in South Africa. This would move WTG10 further into the centre of the CBA, potentially exacerbating the effects that the WTG may have on the CBA nearer its delineated edge and existing disturbances. The EAP recommends that the population of *Ocimum motjaneanum* be demarcated on site, and conserved *in-situ*.

Figure 14: Views of the veld at the WTG10 Site, showing the coal conveyor in the background (left) and signs of over-grazing (bankrupt bush)

- **WTG13** and **WTG16** are located in a CBA Optimal. The access road to be constructed from WTG11 will be a new road and also affects the CBA Optimal. It is not practical to extend the development footprint and relocate these turbines to the west, as that entire farm portion is also a CBA Optimal. The CBA extends to the east as well, and here the land gradient becomes too steep to allow construction vehicles and cranes to construct the Project. The Terrestrial Biodiversity Assessment (Hoare, May 2022) (Appendix F 5) did not identify any fatal flaws associated with these two WTG locations. **WTG15** and **WTG17** are located in a CBA Optimal. The access road from WTG14 to WTG15, and on to WTG17 is constrained by the gradient of the site (becoming too steep to allow safe passage of construction vehicles) on the one side, and delineated wetlands on the other. The Terrestrial Biodiversity Assessment (Hoare, May 2022) (Appendix F 5) did not identify any fatal flaws associated with WTG17, but recommended the removal of WTG 15, and associated roads. Graves have been identified at the WTG15 site, and this turbine will be moved during the detailed design phase to avoid impacting on the graves. If this proves technically unfeasible, WTG15 will not be developed. The Specialist suggests development of an access road from WTHG16 to WTG17 but topographic constraints on the site makes this impossible. The road proposed by the specialist will affect the same CBA. Considering the total footprint of 1Ha per turbine (during construction, being rehabilitated to 0.5Ha for the operational phase) of a total CBA area of 643Ha, the construction of WTG15 (and, by implication WTG17 and the associated roads) would not be considered a fatal flaw to the Project. The condition of the site is shown in Figure 15.
- **WTG14** is located in a CBA Optimal. The proposed road between WTG14 and WTG15 crosses over a delineated wetland within the CBA, but this route largely follows an existing farm track. The Terrestrial Biodiversity Assessment (Hoare, May 2022) (Appendix F 5) did not identify any fatal flaws associated with WTG14.
- **WTG18** is located in a CBA Optimal, but is adjacent (less than 100m) from the existing coal conveyor between Weltevreden and Halfgewonnen Collieries, which would have already compromised the quality of the CBA. The proposed road between WTG18 and WTG10 crosses over a delineated wetland within the CBA, but this route largely follows

an existing farm track. The Terrestrial Biodiversity Assessment (Hoare, May 2022) (Appendix F 5) did not identify any fatal flaws associated with WTG18.

Figure 15: Site condition at WTG15 (graves in photograph on the right)

- **WTG21** largely overlaps with an area delineated as CBA Optimal, but the CBA only comprises 3.4Ha according to the MBSP. The site is right on the edge of an existing agricultural field and aligned to existing farm roads and fences. The Terrestrial Biodiversity Assessment (Hoare, May 2022) (Appendix F 5) did not identify any fatal flaws associated with WTG21.
- **WTG22**, **WTG23**, **WTG24** and **WTG25** are proposed in an area mapped as CBA Irreplaceable; in total the CBA comprises 521.96Ha. The access roads between these turbines are largely aligned to existing farm tracks, or to the edge of agricultural fields adjacent to the CBA. The Terrestrial Biodiversity Assessment (Hoare, May 2022) (Appendix F 5) did not identify any fatal flaws associated with these turbine locations, except for WTG25. If WTG25 is not developed, this would also result in the non-development of approximately 650m of access road.
  Figure 16 shows the current state of the site in the vicinity of WTG25. The veld is not pristine and contains various invasive plant species. The EAP is of the opinion that with proposed mitigations as cited in Section 10.3.5.1 and the EMPr (Appendix H) the benefits of the Project (as unpacked in Section 5) would outweigh the minimal impact associated with the loss of less than 2Ha of indigenous vegetation within the CBA (0.4% of the CBA), if WTG25 and its access road are developed.

Figure 16: General Site Condition at WTG25

- **Laydown Area 2** is in a CBA Optimal with a total extent of 643 Ha. The Terrestrial Biodiversity Assessment (Hoare, May 2022) (Appendix F 5) suggests moving the laydown area about 250m north-west of its current location, to be outside of the CBA area. This suggestion is feasible in terms of the known site sensitivities and should be considered in the detailed design phase of the Project.

Eight broad habitat types were delineated on the Project site (Hoare, May 2022) (Plan 11) 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);
- 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). These factors will be discussed in more detail in the relevant sub-sections (8.8 and 8.9).

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 (Hoare, May 2022). A species[14] was recorded in this grassland that has only been previously recorded in Swaziland, where it is listed as Critically Endangered. 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 (Hoare, May 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 (Hoare, May 2022). The wetlands on

[14] Will not be named to prevent illegal harvesting of the species.

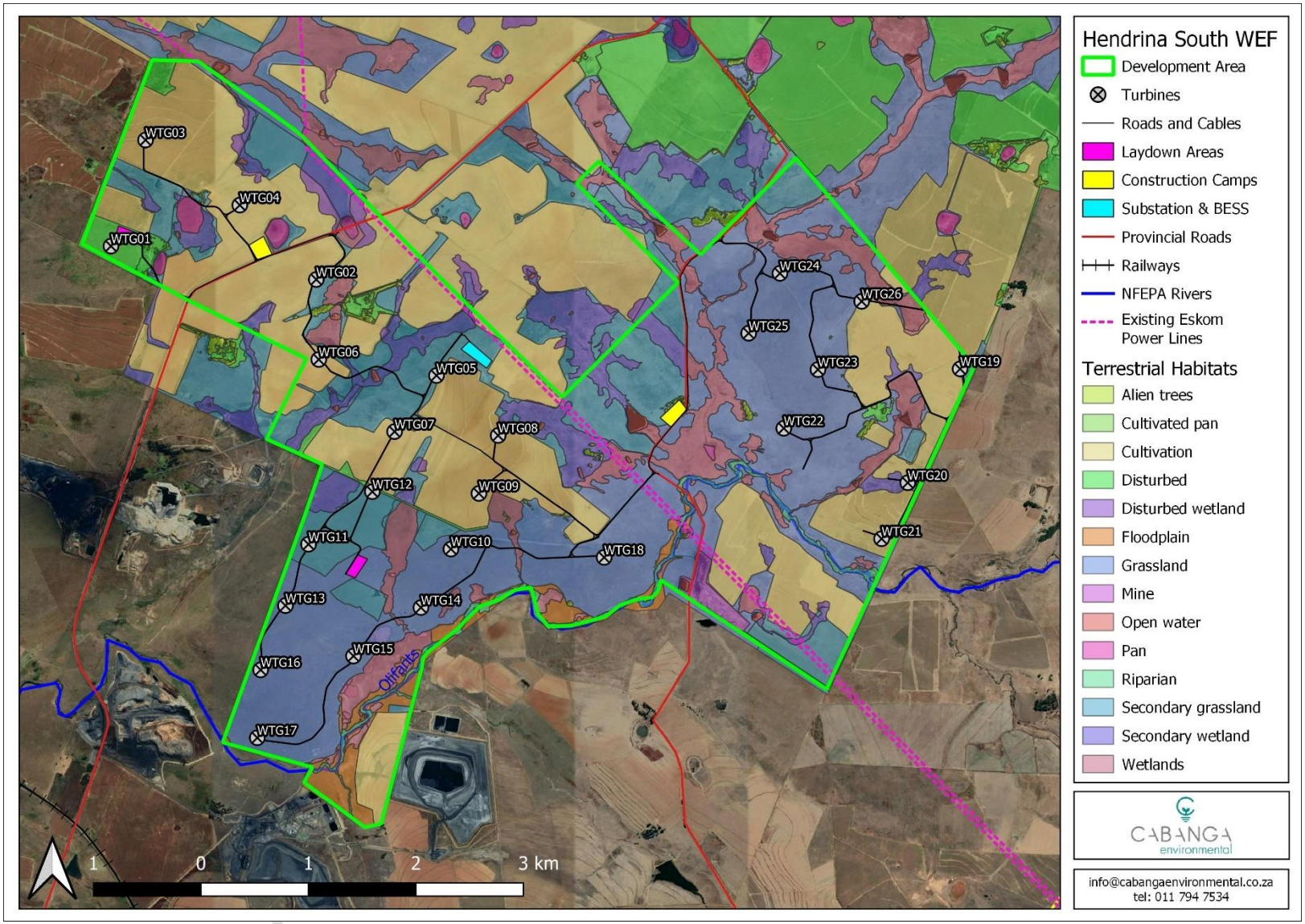
site are considered to have a **Very High Sensitivity**, whereas secondary wetlands are considered to have Medium Sensitivity.

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 **High Sensitivity**.

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 41[15] 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.

[15] Species are not named, to prevent illegal harvesting



Plan 11: Terrestrial Ecology Habitat Units and Sensitivity of the Site

A number of other plant species of conservation concern could potentially occur on the site. Those with a High probability of occurrence include (but are not limited to):

- *Aspidoglossum xanthosphaerum* (Vulnerable)
- *Eucomis pallidiflora* subsp. *Polevansii* (Near Threatened)
- *Gladiolus robertsoniae* (Near Threatened)
- *Khadia carolinensis* (Vulnerable)
- *Merwilla plumbea* (Near Threatened)
- *Miraglossum davyi* (Vulnerable)
- *Pachycarpus suaveolens* (Vulnerable)

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 8.9)
- Mammalia-*Crocidura 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
- African Striped Weasel (*Poecilogale albinucha*), listed as Near Threatened
- 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
- Coppery grass lizard (*Chamaesaura aenea*), listed as Near Threatened
- Striped Harlequin Snake (*Homoroselaps dorsalis*), listed as Near Threatened

8.8 Bats

Bats form part of the Order Chiroptera and are the second largest group of mammals after rodents. They are the only mammals to have developed true powered flight (Animalia, April 2022).

Species currently confirmed on site, previously recorded in the area, or potentially occurring are summarised in Table 24. Roosting and foraging habitats in the study area and conservation status are also discussed. Please see the Bat Impact Assessment in Appendix F 8.

Google Earth satellite imagery and verifications during site visits were used to spatially demarcate areas of the site with high and medium sensitivities relating to bat species ecology and habitat preferences.

Plan 12 depicts the sensitive areas of the site, based on features identified to be important for foraging and roosting of the bat species that are most likely to occur on site. Valley-bottom wetlands, pans, depressions, dams, drainage lines capable of supporting riparian vegetation and other water bodies and other sensitivities such as manmade structures, buildings, houses, barns, sheds, stands of tall trees, were identified as High-Sensitivity areas (including a 200m buffer) and must be subject to development restrictions (turbine exclusion zone). Seasonal Wetlands and drainage lines are assigned a Moderate Sensitivity rating, and a 150m buffer zone. Table 25 describes the development restrictions in each sensitivity zone.

Table 24 Bat species occurring, or likely to occur on site (Animalia, April 2022)

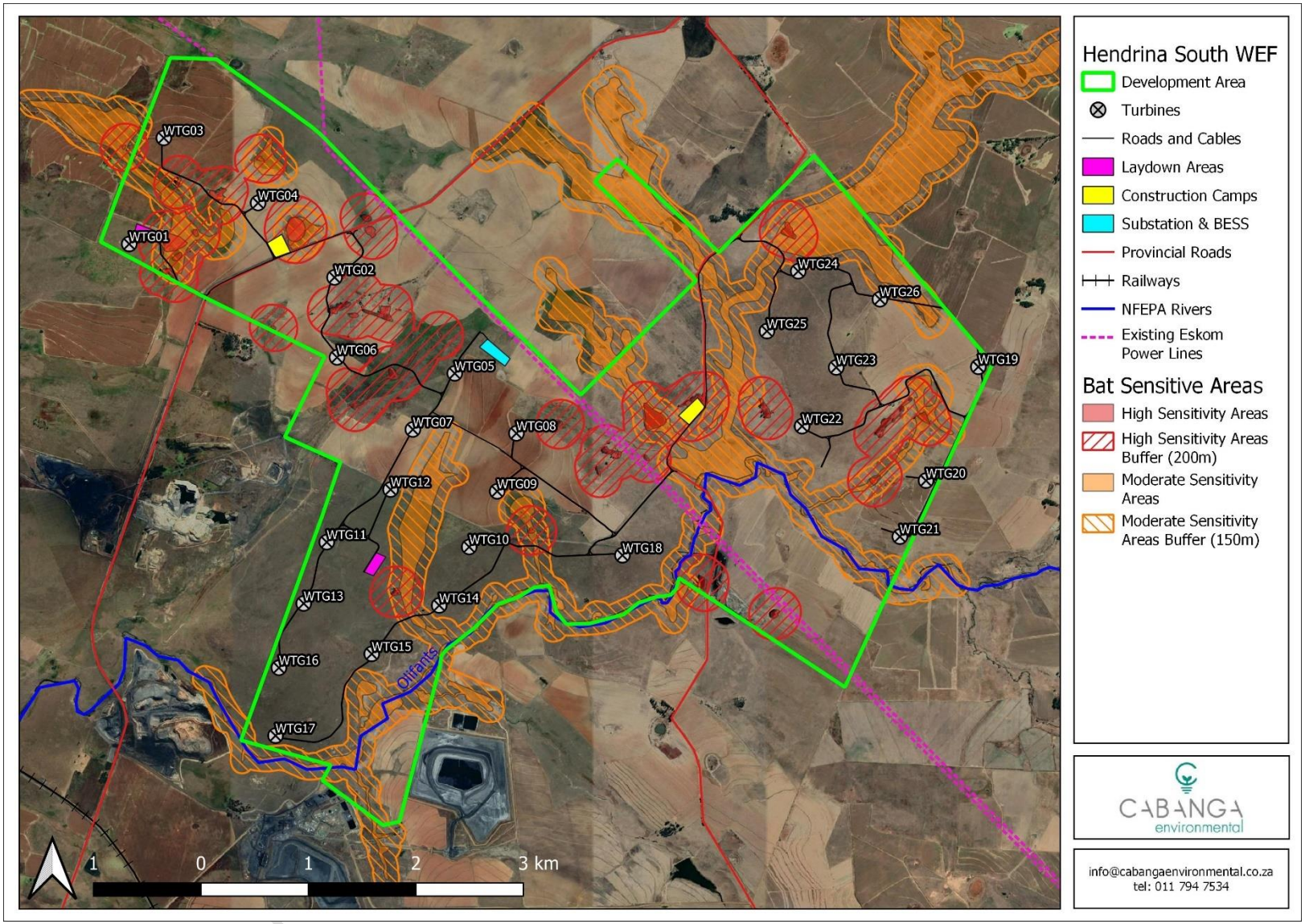
Species	Common name	Occurrence in area	Conservation status (SANBI & EWT, 2016)	Possible roosting habitat in the larger area of the site	Possible foraging habitat in the larger area of the site
Tadarida aegyptiaca	Egyptian free-tailed bat	Confirmed on site	Least Concern (2016 Regional Listing)	Hollows in trees, and behind the bark of dead trees. The species has also taken to roosting in roofs of buildings.	It forages over a wide range of habitats; its preferences of foraging habitat seem independent of vegetation. It seems to forage in all types of habitats.
Mops midas	Midas free-tailed bat	Confirmed in 100km radius	Least Concern (2016 Regional Listing)	Hollows in trees, and behind the bark of dead trees. The species has also taken to roosting in roofs of buildings.	It forages over a wide range of habitats; its preferences of foraging habitat seem independent of vegetation. It seems to forage in all types of habitats.
Laephotis (Neoromicia) capensis	Cape serotine	Confirmed on site	Least Concern (2016 Regional Listing)	Roosts in the roofs of houses and buildings, and also under the bark of trees.	It appears to tolerate a wide range of environmental conditions from arid semi-desert areas to montane grasslands, forests, and savannahs. But is predominantly a medium height clutter edge forager on site.
Laephotis zuluensis	Zulu serotine	Confirmed in 100km radius	Least Concern (2016 Regional Listing)	Roosts under the bark of trees, and possibly roofs of buildings.	Predominantly a medium height clutter edge forager on site.
Pipistrellus hesperidus	Dusky pipistrelle	Confirmed in 100km radius	Least Concern (2016 Regional Listing)	Roosts under the bark of trees, and possibly roofs of buildings.	Prefers vegetation edges and clutter with open water sources.
Pipistrellus rusticus	Rusty pipistrelle	Confirmed in 100km radius	Least Concern (2016 Regional Listing)	Roosts under the bark of trees, and possibly roofs of buildings.	Prefers vegetation edges and clutter with open water sources.
Miniopterus natalensis	Natal long-fingered bat	Confirmed on site	Least Concern (2016 Regional Listing)	Caves and mine tunnels present in the larger area, may also take residence in suitable hollows such as culverts under roads.	Clutter-edge forager. May forage in more open terrain during suitable weather.

Species	Common name	Occurrence in area	Conservation status (SANBI & EWT, 2016)	Possible roosting habitat in the larger area of the site	Possible foraging habitat in the larger area of the site
Miniopterus fraterculus	Lesser long-fingered bat	Confirmed in 100km radius	Least Concern (2016 Regional Listing)	Caves and mine tunnels present in the larger area.	Clutter-edge forager. May forage in more open terrain during suitable weather.
Eptesicus hottentotus	Long-tailed serotine	Confirmed in 100km radius	Least Concern (2016 Regional Listing)	It is a crevice dweller roosting in rock crevices in the larger area, as well as other crevices in buildings.	It generally seems to prefer woodland habitats, and forages on the clutter edge. But may still forage over open terrain occasionally.
Myotis tricolor	Temmink's myotis	Confirmed in 100km radius	Least Concern (2016 Regional Listing)	Caves and mine tunnels present in the larger area, may also take residence in suitable hollows such as culverts under roads.	Clutter-edge forager. May forage in more open terrain during suitable weather.
Myotis welwitschii	Welwitsch's myotis	Confirmed in 100km radius	Least Concern (2016 Regional Listing)	Caves and mine tunnels present in the larger area, may also take residence in suitable hollows such as culverts under roads.	Clutter-edge forager, unlikely on site due to preference for mountains/hillsides.
Taphozous mauritianus	Mauritian tomb bat	Confirmed in 100km radius	Least Concern (2016 Regional Listing)	Roost against the walls of buildings under roof overhangs or on large tree trunks. Often vigilant and conspicuous during daytime.	Open terrain forager, may forage over open grasslands on site.
Rhinolophus blasii	Blasius's horseshoe bat	Confirmed in 100km radius	Near Threatened (2016 Regional Listing)	Caves and mine tunnels present in the larger area.	Vegetation clutter forager, clumps of trees on site.
Rhinolophus clivosus	Geoffroy's horseshoe bat	Confirmed in 100km radius	Least Concern (2016 Regional Listing)	Caves and mine tunnels present in the larger area.	Vegetation clutter forager, clumps of trees on site.

Species	Common name	Occurrence in area	Conservation status (SANBI & EWT, 2016)	Possible roosting habitat in the larger area of the site	Possible foraging habitat in the larger area of the site
Rhinolophus swinnyi	Swinny's horseshoe bat	Confirmed in 100km radius	Vulnerable (2016 Regional Listing)	Caves and mine tunnels present in the larger area.	Vegetation clutter forager, clumps of trees on site.
Rhinolophus simulator	Bushveld horseshoe bat	Confirmed in 100km radius	Least Concern (2016 Regional Listing)	Caves and mine tunnels present in the larger area.	Vegetation clutter forager, clumps of trees on site.
Scotophilus dinganii	Yellow-bellied house bat	Confirmed in 100km radius	Least Concern (2016 Regional Listing)	Roofs of buildings and other suitable hollows.	Clutter-edge forager. May forage in more open terrain during suitable weather.
Nycteris thebaica	Egyptian slit-faced bat	Confirmed in 100km radius	Least Concern (2016 Regional Listing)	Suitable hollows such as culverts under roads, vacant buildings and hollow tree trunks.	Vegetation clutter forager, clumps of trees on site.
Cloeotis percivali	Percival's short-eared trident bat	Confirmed in 100km radius	Endangered (2016 Regional Listing)	Caves and mine tunnels present in the larger area.	Vegetation clutter forager, clumps of trees on site.
Hipposideros caffer	Sundevall's leaf-nosed bat	Confirmed in 100km radius	Least Concern (2016 Regional Listing)	Caves and mine tunnels present in the larger area. Possibly hollows such as road culverts.	Vegetation clutter forager, clumps of trees on site.
Epomophorus wahlbergi	Wahlberg's epauletted fruit bat	Confirmed in 100km radius	Least Concern (2016 Regional Listing)	Roosts in dense foliage of large, leafy trees in the larger area, and may travel several kilometres each night to reach fruiting trees.	Feeds on fruit, nectar, pollen and flowers. If and where available on or near site.

Table 25: The significance of sensitivity map categories for each infrastructure component

Sensitivity	**Turbines**	**Roads and cables**	**Internal overhead transmission lines**	**Buildings** (including substation, battery storage facility and construction camp/yards)
High Sensitivity	Turbines may not be placed in these areas. Turbine blades (blade overhang) may not intrude into these areas.	Preferably keep to a minimum within these areas where practically feasible.	Allowed inside these areas.	Avoid these areas.
High Sensitivity buffer	Turbines may not be placed in these areas. Turbine blades (blade overhang) may not intrude into these areas.	Allowed inside these areas.	Allowed inside these areas.	Preferably keep to a minimum within these areas where practically feasible.
Moderate Sensitivity	Turbines within these areas may require priority (not excluding all other turbines) during post-construction studies, and in some instances, there is a higher likelihood that mitigation measures may need to be applied to them.	Allowed inside these areas.	Allowed inside these areas.	Allowed inside these areas.
Moderate Sensitivity buffer	Turbines within these areas may require priority (not excluding all other turbines) during post-construction studies, and in some instances, there is a higher likelihood that mitigation measures may need to be applied to them.	Allowed inside these areas.	Allowed inside these areas.	Allowed inside these areas.



Plan 12: Bat Sensitivity in relation to Project Layout

8.9 Avifauna

The Screening Tool classified the site as having a low sensitivity in terms of the Avian (wind) Theme; however, the classification should be High, based on actual conditions recorded on the ground during the four seasons of pre-construction monitoring, and the recorded presence of avian species of conservation concern (SCC) in the development area and immediate surroundings (Van Rooyen & Froneman, April 2022).

The development area is not located in an Important Bird Area (IBA). The closest IBA to the site is the Amersfoort-Bethal-Carolina IBA SA018, ~3km to the east of the site. The South African Bird Atlas Project (SABAP2) found that a total of 173 bird species could potentially occur within the broader area. Of these, 25 species are classified as priority species according to the updated list of priority species for wind farms compiled for the Avian Wind Farm Sensitivity Map and 11 of these are South African Red List species. Of the priority species, 16 are likely to occur regularly in the development area.

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

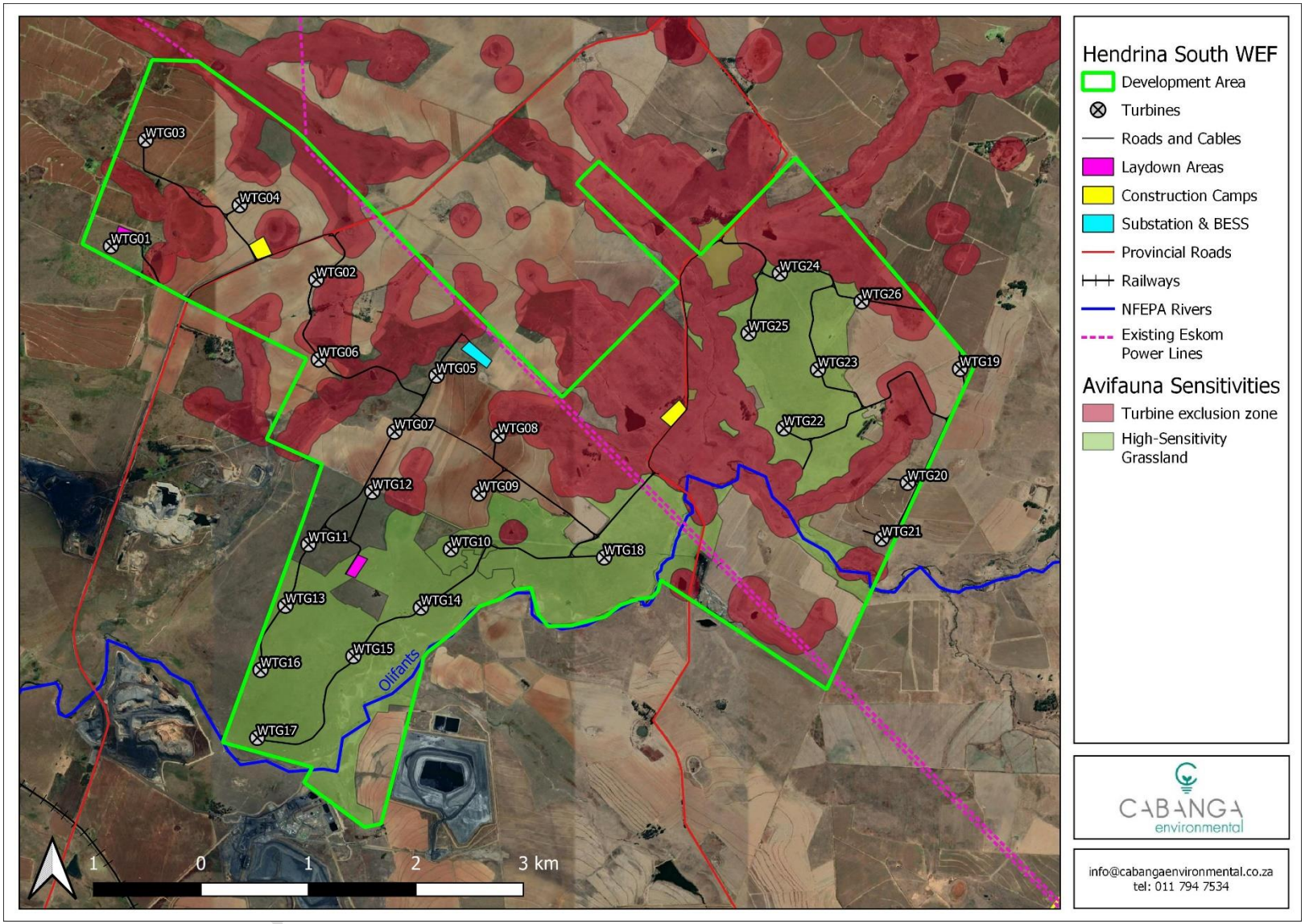
The following bird habitat classes were identified in the development area (Table 26) (Van Rooyen & Froneman, April 2022):

Table 26: 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 development area. The grassland varies from dense stands of relatively high grass to areas of heavily grazed short grass	African Grass Owl	Greater Kestrel
		Amur Falcon	Montagu's Harrier
		Black-chested Snake Eagle	
		Black-winged Kite	
		Blue Korhaan	
		Common Buzzard	
		Denham's Bustard	
		Grey-winged Francolin	
		Lanner Falcon	
		Long-crested Eagle	
		Marsh Owl	
		Martial Eagle	
		Secretarybird	
		Southern Bald Ibis	
		Spotted Eagle-Owl	
		White Stork	
Drainage Lines and Wetlands	There are a number of wetlands in the development areas, most of which are associated with drainage lines	African Grass Owl	Long-crested Eagle
		Grey Crowned Crane	
		Marsh Owl	
Agricultural Lands	The development areas contain a patchwork of	Common Buzzard	Lanner Falcon
		Lanner Falcon	

Habitat Class	Description	Priority Species expected to use the habitat regularly	Priority Species expected to use the habitat occasionally
	agricultural fields. Some fields are lying fallow or are in the process of being re-vegetated by grass.	Southern Bald Ibis Amur Falcon	
Alien Trees	The development 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 Harrier-Hawk Amur Falcon Black Sparrowhawk Black-chested Snake Eagle Black-winged Kite Common Buzzard Grey Crowned Crane Lanner Falcon Secretarybird Southern Bald Ibis Spotted Eagle-Owl White Stork	African Fish Eagle Greater Kestrel Long-crested Eagle Martial Eagle
Dams and Pans	The development 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 foraging and roosting. Large raptors could use the dams and pans for bathing and drinking.	Secretarybird	African Fish Eagle Black-chested Snake Eagle Greater Flamingo Lesser Flamingo Long-crested Eagle Martial Eagle Yellow-billed Stork
High-Voltage lines	The project areas are intersected by two high voltage transmission lines, i.e. Camden Duvha 1 400kV line and the Camden Komati 1 275kV, as well as several reticulation lines.	Amur Falcon Black-winged Kite Common Buzzard Lanner Falcon Southern Bald Ibis White Stork	Black-chested Snake Eagle Greater Kestrel Long-crested Eagle Martial Eagle

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). Other infrastructure must be limited as far as possible to prevent displacement of these species. Avifauna sensitivities of the site, in relation to proposed infrastructure, are shown in Plan 13. Note that all turbines have been located outside of the turbine exclusion zone, but that WTG02; WTG06; WTG08; and WTG26 are located on or near the edge of the exclusion zone and may be shifted slightly during the detailed design phase.



Plan 13: Avifauna site sensitivity in relation to proposed project

8.10 Air Quality

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 (PM_{10}), Ozone (O_3), Sulphur Dioxide (SO_2) and Nitrogen Dioxide (NO_2).

The National Framework for Air Quality Management[16] 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 PM_{10}, $PM_{2.5}$, CO, NO_2, SO_2 and O_3.

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.

8.11 Noise

The screening tool identified the noise theme as having a very high sensitivity due to the presence in the study area of potential temporary or permanently inhabited residences. This section therefore aims to describe:

- The existing environmental sound character in the area; and
- The noise-sensitive receptors experiencing the existing soundscape.

Natural sounds are a part of the environmental noise surrounding humans. In rural areas the sounds from insects, birds and wind flowing through vegetation would dominate the ambient sound character.

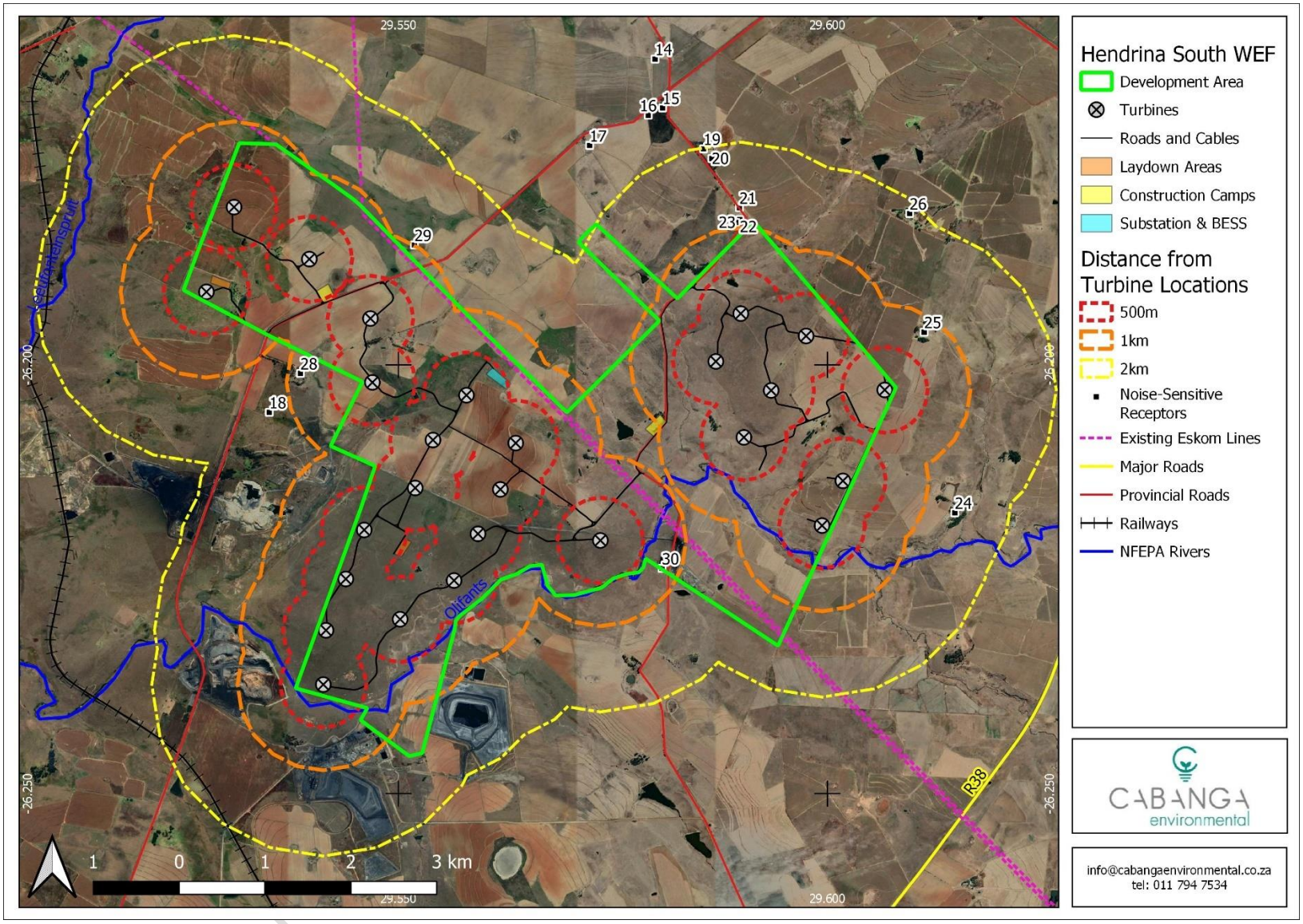
Ambient (background) sound levels were measured over a period of a week from 30 July to 6 August 2021 in accordance with the South African National Standard SANS 10103:2008 at two locations in the study area (please see Appendix F 10 for additional detail on the methodology).

Based on the measured sound levels, ambient sound levels in the area are generally low, with the exception of locations closer to existing roads. Ambient sound levels are typical of a rural noise district. The acceptable zone sound level (noise rating level) during low and no-wind conditions would thus be typical of a rural noise district, e.g.:

- 45 dBA for the daytime period; and,
- 35 dBA for the night-time period.

Potential noise-sensitive receptors identified in the project area, and the relative distance between the receptor and potential noise source associated with the Project layout, are shown in Plan 14.

[16] 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).



Plan 14: Potential Noise-sensitive receptors and distance to proposed turbines

8.12 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).

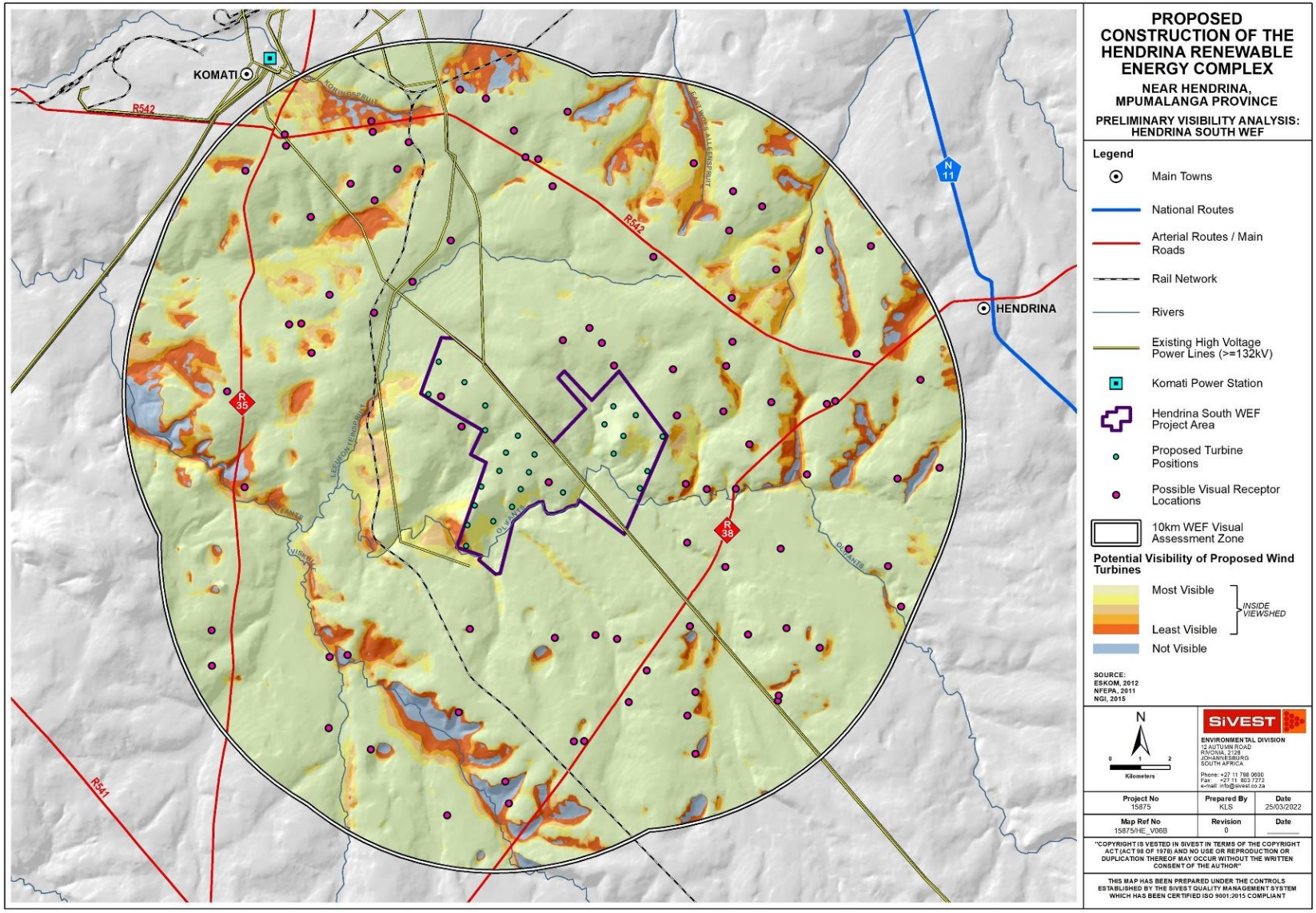
Physical and land use characteristics like topography, vegetation and present land use are considered in determining the visual character of an area. The pastoral landscape and rolling hills in parts of the study area are important features that could increase the visual appeal and visual interest in 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 11) 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.

Typical views of the area are provided in Figure 17. Potential visibility of the proposed project is illustrated in Plan 15.

Figure 17: Views of the terrain and character of the area (SiVEST, April 2022)



Plan 15: Potential visibility of the proposed Project (SiVEST, April 2022)

8.13 Socio-Cultural Environment

The following information is largely sourced from the specialist report (Appendix F 12) (Urban-Econ, April 2022)

The proposed Project is primarily located within the Steve Tshwete Local Municipality (STLM)[17]. 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 27 Overview of population, income and employment profile

Indicator	Mpumalanga	Nkangala District Municipality	Steve Tshwete Local Municipality
Are (km²)	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 (km²)	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 STLM 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

[17] A portion of the development area, seven turbines, Laydown Area 2 and approximately 6.25km of roads fall within the Govan Mbeki Local Municipality of the Gert Sibande District Municipality. The Socio-Economic baseline conditions focus on the STLM as the majority of the Project falls within the STLM.

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.

8.14 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 13. Heritage finds were limited to burial sites and the demolished remains of residential dwellings.

Table 28 provides an explanation of the field ratings that were assigned to the identified heritage resources. Table 29 provides a summary of the sites identified (illustrated in Plan 16), their significance, and their relation to the proposed Project infrastructure.

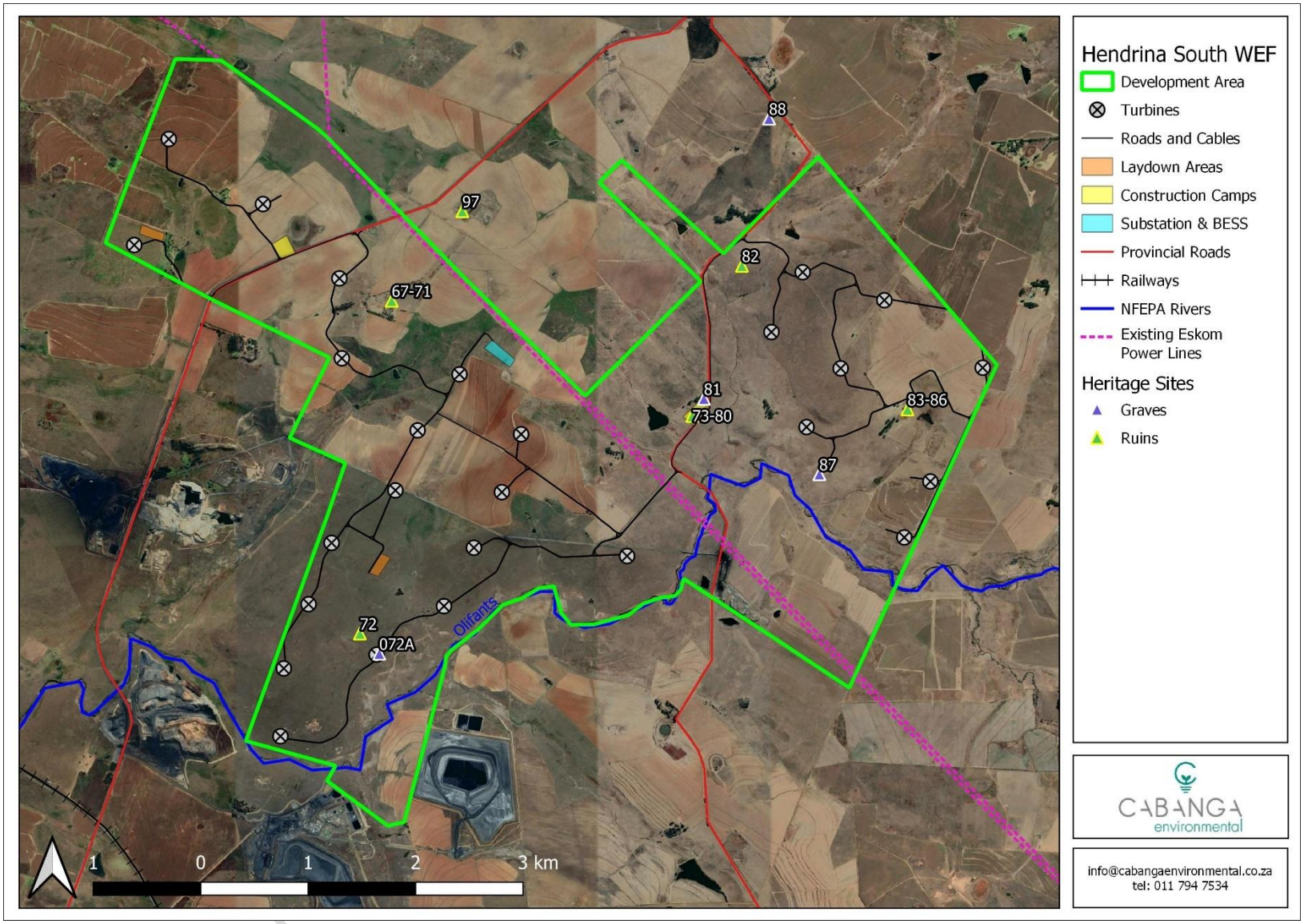
Table 28: Heritage significance and field ratings

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
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 29: Heritage Resources Identified during the survey

ID (Plan 16)	Description	Heritage Significance	Relation to Project	Recommendation
67-71	The site consists of multiple degraded and broken-down structures in an area of 100 x 100 m. These structures could possibly have been part of a farmstead with various buildings such as a house and accompanying infrastructure. The site is surrounded by large trees (pine and eucalyptus). The area is overgrown with grass and weeds.	The ruins' potential to contribute to aesthetic, historic, scientific and social aspects are non-existent, and it is therefore of low heritage significance (Generally Protected C), unless associated with burial sites in which case the burial sites are of high social significance (GP A)	The sites are roughly 500m from the nearest planned Project infrastructure.	No direct impact from Project – protect *in-situ*
72	Rectangular sandstone dwelling with sandstone lintels. Doors, windows and roof have been removed.	The ruins' potential to contribute to aesthetic, historic, scientific and social aspects are non-existent, and it is therefore of low heritage significance (Generally Protected C), unless associated with burial sites in which case the burial sites are of high social significance (GP A)	The ruin is roughly 250m from the nearest planned Project infrastructure (WTG15).	No direct impact from Project – protect *in-situ*
72A	The site consists of at least three graves. It is evident that the graveyard was fenced, with an access gate, though these have not been maintained.	GP A High social significance	The Graves are in the affected footprint of WTG15	Move WTG15 and associated road to avoid these graves. Fence the site and protect the graves from any damage.
73 – 80	The area of approximately 80 m by 80 m contains a historical farmstead with multiple structures that have been mostly destroyed or are degraded. These structures include a large stone build kraal, a stone-built house with multiple rooms as well as multiple smaller structures or remnants of structures. A row of large trees surrounds the area. A grave was also identified at Waypoint 081. The various structures at this location are possibly older than 60 years. Large portions of the structures are still intact.	The ruins' potential to contribute to aesthetic, historic, scientific and social aspects are non-existent, and it is therefore of low heritage significance (Generally Protected C), unless associated with burial sites in which case the burial sites are of high social significance (GP A)	Construction Camp 2 directly affects the site.	The site should be documented before destruction (under permit from SAHRA) unless an alternative construction camp site can be identified and these structures left *in-situ*.
81	Single granite grave of Lucas Viljoen dating to 1940 with a broken gravestone located near the	GP A High social significance	The grave is adjacent to	No direct impact from Project – protect *in-situ*

ID (Plan 16)	Description	Heritage Significance	Relation to Project	Recommendation
	farmstead at Waypoint 073 under a thicket of large trees.		construction camp 3	
82	A 5 x 5m packed stone wall or square foundation. The remnants of a small, stone packed structure.	The ruins' potential to contribute to aesthetic, historic, scientific and social aspects are non-existent, and it is therefore of low heritage significance (Generally Protected C), unless associated with burial sites in which case the burial sites are of high social significance (GP A)	The site is roughly 250m from the nearest planned Project infrastructure (road).	No direct impact from Project – protect *in-situ*
83-86	A large farmstead with multiple degraded structures scattered across the site. The structures include a large broken-down farmhouse on top of a large stone-built foundation. A large sandstone-built structure near a large modern kraal. Multiple small brick structures occur across the site between the other structures. This farmstead could possibly be older than 60 years due to the architectural style and materials used to construct the site. Large parts of the site are still intact.	GP B Medium Significance	Adjacent to planned road	No direct impact from Project – protect *in-situ*
87	Small cemetery with 4 graves located in an open field. The cemetery includes multiple packed stone graves as well as one grave with a cement headstone and skirting.	GP A High social significance	Site is roughly 400m from the nearest planned project infrastructure (WTG22).	No direct impact from Project – protect *in-situ*



Plan 16: Identified Heritage Sites in relation to the Project

8.15 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 14).

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 (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 (Bamford, May 2022).

8.16 Traffic

The R542 between Komati and Hendrina runs north of the development site. 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 000and 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 tarred Provincial Road D622 (known as the Halfgewonnen Road) traverses the north-west portion of 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 D480 is a Provincial gravel road that traverses the eastern portion of the Development Area. It is the main access road to the Weltevreden Mine. Approximately 2.7km of this road will be upgraded as part of the Project.

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 parts of 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

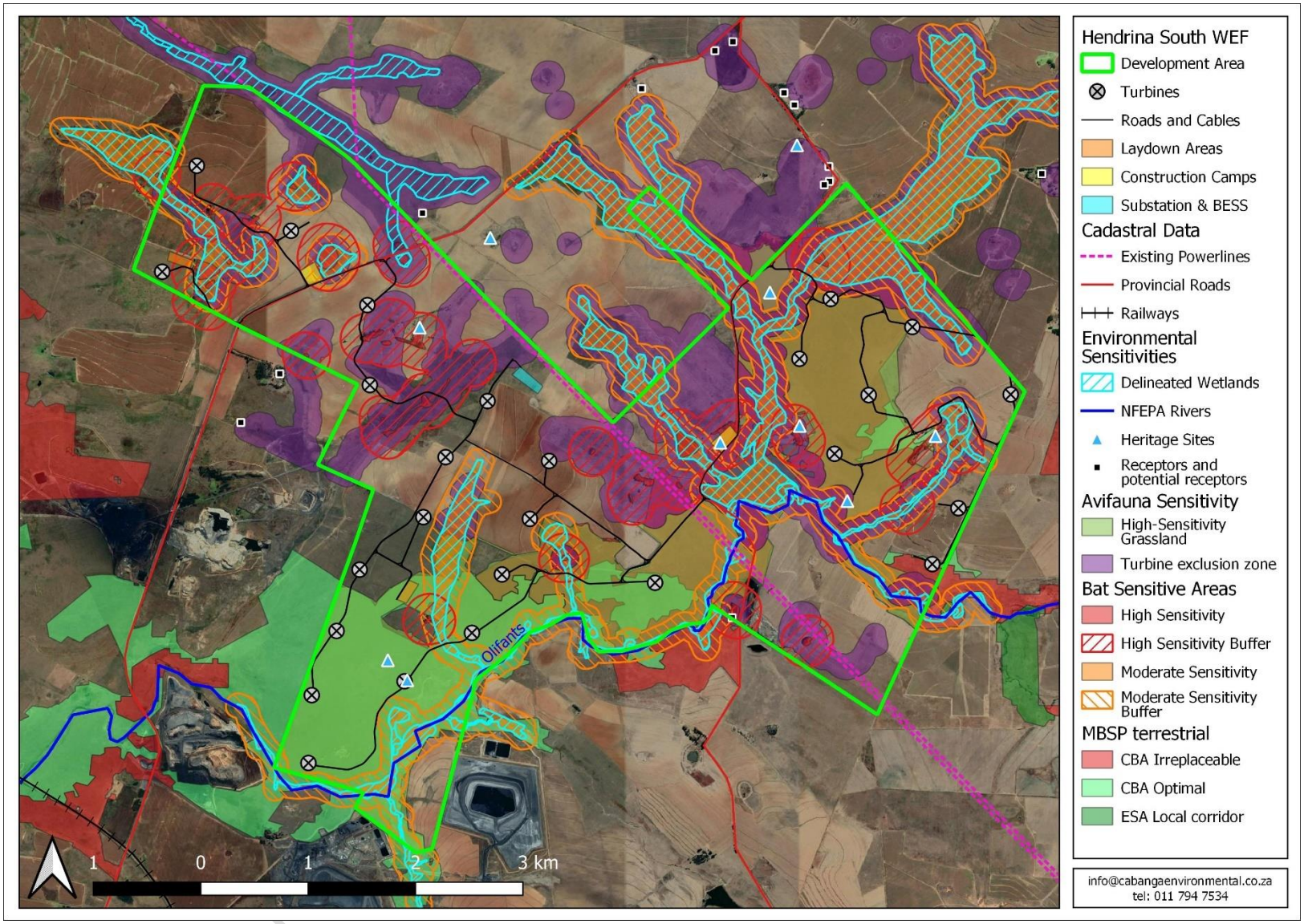
Plan 17 shows the environmental sensitivities identified on the project site and surroundings in relation to the proposed Project Infrastructure.

The following sensitive environmental features are shown:

- Delineated Wetlands (Burton, May 2022);
- NFEPA Rivers (Nel, et al., 2011);
- Heritage Sites (Beyond Heritage, April 2022)[18];
- Human receptors and potential human receptors (EARES, April 2022);
- High-Sensitivity areas for avifauna (turbine exclusion zone) (Van Rooyen & Froneman, April 2022);
- High-sensitivity grasslands (Van Rooyen & Froneman, April 2022);
- Bat Sensitivities and buffers (Animalia, April 2022); and
- Critical Biodiversity Areas (Irreplaceable and Optimal) (MTPA, 2014).

Note: Some of the turbines have been placed at or near the edge of turbine exclusion zones, but none are within the exclusion zones. Micro-siting during the detailed design phase may necessitate the shifting of these turbines further away from identified exclusion zones.

[18] 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 17: Environmental Sensitivity Map

10 Identification of Potential Impacts

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 Assessment Methodology

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 30: 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 31: 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 32:

Table 32: 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 33: 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:

Significance = Consequence x 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 must be included in the EMPr 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 EIA Guideline for Renewable Energy Projects (DEA, 2015) identifies a number of potential impacts typically associated with Wind Energy Facilities. Additionally, the DEA National Screening Tool identified a number of environmental themes as having high-sensitivity in terms of WEF development. These include:

EIA Guideline for Renewable Energy Projects (DEA, 2015)	**Very High Sensitivity Themes identified by the Screening Tool**
Visual impacts	Visual Theme, Flicker Theme
Noise impacts	Noise Theme
Land use impacts	
Biodiversity impacts	Aquatic Biodiversity Theme, Terrestrial Biodiversity Theme
Electromagnetic interference	
Air safety	
Cultural heritage impacts	Palaeontology Theme
Impacts to habitats	

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 the sections below.

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 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 10.3.1, 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 10.3.2 to 10.3.15) then discuss and evaluate the potential impacts of the project on different environmental aspects of the Site.

10.3.1 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 48(i)(a) and (c) Activity 19 Listing Notice 3 Activity 14 (ii)(a)(c)(f)(i)(ff) Activity 23(ii)(a)(c)(f) (i)(ee)	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 10.3.3 and 10.3.4
Listing Notice 1 Activity 14 Listing Notice 3 Activity 10 (f)(i)(ee) and (hh)	These Listed Activities relate to the storage, or the storage and handling of dangerous goods (i.e. substances that are listed in SANS10234 (2008 supplement).). Such facilities and activities require assessment and management to ensure the storage and use of dangerous goods do not pose an unwarranted or unmanageable environmental risk to the surrounding environment.	Please refer to Section 10.3.15
Listing Notice 1. Activity 24(ii) Activity 56(i) and (ii) Listing Notice 3. Activity 4(f)(i)(ee) Activity 18(f)(i)(ee)	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.	Please refer to Sections 10.3.5, 10.3.6 and 10.3.7
Listing Notice 1, Activity 26	The Activity relates to commercial development proposed on land previously used for mining or heavy-industrial purposes. Land previously used for mining or heavy industrial purposes could be associated with contamination or physical stability issues, potentially posing a threat to the environment on that land, and any new proposed development on the land.	Potential issues on portions of the site that have been undermined must be assessed during the detailed design phase. Please see Appendix F 17.
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 see Section 10.3.2
Listing Notice 1. Activity 30	Development of the project involves the undertaking of listed activities in specified geographical areas, and is thus regarded an activity identified in terms of section 53(1) of the NEMBA. Activities proposed in specific geographic areas require assessment to ensure the continued ecological viability of the identified areas.	Please see Section 10.3.5
Listing Notice 2. Activity 1	The Project will involve generation of up to 200MW electricity from a renewable resource (wind). Electricity generation projects require further impact assessment due to the legislative framework that govern	Please see Section 6.4 and 0

Listing Notice & Activity Number	General Description and relevance to the Project	Reference to Impact Assessment
	such projects and potential impacts associated with renewable energy technologies.	
Listing Notice 2. Activity 9 Listing Notice 1 Activity 11	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, bats and thus require further investigation.	Please see Sections 10.3.6 and 10.3.7
Listing Notice 2. Activity 15	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 see Section 10.3.5
Listing Notice 3. Activity 12(f)(i) and (ii)		

10.3.2 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. (Lanz, April 2022).

10.3.2.1 Construction Phase

Two potential direct negative agricultural impacts have been identified that are expected to occur in the construction phase of the Project:

- **Loss of agricultural potential by occupation of land** - Agricultural land directly occupied by the development infrastructure will become unavailable for agricultural use, with consequent loss of agricultural productivity on the directly affected footprints.

  The impact will endure for the duration of the Project (i.e. as long as the land remains occupied by Project Infrastructure and is unavailable for agricultural production). Thus, the impact endures for the operational phase of the Project but occurs during the construction phase.
  For the Wind Turbines, hardstands, substations, BESS and O&M Buildings the impact duration will extend to the entire operational phase. For temporary laydown areas and construction camps, the impact will be negated after the construction phase is complete.
  The total extent of infrastructure development that would exclude agricultural development is comparatively small in the context of agricultural land that is available in the area, thus, only an insignificant proportion of the available agricultural land is impacted in this way.

- **Loss of agricultural potential by soil degradation –** Soil can be degraded by impacts in three different ways: erosion; topsoil loss; and contamination.

  - Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction-related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads. The presence of hard impermeable surfaces will persist throughout the operational phase as well, but are caused by activities in the construction phase.
  - 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 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.

Impact Assessment before mitigation: Construction Phase – Soils, Land Use and Land Capability (Agriculture)

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
1A	Presence of the Turbine hardstands, substation, BESS etc. on land that could otherwise have been used for agricultural production.	Loss of agricultural potential by occupation of land	Negative	5	4	1	4	1	50	Moderate
1B	Presence of the construction camps and laydown areas on land that could otherwise have been used for agricultural production.	Loss of agricultural potential by occupation of land	Negative	5	4	1	1	1	35	Low
1C	Construction causing altered surface run-off (including vegetation clearance, increase in impermeable surfaces)	Loss of agricultural potential by Soil Degradation	Negative	4	4	3	4	2	52	Moderate
1D	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 – Soils, Land Use and Land Capability (Agriculture)

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
1A	Presence of the Turbine hardstands, substation, BESS etc. on land that could otherwise have been used for agricultural production.	Loss of agricultural potential by occupation of land	Negative	5	4	1	1	1	35	Low
1B	Presence of the construction camps and laydown areas on land that could otherwise have been used for agricultural production.	Loss of agricultural potential by occupation of land	Negative	5	4	1	1	1	35	Low
1C	Construction causing altered surface run-off (including vegetation clearance, increase in impermeable surfaces)	Loss of agricultural potential by Soil Degradation	Negative	2	4	2	2	1	18	Insignificant
1D	Construction activity and presence of personnel	Nuisance impacts to farmers and farming operations	Negative	2	2	2	2	2	16	Insignificant

Construction Phase Mitigation Measures

- Minimise and restrict site clearing to areas required for construction purposes only and prevent disturbance to adjacent undisturbed vegetation.
- Vegetation clearing should occur in parallel with the construction progress to minimise erosion and/or run-off.
- Implement adequate waste management procedures, burning or burying of waste will not be permitted 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.
- 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.
- The stormwater management plan must further prevent contaminated runoff from leaving the site.
- If an activity will mechanically disturb the soil below surface in any way, then any available topsoil must first be stripped (top 30cm) 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 stabilised by facilitating vegetation cover. Additionally:
    - Topsoil must only be handled twice, once to strip and stockpile and once for rehabilitation
    - Topsoil must be stored separately from other soils until construction in an area is complete. Ideally, removed topsoil should be re-applied immediately. The next best option is to minimize the duration of topsoil storage as the storing of topsoil for long periods (> 3 months) leads to seed bank depletion. Therefore, stripping of construction areas must be phased.
    - Topsoil stockpiles should not exceed a height of 2m
    - All stockpiles must be positioned away from drainage lines.
    - Sediment fencing should be erected downslope of all stockpiles to intercept any sediment runoff from the stockpiles.
    - Sediment fencing should be erected upslope of topsoil stockpiles to prevent upslope runoff from eroding the topsoil stockpiles.
- EPC Contractor to provide a rehabilitation plan, to ensure the rehabilitation of affected areas immediately following construction in a specific area. As a minimum, post-construction rehabilitation will involve the following:
    - Stockpiled topsoil must be evenly spread over disturbed areas (150 – 200 mm thick) just prior to planting/seeding.
    - Organic fertilizers or compost shall be used if site conditions require it and can be applied as part of hydro-seeding applications (if required).
    - Seed must be sown into weed-free topsoil that has been stockpiled (i.e. original topsoil).

10.3.2.2 Operational Phase

While the impacts associated with loss of agricultural potential by the occupation of land, as identified in the construction phase, are expected to extend into the operational phase, these impacts result from the construction phase and are discussed above. No further loss of agricultural land use occurs in the operational phase.

Maintenance activities may be associated with limited use of hydrocarbons and other chemical substances, or road maintenance which could lead to pollution or erosion impacts, but these impacts are not regarded as likely to have a significant effect when compared to the construction phase.

The presence of turbines may prevent crop spraying by certain aircraft but ground based or using drones for spraying are effective, alternative methods that can be used. Therefore, the presence of the turbines preventing spraying of crops by specific aircraft are not regarded as an agricultural impact, as this aspect will not change the future production potential of land.

Two potential indirect positive agricultural impacts have been identified. The first relates to increased financial security for farming operations as a result of reliable diversified income accruing to land owners directly affected by the Project through the lease agreements. The second relates to improved security at affected farms due to the presence of security infrastructure and personnel associated with the Project.

The extent to which any of these impacts is likely to actually affect levels of agricultural production is small and the significance of all agricultural impacts is therefore low (Lanz, April 2022).

Impact Assessment before mitigation: Operational Phase – Soils, Land Use and Land Capability (Agriculture)

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with or without Mitigation)	
1E	Lease Agreements with affected land owners	Increased financial security for farming operations as a result of reliable diversified income	Positive	2	2	1	4	1	16	Insignificant
1F	Presence of security infrastructure and personnel associated with the Project	Improved security at affected farms	Positive	2	2	1	4	1	16	Insignificant

Operational Phase Mitigation Measures

Identified impacts are insignificant and positive and no mitigation is required.

Pre-and post- mitigation impact significance are the same.

10.3.2.3 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 hydrocarbons and other chemicals. 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.

Conclusion of decommissioning would imply that land previously occupied by Project Infrastructure would again become available for agricultural production, if rehabilitation of the site is successful. Considering the small footprint of the Project Infrastructure over a large area, and the long-term nature of the operational phase (20+ years) the impact is considered **negligible**.

No further impact rating or management measures are deemed necessary.

10.3.3 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.

10.3.3.1 Construction Phase

During the construction phase, a temporary water supply will need to be established at construction sites. Water is available at the Komati Power Station (Usuthu Water Scheme) and negotiations with Eskom to use this water for the Project are underway. As an alternative water supply, it is possible that the Applicant could make use of existing or new boreholes. Over abstraction of groundwater can result in aquifer depletion and loss of resource for farmers (depletion of groundwater).

Also, during the construction phase, the presence of dust, eroded soil, petrochemicals or other pollutants generated during construction activities, could lead to deterioration of surface water quality if polluted runoff is allowed to enter surrounding natural environments, or to seep to groundwater.

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	As part of the construction phase, numerous sites will be graded, vegetation will be cleared, and soil will be stripped.	Deterioration in surface water quality if any surface water runoff comes into contact with dust, eroded soil, or other pollutants generated during construction. Potential spillages of Hazardous materials (i.e., sewage, cement, oil, fuel and / or grease) may negatively impact on the surrounding clean water environment if not prevented or mitigated.	Negative	5	4	3	1	3	55	Moderate
2C	Water use/abstraction of groundwater during the construction phase.	Over abstraction of groundwater for construction needs can result in aquifer depletion and loss of resource for farmers.	Negative	3	3	5	2	4	42	Moderate

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	As part of the construction phase, numerous sites will be graded, vegetation will be cleared, and soil will be stripped.	Deterioration in surface water quality: There may be a deterioration in surface water quality when any surface water runoff comes into contact with dust, eroded soil, or other pollutants generated during the construction phase of the Project. The sediment load within surface water runoff may increase or the chemistry of surface water may be altered if not prevented or mitigated. In addition, hazardous materials (i.e. sewage, cement, oil, fuel and / or grease) will be used during the construction phase of the Project. Spillages of these materials may negatively impact on the surrounding clean water environment if not prevented or mitigated.	Negative	3	4	2	1	3	30	Low
2C	Water use/abstraction of groundwater during the construction phase.	Over abstraction of groundwater for construction needs can result in aquifer depletion and loss of resource for farmers.	Negative	2	3	5	2	2	24	Low

Construction Phase Mitigation Measures

- Disturbed areas to be limited to the footprint as depicted in the layout plan (to be refined during the detailed design phase and specialist walk-downs).
- The laydown areas for the construction site must be kept as small as reasonably possible.
- All vehicle and equipment usage must be limited to designated areas only.
- Effluent from conservancy tanks is to be removed by a registered company (appointed by the EPC Contractor) and disposed of at the nearest sewage facility in accordance with the relevant national legislation.
- 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.
- Emergency spill kits must be available, and spills must be cleaned up quickly with an absorbent material.
- Treat all hydrocarbon spills as hazardous waste and dispose of accordingly.
- All mixing practices are to be conducted on impermeable surfaces.

- 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. Scheduled maintenance to be undertaken off-site at a suitable workshop. Emergency maintenance to ensure the use of drip trays.
- Store oil, and other hazardous substances in designated bunded areas able to contain 110% of the storage capacity.
- Diesel fuel storage tanks must be in accordance to SANS10131: Above-ground storage tanks for petroleum products.
- Refuelling of vehicles to take place on an impermeable surface fitted with a sump to contain any spillages.
- Identified boreholes for construction-phase water supply should be subject to pump tests overseen by a professional.
- Abstraction from boreholes to be metered, to ensure abstraction does not exceed sustainable yield.

10.3.3.2 Operational Phase

During the operational phase, the presence of compacted and/or concreted areas (roads, hardstands etc.) lead to an increase in the velocity of surface water runoff and reduced infiltration. This could cause 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.

Additionally, storage and use of potentially polluting substances associated with maintenance activities could cause pollution of water resources if spills occur or containment facilities fail.

Impact Assessment before mitigation: Operational Phase – Water Resources

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
2B	Presence of compacted and/or concreted areas (roads, hardstands etc.).	Increase in erosion occurring 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.	Negative	3	4	2	4	3	39	Low
2D	Presence and use of hazardous chemicals during the operational phase.	Storage and use of greases, lubricants etc. for maintenance purposes could lead to chemical contamination (pollution) of water resources.	Negative	3	3	3	4	4	42	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)	
2B	Presence of compacted	Increase in erosion occurring along all concrete and / or heavily	Negative	2	4	1	4	3	24	Low

	and/or concreted areas (roads, hardstands etc.).	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.								
2D	Presence and use of hazardous chemicals during the operational phase.	Storage and use of greases, lubricants etc. for maintenance purposes could lead to chemical contamination (pollution) of water resources.	Negative	2	3	3	4	3	26	Low

Operational Phase Mitigation Measures

- Construct bund walls with a collection sump to collect and contain hazardous materials around all areas where such materials are being stored.
- Workshops surfaces must be concrete lined and sloped so that hazardous substances can drain towards the collection sump from where it can be removed by a registered hazardous waste management company and be disposed of in accordance with the relevant national legislation.
- Construct multiple culverts along the access roads in strategic locations to ensure effective drainage of surface runoff towards the receiving environment.
- Storm water is to be diverted from all access roads through the use of mitre drains and gaps in the roadside berms to disperse runoff and to prevent the concentrating of storm water flow.
- Erosion prevention measures must be implemented along concrete and / or heavily compacted surface areas, culvert inlets / outlets and potential storm water channels. These measures may include gabions, rockery and/or vegetation growth to stabilise the surrounding soils.
- Develop and implement a maintenance schedule to ensure the integrity and functionality of all storm water management measures are maintained at all times.

10.3.3.3 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 water quality if spills/leaks of hydrocarbons and chemicals are allowed to affect 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)	
2E	As part of decommissioning, infrastructure will be removed and previously	There may be a deterioration in surface water quality when any surface water runoff	Negative	5	4	3	1	3	55	Moderate

	compacted areas ripped. Decommissioning activities are also associated with the presence of hydrocarbons and other chemicals on site.	comes into contact with dust, eroded soil, or other pollutants. The sediment load within surface water runoff may increase or the chemistry of surface water may be altered.								

Impact Assessment after mitigation: Decommissioning Phase – Water Resources

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
2E	As part of decommissioning, infrastructure will be removed and previously compacted areas ripped. Decommissioning activities are also associated with the presence of hydrocarbons and other chemicals on site.	There may be a deterioration in surface water quality when any surface water runoff comes into contact with dust, eroded soil, or other pollutants. The sediment load within surface water runoff may increase or the chemistry of surface water may be altered.	Negative	2	4	2	1	1	16	Insignificant

Decommissioning Phase Mitigation Measures

- Affected areas to be kept as small as reasonably possible.
- All vehicle and equipment usage must be limited to designated areas only.
- 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.
- 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).
- Emergency spill kits must be available, and spills must be cleaned up quickly with an approved absorbent material.
- Regular maintenance must be conducted on all vehicles and equipment used during the decommissioning phase to ensure they are always in a good working order. Scheduled maintenance to be undertaken off-site in designated facilities. Emergency maintenance on site must use drip trays.
- Refuelling of vehicles to take place on an impermeable surface fitted with a sump to contain any spillages.
- Facilities designed for containment of accidental spills are to be removed from site only once the pollution source has been decommissioned and removed.

10.3.4 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 (Burton, May 2022). As certain Project infrastructure unavoidably overlaps with delineated wetlands, impact significance will be influenced by the sensitivity of the affected wetlands.

10.3.4.1 Construction Phase

The most likely construction-related impacts are the loss of wetland habitat through the clearing of wetland for construction of roads, electrical cables and electrical powerlines (Burton, May 2022). For this Project, all turbines, substation and BESS, laydown areas have been designed and placed outside of delineated wetlands. Some of the internal roads and cables unavoidably cross over or occur within regulated zones of delineated wetlands.

Additionally, potential hydrocarbon and concrete spills from construction activities within wetland areas could potentially lead to soil, water and wetland contamination (Burton, May 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	Construction of roads, pipelines and power cables will result in destruction of wetlands where these overlap the development footprint.	Wetland Destruction: 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	4	4	3	5	3	60	High
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.	Wetland degradation by pollution: Contamination from hydrocarbons and chemicals (lubricants, oils, explosives, and fuels); Contamination from waste, sewage and wastewater; and Changes to wetland health and biodiversity.	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	Construction of roads, pipelines and power cables will result in destruction of wetlands where these overlap the development footprint.	Wetland Destruction: 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	3	4	1	36	Low
3B	Construction activity and the use and storage of lubricants, oils, explosives, and fuels, presence of sanitation facilities during construction.	Wetland degradation by pollution: Contamination from hydrocarbons and chemicals (lubricants, oils, explosives, and fuels); Contamination from waste, sewage and wastewater; and Changes to wetland health and biodiversity.	Negative	2	4	4	3	2	26	Low

Construction Phase Mitigation Measures

- Disturbance within wetlands and their regulated zones, outside of approved development areas as per the approved layout (as refined in the pre-construction walk downs) must be minimised by demarcating them as no-go areas on the ground so that workers do not inadvertently damage wetlands by construction, foot traffic of vehicular movement.
- Where wetlands are affected by construction (as per the layout), these areas must be rehabilitated immediately following construction.
- Where new road crossings have been designed, these roads will cross wetland or river features at the narrowest point and a 90-degree angle with suitable drainage designed into the relevant bridge/culvert crossing.
- Design and implement a stormwater management plan that diverts stormwater runoff away from the planed surface infrastructure and back into natural watercourses, to maintain catchment yield as far as possible.
- Implement effective erosion control at discharge points, to prevent erosion and sedimentation at diversion and discharge points.
- No vehicles or heavy machinery will be allowed to drive indiscriminately within any wetland areas or their buffer areas. All vehicles must remain on demarcated roads.
- 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 must be monitored to ensure no runoff, erosion and sedimentation into the adjacent areas, especially the wetlands and freshwater systems.
- Stockpile wetland soils separately.
- All vehicle maintenance must occur within designated areas (scheduled maintenance to be undertaken off-site, emergency maintenance to use drip trays).

- All vehicles must be regularly maintained and inspected for leaks.
- All spills must be cleaned up immediately.
- Chemicals, such as paints and hydrocarbons, must be used and stored as per each chemical's specific storage descriptions and health and safety requirements.
- Re-fuelling and maintenance of vehicles and machinery must take place on a sealed surface area away from wetlands.
- The edge of the wetlands that are not affected by the approved layout, and a 100m buffer or 1:100 flood line buffer from these wetlands must be demarcated in the field with wooden stakes painted white as no-go zones that will last for the duration of the construction phase.

10.3.4.2 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 lead to soil, water and wetland contamination (Burton, May 2022).

The presence of roads especially at culverts could lead to head cut erosion and channel forming, and increased erosion and consequently sedimentation potential into wetlands (Burton, May 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); Increased erosion and consequently sedimentation potential into wetlands; Loss of vegetation and habitat; and Wetland fragmentation.	Negative	3	4	4	5	3	48	Moderate
3D	Hydrocarbon and Waste Spills	Contamination from hydrocarbons and chemicals (lubricants, oils explosives, and fuels); Contamination from waste, sewage and wastewater; 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); 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); Contamination from waste, sewage and wastewater; and Changes to wetland health and biodiversity.	Negative	2	4	4	3	2	26	Low

Operational Phase Mitigation Measures

- All areas of increased ecological sensitivity outside of the approved development footprints are to be designated as "No-Go" areas and be off-limits to all unauthorised vehicles and personnel. Demarcate these areas in consultation with the Land Owner, where feasible.
- Quarterly (four times a year) inspections by the site ECO to ensure no unnecessary impact to the freshwater resources present, and if so that a remedy is put in place as soon as possible.
- No vehicles or heavy machinery will be allowed to drive indiscriminately within any wetland areas or their buffer areas. All vehicles must remain on demarcated roads
- All vehicles must be regularly maintained and inspected for leaks.
- All vehicle maintenance must occur within designated areas (Scheduled maintenance to occur off-site, emergency maintenance must use appropriate drip trays).
- All spills must be cleaned up immediately.
- Chemicals, such as paints and hydrocarbons, must be used and stored as per each chemical's specific storage descriptions and health and safety requirements. MSDS to be kept on site.
- Re-fuelling and maintenance must take place on an impervious surface area away from wetlands.
- Culverts, roads and river crossings must be maintained and cleared by the Operations and Maintenance (O&M) Contractor as required. The O&M Environmental Officer will monitor maintenance requirements monthly and/or after heavy rains.

10.3.4.3 Decommissioning Phase

During the decommissioning phase, the most likely impacts will again be related to the loss and disturbance of wetland habitat during the removal of infrastructure, and the possible spillage of chemicals, hydrocarbons and other pollutants into wetland areas (Burton, May 2022).

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 profiling and landscaping (re-vegetation) of the affected land.	Uneven surfaces and topographies, causing water ponding and changes to the hydrogeomorphology of the wetlands; The proliferation of alien invasive plant species (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, and other pollutants thus contamination of wetlands.	Negative	4	4	3	4	3	56	Moderate

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
3F	Monitoring and rehabilitation.	Minimal negative impacts on the environment; and Wetland and AIPs Monitoring Plan.	Negative	3	4	3	2	2	33	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 profiling and landscaping (re-vegetation) of the affected land.	Uneven surfaces and topographies, causing water ponding and changes to the hydrogeomorphology of the wetlands; The proliferation of alien invasive plant species (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, and other pollutants thus contamination of wetlands.	Negative	3	4	3	3	3	39	Low
3F	Monitoring and rehabilitation.	Failure to implement the necessary monitoring plans may result in proliferation of AIPs and other impacts to wetlands	Negative	2	4	3	2	1	20	Low

Decommissioning Phase Mitigation Measures

- Decommissioning activities to be undertaken in the dry season if feasible, to avoid high rainfall events that could lead to increased runoff, erosion, contamination and sedimentation of the wetlands.
- Rehabilitated areas are to be made free-draining.
- Stormwater management measures must remain in place during decommissioning, and be rehabilitated last.
- All areas of increased ecological sensitivity outside of the development footprint are to be designated as "No-Go" areas and be off-limits to all unauthorised vehicles and personnel.
- No vehicles or heavy machinery will be allowed to drive indiscriminately within any wetland areas or their buffer areas. All vehicles must remain on demarcated roads.
- 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 Monitoring and Management Plan for the duration of the decommissioning phase.
- Wetland monitoring must be carried out after the decommissioning phase to ensure the success of wetland rehabilitation (once-off wetland functionality assessment).

10.3.5 Terrestrial Ecology

Areas of the site that still contain natural vegetation are considered to have high conservation value due to the conservation status of the Eastern Highveld Grassland.

These grasslands' species composition includes a high number of resprouting sub-terranean species, contributing significantly to species richness. Secondary grassland that develops in previously cleared areas (for example, cultivated lands) usually develop a perennial grass cover, but the resprouting component of the flora almost never recovers (Hoare, May 2022). Thus, clearing of grassland vegetation, even for temporary infrastructure, results in permanent loss of the local species composition, and is therefore considered a permanent impact.

No physical, on-site impacts to terrestrial ecology occur during the design phase of a project, although this is perhaps the phase where the implementation of pro-active management and mitigation measures can be most effective, as the design phase allows for avoidance of impacts, by avoidance of sensitive features and habitats when locating infrastructure, and placement of infrastructure in areas that have already been disturbed.

10.3.5.1 Construction Phase

All infrastructure components will require clearing of vegetation prior to construction.

Habitat loss refers to physical disturbance of habitats through clearing, grading and other loss or degradation. Loss of habitat on site could lead to loss of biodiversity as well as habitat important for the survival of populations of various species (Hoare, May 2022).

Habitat fragmentation will occur primarily through the construction of roads, but is due to any effect that splits continuous areas of vegetation into smaller parcels (Hoare, May 2022). It is noted that the existing habitat on site and in the wider area is already fragmented due to the presence of roads, farm fences and in some instances, mining infrastructure like conveyors.

Edge effects related to roads are difficult to quantify or predict, but anything within 50 m of a road is almost certain to be affected by the changed physical conditions (Hoare, May 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	Loss and/or fragmentation of indigenous natural vegetation.	Negative	5	3	3	5	1	60	High
4B	Development within Critical Biodiversity Areas (CBAs)	Impact on integrity of Critical Biodiversity Areas	Negative	5	3	3	5	1	60	High
4C	General disturbance associated with construction activities, vegetation clearance, earthworks etc.	Establishment and spread of declared weeds and alien invader plants.	Negative	3	2	2	1	2	21	Low
4D	Clearing of vegetation, construction of hard surfaces and compaction of surfaces.	Increased runoff and erosion	Negative	4	1	2	1	2	24	Low

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	Loss and/or fragmentation of indigenous natural vegetation.	Negative	5	2	2	5	1	50	Moderate
4B	Development within Critical Biodiversity Areas (CBAs)	Impact on integrity of Critical Biodiversity Areas	Negative	5	3	2	5	1	55	Moderate
4C	General disturbance associated with construction activities, vegetation clearance, earthworks etc.	Establishment and spread of declared weeds and alien invader plants.	Negative	2	1	1	1	1	8	Insignificant
4D	Clearing of vegetation, construction of hard surfaces and compaction of surfaces.	Increased runoff and erosion	Negative	3	1	1	1	1	12	Insignificant

Construction Phase Mitigation Measures

- Restrict impact to development footprint only and limit disturbance creeping into surrounding areas.
- Compile and implement a Rehabilitation Plan immediately following construction.
- Access to sensitive areas should be limited during construction, by demarcating the construction / activity footprint areas, and sensitising workers not to access adjacent areas unnecessarily.
- Compile an Alien Plant Management Plan, including monitoring, which highlights control priorities and areas and provides a programme for long-term control.
- Undertake regular monitoring to detect alien invasions early so that they can be controlled.
- Compile and implement a stormwater management plan.
- Where possible, access roads should be located along existing farm and district roads (as per the current layout design, to be confirmed / optimized in the detailed design phase).
    - Keep gradients of roads adequately low to minimise erosion.
    - Align roads to avoid steep slopes and avoid the necessity for significant cuts and fills.
- Monitor road surfaces for erosion and repair or upgrade, where necessary.

10.3.5.2 Operational Phase

During the operational phase, normal activities associated with the operational wind farm will occur, along with scheduled maintenance, emergency maintenance and monitoring activities. Continued disturbance of natural habitats could occur as a result of these activities.

Impact Assessment before mitigation: Operational Phase – Terrestrial Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
4E	General operational activities, scheduled and emergency maintenance activities.	Sporadic unforeseen disturbance to natural habitats e.g. accidental	Negative	5	2	2	5	2	55	Moderate

		fires, driving off-road, dumping etc.								
4F	The presence of disturbed surfaces on site creates ecological edges and corridors along which alien species can travel and become established.	Establishment and spread of declared weeds and alien invader plants.	Negative	3	4	4	5	3	48	Moderate
4G	Cleared areas, presence of hard compacted and constructed surfaces.	Increased runoff volumes and velocity, resulting in erosion, and subsequent siltation of downstream areas, loss of soil.	Negative	3	2	3	5	1	33	Low

Impact Assessment after mitigation: Operational Phase – Terrestrial Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
4E	General operational activities, scheduled and emergency maintenance activities.	Sporadic unforeseen disturbance to natural habitats e.g. accidental fires, driving off-road, dumping etc.	Negative	3	2	1	5	1	27	Low
4F	The presence of disturbed surfaces on site creates ecological edges and corridors along which alien species can travel and become established.	Establishment and spread of declared weeds and alien invader plants.	Negative	2	2	2	2	2	16	Insignificant
4G	Cleared areas, presence of hard compacted and constructed surfaces.	Increased runoff volumes and velocity, resulting in erosion, and subsequent siltation of downstream areas, loss of soil.	Negative	3	2	2	5	1	30	Low

Operational Phase Mitigation Measures

- Restrict impact to development footprint only and limit disturbance from operational and maintenance activities creeping into surrounding areas.
- Monitor the success of the rehabilitation plan in areas where construction was undertaken, and surrounding areas, and intervene as necessary.
- Access to sensitive areas should be limited during operations and maintenance, by demarcating the activity footprint areas, and sensitising workers not to access adjacent areas unnecessarily.
- Implement the Alien Plant Management Plan, which 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 based on monitoring results to enable adaptive management in terms of alien invasive plant control.
- Implement the stormwater management plan.
- Monitor road surfaces for erosion and repair or upgrade, where necessary.

10.3.5.3 Decommissioning Phase

The anticipated project lifespan is in excess of 20 years. It is not possible to know at present whether the site will be fully decommissioned at this time, or whether refurbishment of the

Project would be preferable. It is recommended that a closure and rehabilitation plan be compiled near to the stage but in advance of when decommissioning is planned, and that this would be required to be implemented prior to closure of the project.

Impact Assessment before mitigation: Decommissioning Phase – Terrestrial Ecology

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
4H	Removal of infrastructure	Disturbance of natural habitat during infrastructure removal	Negative	3	1	1	5	1	24	Low
4I	The presence of disturbed surfaces on site creates ecological edges and corridors along which alien species can travel and become established.	Continued establishment and spread of declared weeds and alien invader plants	Negative	3	2	2	5	2	33	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)	
4H	Removal of infrastructure	Disturbance of natural habitat during infrastructure removal	Negative	2	1	1	5	1	16	Insignificant
4I	The presence of disturbed surfaces on site creates ecological edges and corridors along which alien species can travel and become established.	Continued establishment and spread of declared weeds and alien invader plants	Negative	2	1	1	5	2	18	Insignificant

Decommissioning Phase Mitigation Measures

- Restrict impact to infrastructure footprint only and limit disturbance creeping into surrounding areas.
- As far as possible, locate new activities associated with decommissioning (new temporary laydown sites, stockpiling sites for components to be removed, contractor's yard etc.) within areas that have been previously disturbed or in areas with lower sensitivity scores.
- Avoid sensitive features and habitats during activities, by demarcating approved footprints and preventing workers from accessing adjacent areas.
- Compile a Rehabilitation Plan as part of decommissioning planning.
- Only use existing access, farm and district roads.
- Undertake monitoring of the success of rehabilitation (two seasons after decommissioning is complete is recommended) to evaluate whether further measures would be required to manage impacts.
- Update the Alien Plant Management Plan (that was implemented during the operational phase), and implement it during decommissioning, to ensure minimal impacts on surrounding areas.
- Monitor the establishment of alien invasive plant species during decommissioning activities, and implement control as per the Alien Invasive Management Plan.

10.3.6 Bats

As discussed in Section 8.8, numerous bat species have been confirmed on site and are expected to occur in the development area. Some of these species are of special importance based on their likelihood of being impacted by the proposed Project, due to high abundances and certain behavioural traits. They have also been dominating records of fatalities at wind energy facilities in South Africa. The relevant species include:

- Egyptian free-tailed bat, *Tadarida aegyptiaca*, (Least Concern)
- Cape serotine, *Laephotis capensis* (formerly *Neoromicia capensis*) (Least Concern)
- Natal long-fingered bat, *Miniopterus natalensis,* (Least Concern)

10.3.6.1 Construction Phase

During the construction phase, vegetation clearance will lead to the loss of foraging habitat for bats. Earthworks, blasting and vegetation clearance can also lead to the destruction of bat roosts (including roosts in clumps of trees).

Impact Assessment before mitigation: Construction Phase – Bats

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
6A	Vegetation clearance	Loss of bat foraging habitat by clearing of vegetation.	Negative	5	3	3	2	2	50	Moderate
6B	Earthworks (incl. blasting if required), diggings and levelling	Bat roost destruction during earthworks. Including bat roosts in clumps of trees.	Negative	4	4	4	2	2	48	Moderate

Impact Assessment after mitigation: Construction Phase – Bats

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
6A	Vegetation clearance	Loss of bat foraging habitat by clearing of vegetation.	Negative	4	2	2	2	2	32	Low
6B	Earthworks (incl. blasting if required), diggings and levelling	Bat roost destruction during earthworks. Including bat roosts in clumps of trees.	Negative	2	4	4	2	2	24	Low

Construction Phase Mitigation Measures

- Turbine base points must be a blade length away from the high bat sensitivity buffer edge.

10.3.6.2 Operational Phase

During the operational phase, the turning turbine blades can cause bat mortalities by collision or by bats suffering barotrauma.

Cave ecosystems rely on bats for ecological energy input, since no sunlight exists in caves. Therefore, bat mortalities from turbines during migrations between caves will influence cave ecosystems and biota inside caves.

Floodlights and other lights at turbine bases or nearby infrastructure, will attract insect-eating bats and therefore significantly increase the likelihood of these bats being impacted on by moving turbine blades.

Additionally, habitat creation in the roofs of nearby buildings can cause a similar increased risk factor.

Impact Assessment before mitigation: Operational Phase – Bats

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
6C	Turbine blades turning	Foraging bats can be killed by colliding with turbine blades, or by suffering barotrauma.	Negative	5	4	5	4	3	80	Significant
6D	Turbine blades turning	Bat mortalities during migration and subsequent effect on cave ecosystems and biota.	Negative	4	5	5	4	4	72	High
6E	Artificial lighting or roost creation at nearby buildings and/or turbine bases.	Floodlights and other lights at turbine bases or nearby buildings, as well as habitat creation in the form of roofs of nearby buildings will attract bats to site, which will increase the likelihood of bats beings impacted on by moving blades.	Negative	5	4	5	4	2	75	High

Impact Assessment after mitigation: Operational Phase – Bats

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
6C	Turbine blades turning	Foraging bats can be killed by colliding with turbine blades, or by suffering barotrauma.	Negative	4	4	2	4	3	52	Moderate
6D	Turbine blades turning	Bat mortalities during migration and subsequent effect on cave ecosystems and biota.	Negative	2	5	4	4	4	34	Low
6E	Artificial lighting or roost creation at nearby buildings and/or turbine bases.	Floodlights and other lights at turbine bases or nearby buildings, as well as habitat creation in the form of roofs of nearby buildings will attract bats to site, which will increase the likelihood of bats beings impacted on by moving blades.	Negative	2	4	2	4	2	24	Low

Operational Phase Mitigation Measures

- Conduct a minimum of 2 years operational bat mortality monitoring study.
- The required and most effective method of mitigation can be determined from pre-construction acoustic bat activity data, climatic data and the results from the operational bat mortality monitoring. The latter monitoring will determine the need for mitigation and if necessary, the specific turbines to be mitigated. Mitigation Options (to be confirmed and implemented based on results of Operational Monitoring) include:
    - Curtailment that increases cut-it speed: Bat mortality has been shown to increase where bats fly in wind speeds above the turbine manufacturer's cut in speed. In such events, the turbine's computer control system (referred to as the Supervisory Control and Data Acquisitions or SCADA system) can be programmed to a cut-in speed higher than the manufacturer's set speed. The new cut-in speed (mitigation cut-in speed) can be determined from studying the relation of long term (12-month) bat activity patterns with wind speed. In

such a case the turbines are curtailed by means of blade feathering, to render the blades motionless in wind speeds below the mitigation cut-in speed.
    - Curtailment to prevent freewheeling: Free-wheeling occurs when the blades are rotating in wind speeds below the manufacturer's cut-in speed, resulting in blade momentum being maintained without any electricity being produced. Higher numbers of bats are expected to be impacted upon in times of low wind speeds, as bat activity tends to be negatively correlated with wind speed, and free-wheeling is also associated with lower wind speeds. If turbine blades are feathered below the manufacturer's cut-in speed, to prevent free-wheeling, it can result in a reduction of bat mortalities with minimal energy production loss.
    - Consideration of acoustic bat deterrents, as the technology is developed and proven.
    - Minimising light pollution on site.
- Lights should be down hooded and fitted with low sensitivity motion sensors that switch off automatically when no persons are nearby, to prevent the creation of regular insect gathering pools. This will be at turbine bases (if applicable) and other infrastructure buildings.
- For buildings, avoid tin roofs and roof structures that offer entrance holes into the roof cavity.

10.3.6.3 Decommissioning Phase

No significant impacts on bats are identified for the decommissioning phase (Animalia, April 2022) (Appendix F 8).

10.3.7 Avifauna

The effects of a wind farm on birds are highly variable and depend on a wide range of factors, including the specification of the development, the topography of the surrounding land, the habitats affected and the number and species of birds that are present (Van Rooyen & Froneman, April 2022).

The principal areas of concern with regard to effects of Wind Energy Facilities and related infrastructure on birds include mortality and displacement (due to different reasons), and these are discussed in the subsections that follow.

10.3.7.1 Construction Phase

General ecological disturbance associated with construction could result in displacement of priority avifauna, specifically ground nesting species in the remaining grasslands, wetlands and wetland fringes. Some species might be able to recolonise the area after the completion of the construction phase, but for some species, this might only be partially the case, resulting in lower densities than before (Van Rooyen & Froneman, April 2022).

Displacement of priority species is also expected to occur due to habitat transformation and fragmentation in the construction phase.

The following species could be impacted by disturbance during the construction phase: African Grass Owl, Blue Korhaan, Denham's Bustard, Grey Crowned Crane, Grey-winged Francolin, 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)	
7A	Construction of the turbines and associated infrastructure	Displacement of priority avifauna due to disturbance associated with the construction	Negative	5	4	4	2	2	60	High
7B	Construction of the turbines and associated infrastructure	Displacement of priority species due to habitat transformation associated with construction	Negative	4	3	3	5	2	52	Moderate

Impact Assessment after mitigation: Construction Phase – Avifauna

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
7A	Construction of the turbines and associated infrastructure	Displacement of priority avifauna due to disturbance associated with the construction	Negative	4	4	4	2	1	44	Moderate
7B	Construction of the turbines and associated infrastructure	Displacement of priority species due to habitat transformation associated with construction	Negative	3	3	3	5	2	39	Low

Construction Phase Mitigation Measures

- The 33kV medium voltage cables should be buried as far as possible. Overhead lines should only be considered if technical constraints to trenching are present.
- A bird-friendly pole design must be employed for all 33kV overhead lines. The avifaunal specialist must approve the final design.
- All internal medium voltage lines must be marked with Bird Flight Diverters according to the Eskom standard.
- 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.
- Maximum use should be made of existing access roads and the construction of new roads are to be kept to a minimum, as reflected in the current layout.
- Micro-siting during the detailed design phase must ensure a 100m turbine exclusion zone around wetlands, dams and pans. Other infrastructure must be limited as far as possible to prevent displacement of African Grass Owl, as reflected in the current layout.
- A 200m turbine exclusion zone applies around selected wetlands (see Avifauna Sensitivity Map in Plan 13), as reflected in the current layout. Other infrastructure must be limited as far as possible to prevent displacement of African Grass Owl and Grey Crowned Crane.

10.3.7.2 Operational Phase

Once the Wind Turbines are operational, collision mortality of priority species is the most significant anticipated impact. Species exposed to this risk are large terrestrial species and occasional long-distance fliers (Van Rooyen & Froneman, April 2022).

While the intention is to establish the electrical cables between turbines underground, it is expected that this would not be possible in all areas due to technical restrictions, and some overhead medium voltage reticulation lines are expected, which could pose collision and/or electrocution risk to avifauna.

The following priority species with a medium to high chance of occurring at the development area could be at risk of collisions with the turbines: Amur Falcon, Black-winged Kite, Common Buzzard, Lanner Falcon, Grey-winged Francolin, Marsh Owl, Southern Bald Ibis, Spotted Eagle-Owl, Blue Korhaan, Denham's Bustard, Secretarybird, White Stork, African Grass Owl, African Harrier-Hawk, Black Sparrowhawk and Grey Crowned Crane (Van Rooyen & Froneman, April 2022).

Species that are most at risk of electrocution or collisions with the medium-voltage network include Grey Crowned Crane, Marsh Owl, Southern Bald Ibis, Spotted Eagle-Owl, Blue Korhaan, Denham's Bustard, Greater Flamingo, Lesser Flamingo, Secretarybird, White Stork, Yellow-billed Stork and African Grass Owl.

Impact Assessment before mitigation: Operational Phase – Avifauna

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
7C	Operation of the wind turbines	Collision mortality of priority species	Negative	5	4	3	5	3	75	High
7D	Medium voltage overhead lines	Electrocution mortality from medium voltage reticulation lines	Negative	4	4	4	4	3	60	High
7E	Medium voltage overhead lines	Collision mortality from medium voltage reticulation lines	Negative	4	4	4	4	3	60	High

Impact Assessment after mitigation: Operational Phase – Avifauna

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
7C	Operation of the wind turbines	Collision mortality of priority species	Negative	4	4	3	5	2	56	Moderate
7D	Medium voltage overhead lines	Electrocution mortality from medium voltage reticulation lines	Negative	3	4	3	3	2	36	Low
7E	Medium voltage overhead lines	Collision mortality from medium voltage reticulation lines	Negative	3	4	3	3	2	36	Low

Operational Phase Mitigation Measures

- Live-bird monitoring to be implemented in the operational phase, as per the most recent edition of the Best Practice Guidelines at the time to compare the abundance of avifauna during the pre-construction monitoring with the abundance post-construction. Operational monitoring to be implemented for a minimum of two years, and then again in Year 5 and every fifth year after that.

10.3.7.3 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 the wind turbines and associated infrastructure.

Impact Assessment before mitigation: Decommissioning Phase – Avifauna

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
7F	Dismantling of the turbines and associated infrastructure	Displacement of priority avifauna due to disturbance associated with the dismantling of the wind turbines and associated infrastructure.	Negative	5	4	4	2	2	60	High

Impact Assessment after mitigation: Decommissioning Phase – Avifauna

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
7F	Dismantling of the turbines and associated infrastructure	Displacement of priority avifauna due to disturbance associated with the dismantling of the wind turbines and associated infrastructure.	Negative	4	4	3	2	2	44	Moderate

Decommissioning Phase Mitigation Measures

- Dismantling 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.

10.3.8 Air and Noise

Typical impacts of WEFs on air quality are restricted to the construction and decommissioning phases as there are no significant emissions associated with the WEF operations.

The proposed Project will impact on existing ambient noise levels throughout all phases of development as discussed below.

10.3.8.1 Construction Phase

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. Atmospheric pollutants associated with construction activities are typically Total Suspended Particulates (TSP), Particulate Matter (PM_{10} and $PM_{2.5}$) with lesser contributions from vehicle exhausts.

Similarly, noise from construction equipment, material supply, drilling and blasting and construction traffic are expected to alter the baseline noise conditions during the construction phase.

The Environmental Noise Impact Assessment (EARES, April 2022) assumed a worst-case scenario, where the impact of the noisiest activity (laying of foundation totalling 113.6 dBA

cumulative noise impact – various equipment operating simultaneously) at all locations (over the full daytime period of 16 hours) where wind turbines and associated infrastructure are to be constructed, calculating how this may impact on noise levels at potential noise-sensitive developments. Noise created due to linear activities (roads – construction traffic) were also evaluated and plotted against distance.

Considering the ambient sound level measurements collected in the area, the following is noted:

- daytime sound levels could range between 41.9 (average impulse-weighted equivalent value) and 38.0 dBA (arithmetic fast-weighted average) at the quietest location.
- night-time sound levels could range between 34.4 (average impulse-weighted equivalent value) and 31.4 dBA (arithmetic fast-weighted average) at the quietest location.
- Based on the Model, neither daytime or night-time construction activities are expected to change the existing ambient sound levels with more than 7 dB.

Impact Assessment before mitigation: Construction Phase – Air and Noise

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
8A	Land clearing, drilling, and blasting, ground excavation, cut and fill operations and the movement of heavy construction vehicles on dirt roads	Dust and Emissions (deterioration of air quality)	Negative	5	4	3	1	3	55	Moderate
8B	Daytime Construction Activities	Daytime construction activities potentially increasing the existing ambient sound levels by more than 7 dB (All Noise Sensitive Receptors considered in Model).	Negative	2	3	3	1	3	20	Low
8C	Night time Construction Activities	Night time construction activities potentially increasing the existing ambient sound levels by more than 7 dB (All Noise Sensitive Receptors considered in Model, Receptor 28 will experience very high impact magnitude, but this represents the Halfgewonnen Mine offices and not a sensitive receptor.)	Negative	2	3	4	1	3	22	Low
8D	Construction and upgrading of access and internal roads	Increase in ambient noise levels from road construction activities.	Negative	2	3	4	1	3	22	Low

Impact Assessment after mitigation: Construction Phase – Air and Noise

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
8A	Land clearing, drilling, and blasting, ground excavation, cut and fill operations and the movement of heavy construction vehicles on dirt roads	Dust and Emissions (deterioration of air quality)	Negative	5	4	1	1	1	35	Low
8B	Daytime Construction Activities	Daytime construction activities potentially increasing the existing ambient sound levels by more than 7 dB (All Noise Sensitive Receptors considered in Model).	Negative	2	3	3	1	3	20	Low
8C	Night time Construction Activities	Night time construction activities potentially increasing the existing ambient sound levels by more than 7 dB (All Noise Sensitive Receptors considered in Model, Receptor 28 will experience very high impact magnitude, but this represents the Halfgewonnen Mine offices and not a sensitive receptor.)	Negative	2	3	4	1	3	22	Low
8D	Construction and upgrading of access and internal roads	Increase in ambient noise levels from road construction activities	Negative	2	3	4	1	3	22	Low

Construction Phase Mitigation Measures

- Limit the duration of the construction phase to as short a timeframe as possible.
- Where possible, minimise the area under construction.
- 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 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.
- If construction necessitates blasting, inform nearby residences and road users of planned blasting activities ahead of time.
- Once construction is complete, initiate rehabilitation (e.g. re-vegetation) procedures to reduce exposed surfaces from where dust could emanate. Rehabilitation must be implemented concurrently.
- When construction activities are required closer than 1km from an NSR at night, limit construction activities to as few as possible locations at a time, and minimise active equipment at night, planning the completion of noisiest activities (such a pile driving, rock breaking and excavation) during the daytime period.

10.3.8.2 Operational Phase

No atmospheric emissions are expected to result from the operational phase.

Noise emitted by wind turbines can be associated with two types of noise sources. These are aerodynamic sources due to the passage of air over the wind turbine blades and mechanical sources which are associated with components of the power train within the turbine, such as the gearbox and generator and control equipment for yaw, blade pitch, etc. In addition, there are other noise sources of lower levels, such as the substations and traffic (maintenance) (EARES, April 2022).

The Table below assesses the significance of night-time operational noise of the wind turbines, as it is expected to be more severe than day-time noise (due to the quiet night-time ambient noise levels recorded in the study area and receptor's need for quiet during night-time and leisure time such as weekends).

While certain components of the BESS may generate a slight hum under load, the dominant source of noise is from the fans or climate control system used to manage heat in the system and/or to maintain the BESS within its optimal operating temperature range. These BESSs however generate low noise levels, with any potential noise impact generally limited to areas within 200m of the BESS. This is an insignificant noise level and the significance of this noise will be low and is not further rated or mitigated.

Similarly, potential noise emanating from substations and transmission lines are not further assessed in detail, as the Noise Study (EARES, April 2022) (Appendix F-7) concludes that these are insignificant when compared to other operational-phase noises and WEFs.

Impact Assessment before mitigation: Operational Phase – Air and Noise

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
8E	Operation of the Wind Turbines	Increase in ambient noise levels from the wind turbines (modelled at all Noise-sensitive receptors).	Negative	2	3	3	4	4	28	Low

Impact Assessment after mitigation: Operational Phase – Air and Noise

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
8E	Operation of the Wind Turbines	Increase in ambient noise levels from the wind turbines (modelled at all Noise-sensitive receptors).	Negative	2	3	3	4	4	28	Low

Operational Phase Mitigation Measures

- The potential significance of the noise impact from operational wind turbines is low, and no specific mitigation is required.

The Noise Study (EARES, April 2022) clarifies that wind turbine manufacturers provide their equipment with control mechanisms to allow for a certain noise reduction during operation that can include:

- A reduction of rotational speed;
- The increase of the pitch angle and/or reduction of nominal generator torque to reduce the angle of attack;
- Implementation of blade technologies such as serrated edges, changing the shape of the blade tips or the edge (proprietary technologies); and
- The insulation of the nacelle.

These mechanisms are used in various ways to allow the reduction of noise levels from the wind turbines, although this may also result in a reduction of power generation.

10.3.8.3 Decommissioning Phase

The potential for a noise impact to occur during the decommissioning and closure phase will be much lower than that of the construction and/or operational phases. This is because:

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

If required, the noise levels for decommissioning can be compared with the daytime construction phase noise level and the noise impact is similar or less (EARES, April 2022).

10.3.9 Wake Effect Assessment

Through the use of the DFFE web-based environmental screening tool and GIS-based mapping sources, it is confirmed that there are no other wind energy projects within 30km radius of the development to date, except for the Hendrina North WEF Application by the same Developer.

Please refer to the Statement included in Appendix F 18.

Considering only the Hendrina North Wind Energy Facility is considered potentially affected by the Project, and both applications (Hendrina North and Hendrina South Wind Energy Facilities) are being submitted by the same Developer, should any wake effects be realised between the two WEFs, the impact thereof will be considered acceptable given both are proposed by the same Developer (via respective SPVs) and therefore loss will only be applicable to one party.

Given the above, and the negligible wake loss effects potentially applicable, no wake loss assessment is considered meaningful for this application.

10.3.10 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).

10.3.10.1 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.

Impact Assessment before mitigation: Construction Phase – Visual Impacts

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
10A	Large construction vehicles, equipment and material stockpiles. Dust emissions and dust plumes from stockpiles, bare areas and increased traffic on the gravel roads. 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	5	3	4	2	2	55	Moderate

Impact Assessment after mitigation: Construction Phase – Visual Impacts

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
10A	Large construction vehicles, equipment and material stockpiles. Dust emissions and dust plumes from stockpiles, bare areas and increased traffic on the gravel roads. 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	4	3	2	2	1	32	Low

Construction Phase Mitigation Measures

- Carefully plan to minimise the construction period and avoid construction delays.
- Position laydown areas and related storage/stockpile areas in unobtrusive positions in the landscape, where possible.
- Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.
- Vegetation clearing must take place in a phased manner.
- Make use of existing 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.
- 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.

10.3.10.2 Operational Phase

For the duration of the operational phase, infrastructure associated with the Project will alter the pre-existing visual character in the area. The wind turbines are large and likely to be visible over significant distances, although the Visual Impact Assessment (SiVEST, April 2022) has determined that visual impacts beyond 10km would be negligible. The following impact zones have been determined:

- 0 – 2km (high impact zone);
- 2km – 6km (moderate impact zone);
- 6km - 10km (low impact zone).

Potential alteration of the night time visual environment as a result of operational and security lighting as well as navigational lighting on top of the wind turbines have also been considered in the assessment.

Impact Assessment before mitigation: Operational Phase – Visual Impacts

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
10B	Presence of the Wind Turbines and Associated Infrastructure. Security and operational lighting at the WEF at night.	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	5	2	2	4	3	55	Moderate

Impact Assessment after mitigation: Operational Phase – Visual Impacts

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
10B	Presence of the Wind Turbines and Associated Infrastructure. Security and operational lighting at the WEF at night.	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	5	2	2	4	3	55	Moderate

Operational Phase Mitigation Measures

- Turbine colours must adhere to CAA requirements.
- Inoperative turbines are to be repaired promptly, as turbines are considered more visually appealing when the blades are rotating (or at work).
- If turbines need to be replaced for any reason, they should be replaced with the same model, or one of equal height and scale to lessen the visual impact.
- Where vegetation must be cleared for maintenance purposes, ensure the minimum required area is cleared.
- Ensure that dust suppression techniques are implemented on all gravel access roads.
- As far as possible, limit the amount of security and operational lighting present on site.

- As far as possible, limit the number of maintenance vehicles which are allowed to access the site.
- 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.
- Where possible, the operation and maintenance buildings (O&M) must be consolidated to reduce visual clutter.
- The O&M buildings must be painted in natural tones that fit with the surrounding environment.
- Non-reflective surfaces should be used where possible.

10.3.10.3 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 Impacts

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
10C	Vehicles and equipment involved in decommissioning. Infrastructure remaining on site after decommissioning.	Visual intrusion caused by vehicles and equipment, dust, and remaining infrastructure.	Negative	4	2	4	2	2	40	Moderate

Impact Assessment after mitigation: Decommissioning Phase – Visual Impacts

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
10C	Vehicles and equipment involved in decommissioning. 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

Decommissioning Phase Mitigation Measures

- All infrastructure that is not required post-decommissioning 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.
- Materials and components awaiting removal must be stockpiled neatly.
- 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.

10.3.11 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.

10.3.11.1 Construction Phase

The total impact on production/business sales is likely to equate to R 12,2 billion (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 3,4 billion and create 300 FTE employment positions over the period of 24 months with the total impact on employment being 1 221 FTE employment positions. These will largely be felt through the construction sector and through the value chains associated with the construction of a wind farm (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, potential negative impacts on existing agricultural operations, and potential impacts on property and land value in the area during construction. 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 security risks and veld fire risks.

Impact Assessment before mitigation: Construction Phase – Socio-Economic

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
11A	Construction activities of the Project	Temporary increase in the GDP and production of the national and local economies during construction	Positive	5	2	4	1	5	60	High
11B	Employees need to conduct construction activities	Temporary increase employment in the national and local economies	Positive	4	2	4	1	4	44	Moderate

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
11C	Skills learned by employees during construction	Contribution to skills development in the country and local economy	Positive	3	2	3	1	4	30	Low
11D	Employees' salaries	Temporary increase in household earnings	Positive	5	2	4	1	4	55	Moderate
11E	Public spending	Temporary increase in government revenue	Positive	4	2	2	1	4	36	Low
11F	Construction activities of the Project	Negative changes to the sense of place	Negative	4	2	4	1	3	40	Moderate
11G	Construction activities on farms	Impact on the agriculture operations	Negative	4	3	3	1	2	36	Low
11H	Influx of people	Temporary increase in social conflicts, increased risk of crime and veld fires.	Negative	4	2	3	1	4	40	Moderate
11I	Increase in local traffic and migration of construction workers	Impact on economic and social infrastructure	Negative	4	2	3	1	4	40	Moderate
11J	Construction activities on farms	Impact on property and land value in the immediately affected area during construction	Negative	2	3	3	4	2	24	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)	
11A	Construction activities of the Project	Temporary increase in the GDP and production of the national and local economies during construction	Positive	5	2	5	1	5	65	High
11B	Employees need to conduct construction activities	Temporary increase employment in the national and local economies	Positive	5	2	5	1	4	60	High
11C	Skills learned by employees during construction	Contribution to skills development in the country and local economy	Positive	4	2	4	1	4	44	Moderate
11D	Employees' salaries	Temporary increase in household earnings	Positive	5	2	5	1	4	60	High
11E	Public spending	Temporary increase in government revenue	Positive	4	2	2	1	4	36	Low
11F	Construction activities of the Project	Negative changes to the sense of place	Negative	4	2	3	1	3	36	Low
11G	Construction activities on farms	Impact on the agriculture operations	Negative	4	3	2	1	2	32	Low
11H	Influx of people	Temporary increase in social conflicts, increased risk of crime and veld fires.	Negative	2	2	2	1	4	18	Insignificant
11I	Increase in local traffic and migration of construction workers	Impact on economic and social infrastructure	Negative	3	2	2	1	4	27	Low
11J	Construction activities on farms	Impact on property and land value in the immediately affected area during construction	Negative	1	3	2	4	2	11	Insignificant

Construction Phase Mitigation Measures

- Engage with local authorities and business organisations to investigate the possibility of procuring construction materials, goods and products from local suppliers where feasible, to maximise the benefits to the local economies.
- 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.
- Advertise for positions locally first.
- Recruit local labour as far as feasible, through the creation of a local skill database.
- Employ labour-intensive methods in construction where feasible.
- Sub-contract to local construction companies particularly SMMEs and BBBEE compliant enterprises where possible.
- Use local suppliers where feasible and arrange with the local SMMEs to provide transport, catering and other services to the construction crews.
- Facilitate knowledge and skills transfer between foreign technical experts and South African professionals during the pre-establishment and construction phases.
- Facilitate a broader skills development programme as part of socio-economic development commitments.
- Natural areas that are not affected by the footprint must remain as such. Efforts should also be made to avoid disturbing such sites during construction.
- Public relations (PR) campaign prior to commencement of construction to communicate to community members the construction programme, inclusive of regular updates to generate excitement in the community.
- 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 premisses.
- Ensure that any damages or losses to nearby affected farms that can be linked to the conduct of construction workers are adequately reimbursed.
- No open fires permitted on site.
- Fire extinguishers to be kept on site, and adequate training on the use thereof to be provided.
- Assign a dedicated person to deal with complaints and concerns of affected parties.
- Provide adequate signage along the access roads to warn motorists of the construction activities taking place on the site.
- Where feasible, assist the municipality in ensuring that the quality of the local social and economic infrastructure does not deteriorate through the use of social responsibility allocations.

10.3.11.2 Operational Phase

Potential economic impacts during the operation phase of the Project, as it specifically relates to the impact derived from the anticipated direct spend in the maintenance and upkeep of the facility is assessed below. This does not account for the Developer's or Applicant's mandated spend on community development projects, otherwise referred to as socio-economic development spend (SED).

The total impact on production/business sales once the project is fully operational is likely to equate to R 148,5 million (direct, indirect, and induced) per annum and will largely be spent in Mpumalanga and Gauteng. The total impact on GDP (direct, indirect, and induced) is likely to be R 90,2 million per year. It is anticipated that 25 South African based FTE employment positions will be created during the operational phase of the Project. The total impact on employment regionally will be 68 FTE employment positions which will largely be experienced in the utilities sector and other value chains associated with wind farm operations (Urban-Econ, April 2022).

During operations, negative impacts to the sense of place may result from the presence of the turbines and related infrastructure. Wind Farm operation may also interfere with agricultural operations although this impact is easily manageable and will not occur on a significant scale, as confirmed by the Agricultural Impact Assessment (Section 10.3.2, Appendix F-1).

The project will contribute to a sustainable increase in production and GDP (nationally and locally) and also contribute to sustainable employment and skills development. This in turn leads to improved standards of living for benefiting households. Sustainable rental revenue will be generated for farms where the turbines are located. Additionally, the project will lead to sustainable increase in national and local government revenue and local economic and social development benefits derived from the Project's operation.

Finally, the Project will positively contribute to a sustainable increase in electricity generation for national benefit.

Impact Assessment before mitigation: Operational Phase – Socio-Economic

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
11K	Operational Expenditure	Sustainable increase in the GDP and production of the national and local economies.	Positive	4	2	4	4	5	60	High
11L	Operational team for facility	Creation of sustainable employment positions nationally and locally	Positive	4	1	4	4	5	56	Moderate
11M	Skills learned by employees during operations	Skills development of permanently employed workers	Positive	3	1	2	4	4	33	Low
11N	Employees' salaries	Improved standards of living for benefiting households	Positive	4	3	3	4	4	56	Moderate
11O	Public spending	Sustainable increase in national and local government revenue	Positive	4	2	4	4	5	60	High
11P	Operational expenditure	Local economic and social development benefits derived from the project's operations	Positive	5	1	4	4	4	65	High
11Q	Operational expenditure	Sustainable rental revenue for farms where the wind farm is located	Positive	5	1	4	4	1	50	Moderate
11R	Wind Farm operation	Sustainable increase in electricity available for the local region and South Africa	Positive	5	1	2	4	5	60	High
11S	Presence of wind turbines	Negative changes to the sense of place	Negative	5	3	2	4	2	55	Moderate
11T	Wind Farm operation	Impact on the agriculture operations	Negative	5	4	2	4	1	55	Moderate

Impact Assessment after mitigation: Operational Phase – Socio-Economic

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
11K	Operational Expenditure	Sustainable increase in the GDP and production of the national and local economies.	Positive	4	2	5	4	5	64	High
11L	Operational team for facility	Creation of sustainable employment positions nationally and locally	Positive	4	1	5	4	5	60	High
11M	Skills learned by employees during operations	Skills development of permanently employed workers	Positive	4	1	2	4	4	44	Moderate
11N	Employees' salaries	Improved standards of living for benefiting households	Positive	4	3	4	4	4	60	High
11O	Public spending	Sustainable increase in national and local government revenue	Positive	4	2	4	4	5	60	High
11P	Operational expenditure	Local economic and social development benefits derived from the project's operations	Positive	5	1	5	4	4	70	High
11Q	Operational expenditure	Sustainable rental revenue for farms where the wind farm is located	Positive	5	1	4	4	1	50	Moderate
11R	Wind Farm operation	Sustainable increase in electricity available for the local region and South Africa	Positive	5	1	2	4	5	60	High
11S	Presence of wind turbines	Negative changes to the sense of place	Negative	3	2	2	4	2	30	Low
11T	Wind Farm operation	Impact on the agriculture operations	Negative	4	2	2	4	1	36	Low

Operational Phase Mitigation Measures

- Procure materials, goods and products required for the operation and maintenance of the facility from local suppliers as far as possible.
- Recruit local labour as far as feasible, through the skills database.
- The Applicant should establish vocational training programmes for the local labour force to promote the development of skills required by the wind energy facility and thus provide for the opportunities for these people to be employed in other similar facilities elsewhere in the future.
- When identifying enterprise development initiatives, the focus should be on creating sustainable and self-sufficient enterprises.
- In devising the programmes to be implemented, the Applicant must take into account the local Integrated Development Plans (IDP).
- The Visual Impact Assessment Report (SiVEST, April 2022) mentions several mitigations to minimise the visual impacts of the turbines – these must be implemented.
- Natural areas that are not affected by the footprint are to remain as such. Efforts should also be made to avoid disturbing such sites during operations.

10.3.11.3 Decommissioning Phase

The project 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 Project is decommissioned, the land will be rehabilitated to return it to pre-project conditions. This also means that all impacts whether positive or negative, which take place during the operational phase will cease to exist.

Some spending on the disassembly of the components and rehabilitation of land will increase the demand for construction services and other industries, resulting in similar impacts than those experienced in the construction phase, and will thus not be rated again.

However, people who were permanently employed at the facility during the operational phase will lose their jobs during the decommissioning phase.

Decommissioning Phase Mitigation Measures

No mitigation measures to address job losses during the decommissioning phase of a Project are possible (except if jobs can be retained by prolonging the life of the Project).

Skills development and work experience gained by the workforce during the operational phase may facilitate re-employment of members of the workforce at other, similar Projects, but the actual socio-economic impacts of this is not quantifiable.

10.3.12 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.

10.3.12.1 Construction Phase

During the construction phase, excavations below 5m depth may disturb fossils of the plants of the *Glossopteris* flora in the Vryheid Formation. The possibility of fossils occurring is very low, and the impact is therefore unlikely to manifest.

Heritage Resources discovered in the study area consisted of ruins (low to zero heritage significance) and graves (high heritage and social significance).

The possibility that undiscovered heritage resources exist on site cannot be excluded, and mitigation (chance-find procedure) is required to prevent impacts to heritage resources that may be uncovered during construction.

Construction of WTG15 in its current proposed location will directly impact on identified graves. The location of WTG15 must be changed to avoid impacts to the graves. Establishment of construction camp will impact on identified ruins (points 73 – 80). These ruins have low heritage significance, but impacts to them will require a destruction permit from SAHRA, unless the

construction camp can be shifted slightly to avoid impacts to the ruins. Construction camp 2 is also adjacent to identified graves, and measures must be implemented to prevent impacts to the graves.

Impact Assessment before mitigation: Construction Phase – Heritage Resources

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
12A	Excavation below 5m	Disturbance of fossils	Negative	2	5	5	5	1	32	Low
12B	Establishment of construction camp 2	Destruction of ruins at 073 - 080	Negative	5	2	3	5	2	60	High
12C	Establishment of construction camp 2	Destruction of graves at 081	Negative	4	4	5	5	3	68	High
12D	Construction of WTG15	Destruction of graves at 072A	Negative	5	5	5	5	3	90	Significant
12E	Fencing of graves for their protection / preservation	Access restriction to ancestral burial grounds	Negative	3	4	4	4	2	42	Moderate
12F	General construction activity and excavation	Destruction of or damage to heritage resources that have not yet been uncovered	Negative	2	5	5	5	1	32	Low

Impact Assessment after mitigation: Construction Phase – Heritage Resources

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
12A	Excavation below 5m	Disturbance of fossils	Negative	1	5	3	5	1	14	Insignificant
12B	Establishment of construction camp 2	Destruction of ruins at 073 - 080	Negative	1	2	3	5	2	12	Insignificant
12C	Establishment of construction camp 2	Destruction of graves at 081	Negative	1	5	5	5	3	18	Insignificant
12D	Construction of WTG15	Destruction of graves at 072A	Negative	1	5	5	5	3	18	Insignificant
12E	Fencing of graves for their protection / preservation	Access restriction to ancestral burial grounds	Negative	1	4	4	3	2	13	Insignificant
12F	General construction activity and excavation	Destruction of or damage to heritage resources that have not yet been uncovered	Negative	1	5	3	5	1	14	Insignificant

Construction Phase Mitigation Measures

- Implement the palaeontological chance-find procedure (Annexure to Appendix H) during construction.
- Implement the archaeology chance-find procedure (Annexure to Appendix H) during construction.
- Avoidance of burial sites (Waypoint 081 and 072A) with a 50 m buffer and access for family members – this implies that the location of WTG15 must be changed.
- Permit applications for destruction of ruins at Waypoint 073-080 (Construction Camp 2).

- Undertake a preconstruction heritage walkdown of final layout.
- Develop and implement an access protocol to enable family members to gain access to the graves on site.
- Include the known heritage resources and their sensitivity in the Environmental Awareness Training (refer to Section 8.3 of Appendix H) to be presented to all personnel and visitors to the Site.

10.3.12.2 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.

10.3.12.3 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 resources, or the recording and permitted destruction), 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 still be relevant for the decommissioning activities.

10.3.13 Transport and Traffic

The Transport Study (JG Afrika, April 2022) (Appendix F 16) investigated two main transportation activities associated with the Project:

- Abnormal load vehicles transporting wind turbine components to the site; and
- The transportation of construction materials, equipment and people to and from the site.

The first aspect is only relevant to the construction phase while the second aspect pertains to both the construction and operational phases, though to varying degrees. Impacts during the decommissioning phase will be similar to those experienced during construction.

10.3.13.1 Construction Phase

Wind turbine components can be transported in a number of ways with different truck / trailer combinations and configurations, which will be decided upon at a later stage by the transporting contractor and the plant hire companies, when applying for the necessary permits from the Permit Issuing Authorities. All required permits will need to be obtained prior to the commencement of construction.

It is anticipated that the components will be transported from the port of Richards Bay to the site during the construction phase. While potentially significant on a national scale, potential impacts associated with this activity will be once-off and must be carefully planned by the transportation company.

It has been estimated that for each turbine 3 abnormal loads will be required for the blades, 10 abnormal loads for the tower sections and another one (1) abnormal load for the nacelle.

All further components will be transported with normal limitation haulage vehicles. With 14 abnormal loads trips (3 trips for blades, 10 trips for tower sections and 1 trip for the nacelle), the total trips to deliver the components of 26 turbines to the proposed site will be around 364 trips (14 trips x 26 turbines). This would amount to 0.96 vehicle trips per day (364 trips / 24 months / 22 working days per month) for a construction period of 24 months. Should the turbines be delivered during an 18-month period, the vehicle trips would amount to 0.92 vehicle trips per day (JG Afrika, April 2022).

Traffic generated by the construction of the facility will have a high impact on the surrounding road network. The exact number of trips generated during construction will be determined by the contractor and the haulage company transporting the components to site, the staff requirements and where equipment is sourced from (JG Afrika, April 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)	
13A	Transport of equipment, material and staff to site.	Traffic Congestion	Negative	4	2	3	2	3	40	Moderate
13B	Transport of equipment, material and staff to site	Increased risk of road safety incidents	Negative	4	5	5	2	3	60	High

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)	
13A	Transport of equipment, material and staff to site.	Traffic Congestion	Negative	3	2	2	2	3	27	Low
13B	Transport of equipment, material and staff to site	Increased risk of road safety incidents	Negative	3	5	3	2	3	39	Low

Construction Phase Mitigation Measures

- Abnormal Load trips to be undertaken according to permit specifications (issued by the roads authorities), which would include the route, safety escort(s), warning signs etc. associated with each abnormal vehicle trip to (and returning from) site.
- The delivery of wind turbine components to the site must be staggered and trips must be scheduled to occur outside of peak traffic periods.
- Dust suppression on gravel roads during the construction (and decommissioning) phases, as required.
- Regular maintenance of gravel roads by the EPC Contractor during the construction and decommissioning phases.
- Use on-site batching plants and licensed quarries in close proximity to the site.
- Staff and general trips should occur outside of peak traffic periods as far as possible.

- Any low hanging overhead lines (lower than 5.1 m) e.g. Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles.
- The preferred route should be surveyed to identify problem areas, e.g. intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, that may require modification.
- After the road modifications have been implemented, it is recommended to undertake a "dry-run" with the largest abnormal load vehicle, prior to the transportation of any turbine components, to ensure that the delivery of the turbines will occur without disruptions. This process is to be undertaken by the haulage company transporting the components and the contractor, who will modify the road and intersections to accommodate abnormal vehicles.
- Ensure that the gravel sections of the haulage routes remain in good condition and maintain these roads during the additional loading of the construction phase.
- Regularly maintain internal gravel roads by grading with a road grader to maintain a flat, even surface.
- Use reputable and experienced transport companies with acceptable road safety statistics.

10.3.13.2 Operational Phase

The traffic generated during this phase will be minimal and will not have any impact on the surrounding road network (JG Afrika, April 2022). No mitigation or impact ratings are considered necessary.

10.3.13.3 Decommissioning Phase

This phase will have a similar impact as the Construction Phase i.e., traffic congestion, air pollution and noise pollution, as similar trips/movements are expected (JG Afrika, April 2022). It is not possible at present to confirm where the dismantled components of the WEF and associated infrastructure will be transported to after decommissioning. Viable recycling and/or disposal options will have to be investigated as part of decommissioning planning closer to the time. No mitigation or additional impact ratings are necessary, or possible at this time.

10.3.14 Waste Generation

10.3.14.1 Construction Phase

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)	
14A	Generation of general and hazardous waste including sewage waste during construction	Incorrect waste disposal leading to environmental pollution.	Negative	5	3	3	1	3	50	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)	
14A	Generation of general and hazardous waste including sewage waste during construction	Incorrect waste disposal leading to environmental pollution.	Negative	2	3	2	1	1	14	Insignificant

Construction Phase Mitigation Measures

- Provide adequate number of skips and 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 skips and 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.

10.3.14.2 Operational Phase

The operational phase of the Project won't be associated with significant waste generation, apart from limited general waste (domestic and office waste) and sewage generated by employees.

It is anticipated that a waste management contractor will be contracted for the duration of the operational phase to collect and dispose of waste generated at the site. Ideally, waste type separation at source must be practiced as this will facilitate recycling of the different waste types expected to be generated.

Conservancy tanks, to be serviced as required by a reputable contractor, will be installed to address operational phase sewage.

Waste quantities expected during operations are insignificant, with the resultant potential impacts from waste generation also being considered insignificant and no specific rating or mitigation are considered necessary.

10.3.14.3 Decommissioning Phase

During the decommissioning phase, similar waste types and quantities as experienced in the construction phase are anticipated, with the addition of redundant infrastructure being decommissioned, that will have to be disposed of (or recycled if possible).

The anticipated operational phase of the Project is a minimum of 20 years, and it is therefore not feasible at this stage to confirm the technology that may be available at the time of decommissioning to facilitate re-use or recycling of project components. It has been reported in Europe that 85 to 90% of a wind turbine's total mass can be recycled (https://windeurope.org/about-wind/wind-energy-and-the-environment/).

Impact Assessment before mitigation: Decommissioning Phase – Waste Generation

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
14B	Dismantling and disposal of turbine components and associated infrastructure	Potential failure to adequately transport components off-site and dispose / recycle components legally, resulting in illegal dumping and associated pollution.	Negative	3	3	3	5	4	45	Moderate

Impact Assessment after mitigation: Decommissioning Phase – Waste Generation

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
14B	Dismantling and disposal of turbine components and associated infrastructure	Potential failure to adequately transport components off-site and dispose / recycle components legally, resulting in illegal dumping and associated pollution.	Negative	1	3	3	1	1	8	Insignificant

Decommissioning Phase Mitigation Measures

- Prior to decommissioning, the Applicant must undertake investigations into the available recycling companies and technologies available at the time, and ensure that project components are recycled as far as possible.
- Where components cannot be recycled, these must be transported off-site by registered waste transporters, and disposed of at licensed waste management facilities (per type of waste).

10.3.15 Storage and Use of Dangerous Goods / Hazardous Substances

10.3.15.1 Construction Phase

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 – Hazardous substances

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (without Mitigation)	
15A	Storage and Use of Dangerous Goods / Hazardous Substances	Releases leading to environmental pollution	Negative	5	3	3	3	3	60	High

Impact Assessment after mitigation: Construction Phase – Hazardous substances

No	Activity	Impact / Risk Description	Nature of Impact	P	S	M	D	E	Significance (with Mitigation)	
15A	Storage and Use of Dangerous Goods / Hazardous Substances	Releases leading to environmental pollution	Negative	2	3	3	3	3	24	Low

Construction Phase Mitigation Measures

- 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 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 Data Safety Sheets (MSDS) to be kept on site.
- 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.

10.3.15.2 Operational Phase

Hazardous chemical substances stored and/or used on site during the operational phase include greases, gearbox fluids, hydraulic oils, paint and other substances required for turbine, substation, road or building maintenance.

These substances will not be stored in large quantities on site, but must still be stored (and used) according to each substance's MSDS and in accordance with the Hazardous Substances Act, 1973 (Act No 15 of 1973).

Impact ratings and mitigation measures will be the same as in the construction phase and are thus not duplicated.

10.3.15.3 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.

10.4 Cumulative Impact Assessment

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 2 shows the development boundaries for the proposed Project, along with all known renewable energy developments and applications in the vicinity, and known existing grid connection infrastructure. These are described in Table 34.

Table 34 Other Renewable Energy Projects in the area

Map ID (see Plan 2)	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 8.3 and shown in Plan 8. 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.

A portion of the development site is also affected by a pending application for open pit coal mining, and some uncertainty exists on the cumulative impacts associated with such potential future mining in relation to the proposed project.

The pre-existing impact of agricultural development on natural vegetation is also acknowledged, but not considered to be a cumulative impact in terms of vegetation removal as the Project is associated with a comparatively small footprint requiring removal of natural vegetation.

The sections that follow each discuss how the proposed Project could cumulatively 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 renewable energy projects planned in the area.

10.4.1 Soils, Land Use and Land Capability (Agriculture)

A cumulative agricultural impact becomes relevant when the impact of the proposed Project will lead directly to the sum of impacts of all developments causing an acceptable level of change to be exceeded in the surrounding area. If the impact of the development being assessed does not cause that level to be exceeded, then the cumulative impact associated with that development is not significant (Lanz, April 2022).

The potential cumulative agricultural impact of importance is a regional loss (including by degradation) of agricultural land, with a consequent decrease in agricultural production (Lanz, April 2022).

The area of land potentially taken out of agricultural use as a result of the known renewable energy projects in a 30km radius around the Proposed Project, amounts to approximately 344 Ha, (calculated based on the total combined generation capacity of other projects, and the industry standard of 2.5Ha/MW for Solar and 0.3Ha/MW for wind energy).

As a proportion of the total area within a 30km radius (approximately 282,700 ha), this amounts to only 0.12% of the surface area. That is considered to be within an acceptable limit in terms of loss of agricultural land (Lanz, April 2022).

The cumulative impact of loss of agricultural land use will not have an unacceptable negative impact on the agricultural production capability of the area. The proposed development is therefore acceptable in terms of cumulative impact from an agricultural perspective (Lanz, April 2022).

10.4.2 Water Resources

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 will be regarded as cumulative impacts.

Reasonable and sound water management measures are recommended to reduce the risk to water resources. The Impact Assessment (Section 10.3.3) indicate that anticipated impacts can be avoided, or managed to be of low significance, this not cumulatively contributing to water resource impacts.

10.4.3 Freshwater Ecology

As discussed in Section 8.6, 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.

As the proposed Project Infrastructure (excluding linear infrastructure) have been designed to be placed outside of wetland areas, the cumulative impact of wetland destruction becomes less likely. Cumulative impacts to wetland degradation through pollution can still occur but are mitigated (prevented) with relative ease, as discussed in Section 10.3.4 and the EMPr.

10.4.4 Terrestrial Ecology

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 (Hoare, May 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 (Hoare, May 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 (Hoare, May 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 (Hoare, May 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 (Hoare, May 2022).

At the current stage there is sufficient CBAs that can protect ecological processes while still allowing development to occur but a singularity is approaching beyond choice will no longer be an option. For this Project, five turbines are proposed in areas mapped as CBA Irreplaceable, and six turbines are proposed in areas mapped as CBA Optimal. Temporary laydown area 2 is also proposed in a CBA Optimal, but can be moved with relative ease. The roads and cables that affect the CBAs on site are largely aligned to existing roads and tracks, or, where no roads or tracks exist, were designed to follow the shortest practicable route. Thus, the maximum area of CBAs that can be affected by this Project, comprise approximately 15 Ha (which will be reduced post-construction). The cumulative footprint is thus comparatively small when compared to the typical footprints affected by open pit mining projects, for example. As various Projects in the vicinity have already affected CBAs and are proposed to affect CBAs on a larger scale, the cumulative contribution of this Project is considered Low.

10.4.5 Bats

Should significant (unmitigated) light pollution be created at surrounding facilities (including other renewable energy projects or mines), cumulative impacts to bats will be relevant (Animalia, April 2022). Furthermore, cumulative loss of bat foraging habitat and/or destruction of bat roosts caused by vegetation clearance, earthworks, diggings and levelling at surrounding Projects could have moderate to high cumulative impact on local bat populations if not mitigated, but can be mitigated if turbine and other infrastructure placement adheres to the Bat Sensitivity Map (Animalia, April 2022).

10.4.6 Avifauna

The total area of similar habitat available to birds in a 30km radius around the project sites is approximately 2629 km², equating to a low turbine density of approximately 1 turbine/53.3km². The turbine density, if all the turbines associated with this Project and the Hendrina North WEF are constructed, and by implication the cumulative impact on avifauna of the currently planned wind energy projects within this area, is therefore considered to be low, and the impact could be further reduced if the recommended mitigation at the two wind projects is diligently implemented (Van Rooyen & Froneman, April 2022).

10.4.7 Air Quality and Noise

Cumulative noise impacts generally only occur when noise sources (such as other wind turbines) are closer than 2,000m from each other (around 1,000m from the conceptual receptor located between them). The cumulative impact also only affects the area between the wind turbines of the various wind farms and normally only relate to the operational phase (EARES, April 2022). This concept is illustrated in Figure 18.

If the wind turbines of one wind farm are further than 2,000m from the wind turbines of the other wind farm, the magnitude (and subsequently the significance) of the cumulative noise impact is reduced, while no cumulative noise impact will be experienced if turbines are further than 4,000m from each other (EARES, April 2022).

The Hendrina North WEF and this Project may cumulatively contribute to noise impacts. Both these Projects were cumulatively assessed by the Noise Specialist. Significance of cumulative impacts was found to be Low. Potential cumulative noise levels during the operational phase will be less than 45 dBA. Changes in sound level will be less than 3 dB (EARES, April 2022).

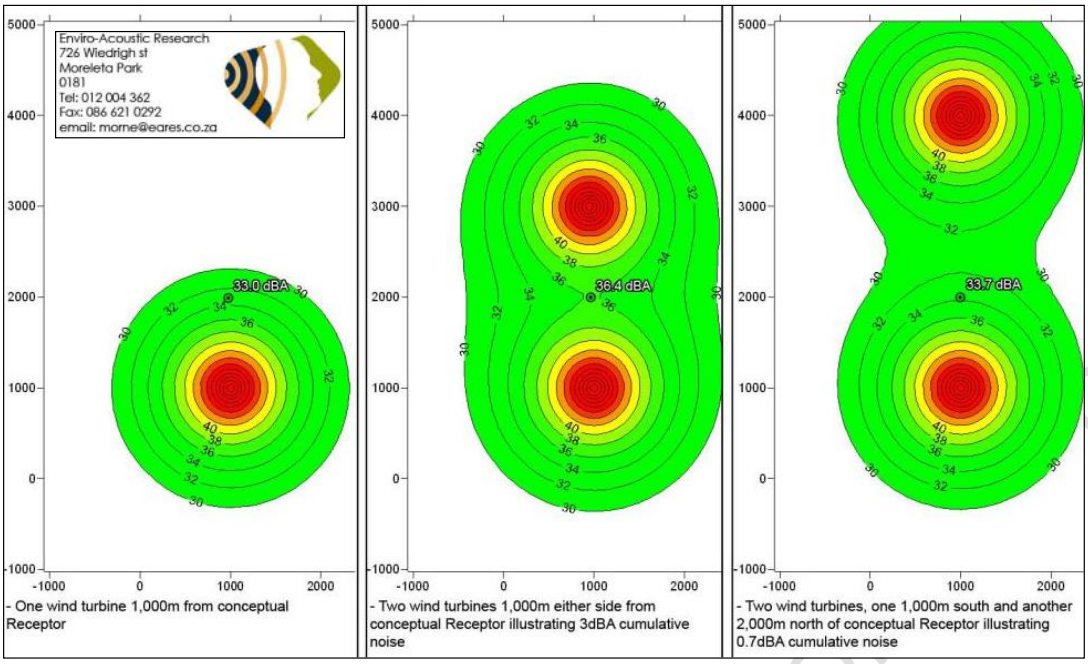


Figure 18: Effect of distance between wind turbines - potential cumulative noise (EARES, April 2022)

10.4.8 Visual

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 cumulative visual impacts are potentially High, but could be reduced to Moderate with the implementation of mitigation measures (SiVEST, April 2022) as put forward in the EMPr.

10.4.9 Socio-Economic

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 Project and the Hendrina North WEF 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).

10.4.10 Archaeology, Palaeontology and Heritage

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 entirely (preserve these resources *in-situ* with the implementation of an access protocol). The location of WTG15 must be changed to avoid impacts to the graves located in that vicinity. Development of construction camp 2 will impact on low-sensitivity ruins and require permitting in terms of the NHRA. But as these features' potential to contribute to aesthetic, historic, scientific and social aspects are non-existent, no cumulative contribution to heritage impacts is expected from the Project.

10.4.11 Transport and Traffic

To assess the cumulative impact, it was assumed that all renewable energy projects 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).

10.4.12 Waste Generation

In the context of the existing developments in the vicinity of the Project site, insufficient waste management has led to cumulative impacts on watercourses (notably the Olifants River) and incidents of illegal dumping of waste. The Project must not be allowed to contribute to the existing impacts of waste on the environment.

At the end of the Project life (20+ years), the project components will be dismantled and dis-assembled before being disposed of or recycled. Considering other wind farm developments country-wide, it is expected that suitable recycling technology would be available in South Africa by the time this Project is decommissioned, however, potential cumulative impacts of decommissioning waste should be re-evaluated nearer the time of decommissioning.

10.4.13 Dangerous Goods

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.

11 Environmental Impact Statement

Based on the impact assessment that has been undertaken (Section 10.3), the following potential negative impacts were rated as **High or Significant**, before the implementation of mitigation measures:

- (3A): **Wetland destruction** due to placement of infrastructure. The impact significance is reduced to Low with the implementation of mitigation measures.
- (4A): Loss and/or fragmentation of **indigenous natural vegetation** due to clearing for construction. The impact significance is reduced to Moderate with the implementation of mitigation measures. The sensitivity of the vegetation on site should be verified during pre-construction site walk-downs prior to vegetation clearance commencing.
- (4B): Impact on **integrity of CBAs** due to development in CBAs. The impact significance is reduced to Moderate with the implementation of mitigation measures. The sensitivity of the vegetation on site should be verified during pre-construction site walk-downs prior to vegetation clearance commencing. See Figure 14 to Figure 16 – the vegetation on site is not pristine and already fragmented due to the presence of mining and farming infrastructure, which should be considered when designating areas as CBAs.
- (6C): **Bat mortalities** due to collisions with Turbine Blades or due to Barotrauma during the operational Phase. Before Mitigation the impact is considered significant. With mitigation, impact significance is reduced to Moderate. Further operational monitoring will be required.
- (6D): **Bat mortalities** during migration, and subsequent effect on cave ecosystems and biota. The impact significance is reduced to Low with the implementation of mitigation measures.
- (6E): Increased risk of impacts to **bats**, due to lighting and habitat creation. The impact significance is reduced to Low with the implementation of mitigation measures.
- (7A): Displacement of priority **avifauna** due to disturbance associated with the construction. The impact significance is High, and reduced to Moderate with the implementation of mitigation measures.
- (7C): **Avifauna** mortalities due to collision with wind turbines. With mitigation, impact significance is reduced to Moderate.
- (7D and 7E): **Avifauna** Electrocution mortality and/or collision mortality from medium voltage reticulation lines. The impact significance is reduced to Low with the implementation of mitigation measures.
- (7F): Displacement of priority **avifauna** due to disturbance associated with the dismantling of the wind turbines and associated infrastructure. The impact significance is reduced to Moderate with the implementation of mitigation measures.
- (12B): Destruction of **heritage resources**: ruins at 073 to 080. The impact significance is reduced to Insignificant with the implementation of mitigation measures (permitted destruction or avoidance).
- (12C): Destruction of **heritage resources**: graves at 081. Impact significance is reduced to insignificant with mitigation measures (in-situ conservation of the site).
- (12D): Destruction of **heritage resources**: graves at 072A. Impact Significance is reduced to Insignificant if the location of WTG15 is moved to avoid the graves.

- (13B): Increased risk of **road safety incidents** due to transport of equipment, staff. Material etc to the site. The impact significance is reduced to Low with the implementation of mitigation measures.
- (15A): Incorrect storage and Use of **Dangerous Goods / Hazardous Substances** leading to environmental pollution. The impact significance is reduced to Low with the implementation of mitigation measures.

The following potential negative impacts were rated as **Moderate**, before the implementation of mitigation measures:

- (1A): **Loss of agricultural potential** by occupation of land, due to the presence of the Turbine hardstands, substation, BESS etc. on land that could otherwise have been used for agricultural production. The impact significance is reduced to Low with the implementation of mitigation measures.
- (1C): **Loss of agricultural potential** by Soil Degradation, due to altered surface run-off (including vegetation clearance, increase in impermeable surfaces) caused by construction. The impact significance is reduced to Insignificant with the implementation of mitigation measures.
- (2A): **Deterioration in surface water quality** due to physical or chemical pollution caused by construction and related activities. The impact significance is reduced to Low with the implementation of mitigation measures.
- (2C): **Aquifer depletion** due to over-abstraction of groundwater for construction purposes. The impact significance is reduced to Low with the implementation of mitigation measures.
- (2D): Surface- and/or groundwater **pollution** due to hazardous chemicals storage and use in the operational phase. The impact significance is reduced to Low with the implementation of mitigation measures.
- (2E): **Deterioration in surface water quality** due to physical or chemical pollution caused by decommissioning activities. The impact significance is reduced to Insignificant with the implementation of mitigation measures.
- (3B and 3D): **Wetland degradation** due to physical or chemical pollution in the Construction and Operational phases. The impact significance is reduced to Low with the implementation of mitigation measures.
- (3C): **Wetland degradation** due to fragmentation and erosion resulting from roads. The impact significance is reduced to Low with the implementation of mitigation measures.
- (3E): **Degradation of wetlands** during decommissioning, due to surface disturbance, ponding, proliferation of AIPs and potential chemical pollution. The impact significance is reduced to Low with the implementation of mitigation measures.
- (4E): Sporadic unforeseen **disturbance to natural habitats** e.g. accidental fires, driving off-road, dumping etc. The impact significance is reduced to Low with the implementation of mitigation measures.
- (4F): Establishment and spread of declared **weeds and alien invader plants**. The impact significance is reduced to Insignificant with the implementation of mitigation measures.
- (6A and 6B): **Loss of bat foraging habitat** by clearing of vegetation, and **destruction of bat roosts**. The impact significance is reduced to Low with the implementation of mitigation measures.

- (7B): Displacement of priority **avifauna** species due to habitat transformation associated with construction. The impact significance is reduced to Low with the implementation of mitigation measures.
- (8A): Dust and emissions from construction activities affecting **air quality**. The impact significance is reduced to Low with the implementation of mitigation measures.
- (10A): Potential **visual** impacts from construction activities. The impact significance is reduced to Low with the implementation of mitigation measures.
- (10B): Potential **visual** impacts from the presence of the Project. The impact remains Moderate regardless of the mitigation implemented.
- (10C): **Visual** impacts during the decommissioning phase. The impact significance is reduced to Low with the implementation of mitigation measures.
- (11F and 11S): Negative changes to the **sense of place** due to construction, and due to the presence of infrastructure. The impact significance is reduced to Low with the implementation of mitigation measures.
- (11H): Temporary increase in **social conflicts** due to influx of people. The impact significance is reduced to Insignificant with the implementation of mitigation measures.
- (11I): Impact on **economic and social infrastructure** due to increase in local traffic and migration of construction workers. The impact significance is reduced to Low with the implementation of mitigation measures.
- (11T): Impact on the **agriculture** operations due to wind farm operation. The impact significance is reduced to Low with the implementation of mitigation measures.
- 12(E): Access restriction to ancestral burial grounds. With mitigation, the impact is insignificant.
- (13A): Transport of equipment, material and staff to site, leading to **traffic congestion.** The impact significance is reduced to Low with the implementation of mitigation measures.
- (14A and 14B): Environmental impacts resulting from improper **waste management** during construction and/or decommissioning. The impact significance is reduced to Insignificant with the implementation of mitigation measures.

The following **positive** impacts were identified:

- (1E): Increased financial security for farming operations as a result of reliable diversified income (Insignificant);
- (1F): Improved security at affected farms (Insignificant);
- (11A and 11K): Increase in the GDP and production of the national and local economies during construction and operation (High Significance);
- (11B and 11L): Increase employment in the national and local economies during the construction and operation phases (Moderate Significance, can be increased to High if measures to enhance the impact are implemented);
- (11C and 11M): Contribution to skills development in the country and local economy (Low significance, can be increased to Moderate Significance with the implementation of enhancement measures);
- (11D and 11N): Temporary increase in household earnings, due to employees' salaries during construction, and improved standards of living for benefiting households for the

operational phase. Moderate Significance, can be increased to High if measures to enhance the impact are implemented;
- (11E and 11O): Increase in government revenue (Low impact significance in construction phase, but High in operational phase).
- (11P): Local economic and social development benefits derived from the project's operations (High Significance);
- (11Q): Sustainable rental revenue for farms where the wind farm is located (Moderate);
- (11R): Sustainable increase in electricity available for the local region and South Africa (High Significance).

11.1 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:

- 4A: Loss and/or fragmentation of indigenous natural vegetation, due to clearance for construction.
- 4B: Impact on integrity of CBAs, due to development in CBAs.
- 6C: Bat mortalities due to collisions with turbine blades, or due to barotrauma, during operations.
- 7A: Displacement of priority avifauna due to disturbance associated with construction.
- 7C: Avifauna mortality due to collisions with turbine blades.
- 7F: Displacement of priority avifauna due to disturbance associated with the dismantling of the wind turbines and associated infrastructure.
- 10B: Visual impacts due to the presence of the Wind Turbines and Associated Infrastructure, and security and operational lighting at night.

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:

- 4A and 4B: The CBAs on the site are already impacted and fragmented by the presence of farm roads, fences, the coal conveyor from Weltevreden to Halfgewonnen Collieries and electricity distribution infrastructure. See Section Figure 14 to Figure 16 that illustrate the on-site conditions. The Specialist Assessment confirmed that, even if assessed as a cumulative impact "there is sufficient CBAs that can protect ecological processes while still allowing development to occur".
- 6C: a minimum of 2 years operational bat mortality monitoring study will be undertaken, to identify (along with data obtained during the pre-construction monitoring) the need for mitigation additional to those measures stipulated in the EMPr, and if necessary, the specific turbines to be mitigated.
- 7A: A pre-construction survey (walk-through) must be undertaken 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. Micro-siting during the detailed design phase must ensure a 100m turbine exclusion zone around wetlands, dams and pans and a 200m turbine exclusion zone around selected wetlands, as shown in the Avifauna Sensitivity Map (Plan 13).

- 7C: A bird-friendly pole design must be employed for all 33kV overhead lines. All internal medium voltage lines must be marked with Bird Flight Diverters according to the Eskom standard. Live-bird monitoring will be implemented in the operational phase, as per the most recent edition of the Best Practice Guidelines at the time to compare the abundance of avifauna during the pre-construction monitoring with the abundance post-construction. Operational monitoring to be implemented for a minimum of two years, and then again in Year five and every fifth year after that.
- 7F: Specific measures to mitigate impacts associated with the decommissioning phase must be identified closer to the time of decommissioning.
- 10B: Lighting impacts to be mitigated by the use of appropriate lighting design and technology, as specified in the EMPr. As affected land owners will directly benefit from the Project, and the whole country will indirectly benefit from the Project's contribution to the National Electricity Grid, it is considered likely that receptors would not be opposed to the visual presence of the Project infrastructure.

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.

11.2 Specific Aspects to be Included as Conditions of Authorisation

It is recommended that the following key measures be included as conditions of the authorisation:

- The 100m and 200m turbine exclusion zones specified by the Avifauna Specialist must be adhered to in the final micro-siting and detailed design of the Project infrastructure;
- 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
- Undertake operational avifauna monitoring: Live-bird monitoring and carcass searches to be implemented in the operational phase, as per the most recent edition of the Best Practice Guidelines at the time Operational monitoring and carcass searches to be implemented for a minimum of two years after construction, and then again in Year five of operations and every fifth year after that.
- Adhere to the Bat Specialist's Sensitivity mapping to in the final micro-siting and detailed design of the Project infrastructure;
- Conduct a minimum of two years operational bat mortality monitoring study.
- The Appointed EPC Contractor must compile a Rehabilitation Plan prior to the commencement of construction (may be refined in the first year of construction, in consultation with the relevant Authorities, Applicant and Developer);
- 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 EMPr 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 EMPr 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 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.
- Ensure the necessary permits for the destruction of ruins affected by construction camp 2 are obtained prior to the commencement of construction.
- Move WTG15 so as to avoid impacts on the graves in that vicinity.
- 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.
- Ambient sound levels should be measured at Noise Receptor Locations 25 before construction commences, with the measurements repeated after the first year of operation. Should there be a noise complaint, once-off noise measurements must be conducted at the location of the person that registered a valid and reasonable noise complaint.
- The BESS should be subject to a full Hazard and Operability Study (HAZOP) prior to commencement of procurement.
- Throughout all Project Phases, local procurement should be prioritized whenever possible. Additionally, the Applicant must implement skills development programmes in the local communities.
- The preferred route to transport components from the port of entry to the site should be surveyed as part of the detailed design phase to identify problem areas, e.g. intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, that may require modification. After the road modifications have been implemented, it is recommended to undertake a "dry-run" with the largest abnormal load vehicle, prior to the transportation of any turbine components, to ensure that the delivery of the turbines will occur without disruptions. This process is to be undertaken by the haulage company transporting the components and the contractor, who will modify the road and intersections to accommodate abnormal vehicles. It needs to be ensured that the gravel sections of the haulage routes remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.

11.3 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 35:

Table 35: 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
(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—	

Provision of NEMA	Relevance to this application and report
(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;	The DFFE has been identified as the competent authority in terms of the application. 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. The relevant conservation authorities and infrastructure / service delivery organs of state are also included in the consultation process.
(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;	It is assumed that the decision-making authorities will take the provisions of Section 2 of the NEMA into account when evaluating the project.
(iii) that a description of the environment likely to be significantly affected by the proposed activity is contained in such application;	Please see the baseline description in Section 8 of this Report.
(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	Please refer to Section 10 of this Report.
(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	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) 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; (ii) investigation of mitigation measures to keep adverse consequences or impacts to a minimum;	Please refer to Section 6 for a discussion on Alternatives, and Section 6.9 for the Assessment of Alternatives. Mitigation measures are summarised in Section 10 and presented in detail in the EMPr (Appendix H)
(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;	A Heritage Impact Assessment has been completed for the Project (Appendix F 13) and sites included in the national estate (as defined in the NHRA, Section 3(2)) present on the site include graves and burial grounds, and archaeological sites (ruins, though these were assessed to be of low significance). Please refer to the impact assessment in Section 10.3.12.
(iv) reporting on gaps in knowledge, the adequacy of predictive methods and underlying assumptions, and uncertainties encountered in compiling the required information;	Please see Section 12 of this report.
(v) Investigation and formulation of arrangements for the monitoring and management of consequences for or impacts on the environment,	Please refer to the EMPr (Appendix H)

Provision of NEMA	Relevance to this application and report
and the assessment of the effectiveness of such arrangements after their implementation;	
(vi) consideration of environmental attributes identified in the compilation of information and maps contemplated in subsection (3); and	Please refer to the Maps in Appendix E, as well as the Maps included in the Screening Tool Report appended to the Application Form (Appendix J)
(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.	Provisions of the NEMWA, NHRA and NWA and other relevant legislation are included in this report, and, where relevant, the EMPr (Appendix H)

12 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, the EMPr (Appendix H) and Specialist Studies (Appendix F) are summarised below (detailed assumptions and limitations are also included in each specialist study).

- 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.
    - Priority avifauna species for wind development were identified from the updated list of priority species for wind farms compiled for the Avian Wind Farm Sensitivity Map (Retief et al. 2012), which is not considered recent.
    - Distribution maps of South African bat species still require further refinement, thus the bat species proposed to occur on the site (and not detected in the area yet) should be considered precautionary. If a species has a distribution marginal to the site, it was assumed to occur in the area.
    - The migratory paths of bats are largely unknown, thus some uncertainty in this regard will remain until the end of operational monitoring of at least 2 years.
- Conclusions in the Biodiversity Reports are based on experience of the Specialists with the relevant species and at wind farm developments in different parts of South Africa. However, animal (including birds, bats, mammals, reptiles etc.) behaviour can never be predicted with absolute certainty.

- 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.
- Measured sound levels will vary over seasons, time of day, meteorological conditions (including wind), faunal activity, vegetation characteristics and anthropogenic influence. Measurements taken for this Project were taken at two locations over an extended period (almost a week) and the confidence in characterising the ambient soundscape is high, though there will always be a level of uncertainty in the measured sound levels and the cause thereof.
- There are inherent uncertainties and inaccuracies associated with predictive models as detailed in the Noise Impact Assessment. The Noise Model aims to predict, with a degree of certainty, the anticipated noise levels of the Project at receptor locations, based on the precautionary principle (worst-case scenario is assumed), but does not necessarily present a 100% accurate and definitive assessment of what the noise from the Project may be.
- Due to the uncertainties highlighted, noise modelling generally could be out with as much as +10 dBA (the potential noise level is over-modelled), although realistic values ranging from 3 dBA to less than 5 dBA are more common in practice.
- 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 (Hoare, May 2022).
- The Socio-economic impact assessment (Appendix F 12) 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.

13 Conclusion

The Applicant is proposing the development of the Hendrina South WEF (the Project), as part of the Hendrina Renewable Energy Complex. The development area comprises 2,900ha, with a buildable area of 200ha, and a total development footprint of 76.5ha. The site is largely located in the Tshwete Local Municipality, of the Nkangala District Municipality, with a small portion in the south of the development area falling in the Govan Mbeki Local Municipality of the Gert Sibande District Municipality. The site is approximately 12 kilometres south-west of Hendrina and 11 km south-east of Komati, in Mpumalanga Province.

The Project comprises up to 26 wind turbines with a combined generation capacity of up to 200MW of electricity, and supporting infrastructure, including a substation with battery energy storage system (BESS), Operations and Maintenance (O&M) Building, temporary construction camps with cement batching plants, temporary laydown areas and internal roads and cables.

The Project will feed into the National Power Grid at the existing substations at the Komati Power Station, via the Hendrina South Grid Infrastructure Project which is subject to a separate application process.

The Project involves the undertaking of Listed Activities identified in the EIA Regulations, 2014 (as amended) and as such requires an Environmental Authorisation in terms of the NEMA before being undertaken. A Scoping and Environmental Impact Assessment Process is relevant to the Application. Should the outcome of the approval process be positive, it is the Applicant's intention to bid the project into future Renewable Energy Independent Power Producer Programme (REIPPP) rounds, in line with the Integrated Resource Plan (IRP) – renewable wind energy.

The EIA has identified various potential impacts associated with the Project on the biophysical, socio-cultural and economic environments. No Fatal flaws have been identified, and the anticipated negative impacts are found to be manageable, provided that strict mitigation is implemented.

The following additional management/mitigation, and further motivation for the development are identified:

- a minimum of 2 years operational bat mortality monitoring study will be undertaken, to identify (along with data obtained during the pre-construction monitoring) the need for additional mitigation, and if necessary, the specific turbines to be mitigated.
- A pre-construction survey (walk-through) must be undertaken by the relevant specialists, to inform the detailed design phase and micro-siting of infrastructure.
- WTG15 must be shifted to avoid impacts to graves identified in its current proposed location. A destruction permit must be obtained prior to impacting the ruins located at the Construction Camp 2 Site.
- WTG25 will affect about 2Ha of CBA. The total area of the affected CBA is 521.96Ha, thus WTG25 would impact on 0.4% of the CBA, which is negligible. Further, it is expected that the sensitivity of the site has been over-estimated, as illustrated in Figure 16.
- A bird-friendly pole design must be employed for all 33kV overhead lines. All internal medium voltage lines must be marked with Bird Flight Diverters according to the Eskom standard. Live-bird monitoring will be implemented in the operational phase, as per the most recent edition of the Best Practice Guidelines at the time to compare the abundance of avifauna during the pre-construction monitoring with the abundance post-construction. Operational monitoring to be implemented for a minimum of two years, and then again in year five and every fifth year after that.
- Specific measures to mitigate impacts associated with the decommissioning phase must be identified closer to the time of decommissioning.
- Lighting impacts must be mitigated by the use of appropriate lighting design and technology, as specified in the EMPr. As affected land owners will directly benefit from the Project, and the whole country will indirectly benefit from the Project's contribution to the National Electricity Grid, it is considered likely that receptors would not be opposed to the visual presence of the Project infrastructure.

The impact assessment further concluded that the socio-economic benefits of the Project outweigh the potential environmental risks, provided the management measures stipulated in the EMPr (Appendix H) are implemented.

It is therefore the opinion of the Environmental Assessment Practitioner, that the Project be considered for approval.

14 References

Africa Check. (2021, March). *South Africa the 12th biggest source of greenhouse gases? Yes, but that's not the only measure that matters*. Retrieved from Polity: https://www.polity.org.za/article/south-africa-the-12th-biggest-source-of-greenhouse-gases-yes-but-thats-not-the-only-measure-that-matters-2021-04-19#:~:text=Different%20agencies%20calculate%20countries'%20greenhouse,470%2D million%20MtCO2e.

Animalia. (April 2022). *12-Month Pre-Construction Bat Environmental Impact Assessment for the Proposed Hendrina Renewable Energy Complex.* Animalia Consulting.

Bamford, M. (May 2022). *Palaeontological Impact Assessment for the proposed Hendrina Renewable Energy Complex, Hendrina, Mpumalanga Province.*

Beyond Heritage. (April 2022). *Heritage Impact Assessment for the proposed Hendrina South Wind Energy Facility, Mpumalanga Province.*

Birdlife South Africa. (2017). *Best Practice Guidelines: Birds & Solar Energy - Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa.* BirdLife South Africa.

Burton, S. (May 2022). *Hendrina Renwable Energy Complex: Wetland and Aquatic Ecology Impact Assessment.*

Cadman, M.,de Villiers, C., Lechmere-Oertel, R. and D. McCulloch. (2013). *Grasslands Ecosystem Guidelines: landscape interpretation for planners and manager.* Pretoria: SANBI.

COGTA. (2019). *PROFILE: NKANGALA DISTRICT.* Accessed 24 November 2021: https://www.cogta.gov.za/ddm/wp-content/uploads/2020/07/Nkangala-District-Profile.pdf.

DAFF. (2018, Department of Agriculture Forestry and Finsheries). *Long-term grazing capacity map for South Africa developed in line with the provisions of Regulation 10 of the Conservation of Agricultural Resources Act, Act 43 of 1983*. Retrieved from https://gis.elsenburg.com/apps/cfm/.

DALRRD. (2020). *Protected agricultural areas Spatial data layer, Mpumalanga province.* Department of Agriculture, Land Reform and Rural Development.

DEA. (2015). *EIA Guideline for Renewable Energy Projects.* Pretoria: Department of Environmental Affairs.

DEA. (2016). *National Protected Areas Expansion Strategy for South Africa.* Department of Environmental Affairs.

DEA. (2017). *Guideline on Need and Desirability.* Pretoria: Department of Environmental Affairs.

DEA. (2017). *Public Participation Guideline in terms of NEMA EIA Regulations.* Pretoria: Department of Environmental Affairs.

DEA. (2018, February 09). National Guideline on Minimum Information Requirements for Preparing Environmental Impact Assessments for Mining Activities that Require

Environmental Authorisation. *Government Gazette*. Pretoria: Deaprtment of Environmental Affairs.

DEA. (2019). *Generic Environmental Management Programme (EMPr) for the development and expansion of substation infrastructure for the transmission and distribution of electricity.* Government Gazette No. 435. Department of Environmental Affairs.

DEAT. (2004). Criteria for determining Alternatives in EIA, Integrated Environmental Management, Information Series 11. Pretoria: Department of Environmental Affairs and Tourism (DEAT).

Department of Agriculture, Forestry and Fisheries. (2015). *Integrated Spatial Analysis on land capability and land use for Agriculture and Forestry.* Cape Town.

Department of Minerals and Energy. (1998). *White Paper on the Energy Policy of the Republic of South Africa.* ISBN: 0-9584235-8-X.

DoE. (2016). *Integrated Energy Plan.* Department of Energy.

DoE. (2019). *Integrated Resource Plan.* Department of Energy, Republic of South Africa.

DWA. (October 2013). *Business Case for the Olifants Catchment Management Agency.* Department of Water Affairs.

DWAF. (2006). *Best Practice Guideline G2: Water and Salt Balances.* Pretoria: Department of Water Affairs and Forestry, Directorare: Resource protection & waste.

EARES. (April 2022). *Environmental Noise Impact Assessment for the Proposed Hendrina Renewable Energy Complex and associated Infrastructure near Hendrina.* Enviro Acoustic Research.

Environomics Environmental Consultants. (December 2009). *Environmental Management Framework for the Olifants and Letaba Rivers Catchment Areas.* Midstream: Department of Environmental Affairs.

Equator Principles. (2020). Retrieved from https://equator-principles.com/

Ferrar, A., & Lotter, M. (2007). *Mpumalanga Biodiversity Conservation Plan Handbook.* Nelspruit: Mpumalanga Tourism & Parks Agency.

GMLM. (2020/2021). *2020/2021 Third Review of the Integrated Development Plan (IDP)*. Govan Mbeki Local Municipality.

Govender, J. (2019, 10 22). *Cliffe Dekker Hofmeyr.* Retrieved from The Integrated Resource Plan 2019: A promising future roadmap for generation capacity in South Africa: https://www.cliffedekkerhofmeyr.com/en/news/publications/2019/Corporate/energy-alert-22-october-The-Integrated-Resource-Plan-2019-A-promising-future-roadmap-for-generation-capacity-in-South-Africa.html

Hoare, D. (May 2022). *Terrestrial Biodiversity Assessment.* David Hoare Consulting (Pty) Ltd.

IFC. (2012). *International Finance Corporation's Policy on Environmental and Social Sustainability.* International Finance Corporation.

iSHEcon. (May 2022). *High-level safety, health and environmental risk assessment for the proposed development of Battery Energy Storage Systems at the Hendrina North and South Wind Energy Facilities, Mpumalanga.* iSHEcon Chemical Process Safety Engineers.

JG Afrika. (April 2022). *EIA Report: Proposed Hendrina South Wind Energy Facility, Mpumalanga - Transport Study.* Cape Town: JG Afrika (Pty) Ltd.

Land Type Survey Staff. (1972 - 2002). *1:250,000 scale Land Type Survey of South Africa.* Pretoria: ARC-Institute for Soil, Climate and Water.

Lanz, J. (April 2022). *Site Sensitivity Verification and Agricultural Agro-Ecosystem Specialist Assessment for the Hendrina Renewable Energy Projects.* Appendix F-1.

Loise Kinyanjui. (n.d.). *Factors Affecting a Selection Site for a Hydroelectric Station*. Retrieved from Sciencing: https://sciencing.com/info-8619867-factors-affecting-selection-hydroelectric-station.html

McSweeney, R., & Timperley, J. (2018). *The Carbon Brief Profile. [Online] Available at: https://www.carbonbrief.org/the-carbon-brief-profile-south-africa. Accessed 08 November 2021.*

MPSDF. (2018). Mpumalanga Spatial Development Framework. https://cer.org.za/wp-content/uploads/2019/01/Phase1.pdf.

MTPA. (2014). Mpumalanga Biodiversity Sector Plan Handbook. Compiled by Lötter M.C., Cadman, M.J. and Lechmere-Oertel R.G. Mbombela: Mpumalanga Tourism & Parks Agency,.

Mucina, L., & Rutherford, M. C. (2006). *Reprint 2011. The Vegetation of South Africa, Lesotho and Swaziland.* Pretoria: Strelitzia 19. South African National Biodiversity Institute.

Nel, J., Murray, K., Maherry, A., Petersen, C., Roux, D., Driver, A., . . . Nienaber, S. (2011). *Technical Report for the National Freshwater Ecosystem Priority Areas Project.* . Pretoria: Report to the Water Research Commission WRC Report No 1801/2/11.

NPC. (2011). *National Development Plan, 2030.* National Planning Commission, Department of the Presidency, Republic of South Africa.

SANBI. (2013). *Grasslands Ecosystem Guidelines: landscape interpretation for planners and managers. Compiled by Cadman, M., de Villiers, C., Lechmere-Oertel, R. and D. McCulloch.* Pretoria: South African National Biodiversity Institute.

Scotney, Ellis, Nott, Taylor, v Niekerk, Verster & Wood. (1987). *A System for Soil and Land Capability Classification for Agriculture in South Africa.* South Africa.

Shangoni AquiScience. (May 2022). *Geohydrological Impact Assessment for the Hendrina Renewable Energy Complex, Hendrina, Mpumalanga.* Shangoni Management Services.

Shangoni. (May 2022). *Surface Water Assessment Report.* Shangoni Management Services (Pty) Ltd.

SiVEST. (April 2022). *Visual Impact Assessment Report - Proposed Hendrina Renewable Energy Complex near Hendrina, Mpumalanga Province.* SiVEST SA (Pty) Ltd.

SLR. (2022). *Geotechnical Desktop Study for Hendrina Renewable Energy Complex.* SLR Consulting (South Africa) (Pty) Ltd.

Stats SA. (2015). *South African Statistics, 2015.* Pretoria: Statistics South Africa.

Urban-Econ. (April 2022). *Socio-Economic Impact Assessment Report for Hendrina Renewable Energy Complex.* Urban-Econ Development Economists.

Van Rooyen, C., & Froneman, A. (April 2022). *Avifaunal Impact Assessment: Hendrina South Wind Energy Facility, Mpumalanga Province.* Chris van Rooyen Consulting.

van Tonder, G. and Xu, Y. (2000). *A Guide for the Estimation of Groundwater Recharge in South Africa.* DWAF.

Appendix A: Approval of and Comments on Final Scoping 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 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: 12-Month Pre-Construction Bat Environmental Impact Assessment**
- **Appendix F 9: Avifaunal Impact Assessment**
- **Appendix F 10: Environmental Noise Impact Assessment**
- **Appendix F 11: Visual Impact Assessment**
- **Appendix F 12: Socio-Economic Impact Assessment**
- **Appendix F 13: Heritage Impact Assessment**
- **Appendix F 14: Palaeontological Impact Assessment**
- **Appendix F 15: High-Level Safety, Health and Environmental Risk Assessment**
- **Appendix F 16: Transport Study**
- **Appendix F 17: Geotechnical Desktop Study**
- **Appendix F 18: Wake Effect Statement**
- **Appendix F 19: Civil Aviation Compliance Statement**
- **Appendix F 20: Defence Compliance Statement**
- **Appendix F 21: Site Sensitivity Verification: RFI Theme**

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 Scoping Report)**
- **Appendix G 4: I&AP Register**
- **Appendix G 5: Background Information Document**
- **Appendix G 6: Newspaper Advert**
- **Appendix G 7: Notices**
- **Appendix G 8: Agenda and minutes of Focus Group Meetings**
- **Appendix G 9: Presentation and minutes of Public Meetings**
- **Appendix G 10: Proof of correspondence with Commenting Authorities**
- **Appendix G 11: Comments received from Commenting Authorities**
- **Appendix G 12: Proof of correspondence with I&APs**
- **Appendix G 13: Written comments received from I&APs**

Appendix H: Environmental Management Programme

- **Appendix H 1: Stormwater Management Plan**
- **Appendix H 2: Plant Rescue and Relocation Plan**
- **Appendix H 3: High Level Alien Invasive Plants Management Plan**
- **Appendix H 4: Preliminary Rehabilitation Plan**
- **Appendix H 5: Traffic Management Plan**
- **Appendix H 6: Chance Find Protocol**
- **Appendix H 7: Emergency Response Plan**
- **Appendix H 8: Grievance Procedure**
- **Appendix H 9: Waste Management Procedure**

Appendix I: Generic EMPr (GN R 435) for the development and expansion of substation infrastructure for the transmission and distribution of electricity

Appendix J: Application Form