Igolide Wind (Pty) Ltd

IGOLIDE WIND ENERGY FACILITY (UP TO 100MW) DFFE REFERENCE: 14/12/16/3/3/2/2385

Final Environmental Scoping Report

AUGUST 2023

PUBLIC

Igolide Wind (Pty) Ltd

IGOLIDE WIND ENERGY FACILITY (UP TO 100MW) DFFE REFERENCE: 14/12/16/3/3/2/2385

Final Environmental Scoping Report

TYPE OF DOCUMENT (VERSION) PUBLIC

PROJECT NO. 41104282

DATE: AUGUST 2023

Igolide Wind (Pty) Ltd

IGOLIDE WIND ENERGY FACILITY (UP TO 100MW) DFFE REFERENCE: 14/12/16/3/3/2/2385

Final Environmental Scoping Report

WSP

Building 1, Maxwell Office Park
Magwa Crescent West, Waterfall City
Midrand, 1685
South Africa

Phone: +27 11 254 4800

WSP.com

QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft Scoping Report	Final Scoping Report		
Date	June 2023	August 2023		
Prepared by	Jashmika Maharaj	Jashmika Maharaj		
Signature				
Checked by	Ashlea Strong	Ashlea Strong		
Signature				
Authorised by	Ashlea Strong	Ashlea Strong		
Signature				
Project number	41104282	41104282		
Report number	01	01		
File reference	"\\corp.pbwan.net\za\Central_Data\Projects\41100xxx\41104282 - Enertrag Egoli and Igolide WEF\41 PA\01-Reports\03_Scoping\02 SER\SER - FSR"			

GENERAL SITE INFORMATION

Technical details of the proposed Igolide Wind Energy Facility		
Location of Site	Merafong City Local Municipality in the Gauteng Province of South Africa	
Description of all affected farm portions and 21 digit SG Codes	Farm Name	21-Digit SG Code
	Portion 14 of Farm Kraalkop 147IQ	T0IQ00000000014700014
	Portion 20 of Farm Kraalkop 147IQ	T0IQ00000000014700020
	Portion RE/22 of Farm Kraalkop 147IQ	T0IQ00000000014700022
	Portion 8 of Farm Leeuwpoort 356IQ	T0IQ00000000035600008
	Portion 57 of Farm Leeuwpoort 356IAQ	T0IQ00000000035600057
	Portion 65 of Farm Leeuwpoort 356IQ	T0IQ00000000035600065
	Portion 66 of Farm Leeuwpoort 356IQ	T0IQ00000000035600066
Central coordinates of the site and activity location	26°27'2.44"S / 27°30'58.82"E	
Total Site extent	680ha	
Design Specifications		
Capacity:	Up to 100MW	
No. of turbines:	Up to 12	
Turbine hub height:	Up to 200m	
Rotor Diameter:	Up to 200m	
Tip Height :	Up to 300m	
Foundation:	Approximately 25m diameter x 3m deep – 500 m^3 – 650m^3 concrete. Excavation approximately 2 200m^3, in sandy soils due to access requirements and safe slope stability requirements.	
Turbine Hardstand:	Hardstand does not require concrete. Area required will be approximately 1ha per turbine.	
Tower Type	Steel or concrete towers can be utilised at the site. Alternatively, the towers can be of a hybrid nature, comprising concrete towers and top steel sections.	
On-site IPP substation and battery energy storage system (BESS):	Total footprint will be up to 4ha in extent. The on-site IPP portion substation will have a footprint of approximately 2ha. The substation will consist of a high voltage substation yard to allow for multiple up to 132kV feeder bays and transformers, control building, telecommunication infrastructure, and other substation components, as required. A 500m buffer around the on-site IPP substation has been identified to ensure flexibility in routing the powerline.	

	The Battery Energy Storage System (BESS) footprint will be up to 2ha. The BESS storage capacity will be up to 100MW/400 megawatt-hour (MWh) with up to four hours of storage. It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology; however, the specific technology will only be determined following Engineering, Procurement, and Construction ("EPC") procurement. The main components of the BESS include the batteries, power conversion system and transformer which will all be stored in various rows of containers. The BESS components will arrive on site pre-assembled.
Grid (to form part of a separate application for EA)	A single or double circuit 132kV overhead powerline and 132kV switching station (adjacent to the on-site IPP substation) to feed the electricity generated by the proposed WEF into Eskom's Midas Main Transmission Substation via a 11km overhead line. A corridor of up to 250m in width (125m on either side of the centre line) has been identified for the placement of the up to 132kV single or double circuit power line to allow flexibility in the design of the final powerline route, and for the avoidance of sensitive environmental features (where possible).
Cables:	The medium voltage collector system will comprise 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 on-site IPP.
Operations and Maintenance (O&M) building footprint:	Operations and Maintenance ("O&M") building footprint to be located near the on-site substation. Typical areas include: • Operations building – 20m x 10m = 200m^2 • Workshop and stores area – of ~300m^2 • Refuse area for temporary waste storage and conservancy tanks to service ablution facility. The total combined area of the buildings will not exceed 5 000m^2.
Construction camps:	Typical area of 0.5ha, including portable toilets. Sewage will be stored in septic tanks.
Temporary laydown or staging areas:	Typical area of 2ha. Could increase to 3ha for concrete towers, should they be required. Will include diesel, cement and chemical storage, as well as a small workshop area.
Cement Batching Plant (temporary):	Footprint of 1 – 3ha.
Access and 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. Existing access roads will be used to minimise impact. Where required, the width of the existing roads will be widened to ensure the passage of vehicles.
Supporting Infrastructure:	• Fencing; • Lighting; • Lightning protection; • Telecommunication infrastructure; • Stormwater channels; • Water pipelines; • Offices;

	• Operational control centre; • Warehouse; • Ablution facilities; • Gatehouse; • Security building; • Visitor's centre; and • Substation building.

CONTENTS

TABLES

FIGURES

APPENDICES

APPENDIX G.3

AVIFUANA ASSESSMENT

APPENDIX G.4

AQUATIC IMPACT ASSESSMENT

APPENDIX G.5

GEOTECHNICAL ASSESSMENT

APPENDIX G.6

HERITAGE IMPACT ASSESSMENT

APPENDIX G.7

PALAEONTOLOGICAL IMPACT ASSESSMENT

APPENDIX G.8

NOISE IMPACT ASSESSMENT

APPENDIX G.9

SOCIAL IMPACT ASSESSMENT

APPENDIX G.10

RISK ASSESSMENT

APPENDIX G.11

TRAFFIC IMPACT ASSESSMENT

APPENDIX G.12

VISUAL IMPACT ASSESSMENT

APPENDIX G.13

BAT IMPACT ASSESSMENT

ACRONYMS

Acronym	Definition
AIS	Alien and Invasive Species
AQMP	Air Quality Management Plan
ATNS	Air Traffic and Navigation Services
BA	Basic Assessment
BESS	Battery Energy Storage System
CA	Competent Authority
CAA	Civil Aviation Authority
CARs	Civil Aviation Regulations
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Areas
CRR	Comment and Response Report
DALRRD	Department of Agriculture, Land Reform and Rural Development
DFFE	Department of Forestry, Fisheries and Environment
DMRE	Department of Mineral Resources and Energy
DoD	Department of Defence
DoE	Department of Energy
DoT	Department of Transport
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EHS	Environmental Health and Safety
EI	Ecological Importance
EIA	Environmental Impact Assessment

EIAR	Environmental Impact Assessment Report
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
EPs	Equator Principles
EPFI	Equator Principles Financial Institutions
EPL	Ecosystem Protection Level
EPC	Engineering, Procurement, and Construction
ERA	Electricity Regulation Act
ES	Ecological Sensitivity
ESA	Ecological Support Areas
ESMS	Environmental and Social Management System
ETS	Ecosystem Threat Status
FEPA	Freshwater Priority Areas
GA	General Authorisation
GIIP	Good International Industry Practice
GNR	Government Notice Regulations
Ha	Hectares
HIA	Heritage Impact Assessment
HPA	Highveld Priority Area
IBA	Important Bird Area
ICAO	International Civil Aviation Organisation
IDP	Integrated Development Plan
IEP	Integrated Energy Plan
IFC	International Finance Corporation
ILO	International Labour Organisation
IPP	Independent Power Producer
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature

MPRDA	Mineral and Petroleum Resources Development Act
MSA	Municipal Systems Act
MV	Medium Voltage
MW	Megawatt
NDP	National Development Plan
NEMA	National Environmental Management Act
NEM:AQA	National Environmental Management: Air Quality Act
NEM:BA	National Environmental Management: Biodiversity Act
NEM:WA	National Environmental Management: Waste Act
NEMPAA	National Environmental Management Protected Areas Act
NFA	National Forest Act
NHRA	National Heritage Resource Act
NIP	National Infrastructure Plan
NPAES	National Protected Area Expansion Strategy
NSR	Noise-sensitive Receptors
NT	Near Threatened
NWA	National Water Act
O&M	Operation and Maintenance
OHS	Occupational Health and Safety
OHSA	Occupational Health and Safety Act
ONA	Other Natural Areas
PICC	Presidential Infrastructure Coordinating Commission
PES	Present Ecological State
PSs	Performance Standards
RAMS	Road Asset Management System
REC	Recommended Ecological Category
REDZ	Renewable Energy Development Zones
RFI	Radio Frequency Interference

S&EIA	Scoping and Environmental Impact Assessment
S&EIR	Scoping and Environmental Impact Reporting
SACAA	South African Civil Aviation Authority
SAHRA	South African Heritage Resource Agency
SAHRIS	South African Heritage Resources Information System
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SARPs	Standards and Recommended Practices
SAWS	South African Weather Services
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SDGs	Sustainable Development Goals
SER	Stakeholder Engagement Report
SIA	Social Impact Assessment
SQR	Sub Quaternary Reaches
ToPS	Threatened or Protected Species
UNDP	United Nations' Development Programmes
VIA	Visual Impact Assessment
VU	Vulnerable
WBG	World Bank Group
WEF	Wind Energy Facility
WMA	Water Management Area
WML	Waste Management Licence
WUA	Water Use Authorisation Application
WUL	Water Use License

1 INTRODUCTION

Changes from the Draft Scoping Report (DSR) have been underlined in this Final Scoping Report (FSR) for ease of reference.

WSP Group Africa (Pty) Ltd (WSP) has been appointed by Igolide Wind (Pty) Ltd (Igolide), to undertake an Environmental Impact Assessment (EIA) to meet the requirements under the National Environmental Management Act (Act 107 of 1998) (NEMA), for the proposed Igolide Wind Energy Facility (WEF) and its associated infrastructure, including an on-site Independent Power Producer (IPP) substation, located northeast of Fochville in the Merafong West Local Municipality (MLM) in the Gauteng Province (**Figure 1-1** and **Figure 1-2**).

The proposed development will be subject to a Scoping and EIA (S&EIA) Process in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) (as amended) and Appendix 2 of the EIA Regulations, 2014 promulgated in Government Gazette 40772 and GN R326, R327, R325 and R324 on 7 April 2017. The competent authority for this S&EIA Process is the national Department of Forestry, Fisheries and Environment (DFFE).

1.1 PURPOSE OF THIS REPORT

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

The Final Scoping Report (DSR) (this report) aims to provide stakeholders with information on the proposed development including location, layout and technological alternatives, the scope of the environmental assessment and key impacts to be addressed in the environmental assessment, and the consultation process undertaken through the EIA process.

1.2 BACKGROUND INFORMATION

Igolide Wind (Pty) Ltd, proposes to establish the up to 100MW Igolide Wind Energy Facility (WEF) (hereafter the 'Project'), and associated infrastructure, including an on-site IPP substation, near Fochville in Gauteng. The proposed WEF triggers a Scoping and Environmental Impact Reporting (S&EIR) process in terms of Sections 24 and 24D of the National Environmental Management Act (NEMA) (No. 107 of 1998), as read with GNR 983, GNR 984 and GNR 985 (as amended). The extent of the Project footprint will be approximately 130 hectares (ha), subject to finalization based on technical and environmental requirements. The proposed Igolide WEF will comprise the following key components:

- Wind turbines:
  - Up to 12 turbines, each with a foundation of approximately 25m in diameter and approximately 3m in depth;
  - Turbine hub height of up to 200m;
  - Rotor diameter up to 200m;
  - Tip height of up to 300m;
  - Permanent hard standing area: approximately 1 ha will be required per turbine; and

- Tower type: Steel or concrete towers can be utilised at the site. Alternatively, the towers can be of a hybrid nature, comprising concrete towers and top steel sections.

- On-site IPP substation and Battery Energy Storage System (BESS):
  - Total footprint will be up to 4ha in extent;
  - The on-site IPP portion substation will have a footprint of approximately 2ha. The substation will consist of a high voltage substation yard to allow for multiple up to 132kV feeder bays and transformers, control building, telecommunication infrastructure, and other substation components, as required. A 500m buffer around the on-site IPP substation has been identified to ensure flexibility in routing the powerline; and
  - The Battery Energy Storage System (BESS) footprint will be up to 2ha. The BESS storage capacity will be up to 100MW/400 megawatt-hour (MWh) with up to four hours of storage. It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology; however, the specific technology will only be determined following Engineering, Procurement, and Construction ("EPC") procurement. The main components of the BESS include the batteries, power conversion system and transformer which will all be stored in various rows of containers. The BESS components will arrive on site pre-assembled.

- Cabling:
  - The medium voltage collector system will comprise 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 on-site IPP substation.

- Operations and maintenance (O&M) building infrastructure:
  The O&M building footprint will be located near the on-site substation. Typical areas include:
  - Operations building – 20m x 10m = 200m^2;
  - Workshop and stores area – of ~300m^2; and
  - Refuse area for temporary waste storage and conservancy tanks to service the ablution facility.

  The total combined area for the buildings will not exceed 5 000m^2.

- Construction camp, laydown area and batching plant:
  - The construction camp will have a footprint of approximately 0.5ha, and will include portable toilets. Sewage generated will be stored septic tanks and subsequently collected by service provider for treatment at a licensed facility;
  - The laydown area will have a footprint of approximately 2ha, however, this could increase to 3ha for concrete towers (should they be required). The laydown area will include diesel, cement and chemical storage, as well as a small workshop area; and
  - Cement batching plant (temporary) of 1ha to 3ha.

- Access and internal roads:
  - Internal roads will be approximately 8 - 10m in width, increasing up to 15m for turning circle/bypass areas to allow for larger component transport; and
  - Existing access roads will be used to minimise impact. Where required, the width of the existing roads will be widened to ensure the passage of vehicles.

- Supporting infrastructure:

  Other Infrastructure located within the project footprint will include:

  - Fencing;
  - Lighting;
  - Lightning protection;
  - Telecommunication infrastructure;
  - Stormwater channels;
  - Water pipelines;
  - Offices;
  - Operational control centre;
  - Warehouse;
  - Ablution facilities;
  - Gatehouse;
  - Security building;
  - Visitor's centre;
  - Substation building;

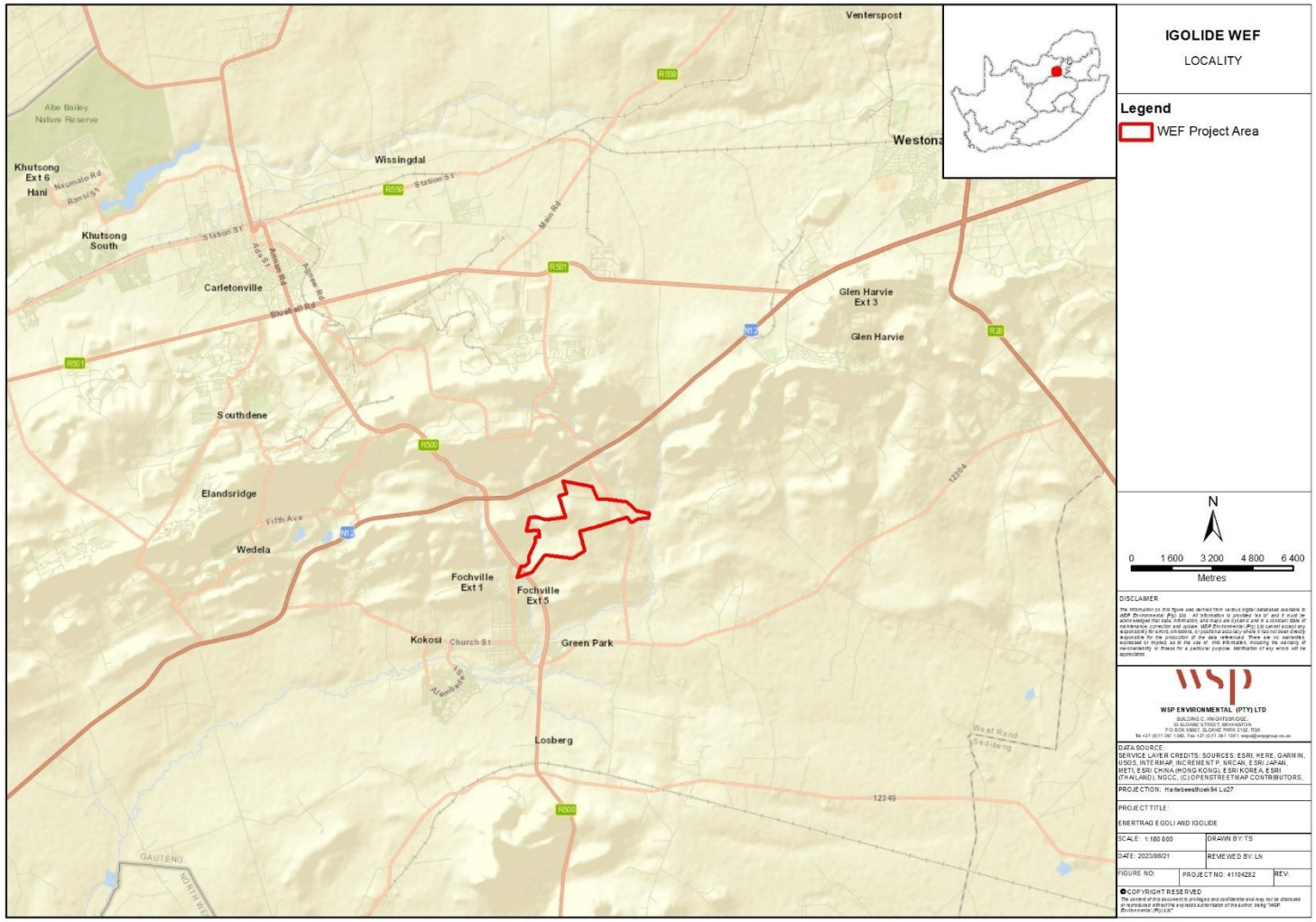


Figure 1-1 – Regional locality map of the Igolide WEF Development

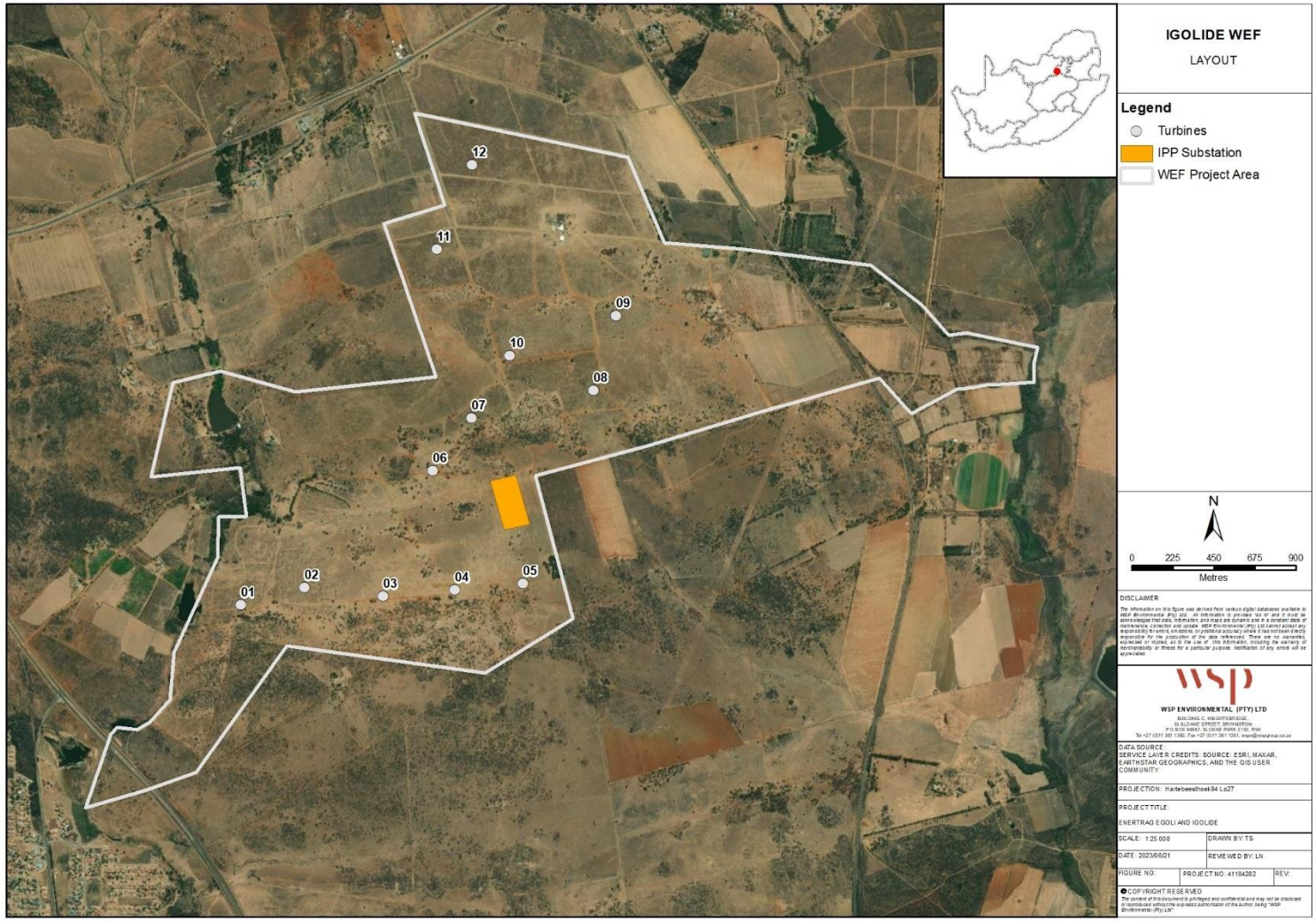


Figure 1-2 – Layout of Igolide WEF Development being assessed in the formal environmental impact assessment process

1.3 DETAILS OF KEY ROLE PLAYERS

1.3.1 PROJECT PROPONENT

Igolide Wind (Pty) Ltd is the project proponent (Applicant) with regards to this application for the construction and operation of the Igolide WEF. **Table 1-1** provides the relevant details of the project proponent.

Table 1-1 – Details of Project Proponent

Proponent:	Igolide Wind (Pty) Ltd
Contact Person:	Mercia Grimbeek/Mmakoena Mmola
Postal Address	Suite 104, Albion Springs, 183 Main Road, Rondebosch, Cape Town, South Africa 7700
Telephone:	071 752 8033
Email:	Mercia.Grimbeek@enertrag.com / mmakoena.mmola@enertrag.com

1.3.2 COMPETENT AUTHORITY

Section 24C(2)(a) of NEMA stipulates that the Minister of Forestry, Fisheries and the Environment ("the Minister") must be identified as the competent authority 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.

As the proposed Igolide WEF is related to the IRP, DFFE is the CA for the proposed Project. **Table 1-2** provides the relevant details of the competent authority on the Project.

Table 1-2 – Competent Authority

Aspect	Competent Authority	Contact Details
Competent Authority: Environmental Authorisation	Department of Forestry, Fisheries, and the Environment (DFFE)	Case Officer: Lunga Dlova Integrated Environmental Authorisations Email: LDlova@dffe.gov.za Tel: 012 399 8524

1.3.3 COMMENTING AUTHORITY

The commenting authorities for the project include:

- Gauteng Department of Agriculture and Rural Development (GDARD);
- DFFE: Biodiversity and Conservation;
- DFFE: Protected Areas;
- Department of Water and Sanitation (DWS);
- Department of Mineral Resources and Energy (DMRE);
- Department of Agriculture, Land Reform and Rural Development (DALRRD);

- Department of Public Works;
- Department of Defence;
- National Department of Transport;
- South African National Roads Agency Limited (SANRAL);
- South African Heritage Resources Agency (SAHRA);
- South African Civil Aviation Authority (CAA);
- Air Traffic and Navigation Services (ATNS);
- Square Kilometre Array (SKA);
- South African Weather Service (SAWS);
- The Provincial Heritage Resources Authority: Gauteng
- Merafong City Local Municipality;
- West Rand District Municipality;
- BirdLife South Africa;
- Endangered Wildlife Trust; and
- South African National Parks.

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

1.3.4 ENVIRONMENTAL ASSESSMENT PRACTITIONER

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

Table 1-3 – Details of the EAP

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

Statement of Independence

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

1.3.5 SPECIALISTS

Specialist input was required in support of this application for EA. The details of the specialists are provided in **Table 1-4** below. The specialist studies are attached in **Appendix G** and their declarations in **Appendix C**.

Table 1-4 – Details of Specialists

Assessment	Name of Specialist	Company	Sections in Report	Specialist Report attached as
Terrestrial Biodiversity Compliance Statement	Dr Noel van Rooyen and Prof. Gretel van Rooyen	Ekotrust CC	▪ Section 2.7 ▪ Section 6.2.1 ▪ Section 7.1.2 ▪ Section 8 ▪ Section 9.2	**Appendix G.1**
Agricultural Compliance Statement	Johann Lanz	Independent consultant	▪ Section 2.7 ▪ Section 6.1.2 ▪ Section 0 ▪ Section 8 ▪ Section 9.1	**Appendix G.2**
Avifauna Impact Assessment	Chris van Rooyen	Chris van Rooyen Consulting	▪ Section 2.7 ▪ Section 6.2.3 ▪ Section 7.1.4 ▪ Section 8 ▪ Section 9.3	**Appendix G.3**
Aquatic Biodiversity Impact Assessment	Lufuno Nemakhavhani	WSP Group Africa (Pty) Ltd	▪ Section 2.7 ▪ Section 6.1.5 ▪ Section 6.2.2 ▪ Section 7.1.3 ▪ Section 8	**Appendix G.4**
Geotechnical Assessment	Heather Davis	WSP Group Africa (Pty) Ltd	▪ Section 6.1.4 ▪ Section 8 ▪ Section 9.7	**Appendix G.5**
Archaeological and Cultural Heritage Impact Assessment	Dr Jayson Orton	ASHA Consulting (Pty) Ltd	▪ Section 2.7 ▪ Section 6.3.1 ▪ Section 7.1.5 ▪ Section 8 ▪ Section 9.5	**Appendix G.6**

Assessment	Name of Specialist	Company	Sections in Report	Specialist Report attached as
Palaeontological Impact Assessment	Prof. Marion Bamford	ASHA Consulting (Pty) Ltd	▪ Section 2.7 ▪ Section 6.1.3 ▪ Section 6.3.2 ▪ Section 7.1.6 ▪ Section 8 ▪ Section 9.6	**Appendix G.7**
Noise Assessment	M. de Jager	Enviro-Acoustic Researchcc	▪ Section 6.3.7 ▪ Section7.1.9 ▪ Section 8	**Appendix G.8**
Social Impact Assessment	Tony Barbour	Tony Barbour Environmental Consulting	▪ Section 6.3.5 ▪ Section 7.1.8 ▪ Section 8 ▪ Section 9.1.	**Appendix G.9**
Risk Assessment	Debra Mitchell	ISHECONcc	▪ Section 2.7 ▪ Section 6.3.6 ▪ Section 8	**Appendix G.10**
Traffic Assessment	A. Johnson	JG Afrika (Pty) Ltd	▪ Section 2.7 ▪ Section 6.3.3 ▪ Section 8 ▪ Section 9.8	**Appendix G.11**
Visual Impact Assessment	Kerry Schwartz	SLR Consulting (Pty) Ltd	▪ Section 2.7 ▪ Section 6.3.4 ▪ Section 7.1.7 ▪ Section 8 ▪ Section 9.9	**Appendix G.12**
Bat Impact Assessment	Werner Marais	Animalia Consultants	▪ Section 2.7 ▪ Section 6.2.4 ▪ Section 7.1.5 ▪ Section 8 ▪ Section 9.4	**Appendix G.13**

1.4 SCOPING TERMS OF REFERENCE

The 2014 EIA Regulations (Government Notice Regulation (GNR) 982), as amended, identifies the proposed Project as an activity being subject to an S&EIR process due to the applicability of the EIA Listing Notice 2 (GNR 984, as amended).

As defined in Appendix 2 of GNR 982, as amended, the objective of the scoping process is to, through a consultative process:

- Identify the relevant policies and legislation relevant to the activity;

- Motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;
- Identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- Identify the key issues to be addressed in the assessment phase;
- Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration, and probability of the impacts to inform the location of the development footprint within the preferred site; and
- Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

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

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

1.5 FINAL SCOPING REPORT STRUCTURE

As per the EIA Regulations 2014, as amended, Appendix 2 of GNR 982 identifies the legislated requirements that must be contained within a SR for the Competent Authority (CA) to consider and come to a decision on the application. **Table 1-5** below details where the required information is located within this report.

Table 1-5 - Legislated Report Requirements as detailed in Appendix 2 of GNR 982

Appendix 2 of GNR 982	Description	Relevant Report Section
(a)	Details of	
	the EAP who compiled the report; and	Section 1.3.4 and **Appendix A**
	the expertise of the EAP, including a Curriculum Vitae	**Appendix A**
(b)	The location of the activity, including-	
	The 21-digit Surveyor code for each cadastral land parcel;	Section 3.1
	Where available, the physical address and farm name	Section 3.1
	Where the required information in terms of (i) and (ii) is not available, the coordinates of the boundary of the property.	N/A
(c)	A plan which locates the proposed activities applied for at an appropriate scale, or, if it is-	
	A linear activity, a description of the corridor in which the proposed activity or activities is to be undertaken; or	N/A
	On land where the property has not been defined, the coordinates within which the activity is to be undertaken.	N/A
(d)	A description of the proposed activity, including	
	All listed and specified activities triggered;	Section 5.1
	A description of the activities to be undertaken, including associated structures and infrastructure;	Section 3
(e)	A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	Section 5
(f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Section 3.5
(h)	A full description of the process followed to reach the proposed preferred activity, site and location within the site, including-	
	Details of all the alternatives considered;	Section 4
	Details of the public participation undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 2.6 **Appendix D**

Appendix 2 of GNR 982	Description	Relevant Report Section
	a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	**Appendix D**
	the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 6 Section 10
	the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Section 8
	the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Section 2.5
	positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 8
	the possible mitigation measures that could be applied and level of residual risk;	Section 8
	the outcome of the site selection matrix;	Section 4
	if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	N/A
	a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Section 4
(i)	A plan of study for undertaking the environmental impact assessment process to be undertaken, including-	
	a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;	Section 4
	a description of the aspects to be assessed as part of the environmental impact assessment process;	Section 10.4
	aspects to be assessed by specialists;	Section 10.5
	a description of the proposed method of assessing the environmental aspects, including a description of the proposed	Section 10.6

Appendix 2 of GNR 982	Description	Relevant Report Section
	method of assessing the environmental aspects including aspects to be assessed by specialists;	
	a description of the proposed method of assessing duration and significance;	Section 10.6
	an indication of the stages at which the competent authority will be consulted;	Section 10.8
	particulars of the public participation process that be conducted during the environmental impact assessment process; and	Section 2.6
	a description of the tasks that will be undertaken as part of the environmental impact assessment process;	Section 10
	identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	Section 8.1 Section 10.7
(j)	An undertaking under oath or affirmation by the EAP in relation to-	
	the correctness of the information provided in the report;	**Appendix B**
	the inclusion of comments and inputs from stakeholders and interested and affected parties; and	
	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;	
(k)	An undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;	**Appendix B**
(l)	Where applicable, any specific information required by the competent authority; and	N/A
(m)	Any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A

2 S&EIA PROCESS

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

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

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

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

- The DFFE to provide written notification of the decision to either grant or refuse EA for the proposed project; and
- Notify all registered stakeholders of the decision and right to appeal.

2.2 DFFE WEB-BASED ENVIRONMENTAL SCREENING TOOL

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

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

A screening report for the proposed Project was generated on 27 March 2023 and is attached as **Appendix F**. The Screening Report for the Project identified various sensitivities for the site. The report also generated a list of specialist assessments that should form part of the S&EIA based on the development type and the environmental sensitivity of the site. Assessment Protocols in the report provide minimum information to be included in a specialist report to facilitate decision-making.

Table 2-1 below provides a summary of the sensitivities identified for the development footprint.

Table 2-1 – Sensitivities identified in the DFFE Screening Report

Theme	Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low Sensitivity
Agriculture Theme		X		
Animal Species Theme			X	
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Avian (Wind) Theme				X
Bats (Wind) Theme		X		
Civil Aviation (Wind) Theme		X		
Defence (Wind) Theme			X	
Flicker Theme	X			
Landscape (Wind) Theme	X			
Palaeontology Theme		X		

Theme	Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low Sensitivity
Noise Theme	X			
Plant Species Theme			X	
RFI (Wind) Theme				X
Terrestrial Biodiversity Theme	X			

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

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

2.2.1 MOTIVATION FOR SPECIALIST STUDIES

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

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

Specialist Study Identified	Specialist Study Commissioned (Yes/No)	Motivation
Soil and Agricultural Potential Assessment	Yes	-

Specialist Study Identified	Specialist Study Commissioned (Yes/No)	Motivation
Landscape/Visual Impact Assessment	Yes	-
Archaeological and Cultural Heritage Impact Assessment	Yes	-
Palaeontology Impact Assessment	Yes	-
Terrestrial Biodiversity Impact Assessment	Yes	-
Aquatic Biodiversity Impact Assessment	Yes	-
Avian Impact Assessment	Yes	-
Civil Aviation Assessment	No	The relevant Authorities have been included on the project stakeholder database. As of the 1st of May 2021, ATNS has been appointed as the new Obstacle application Service Provider for Wind farms and later Solar Plants. Their responsibility would pertain to the assessments, maintenance, and all other related matters in respect to Windfarms and in due time Power Plant assessments. Where required, an Application for the Approval of Obstacles will also be submitted to ATNS and the required permits will be obtained prior to the development of the project. The SACAA and ATNS have been included on the project stakeholder database. They will be informed of the proposed Project, and comment will be sought. An Application for the Approval of Obstacles has been submitted to ATNS by the Applicant. As this theme has been identified as a high sensitivity, a compliance statement will be included in the EIA Phase.
Defence Assessment	No	The Department of Defence has been included on the project stakeholder database. They will be informed of the proposed Project, and comment will be sought. As this theme has been identified as a Medium sensitivity, a compliance statement will be included in the EIA Phase.
RFI Assessment	No	An RFI Study will not be undertaken. The SAWS and relevant telecommunications stakeholders will be engaged with as part of the Public Participation Process. As this theme has been identified as low sensitivity, a compliance statement will not be required.

Specialist Study Identified	Specialist Study Commissioned (Yes/No)	Motivation
Noise Impact Assessment	Yes	-
Flicker Assessment	Yes	The Flicker Assessment is being undertaken as part of the Visual Impact Assessment.
Traffic Impact Assessment	Yes	-
Geotechnical Assessment	Yes	A desktop study will be undertaken. A detailed Geotechnical Assessment will not be undertaken as this will be undertaken during the design phase.
Socio-Economic Assessment	Yes	-
Plant Species Assessment	Yes	-
Animal Species Assessment	Yes	-

The following specialist studies have been commissioned in addition to those above:

- Qualitative Risk Assessment for the BESS.

Specialist assessments were conducted in accordance with the Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes, which were promulgated in Government Notice No. 320 of 20 March 2020 and in Government Notice No. 1150 of 30 October 2020 (i.e. “the Protocols”). The assessment protocols followed as well as the site sensitivity verification undertaken by the specialists are indicated in **Section 7**.

2.3 APPLICATION FOR ENVIRONMENTAL AUTHORISATION

The application phase consisted of a pre-application consultation with DFFE and subsequently completing the appropriate application form as well as the submission and registration of the application for EA with the DFFE. The pre-application meeting was requested with DFFE on 2 May 2023. The DFFE responded on 4 May 2023 and confirmed that a pre-application meeting was not needed for the project (proof of pre-app request form and email correspondence included in the SER in **Appendix D**). The application for EA was submitted to the DFFE with the DSR on 23 June 2023. The application reference number (DFFE Reference: 14/12/16/3/3/2/2385) is included in this Final Scoping Report.

2.4 BASELINE ENVIRONMENTAL ASSESSMENT

The description of the environmental attributes of the Project area was compiled through a combination of desktop reviews and site investigations. Desktop reviews made use of available information including existing reports, aerial imagery, and mapping. The specialist teams undertook

site investigations, between March and June 2023, to identify sensitive features on site that informed the sensitivity mapping (**Section 7.1**) for the proposed project.

2.5 IMPACT SCREENING METHODOLOGY

The potential impacts associated with the proposed development were determined at both a desktop level based on existing information, as well as field assessments. The following methodology was used:

- Identify potential sensitive environments and receptors that may be impacted on by the proposed development;
- Identify potential social receptors that may be impacted on by the proposed development;
- Identify the type of impacts that are most likely to occur (including cumulative impacts);
- Determine the nature and extent of the potential impacts during the various developmental phases, including, construction, operation and decommissioning;
- Identify potential No-Go areas; and
- Summarise the potential impacts that will be considered further in the Scoping & EIA phase through detailed specialist studies.

Appendix 2 of GNR 982, as amended, requires the identification of the significance of potential impacts during scoping. To this end, an impact screening tool has been used in the scoping phase. The screening tool is based on two criteria, namely probability; and consequence (**Table 2-3**), where the latter is based on general consideration to the intensity, extent, and duration.

The scales and descriptors used for scoring probability and consequence are detailed in **Table 2-4** and **Table 2-5** respectively.

Table 2-3 – Significance Screening Tool

	Consequence Scale				
Probability Scale		1	2	3	4
	1	Very Low	Very Low	Low	Medium
	2	Very Low	Low	Medium	Medium
	3	Low	Medium	Medium	High
	4	Medium	Medium	High	High

Table 2-4 – Probability scores and descriptors

Score	Descriptor
4	Definite: The impact will occur regardless of any prevention measures
3	Highly Probable: It is most likely that the impact will occur
2	Probable: There is a good possibility that the impact will occur
1	Improbable: The possibility of the impact occurring is very low

Table 2-5 - Consequence Score Descriptions

Score	Negative	Positive
4	Very severe: An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated.	Very beneficial: A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit.
3	Severe: A long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these.	Beneficial: A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.
2	Moderately severe: A medium to long term impacts on the affected system(s) or party (ies) that could be mitigated.	Moderately beneficial: A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way.
1	Negligible: A short to medium term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	Negligible: A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.

The nature of the impact must be characterised as to whether the impact is deemed to be positive (+ve) (i.e. beneficial) or negative (-ve) (i.e. harmful) to the receiving environment/receptor. For ease of reference, a colour reference system (**Table 2-6**) has been applied according to the nature and significance of the identified impacts.

Table 2-6 - Impact Significance Colour Reference System to Indicate the Nature of the Impact

Negative Impacts (-ve)	Positive Impacts (+ve)
Negligible	Negligible
Very Low	Very Low
Low	Low
Medium	Medium
High	High

2.6 STAKEHOLDER ENGAGEMENT PROCESS

Stakeholder engagement (public participation) is a requirement of the S&EIA process. It consists of a series of inclusive and culturally appropriate interactions aimed at providing stakeholders with

opportunities to express their views, so that these can be considered and incorporated into the S&EIA decision-making process. Effective engagement requires the prior disclosure of relevant and adequate project information to enable stakeholders to understand the risks, impacts, and opportunities of the proposed project. The objectives of the stakeholder engagement process can be summarised as follows:

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

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

2.6.1 STAKEHOLDER IDENTIFICATION

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

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

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

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

2.6.2 STAKEHOLDER NOTIFICATION

2.6.2.1 DIRECT NOTIFICATION

Notification of the proposed Project was issued to potential Stakeholders, via direct correspondence (i.e. site notices, sms and e-mail) on **26 June 2023**. The notification letter circulated on the **26 June 2023**. Proof of notification is included in this FSR, **Appendix D.**

2.6.2.2 NEWSPAPER ADVERTISEMENTS

In accordance with the requirements of GNR 982, as amended, the proposed project was advertised in one local newspaper. The purpose of the advertisement was to notify the public about the proposed project and to invite them to register as stakeholders. A copy of the advertisements and proof of

placement has been included in A copy of the advertisements has been included in the SER included in **Appendix D**.

Proof of placement is included in this FSR. The proposed scoping phase advertisement dates are listed in **Table 2-7**.

Table 2-7 - Dates on which the Adverts were published

Newspaper	Publication Date	Language
Carletonville/Fochville Herald	22 June 2023	English, Afrikaans and Sesotho

The official site notices were erected as per GNR 982, as amended, on the boundary fence of the proposed site. In addition, general project notices, announcing the proposed project and inviting stakeholders to register, were placed at various locations in and around the project area on **26 June 2023**. A copy of the site notice is included in the SER included in **Appendix D**. Proof of placement is also included in this FSR.

2.7 ASSUMPTIONS AND LIMITATIONS

GENERAL ASSUMPTIONS AND LIMITATIONS:

- The EAP hereby confirms that they have undertaken to obtain project information from the client that is deemed to be accurate and representative of the project;
- Site visits have been undertaken to better understand the project and ensure that the information provided by the client is correct, based on site conditions observed;
- The EAP hereby confirms their independence and understands the responsibility they hold in ensuring all comments received are accurately replicated and responded to within the EIA documentation; and
- The comments received in response to the public participation process, will be representative of comments from the broader community.

AGRICULTURAL ASSESSMENT:

- There are no specific assumptions, uncertainties or gaps in knowledge or data that affect the findings of this study.

TERRESTRIAL BIODIVERSITY COMPLIANCE STATEMENT:

- The site visit was undertaken in January 2021 after the region had received good rains, thus the botanical assessment was conducted under favourable conditions.
- The area has been well collected in the past and the list of plant species that could potentially occur on site as obtained from the NewPosa database, is thus considered to provide a good representation of the flora on site.
- Rare and threatened plant and animal species are generally uncommon and/or localised and the once-off survey may fail to locate such species.
- Rare plant species usually occur in specialised and localised habitats, thus special attention was given to these habitats. The list was supplemented by a list of SCC provided by GDARD (2011) occurring on the farms in the immediate vicinity of the development.
- No aerial census, road census or trapping (either camera trapping or by way of Sherman traps) was conducted for fauna, since these methods generally provide an underrepresentation of the

full faunal diversity within the limited timeframe available. Faunal lists were sourced from literature and the website of the Animal Demography Unit of the University of Cape Town.

BAT IMPACT ASSESSMENT:

- 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 limiting the ability to determine if the wind farm will have a large-scale effect on migratory species. This limitation is partially overcome with the 12-months pre-construction sensitivity assessment, however some uncertainty in this regard will remain until the end of operational monitoring of at least 2 years.
- The sensitivity map is based partially on satellite imagery, and ground truthing from site visits. However, given the large extent of the site there is always the possibility that what has been mapped may differ slightly to what is on the ground.
- Species identification with the use of bat detection and echolocation is less accurate when compared to morphological identification, nevertheless it is a very certain and accurate indication of bat activity and their presence with no harmful effects on bats being surveyed.
- Automated species identification by the Kaleidoscope software may produce a small portion of incorrect identifications or unknown identifications. In the last-mentioned case, the dominant frequency of the unknown call was simply used to group the bat into a family or genus group, using dominant frequency only as the determining factor. However, the automated software is very effective at distinguishing bat calls from ultrasonic noise, therefore the number of bat passes are not significantly overestimated.
- It is not possible to determine actual individual bat numbers from acoustic bat activity data, whether gathered with transects or the passive monitoring systems. However, bat passes per night are internationally used and recognised as a comparative unit for indicating levels of bat activity in an area.
- Exact foraging distances from bat roosts or exact commuting pathways cannot be determined by the current methodology. Radio telemetry tracking of tagged bats is required to provide such information if needed.
- Periods of exceptional drought or rain during the pre-construction assessment study can influence bat numbers, causing measurements of lower or higher bat activity due to changes in typical water availability, and consequently, insect prey abundance

AQUATIC IMPACT ASSESSMENT:

- This scoping report was prepared on the basis of the site sensitivity verification process undertaken in response to the national web-based screening report. The site sensitivity verification was completed via desktop analysis of the existing baseline knowledge of riparian or wetlands systems in the study area.
- The National Wetland Map 5 database was used to inform the desktop delineation of wetlands onsite. A site verification of these wetlands will be undertaken during the EIA phase.

AVIFAUNA IMPACT ASSESSMENT:

- The SABAP2 data is regarded as an adequate indicator of the avifauna which could occur at the PAOI, and it was further supplemented by data collected during the on-site surveys.

- The focus of the study was on the potential impacts of the proposed WEF on wind energy priority species.
- Priority species for wind developments were identified from the updated list of priority species for wind farms compiled for the Avian Wind Farm Sensitivity Map.
- Despite the growing body of peer reviewed literature investigating the collision risks of birds with wind turbines and overhead powerlines in South Africa, relevant information for many individual species remains limited. The precautionary principle was therefore applied throughout. The World Charter for Nature, which was adopted by the UN General Assembly in 1982, was the first international endorsement of the precautionary principle. The principle was implemented in an international treaty as early as the 1987 Montreal Protocol and, among other international treaties and declarations, is reflected in the 1992 Rio Declaration on Environment and Development. Principle 15 of the 1992 Rio Declaration states that: "to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall be not used as a reason for postponing cost-effective measures to prevent environmental degradation."
- The assessment of impacts is based on the baseline environment as it currently exists at the PAOI.
- Conclusions drawn in this study are based on experience of the specialists on the species found on site and similar species in different parts of South Africa. Bird behaviour can never be entirely reduced to formulas that will be valid under all circumstances.
- The Broader Area is defined as the area encompassed by the four pentads where the project is located.
- The Project Area of Impact (PAOI) is defined as the area where the primary impacts on avifauna are expected.
- The Project Site is the where the actual development will be located, i.e., the footprint containing the wind turbines and associated infrastructure.

HERITAGE IMPACT ASSESSMENT:

- No field survey was carried out during the Scoping Phase, but a detailed analysis of aerial photography was done. The study was thus slightly limited because smaller, less visible sites are unlikely to be documented from the aerial photography. While sites were clearly visible from the aerial photography, such identification does not allow for an accurate determination of cultural significance which thus needs to be assumed until confirmed on site.
- Cumulative impacts are difficult to assess due to the variable site conditions that would have been experienced in different areas and in different seasons. Survey quality is thus likely to be variable. As such, some assumptions need to be made in terms of what and how much heritage might be impacted by other developments in the broader area.

PALAEONTOLOGICAL IMPACT ASSESSMENT:

- 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 only some contain trace fossils such as stromatolites or microbialites. The overlying soils and sands of the Quaternary period would not preserve fossils.

TRAFFIC IMPACT ASSESSMENT:

- This study is based on the project information provided by the Client.

- According to the Eskom Specifications for Power Transformers (Eskom Power Series, Volume 5: Theory, Design, Maintenance and Life Management of Power Transformers), the following dimensional limitations need to be kept when transporting the transformer – total maximum height 5 000mm, total maximum width 4 300mm and total maximum length 10 500mm.
- Maximum vertical height clearances along the haulage route are 5.2m for abnormal loads.
- The imported elements will be transported from the most feasible port of entry, which is deemed to be the Richards Bay Port.
- If any elements are manufactured within South Africa, these will be transported from their respective manufacturing centres, which would be either in the greater Johannesburg, Cape Town, or Pinetown/Durban.
- All haulage trips on the external road network will occur on either surfaced national and provincial roads or existing gravel roads.
- Material for the construction of internal access roads will be sourced locally as far as possible.
- A maximum of 12 turbines is proposed for the site with a maximum hub height of 200m, and rotor diameter of 200m.
- Abnormal load components will include the generator (weight – 130tT and size), Nacelle (weight – 50t and size), Hub (weight – 60t and size), Blades (weight - 30t and length – up to 95m), Tower – 5 sections (weight per section – up to 81t, length up to 25m), and Transformer (s). (Weight – up to 240t).

RISK ASSESSMENT:

- No detailed site visit will be undertaken, although a general visit to the area will be undertaken. The level of detail required for assessment of SHE impacts of the BESS SHE RA does not necessitate a detailed inspection of the exact area.
- Only solid state (typically lithium-ion) or redox flow (typically vanadium) type batteries will be considered.
- As they have been more widely used there is more information readily available in the literature on lithium type batteries as opposed to vanadium redox flow batteries.
- Lithium BESS facilities are assumed to be containerized.
- Redox flow battery systems can be containerized but can also be utility scale facilities with electrolyte in tanks within a large building, i.e., not containerised.

VISUAL IMPACT ASSESSMENT:

- This visual study has been undertaken based on the updated project description dated March 2023 as provided by the Proponent and the Environmental Assessment Practitioner.
- Given the nature of the receiving environment and the height of the proposed wind turbines, the study area or visual assessment zone is assumed to encompass an area of 10km from the proposed WEF – i.e., an area of 10km from the boundary of the WEF project area. The 10km limit on the visual assessment zone relates to the fact that visual impacts decrease exponentially over distance. Thus, although the turbines may still be visible beyond 10km, the degree of visual impact would diminish considerably. As such, the need to assess the impact on potential receptors beyond this distance would not be warranted.
- The identification of visual receptors involved a combination of desktop assessment as well as field-based observation. Initially Google Earth imagery was used to identify potential receptors within the study area. Where possible, these receptor locations were verified and assessed during a site visit which was undertaken between the 9th and 10th of February 2022. Due to the extent

of the study area however and the number of receptors that could potentially be sensitive to the proposed development, it was not possible to visit or verify every potentially sensitive visual receptor location. As such, several broad assumptions have been made in terms of the likely sensitivity of the receptors to the proposed development.

- It should be noted that not all receptor locations would necessarily perceive the proposed development in a negative way. This is usually dependent on the use of the facility, the economic dependency of the occupants on the scenic quality of views from the facility and on people's perceptions of the value of "Green Energy". Sensitive receptor locations typically include sites such as tourism facilities and scenic locations within natural settings which are likely to be adversely affected by the visual intrusion of the proposed development. Thus, the presence of a receptor in an area potentially affected by the proposed development does not necessarily mean that any visual impact will be experienced.
- The potential visual impact at each visual receptor location was assessed using a matrix developed for this purpose. The matrix is based on three main parameters relating to visual impact and, although relatively simplistic, it provides a reasonably accurate indicative assessment of the degree of visual impact likely to be experienced at each receptor location as a result of the proposed development. It is however important to note the limitations of quantitatively assessing a largely subjective or qualitative type of impact and as such the matrix should be seen merely as a representation of the likely visual impact at a receptor location.
- The exact status of all the receptors could not be verified during the field investigation and as such the receptor impact rating was largely undertaken via desktop means.
- Receptors that were assumed to be farmsteads were still regarded as being potentially sensitive to the visual impacts associated with the proposed development and were thus assessed as part of the VIA.
- Where receptors have been identified within the WEF project area, it has been assumed that the landowners or residents at these locations support the proposed WEF development and would not view the project in a negative light.
- Based on information provided by Igolide, all analysis for this VIA is based on a worst-case scenario where turbine heights are assumed to be 300 m at the blade tip, while substation, BESS facilities and office building heights are assumed to be between 10m and 22 m in height.
- Due to the varying scales and sources of information; maps may have minor inaccuracies. Terrain data for this area, derived from the National Geo-Spatial Information (NGI)'s 25m Digital Elevation Model (DEM), is fairly coarse and somewhat inconsistent and as such, localised topographic variations in the landscape may not be reflected on the DEM used to generate the viewshed(s) and visibility analysis conducted in respect of the proposed development.
- In addition, the viewshed / visibility analysis does not consider any existing vegetation cover or built infrastructure which may screen views of the proposed development. This analysis should therefore be seen as a conceptual representation or a worst-case scenario.
- No feedback regarding the visual environment has been received from the public participation process to date. Any feedback from the public during the review period of the Draft Scoping Report for the Facility will however be incorporated into further drafts of this report, if relevant.
- At the time of undertaking the visual study no information was available regarding the type and intensity of lighting that will be required for the proposed WEF and therefore the potential impact of lighting at night has not been assessed at a detailed level. General measures to mitigate the impact of additional light sources on the ambiance of the nightscape have however been provided.

- In the light of the fact that renewable energy projects are still relatively new in South Africa and as such, this report is based on assumptions as to the likely generic impacts associated with the proposed development.
- This study includes a broad assessment of the potential cumulative impacts of other renewable energy developments on the existing landscape character and on the identified sensitive receptors.
- At the time of writing this report, the proposed WEF layout was still in the preliminary design phase and as such, no visualisation modelling (photomontages) was undertaken for the proposed development. Photomontages will be provided in the EIA phase VIA report.
- The site visit was undertaken in early February 2022, during mid-summer, which is characterised by higher levels of rainfall and increased vegetation cover. In these conditions, slightly reduced levels of visual impact will be experienced from receptor locations in the surrounding area. Accordingly, Google Earth Street View has been used to provide an indication of views during the drier season when vegetation cover provides less screening.
- In clear weather conditions, wind turbines would present a greater contrast with the surrounding environment than they would on an overcast day. The field investigation was conducted during clear to partly cloudy weather conditions.

SOCIAL IMPACT ASSESSMENT:

- Identification of social issues:
  - The identification of social issues is based on the authors experience associated with undertaking in the region of 130 SIAs for renewable energy facilities and associated infrastructure (substations, transmission lines, roads etc.). Based on this the author is confident that the majority of social issues have been identified. As indicated above, a site visit will be undertaken during the Assessment Phase of the SIA.
- Technical suitability:
  - It is assumed that the development site represents a technically suitable site for the establishment of the proposed development.
- Strategic importance of the project:
  - The strategic importance of promoting renewable and other forms of energy is supported by the national and provincial energy policies.
- Fit with planning and policy requirements:
  - Legislation and policies reflect societal norms and values. The legislative and policy context therefore plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard, a key component of the SIA process is to assess the proposed development in terms of its fit with key planning and policy documents. As such, if the findings of the study indicate that the proposed development in its current format does not conform to the spatial principles and guidelines contained in the relevant legislation and planning documents, and there are no significant or unique opportunities created by the development, the development cannot be supported.
- Demographic data:

- The data from the 2021 Census is not currently available. The form the 2011 Census and 2016 Household Community Survey has therefore been used.

- Site visit:
  - A site visit will be undertaken during the Assessment Phase of the SIA. The site visit will include interviews with key stakeholders and interested and affected parties. However, as indicted above, the author is confident that the key social issues have been identified.

3 PROJECT DESCRIPTION

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

3.1 LOCATION OF THE PROPOSED PROJECT

The proposed project will be developed within a project area of approximately 680 hectares (ha). Within this project area, the extent of the Project footprint will be approximately 130 hectares (ha), subject to finalization based on technical and environmental requirements. The Project is located approximately 6km northeast of Fochville, within the Merafong City Local Municipality in the Gauteng Province.

The details of the properties associated with the proposed project, are outlined in **Table 3-1**. The project site coordinates, are indicated in **Figure 3-1, Table 3-2**; and the coordinates for the on-site IPP Substation/ BESS is shown in **Table 3-3**.

Table 3-1 – Affected Farm Portions

Farm Name	21 Digit Surveyor General Code of Each Cadastral Land Parcel
Portion 14 of Farm Kraalkop 147IQ	T0IQ00000000014700014
Portion 20 of Farm Kraalkop 147IQ	T0IQ00000000014700020
Portion RE/22 of Farm Kraalkop 147IQ	T0IQ00000000014700022
Portion 8 of Farm Leeuwpoort 356IQ	T0IQ00000000035600008
Portion 57 of Farm Leeuwpoort 356IQ	T0IQ00000000035600057
Portion 65 of Farm Leeuwpoort 356IQ	T0IQ00000000035600065
Portion 66 of Farm Leeuwpoort 356IQ	T0IQ00000000035600066

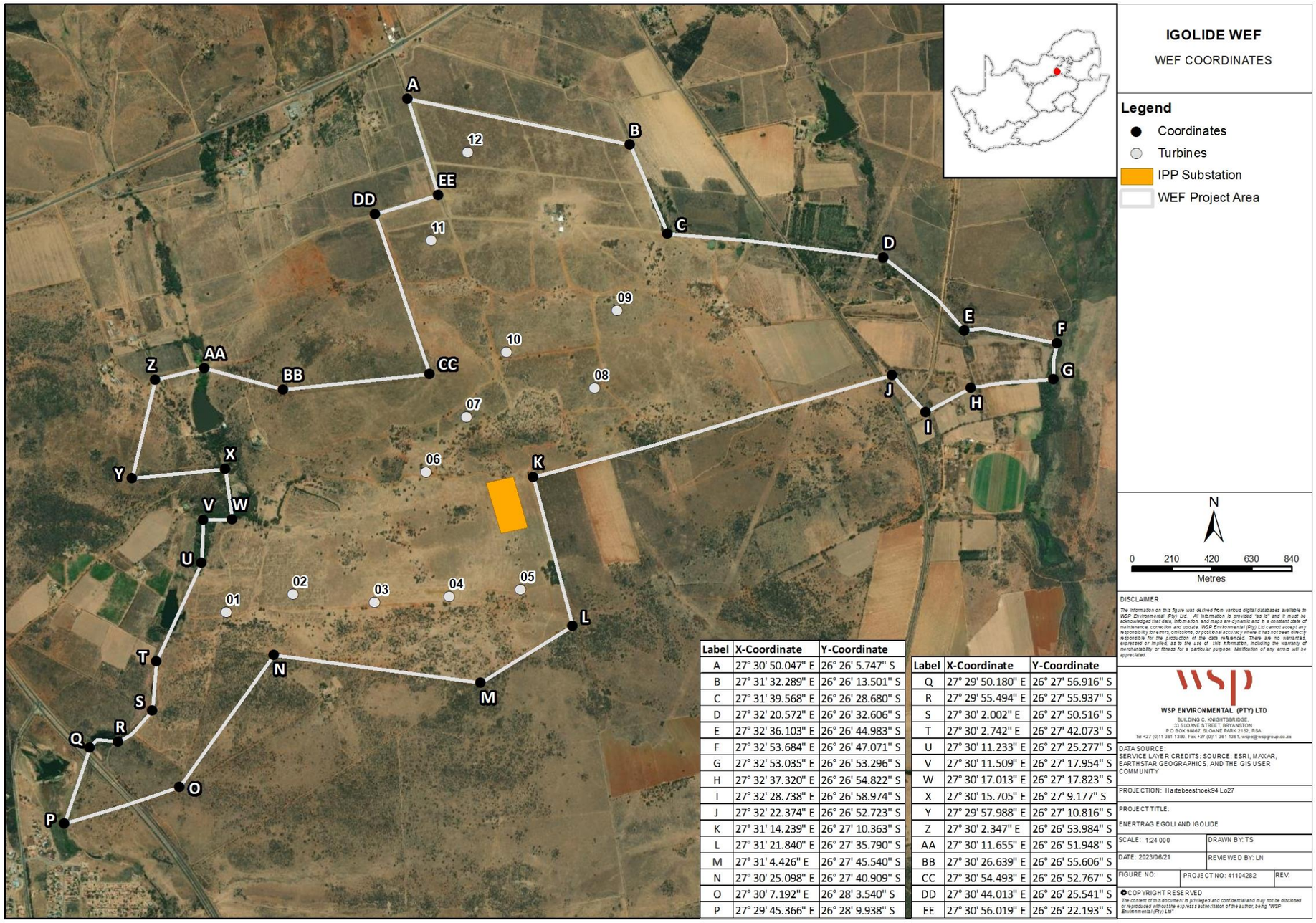
Table 3-2 – Coordinate Points of the Cadastral Land Parcel

Point	Longitude	Latitude
A	27° 30' 50.047" E	26° 26' 5.747" S
B	27° 31' 32.289" E	26° 26' 13.501" S
C	27° 31' 39.568" E	26° 26' 28.680" S
D	27° 32' 20.572" E	26° 26' 32.606" S

Point	Longitude	Latitude
E	27° 32' 36.103" E	26° 26' 44.983" S
F	27° 32' 53.684" E	26° 26' 47.071" S
G	27° 32' 53.035" E	26° 26' 53.296" S
H	27° 32' 37.320" E	26° 26' 54.822" S
I	27° 32' 28.738" E	26° 26' 58.974" S
J	27° 32' 22.374" E	26° 26' 52.723" S
K	27° 31' 14.239" E	26° 27' 10.363" S
L	27° 31' 21.840" E	26° 27' 35.790" S
M	27° 31' 4.426" E	26° 27' 45.540" S
N	27° 30' 25.098" E	26° 27' 40.909" S
O	27° 30' 7.192" E	26° 28' 3.540" S
P	27° 29' 45.366" E	26° 28' 9.938" S
Q	27° 29' 50.180" E	26° 27' 56.916" S
R	27° 29' 55.494" E	26° 27' 55.937" S
S	27° 30' 2.002" E	26° 27' 50.516" S
T	27° 30' 2.742" E	26° 27' 42.073" S
U	27° 30' 11.233" E	26° 27' 25.277" S
V	27° 30' 11.509" E	26° 27' 17.954" S
W	27° 30' 17.013" E	26° 27' 17.823" S
X	27° 30' 15.705" E	26° 27' 9.177" S
Y	27° 29' 57.988" E	26° 27' 10.816" S
Z	27° 30' 2.347" E	26° 26' 53.984" S
AA	27° 30' 11.655" E	26° 26' 51.948" S
BB	27° 30' 26.639" E	26° 26' 55.606" S
CC	27° 30' 54.493" E	26° 26' 52.767" S
DD	27° 30' 44.013" E	26° 26' 25.541" S
EE	27° 30' 56.019" E	26° 26' 22.193" S

Table 3-3 – On site IPP Substation/ BESS

IPP substation/BESS		
		
S1-1	26°27'11.33"S	27°31'5.28"E
S1-2	26°27'10.24"S	27°31'10.34"E
S1-3	26°27'19.02"S	27°31'13.14"E
S1-4	26°27'20.01"S	27°31'8.15"E



Label	X-Coordinate	Y-Coordinate
A	27° 30' 50.047" E	26° 26' 5.747" S
B	27° 31' 32.289" E	26° 26' 13.501" S
C	27° 31' 39.568" E	26° 26' 28.680" S
D	27° 32' 20.572" E	26° 26' 32.606" S
E	27° 32' 36.103" E	26° 26' 44.983" S
F	27° 32' 53.684" E	26° 26' 47.071" S
G	27° 32' 53.035" E	26° 26' 53.296" S
H	27° 32' 37.320" E	26° 26' 54.822" S
I	27° 32' 28.738" E	26° 26' 58.974" S
J	27° 32' 22.374" E	26° 26' 52.723" S
K	27° 31' 14.239" E	26° 27' 10.363" S
L	27° 31' 21.840" E	26° 27' 35.790" S
M	27° 31' 4.426" E	26° 27' 45.540" S
N	27° 30' 25.098" E	26° 27' 40.909" S
O	27° 30' 7.192" E	26° 28' 3.540" S
P	27° 29' 45.366" E	26° 28' 9.938" S

Label	X-Coordinate	Y-Coordinate
Q	27° 29' 50.180" E	26° 27' 56.916" S
R	27° 29' 55.494" E	26° 27' 55.937" S
S	27° 30' 2.002" E	26° 27' 50.516" S
T	27° 30' 2.742" E	26° 27' 42.073" S
U	27° 30' 11.233" E	26° 27' 25.277" S
V	27° 30' 11.509" E	26° 27' 17.954" S
W	27° 30' 17.013" E	26° 27' 17.823" S
X	27° 30' 15.705" E	26° 27' 9.177" S
Y	27° 29' 57.988" E	26° 27' 10.816" S
Z	27° 30' 2.347" E	26° 26' 53.984" S
AA	27° 30' 11.655" E	26° 26' 51.948" S
BB	27° 30' 26.639" E	26° 26' 55.606" S
CC	27° 30' 54.493" E	26° 26' 52.767" S
DD	27° 30' 44.013" E	26° 26' 25.541" S
EE	27° 30' 56.019" E	26° 26' 22.193" S

IGOLIDE WEF

WEF COORDINATES

Legend

- Coordinates
- Turbines
- IPP Substation
- WEF Project Area

N

0 210 420 630 840

Metres

WSP ENVIRONMENTAL (PTY) LTD

BUILDING C, KNIGHTSBRIDGE,
33 SLOANE STREET, BRYANSTON
P O BOX 98867, SLOANE PARK 2152, RSA
Tel +27 (0)11 361 1390, Fax +27 (0)11 361 1381, wsp@wspgroup.co.za

DATA SOURCE:
SERVICE LAYER CREDITS: SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY

PROJECTION: Hartebeesthoek94 Lo27

PROJECT TITLE:

ENERTRAG EGOLI AND IGOLIDE

SCALE: 1:24 000 | DRAWN BY: TS

DATE: 2023/06/21 | REVIEWED BY: LN

FIGURE NO: | PROJECT NO: 41104282 | REV:

Figure 3-1 – Igolide WEF Layout map (with corner coordinates)

3.2 WIND ENERGY POWER GENERATION PROCESS

Wind power is the conversion of wind energy into a useful form of energy, such as electricity, using modern and highly reliable wind turbines. Wind Power is non-dispatchable, meaning that for economic operation, all the available output must be taken when it is available.

Wind turbines, like windmills, are mounted on a tower to harness wind energy at an increased level above the ground where wind is faster and less turbulent. The kinetic energy of the wind is used to turn the blades of the turbine to generate electricity. Wind turbines can operate at varying wind speeds, with the amount of energy the wind transfers to the rotor depending on the density of the air, the rotor area and the wind speed.

The electricity generated by the wind turbines is passed through the step-up transformer and then transmitted via either underground or overhead cables to a central substation, which connects the wind energy facility to a high voltage network. Wind turbines are designed to operate automatically with minimal maintenance for approximately 20-25 years.

Figure 3-2 illustrates the following main components of a wind turbine:

- The rotor consists of three blades which are attached to a hub. The blades collect energy from the wind and converts the wind energy into rotational shaft motion/energy to turn the generator;
- The nacelle houses the equipment at the top of the tower as well as a gearbox, a generator that converts the turning motion/mechanical energy of the blades into electricity and coupling and brake;
- The tower supports the nacelle and rotor and allows the blades to be distanced safely off the ground so as to reach the stronger winds found at higher elevations;
- Turbine step-up transformer which can be indoor or outdoor, depending on the turbine model whose function is to increase the voltage capacity of the electricity generated by the turbine to a higher, grid-equivalent.
- The foundation unit ensures the stability of the turbine structure.

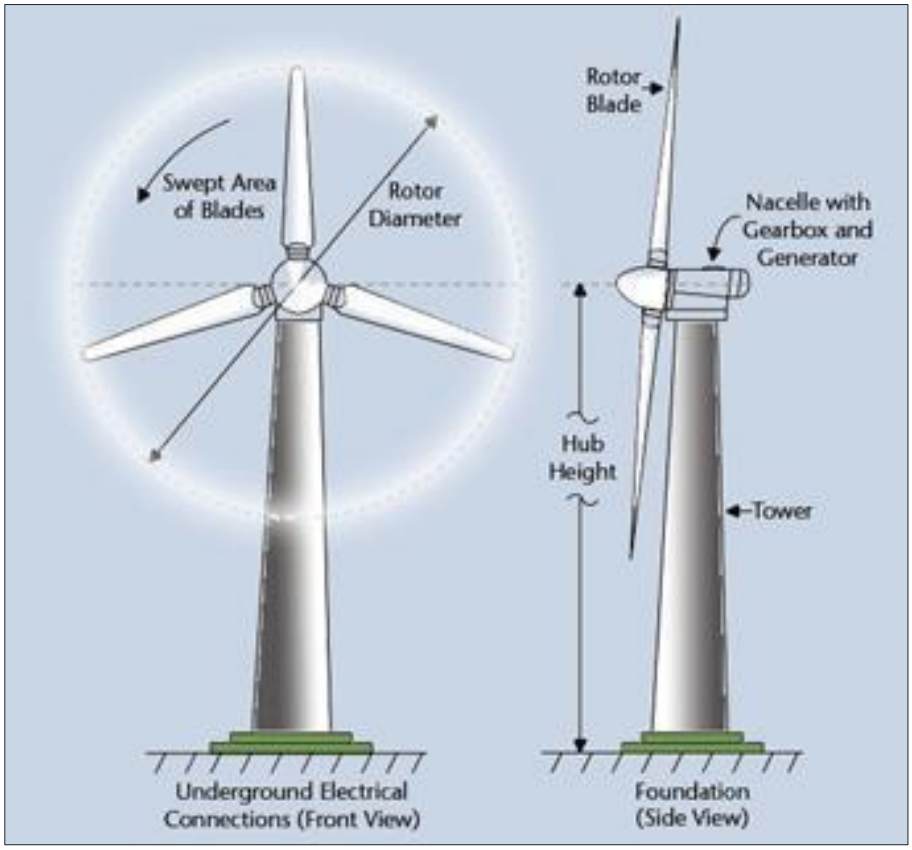


Figure 3-2 - Illustration of the main components of a wind turbine

3.3 PROJECT INFRASTRUCTURE

The proposed Igolide WEF will be developed with an installed capacity of up to 100 MW. The proposed Igolide WEF will comprise the following key components:

WIND TURBINES

- Up to 12 turbines, each with a foundation of approximately 25m in diameter and approximately 3m in depth.
- Turbine hub height of up to 200m.
- Rotor diameter up to 200m.
- Tip height of up to 300m.
- Permanent hard standing area: approximately 1ha will be required per turbine.
- Tower type: Steel or concrete towers can be utilised at the site. Alternatively, the towers can be of a hybrid nature, comprising concrete towers and top steel sections.

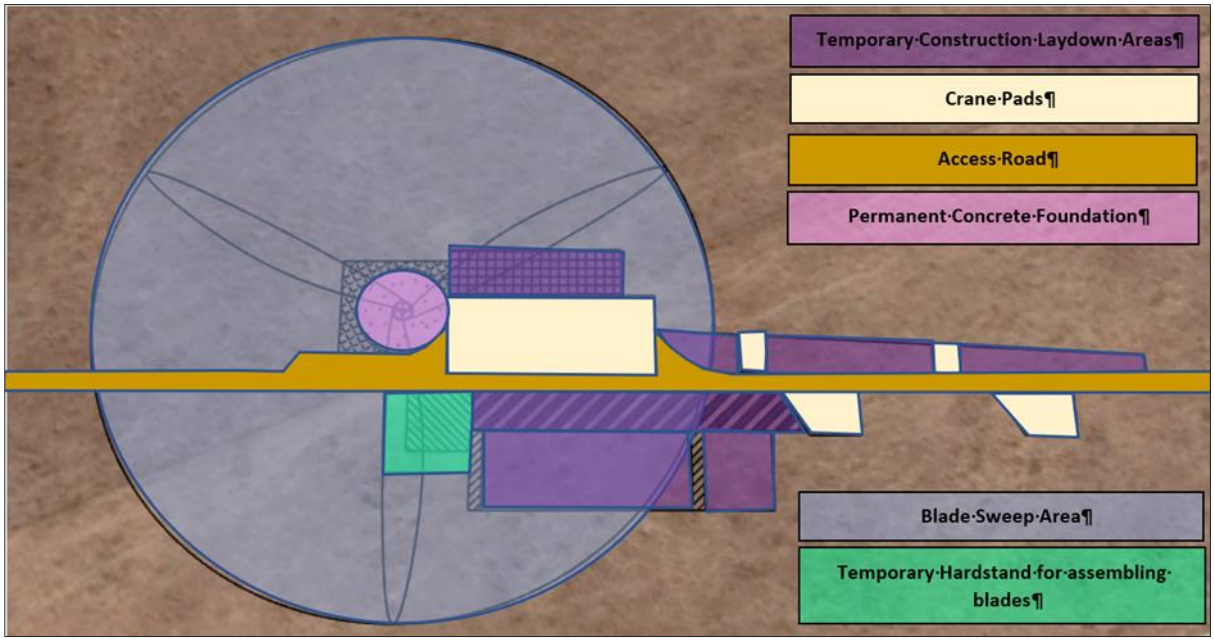


Figure 3-3 - Typical Turbine Hard Standing Requirements (illustration purposes only)

ON-SITE IPP SUBSTATION AND BATTERY ENERGY STORAGE SYSTEM (BESS)

- Total footprint will be up to 4ha in extent.
- The on-site IPP portion substation will have a footprint of approximately 2ha. The substation will consist of a high voltage substation yard to allow for multiple up to 132kV feeder bays and transformers, control building, telecommunication infrastructure, and other substation components, as required. A 500m buffer around the on-site IPP substation has been identified to ensure flexibility in routing the powerline.
- The Battery Energy Storage System (BESS) footprint will be up to 2ha. The BESS storage capacity will be up to 100MW/400 megawatt-hour (MWh) with up to four hours of storage. It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology; however, the specific technology will only be determined following Engineering, Procurement, and Construction ("EPC") procurement. The main components of the BESS include the batteries, power conversion system and transformer which will all be stored in various rows of containers. The BESS components will arrive on site pre-assembled.

CABLING:

The medium voltage collector system will comprise 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 on-site IPP.

OPERATIONS AND MAINTENANCE (O&M) BUILDING INFRASTRUCTURE

- The O&M building footprint will be located near the on-site substation. Typical areas include:
- Operations building – 20m x 10m = 200m^2;
- Workshop and stores area – of ~300m^2; and
- Refuse area for temporary waste storage and conservancy tanks to service the ablution facility.

The total combined area of the buildings will not exceed 5 000m^2.

CONSTRUCTION CAMP LAYDOWN AREA AND BATCHING PLANT:

- The construction camp will have a footprint of approximately 0.5ha and will include portable toilets. Sewage generated will be stored in septic tanks and subsequently collected by a service provider for treatment at a licensed facility;
- The laydown area will have a footprint of approximately 2ha, however, this could increase to 3ha for concrete towers (should they be required). The laydown area will include diesel, cement and chemical storage, as well as a small workshop area; and
- Cement batching plant (temporary) of 1 -3ha.

ACCESS AND INTERNAL ROADS:

- Internal roads will be approximately 8 - 10m in width, increasing up to 15m for turning circle/bypass areas to allow for larger component transport.
- Existing access roads will be used to minimise impact. Where required, the width of the existing roads will be widened to ensure the passage of vehicles.

SUPPORTING INFRASTRUCTURE:

Other Infrastructure located within the project footprint includes:

- Fencing;
- Lighting;
- Lightning protection;
- Telecommunication infrastructure;
- Stormwater channels;
- Water pipelines;
- Offices;
- Operational control centre;
- Warehouse / workshop;
- Ablution facilities;
- Gatehouse;
- Security building;
- Visitor's centre; and
- Substation building.

3.4 PROJECT DEVELOPMENT ACTIVITIES

The typical steps involved in the construction and operation of a wind energy facility is summarised below:

- Planning Phase
  - Step 1: Surveying of the development area and negotiation with affected landowners; and
  - Step 2: Final design and micro-siting of the infrastructure based on geotechnical, topographical conditions and potential environmental sensitivities.
- Construction Phase
  - Step 3: Vegetation clearing and construction of access roads/tracks (where required);

- Step 4: Construction of turbine tower structure foundations;
- Step 5: Assembly and erection of infrastructure on site; and
- Step 6: Rehabilitation of disturbed areas and protection of erosion sensitive areas.

- Operation Phase
  - Step 7: Continued maintenance during operation.

3.4.1 PLANNING PHASE

Surveys will be conducted prior to construction, This will include, but will not be limited to, a geotechnical survey, site survey, and confirmation of the turbine micro-siting footprint, and survey of the on-site substation site to determine and confirm the locations of all associated infrastructure.

Site establishment will include clearing of vegetation and topsoil at the footprint of each turbine, for laydown area, batching plant and access routes. The temporary laydown area will be constructed, including establishment of the construction camp (temporary offices, storage containers, concrete batching plant etc). Site establishment will also entail the installation and/or connection of services (sanitation, electricity, etc).

3.4.2 CONSTRUCITON PHASE

The construction process will follow industry standard methods and techniques. Key activities associated with the construction phase are described in **Table 3-4**.

Table 3-4 – Construction activities

Activity	Description
Transport of components and equipment to site	Bulk materials (aggregate, steel etc.), infrastructure components (masts, blades, tower sections etc), lifting and construction equipment (excavators, trucks, compaction equipment etc.) will be sourced and transported to site via suitable National and provincial routes and designated access roads. The infrastructure components may be defined as abnormal loads in terms of the Road Traffic Act (No. 29 of 1989) due to their large size and abnormal lengths and loads for transportation. A permit may be required for the transportation of these loads on public roads.
Excavation, earthworks and construction of foundations	Subject to the determination of founding specifications, earthworks will be required. This is likely to entail: Excavation of foundation holes to a depth of approximately 3m and pouring of concrete foundations of approximately 500 – 650m^3 from the batching plant. Concrete foundations will be constructed at each turbine location. Please note these dimensions may be larger as required by the geotechnical conditions. Levelling of the construction camp area, on-site substation area, and O&M building area, and excavation of foundations prior to construction. Excavation of trenches for the installation of underground cables.
Construction of wind turbines, site substation and BESS	A large lifting crane(s) will be required to lift the turbine sections (nacelle, blades) into place. The lifting crane/s will be brought on site and will be required to move between the turbine site. Cranes of varying sizes may be required depending on the size of the components.

Activity	Description
	An on-site IPP substation will be constructed on the site. The wind turbines will be connected to the on-site IPP substation via underground or overhead (if required) up to 33kV electrical cables. The BESS will typically require the placement of multiple containers to house the BESS components.
Establishment of ancillary infrastructure	Ancillary infrastructure will include construction site office, temporary laydown area and workshop area for contractor's equipment. Establishment of the ancillary infrastructure will require the clearing of vegetation, levelling, and the excavation of foundations prior to construction.
Rehabilitation	Once all construction is completed on site and all equipment and machinery has been removed from the site, the site will be rehabilitated. On commissioning, access points to the site not required during the operation phase will be closed and prepared for rehabilitation.

3.4.3 OPERATIONAL PHASE

The proposed Igolide WEF is anticipated to have a minimum life of 20 years. The facility will operate for 24 hours, 7 days a week. While the project is self-sufficient, maintenance and monitoring activities will be required. Potable water requirements for permanent staff will be limited. During the operational phase there will be little to no Project-related movement along the servitudes as activities are limited to maintaining the servitude (including maintenance of access roads and cutting back or pruning of vegetation to ensure that vegetation does not affect the WEF), inspection of the WEF infrastructure and repairs when required. Limited impact is expected during operation since there will not be any intrusive work done outside of maintenance in the event that major damage occurs to site infrastructure. Operation of the WEF will involve the following activities, discussed below.

- Servitude and access road maintenance is aimed at eliminating hazards and facilitating continued access to the WEF. The objective is to prevent all forms of potential interruption of power supply due to overly tall vegetation/climbing plants or establishment of illegal structures within the right servitude. It is also to facilitate ease of access for maintenance activities on the WEF. During the operational phase of the project, the servitude will be maintained to ensure that the functions optimally and does not compromise the safety of persons within the vicinity of the WEF.
- Igolide WEF will develop comprehensive planned and emergency programmes through its technical operations during the operation and maintenance phase for the WEF. The maintenance activities will include:
  - Periodic physical examination of the WEF and its safety, security and integrity.
  - Defects that are identified will be reported for repair. Such defects may include defective conductors, flashed over insulators, defective dampers, vandalised components, amongst others.
  - Maintenance / repairs will then be undertaken.

3.4.4 DECOMMISSIONING PHASE

Following the initial 20-year operational period of the wind facility, the continued economic viability will be investigated. If the facility is still deemed viable, the life of the facility will be extended. The

facility will only be decommissioned once it is no longer economically viable. If a decision is made to completely decommission the facility, this will be subject to a separate authorisation and impact assessment process, all the components will be disassembled, reused and recycled or disposed. The site would be returned to its current use i.e., agriculture (Grazing).

3.5 NEED AND DESIRABILITY OF THE PROJECT

South Africa is faced with significant increases in electricity demand and a shortage in electricity supply. South Africa is the seventh highest coal producer in the world, with approximately 77% of the country's electricity generated from coal. 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. South Africa is also the highest emitter of greenhouse gases in Africa; attributed to the country's energy-intensive economy that largely relies on coal-based electricity generation.

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

3.5.1 INTERNATIONAL PERSPECTIVE

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

Failure to do so will result in catastrophic impacts on both the global and local communities, as it is predicted that as climate change increases, this would have a significant negative impact on agriculture. Studies have shown that climate change, including the drastic increases in the frequency and intensity of extremes events, have reduced food and water security, hindering efforts to meet Sustainable Development Goals.

The Kyoto Protocol, which was adopted in December 1997, is also relevant to the need of the Project. The protocol aimed to reduce the emission of gases that contribute to global warming. In force since 2005, the protocol called for reducing the emission of six greenhouse gases in 41 countries, plus the European Union, through actively cutting down on fossil fuels, or by utilising more renewable resources. The development of the Project will add capacity to the renewable energy sector of the country and strengthen the commitment and action plan to achieve the requirements, as set out in the protocol, through the generation of energy without the emission of greenhouse gases.

3.5.2 NATIONAL COMMITMENTS

The National Development Plan envisages that by 2030, South Africa would have an energy sector that produces sufficient energy to support industry at competitive prices, ensuring for poor households, while reducing carbon emissions per unit of power by about one third. The National Development Plan states the procurement of 20 000MW of renewable energy by 2030, decommissioning of 11 000MW

of ageing coal-fired power stations and stepping up investments in energy-efficiency as some of the infrastructure investments that should be prioritised in the Country.

The Project is proposed in specific response to the identified energy mix of South Africa as per the requirements set out in the Integrated Resource Plan (IRP) with regards to renewable energy targets. Thermal power comprised 92.4% of the total power capacity in South Africa in 2000. With a few plants decommissioned and capacities of other technologies increasing, the share of thermal power fell during 2000 – 2019, but not my much. With international pressure to reduce emissions, the Country announced plans to increase renewable power and reduce the share of thermal power, especially coal power. These plans were elucidated in the IRP of 2016 soon after signing the Paris Agreement. Later, the intention of reduce thermal power and increase renewable power was reaffirmed in the subsequently published IRP 2018 and IRP 2019.

The need for new power generation from wind energy facilities has been identified and assessed by government at a national scale, considering the national energy requirements as well as international commitments under the Paris Agreement; therefore, the provision has been made for the inclusion of new wind power generation capacity in South Africa's energy mix. The development of the Project has the potential to contribute positive towards the identified need, while simultaneously contributing to job creation and socio-economic development, identified as a need for the Country in the NDP.

In 2011, South Africa launched a competitive procurement programme for renewable energy called the Renewable Energy Independent Power Producer Procurement Program (REIPPPP) aimed at diversifying the Country's energy mix. Under the REIPPPP, the Department of Mineral Resources and Energy (DMRE) intends to secure 14 725MW of electricity from renewable energy generation facilities utilising either onshore wind, concentrated solar thermal, solar photovoltaic, biomass, biogas, landfill gas, or hydro across a number of bidding windows, while simultaneously contributing towards socio-economic development. The REIPPPP requires renewable energy companies to create local development benefits in an effort to reduce the weight of structural and systemic issues of poverty and inequality. Therefore, in addition to electricity generation and supply, the Project will also contribute positively towards the socio-economic development of a region, over and above job creation.

The proposed Igolide WEF will also aid in overcoming the power shortages that are currently faced in the country. In 2022, South Africa witnessed its longest recorded hours of load shedding, with the power being off for 859 hours of the year as shown in **Figure 3-4**. The South African Government has taken strides to try reducing these power cuts through the implementation of bid Windows in REIPPP and lifting the independent power generation threshold to 100MW, but it is still expected that the country will undergo more load shedding.

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

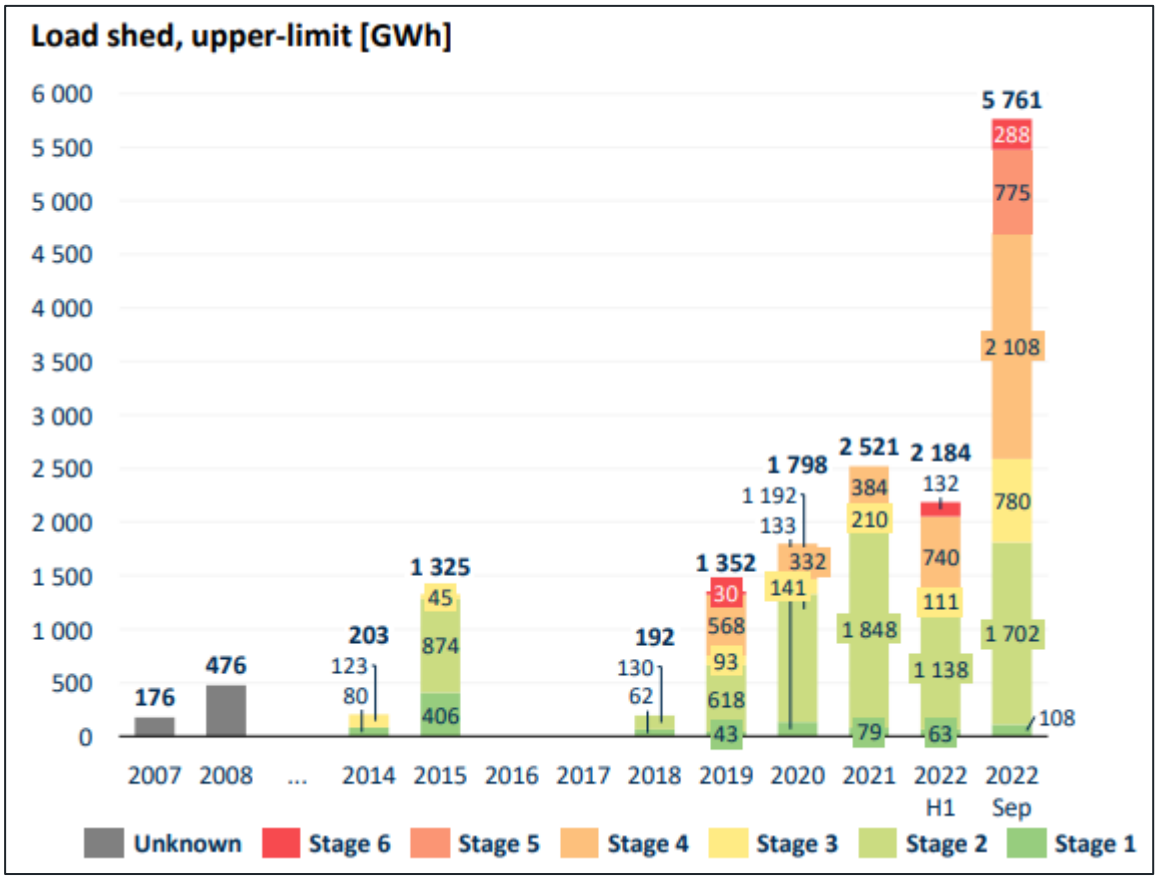


Figure 3-4 - Load shedding hours over the years in South Africa

Source: CSIR (2022)

3.5.3 POWER GENERATION

3.5.3.1 National

Load shedding is the single biggest constraint on South Africa's economy. This has devasted critical economic sectors such as manufacturing, hospitality, tourism, mining and agriculture. Therefore, the Project will aid in assisting in overcoming the power shortages that are currently faced in the country. In 2022, South Africa endured 192 720 minutes of loadshedding, which is 200% more than any other year. The South African Government has taken strides to try reducing these power cuts through the implementation of bid Windows in REIPPPP and lifting the independent power generation threshold to 100 MW, but it is still expected that the country will undergo more load shedding. Over the years the construction of Wind and Wind 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. Furthermore, after the COP26, South Africa signed an international partnership which will facilitate the funding of USD 8.5 billion from Germany, France, the USA, the UK and, the European Union over the next three to five years to aid in the country's transition towards a low-carbon economy. This opens an opportunity for renewable energy Independent Power Producers (IPPs) to aid in the countries quest to reduce its GHG emissions and help resolve the ongoing electricity crisis in the country.

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

3.5.3.2 Provincial

To deal with the energy crisis, the Gauteng Provincial Government (GPG) hosted the Energy Expo on 16 February 2023 under the theme “Growing Gauteng Together towards a sustainable energy mix”. The Expo aimed to provide a platform for showcasing solutions and technologies than can be incorporated into the GPG plans as well as to gain insights into stakeholder energy plans. The Gauteng government is committed to working with all spheres of government and stakeholders to end load shedding and ensure a stable supply of affordable power.

The provincial government’s strategic intent includes the following:

- Ensuring energy security for desirable economic growth.
- Ensuring universal, affordable and modern energy to all citizens of the Gauteng City Region.
- Diversifying energy source within the province to include renewables and other forms of energy.
- Promoting energy efficiency measures across of sectors of the economy and improving provincial energy governance and administration.

Additionally, the Gauteng government has established the Energy Emergency Council to respond to the worsening electricity supply crisis.

4 PROJECT ALTERNATIVES

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

All alternatives outlined below are considered both feasible and reasonable with no apparent advantages or disadvantages at this stage of the project. All alternatives will be described and assessed in more detail during the EIA Phase.

Extensive consideration of alternatives and avoidance of impacts took place in the screening/design phase. This is discussed in detail in the section below.

4.1 SITE ALTERNATIVES

Based on the extensive in-house scoping study done in the province, the Igolide WEF has been selected based on several factors, namely: wind resource, grid capacity and access to the national electricity grid, topography, site access, existing competition, land availability, land use and suitability, landowner support, and environmental constraints. These factors are further explained in the subsections below:

4.1.1 WIND RESOURCE

Wind resource is the first main driver of site selection and project viability when considering the development of wind energy facilities. The project site, which is located near the town of Fochville in the Gauteng Province, has good wind resource potential. The wind resource for the development site has been monitored using on-site monitoring devices over approximately 16 months and has proven to be competitive and equal to other projects in the country. The project developer explored the wind resource around South Africa, with specific focus on the Gauteng Province, and highlighted this area as being a strong site from a resource perspective. This viable resource ensures that best value for money is gained for the economy of South Africa.

4.1.2 GRID CAPACITY AND ACCESS TO THE NATIONAL ELECTRICITY GRID

Grid capacity is one of the main constraints to the expansion of wind energy projects and renewable energy projects at large in South Africa. The failure to appoint any wind projects in Bid Window 6 was attributed to an unavailability of grid capacity in the Eastern, Northern and Western Cape provinces, where all the wind projects submitted as part of Bid Window 6 are located. Unlike the Cape Provinces of South Africa, where there is abundant wind resources but no available grid capacity, the Project site provides the opportunity to connect to the Eskom grid. For this reason, the project developer, is developing the proposed Igolide Wind Energy Facility within the Gauteng area.

A key factor in the siting of any power generation project is a viable grid connection. The anticipated grid connection (subject to a separate environmental assessment and authorisation process) is a 132kV on-site substation (comprising IPP and Eskom portions) and a 132kV single or double circuit overhead power line from the on-site substation to the existing Eskom-owned Midas Main Transmission Substation (MTS), which is located ~10.3km from the proposed Project site.

4.1.3 TOPOGRAPHY, SITE ACCESS, AND COMPETITION

The project site is characterised by sloping plains and low hills. The altitude ranges from 1 500m at the lowest point in the west, up to ~1 640m at the highest point in the central part of the site. High lying areas where wind resources are at their best are favoured during the site selection process for a wind energy facility, and the project site fits this criterion.

Access to the project site is ample with the presence of existing roads mainly consisting of national and regional roads. The project site is located to the south of the N12 national road, and to the east of the R500. The secondary roads off the N12 provide direct access to the project site and either option may be utilised to access the Project site during the life of the project.

There is minimal competition in the area, with regards to renewable energy facilities, specifically wind energy facilities; thus, the Project will likely be the one of the first few wind farms in the area and will act as one of the pioneering developments and open opportunities for other wind energy developments in the area.

4.1.4 LAND AVAILABILITY

In order to develop the proposed project with a contracted capacity of up to 100MW, sufficient space is required. The preferred project site was identified within the Gauteng Province, near the Fochville area, following the confirmation of a feasible wind resource from on-site wind measurements taken over a 16-month period. The properties included in the project site are privately – owned parcels available in the area for a development of this nature through agreement with landowners and are deemed technically feasible by the project developer for such development to take place. The combination of the affected properties has an extent of ~680ha, which was considered by the project developer as sufficient for the development of the project.

4.1.5 LAND USE AND SUITABILITY

The current land use of the Project site is an important consideration in site selection to limit disruption of existing land use parcels. There is some evidence of crop production within the western section of the site. It is important to note that a wind development, dissimilar to other power generation facilities, does not result in whole-scale disturbance. For example, Gouda Wind Farm, which is located outside the town of Gouda in the Western Cape province, has shown that it is possible to construct a wind farm in an agricultural area and that crop production can continue around the wind turbines while renewable energy is generated by the turbines.

4.1.6 LANDOWNER SUPPORT

The selection of a site where the landowner is supportive of the development of renewable energy is essential for ensuring the success of the project. The owner of the properties affected by the proposed Project does not view the development as a conflict with their current or planned land use practices. The support for the development to be undertaken on the affected properties has been solidified by

the provision of consent for the project to proceed on the property through the signing of a consent form.

4.1.7 ENVIRONMENTAL CONSTRAINTS

Following confirmation of the Project site as being technically feasible for the development of a wind energy facility, the project developer commenced with desktop environmental screening of the site to identify the main constraints and determine whether there were any potential fatal flaws or significant no-go areas within the site that may compromise or limit the buildable area and the potential for generating up to 100MW. This is a common approach in the development of renewable energy projects in order to inform the placement of infrastructure for further investigation in the Scoping and Environmental Impact Assessment process.

4.2 TECHNOLOGY ALTERNATIVES

4.2.1 RENEWABLE ENERGY TECHNOLOGY ALTERNATIVES

Through desktop screening, and monitoring wind resource using on-site monitoring devices over approximately 16 months, the project developer has identified the site for the Igolide WEF as being competitive from a wind resource perspective. The project developer is therefore considering wind technology as a feasible option for implementation at the identified site based on the outcome of the onsite wind monitoring. There is a limited range of alternative technologies (turbines) available for commercial-scale wind energy facilities. Furthermore, the technology is constantly evolving. The project developer therefore confirms wind energy technology as the preferred technology alternative for the development of the project. No further renewable energy technology alternatives are considered within this Scoping Report.

4.2.2 BATTERY ENERGY STORAGE SYSTEM TECHNOLOGY ALTERNATIVES

The Proponent is considering two types of preferred battery technologies for the BESS, that is, either Solid State Lithium (SSL) or Vanadium Redox Flow (VRF) Battery Energy Storage Systems. It is important to note that the selection of specific technology will only be determined following EPC. Therefore, both technologies are currently being considered.

4.2.2.1 Lithium Solid State Batteries

Solid-State Battery consists of multiple battery cells that are assembled together to form modules. Each cell contains a positive electrode, a negative electrode and an electrolyte. The BESS will comprise multiple battery units or modules housed in shipping containers and/or an applicable housing structure which is delivered pre-assembled to the project site. Containers are usually raised slightly off the ground and layout out is rows. They can be stacked if required although this may increase the risk of events in one container spreading to another container. Supplementary infrastructure and equipment may include substations, power cables, transformers, power converters, substation buildings & offices, HV/MV switch gear, inverters and temperature control equipment that may be positioned between the battery containers. The solid-state batteries that are being considered are Lithium-ion systems.
In Lithium battery technologies, energy storage and release is provided by the movement of lithium ions from the negative electrode to the positive electrode during discharge and back when charging.

Solid-State lithium (SSL) batteries have become increasing popular due to their high energy density, low self-discharge and long lifetime and cycling performances.

4.2.2.2 Vanadium redox Flow Battery

The project will employ utility scale batteries. These energy storage systems can be supplied either as containerized units or as a fixed installation within a building etc. Due to the proposed size of the facility (100MW) the Igolide WEF is currently envisioned as having units housed within a large battery building.

All electrochemical energy storage systems convert electrical energy into chemical energy when charging, and the process is reversed when discharging. With conventional batteries, the conversion and storage take place in closed cells. With redox flow batteries, however, the conversion and storage of energy are separated. Redox flow batteries differ from conventional batteries in that the energy storage material is conveyed by an energy converter. This requires the energy storage material to be in a flowable form. In redox flow batteries, charging and discharging processes can take place in the same cell. Redox flow batteries thus have the distinguishing feature that energy and power can be scaled separately. The power determines the cell size, or the number of cells and the energy is determined by the amount of the energy storage medium. In theory, there is no limit to the amount of energy that can be produced and/or stored thereby allowing for scalability of these systems. VRF battery is considered to have a large cycle life, independent power and energy ratings, relatively poor round trip, moderate cost and no self-discharge.

Figure 4-1 shows the general operating principle of redox flow batteries. The energy conversion takes place in an electrochemical cell which is divided into two half cells. The half cells are separated from each other by an ion-permeable membrane or separator, so that the liquids of the half cells mix as little as possible. The separator ensures a charge balance between positive and negative half cells, ideally without the negative and positive.

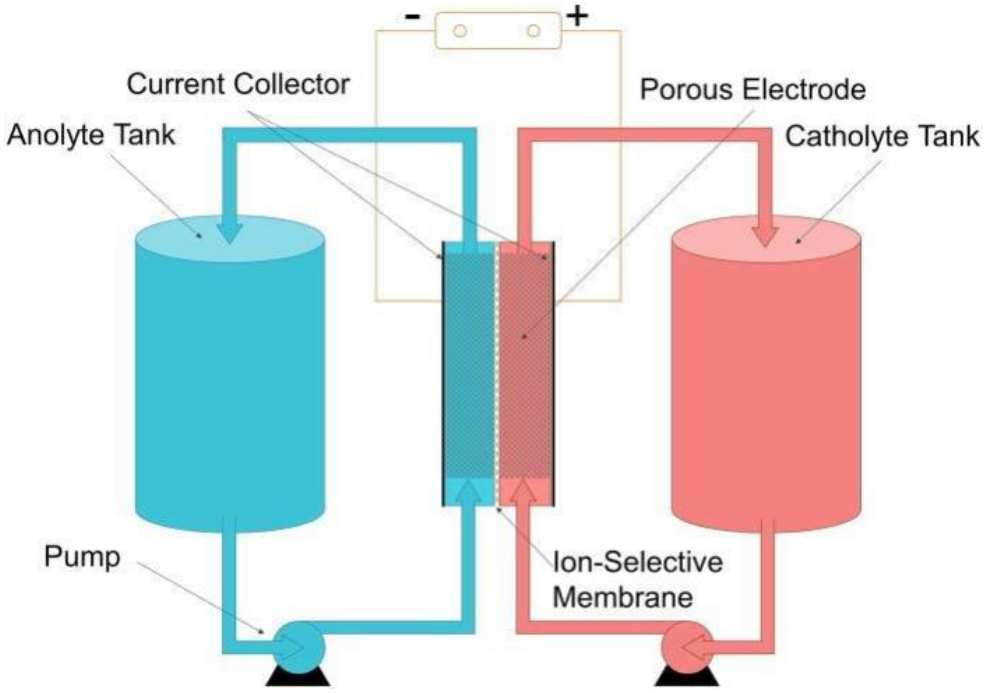


Figure 4-1: Schematic Diagrams of Redox Flow BESS Systems (Source: Wikipedia)

The potential risks and impacts of the proposed BESS at the Igolide WEF will be assessed through a Qualitative Risk Assessment to be undertaken in the EIA phase. This study will also indicate how impacts will be minimised.

4.3 LAYOUT ALTERNATIVES

The aim of the facility layout is to maximise electricity production through exposure to the wind resource, while minimising infrastructure, operation, and maintenance costs, as well as social and environmental impacts.

The process undertaken for this project is an iterative design process whereby through various assessment phases and iteratively updating the site sensitivities to avoid environmental features (as outlined within Section 4.1) the site boundaries were determined and further assessed by the specialists to determine the footpfrint/layout for the facility. The footprint/layout would avoid all the no-go areas identified by the specialists (and associated restrictions/exceptions) and would be seen as acceptable. Therefore, no layout alternatives are being considered for this project.

4.4 NO-GO ALTERNATIVE

In the “no project” alternative, the Igolide WEF project will not be developed. In this scenario, there could be a missed opportunity to address the need for increase in renewable energy generation in an effort to mitigate against concerns of climate change and exploitation of non-renewable resources. The no-go alternative would not assist in responding to the growing electricity demand in South Africa and would not contribute to the reliability of electricity supply at a national scale. Conversely, negative environmental impacts of the project (as outlined in Section 8) associated with the development of the proposed project would be avoided.

Specialists have considered the no-go alternative and the following has been concluded:

- Agriculture:

  The no-go alternative considers impacts that will occur to the agricultural environment in the absence of the proposed development. The development compliments agriculture by providing an additional income source, without excluding agriculture from the land, or decreasing production. Therefore, the negative agricultural impact of the no-go alternative is more significant than that of the development, and so, from an agricultural impact perspective, the proposed development is the preferred alternative. In addition, the no-go option would prevent the proposed development from contributing to the environmental, social and economic benefits associated with the development of renewable energy in South Africa.

- Heritage:

  If the project were not implemented, then the site would stay as it currently is (impact significance of neutral). Although the heritage impacts with implementation would be greater than the existing impacts, the loss of socio-economic benefits is more significant and suggests that the No-Go option is less desirable in heritage terms.

- Traffic:

  The no-go alternative implies that the proposed development of the WEF does not proceed. This would mean that there will be no negative environmental impacts and no traffic impact on the surrounding network during the construction and decommissioning phases of the proposed WEF.

However, this would also mean that there would be no socio-economic benefits to the surrounding communities, and it will not assist government in meeting its' targets for renewable energy. Hence, the no-go alternative is not a preferred alternative.

- Visual:

  The 'no-go' alternative is the option of not undertaking the proposed project. Hence, if the 'no-go' option is implemented, there would be no development. The area would thus retain its visual character and sense of place and no visual impacts would be experienced by any locally occurring receptors.

- Social:

  The primary goal of the Project is to assist in providing additional capacity to Eskom to assist in addressing the current energy supply constraints. The project also aims to reduce the carbon footprint associated with energy generation. As indicated above, energy supply constraints and the associated load shedding have had a significant impact on the economic development of the South African economy. South Africa also relies on coal-powered energy to meet more than 90% of its energy needs. South Africa is therefore one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions.

The No-Development option would represent a lost opportunity for South Africa to improve energy security and supplement is current energy needs with clean, renewable energy. Given South Africa's current energy security challenges and its position as one of the highest per capita producers of carbon emissions in the world, this would represent a significant negative social cost.

5 GOVERNANCE FRAMEWORK

5.1 NATIONAL LEGAL AND REGULATORY FRAMEWORK

The South African regulatory framework establishes well-defined requirements and standards for environmental and social management of industrial and civil infrastructure developments. Different authorities at both national and regional levels carry out environmental protection functions. The applicable legislation and policies are shown in **Table 5-1**.

Table 5-1 – Applicable National Legislation[1]

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

[1] It should be noted that all dimensions outlined in relation to Listing Notice 1, 2 and 3 are provisional and are subject to final design.

Legislation	Description of Legislation and Applicability
	The development of facilities or infrastructure for the transmission and distribution of electricity— *(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts* **Description:** Internal distribution electrical infrastructure required to connect the facility to the grid will include a 33/132kV on-site IPP substation and 33kV cabling (buried or overhead). The Facility is located outside urban areas.
	Activity 12(ii)(a)(c) *The development of—* *(ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—* *(a) within a watercourse; or* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse* **Description:** The physical footprint of internal access roads and electrical cabling required to connect the various components of the facility will exceed 100m2 within delineated watercourses on site, or within 32m of the outer extent of the delineated watercourses on site.
	Activity 14 *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 80 but not exceeding 500 cubic metres* **Description:** The facility will require the storage and handling of dangerous goods, including fuel, cement, and combustible and flammable liquids such as oils, lubricants and solvents, where such storage will occur inside containers with a combined capacity greater than 80m3 but not exceeding 500m^3.
	Activity 19 *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.* **Description:** Internal access roads and stormwater control infrastructure, as well as electrical cabling required to connect the various components of the facility will collectively require the excavation, infilling or removal of soil exceeding 10m^3 from delineated watercourses on site. The exact values will be confirmed once final designs have been provided however, these will be within the thresholds relevant to this Listed Activity and therefore within the threshold values and triggering this activity

Legislation	Description of Legislation and Applicability
	Activity 24(ii) *The development of a road—* *(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;* **Description:** Internal access roads required by the facility will be between 8m and 10m wide. Where required for turning circle/bypass areas, however, access or internal roads may be up to 15m to allow for larger component transport. The exact values will be confirmed once final designs have been provided however, these will be within the thresholds relevant to this Listed Activity and therefore within the threshold values and triggering this activity
	Activity 28(ii) *Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:* *(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 ha.* **Description:** The facility is considered a commercial and/or industrial development and is located on several farm portions outside an urban area, used for agricultural purposes. The total area to be developed for the facility (buildable area) greater than 1 hectare within agricultural use land, subject to finalization based on technical and environmental requirements.
	Activity 48(i)(a)(c) *The expansion of—* *(i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more;* *where such expansion occurs—* *(a) within a watercourse;* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.* **Description:** Transport of large infrastructure components related to the facility 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 or road reserves located within delineated watercourses on site, or within 32m of the outer extent of the delineated watercourses on site. The expansion footprint will be confirmed once final designs have been provided however, these will be within the thresholds relevant to this Listed Activity and therefore within the threshold values and triggering this activity.

Legislation	Description of Legislation and Applicability
	Activity 56(ii) *The widening of a road by more than 6 m, or lengthening of a road by more than 1 km –* *(ii) where no reserve exists, where the existing road is wider than 8 metres.* **Description:** Transport of large infrastructure components related to the facility will require the widening of existing access and/or internal roads where no reserve exists and where such road is wider than 8 metres. The facility is located within a rural area. Subject to detail design widening up to 15m for turning circle/bypass areas is anticipated, thereby exceeding the threshold value and triggering this activity.
Listing Notice 2: GNR 984	**Activity 1** *The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs:* *(a) within an urban area; or* *(b) on existing infrastructure.* **Description:** The project comprises a Wind Energy Facility of up to 100MW.
	Activity 15 *The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—* *(i) the undertaking of a linear activity; or* *(ii) maintenance purposes undertaken in accordance with a maintenance management plan* **Description:** The facility will require the clearance of indigenous vegetation be in excess of 20ha (subject to finalisation based on technical, final design and environmental requirements). The approximate footprint will be confirmed at final design.
Listing Notice 3: GNR 985	**Activity 4(c)(iv)** *The development of a road wider than 4 metres with a reserve less than 13,5 metres—* *c)Gauteng:* *iv. Sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans.* **Description:**

Legislation	Description of Legislation and Applicability
	Internal access roads required for the facility will be between 8m and 10m wide, increasing up to 15m where required for turning circle/bypass areas. The exact values will be confirmed following detailed design. The proposed roads required for the facility will be located within and may require vegetation clearance or disturbance within Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA)(iv) in the Gauteng Province.
	Activity 12: *The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan—* *c) Gauteng:* *ii. Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans.* **Description:** The facility will require the clearance more than 300m^2 of indigenous vegetation, which will partially include the clearance of Rand Highveld Grassland and Gauteng Shale Mountain Bushveld vegetation types, both with a conservation status listed as "Vulnerable" by Mucina & Rutherford (2006), but it is listed as "Least Concern" by NEMA (2011) and Skowno et al., (2019). Furthermore, the vegetation clearance required for the facility may be located within Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA), in excess of 300m^2(ii) in the Gauteng Province.
	Activity 14(ii)(a)(c)(iv) *The development of—* *(ii) infrastructure or structures with a Physical footprint of 10 Square metres or more;* *where such development occurs—* *(a) within a watercourse;* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* *c) Gauteng:* *iv. Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans.* **Description:** The facility will require the development of internal roads and/or access roads, culverts or similar drainage crossing infrastructure around the site (with a physical footprint exceeding 10m^2 within the delineated watercourses on site or within 32m of the outer extent of the delineated watercourses on site. In addition, the roads associated with the facility will be located within Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA)(iv) in the Gauteng Province.

Legislation	Description of Legislation and Applicability
	Activity 18(c)(iv) *The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.* *c) Gauteng:* *iv. Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans;* **Description:** Transport of large infrastructure components related to the facility will require the widening of existing access and/or internal roads where no reserve exists and where such road is wider than 8 metres. The facility is located within a rural area. Subject to detail design widening up to 15m for turning circle/bypass areas is anticipated, thereby exceeding the threshold value and triggering this activity. The facility will be located within Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA)(iv) in the Gauteng Province
	Activity 23(ii)(a)(c)(iv) *The expansion of* *(ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more;* *Where such expansion occurs-* *(a) within a watercourse* *c) Gauteng:* *iv. Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans;* **Description:** Transport of large infrastructure components related to the facility will require the expansion of existing access and/or internal roads, culverts or similar drainage crossing infrastructure collectively exceeding 10m^2 or more within delineated watercourses on site, or within 32m of the outer extent of the delineated watercourses on site(ii)(a)(c). The exact values will be confirmed at detailed design, however, these will be within the thresholds relevant to this Listed Activity and therefore within the threshold values and triggering this activity. In addition, the development activity contemplated will be located within Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA) in the Gauteng Province.
Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes (GNR 320, 20 March 2020 and GNR 1150, 30 October 2020)	The protocols provide the criteria for specialist assessment and minimum report content requirements for impacts for various environmental themes for activities requiring environmental authorisation. The protocols replace the requirements of Appendix 6 of the EIA Regulations, 2014, as amended. The assessment and reporting requirements of the protocols are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (screening tool).

Legislation	Description of Legislation and Applicability
	The following environmental themes were applicable to the Igolide WEF project: ▪ Agriculture Theme ▪ Animal Species Theme ▪ Aquatic Biodiversity Theme ▪ Archaeological and Cultural Heritage Theme ▪ Avian Theme ▪ Civil Aviation (Solar PV) Theme ▪ Defence Theme ▪ Landscape (Solar) Theme ▪ Palaeontology Theme ▪ Plant Species Theme ▪ Radio Frequency Interference (RFI) Theme ▪ Terrestrial Biodiversity Theme
Renewable Energy Development Zones and Strategic Transmission Corridors	On 16 February 2018, the DFFE gazetted the Renewable Energy Development Zones (REDZs) and Strategic Transmission Corridors and Procedures for the Assessment of Large-scale Wind and Solar Photovoltaic Energy Development Activities (GN 114) and Grid Infrastructure (GN 113). Subsequently, on 26 February 2021 a further three REDZ were gazetted (GN 142). The procedure allows for wind and solar PV activities within the eight REDZs and electricity grid development within the five power corridors to be subjected to a BA and not a full S&EIA process. In addition, the timeframes associated with the decision on the application is reduced from 107 days to 57 days. **The proposed Igolide WEF is not located within a REDZ.**
National Environmental Management: Waste Act (59 of 2008) (NEM:WA)	This Act provides for regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation. The Act also provides for the licensing and control of waste management activities through GNR. 921 (2013): List of Waste Management Activities that Have, or are Likely to Have, a Detrimental Effect on the Environment. The proposed project does not constitute a Listed Activity requiring a Waste Management Licence (WML) as defined in GNR 921. However, the contents of this Scoping Report will include reasonable measures for the prevention of pollution and good international industry practice (GIIP).
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) was promulgated in June 2004 within the framework of NEMA to provide for the management and conservation of national biodiversity. The NEMBA's primary aims are for the protection of species and ecosystems that warrant national protection, the sustainable use of indigenous biological resources, the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources. In addition, the NEMBA provides for the establishment and functions of a South African National Biodiversity Institute (SANBI).

Legislation	Description of Legislation and Applicability
	SANBI was established by the NEMBA with the primary purpose of reporting on the status of the country's biodiversity and conservation status of all listed threatened or protected species and ecosystems. The terrestrial biodiversity assessment (**Appendix G.1**) identified that the Facility will be located within Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA). The Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA) Regulations with regards to alien and invasive species have been superseded by the National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) – Alien and Invasive Species (AIS) Regulations which became law on 1 October 2014. Specific management measures for the control of alien and invasive plants will be included in the Environmental Management Programme (EMPr).
National Environmental Management Protected Areas Act (No. 57 of 2003)	The purpose of the National Environmental Management Protected Areas Act (No. 57 of 2003) (NEMPAA) is to, *inter alia*, provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. To this end, it provides for the declaration and management of various types of protected areas. Section 50(5) of NEMPAA states that "no development, construction or farming may be permitted in a nature reserve or world heritage site without the prior written approval of the management authority." According to the National Protected Area Expansion Strategy (NPAES), there are no areas within the study area that have been identified as priority areas for inclusion in future protected areas. The study area is therefore outside the NPAES focus area.
The National Water Act (No. 36 Of 1998)	The National Water Act, 1998 (Act No. 36 of 1998) (NWA) provides the framework to protect water resources against over exploitation and to ensure that there is water for social and economic development, human needs and to meet the needs of the aquatic environment. The Act defines water source to include watercourses, surface water, estuary or aquifer. A watercourse is defined in the Act as a river or spring, a natural channel in which water flows regularly or intermittently, a wetland, lake or dam into which or from which water flows, and any collection of water that the Minister may declare a watercourse. Section 21 of the Act outlines a number of categories that require a water user to apply for a Water Use License (WUL) and Section 22 requires water users to apply for a General Authorisation (GA) with the Department of Water and Sanitation (DWS) if they are under certain thresholds or meet certain criteria. The list of water uses applicable to the proposed Project include: a) Taking water from a water resource; c) Impeding or diverting the flow of water in a watercourse; g) Disposing of waste in a manner which may detrimentally impact on a water resource; i) Altering the bed, banks, course or characteristics of a watercourse; The DWS will make the final decision on water uses that are applicable to the project through a pre-application meeting after which a Water Use

Legislation	Description of Legislation and Applicability
	Authorisation Application (WUA) as determined by the risk assessment will be undertaken in compliance with procedural regulations published by the DWS within General Notice 267 (GN267). These regulations specify required information per water use and the reporting structure of required supporting technical information.
The National Heritage Resources Act (No. 25 Of 1999)	The National Heritage Resource Act (Act No. 25 of 1999) (NHRA) serves to protect national and provincial heritage resources across South Africa. The NHRA provides for the protection of all archaeological and palaeontological sites, the conservation and care of cemeteries and graves by the South African Heritage Resources Agency (SAHRA) and lists activities that require any person who intends to undertake to notify the responsible heritage resources agency and furnish details regarding the location, nature, and extent of the proposed development. Part 2 of the NHRA details specific activities that require a Heritage Impact Assessment (HIA) that will need to be approved by SAHRA. Parts of Section 35, 36 and 38 apply to the proposed project, principally: ▪ Section 35 (4) - No person may, without a permit issued by the responsible heritage resources authority- • destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite; • destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite. ▪ Section 38 (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as- • any development or other activity which will change the character of a site— (i) exceeding 5 000 m2 in extent, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development. In terms of Section 38(8), approval from the heritage authority is not required if an evaluation of the impact of such development on heritage resources is required in terms of any other legislation (such as NEMA), provided that the consenting authority ensures that the evaluation of impacts fulfils the requirements of the relevant heritage resources authority in terms of Section 38(3) and any comments and recommendations of the relevant resources authority with regard to such development have been taken into account prior to the granting of the consent. However, should heritage resources of significance be affected by the proposed Igolide WEF, a permit is required to be obtained prior to disturbing or destroying such resources as per the requirements of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668). A Heritage Report (**Appendix G.6**) has been carried out by a suitably qualified specialist, revealing: ▪ Line of planted stones within the study area, which relate to earlier farming activities in the area. The proposed project will be loaded onto the SAHRIS portal for comment by SAHRA and HWC.

Legislation	Description of Legislation and Applicability
Mineral and Petroleum Resources Development Act (No. 28 of 2002)	The aim of the Mineral and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA) is to make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources. Section 53(1) of the MPRDA provides that any person who intends to use the surface of any land in any way that may be contrary to any object of the MPRDA, or which is likely to impede any such object, must apply to the Minister of Mineral Resources (the Minister) for approval. Section 53 of the MPRDA provides a mechanism for ensuring that, inter alia, the mining of mineral resources is not detrimentally affected through the use of the surface of land and which may, for example, result in the sterilisation of a mineral resource. A Section 53 approval will be required due to the fact that the project is located on various mining right areas. The Amendment Regulations (GNR 420 of 27 March 2020) introduced a template for section 53 applications (Form Z) and the specific information that applicants will need to provide as part of a section 53 application.
Noise Control Regulations in terms of the Environmental Conservation, 1989 (Act 73 of 1989)	In South Africa, environmental noise control has been in place for three decades, beginning in the 1980s with codes of practice issued by the South African National Standards (formerly the South African Bureau of Standards, SABS) to address noise pollution in various sectors of the country. Under the previous generation of environmental legislation, specifically the Environmental Conservation Act 73 of 1989 (ECA), provisions were made to control noise from a National level in the form of the Noise Control Regulations (GNR 154 of January 1992). In later years, the ECA was replaced by the National Environmental Management Act 107 of 1998 (NEMA) as amended. The National Environmental Management: Air Quality Act 39 of 2004 (NEMAQA) was published in line with NEMA and contains noise control provisions under Section 34: (1) The minister may prescribe essential national standards – (a) for the control of noise, either in general or by specific machinery or activities or in specified places or areas; or (b) for determining – (i) a definition of noise; and (ii) the maximum levels of noise. (2) When controlling noise, the provincial and local spheres of government are bound by any prescribed national standards. Under NEMAQA, the Noise Control Regulations were updated and are to be applied to all provinces in South Africa. The Noise Control Regulations give all the responsibilities of enforcement to the Local Provincial Authority, where location specific by-laws can be created and applied to the locations with approval of Provincial Government. Where province-specific regulations have not been promulgated, acoustic impact assessments must follow the Noise Control Regulations. Furthermore, NEMAQA prescribes that the Minister must publish maximum allowable noise levels for different districts and national noise standards. These have not yet been accomplished and as a result all monitoring and assessments are done in accordance with the South African National Standards (SANS) 10103:2008 and 10328:2008.

Legislation	Description of Legislation and Applicability
National Environment Management Air Quality Act (No. 39 of 2004)	The National Environment Management: Air Quality Act (No. 39 of 2004) (NEMAQA) came into effect on 11 September 2005. Persons undertaking such activities listed under GNR 893, as amended, are required to possess an Atmospheric Emissions License (AEL). The National Dust Control Regulations (GNR 827) were promulgated in terms of Section 32 of NEMAQA, which aim at prescribing general measures for the control of dust in both residential and non-residential areas. Although no AEL will be required for the construction and operation of the Igolide WEF, the dust control regulations will be applicable during construction.
Conservation of Agricultural Resources Act (No. 43 of 1983)	The Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) provides for the implementation of control measures for soil conservation works as well as alien and invasive plant species in and outside of urban areas. In terms of the amendments to the regulations under the CARA, landowners are legally responsible for the control of alien species on their properties. Various Acts administered by the DFFE and the DWS, as well as other laws (including local by-laws), spell out the fines, terms of imprisonment and other penalties for contravening the law. Although no fines have yet been placed against landowners who do not remove invasive species, the authorities may clear their land of invasive alien plants and other alien species entirely at the landowners' cost and risk. The CARA Regulations with regards to alien and invasive species have been superseded by NEMBA Alien and Invasive Species (AIS) Regulations which became law on 1 October 2014.
Civil Aviation Act (No. 13 of 2009)	Civil aviation in South Africa is governed by the Civil Aviation Act (Act 13 of 2009). This Act provides for the establishment of a stand-alone authority mandated with controlling, promoting, regulating, supporting, developing, enforcing and continuously improving levels of safety and security throughout the civil aviation industry. This mandate is fulfilled by South African Civil Aviation Authority (SACAA) as an agency of the Department of Transport (DoT). SACAA achieves the objectives set out in the Act by complying with the Standards and Recommended Practices (SARPs) of the International Civil Aviation Organisation (ICAO), while considering the local context when issuing the South African Civil Aviation Regulations (SA CARs). As of the 1st of May 2021, Air Traffic and Navigation Services (ATNS) has been appointed as the new Obstacle application Service Provider for Windfarms and later Solar Plants. Their responsibility would pertain to the assessments, maintenance, and all other related matters in respect to Windfarms and in due time Power Plant assessments. The DFFE Screening Tool Report identified Civil Aviation as having high sensitivity for the proposed Igolide WEF, with a civil aviation aerodrome located within 8km of the site. ATNS and SACAA will be included on the project stakeholder database. They will be informed of the proposed Project, and comment will be sought from these authorities as applicable.

Legislation	Description of Legislation and Applicability
Occupational Health and Safety Act (No. 85 of 1993)	The National Occupational Health and Safety Act (No. 85 of 1993) (OHSA) and the relevant regulations under the Act are applicable to the proposed project. This includes the Construction Regulations promulgated in 2014 under Section 43 of the Act. Adherence to South Africa's OHSA and its relevant Regulations is essential.
National Energy Act (No. 34 of 2008)	The National Energy Act aims to ensure that diverse energy resources are available, in sustainable quantitates, and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, taking into account environmental management requirements and interactions amongst economic sectors. The main objectives of the Act are to: ▪ Ensure uninterrupted supply of energy to the Republic; ▪ Promote diversity of supply of energy and its sources; ▪ Facilitate effective management of energy demand and its conservation; ▪ Promote energy research; ▪ Promote appropriate standards and specifications for the equipment, systems and processes used for producing, supplying and consuming energy; ▪ Ensure collection of data and information relating to energy supply, transportation and demand; ▪ Provide for optimal supply, transformation, transportation, storage and demand of energy that are planned, organised and implemented in accordance with a balanced consideration of security of supply, economics, consumer protection and a sustainable development; ▪ Provide for certain safety, health and environment matters that pertain to energy; ▪ Facilitate energy access for improvement of the quality of life of the people of Republic; ▪ Commercialise energy-related technologies; ▪ Ensure effective planning for energy supply, transportation, and consumption; and ▪ Contribute to sustainable development of South Africa's economy. In terms of the act, the Minister of Energy is mandated to develop and, on an annual basis, review and publish the Integrated Energy Plan (IEP) in the Government Gazette. The IEP analyses current energy consumption trends within different sectors of the economy (i.e. agriculture, commerce, industry, residential and transport) and uses this to project future energy requirements, based on different scenarios. The IEP and the Integrated Resource Plan are intended to be updated periodically to remain relevant. The framework is intended to create a balance between energy demand and resource availability so as to provide low-cost electricity for social and economic development, while taking into account health, safety and environmental parameters.
Electricity Regulation Act (No. 4 of 2006)	The Electricity Regulation Act (No. 4 of 2006) (ERA) aims to: ▪ Achieve the efficient, effective, sustainable and orderly development and operation of electricity supply infrastructure in South Africa; ▪ Ensure that the interests and needs of present and future electricity customers and end users are safeguarded and met, having regard to the governance, efficiency. effectiveness and long-term sustainability of

Legislation	Description of Legislation and Applicability
	the electricity supply industry within the broader context of economic energy regulation in the Republic: ▪ Facilitate investment in the electricity supply industry; ▪ Facilitate universal access to electricity; ▪ Promote the use of diverse energy sources and energy efficiency; ▪ Promote competitiveness and customer and end user choice; and ▪ Facilitate a fair balance between the interests of customers and end users, licensees, investors in the electricity supply industry and the public. The Act establishes a National Energy Regulator as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licenses and registration as the manner in which generation, transmission, distribution, trading and the import and export of electricity are regulated.

5.2 POLICIES AND PLANS

Table 5-2 summarised key policies and plans as an outline of the governance framework for the project.

Table 5-2 – Applicable Regional Policies and Plans

Applicable Policy	Description of Policy
National Development Plan	The National Development Plan aims to eliminate poverty and reduce inequality by 2030. The NDP identifies a number of enabling milestones. Of relevance to the proposed development the NDP refers to the need to produce sufficient energy to support industry at competitive prices and ensure access for poor households, while reducing carbon emissions per unit of power by about one-third. In this regard the infrastructure is not just essential for faster economic growth and higher employment. It also promotes inclusive growth, providing citizens with the means to improve their own lives and boost their incomes. Infrastructure is essential to development. Chapter 3, Economy and Employment, identifies some of the structural challenges specific to South Africa, including an energy constraint that will act as a cap on growth and on options for industrialisation. The NDP notes that from an environmental perspective South Africa faces several related challenges. The reduction of greenhouse gas emissions and shift to a green low-carbon economy, is one of these challenges. In terms of implementation the NDP identifies three phases. The first two are of specific relevance to the proposed project. The first phase (2012–2017) notes that ensuring the supply of energy and water is reliable and sufficient for a growing economy. The second phase (2018–2023) involves building on the first phase to lay the foundations for more intensive improvements in productivity. The provision of affordable and reliable energy is a key requirement for this to take place. Chapter 4, Economic infrastructure, notes that economic infrastructure provides the foundation for social and economic development. In this regard South Africa must invest in a strong network of economic infrastructure designed to support the country's medium- and long-term economic and

Applicable Policy	Description of Policy
	social objectives. The plan envisages that, by 2030, South Africa will have an energy sector that promotes: ▪ Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation. ▪ Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change. More specifically, South Africa should have adequate supply security in electricity and in liquid fuels, such that economic activity, transport, and welfare are not disrupted. The plan sets out steps that aim to ensure that, in 20 years, South Africa's energy system looks very different to the current situation. In this regard coal will contribute proportionately less to primary-energy needs, while gas and renewable energy resources, will play a much larger role.
Integrated Resource Plan (2010 – 2030)	The IRP is an electricity capacity plan which aims to provide an indication of the country's electricity demand, how this demand will be supplied and what it will cost. On 6 May 2011, the then Department of Energy (DoE) released the Integrated Resource Plan 2010-2030 (IRP 2010) in respect of South Africa's forecast energy demand for the 20-year period from 2010 to 2030. The promulgated IRP 2010–2030 identified the preferred generation technology required to meet expected demand growth up to 2030. It incorporated government objectives such as affordable electricity, reduced greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources, localisation and regional development. The IRP recognises that solar PV, wind and CSP with storage present an opportunity to diversify the electricity mix, to produce distributed generation and to provide off-grid electricity. Renewable technologies also present huge potential for the creation of new industries, job creation and localisation across the value chain.
New Growth Path	Government released the New Economic Growth Path Framework on 23 November 2010. The aim of the framework is to enhance growth, employment creation and equity. The policy's principal target is to create five million jobs over the next 10 years and reflects government's commitment to prioritising employment creation in all economic policies. The framework identifies strategies that will enable South Africa to grow in a more equitable and inclusive manner while attaining South Africa's developmental agenda. Central to the New Growth Path is a massive investment in infrastructure as a critical driver of jobs across the economy. In this regard the framework identifies investments in five key areas namely: energy, transport, communication, water, and housing.
National Infrastructure Plan	The South African Government adopted a National Infrastructure Plan (NIP) in 2012. The NIP aims to transform the South African economic landscape while simultaneously creating significant numbers of new jobs and strengthening the delivery of basic services. It outlines the challenges and enablers which needs to be addressed in the building and developing of infrastructure. The Presidential Infrastructure Coordinating Commission (PICC) was established by the Cabinet to integrate and coordinate the long-term infrastructure build. The plan also supports the integration of African economies. In terms of the plan Government will invest R827 billion over the next three years to build

Applicable Policy	Description of Policy
	new and upgrade existing infrastructure. The aim of the investments is to improve access by South Africans to healthcare facilities, schools, water, sanitation, housing and electrification. The plan also notes that investment in the construction of ports, roads, railway systems, electricity plants, hospitals, schools and dams will contribute to improved economic growth.
Integrated Energy Plan	The development of a National IEP was envisaged in the White Paper on the Energy Policy of the Republic of South Africa of 1998 and, in terms of the National Energy Act, 2008 (Act No. 34 of 2008), the Minister of Energy is mandated to develop and, on an annual basis, review and publish the IEP in the Government Gazette. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development. The IEP notes that South Africa needs to grow its energy supply to support economic expansion and in so doing, alleviate supply bottlenecks and supply-demand deficits. In addition, it is essential that all citizens are provided with clean and modern forms of energy at an affordable price. As part of the Integrated Energy Planning process, eight key objectives are identified, namely: ▪ Objective 1: Ensure security of supply. ▪ Objective 2: Minimise the cost of energy. ▪ Objective 3: Promote the creation of jobs and localisation. ▪ Objective 4: Minimise negative environmental impacts from the energy sector. ▪ Objective 5: Promote the conservation of water. ▪ Objective 6: Diversify supply sources and primary sources of energy. ▪ Objective 7: Promote energy efficiency in the economy. ▪ Objective 8: Increase access to modern energy. The IEP provides an assessment of current energy consumption trends within different sectors of the economy (i.e., agriculture, commerce, industry, residential and transport) and uses this information to identify future energy requirements, based on different scenarios. The scenarios are informed by different assumptions on economic development and the structure of the economy and also take into account the impact of key policies such as environmental policies, energy efficiency policies, transport policies and industrial policies, amongst others. Based on this information the IEP then determines the optimal mix of energy sources and technologies to meet those energy needs in the most cost-effective manner for each of the scenarios. The associated environmental impacts, socio-economic benefits and macroeconomic impacts are also analysed. The IEP is therefore focused on determining the long-term energy pathway for South Africa, taking into account a multitude of factors which are embedded in the eight objectives. As part of the analysis four key scenarios were developed, namely the Base Case, Environmental Awareness, Resource Constrained and Green Shoots scenarios: ▪ The Base Case Scenario assumes that existing policies are implemented and will continue to shape the energy sector landscape going forward. It assumes moderate economic growth in the medium to long term. ▪ The Environmental Awareness Scenario is characterised by more stringent emission limits and a more environmentally aware society,

Applicable Policy	Description of Policy
	where a higher cost is placed on externalities caused by the supply of energy. ▪ The Resource Constrained Scenario in which global energy commodity prices (i.e. coal, crude oil and natural gas) are high due to limited supply. ▪ The Green Shoots Scenario describes an economy in which the targets for high economic growth and structural changes to the economy, as set out in the National Development Plan (NDP), are met. The IEP notes that South Africa should continue to pursue a diversified energy mix which reduces reliance on a single or a few primary energy sources. In terms of existing electricity generation capacity, the IEP indicates that existing capacity starts to decline notably from 2025, with significant plant retirement occurring in 2031, 2041 and 2048. By 2050 only 20% of the current electricity generation capacity remains. As a result, large investments are required in the electricity sector in order to maintain an adequate supply in support of economic growth. By 2020, various import options become available, and some new coal capacity is added along with new wind, solar and gas capacity. The mix of generation capacity technologies by 2050 is considerably more diverse than the current energy mix, across all scenarios. The main differentiating factors between the scenarios are the level of demand, constraints on emission limits and the carbon dioxide externality costs. In all scenarios the energy mix for electricity generation becomes more diverse over the period to 2050, with coal reducing its share from about 85% in 2015 to 15–20% in 2050 (depending on the scenario). Solar, wind, nuclear, gas and electricity imports increase their share. The Environmental Awareness and Green Shoots scenarios take on higher levels of renewable energy. An assessment of each scenario against the eight objectives with reference to renewable energy notes while all scenarios seek to ensure that costs are minimised within the constraints and parameters of each scenario, the Base Case Scenario presents the least cost followed by the Environmental Awareness, Resource Constrained and Green Shoots scenarios respectively when total energy system costs are considered. In terms of promoting job creation and localisation potential the Base Case Scenario presents the greatest job creation potential, followed by the Resource Constrained, Environmental Awareness and Green Shoots scenarios respectively. In all scenarios, approximately 85% of total jobs are localisable. For electricity generation, most jobs result from solar technologies followed by nuclear and wind, with natural gas and coal making a smaller contribution. The Environmental Awareness Scenario, due to its stringent emission constraints, shows the lowest level of total emissions over the planning horizon. This is followed by the Green Shoots, Resource Constrained and Base Case scenarios. These trends are similar when emissions are considered cumulatively and individually by type.
National Protected Area Expansion Strategy (2018)	The National Protected Area Expansion Strategy 2018 (NPAES) areas were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine scale planning which may identify a range of different

Applicable Policy	Description of Policy
	priority sites based on local requirements, constraints and opportunities (NPAES, 2018). According to the NPAES, there are no areas within the study area that have been identified as priority areas for inclusion in future protected areas. The study area is therefore outside the NPAES focus area.

5.3 PROVINCIAL AND MUNICIPAL LEGAL AND REGULATORY FRAMEWORK

Table 5-3 – Provincial and Municipal Plans

Applicable Plan	Description of Plan
The Gauteng Provincial Employment, Growth and Development Strategy (GEGDS)	The Gauteng Provincial Employment, Growth and Development Strategy (GEGDS) identifies the need for creating accessible and decent work within a growing, sustainable, and inclusive economy as a priority for the province. The GEGDS aims to address the deep structural weaknesses within the economy that has yielded persistent high unemployment and excluded marginalized populations despite the economic growth of the region. Key aims of GEGDS: ▪ Provide a framework within which relevant government departments can develop and/or refine their strategic policy interventions or drivers, while creating decent work and building a growing, inclusive economy. ▪ Identify effective interventions for provincial government to mitigate the impact of economic crises while initiating programmes that can maximise (decent) employment creation in the medium term. ▪ Address inequality through the investment in people and the progressive realisation of decent jobs. ▪ Support social cohesion through interventions that directly contribute towards employment creation and a healthy, well-nourished, and safe labour force. ▪ Highlight the need for effective monitoring, reviewing, and evaluating of the various interventions or drivers. ▪ To act as the framework that leads to the Gauteng Growth Path, which is the living or real implementation of the GEGDS. To achieve this GEGDS proposes necessary and profound structural changes to the Gauteng economy that are based on a rapid shift to an endogenous economy rooted in three key factors: ▪ Innovation. ▪ Green Growth. ▪ Inclusivity. There are three integral components that make up the strategy, namely: the seven foundational provincial priorities, the five strategic pillars, and seven cross-cutting drivers. The foundational provincial priorities of relevance include: ▪ Creating Decent Work and Building a Sustainable and Inclusive Economy.

Applicable Plan	Description of Plan
	▪ Building Cohesive and Sustainable Communities including Spatial Development. This GEGDS outlines the strategic interventions by which Gauteng will work to make this innovating, green and inclusive economy a reality. These interventions are organised into five strategic pillars. The strategic pillars of relevance include: ▪ Transforming the provincial economy through improved efficiency. ▪ Sustainable employment creation. ▪ Sustainable communities and social cohesion. Each pillar contains several government interventions, which enable them to implement this strategy. These are called drivers. Cross-cutting drivers of relevance include: ▪ Green Economy and Sustainable Energy Usage. ▪ Innovation and the Knowledge Economy. ▪ Infrastructure – Strategic, Socio-economic and Bulk. ▪ Green Jobs. ▪ Spatial Planning.
Gauteng Provincial Spatial Development Framework (2030)	The Gauteng Provincial Spatial Development Framework (GSDF) 2030 aspires to establish a compact urban form that has a balanced, polycentric spatial network, with strong and resilient nodes enabling mutually beneficial exchanges of goods and services, and movement of people as well as the protection of green spaces and sustainable energy use. To support this vision, four spatial development strategies are to be followed: ▪ Capitalising on proximity. ▪ Managing new settlement development. ▪ Building an economic network. ▪ Creating a viable and productive hinterland. The effective provision and maintenance of bulk infrastructure, including energy production, is prioritised within the capitalising on proximity strategy. Ten high-priority provincial spatial development proposals are outlined. While none focus specifically on energy production, the following are important in terms of conservation and bulk infrastructure development: ▪ Municipal urban growth management. ▪ Strengthening and enhancing agricultural production and agro-processing. ▪ Actively pursuing environmental management and eco-system protection. ▪ Boosting and optimising provincial tourism opportunities. The GSDF notes that the West Rand District Municipality (WRDM) is currently operating at near capacity in terms of energy production and the lack of stable generation capacity from current providers act as a major constraint to economic development and investor confidence. The GSDF also notes that Merafong's electricity network was not designed to supply the developments and extensions that are currently underway in the district.

Applicable Plan	Description of Plan
Gauteng Integrated Energy Strategy (2012)	The aim of the Gauteng Integrated Energy Strategy (GIES) is to direct the energy supply and consumption of the Gauteng province over the next five to forty-five years by integrating and supporting sustainable energy and climate change initiatives, both locally and internationally. The key goals of this strategy include: ▪ Providing the leadership and institutional framework required to drive the strategy. ▪ Implementing strong energy efficient measures. ▪ Facilitating the development and growth of renewable and alternative energy options. ▪ Supporting the move towards a low carbon economy. ▪ Prioritizing energy security and access to safe, clean, and affordable energy. ▪ Developing and growing the alternative and energy efficiency industry as a critical aspect of Gauteng's economy. The relative policy implications include: ▪ Shifting to a low carbon economy. ▪ Maximizing the use of local energy resources. ▪ Development of the renewable energy industry as an employment creation opportunity. The GIES hopes to achieve a low carbon economy, Gauteng as a hub of innovation, focused on clean energy technology, decentralised energy generation-micro generation, as well as clean and renewable energy contributing 50% of the total energy mix of the province.
Growing Gauteng Together 2030	Growing Gauteng Together 2030 (GGT2030) is a plan of action realised by the Gauteng government to drive the province towards a more sustainable and inclusive future. The plan includes seven priorities that are to be executed to achieve this vision. The relevant priorities include: ▪ The Economy, Jobs, and Infrastructure. ▪ Integrated Human Settlements and Land Release. ▪ Safety, Social Cohesion and Food Security. ▪ Sustainable Development for Future Generations. This vision will be implemented along five developmental corridors of Gauteng. The Western Development Corridor includes WRDM, and the focus is around diversifying the district economy to include tourism, agriculture, and agro-processing, and renewable energy projects.
Merafong City Local Municipality Integrated Development Plan (2020)	The vision for the Merafong City Local Municipality (MCLM) Integrated Development Plan (IDP) is "A prosperous, Sustainable and Community-oriented City". The Key Performance Areas (KPA) adopted by the municipality to realise this vision are: ▪ KPA 1: Basic Service Delivery ▪ KPA 2: To Promote Local Economic Development ▪ KPA 3: To Promote Municipal Transformation & Organisational Development ▪ KPA 4: To ensure Municipal Financial Viability & Management ▪ KPA 5: To ensure Good Governance and Public Participation

Applicable Plan	Description of Plan
	▪ KPA 6: Spatial Development Framework There are various Development Strategies of Merafong Municipality, which are informed by a Strategic Turn-Around plan developed during a strategic review session held in 2018. Of relevance to the project is the Electricity Supply Strategy (2020/2021), which identifies a variety of strategic interventions for the municipality. The Strategic Turnaround Plan is aligned to 14 regional outcomes, with Outcome 1: Provision of Basic Service Delivery as well as Outcome 8: Sustainable Environment being relevant to the project. The MCLMIDP notes that the status of the current Energy Plan needs to be re-assessed to integrate with the greater West Rand Plan.
Merafong City Local Municipality Spatial Development Framework (2019)	Merafong Spatial Development Framework (MSDF), forms part of a hierarchy of plans that consolidate into the IDP. It concentrates on the spatial aspects of development planning and identifies the opportunities and constraints associated with the district. The Merafong City's SDF proposes the following structuring tools: ▪ Improve urban efficiency and rectify Apartheid spatial disparities through realigning the urban structure of Merafong settlements into three distinct urban areas. ▪ Improve urban and rural liveability where basic needs are met, the cost of living is bearable, amenities and employment are accessible, and urban space is aesthetically pleasing and healthy. ▪ Facilitate sustainable economic growth and diversification, through identified strategic nodes, which include a bio-energy eco-industrial park. ▪ Protect natural and agricultural resources to ensure a sustainable coexistence between urban, mining, agricultural and ecological land uses. Opportunities in the MSDF of relevance to the project include a Bioenergy Agro-Industrial Park and the Merafong Solar Farm Cluster Concept. Additionally, the adaptation of unsustainable, unused, or old mines and mine dumps for reuse or rehabilitation also presents an opportunity. The mines Driefontein North and Kusasalethu/Elandsrand were identified as particularly promising for the establishment of solar farms or other renewable energy sources.

5.4 INTERNATIONAL STANDARDS AND GUIDELINES

5.4.1 IFC PERFORMANCE STANDARDS

The International Finance Corporation (IFC) is an international financial institution that offers investment, advisory, and asset management services to encourage private sector development in developing countries. The IFC is a member of the World Bank Group (WBG) and is headquartered in Washington, D.C., United States. It was established in 1956 as the private sector arm of the WBG to advance economic development by investing in strictly for-profit and commercial projects that purport to reduce poverty and promote development.

The IFC's stated aim is to create opportunities for people to escape poverty and achieve better living standards by mobilizing financial resources for private enterprise, promoting accessible and

competitive markets, supporting businesses and other private sector entities, and creating jobs and delivering necessary services to those who are poverty-stricken or otherwise vulnerable. Since 2009, the IFC has focused on a set of development goals that its projects are expected to target. Its goals are to increase sustainable agriculture opportunities, improve health and education, increase access to financing for microfinance and business clients, advance infrastructure, help small businesses grow revenues, and invest in climate health.

The IFC is owned and governed by its member countries but has its own executive leadership and staff that conduct its normal business operations. It is a corporation whose shareholders are member governments that provide paid-in capital and which have the right to vote on its matters. Originally more financially integrated with the WBG, the IFC was established separately and eventually became authorized to operate as a financially autonomous entity and make independent investment decisions. It offers an array of debt and equity financing services and helps companies face their risk exposures, while refraining from participating in a management capacity. The corporation also offers advice to companies on making decisions, evaluating their impact on the environment and society, and being responsible. It advises governments on building infrastructure and partnerships to further support private sector development.

The IFC's Sustainability Framework articulates the Corporation's strategic commitment to sustainable development and is an integral part of IFC's approach to risk management. The Sustainability Framework comprises IFC's Policy and Performance Standards on Environmental and Social Sustainability, and IFC's Access to Information Policy. The Policy on Environmental and Social Sustainability describes IFC's commitments, roles, and responsibilities related to environmental and social sustainability. IFC's Access to Information Policy reflects IFC's commitment to transparency and good governance on its operations and outlines the Corporation's institutional disclosure obligations regarding its investment and advisory services. The Performance Standards (PSs) are directed towards clients, providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities. In the case of its direct investments (including project and corporate finance provided through financial intermediaries), IFC requires its clients to apply the PSs to manage environmental and social risks and impacts so that development opportunities are enhanced. IFC uses the Sustainability Framework along with other strategies, policies, and initiatives to direct the business activities of the Corporation to achieve its overall development objectives. The PSs may also be applied by other financial institutions (FIs).

The project is considered a Category B project in terms of the IFC Policy on E&S Sustainability (2012), having the potential to cause 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.

The objectives and applicability of the eight PSs are outlined in **Table 5-4.**

Table 5-4 – Objectives and Applicability of the IFC Performance Standards

Reference	Requirements		Project Specific Applicability
Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts			
Overview	Performance Standard 1 underscores the importance of managing environmental and social performance throughout the life of a project. An effective Environmental and Social Management System (ESMS) is a dynamic and continuous process initiated and supported by management, and involves engagement between the client, its workers, local communities directly affected by the project (the Affected Communities) and, where appropriate, other stakeholders.		
Objectives	▪ To identify and evaluate environmental and social risks and impacts of the project. ▪ To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment. ▪ To promote improved environmental and social performance of clients through the effective use of management systems. ▪ To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately. ▪ To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.		
Aspects	1.1	Policy	The IFC Standards state under PS 1 (Guidance Note 23) that "*the breadth, depth and type of analysis included in an ESIA must be proportionate to the nature and scale of the proposed project's potential impacts as identified during the course of the assessment process*." This document is the final deliverable from the S&EIA process undertaken for the proposed Project. The impact assessment comprehensively assesses the key environmental and social impacts and complies with the requirements of the South African EIA Regulations. In addition, an EMPr will be compiled during the EIA phase of the project.
	1.2	Identification of Risks and Impacts	
	1.3	Management Programmes	
	1.4	Organisational Capacity and Competency	
	1.5	Emergency Preparedness and Response	
	1.6	Monitoring and Review	
	1.7	Stakeholder Engagement	
	1.8	External Communication and Grievance Mechanism	
	1.9	Ongoing Reporting to Affected Communities	
Performance Standard 2: Labour and Working Conditions;			
Overview	Performance Standard 2 recognises that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers.		

Reference	Requirements		Project Specific Applicability
Objectives	▪ To promote the fair treatment, non-discrimination, and equal opportunity of workers. ▪ To establish, maintain, and improve the worker-management relationship. ▪ To promote compliance with national employment and labour laws. ▪ To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain. ▪ To promote safe and healthy working conditions, and the health of workers. ▪ To avoid the use of forced labour.		
Aspects	2.1	▪ Working Conditions and Management of Worker Relationship ▪ Human Resources Policy and Management ▪ Working Conditions and terms of Engagement ▪ Workers organisation ▪ Non- Discrimination and Equal Opportunity ▪ Retrenchment ▪ Grievance Mechanism	Even though the nature and scale of the project is considered to be small, PS2 is considered applicable as a contractor will be appointed to undertake the required scope of work. Whilst PS2 will be applicable to the Project, it is not intended to be addressed in detail at the EIA stage. Recommendations are provided concerning development of a detailed Human Resources (HR) and Occupational Health and Safety (OHS) system by the developer and its partners as the Project moves towards implementation. In addition, measures to address the Interim Advice for IFC Clients on Supporting Workers in the Context of COVID-19 are referenced. The EMPr will incorporate the requirements for compliance with local and international Labour and Working legislation and good practice on the part of the contractors.
	2.2	▪ Protecting the Workforce ▪ Child Labour ▪ Forced Labour	
	2.3	Occupational health and Safety	
	2.4	Workers Engaged by Third Parties	
	2.5	Supply Chain	
Performance Standard 3: Resource Efficiency and Pollution Prevention			
Overview	Performance Standard 3 recognises that increased economic activity and urbanisation often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. There is also a growing global consensus that the current and projected atmospheric concentration of greenhouse gases (GHG) threatens the public health and welfare of current and future generations. At the same time, more efficient and effective resource use and pollution prevention and GHG emission avoidance and mitigation technologies and practices have become more accessible and achievable in virtually all parts of the world.		
Objectives	▪ To avoid or minimise adverse impacts on human health and the environment by avoiding or minimising pollution from project activities. ▪ To promote more sustainable use of resources, including energy and water. ▪ To reduce project related GHG emissions.		

Reference	Requirements		Project Specific Applicability
Aspects	3.1	▪ Policy Resource Efficiency ▪ Greenhouse Gases ▪ Water Consumption	PS3-related impacts, such as the management of construction waste, hazardous substances, and stormwater are assessed in **Section 8** of this report. There are no material resource efficiency issues associated with the Project. The EMPr will include general resource efficiency measures. The Igolide WEF seeks to facilitate resource efficiency and pollution prevention by contributing to the South African green economy. Dust air pollution in the construction phase will be addressed in the EMPr. The Project will not result in the release of industrial effluents. Potential pollution associated with sanitary wastewater is low and mitigation measures will be included in the EMPr. Land contamination of the site from historical land use (i.e. low intensity agricultural / grazing) is not considered to be a cause for concern. The waste generation profile of the project is not complex. Waste mitigation and management measures will be included in EMPr. Hazardous materials are not a key issue; small quantities of construction materials (oil, grease, diesel fuel etc.) are the only wastes expected to be associated with the project. The EMPr will take these anticipated hazardous materials into account and recommend relevant mitigation and management measures.
	3.2	▪ Pollution Prevention ▪ Air Emissions ▪ Stormwater ▪ Waste Management ▪ Hazardous Materials Management ▪ Pesticide use and Management	
Performance Standard 4: Community Health, Safety, and Security			
Overview	Performance Standard 4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts.		
Objectives	▪ To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances. ▪ To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities		
Aspects	4.1	▪ Community Health and Safety ▪ Infrastructure and Equipment Design and Safety ▪ Hazardous Materials Management and Safety ▪ Ecosystem Services ▪ Community Exposure to Disease	The requirements included in PS 4 will be addressed in the EIA process and the development of the EMPr. During the construction phase there will be an increase in vehicular traffic along public roads, largely due to the need for importation of construction material. Pedestrian and road safety risks will be qualitatively evaluated in the EIA process and the clients' standard safety and security measures, as well as potential additional measures recommended by WSP, will be detailed in the EMPr.

Reference	Requirements		Project Specific Applicability
		▪ Emergency Preparedness and Response	
	4.2	Security Personnel	
Performance Standard 5: Land Acquisition and Involuntary Resettlement			
Overview	Performance Standard 5 recognises that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood) as a result of project-related land acquisition and/or restrictions on land use.		
Objectives	▪ To avoid, and when avoidance is not possible, minimise displacement by exploring alternative project designs. ▪ To avoid forced eviction. ▪ To anticipate and avoid, or where avoidance is not possible, minimise adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected. ▪ To improve, or restore, the livelihoods and standards of living of displaced persons. ▪ To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.		
Aspects	5.1	▪ Displacement ▪ Physical Displacement ▪ Economic Displacement ▪ Private Sector Responsibilities under Government Managed Resettlement	PS5 is not applicable to the proposed Igolide WEF as no physical or economic displacement or livelihood restoration will be required. The proposed Igolide WEF is located on privately owned land that is utilised for agriculture by the landowners. The significance of all potential agricultural impacts is kept low by the very small proportion of the land that is impacted. An Agricultural Potential Assessment has been undertaken and is included in **Appendix G.2**.
Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources			
Overview	Performance Standard 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development.		
Objectives	▪ To protect and conserve biodiversity. ▪ To maintain the benefits from ecosystem services. ▪ To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.		

Reference	Requirements		Project Specific Applicability
Aspects	6.1	Protection and Conservation of Biodiversity	The Igolide WEF overlaps with a small isolated CBA in the Eastern Corner of the footprint. A Terrestrial Biodiversity assessment as well as an Avifaunal Impact Assessment and Aquatic Biodiversity Impact Assessment have been included in the proposed scope. The methodologies for the specialist assessments include a combination of literature review, in-field surveys and sensitivity mapping. This substantively complies with the PS 6 general requirements for scoping and baseline assessment for determination of biodiversity and ecosystem services issues. The determination of habitat sensitivity was undertaken within the legal and best practice reference framework for South Africa. The prevalence of invasive alien species will be determined, and mitigation and management measures will be included in the EMPr.
Performance Standard 7: Indigenous People			
Overview	Performance Standard 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development. Indigenous Peoples are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded.		
Objectives	▪ To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples. ▪ To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts. ▪ To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner. ▪ To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle. ▪ To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present. ▪ To respect and preserve the culture, knowledge, and practices of Indigenous Peoples.		
Aspects	7.1	General ▪ Avoidance of Adverse Impacts ▪ Participation and Consent	As per the international instruments under the United Nations (UN) Human Rights Conventions, no indigenous peoples are present within the study area.
	7.2	Circumstances Requiring Free, Prior, and Informed Consent	

Reference	Requirements		Project Specific Applicability
		▪ Impacts on Lands and Natural Resources Subject to Traditional Ownership or Under Customary Use ▪ Critical Cultural Heritage ▪ Relocation of Indigenous Peoples from Lands and Natural Resources Subject to Traditional Ownership or Under Customary Use	
	7.3	Mitigation and Development Benefits	
	7.4	Private Sector Responsibilities Where Government is Responsible for Managing Indigenous Peoples Issues	
Performance Standard 8: Cultural Heritage			
Overview	Performance Standard 8 recognizes the importance of cultural heritage for current and future generations.		
Objectives	▪ To protect cultural heritage from the adverse impacts of project activities and support its preservation. ▪ To promote the equitable sharing of benefits from the use of cultural heritage.		
Aspects	8.1	Protection of Cultural Heritage in Project Design and Execution	A Heritage Assessment (**Appendix G.6**) has been carried out by a suitably qualified specialist. A Chance Find Procedure will be included in the EMPr during the EIA phase of the project.

5.4.2 WORLD BANK GROUP ENVIRONMENTAL HEALTH AND SAFETY GUIDELINES

In support of the Performance Standards, the World Bank Group (WBG) has published a number of Environmental Health and Safety (EHS) Guidelines. The EHS Guidelines are technical reference documents that address IFC's expectations regarding the industrial pollution management performance of its projects. They are designed to assist managers and decision makers with relevant industry background and technical information. This information supports actions aimed at avoiding, minimising, and controlling EHS impacts during the construction, operation, and decommissioning phase of a project or facility. The EHS Guidelines serve as a technical reference source to support the implementation of the IFC Performance Standards, particularly in those aspects related to PS3: Pollution Prevention and Abatement, as well as certain aspects of occupational and community health and safety.

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

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

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

5.4.3 EQUATOR PRINCIPALS

The Equator Principles (EPs) is a risk management framework, adopted by financial institutions, for determining, assessing, and managing environmental and social risk in projects and is primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making.

The EPs apply globally to all industry sectors and to five financial products 1) Project Finance Advisory Services, 2) Project Finance, 3) Project-Related Corporate Loans, 4) Bridge Loans and 5) Project-Related Refinance and Project-Related Acquisition Finance. The relevant thresholds and criteria for application is described in detail in the Scope section of the EP. Currently 125 Equator Principles Financial Institutions (EPFIs) in 37 countries have officially adopted the EPs, covering the majority of international project finance debt within developed and emerging markets. EPFIs commit to implementing the EPs in their internal environmental and social policies, procedures and standards for financing projects and will not provide Project Finance or Project-Related Corporate Loans to projects where the client will not, or is unable to, comply with the EPs.

While the EPs are not intended to be applied retroactively, EPFIs apply them to the expansion or upgrade of an existing project where changes in scale or scope may create significant environmental and social risks and impacts, or significantly change the nature or degree of an existing impact. The EPs have greatly increased the attention and focus on social/community standards and responsibility, including robust standards for indigenous peoples, labour standards, and consultation with locally affected communities within the Project Finance market.

The EPs have also helped spur the development of other responsible environmental and social management practices in the financial sector and banking industry and have supported member banks in developing their own Environmental and Social Risk Management Systems.

The requirements and applicability of the EPs are outlined in **Table 5-5**.

It should be noted that Principles 8 and 10 relate to a borrower's code of conduct and are therefore not considered relevant to the S&EIA process and have not been included in this discussion.

Table 5-5 - Requirements and Applicability of the Equator Principles

Requirement		Project Specific Applicability
Principle 1: Review and Categorisation		
Overview	When a project is proposed for financing, the EPFI will, as part of its internal social and environmental review and due diligence, categorise such project based on the magnitude of its potential impacts and risks in accordance with the environmental and social screening criteria of the IFC. Using categorisation, the EPFI's environmental and social due diligence is commensurate with the nature, scale, and stage of the Project, and with the level of environmental and social risks and impacts. The categories are: ▪ Category A: Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented; ▪ Category B: Projects with potential limited adverse environmental and social risks and/or impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures; and ▪ Category C: Projects with minimal or no adverse environmental and social risks and/or impacts.	Based upon the significance and scale of the Project's environmental and social impacts, the proposed project is regarded as a Category B project i.e. a project 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		
Overview	For all Category A and Category B Projects, the EPFI will require the client to conduct an appropriate Assessment process to address, to the EPFI's satisfaction, the relevant environmental and social risks and scale of impacts of the proposed Project (which may include the illustrative list of issues found in Exhibit II). The Assessment Documentation should propose measures to minimise, mitigate, and where residual impacts remain, to compensate/offset/remedy for risks and impacts to Workers, Affected Communities, and the environment, in a manner relevant and appropriate to the nature and scale of the proposed Project. The Assessment Documentation will be an adequate, accurate and objective evaluation and presentation of the environmental and social risks and impacts, whether prepared by the client, consultants or external experts. For Category A, and as appropriate, Category B	This document is the second first deliverable (i.e., Final Scoping Report) from the S&EIA process undertaken for the proposed Project. The impact assessment will be undertaken during the next phase of the S&EIA process. The assessment will comprehensively assess the key environmental and social impacts and complies with the requirements of the South African EIA Regulations. In addition, an EMPr will also be compiled.

Requirement		Project Specific Applicability
	Projects, the Assessment Documentation includes an Environmental and Social Impact Assessment (ESIA). One or more specialised studies may also need to be undertaken. For other Category B and potentially C Projects, a limited or focused environmental or social assessment may be appropriate, applying applicable risk management standards relevant to the risks or impacts identified during the categorisation process.	
Principle 3: Applicable Environmental and Social Standards		
Overview	The Assessment process should, in the first instance, address compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues. The EPFI's due diligence will include, for all Category A and Category B Projects globally, review and confirmation by the EPFI of how the Project and transaction meet each of the Principles. For Projects located in Non-Designated Countries, the Assessment process evaluates compliance with the then applicable IFC PS and WBG EHS Guidelines. For Projects located in Designated Countries, compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues.	As South Africa has been identified as a non-designated country, the reference framework for environmental and social assessment is based on the IFC PS. In addition, this S&EIA process has been undertaken in accordance with NEMA (the host country's relevant legislation).
Principle 4: Environmental and Social Management System and Equator Principles Action Plan		
Overview	For all Category A and Category B Projects, the EPFI will require the client to develop or maintain an Environmental and Social Management System (ESMS). Further, an Environmental and Social Management Plan (ESMP) will be prepared by the client to address issues raised in the assessment process and incorporate actions required to comply with the applicable standards. Where the applicable standards are not met to the EPFI's satisfaction, the client and the EPFI will agree on an Equator Principles Action Plan (EPAP). The EPAP is intended to outline gaps and commitments to meet EPFI requirements in line with the applicable standards.	A formal project specific ESMS will be compiled in the event that the project is developed in the future. Management and monitoring plans outlines in the EMPr will serve as the basis for an ESMS for the proposed Project.
Principle 5: Stakeholder Engagement		
Overview	EPFI will require the client to demonstrate effective Stakeholder Engagement as an ongoing process in a structured and culturally	The S&EIA process includes an extensive stakeholder engagement process which complies with the South

Requirement		Project Specific Applicability
	appropriate manner with Affected Communities Workers and, where relevant, Other Stakeholders. For Projects with potentially significant adverse impacts on Affected Communities, the client will conduct an Informed Consultation and Participation process. To accomplish this, the appropriate assessment documentation, or non-technical summaries thereof, will be made available to the public by the borrower for a reasonable minimum period in the relevant local language and in a culturally appropriate manner. The borrower will take account of and document the process and results of the consultation, including any actions agreed resulting from the consultation. Disclosure of environmental or social risks and adverse impacts should occur early in the Assessment process, in any event before the Project construction commences, and on an ongoing basis.	African EIA Regulations. The process includes consultations with local communities, nearby businesses, and a range of government sector stakeholders (state owned enterprises, national, provincial, and local departments). The stakeholder engagement process solicits interest from potentially interested parties through the placement of site notices and newspaper advertisements as well as written and telephonic communication. The stakeholder engagement process is detailed in **Section 2.6** and in the SER **(Appendix D)**.
Principle 6: Grievance Mechanism		
Overview	For all Category A and, as appropriate, Category B Projects, the EPFI will require the client, as part of the ESMS, to establish effective grievance mechanisms which are designed for use by Affected Communities and Workers, as appropriate, to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance. The borrower will inform the Affected Communities and Workers about the grievance mechanism in the course of the stakeholder engagement process and ensure that the mechanism addresses concerns promptly and transparently, in a culturally appropriate manner, and is readily accessible, at no cost, and without retribution to the party that originates the issue or concern.	The EMPr will include 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		
Overview	For all Category A and, as appropriate, Category B Projects, an Independent Environmental and Social Consultant, not directly associated with the client, will carry out an Independent Review of the Assessment Documentation including the ESMPs, the ESMS, and the Stakeholder Engagement process documentation in order to assist the EPFI's due diligence, and assess Equator Principles compliance.	This principle will only become applicable in the event that the project is developed in the future.

Requirement		Project Specific Applicability
Principle 9: Independent Monitoring and Reporting		
Overview	To assess Project compliance with the Equator Principles after Financial Close and over the life of the loan, the EPFI will require independent monitoring and reporting for all Category A, and as appropriate, Category B projects. Monitoring and reporting should be provided by an Independent Environmental and Social Consultant; alternatively, the EPFI will require that the client retain qualified and experienced external experts to verify its monitoring information, which will be shared with the EPFI in accordance with the frequency required.	This principle will only become applicable in the event that the project is developed in the future.

5.5 OTHER GUIDELINES AND BEST PRACTICE RECOMMENDATIONS

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

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

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

The objective of the generic EMPr is "*to prescribe and pre-approve generally accepted impact management outcomes and impact management actions, which can commonly and repeatedly be used for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of overhead electricity transmission and distribution infrastructure. The use of a generic EMPr is intended to reduce the need to prepare and review individual EMPrs for applications of a similar nature*."[2]

[2] DEA (2019) *Appendix 1: Generic Environmental Management Programme (EMPr) for the Development and Expansion for Overhead Electricity Transmission and Distribution Infrastructure*

The generic EMPr (for Substations) will be included in the Site-Specific EMPr to be generated in the EIA Phase.

5.6 ADDITIONAL PERMITS AND AUTHORISATIONS

Table 5-6 outlines the additional permits and authorisations required for the proposed development, as well as the relevant Competent Authorities responsible.

Table 5-6 – Additional Permits and Authorisations required for the proposed development

Permits / Authorisation	Legislation	Relevant Authority	Status
Notification Of Intent To Develop (NID) Section 38 (1) and Section 38 (8)	Section 38 (1) & (8) of the NHRA	HWC and SAHRA	Submitted – Case ID: 21549
Subdivision of Agricultural Land Act (SALA) Consent / Change of Land Use (re-zoning)	Subdivision of Agricultural Land Act (Act No. 70 of 1970) / Spatial Planning and Land Use Management Act (Act No. 16 of 2013) (SPLUMA)	DALRRD	An application will be submitted following conclusion of the EIA process and receipt of an EA
Water Use Licence / General	National Water Act (Act No. 36 of 1998)	Department of Water and Sanitation	An application will be submitted following the conclusion of the EIA process
Obstacle Permit	Civil Aviation Act (Act 13 of 2009)	Air Traffic and Navigation Services / Civil Aviation Authority	An application has already been submitted to ATNS
Section 53 Approval	Minerals and Petroleum Resources Development Act (No. 28 of 2002)	Department of Mineral Resources and Energy	An application will be submitted during the EIA process
Permits for removal or destruction of Threatened or Protected Species (TOPs)	Transvaal Nature Conservation Ordinance (No. 12 of 1983	GDARD	Permits will be obtained prior to the commencement of construction.

6 BASELINE ENVIRONMENT

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

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

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

6.1 PHYSICAL ENVIRONMENT

6.1.1 CLIMATE

The following is extracted from the Terrestrial Biodiversity Assessment compiled by Ekotrust cc and included as ***Appendix G.1****.*

6.1.1.1 Regional Climate and rainfall

The site within falls a seasonal summer-rainfall, warm-temperate region, with very dry winters. The mean annual precipitation of the Rand Highveld Grassland is 654 mm (range from 570 mm in the west to 730 mm in the east) with a peak in rainfall in January. The annual precipitation coefficient of variation is 25%. Mean annual potential evaporation is 1926 mm, while the mean annual soil moisture stress is 73%. Mean annual temperature is 14.7°C and frost is frequent in winter with a mean of 32 days per annum.

The mean annual rainfall in the region ranges from 613 mm at Fochville to 652 mm at the farm Leeuwpoort (**Table 6-1**). The mean annual rainfall as measured at Carltonville is 646 mm (**Table 6-2, Figure 6-1**). The total annual rainfall at Carltonville during dry and wet years respectively may range from 421 mm to 1109 mm, indicating a high variation in the annual rainfall and therefore a rainfall scenario that is highly unpredictable. The rainy season at Carltonville is predominantly from October to April when about 92% of the annual rainfall occurs. December and January are the wettest months and the driest period is from June to August, when less than 10 mm of rain per month is recorded (**Figure 6-1**). Maximum rainfall measured over a 24-hour period at Carltonville was 159 mm, recorded in December. The highest monthly rainfall recorded was 272 mm, measured in January.

Table 6-1 - Rainfall at some weather stations in the general environs of the Igolide site

	Mean Annual Rainfall (mm)				
Month	**Fochville**	**Leeuwpoort**	**Carltonville**	**Potchefstroom**	**Elandsfontein**
Jan	110	117	119	119	107
Feb	74	87	73	83	95
Mar	83	85	77	78	85
Apr	41	43	58	61	32
May	20	23	13	15	20
June	7	7	6	7	7
July	6	8	4	4	9
Aug	6	6	8	10	8
Sep	18	18	20	20	18
Oct	55	57	66	55	52
Nov	93	97	93	85	80
Dec	98	97	109	94	105
Year	**613**	**652**	**646**	**631**	**618**

Table 6-2 - Maximum rainfall (mm) in 24 hours, highest maximum and lowest monthly minimum rainfall at Carltonville: 26° 20’ S; 27° 23’ E; 1500 m

	Rainfall (mm)			
Month	**Mean (month)**	**24 h max**	**Max per month**	**Min per month**
Jan	119	71	272	44
Feb	73	111	204	29
Mar	77	79	204	3
Apr	58	72	201	7
May	13	33	75	0
June	6	21	35	0
July	4	29	29	0
Aug	8	35	81	0
Sep	20	45	90	0
Oct	66	102	169	8
Nov	93	73	216	24
Dec	109	159	252	46
Year	**646**	**159**	**1109**	**421**

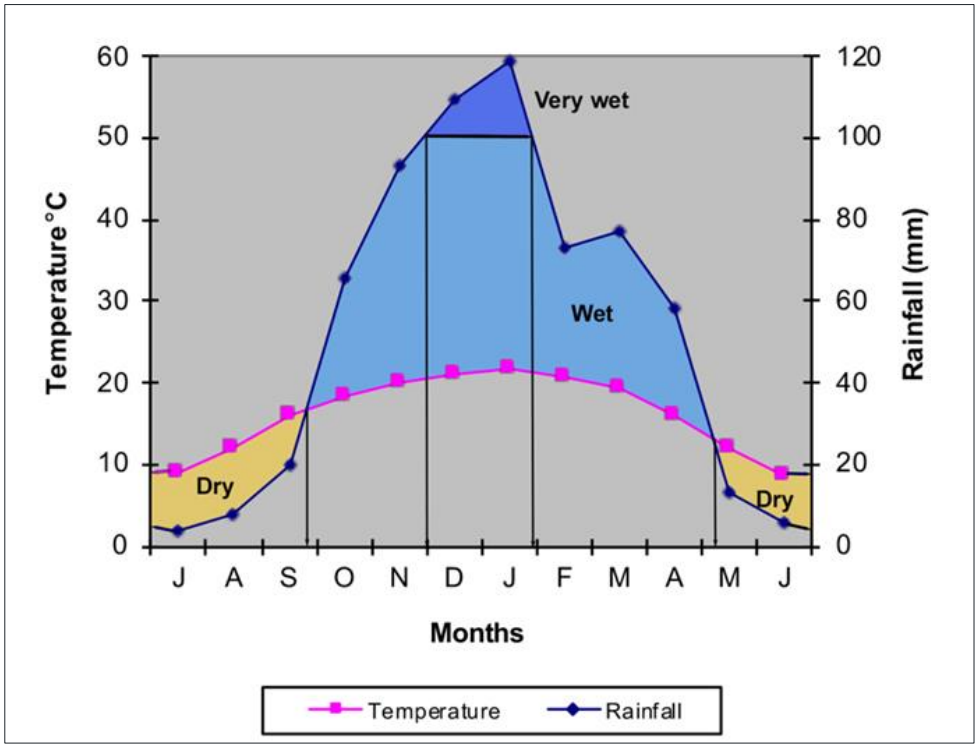


Figure 6-1 - Climate diagram for Carltonville

(Months on X-axis are from July to June. When the rainfall curve is below the temperature curve it indicates a dry period and when the monthly rainfall is higher than 100 mm it indicates a very wet period)

6.1.1.2 Temperature

The mean annual temperature for Carltonville is 16.3°C (**Table 6-3**) with the extreme maximum and minimum temperatures 37.1°C and -9.5°C respectively. The mean daily maximum for January is 27.9°C and for July it is 18.4°C, whereas the mean daily minimum for January is 16.5°C and for July it is 7.9°C. Frost may occur anytime from April to October.

Table 6-3 - Temperature data (°C) for Carltonville: 26° 20' S; 27° 23' E; 1500 m

	Temperature (°C)												
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Max	27.8	27.2	26.1	23.1	20.7	17.8	18.4	21.1	24.5	25.9	26.6	27.6	23.9
*Ext. Max	37.1	35.2	33.7	31.8	29.2	24.4	24.8	27.6	32.6	34.7	35	35.2	37.1
Min	16.5	16.9	14.5	9.8	8.8	3.5	7.9	8.7	8.4	11.5	8.8	15.1	3.5
*Ext. Min	7.5	5.5	2.0	-1.2	-5.6	-9.0	-8.8	-9.5	-3.3	-0.7	2.8	1.2	-9.5
Mean	21.6	20.9	19.5	15.9	12.1	8.7	9.0	11.9	16.1	18.4	20.0	21.1	16.3

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

6.1.2 AGRICULTURAL POTENTIAL

*The following is extracted from the Agricultural Compliance Statement compiled by Johann Lanz and included as **Appendix G.2**.*

The site falls within of an area that is classified as a Protected Agricultural Area. A Protected Agricultural Area is a demarcated area in which the climate, terrain, and soil are generally conducive for agricultural production and which, historically, has made important contributions to the production of the various crops that are grown across South Africa. Within Protected Agricultural Areas, the protection, particularly of arable land, is considered a priority for the protection of food security in South Africa. Obviously, all land within a Protected Agricultural Area is not necessarily of sufficient agricultural potential to be suitable for crop production, due to site-specific terrain, soil, and other constraints, and is therefore not necessarily worthy of prioritised protection as agricultural production land. The proposed wind farm site is such land that is of insufficient agricultural potential to be suitable for crop production.

All important parameters that control the agricultural production potential of the site are given in **Table 6-4**.

Table 6-4 - Parameters that control and/or describe the agricultural production potential of the site

	Parameter	Value
Climate	Köppen-Geiger climate classification	Cwb
	Köppen-Geiger climate description	Temperate, dry winter, warm summer
	Mean Annual Rainfall (mm)	613
	Reference Crop Evaporation Annual Total (mm)	1354
	Climate capability classification (out of 9)	Between 5 and 6, but predominantly 6 (moderate to high)
Terrain	Terrain type	The site is situated on a low ridge line
	Slope gradients (%)	3
	Altitude (m)	1600
	Terrain capability classification (out of 9)	Between 4 and 7, but predominantly 6 (moderate to high)
Soil	Geology	Timeball Hill and Rooihoogte Formations [Mudrock, quartzite (ferruginous in places), wacke, chert breccia, minor diamictite, conglomerate, shale, magnetic ironstone] and Hekpoort and Boshoek Formations [Tuff, agglomerate]
	Land type	Fb15 and Ba1

	Parameter	Value
	Description of land type soils	Predominantly shallow (with some deep), medium textured, soils on underlying weathered bedrock. Rock outcrops common.
	Dominant soil forms	Hutton, Mispah, Glenrosa
	Soil capability classification (out of 9)	Between 4 and 6, but predominantly 6 (moderate to high)
Land use	Agricultural land use in the surrounding area	Grazing and rain-fed field crops
	Agricultural land use on the site	Grazing of game only
	Land Cover classification on the site	Natural grassland, fallow land
General	Long-term grazing capacity (hectares per Large Stock Unit)	6 (very high)
	Land capability classification (out of 15)	Between 4 and 10, but predominantly 8 (moderate)
	Within Protected Agricultural Area	Yes

Although cropping occurs in the area (on better soils that are off the ridge line), and occurred on the site many years ago, the cropping potential of the site is limited predominantly by shallow, rocky soils that dominate the higher lying land on the ridge line where the turbines are situated. Cropping on the site is no longer economically viable. The marginal agricultural potential of the site limits its agricultural use to grazing only. It should be noted that cropping potential changes with a changing agricultural economy over time. Poorer soils that may have been cropped with economic viability in the past, are abandoned as cropland because they become too marginal for viable crop production in a more challenging agricultural economy, with increased input costs..

6.1.3 GEOLOGICAL CONTEXT

The following is extracted from the Palaeontological Study compiled by Professor Marion Bamford (Palaeobotanist) and included as ***Appendix G.7****.*

As depicted on the geological map (**Figure 6-2** and **Table 6-5**), the project lies in the Transvaal Basin with exposed strata of Transvaal Supergroup and is divided into two Groups, the lower Chuniespoort Group and the upper Pretoria Group.

Making up the lower Pretoria Group is the potentially highly sensitive rocks of the Timeball Hill Formation (northern part of the project area) and the moderately fossiliferous rocks of the Boshoek Formation and Silverton Formations (central and southeast, respectively).

The Pretoria Group is approximately 6-7km thick and is composed mostly of mudrocks alternating with quartzitic sandstones, significant interbedded basaltic-andesitic lavas and subordinate conglomerates, diamictites and carbonate rocks. These have been subjected to low grade metamorphism.

The Hekpoort Formation is composed of subaerial lavas that intruded into the Boshoek sandstones. These basaltic-andesitic lavas are thickest in the south of the Transvaal basin, thinning to the west and thinnest in the northeast.

The study indicated that it is unlikely that any trace fossils such as stromatolites or microbialites, occur in the project footprint.

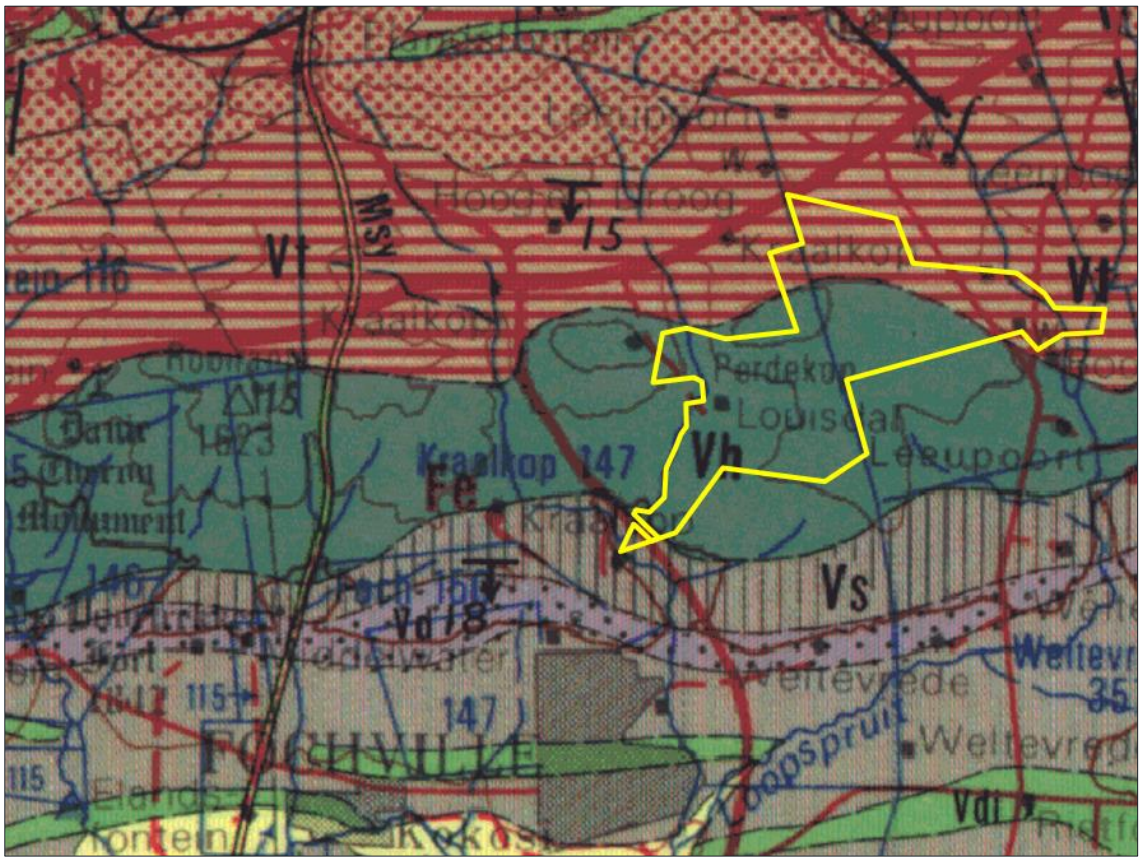


Figure 6-2 - Geological map of the area around the proposed Igolide WEF indicated within the yellow polygon

Abbreviations of the rock types are explained in Table 6-4. Map enlarged from the Geological Survey 1: 250 000 map 2626 West Rand.

Table 6-5 - Explanation of symbols for the geological map and approximate ages

Symbol	Group/Formation	Lithology	Approximate Age
Vdi	Diabase	Intrusive volcanic rocks	Post Transvaal SG
Vsi	Silverton Fm, Pretoria Group, Transvaal SG	Shale, carbonaceous in places, hornfels, chert	Ca 2202 Ma
Vd	Daspoort Fm, Pretoria Group, Transvaal SG	Sandstone, mudrock	Ca 2230 Ma
Vs	Strubenkop Fm, Pretoria Group, Transvaal SG	Shale, in places ferruginous	Ca 2242 Ma
Vdw	Dwaalheuvel Fm, Pretoria Group, Transvaal SG	Quartzite, chert, jaspilite	<2242 Ma
Vh	Hekpoort Fm, Pretoria Group, Transvaal SG	Volcanic rocks	Ca 2224 Ma
Vt	Timeball Hill Fm Pretoria Group, Transvaal SG	Shale, siltstone, conglomerate in places; dotted = Quartzite	Ca 2316 – 2266 Ma

SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project.

6.1.4 GEOTECHNICAL CONTEXT

*The following is extracted from the Desktop Geotechnical Study compiled by WSP Group Africa (Pty) Ltd and included as **Appendix G.5**.*

A desktop geotechnical study was undertaken for the proposed project, and the findings are presented below.

6.1.4.1 SURFACE DRAINAGE

Flooding affects flat lying areas, areas confined to drained channels and flood plains. The Loopspruit river passes through the far west and far east sections of the site which can pose potential problems during wet periods especially in areas where shallow rock or clay is present. Water management is recommended on all flat areas on site to facilitate water run-off and to alleviate the possibility of standing water at the foundation positions.

6.1.4.2 EROSION

The slope on site, as well as the soil structure will influence the amount of erosion that occurs on site. The undulating gradient makes the probability of erosion likely although this is reduced by the presence of tall grass and trees (**Figure 6-3**), that cover large portions of the site. Construction might increase the likelihood of erosion due to the disturbance of natural vegetation. This should be mitigated by revegetation after construction.

Figure 6-3 - Vegetation on site

6.1.4.3 SUITABILITY OF INSITU MATERIAL FOR USE IN CONSTRUCTION

Shale rock can be used during construction as backfill and in layerworks. However, some shale material breaks down on exposure to air and water and this can cause severe problems. Should the shale be indicated for use as a construction material, its durability properties would need to be assessed.

Quartzite rock is generally inert and of use as a construction material However, it is generally hard rock or harder in situ and blasting and crushing is generally required. Quartzitic sand is of use in construction but is likely be available only in very small quantities.

The soils developed on the Hekpoort Andesite Formation are unlikely to be suitable for use as a construction material due to their potential expansivity. The rock, however, is often used as general fill and in layerworks, once crushed.

6.1.4.4 EXCAVATIBITY

The excavation characteristics of the soil horizons has been evaluated according to the South African Bureau of Standards standardized excavation classification for earthworks (SABS – sa1200D). The definition of the excavation classes is indicated in **Table 6-6** and the assessment of the in-situ profile in **Table 6-7**. The ease of excavation is a critical financial factor for any development.

Table 6-6 - SABS Excavation Classes

Class of Excavation	General Definition
Soft	Excavation in material which can be efficiently removed or loaded by any of the following plant. without prior ripping: A bulldozer with a mass of at least 22 tons (which includes the mass of the ripper, if fitted) and an engine developing approximately 145kW at the flywheel. Or, A tractor-scraper unit with a mass of at least 28 tons and an engine developing approximately 245kW at the flywheel, pushed during loading by a bulldozer as specified for intermediate excavation Or, A track type front end loader with a mass of at least 22 tons and an engine developing approximately 140kW at the flywheel.
Intermediate	Excavation (excluding soft excavation) in material which can be efficiently ripped by a bulldozer with a mass of at least 35 tons when fitted with a single tine ripper and an engine developing approximately 220kW at the flywheel.
Hard	Excavation (excluding boulder excavation) in material which cannot be efficiently ripped by a bulldozer with properties equivalent to those described for intermediate excavation. This type of excavation generally includes excavation in material such as formations of unweathered rock, which can be removed only after blasting.
Boulder Class A	Excavation in material containing in excess of 40% by volume of boulders between 0.03m3 and 20m3 in size, in a matrix of softer material or smaller boulders. Excavation of fissured or fractured rock shall not be classed as boulder excavation but as hard or intermediate excavation according to the nature of the material.

Class of Excavation	General Definition
Boulder Class B	Where material contains 40% or less by volume of boulders in a matrix or soft material or smaller boulders.

Table 6-7 - Excavatability on Site

Material	Excavation Class
Strubenkop Shale and Timeball Hill Formations	▪ Soft excavations in residual shale, quartzite and hornfels and in very soft rock. ▪ Intermediate to hard excavation in medium hard and hard rock.
Hekpoort Andesite Formation	▪ Soft excavations in residual andesite, agglomerate and tuff, and in very soft rock. Some boulder excavation may be required. ▪ Intermediate to hard excavation in medium hard and hard rock.

6.1.4.5 SLOPE STABILITY

Development on the site is unlikely to cause any slope instability as no significant cut slopes will be developed. Where excavations are required, up to a depth of 3m, excavations should be excavated at a batter of 1:1 in soil where no water or seepage is evident and to 1:2, or flatter, where water is encountered. Rock can be excavated at a batter of 1:0.5 or vertically in the temporary case up to a depth of 3m.

6.1.4.6 SEISMIC HAZARD

The peak ground acceleration is between 0.16g and 0.20g for the site. The peak ground acceleration may be described as the maximum acceleration of the ground shaking during an earthquake, which has a 10% probability of being exceeded in a 50-year period as per **Figure 6-4**.

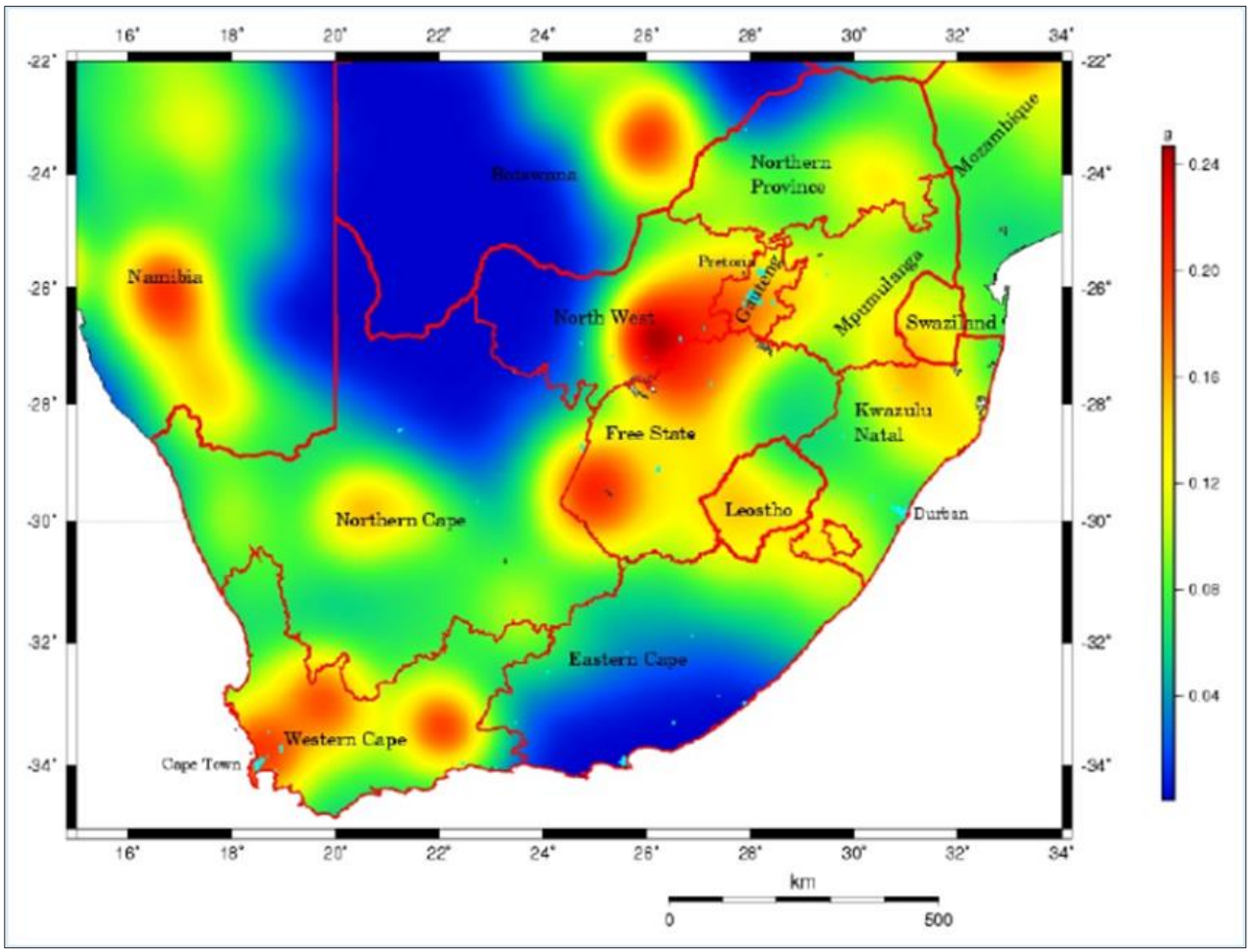


Figure 6-4 - Probabilistic seismic hazard map of South Africa

The site is situated in a zone were mining induced and natural seismic activity is possible (**Figure 6-5**). The last seismic event in the area was recoded on the 18th of January 2022 with a magnitude of 3.3.

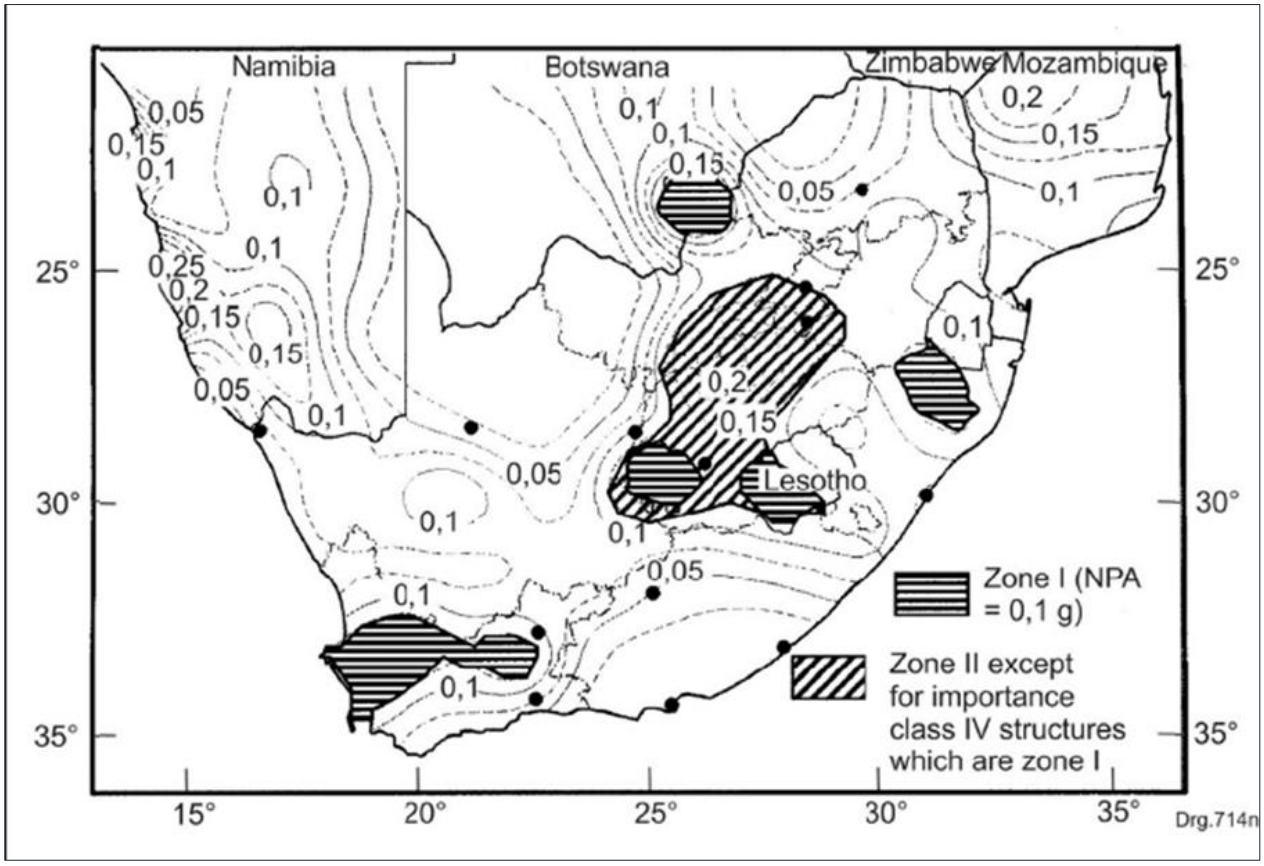


Figure 6-5 - Seismic zones of South Africa

6.1.4.7 UNDERMINING

Subsidence at surface in undermined areas is caused by the collapse and failure of the underground mining voids relatively close to the surface. The extent of mining activity in South Africa, shown in **Figure 6-6**, which depicts that the site is in an area with a significant number of gold mines.

Kloof mine is an underground gold mine located approximately 6km west of the site and could potentially pose problems for the proposed project with the possibility of a mine induced seismic event. The specialist recommended that the extent of any undermining below the site should be assessed, in detail, prior to development as the possibility of surface subsidence cannot be discounted should the site be undermined.

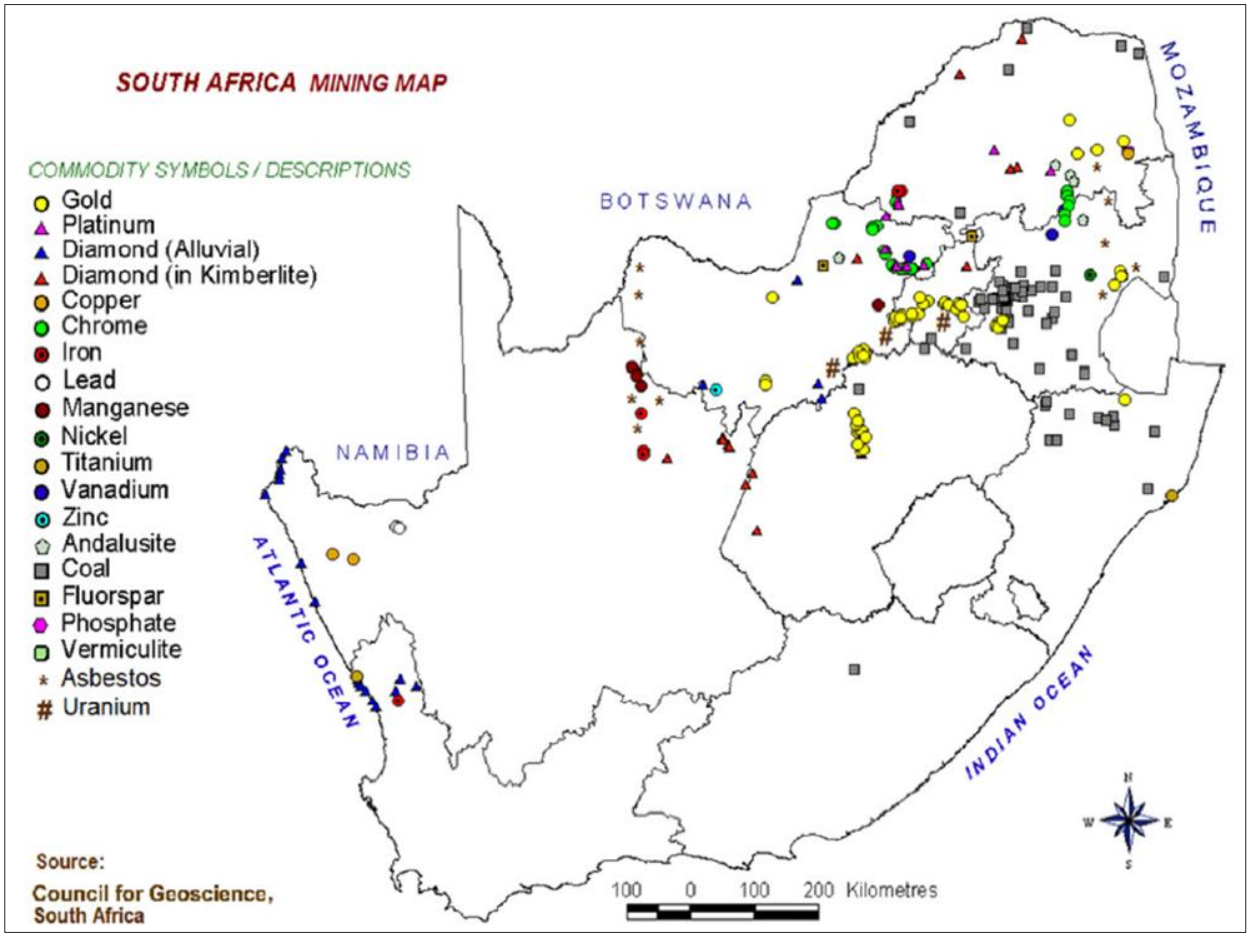


Figure 6-6 - Map indicating mining areas in South Africa

6.1.4.8 FOUNDATIONS

The turbines exert both a static load and a dynamic load on the founding material and competent material is required for founding to ensure stability and serviceability of the structures in the in the long term. Outcrops and shallow rock are expected under parts of the project site underlain by rocks of the Strubenkop Shale and Timeball Hill Formations. The depth to rock in those areas underlain by the Hekpoort Andesite Formation is expected to be highly variable over a very small distance.

6.1.5 SURFACE WATER

The following is extracted from the Aquatic Biodiversity Assessment compiled by WSP Group Africa (Pty) Ltd and included as ***Appendix G.4.***

The proposed site lies within the C23J quaternary catchment of the primary drainage region C within the Vaal Water Management Area (WMA). The Kraalkopspruit Sub-Quaternary Reach (SQR) C23J-01507 drains the Project Area to the west, while the perennial Loopspruit SQR C23J-01487 drains the study area on the east (**Figure 6-7**).

The Kraalkopspruit SQR is a first order stream which flows for approximately 10 km in a southward direction before joining the Loopspruit. The Loopspruit SQR is also a first order stream which flows for approximately 17 km in the southwest direction.

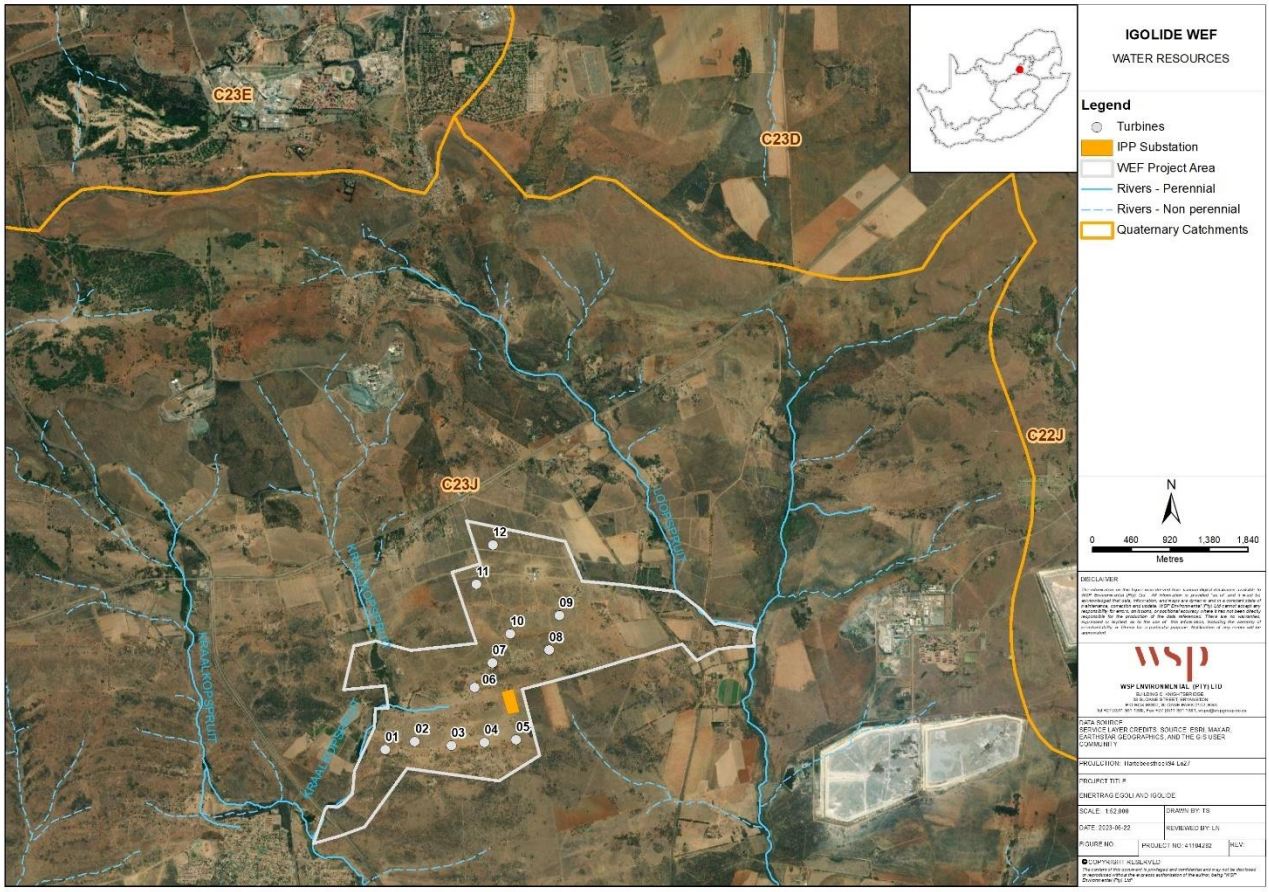


Figure 6-7 - Water Resources in the Study Area

6.2 BIOLOGICAL ENVIRONMENT

6.2.1 TERRESTRIAL BIODIVERSITY

The following is extracted from the Terrestrial Biodiversity Assessment compiled by Ekotrust cc and included as ***Appendix G.1.***

The project site falls in the Grassland Biome, the northern section of the site falls in the Central Bushveld Bioregion, while the remainder of the site falls in the Mesic Highveld Grassland Bioregion. The site does not fall within any Centre of Plant Endemism.

6.2.1.1 Vegetation types

Rand Highveld Grassland

Majority of the site is covered by Rand Highveld Grassland (**Figure 6-8**), and this vegetation type is heterogeneous and geographically disjunct. It covers a highly variable landscape with sloping plains and ridges elevated over the undulating surrounding plains. The vegetation comprises a species-rich sour grassland alternating with shrubland on rocky outcrops. The rocky hills support woody species such as *Senegalia caffra, Celtis africana, Protea caffra* and *Searsia* spp. Dwarf shrubs include *Seriphium plumosum* and *Searsia magalismontana*. The grass layer is characterised by *Eragrostis chloromelas, Diheteropogon amplectens, Loudetia simplex, Setaria sphacelata, Themeda triandra,*

Trachypogon spicatus and *Tristachya rehmannii*. Common herbs include *Justicia anagalloides, Acalypha angustata, Helichrysum nudifolium, Nidorella hottentotica* and *Selago densiflora.* Endemic taxa include Melanospermum rudolfii, Polygala spicata, Anacampseros subnuda subsp. lubersii, Frithia humilis, Crassula arborescens subsp. undulatifolia, Delosperma purpureum, Encephalartos lanatus and E. middelburgensis.

Although the conservation status of this vegetation type was listed as "Endangered" by Mucina & Rutherford (2006) it is listed as "Vulnerable" by NEMA (2011) and Skowno *et al*. (2019). Only 1.8% is statutorily conserved and almost half has been transformed mostly by cultivation, plantations and urbanisation.

Gauteng Shale Mountain Bushveld

This vegetation type covers the northern parts of the Igolide site (**Figure 6-8**). The unit is characterised by low, broken ridges varying in steepness and with a high surface rock cover. The vegetation is a short (3–6 m tall) semi-open bushveld dominated by a variety of woody species including *Senegalia caffra, Dombeya rotundifolia, Vachellia karroo, Celtis africana, Combretum molle, Englerophytum magalismontanum, Protea caffra, Searsia magalismontana, Cussonia spicata, Zanthoxylum capense, Vangueria infausta, Ziziphus mucronata, Ancylobotrys capensis, Euclea crispa, Ehretia rigida, Diospyros lycioides* and *Grewia occidentalis.* The grass layer is characterised by *Hyparrhenia dregeana, Cymbopogon caesius, Cymbopogon pospischilii* and *Eragrostis curvula*. The conspicuous forbs include *Macledium zeyheri, Helichrysum nudifolium, Helichrysum rugulosum, Hermannia lancifolia, Senecio venosus and Hilliardiella elaeagnoides*. In rocky areas the ferns *Cheilanthes hirta* and *Pellaea calomelanos* are prominent.

Although the conservation status of this vegetation type was listed as "Vulnerable" by Mucina & Rutherford (2006) it is listed as "Least Concern" by NEMA (2011) and Skowno *et al*. (2019). About 4.9% is statutorily conserved and more than 20% has been transformed mostly by cultivation, plantations, mines and quarries and urbanisation.

Figure 6-8 - Vegetation types in the region of the Igolide site

Plant communities

Based on species composition, nine natural habitats (plant communities) were distinguished, described and mapped on the Igolide site and a further five man-made units were also distinguished (**Figure 6-9**):

- *Trachypogon spicatus* grassland
- *Melinis repens - Selaginella dregei* rocky grassland
- *Cymbopogon caesius - Elionurus muticus* rocky grassland
- *Hyparrhenia hirta - Eragrostis chloromelas* grassland
- *Eragrostis plana - Trisetopsis imberbis* wetlands/floodplains
- *Vachellia karroo - Ehretia rigida* rocky bushveld
- *Salix babylonica - Phragmites australis* riverine vegetation
- *Hyparrhenia tamba* floodplains
- *Eragrostis tef - Tagetes minuta* abandoned cropland
- Planted pasture (*Digitaria eriantha*)
- *Eucalyptus camaldulensis* plantations (degraded)
- Hedges (*Robinia sp., Pyracantha sp., Cedrus sp., Searsia pyroides*)
- Dams
- Habitation/infrastructure

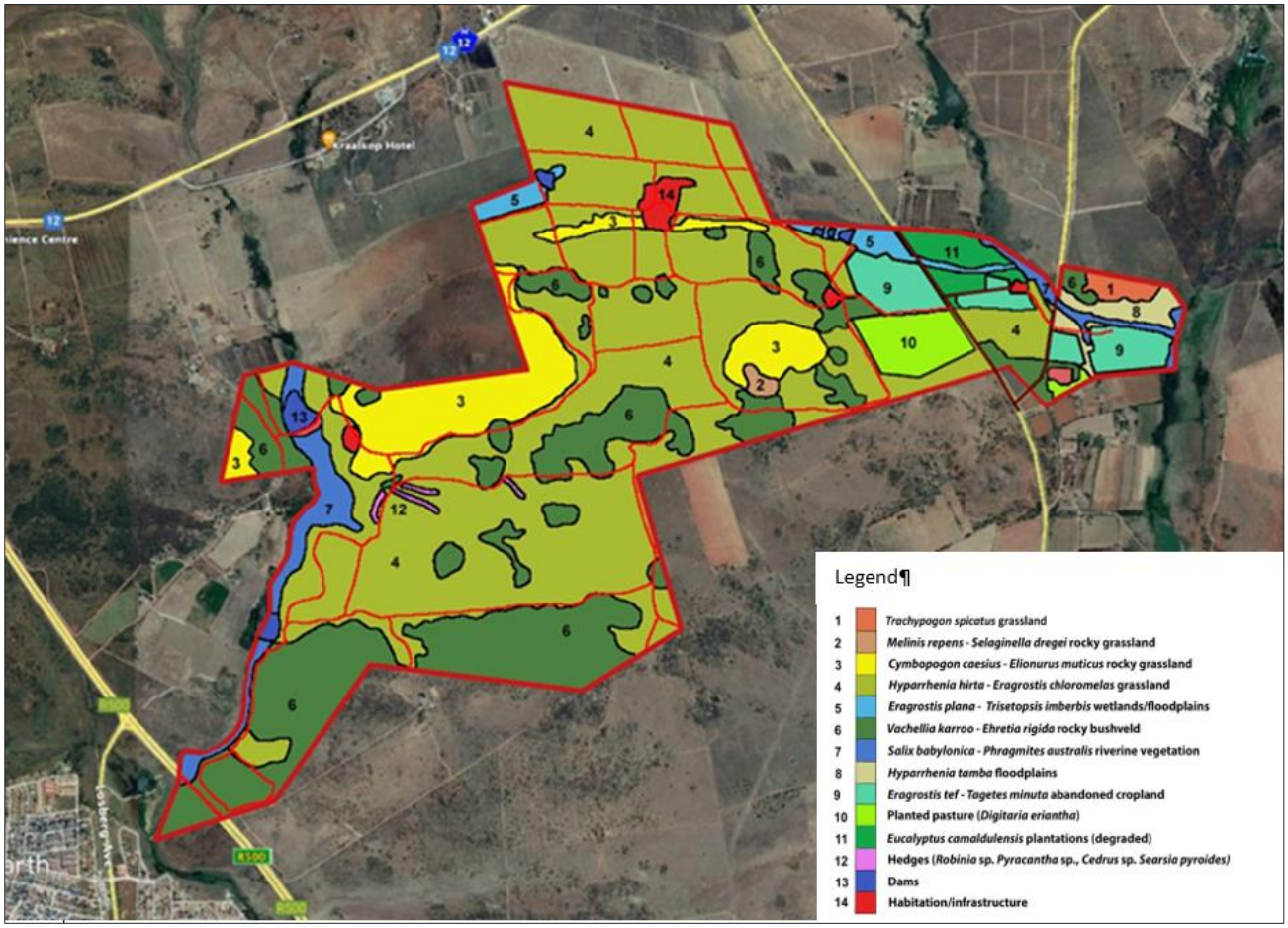


Figure 6-9 - Vegetation map of the Igolide site

6.2.1.2 Alien Invasive Plant Species

Forty-nine alien plant species were recorded on the project site of which 22 are currently declared alien invasive species and 27 naturalised alien species; and 38 alien species were listed by NewPosa for the region.

Category 1b Listed Invasive Species

The following species were recorded at the project site:

- *Campuloclinium macrocephalum*
- *Cuscuta campestris*
- *Eucalyptus camaldulensis**
- *Melia azedarach*
- *Pyracantha angustifolia*
- *Robinia pseudoacacia*
- *Solanum pseudocapsicum*
- *Verbena bonariensis*
- *Xanthium spinosum*
- *Cirsium vulgare*
- *Datura ferox*
- *Ipomoea purpurea*
- *Opuntia ficus-indica*
- *Pyracantha crenulata*
- *Solanum elaeagnifolium*
- *Solanum sisymbriifolium*
- *Verbena brasiliensis*

**Exempted for an existing plantation*

Other category 1b Alien Invasive Species

The following species were recorded at the project site:

- *Agrimonia procera*
- *Argemone ochroleuca*
- *Datura stramonium*
- *Xanthium strumarium*
- *Araujia sericifera*
- *Cestrum parqui*
- *Phytolacca octandra*

Category 2 Listed Invasive Species

The following Category 2 Listed Invasive Species were recorded on Igolide:

- *Acacia dealbata*
- *Ricinus communis*
- *Acacia mearnsii**
- *Populus canescens*

**Exempted for an existing plantation*

Category 3 Listed Invasive Species

Twenty-seven naturalised weedy alien species were recorded on the site. Another 37 naturalised weedy alien species were also listed by NewPosa for the region. One non-declared alien tree species was recorded on site - *Cedrus deodora* and one non-declared alien tree species was listed by NewPosa for the region: *Ulmus parvifolia.*

6.2.1.3 Mammals

IUCN Threatened Mammal Species

Five IUCN threatened mammal species were listed for the environs of the Igolide site on the website of the Animal Demography Unit, University of Cape Town (**Table 6-8**). The threatened category include species that are Critically Endangered (CR), Endangered (EN) and Vulnerable (VU).

Table 6-8 - IUCN threatened mammal species

IUCN threatened mammal species		Threatened category
Redunca fulvorufula	Mountain reedbuck*	EN
Acinonyx jubatus	Cheetah	VU
Panthera pardus	Leopard	VU
Cloeotis percivali	Percival's short-eared trident bat	EN
Mystromys albicaudatus	African white-tailed rat	VU

**species recorded on site or confirmed by landowner*

Six mammal species were listed as Near Threatened (**Table 6-9**). However, none were recorded on the site).

Table 6-9 - IUCN near threatened mammal species

IUCN near threatened mammal species		Threatened category
Atelerix frontalis	Southern African Hedgehog	NT
Leptailurus serval	Serval	NT
Aonyx capensis	African clawless otter	NT
Miniopterus schreibersii	Schreibers's long-fingered bat	NT
Pipistrellus rusticus	Rusty pipistrelle	NT
Hydrictis maculicollis	Spotted-necked otter	VU

- Southern Mountain reedbuck (*Redunca fulvorufula fulvorufula*):

The southern mountain reedbuck is listed as **Endangered A2b** due to large population declines in all protected areas for which long-term count data are available. However, the species has been extensively reintroduced into parts of its former range. A large portion of the Igolide site is currently a game farm and the species could have been introduced.

Due to their specialised habitat requirements, the distribution of the mountain reedbuck is patchy and discontinuous and that they are found only where there is suitable habitat. They favour grass-covered ridges and hillsides in broken, rocky country or high-altitude grasslands. They are dependent on steep slopes, a well-developed grass layer and some scattered woody cover to evade predators. The mountain reedbuck favours slopes with a gradient of 20° or more. In regions where cover is locally more abundant in lower valleys than on upper slopes and ridges, it often prefers the lower slopes. They avoid the open conditions with no cover associated with the summits of mountainous areas as well as dense woody cover. They also occur in dry hilly areas (such as the Nama-Karoo), utilising steep slopes and the bases of hills for grazing. The extent of available slopes for predator evasion is regarded as an indicator of the quality of their territory.

The Screening Tool did not list the Southern mountain reedbuck for the site and it could thus have been introduced on site. Its presence on site and its status of “Endangered” should be considered when developing the Igolide site.

The Screening Tool highlighted the following two mammal species in the region, however, neither were recorded on site during the survey although they may occur in the region:

- Spotted-necked otter (*Hydrictis maculicollis*)
- Maquassie musk shrew (*Crocidura maquassiensis*)

Provincially protected mammal species

Ten of the terrestrial mammal species listed, are Schedule 2 Protected Game in Gauteng. However, the hippopotamus was not recorded on site. The following nine species were recorded on the Igolide site:

- *Alcelaphus buselaphus caama* Red hartebeest

- *Connochaetes gnou* Black wildebeest
- *Kobus ellipsiprymnus ellipsiprymnus* Waterbuck
- *Oryx gazella* Gemsbok
- *Raphicerus campestris* Steenbok
- *Redunca fulvorufula* Mountain reedbuck
- *Taurotragus oryx* Cape eland
- *Giraffa giraffa giraffa* Giraffe
- *Lepus saxatilis* Scrub hare

Three mammal species listed in the ADU database are Schedule 4 Protected Wild Animals (not recorded on site):

- *Acinonyx jubatus* Cheetah
- *Panthera leo* Lion
- *Panthera pardus* Leopard

Three species are listed as Schedule 8 Problem Animals (all recorded on site):

- *Canis mesomelas* Black-backed jackal
- *Chlorocebus pygerythrus pygerythrus* Vervet monkey
- *Caracal caracal* Caracal

6.2.1.4 Reptiles

Forty-four (44) reptile species are listed for the region. The list includes one IUCN threatened (Vulnerable) species, i.e., *Crocodylus niloticus* for the region. Provincially protected reptile species include 26 Schedule 2 Protected Game and 17 Schedule 5 snakes. The python *Python natalensis* is the only protected reptile species according to the ToPS list (NEMBA 2007c).

6.2.1.5 Frogs

Sixteen species were listed for the region and the Giant Bull Frog *Pyxicephalus adspersus* is listed as Near Threatened and is also on the ToPS list as a protected species (NEMBA 2007c).

6.2.1.6 Lepidoptera

One of the 100 species of the Lepidoptera is listed as Endangered, i.e., *Lepidochrysops praeterita* (Highveld giant cupid).

The two Lepidopteran species listed by the Screening Tool are unlikely to occur on site because their host plant was not recorded on site. *Lepidochrysops praeterita* is not ranked as sensitive although it has an IUCN status of Vulnerable. The species is not exploited, collected, traded or utilised in a targeted manner. This taxon is confined to grassy, rocky, typically south-facing slopes, where its host plant (*Ocimum obovatum*). Most localities are within an altitudinal band between 1500 m and 1750 m. *Lepidochrysops praeterita* is highly localized and appears to have a very specific habitat niche.

6.2.1.7 Odonata

Fifty-three species of Odonata were listed for the region and all have a status of Least Concern according to the IUCN classification.

6.2.1.8 Scorpions

Four scorpion species are listed for the region and two are listed as ToPS species (NEMBA 2007c).

6.2.1.9 Spiders

All baboon spiders are provincially protected. One of the listed baboon spiders *Harpactira hamiltoni* is a ToPS protected species (NEMBA 2007c).

6.2.1.10 Other insects

According to the RSA Red List, *Clonia uvarovi* is rated as Vulnerable. It inhabits tall savanna woodland. The habitat on site could be described as bushveld which may be marginally suitable for the species. However, its habitat will not be affected by the turbines.

6.2.1.11 Conservation status

- Protected Areas: The study area is not located in a protected area.
- National Protected Areas Expansion Strategy (NPAES): The development will not interfere with the protected areas expansion strategy.
- Critical Biodiversity Areas (CBAs): The proposed Igolide site does not constitute any of the land uses considered to be undesirable in a CBA. Turbines avoided the CBAs on site.
- Ecological Support Areas (ESAs): Ecological processes that operate within or across ESAs will not be altered by the development. The extent of the development is relatively small and will not have a negative impact on the functionality of the broader ESA. Thus, no additional loss of ecological connectivity in relation to the broader landscape is likely.
- Freshwater Ecosystem Priority Area (FEPA): Although the entire site is classified as Upstream FEPA, the site assessment of the vegetation and the application of a sensitivity model rated most of the FEPA as being of low to moderate sensitivity. FEPAs were not highlighted by the Screening Tool.

The CBA map **Figure 6-10** indicates the presence of a CBA 2 on the rocky grassland habitat (Habitat 3) and parts of the grassland on the plains (Habitat 4). The ESAs cover parts of the rocky grassland (Habitat 3) and some of the rocky bushveld habitat (Habitat 6). Development within Critical Biodiversity Areas is not encouraged.

No turbines appear to be sited in a CBA or ESA (**Figure 6-10**). An Ecological Support Area (ESA) is not essential for meeting biodiversity targets but plays an important role in supporting the ecological functioning in a CBA. ESAs need to be maintained in at least a functional and often natural state, but some limited habitat loss may be acceptable. It is important that the project should not compromise the functional (natural) state of the ESAs.

Other Natural Areas (ONAs) have not been identified as a priority, but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Land use guidelines for Terrestrial Other Natural Areas (ONAs) are not required to meet biodiversity targets. ONAs represent the largest area in the region and form a matrix within which the CBAs and ESAs occur (**Figure 6-10**).

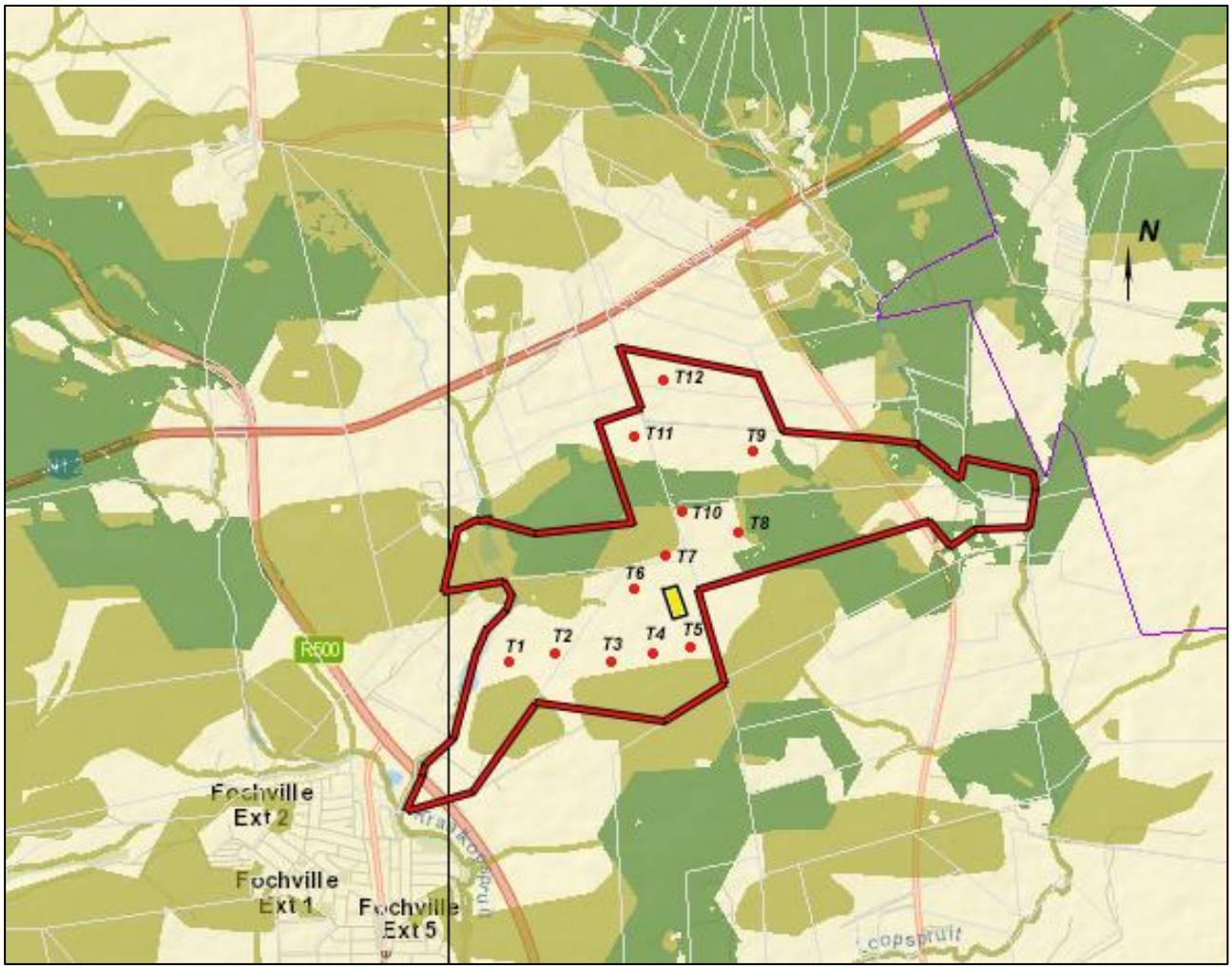


Figure 6-10 - Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs) and Other Natural Areas (ONAs) of the Igolide site and environs

Green = CBAs; olive green = ESAs; cream = ONAs; yellow square = IPP substation/BESS; red dots = Turbines 1 – 12

6.2.1.12 Habitat sensitivity

A sensitivity model was applied to the data for each of the 13 habitats (plant communities) on site. Habitats 2, 5 and 7 (rocky outcrops, wetlands and watercourses respectively) were rated as of medium sensitivity and the remainder as low sensitivity. The proposed substation is not located in any sensitive habitat or CBA and could be used as the preferred site for the substation and BESS facility. The WEF infrastructure is currently located in Habitat 4 (Grassland) and all rocky hills, rocky outcrops (sheets) and drainage lines are avoided. The twelve turbines are located in a habitat with a low sensitivity rating (Habitat 4).

Buffers are applicable to the development along the watercourses. A buffer zone of 32 m is usually applied to drainage lines, but the bat and aquatic specialists may apply wider buffer zones along these habitats. It is recommended that the buffer zones specified in the aquatic report are used as guidelines.

The Screening Tool rated the sensitivity of the Plant Species Theme as medium and four species were highlighted as being of concern. None of the SCC highlighted by the Screening Tool were

recorded on site. Our site surveys and sensitivity model applied in the site data indicated that most of site had a low sensitivity.

The Screening Tool rated the sensitivity of the Animal Species Theme as medium. Eight animal species were highlighted by the Screening Tool for the region and include three bird species, three invertebrates and two mammal species, i.e., the '*Vulnerable' Maquassie* Musk Shrew *Crocidura maquassiensis* and the Spotted-necked Otter *Hydrictis maculicollis*. None were recorded on site. According to the RSA Red List, *Clonia uvarovi* (Orthoptera) is rated as Vulnerable. It inhabits tall savanna woodland, and where the habitat on site could be decribed as bushveld it may be marginally suitable for the species.

The Screening Tool rated the sensitivity of the Relative Terrestrial Biodiversity Theme as very high based on the presence of CBAs, ESAs, PAES and a vulnerable ecosystem. The study area is not located in a protected area, nor does it fall in an area earmarked as PAES. Our background study indicated that there are CBAs as well as ESAs on site but the proposed positions of the twelve turbines avoid these areas. Overall, the impact of the development within the identified CBAs and ESAs is believed to be small.

The Freshwater Ecosystem Priority Areas (FEPAs) or water catchments are priority areas for conserving freshwater ecosystems and supporting sustainable use of water resources and upstream management areas. The Screening Tool classified the entire area covered by the FEPA as having a low or moderate sensitivity. Furthermore, based on the site assessment of the vegetation, the area was rated as being of low or moderate sensitivity and FEPAs were not flagged by the Screening Tool.

6.2.1.13 Ecological processes, function, and drivers

Overall, it is unlikely that the development will contribute to the disruption of broad-scale ecological processes such as dispersal, migration or the ability of fauna to respond to fluctuations in climate or other conditions.

The disturbance caused by the construction of the WEF will inevitably create conditions favourable for invasion by alien species.

6.2.2 AQUATIC BIODIVERSITY

The following is extracted from the Aquatic Biodiversity Assessment compiled by WSP Group Africa (Pty) Ltd and included as ***Appendix G.4.***

6.2.2.1 Classification of aquatic features

Freshwater Ecosystem Priority Areas (FEPA) sub-catchment

The proposed development footprint in relation to FEPA sub-catchments and mapped National Freshwater Ecosystem Priority Areas (NFEPA) wetlands is illustrated on **Figure 6-11** and **Figure 6-12**, respectively. FEPA sub-catchment areas provide strategic spatial priorities for conserving south Africa's freshwater ecosystems and supporting sustainable use of water resources. Areas mapped as FEPA sub-catchment provide guidance on which watercourses should remain in a natural or near natural condition to support water resource protection goals of the water act.

Figure 6-11 - FEPA Sub-Catchments in relation to the Study Area

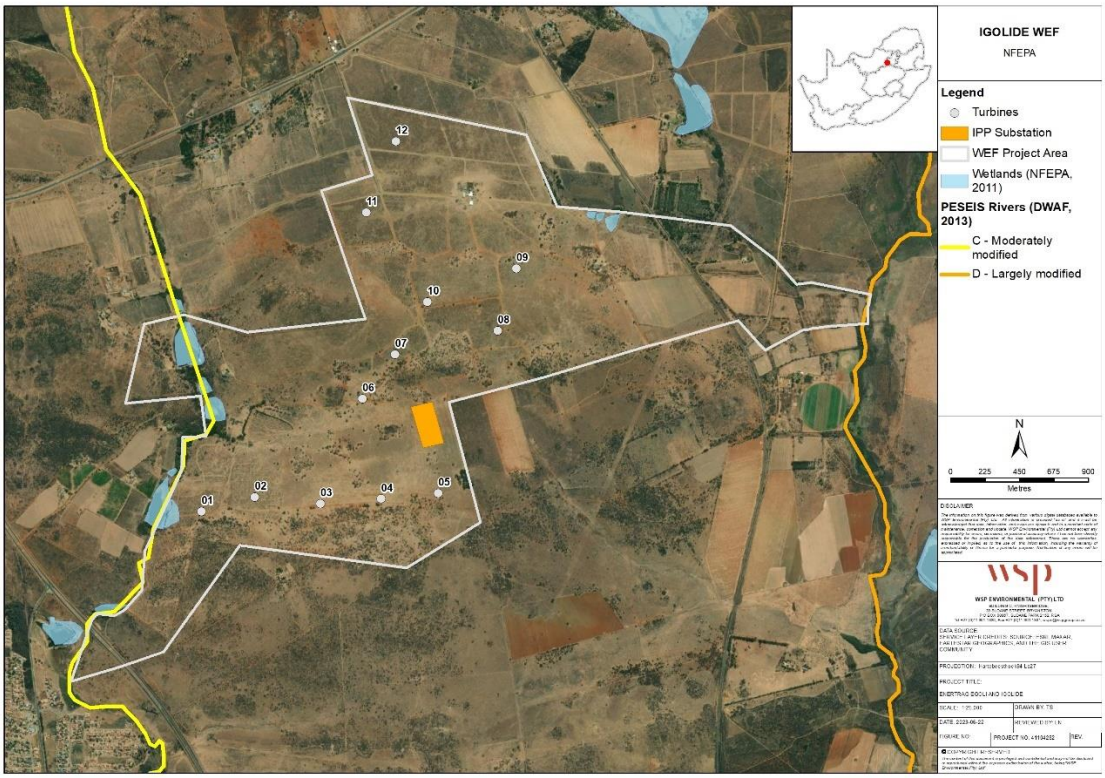


Figure 6-12 - NFEPA Wetlands and Rivers within the Study Area

National Wetland Map 5 Wetlands

The South African National Wetland Map version 5 (NWM5) portrays the most up-to-date spatial data for the extent and types of estuarine and inland aquatic (freshwater) ecosystems of South Africa. The proposed development footprint in relation to wetlands mapped as part of the National Wetland Map 5 project is illustrated on **Figure 6-13**. Based on NWM5 the Project area intercepts a number of wetland systems including a channelled valley bottom wetland, a hillslope seep and an unchanneled valley bottom wetland (**Figure 6-13**).

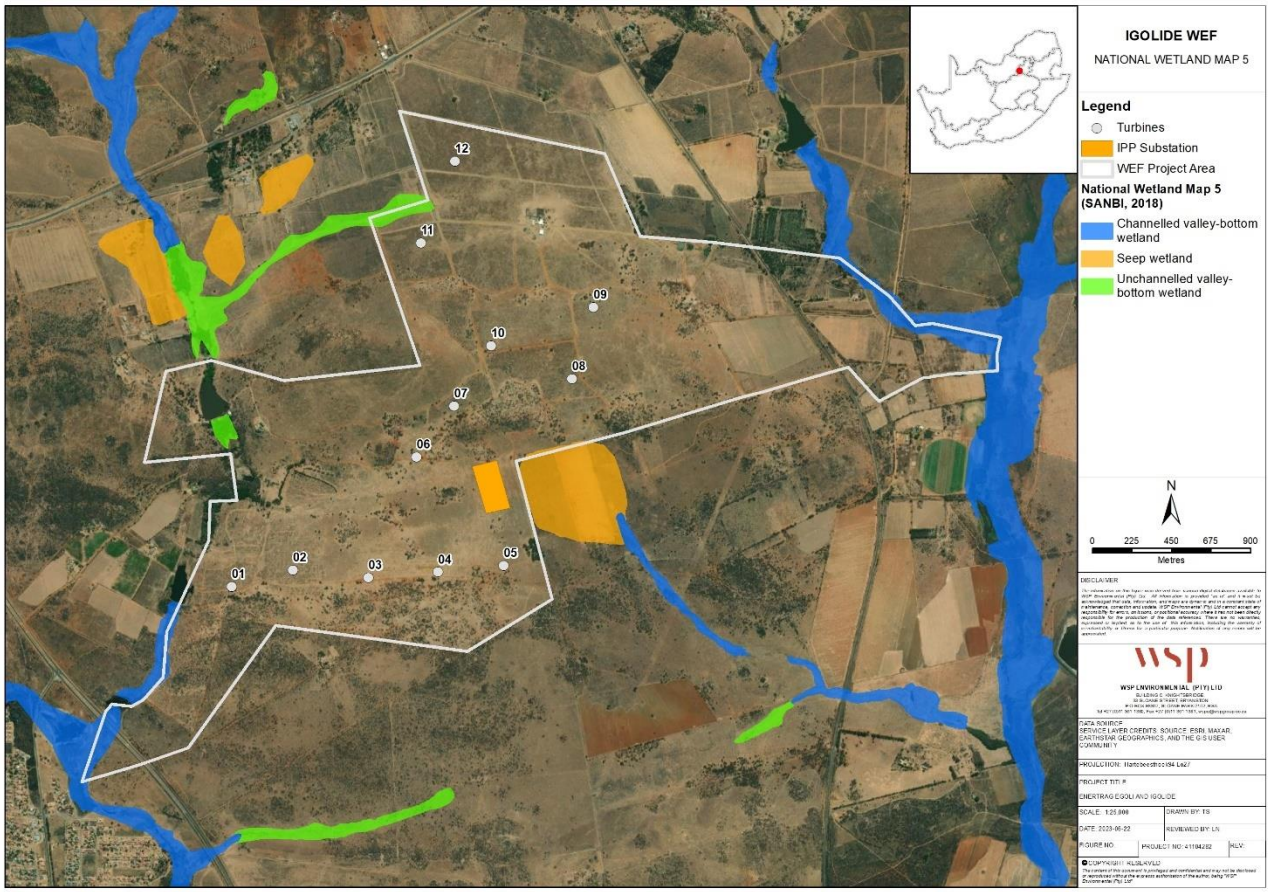


Figure 6-13 - National Wetland Map 5 Wetlands on site

Wetlands

At a desktop level 14 wetlands were identified and mapped within the proposed project site, these are indicated in **Table 6-10** and **Figure 6-14**. Although the wind turbine location avoids direct wetland habitat, they are still within a 500 m regulated buffer of a wetland (**Figure 6-14**). Based on the NWM5, majority of the wetlands on site are considered Largely Modified (PES-D), which means that a large loss of natural habitat and basic ecosystem has occurred as a result of land use impacts within the wetland and the catchment. Current impacts identified at a desktop level include, current and old farming activities, impoundment of flow at dams, hardened surfaces at road crossings and at residential settlement.

Table 6-10 - Summary of wetlands identified

Unit #	Wetland Unit	Area (Ha)	PES Category
1	SEEP	27.40	D- Largely Modified
2	SEEP	4.16	D- Largely Modified
3	SEEP	0.44	D- Largely Modified
4	SEEP	1.68	D- Largely Modified
5	SEEP	0.00	D- Largely Modified
6	Channelled Valley Bottom	4.98	D- Largely Modified
7	Channelled Valley Bottom	0.53	D- Largely Modified
8	Channelled Valley Bottom	1.16	D- Largely Modified
9	Channelled Valley Bottom	27.79	D- Largely Modified
10	Channelled Valley Bottom	7.88	C- Moderately Modified
11	Channelled Valley Bottom	13.15	D- Largely Modified
12	Unchanneled Valley Bottom	1.53	D- Largely Modified
13	Unchanneled Valley Bottom	15.09	D- Largely Modified
14	Channelled Valley Bottom	19.15	D- Largely Modified

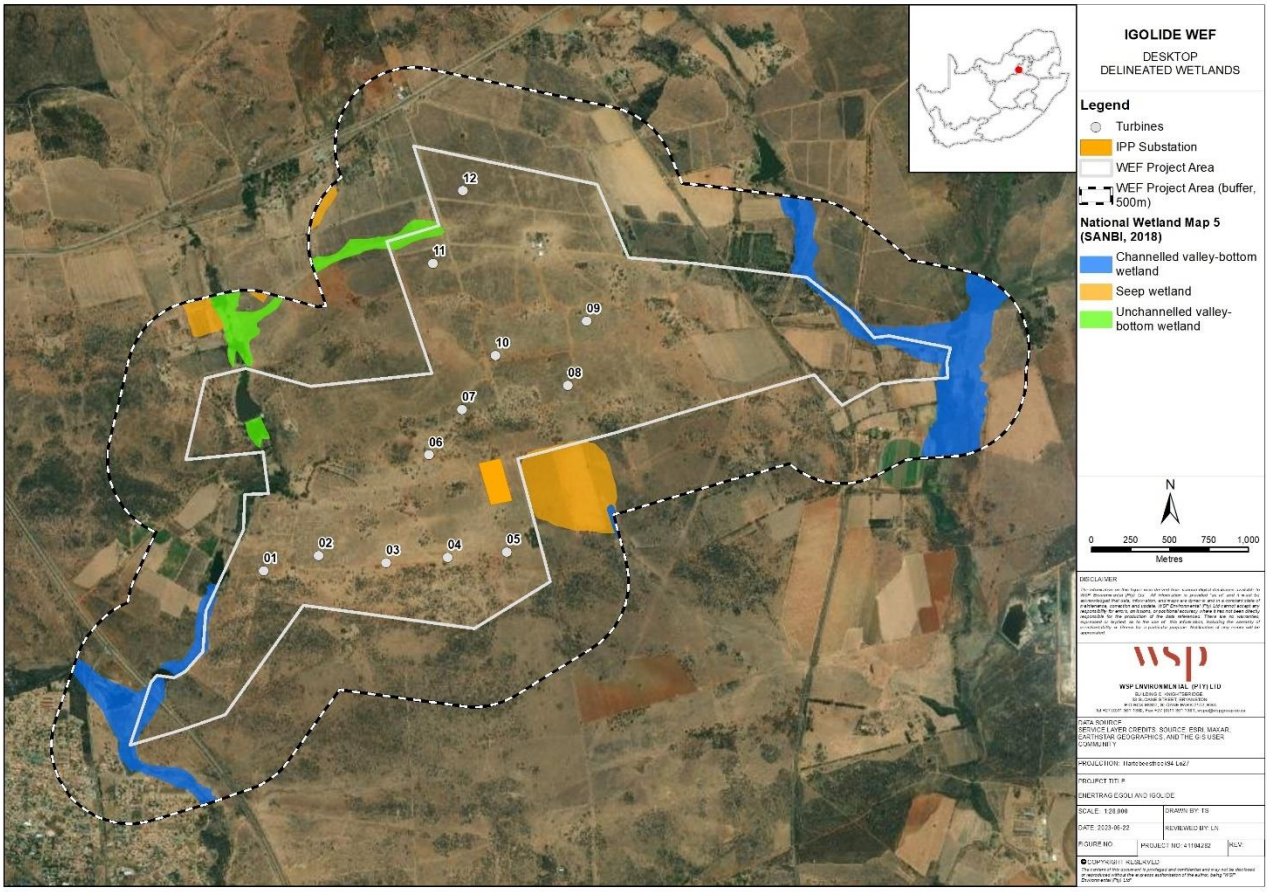


Figure 6-14 - Desktop Delineated Wetlands

6.2.2.2 Freshwater

The proposed project monitoring points (**Figure 6-15**) have been selected based on the proposed positioning of WEF infrastructure and access roads, and the future need to measure and monitor potential impacts on the various surface water systems that coincide and interact with the proposed infrastructure and activities.

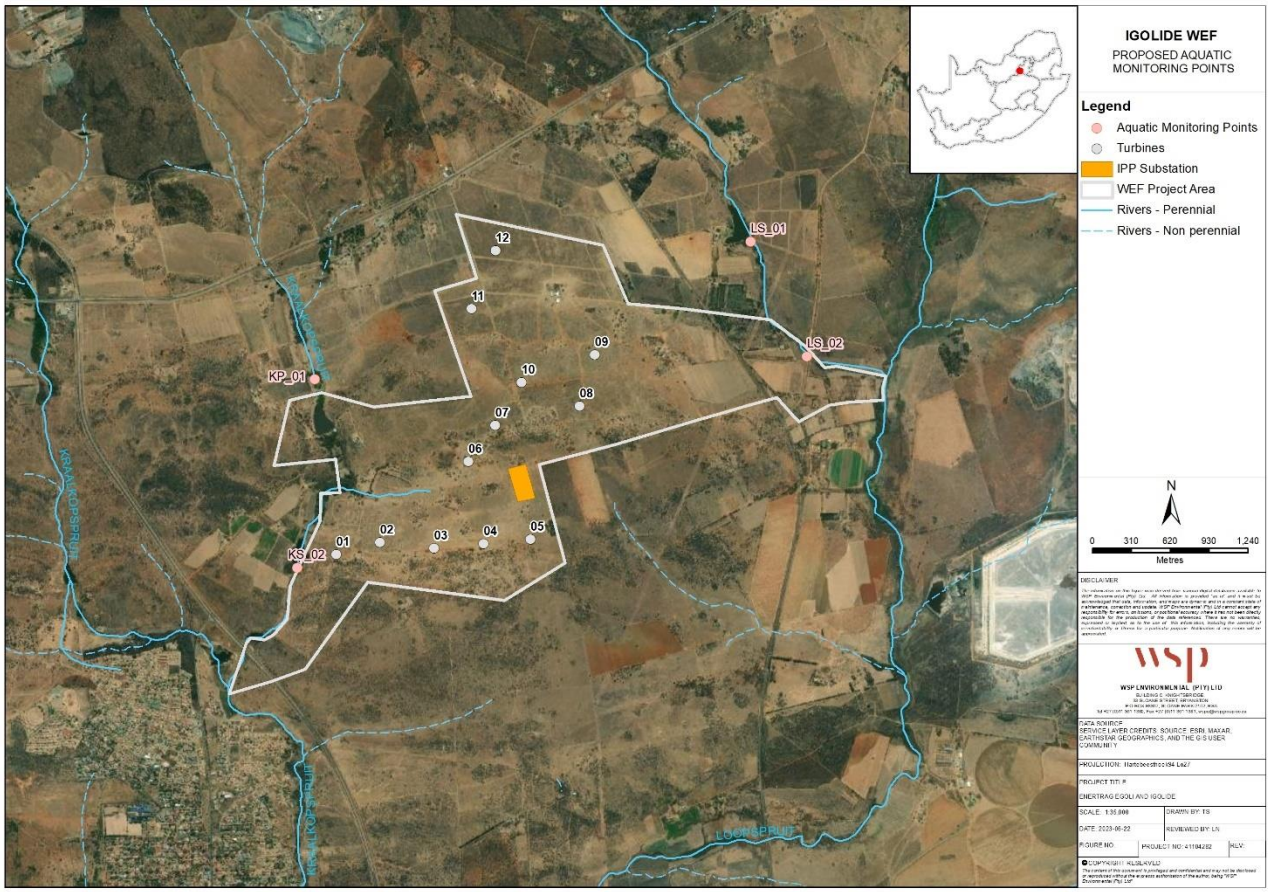


Figure 6-15 - Proposed Aquatic Biomonitoring Points

Present Ecological State, Importance and Sensitivity

The Present Ecological State (PES) for the associated Kraalkopspruit and Loopspruit SQRs is Moderately Modified and Largely Modified respectively. The Ecological Importance and Sensitivity (EIS) for the Kraalkopspruit SQR is moderate and high respectively, and moderate for the Loopspruit SQR. The EIS categories are based on the diversity of fish and aquatic macroinvertebrate taxa expected to occur within these systems and their sensitivities to water quality modifications (**Table 6-11** and **Figure 6-12**).

Table 6-11 - Desktop Present Ecological State, Importance and Sensitivity for the focus Sub-Quaternary Reaches

River	Kraalkopspruit	Loopspruit
SQR Code	C23J-01507	C23J-01487

River	Kraalkopspruit	Loopspruit
Ecological Category	C	D
Category Description	Moderately Modified	Largely Modified
Ecological Importance (EI)	Moderate	Moderate
Ecological Sensitivity (ES)	High	Moderate
No. of fish species	5	4
No. of aquatic invert taxa	42	41

Expected Fish Species and Aquatic Macroinvertebrate Taxa

The expected fish species and aquatic macroinvertebrate taxa for the SQRs associated with the proposed project are presented in **Table 6-12** and **Table 6-13** respectively. Five fish species are expected, all of which are categorized as Least Concern (LC) according to the IUCN Red List of Threatened Species. The fish species tolerances to modified water quality and no-flow conditions vary between tolerant to moderately Intolerant. A total of 42 aquatic macroinvertebrate taxa are expected within the study area. The community assemblage is predominantly comprised of taxa with a high preference for slow flows, and with very low sensitivities toward water quality modifications. Few taxa have a high requirement for fast flowing water (i.e., Ceratopogonidae, Chironomidae, Simuliidae, Tipulidae and Ancylidae).

Table 6-12 - Expected fish species, respective tolerance/intolerance to water quality modifications and no-flow conditions and IUCN conservation status

SQR		Fish Species	Tolerance		Conservation Status
			Modified Water Quality	No-Flow	
C23J-01507	C23J-01487	*Tilapia sparrmanii*	Tolerant	Tolerant	LC
		Enteromius anoplus	Moderately tolerant	Moderately tolerant	LC
		Enteromius paludinosus	Tolerant	Moderately tolerant	LC
		Pseudocrenilabrus philander	Tolerant	Tolerant	LC
		Enteromius pallidus	Moderately Intolerant	Moderately tolerant	LC

Table 6-13 - Expected aquatic macroinvertebrates

Family names		
Turbellaria	*Gerridae*	*Chironomidae*
Oligochaeta	*Hydrometridae*	*Culicidae*
Hirudinea	*Naucoridae*	*Muscidae*
Potamonautidae	*Nepidae*	*Psychodidae*
Atyidae	*Notonectidae*	*Simuliidae*
Hydracarina	*Pleidae*	*Syrphidae*

Family names		
Baetidae > 1 sp	*Veliidae/mesoveliidae*	*Tabanidae*
Caenidae	*Hydropsychidae 1 sp*	*Tipulidae*
Coenagrionidae	*Hydroptilidae*	*Ancylidae*
Aeshnidae	*Leptoceridae*	*Lymnaeidae*
Gomphidae	*Dytiscidae*	*Physidae*
Libellulidae	*Gyrinidae*	*Planorbinae*
Belostomatidae	*Hydrophilidae*	*Corbiculidae*
Corixidae	*Ceratopogonidae*	*Sphaeriidae*

6.2.3 AVIFAUNA

*The following is extracted from the Avifaunal Specialist Scoping Report compiled by Chris van Rooyen Consulting and included as **Appendix G.3**.*

6.2.3.1 Vegetation description

The project site is situated along an ecotone between the Savanna and Grassland Biomes but falls mainly within the Grassland Biome (**Figure 6-16**) and within the Central Bushveld Bioregion (northern half of the project site) and the Mesic Highveld Grassland Bioregion (southern half of the project site) (**Figure 6-17**). The natural vegetation at the project site consists predominantly of Gauteng Shale Mountain Bushveld and Rand Highveld Grassland.

The typical landscape associated with Rand Highveld Grassland is highly variable, containing extensive sloping plains and a series of ridges slightly elevated over undulating surrounding plains. The Gauteng Shale Mountain Bushveld is represented by woody vegetation and a grass dominated herbaceous layer.

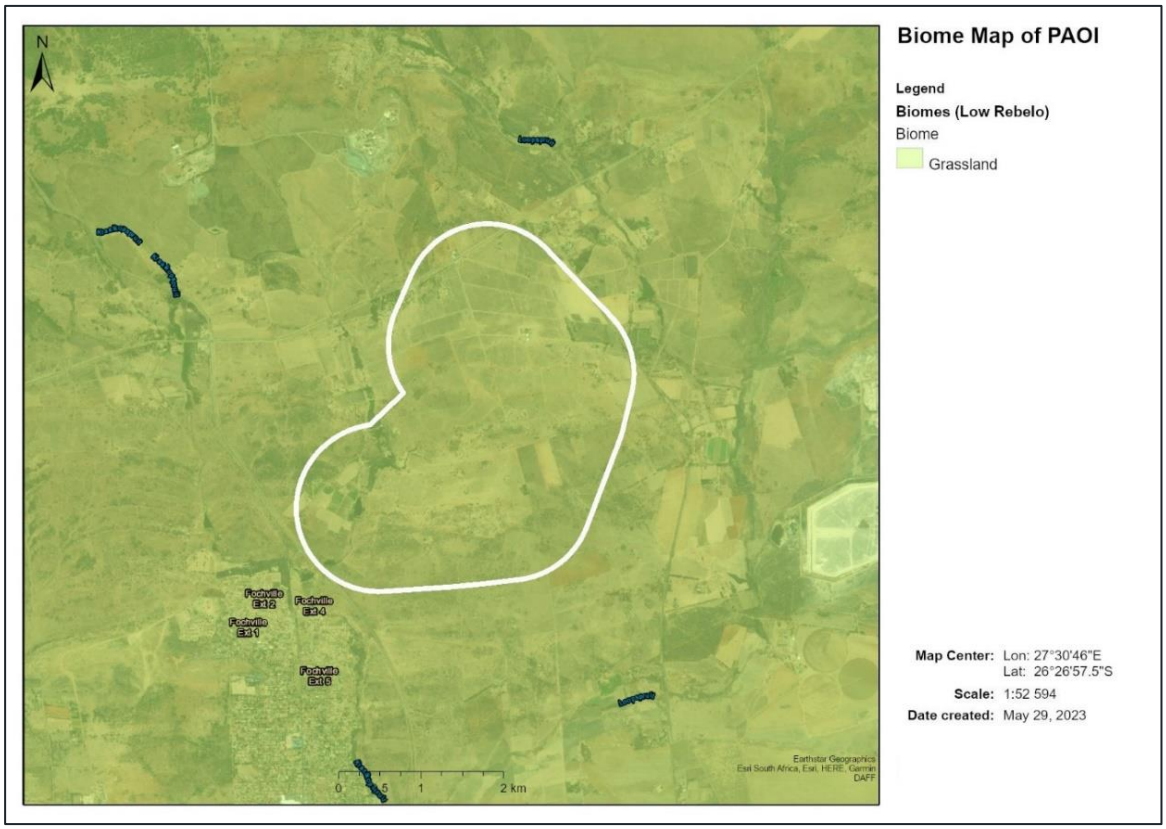


Figure 6-16 - The study area (outlined in white) falls within the Grassland Biome

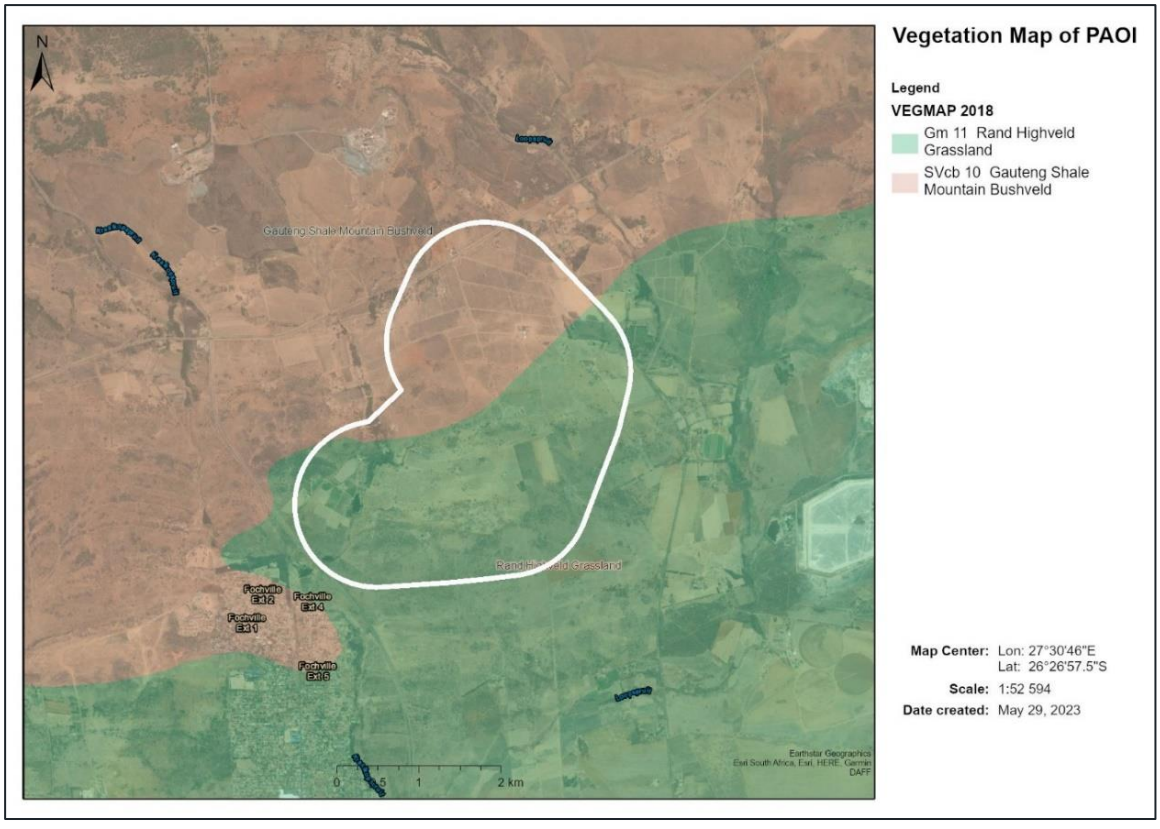


Figure 6-17 - Vegetation map of the study area (outlined in white)

6.2.3.2 Avifaunal community in/around the site

- Important Bird Areas (IBAs):

  The proposed project site does not fall within an Important Bird Area (IBA). The closest IBA, the Suikerbosrand Nature Reserve, lies 63km east of the project site.

- National Protected Areas and National Protected Areas Expansion Strategy (NPAES) Focus Areas:

The proposed project does not fall within a protected area or an NPAES focus area.

- The Renewable Energy Development Zones (REDZ):

The proposed project is not located in a REDZ.

A total of 307 species could potentially occur within the broader area of the proposed project site, and of these, 32 are classified as priority species for wind energy developments. Of the 32 priority species, 11 have a medium to very high probability of occurring regularly in the project site, and 12 were recorded during the on-site field surveys.

Ten of the priority species recorded in the broader area are also Species of Conservation Concern (SCC). Two SCC were recorded during the on-site surveys thus far, namely Secretarybird (Globally Endangered and Regionally Vulnerable) and Lanner Falcon (Regionally Vulnerable). There is also confirmed habitat for African Grass Owl (Regionally Vulnerable) within the project site.

Table 6-14 - Priority species which could occur at the project site, habitat classes within the project site, and the potential impacts of the Igolide WEF on avifauna

Species name	Scientific name	SABAP2 Reporting Rate %		Global Conservation Status	Regional Conservation Status	Recorded during monitoring	Likelihood of regular occurrence at PAOI	Primary grassland	Secondary grassland	Open woodland	Drainage lines and wetlands	Dams	Agriculture	HV lines	Collision with turbines	Displacement - habitat transformation	Displacement - disturbance (breeding)	Electrocution MV lines	Collision powerlines
		Full protocol	Ad hoc protocol																
African Fish Eagle	*Haliaeetus vocifer*	1,45	0,75	-	-		M				x	x			x			x	
African Grass Owl	*Tyto capensis*	0,00	0,75	-	VU		L	x			x				x	x	x	x	x
African Harrier-Hawk	*Polyboroides typus*	0,73	0,75	-	-		L			x		x			x	x	x	x	
African Hawk-eagle	*Aquila spilogaster*	0,36	0,00	-	-		L			x		x			x	x		x	
Amur Falcon	*Falco amurensis*	1,63	2,26	-	-	x	M	x	x				x	x	x	x		x	
Black Harrier	*Circus maurus*	0,18	0,00	EN	EN		L	x							x	x		x	
Black Kite	*Milvus migrans*	0,00	0,75	-	-		L			x		x	x		x	x	x	x	
Black Sparrowhawk	*Accipiter melanoleucus*	1,45	0,00	-	-	x	M			x					x	x	x	x	
Black-chested Snake Eagle	*Circaetus pectoralis*	0,18	0,00	-	-		L	x	x	x		x	x	x	x	x	x	x	

Species name	Scientific name	SABAP2 Reporting Rate %		Global Conservation Status	Regional Conservation Status	Recorded during monitoring	Likelihood of regular occurrence at BAOI	Primary grassland	Secondary grassland	Open woodland	Drainage lines and wetlands	Dams	Agriculture	HV lines	Collision with turbines	Displacement - habitat transformation	Displacement - disturbance (breeding)	Electrocution MV lines	Collision powerlines
		Full protocol	Ad hoc protocol																
Black-winged Kite	*Elanus caeruleus*	47,19	13,53	-	-	x	H	x	x	x			x	x	x	x	x	x	
Black-winged Pratincole	*Glareola nordmanni*	0,18	0,00	NT	NT		L	x	x		x		x		x				
Booted Eagle	*Hieraaetus pennatus*	0,36	0,75	-	-		L	x	x	x		x		x	x	x		x	
Cape Vulture	*Gyps coprotheres*	0,18	0,00	VU	EN		L	x	x	x		x		x	x	x		x	x
Common Buzzard	*Buteo buteo*	7,80	2,26	-	-	x	M	x	x	x		x	x	x	x	x		x	
Greater Flamingo	*Phoenicopterus roseus*	0,00	0,75	-	NT		L					x			x				x
Greater Kestrel	*Falco rupicoloides*	1,09	0,75	-	-		L	x	x					x	x	x	x	x	
Jackal Buzzard	*Buteo rufofuscus*	0,54	0,75	-	-		L	x	x	x		x	x	x	x	x	x	x	
Lanner Falcon	*Falco biarmicus*	0,36	0,75	-	VU	x	M	x	x	x		x	x	x	x	x	x	x	
Lesser Kestrel	*Falco naumanni*	1,27	0,00	-	-		L	x	x				x	x	x	x		x	
Long-crested Eagle	*Lophaetus occipitalis*	0,73	0,75	-	-		L	x		x		x		x	x	x	x	x	
Marsh Owl	*Asio capensis*	1,27	1,50	-	-	x	M	x			x				x	x	x	x	x

Species name	Scientific name	SABAP2 Reporting Rate %		Global Conservation Status	Regional Conservation Status	Recorded during monitoring	Likelihood of regular occurrence at BAOI	Primary grassland	Secondary grassland	Open woodland	Drainage lines and wetlands	Dams	Agriculture	HV lines	Collision with turbines	Displacement - habitat transformation	Displacement - disturbance (breeding)	Electrocution MV lines	Collision powerlines
		Full protocol	Ad hoc protocol																
Martial Eagle	*Polemaetus bellicosus*	0,00	0,75	EN	EN		L	x	x	x		x		x	x	x		x	
Melodious Lark	*Mirafra cheniana*	0,18	0,75	-	-	x	L	x	x						x	x	x		
Northern Black Korhaan	*Afrotis afraoides*	54,08	4,51	-	-	x	H	x	x						x	x	x		x
Pale Chanting Goshawk	*Melierax canorus*	3,81	0,75	-	-	x	M	x	x	x		x		x	x	x	x	x	
Secretarybird	*Sagittarius serpentarius*	0,18	0,00	EN	VU	x	L	x	x	x		x			x	x	x		x
Spotted Eagle-Owl	*Bubo africanus*	11,98	0,75	-	-	x	H	x	x	x		x	x		x	x	x	x	x
Verreaux's Eagle	*Aquila verreauxii*	3,09	2,26	-	VU		L	x	x	x		x		x	x	x		x	
Verreaux's Eagle-Owl	*Bubo lacteus*	0,00	0,75	-	-		L			x		x			x	x	x	x	
Western Osprey	*Pandion haliaetus*	0,18	0,75	-	-		L					x			x			x	
White Stork	*Ciconia ciconia*	1,63	1,50	-	-	x	M	x	x				x		x	x			x
Yellow-billed Stork	*Mycteria ibis*	0,00	0,75	-	EN		L				x	x			x				x

Global and Regional (South African) Red List status: CR = Critically Endangered; EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least concern

6.2.3.3 Sensitivity analyses and verification

Very high sensitivity: Turbine exclusion zone

Drainage lines, wetlands, dams: A wind turbine exclusion zone (including the rotor swept area) should be implemented within a 50m buffer around drainage lines, wetlands, dams and in all African Grass Owl breeding habitat. Wetlands (including dam margins) are important breeding, roosting and foraging habitat for a variety of SCC, most notably for African Grass Owl (Regionally Vulnerable), Greater Flamingo (Regionally Near Threatened), Maccoa Duck (Globally Vulnerable, Regionally Near Threatened), and Yellow-billed Stork (Regionally Endangered). These SCC have all been recorded in the broader area through the Southern African Bird Atlas Project (SABAP2). It should also be noted that any road and/or grid line crossings across these features should be restricted to what is unavoidable.

High sensitivity: Limited infrastructure zone

Development in the remaining natural grassland in the project site must be limited as far as possible. Where possible, infrastructure must be located near margins, with shortest routes taken from the existing roads. The grassland is potential breeding, roosting and foraging habitat for a variety of SCC. These include African Grass Owl (Globally Least Concern, Regionally Vulnerable), and Secretarybird (Globally Endangered, Regionally Vulnerable). Figure 6-18 below is a preliminary sensitivity map, indicating sensitivity areas identified for development.

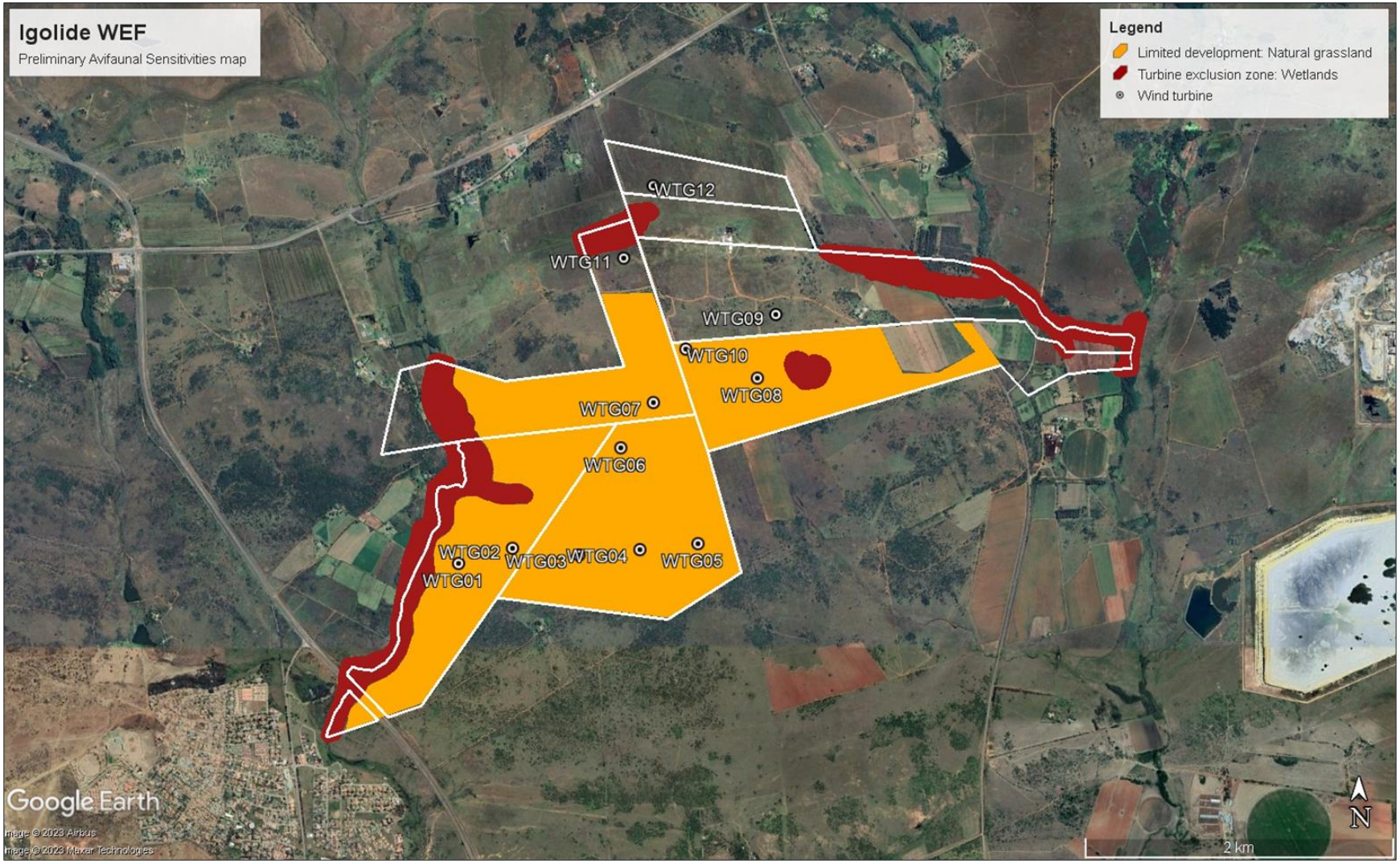


Figure 6-18 - Preliminary avifaunal sensitivity map (Wind turbine exclusion zones indicated in red)

6.2.4 BATS

6.2.4.1 Protected areas, known sensitivities and caves/roosts within 100km from the site

The Tweefontein Private Nature Reserve is the closest protected area to the site, approximately 17.5km to the south east (**Figure 6-19**). This nature reserve is not a well-known hotspot for bat activity or bat roosts that may influence the site, although the presence of natural vegetation may promote bat diversity and activity levels.

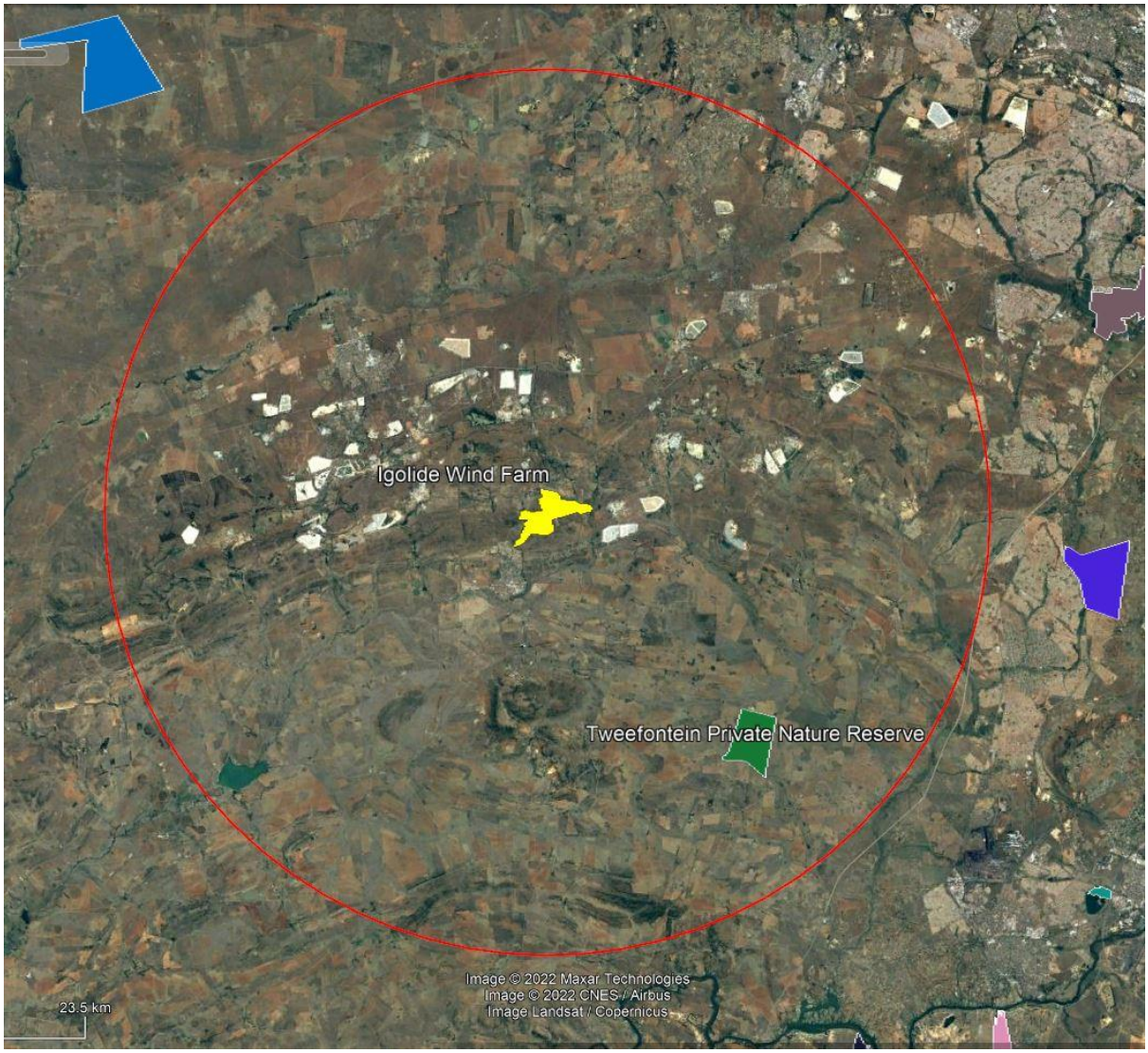


Figure 6-19 - Protected areas within a radius of 30km (red line) around the site (SAPAD, DFFE, October 2021)

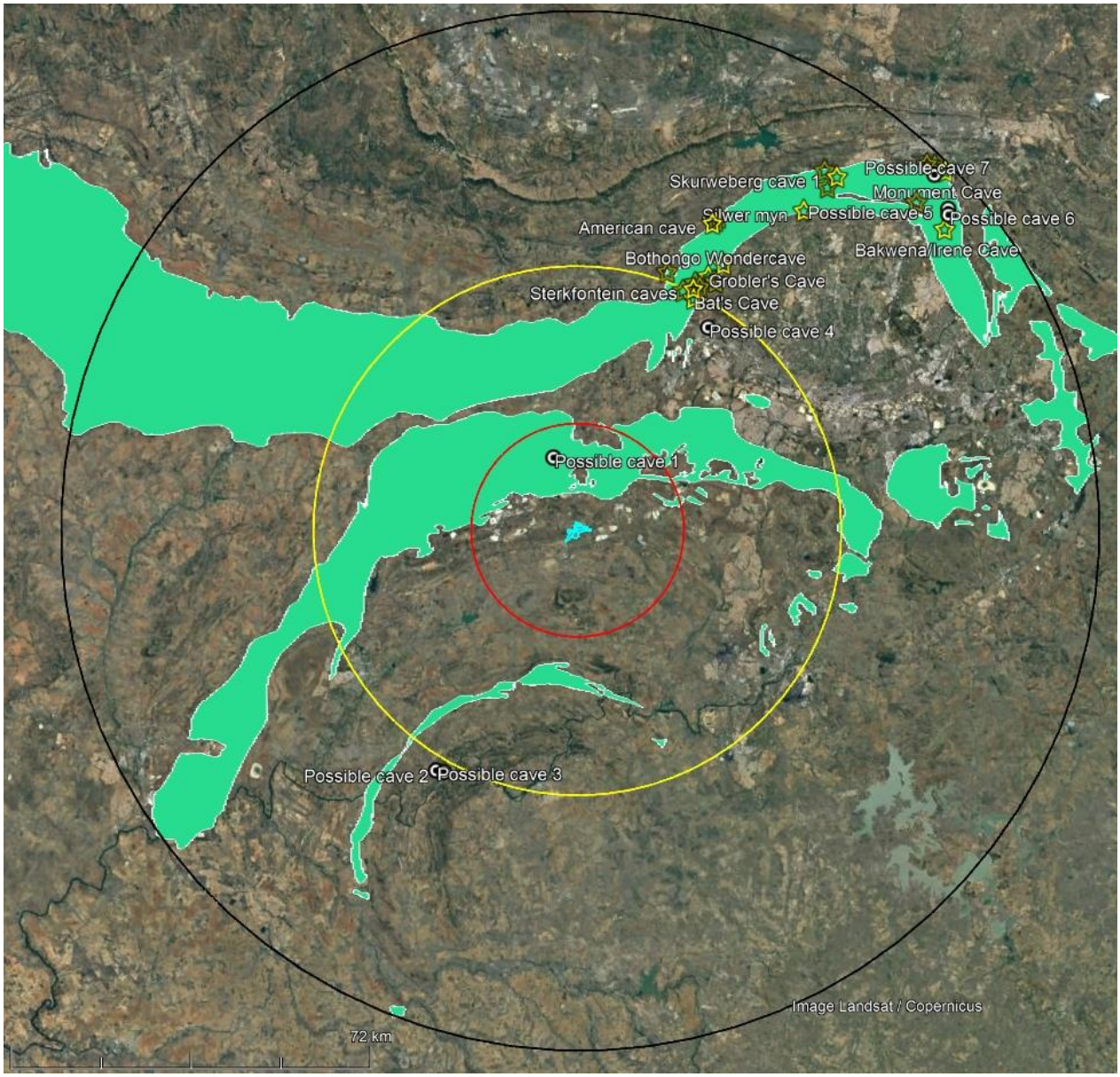


Figure 6-20 - Confirmed and possible bat roosts within 100km (black circle), 50km (yellow circle) and 20km (red circle) of the site. Dolomite geology indicated in green

The SEA assigns 20km high sensitivity and 50km medium sensitivity buffers to large bat roosts for wind energy. Based on museum records of cave bats in the area there may be a possible cave within 20km of the site (called Possible Cave 1). However the bat activity data collected over 12 months do not indicated abnormally high levels of cave bat activity that may indicate activity of this cave to be overlapping with the site.

Other caves, some with large bat roosts and most with the potential to house large roosts, within the 50km and 100km radius include: Nash's Cave, Bat's Cave, Bakwena/Irene Cave, Skurweberg Caves, Gladysvale Mine, American Cave, Monument Cave, Fountains Cave, Scramblers, Sterkfontein, Gladysvale Mine, Kromdraai Mine, Minaar's Cave, Wondercave, Silwer Myn, Grobler's Cave, Porcupine Cave, Mamelodi Cave, Groenkloof, Swartkop cave.

It must be noted that these caves are grouped to the North of the site and movement between these caves will not be affected by the WEF. Only movement between Possible Cave 1 , 2 and 3 may be affected by the WEF, although the passive data did not indicate migration movements. However, the prevalence of cave forming dolomite within 6km from the site increases the likelihood of undiscovered caves significantly, and the possibility of future bat migrations during the operational phase must be accounted for in reactive mitigation measures.

6.2.4.2 Ecology of bat species that may be impacted the most by the Wind Farm.

There are several bat species in the vicinity of the site that occur commonly in the area. Some of these species are of special importance based on their likelihood of being impacted by the proposed wind farm, due to high abundances and certain behavioural traits. They have also been dominating records of fatalities at nearby wind farms. The relevant species are discussed below.

***Tadarida* aegyptiaca**

The Egyptian Free-tailed Bat, *Tadarida aegyptiaca*, is a Least Concern species (IUCN Red List 2016) as it has a wide distribution and high abundance throughout South Africa and is part of the Free-tailed bat family (Molossidae). It occurs from the Western Cape of South Africa, north through to Namibia and southern Angola; and through Zimbabwe to central and northern Mozambique (Monadjem et al. 2020). This species is protected by national legislation in South Africa (ACR 2018). They roost communally in small (dozens) to medium-sized (hundreds) groups in rock crevices, under exfoliating rocks, in hollow trees and behind the bark of dead trees. *Tadarida aegyptiaca* has also adapted to roosting in buildings, in particular roofs of houses (Monadjem et al. 2020). Thus, the rocky boulder crevices and man-made structures on the site would be important roosts for this species.

Tadarida aegyptiaca forages over a wide range of habitats, flying above the vegetation canopy. It appears that the vegetation has little influence on foraging behaviour as the species forages over desert, semi-arid scrub, savannah, grassland and agricultural lands. Its presence is strongly associated with permanent water bodies due to concentrated densities of insect prey (Monadjem et al. 2020).

After a gestation of four months, a single pup is born, usually in November or December, when females give birth once a year. In males, spermatogenesis occurs from February to July and mating occurs in August. Maternity colonies are apparently established by females in November.

The Egyptian Free-tailed bat is considered to have a high likelihood of risk of fatality due to wind turbines (MacEwan et al. 2020) and are displaying moderate to high numbers of mortalities at operating wind farms in South Africa. Due to the high abundance and widespread distribution of this species, high mortality rates due to wind turbines would be a cause of concern as these species have more significant ecological roles than the rarer bat species.

Laephotis capensis

Laephotis capensis (Cape serotine bat) has a conservation status of Least Concern (IUCN Red List 2016) as it is found in high numbers and is widespread over much of Sub-Saharan Africa.

High mortality rates of this species due to wind turbines would be a cause of concern as L. capensis is abundant and widespread and as such has a more significant role to play within the local ecosystem than the rarer bat species. They do not undertake migrations and thus are considered residents of the site. It roosts individually or in small groups of two to three bats in a variety of

shelters, such as under the bark of trees, and inside the roofs of houses. They will use most man-made structures as day roosts which can be found on the site and surrounding areas (Monadjem et al. 2020).

Mating takes place from the end of March until the beginning of April. Spermatozoa are stored in the uterine horns of the female from April until August, when ovulation and fertilisation occurs. They give birth to twins during late October and November, but single pups, triplets and quadruplets have also been recorded (van der Merwe 1994 and Lynch 1989).

They are tolerant of a wide range of environmental conditions as they survive and prosper within arid semi-desert areas to montane grasslands, forests, and savannas; indicating that they may occupy several habitat types across the site and are amenable towards habitat changes. They are however clutter-edge foragers, meaning they prefer to hunt on the edge of vegetation clutter mostly, but can occasionally forage in open spaces. They are thought to have a Medium-High likelihood of risk of fatality due to wind turbines (MacEwan et al. 2020). And are displaying moderate to high numbers of mortalities at operating wind farms in South Africa.

Miniopterus natalensis

Miniopterus natalensis (Natal long-fingered bat), occurs widely across the country but mostly within the southern and eastern regions and is listed as Near Threatened (Monadjem et al. 2020). This bat is a cave-dependent species and identification of suitable roosting sites may be more important in determining its presence in an area than the presence of surrounding vegetation. It occurs in large numbers when roosting in caves with approximately 260 000 bats observed making seasonal use of the De Hoop Guano Cave in the Western Cape, South Africa. Culverts and mines have also been observed as roosting sites for either single bats or small colonies in South Africa. Separate roosting sites are used for winter hibernation activities and summer maternity behaviour, with the winter hibernacula generally occurring at higher altitudes in more temperate areas and the summer hibernacula occurring at lower altitudes in warmer areas of the country (Monadjem et al. 2020)

Mating and fertilisation usually occur during March and April and is followed by a period of delayed implantation until July/August. Birth of a single pup usually occurs between October and December as the females congregate at maternity roosts (Monadjem et al. 2020 & Van Der Merwe 1979).

The Natal long-fingered bat undertakes short migratory journeys between hibernaculum and maternity roosts. Due to this migratory behaviour, they are considered to be at high risk of fatality from wind turbines if a wind farm is placed within a migratory path (MacEwan et al. 2020). The mass movement of bats during migratory periods could result in mass casualties if wind turbines are positioned over a mass migratory route and such turbines are not effectively mitigated. Very little is known about the migratory behaviour and paths of M. natalensis in South Africa with migration distances exceeding 150 kilometres. However, from personal observations it has been noted that they can occur individually or in small groups in rock hollows or man-made structures such as culverts.

MacEwan et al. (2020) advise that M. natalensis faces a medium to high risk of fatality due to wind turbines. This evaluation was based on broad ecological features and excluded migratory information. And are displaying low to moderate numbers of mortalities at operating wind farms in South Africa.

6.2.4.3 Passive Bat activity

Passive bat data was collected for the 12-month monitoring at the Igolide Wind Farm between the period of October 2021 to March 2023 for the Short Mast and February 2022 to March 2023 for the Met Mast. **Figure 6-21** to **Figure 6-26** graphically display the data collected, pertaining to the total bat passes recorded at the Met Mast (7m, 55m and 110m) and the Short Mast systems (7m), as well as the average hourly bat passes per system.

Bat activity was divided into categories (**Table 6-15**) according to the risk of being impacted on by wind turbines, as well as other important ecological significance (as is the case with cave bats).

Table 6-15 - The categories used for grouping and presenting bat activity in the passive bat activity graphs. "Risk" represents the likelihood of fatality to turbine collision

Graph category and abbreviation	Motivation of graph category	Species detected in graph category
High risk (H)	• Open-air foragers • High-flying in rotor swept zone	• *Tadarida aegyptiaca* • Other members of Molossidae family
Medium – High risk (MH)	• Migrant bats, can influence multiple ecologies • Cave bats, may possibly indicate presence of undiscovered bat cave roosts or migartions • Can also roost in non-cave hollows • Forages on the edges of vegetation clutter (clutter-edge foragers) • Medium height foraging, overlapping with lower rotor swept zone	• *Miniopterus natalensis* • *Miniopterus* spp. • *Myotis tricolor*
Medium risk (M)	• Forages on the edges of vegetation clutter (clutter-edge foragers) • Medium height foraging, overlapping with lower rotor swept zone	• *Laephotis capensis* • *Eptesicus hottentotus* • Other members of Vespertilionidae family
Low risk (L)	• Non-migrant cave and hollow dwelling bats, but may possibly indicate presence of caves, therefore presented in graphs • Forages in dense vegetation clutter (clutter foragers) • Low height foraging, outside rotor swept zone	• *Rhinolophus* spp.

The five bat species detected on site were: *Eptesicus hottentotus, Tadarida aegyptiaca, Myotis tricolor, Laephotis capensis,* and *Miniopterus natalensis*. Additionally, bat passes were recorded that are classified up to family level for the Vespertilionidae and Rhinolophidae. First mentioned is taxonomically a large family that includes many species that behave ecologically similarly with regards to their risk of collision with wind turbines. When the frequency of their vocalisations overlaps, these species are more difficult to distinguish from one another, and are grouped together.

It must be noted that the species *Laephotis capensis* (Cape Serotine bat) is very well-represented in the data for this site. *L. capensis* (part of Medium risk category) displayed an abnormally high peak of activity during the autumn of 2022 at 110m on the Met Mast, this is unusual since this species is not generally utilising the higher airspaces frequently. A smaller peak was observed during late winter and early spring is 2022. These activity peaks may be due to the mating season of this species being in autumn and birth of young being in late winter and spring (generally October).

However, bat activity was still overall higher on low microphones than higher microphones, as expected. Since the Medium risk category dominated at all systems and at all heights, with *L. capensis* displaying the highest activity levels at both masts. And *L. capensis,* that forages on the edge of vegetation clutter, made up the majority of the Medium risk category.

The temporal data displays the spread of bat activity over each month and may indicate abrupt peaks in activity. *Miniopterus natalensis* is a cave dwelling species within the High-Medium risk category, but may also take residence in smaller numbers in culverts and other suitable man-made hollows, this species did not show any abrupt peaks of activity that may indicate that the site is on any migration route. The species was not particularly frequently recorded on the systems, although it was present in the data from each system.

Average hourly activity is useful since it considers only the nights on which the systems recorded successfully, and are therefore a true indication of monthly activity levels. The seasons of autumn and spring had the highest average activity levels across all systems on site. These higher activity months are important to consider in case mitigation may be required during the operational phase.

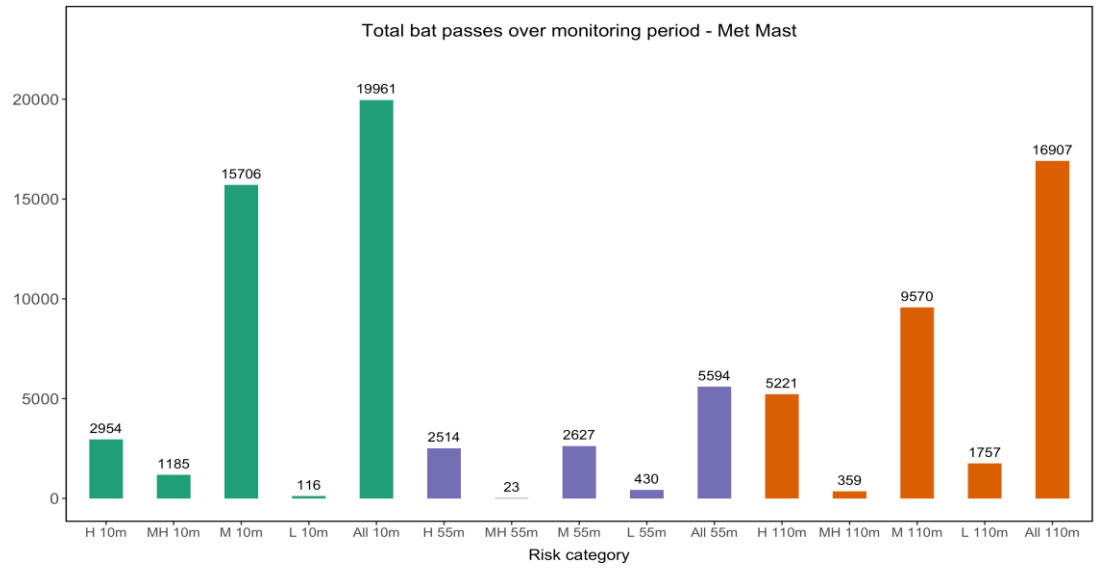


Figure 6-21 - Total number of bat passes recorded over the monitoring period by the Met Mast

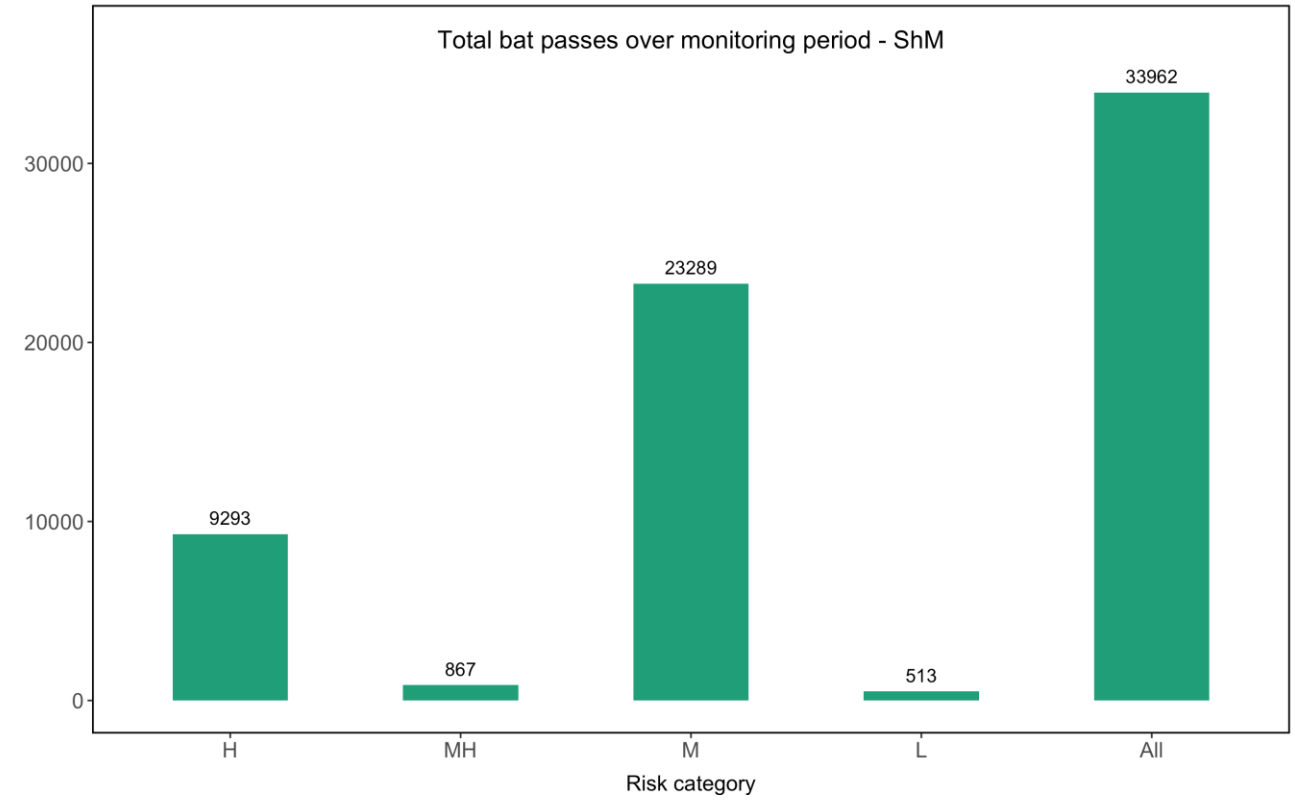


Figure 6-22 - Total number of bat passes recorded over the monitoring period by Short Mast1 (ShM1)

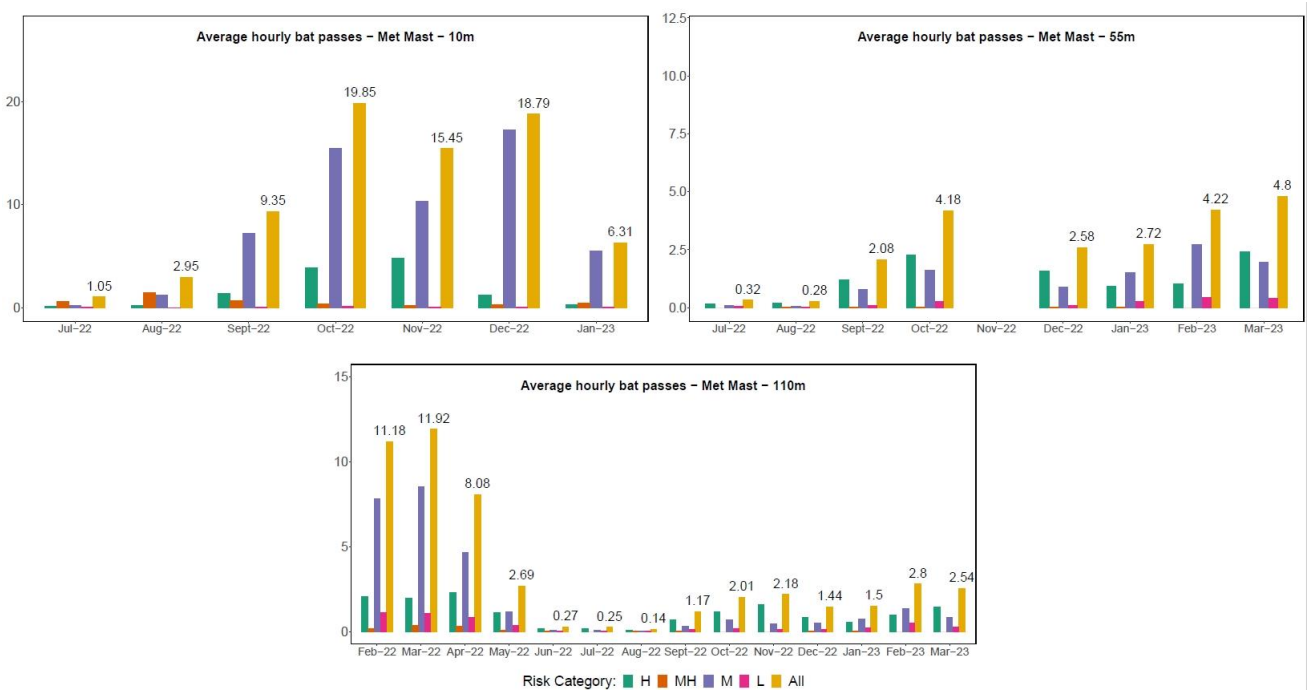


Figure 6-23 - Average hourly bat passes recorded per month by the Met Mast – 10m, 55m and 110m

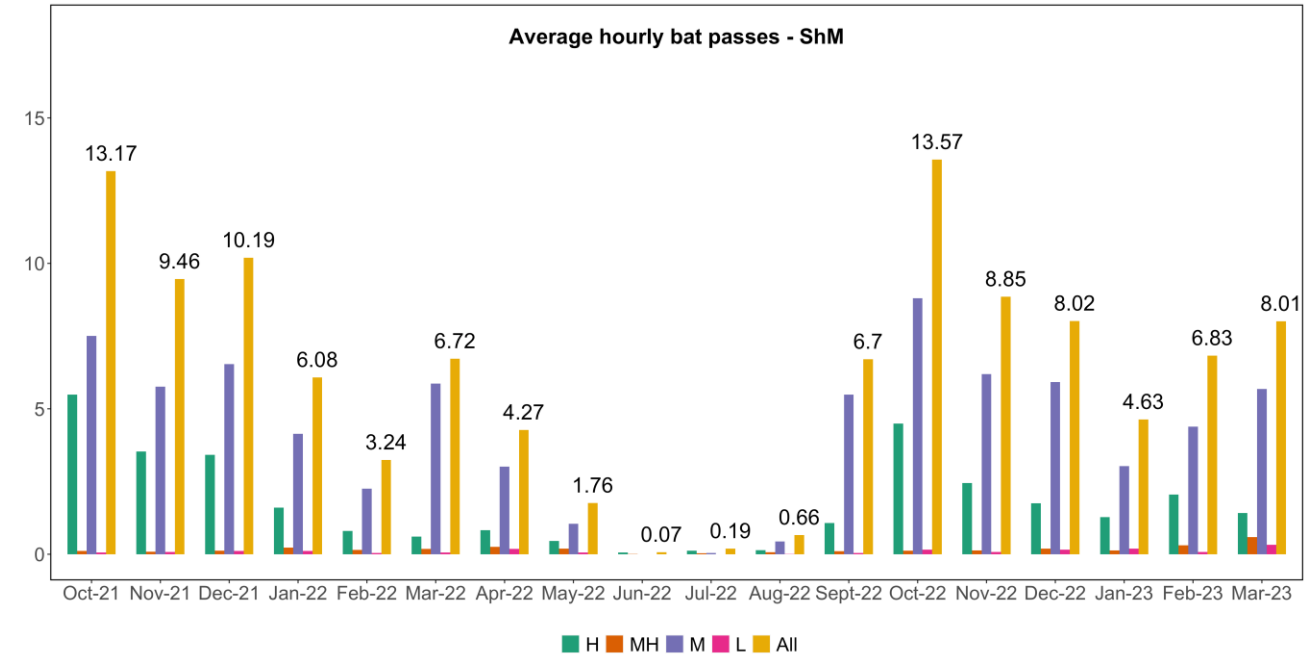


Figure 6-24 - Average hourly bat passes recorded per month by Short Mast1

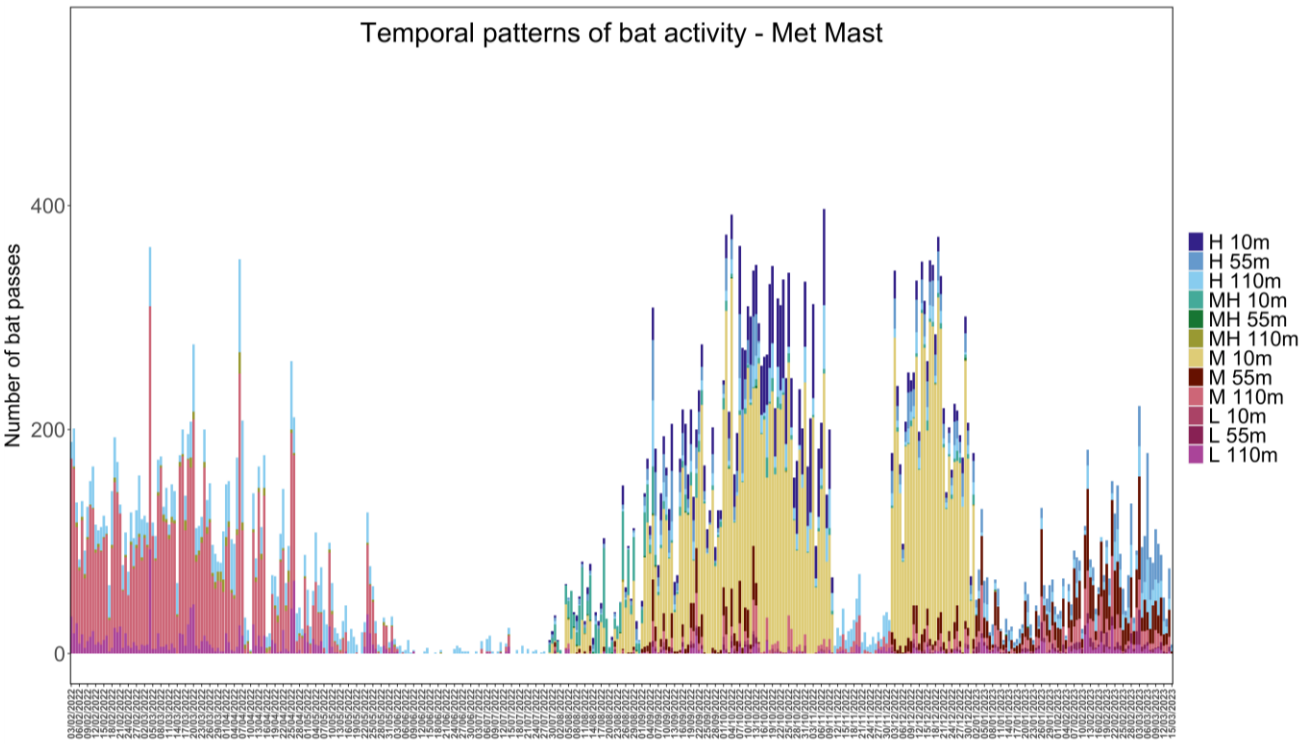


Figure 6-25 - Temporal distribution of bat passes detected over the monitoring period by the Met Mast

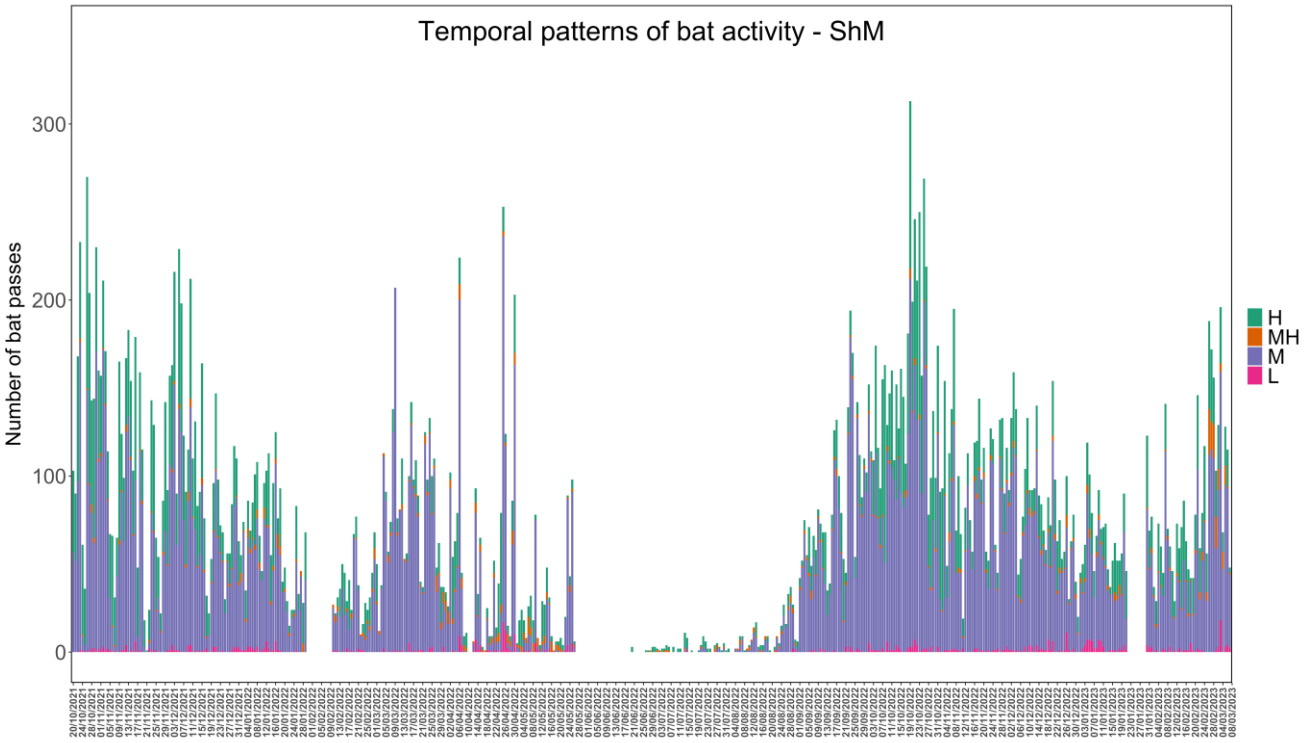


Figure 6-26 - Temporal distribution of bat passes detected over the monitoring period by Short Mast 1

6.3 SOCIAL AND ECONOMIC ENVIRONMENT

6.3.1 ARCHAEOLOGICAL AND CULTURAL HERITAGE

The following is extracted from the Heritage Impact Assessment compiled by ASHA Consulting (Pty) Ltd and included as ***Appendix G.6.***

The study area is an undulating landscape with the lowlands largely ploughed and the hills often covered in bush and rocks. Although no field survey has yet been conducted, aerial photography revealed the presence of Late Iron Age settlements amongst the bushy areas.

Stone Age

The region surrounding the study area lacks any significant Stone Age sites and finds in the area are limited to low significance surface scatters of artefacts. These scatters represent the movement of early humans within the landscape but, due to their poor context, do not represent definitive occupation sites. A survey conducted within sections of the current project area (Huffman et al. 1994) found multiple MSA and LSA scatters on sandy terraces. The MSA tools were made from red ironstone and the LSA lithics were made from fine grained cherts and chalcedonies. As such, Stone Age scatters are likely to occur within the project area. MSA and LSA sites are likely to be dominant since ESA finds within this region are rare. An ESA scatter was, however, identified during a survey around 15km east of the project area (Schoeman et al. 2004).

Iron Age

Bantu-speaking people moved into Eastern and Southern Africa about 2000 years ago (Mitchell 2002). These people cultivated sorghum and millets, herded cattle and small stock and manufactured iron tools and copper ornaments. Because metalworking represents a new technology, archaeologists call this period the Iron Age. Characteristic ceramic styles help archaeologists to separate the sites into different groups and time periods. The Iron Age as a whole represents the spread of Bantu-speaking people and includes both the Pre-Historic and Historic periods. It can be divided into three distinct periods:

» The Early Iron Age (EIA): Most of the first millennium AD.

» The Middle Iron Age (MIA): 10th to 13th centuries AD.

» The Late Iron Age (LSA): 14th century to colonial period.

The Iron Age is characterised by the ability of people to manipulate and work Iron ore into implements that assisted them in creating a favourable environment to make a better living.

Iron Age occupation in the vicinity of the study area only started during the LIA after climatic conditions became favourable in the region for LIA settlement and agricultural activities. Iron Age communities in the region are associated with Sotho and Tswana speaking people who entered and settled in the region. LIA stone-walled complexes can be found spread across the broader landscape with associated artefacts. These LIA settlements can be widely found on flat-topped ridges and hills throughout the landscape (Dreyer 2006). The hills surrounding Fochville are well known for the Tlokwe Ruins which are scattered throughout. The region surrounding the project area is known to have been inhabited by the Bakwena baMare-a-Phogole who are known to have settled south of Fochville during the LIA (Vorster 1969). Under the leadership of their chief, Kokosi, the baMare-a-Phogole are believed to have inhabited the region until the 1820s when Mzilikazi and his Matabele raided the interior of South Africa and killed and drove out many Iron Age communities (Sadr 2020). A township just west of Fochville was named Kokosi after the LIA chief. The stone walled settlements within the larger region were later classified as belonging to the Molokwane settlement type which is prevalent across this part of Gauteng (Huffman 2007).

During the mid-17th century Europeans started to settle in modern-day Cape Town. During and after the conflict caused by the Mfecane (1820-1840), during the reign of king kaSenzangakhona Zulu, known as Shaka, Dutch-speaking farmers started to migrate to the interior regions of South Africa. This period is marked by various skirmishes and battles between the local inhabitants, Dutch settlers and the British (Giliomee & Mbenga 2007).

Large stone walled complexes can be clearly seen on Google Earth imagery within the project area (**Figure 6-27** and **Table 6-16**). No graves are currently known within the study area, but there is a possibility that graves, especially of still born babies, can be associated with the Iron Age settlements.

Table 6-16 - List of Heritage Finds

Waypoint	Location	Description
01	S26 27 40.3 E27 30 52.2	An overgrown Late Iron Age stone-walled settlement measuring about 1050 m by 540 m.

Waypoint	Location	Description
02	S26 27 47.0 E27 30 15.7	An overgrown Late Iron Age stone-walled settlement measuring about 750 m by 500 m.
03	S26 27 24.0 E27 30 39.5	An overgrown Late Iron Age stone-walled settlement measuring about 110 m by 120 m.
04	S26 27 10.5 E27 30 46.6	An overgrown Late Iron Age stone-walled settlement measuring about 110 m by 60 m.
05	S26 27 00.6 E27 30 11.1	An overgrown Late Iron Age stone-walled settlement measuring about 590 m by 260 m.
06	S26 26 55.2 E27 30 32.3	A single circular overgrown Late Iron Age stone-walled feature of about 45 m diameter. The southern edge of it has been damaged by farm road construction along the northern edge of the study area with the preserved part being outside the study area.
07	S26 26 50.8 E27 30 54.8	An overgrown Late Iron Age stone-walled settlement measuring about 230 m by 150 m.
08	S26 26 39.2 E27 30 58.8	An overgrown Late Iron Age stone-walled settlement measuring about 390 m by 120 m.
09	S26 26 52.8 E27 30 30.0	An overgrown Late Iron Age stone-walled settlement measuring about 30 m by 30 m. Not readily visible on aerial photography.
10	S26 26 56.2 E27 30 51.5	An overgrown Late Iron Age stone-walled settlement measuring about 330 m by 100 m.
11	S26 24 54.2 E27 32 53.5	An overgrown Late Iron Age stone-walled settlement measuring about 500 m by 160 m. Outside study area.
12	S26 26 43.1 E27 30 42.4	An overgrown Late Iron Age stone-walled settlement measuring about 190 m by 80 m. Outside study area.
13	S26 27 41.7 E27 31 22.7	An overgrown Late Iron Age stone-walled settlement measuring about 510 m by 360 m. Outside study area.
14	S26 27 57.9 E27 29 58.3	An overgrown stone-walled complex measuring about 120 m by 80 m that includes a large, rectangular feature and that thus might be historical. It is not visible on the 1968 or 1934 aerial photography, presumably due to long disuse and seasonal vegetation cover.
15	S26 26 15.7 E27 32 25.2	Small, likely recent graveyard located beneath an existing Eskom powerline. Outside study area.
F1	S26 26 25.8	Modern structures.

Waypoint	Location	Description
	E27 31.19.4	
F2	S26 26 41.2 E27 31 49.6	Modern structures.
F3	S26 26 54.4 E27 32 34.1	Structures here are older than 1938 but looks very much altered.
F4	S26 27 14.9 E27 30 24.6	Structures here are older than 1968 and probably also 1938.
F5	S27 27 09.7 E27 30 34.1	Structures here are older than 1938.
F6	S26 27 04.5 E27 30 22.3	Modern structures.
F7	S26 27 03.4 E27 30 12.9	Modern structures.
F8	S26 26 56.9 E27 30 03.6	Structures here are older than 1938.

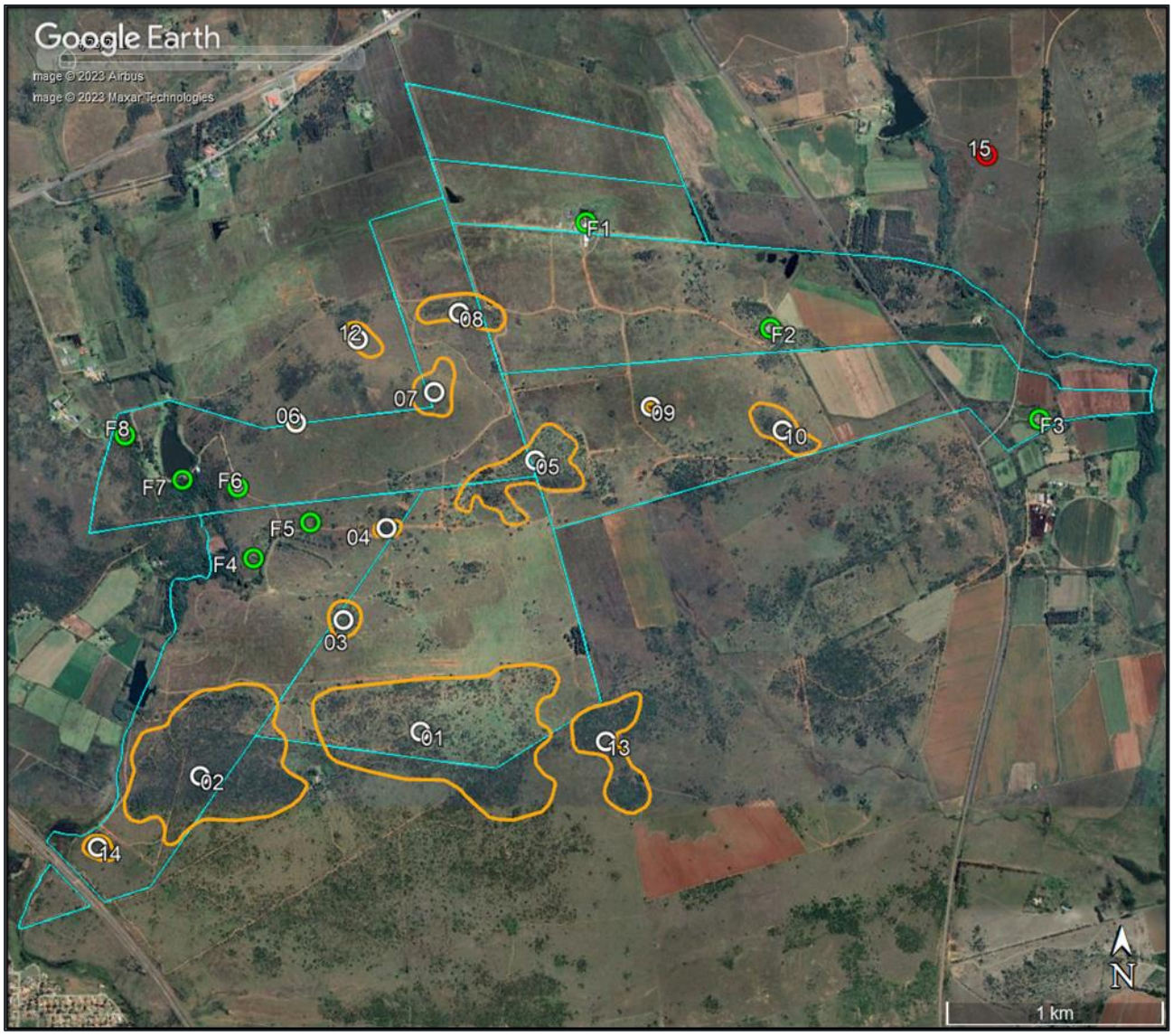


Figure 6-27 - Aerial view of the study area showing visible stone-walled archaeological sites (white symbols), farm buildings (green symbols) and a graveyard (red symbol). Stone-walled site 11 lies out of view towards the northeast and is not relevant to the WEF project

Graves

No graves are currently known within the study area, but there is a possibility that graves, especially of still born babies, can be associated with the Iron Age settlements.

Historical aspects and the Built environment

The Anglo-Boer War – or Second South African War – was an important aspect of local history in many parts of South Africa. In the vicinity of the present study area there were a few skirmishes. Most notably, in 1900, Boer military leader Daniel Theron was killed in action near present day Fochville. In present day Hillshaven, east of Fochville, a small battle was waged on the farm Modderfontien at the end of January 1901. Boer General Smuts defeated a small British force posted at Modderfontein. A few days later General Cunninghame arrived with his force and was

unable to dislodge the Boers from their defensive position. On the 4th of February, however, he was successful, and the Boers retreated southwards (Conan Doyle 1901 in AngloBoerWar.com 2023).

Fochville was initially laid out on farms Kraalkop and Leeuspruit during World War I and was then only formally proclaimed as a town on 15 November 1920. The town is named after the commander-in-Chief of the Allied Forces in France during World War I, Ferdinand Foch (Raper 2004).

A number of buildings are visible in the study area with some of them being historical and legally protected.

Cultural landscapes and scenic routes

Cultural landscapes are the product of the interactions between humans and nature in a particular area. Sauer (1925) defined them thus: “The cultural landscape is fashioned from a natural landscape by a cultural group. Culture is the agent, the natural area is the medium, the cultural landscape the result”.

The landscape has several different land uses. The immediate on-site land use is agriculture which provides a rural context for the development. However, very nearby are various gold mines and the town of Fochville (the edge of the town is immediately adjacent to the study area but 1.5 km from the south-westernmost turbine). These other land uses alter the overall sense of place of the rural environment.

It is evident that the amount of ploughed land increased dramatically between 1938 and 1968 but that subsequently a number of areas have been left fallow. Internal farm roads have also changed considerably over time as fields were reconfigured and new areas were ploughed. Although several farmsteads and/or buildings were present in 1938, a number of new complexes have been added after 1968. It is also evident that the N12 and R500 roads were built after 1968, partly following existing roads. The various gold mines an associated slimes dams scattered around the wider area have also all appeared post-1968. These observations show a continually evolving cultural landscape with modern industrial uses (i.e. mining) becoming visually prominent on the landscape.

6.3.2 PALAEONTOLOGY

The following is extracted from the Palaeontological Study compiled by Professor Marion Bamford (Palaeobotanist) and included as ***Appendix G.7.***

The Northwest Province Palaeotechnical Report indicates that the Silverton Formation is highly sensitive as there are stromatolites, but no evidence has been supplied and the geological records do not support this conclusion. Stromatolites and microbial mats are usually formed in shallow, low energy environments.

The Hekpoort Formation is predominantly composed of basaltic andesite and pyroclastic rocks and this type of rock does not preserve fossils. No fossiliferous caves are known from this area and for geological and engineering reasons, it is unlikely that turbines would place over cave sites. Although the Hekpoort Formation is indicated as moderately sensitive in the Gauteng Palaeotechnical Report, this is based on “no fossils recorded”.

The Timeball Hill Formation is composed of black shales and subordinate sandstones that are interpreted cycles of fluvio-deltaic deposits, turbidites and even diamictites from glacial outwash in the northern part. There are stromatolites in this formation, but none have been recorded. Stromatolites and microbial features occur in the overlying formations of the Pretoria Group.

Stromatolites are the trace fossils that were formed by colonies of green algae and blue-green algae (Cyanobacteria) that grew in warm, shallow marine settings. These algae were responsible for releasing oxygen via the photosynthetic process where atmospheric carbon dioxide and water, using energy from the sun, are converted into carbon chains and compounds that are the building blocks of all living organisms. The released carbon dioxide initially was taken up by the abundant reducing minerals to form oxides, e.g. iron oxide. Eventually free oxygen was released into the atmosphere and some was converted into ozone by the bombardment of cosmic rays. The ozone is critical for the filtering out of harmful ultraviolet rays.

Stromatolites are the layers upon layers of inorganic materials that were deposited during photosynthesis, namely calcium carbonate, magnesium carbonate, calcium sulphate and magnesium sulphate. These layers can be in the form of flat layers, domes or columns depending on the environment where they grew (Beukes, 1987). Some environments did not form stromatolites, just layers of limestone that later was converted to dolomite. The algae that formed the stromatolites are very rarely preserved, and they are microscopic so they can only be seen from thin sections studies under a petrographic microscope.

6.3.3 TRAFFIC

The following is extracted from the Traffic Impact Assessment compiled by JG Afrika (Pty) Ltd and included as ***Appendix G.11****.*

6.3.3.1 Surrounding road network

The road classification mentioned has been derived from the COTO's South African Road Classification and Access Management Manual (TRH26). The surrounding road network is shown in **Figure 6-28**.

- The N12:

The N12 is a Class R1 Rural Principal Arterial. A section of the N12 is located just north of the project site. This section of the N12 is a surfaced single carriageway which generally accommodates two lanes per direction of travel. The shoulders accommodated are gravel shoulders.

- The R500:

Based on the TRH26 rural road classification system, the R500 can be classified as a Class R2 Rural Major Arterial. The road is located to the west of the site and is a surfaced dual carriageway. The section to the west of the site accommodates two lanes per direction and a gravel shoulder.

- Losberg Road:

Losberg Road can be classified as a Class R3 Rural Minor Arterial. The road is a surfaced single carriageway road with one lane per direction and gravel shoulders. The road is located to the east of the site.

- Loopspruit Avenue:

Loopspruit Avenue can be classified as a Class R3 Rural Minor Arterial. The road is a surfaced single carriageway road with one lane per direction and gravel shoulders. The road is located to the south of the site.

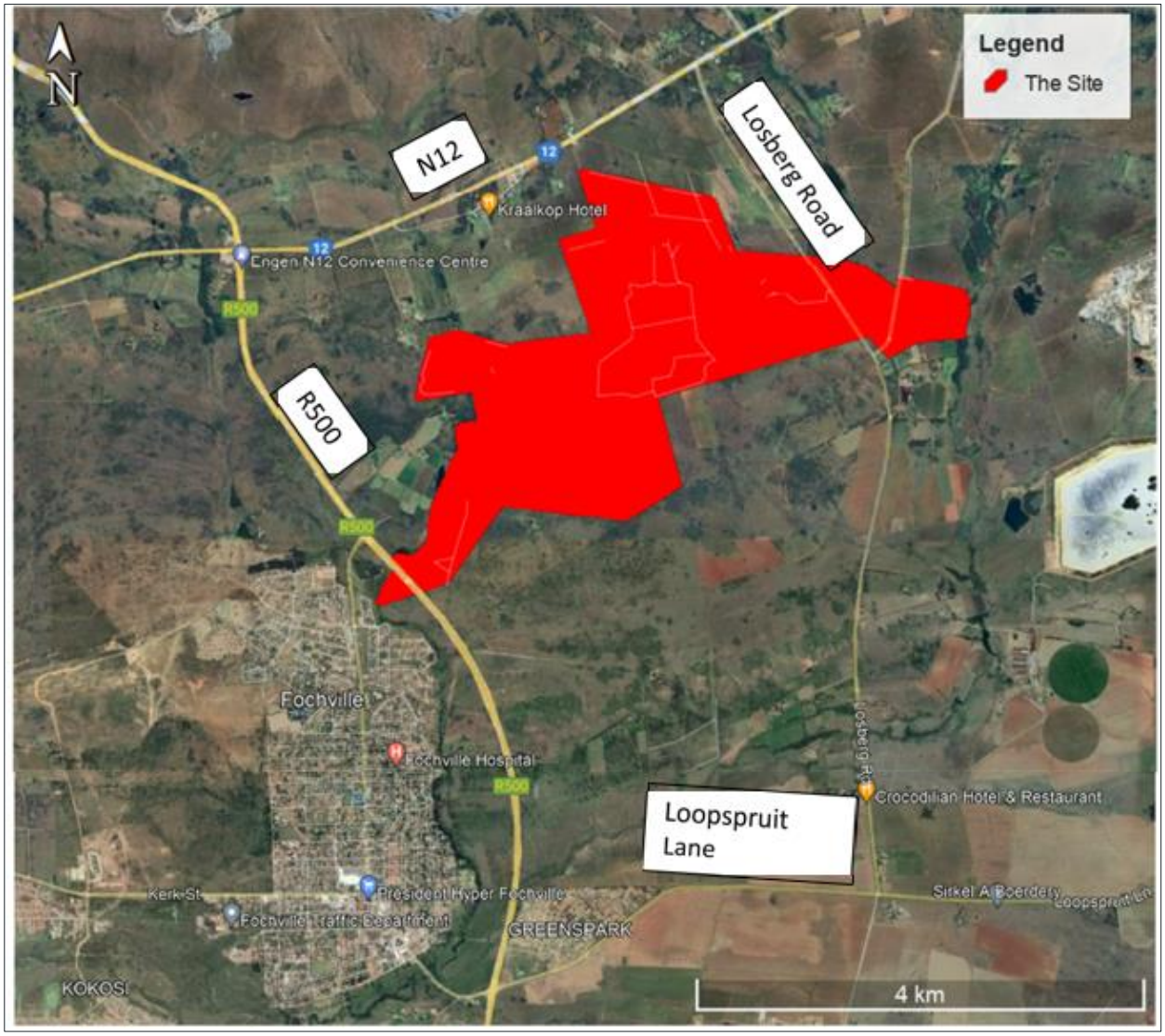


Figure 6-28 - Surrounding Road Network

6.3.3.2 Site access

Three site access point options (**Figure 6-29**) are suggested for the site. One of the access points is proposed off the R500 approximately 0.6km south of the Losberg Avenue/R500 intersection. The remaining two access point alternatives are located off Losberg Road towards the east of the site.

The access proposed off the R500 is not recommended due to access spacing restrictions along Class 2 roads. The proposed access points along Losberg Road are located off existing farm access points thus access spacing restrictions are not envisaged. It must however be noted that the potential site entrance (B) is located just north of a horizontal road curve on Losberg Road. Sight distance issues are envisaged towards the south of the access.

It is therefore recommended that the road reserve be kept clear of obstructions to improve sight lines. Additionally, potential site entrance (B) can be utilised as an alternative access instead of a main access to limit the number of vehicles using the access.

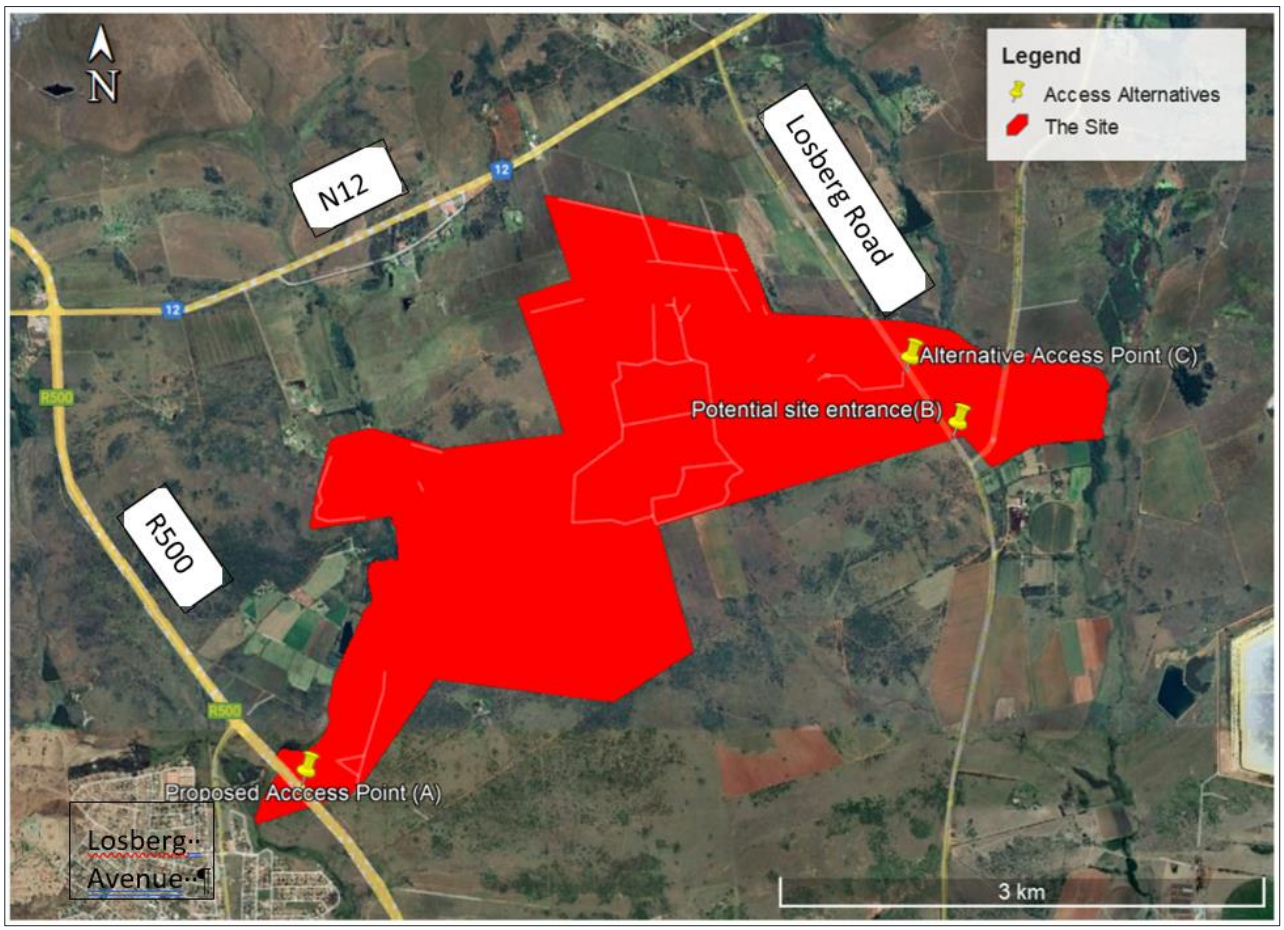


Figure 6-29 - Site Access Points

6.3.3.3 Provision for emergency vehicles

As a guide, emergency service routes are typically recommended to have a total unobstructed width of not less than 5.0 m, while property access control gates and accesses to buildings must have a total unobstructed width of not less than 4.5m. A minimum height clearance of 4.2m, is recommended if an overhead structure is planned.

6.3.3.4 Internal roads

The geometric design constraints encountered due to the terrain should be taken into consideration by the geometric designer. Preferably, the internal roads need to be designed with smooth, relatively flat gradients (recommended to be no more than 8%) to allow a larger transport load vehicle to ascend to the respective laydown areas.

6.3.3.5 Main Route for the Transportation of Materials, Plant and People to the proposed facility

It is assumed that the materials, plant, and workers will be sourced from the surrounding towns as far as possible. The closest towns to the site are Carletonville, Fochville, and Wedela.

6.3.4 VISUAL

The following is extracted from the Visual Impact Assessment compiled by SLR Consulting (South Africa) Pty Ltd and included as ***Appendix G.12****.*

6.3.4.1 Visual character

The assessment indicated that the study area has a mixed visual character, transitioning from the heavily transformed mining landscape in the north to a more rural / pastoral character across the remainder of the study area. The proposed project would alter the visual character and contrast with the rural / pastoral character, however, the location of the proposed project in relatively close proximity to the gold mining complex will significantly reduce the level of contrast (**Figure 6-31**).

From a visual perspective, sensitive areas would be areas where the placement of wind turbines would result in the greatest probability of visual impacts on potentially sensitive visual receptors. The identified areas of sensitivity are shown in **Figure 6-30** below. The study indicated that area would have a low visual sensitivity, and no formal protected areas, leisure-based tourism activities or sensitive receptor locations were identified in the study area, and this factor in conjunction with the high levels of transformation in the north have reduced the overall visual sensitivity of the broader area.

A total of seventy-five potentially sensitive receptor locations were identified within 5 km of the proposed project area, and only one is inside the viewshed for the proposed project. However, five receptor locations located within the proposed project area but none of these receptor locations was found to be sensitive; and the residents are assumed to be in favour of the proposed project.

In addition, most of the seventy-four receptor locations within the 5 km radius are assumed to be farmsteads and residences which could be regarded as potentially sensitive visual receptors as they are located within a mostly rural setting with pastoral / natural vistas that will likely be altered by the proposed development. Although several accommodation, restaurant, wedding or venue facilities were identified in the study area, these were not considered sensitive as the type of facilities provided are not expected to be detrimentally affected by changes in the landscape.

Only two of the identified receptors could potentially experience high levels of visual impact, namely Visual Receptor (VR)34 and VR36. Impacts are however expected to be reduced by the proximity of these farmsteads to major road infrastructure in the area. Impacts are expected to be further reduced by the fact that there are relatively few turbines (12) proposed for this development, although local sentiments towards the proposed development are not yet known. Seventy receptor locations are expected to experience moderate levels of visual impact, while the remaining two receptor locations will only be subjected to low levels of impact.

Although the N12 and the R500 receptor roads traverse the study area, motorists travelling along these routes are only expected to experience moderate impacts from the proposed project. Impacts on the R501 receptor road are expected to be minimal as most sections of this road are outside the viewshed for the proposed turbines.

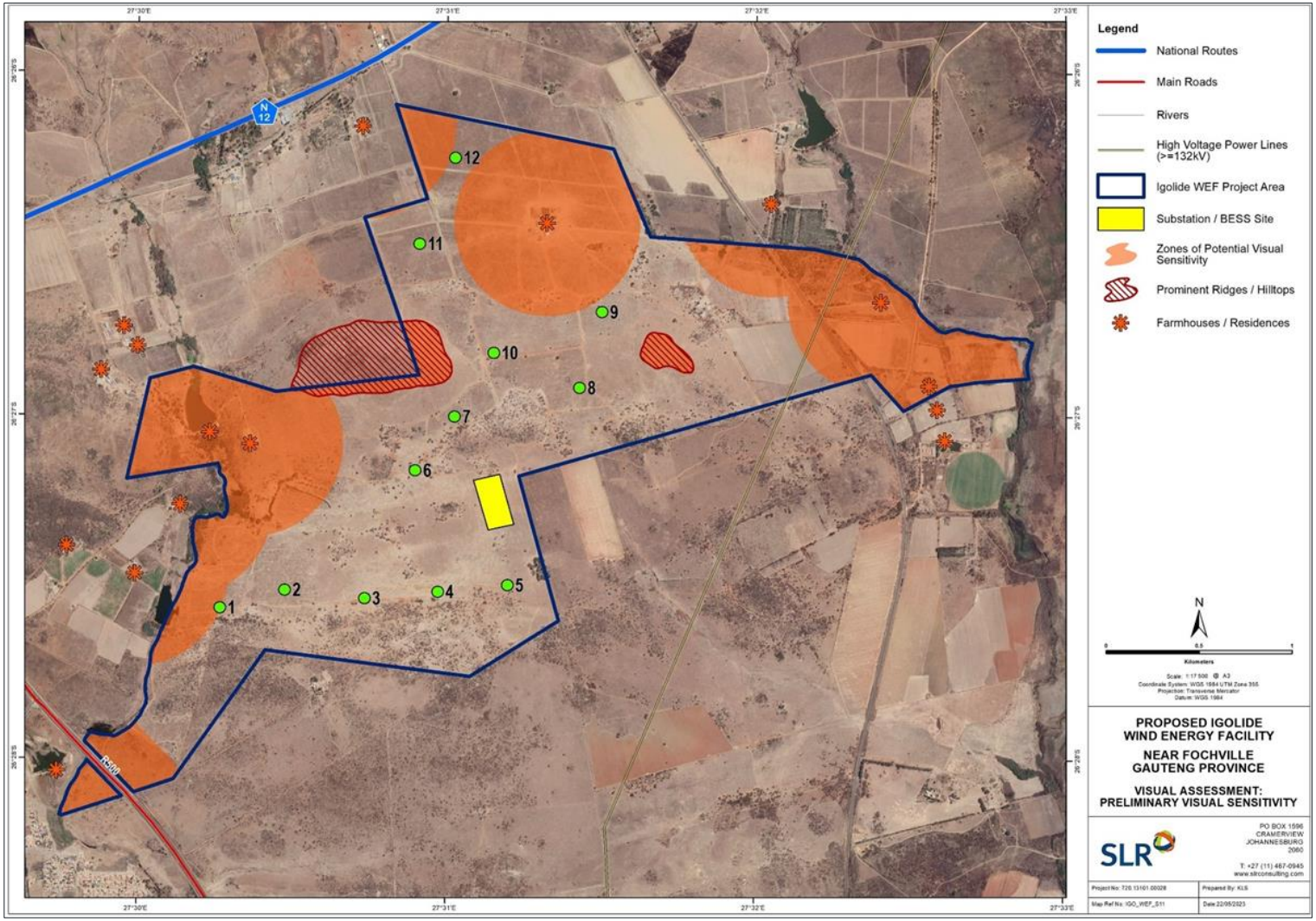


Figure 6-30 - Potential visual sensitivity within the study area

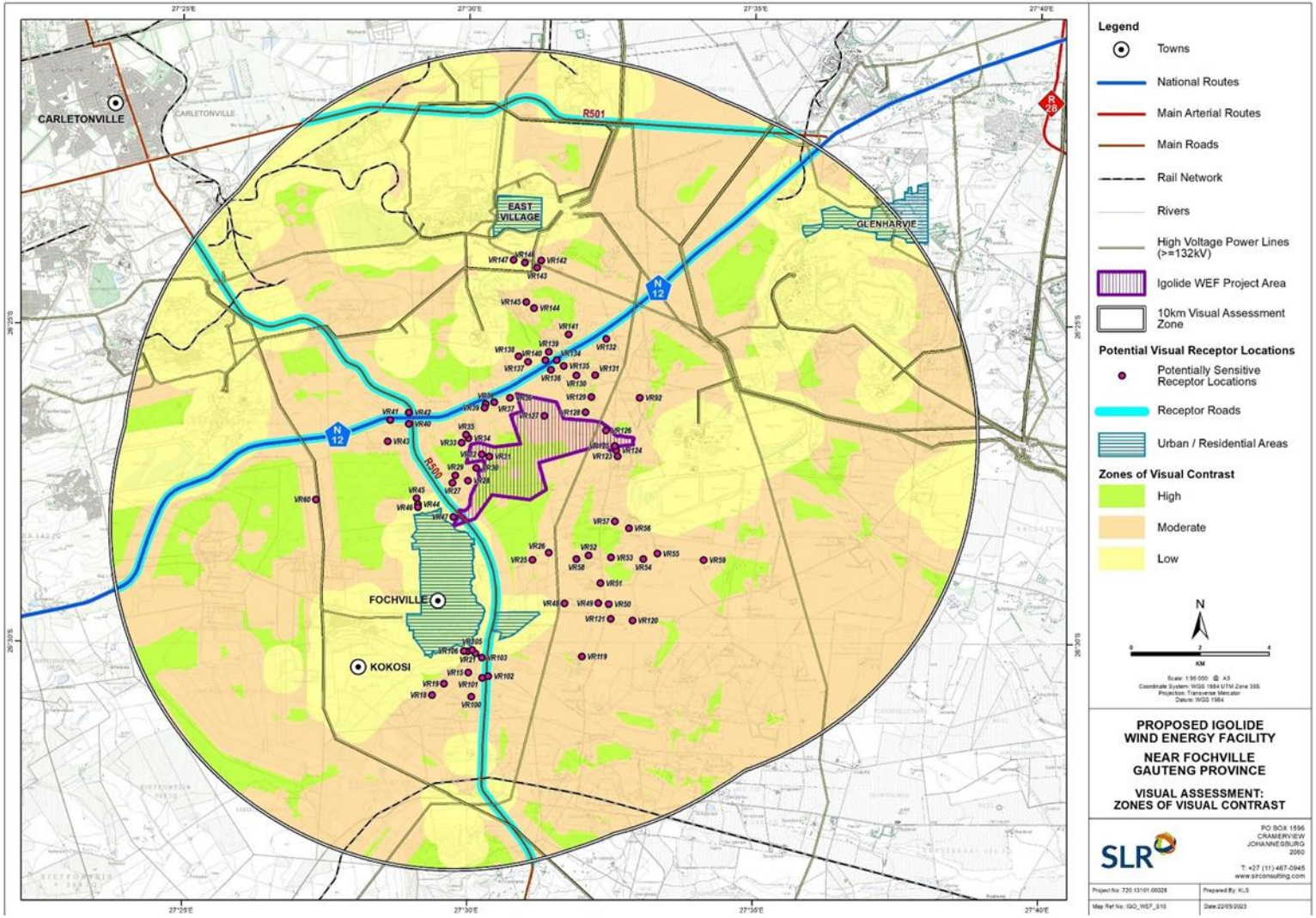


Figure 6-31 -: Zones of visual contrast within the study area

6.3.4.2 Sensitivity analyses

Although the Screening Tool identifies significant areas of very high landscape and flicker sensitivity, the site sensitivity verification assessment found little evidence to support this sensitivity rating. Desktop terrain analysis, confirmed by the field investigation, did not indicate the presence of mountain tops or high ridges within the project area and although there are some distinct hills with steep slopes, these are isolated and the average slopes across the remainder of the project area are relatively flat.

The presence of receptors, either within the proposed project area, or within 500m of the project area boundary, was confirmed by the site sensitivity verification exercise. However, an assessment of receptor locations using Google Earth showed that there were no receptors present at some of the locations identified by the Screening Tool. The remaining (confirmed) receptors were factored into the sensitivity analysis, together with a 500m buffer which is considered sufficient to reduce any adverse effects of shadow flicker.

6.3.4.1 Visual receptors

The potentially sensitive visual receptor locations identified within the study area for the proposed project are indicated in **Figure 6-32**.

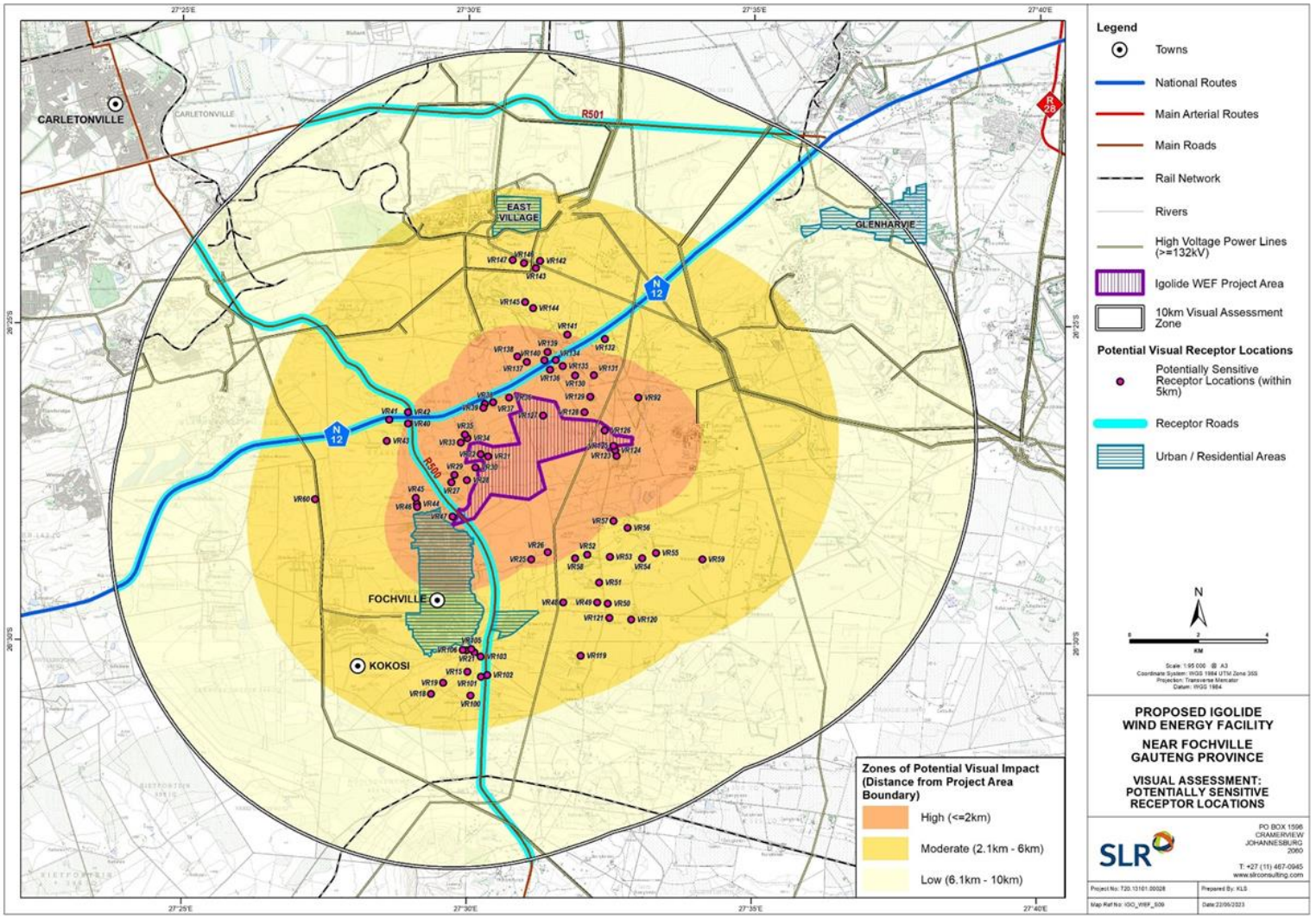


Figure 6-32 - Potentially sensitive receptor locations affected by the proposed project

6.3.5 SOCIAL

The following is extracted from the Socio-Economic Impact Assessment compiled by Tony Barbour Environmental Consulting and included as Appendix G.9.

6.3.5.1 Provincial context

The proposed site is located in the Gauteng Province, which is the smallest province in South Africa. Gauteng covers an area of 18 183 km^2, which only constitutes approximately 1.5% of South Africa total land area. The province is divided into two district municipalities and three metropolitan municipalities (MM). Gauteng's District Municipalities include Sedibeng and West Rand. The three MM include Tshwane, Johannesburg, and Ekurhuleni. The site itself is located in the WRDM.

Population

Despite having the smallest surface area, Gauteng is home to approximately a quarter of South Africa's population (Community Household Survey, 2016). The province has a population of 13 399 724 inhabitants. Of the five municipalities, Johannesburg MM has the largest population (36.9%), followed by Ekurhuleni MM (25.2%), Tshwane MM (24.4%), Sedibeng DM (7.2%), and West Rand DM (6.3%). The majority of the population in the Gauteng Province are Black African (80.4%), followed by White (13.6), Coloured (3.3%), and Indian or Asian (2.7%).

In terms of age, 43.5% of the Gauteng population is between 15 and 39 years old, which is the highest age distribution, followed by 26.1% of those aged 40–64 years, 24.7% of those 14 and younger, while only 5.6% comprised those aged 65 years and older. Similarly, this pattern is also seen across all districts in the province. More specifically, Merafong, and the broader West Rand District, had the highest proportion of persons aged 15-64 years. Additionally, Gauteng's working age population (15-64) has declined from 72% in 2011 to 66.5% in 2016 while the proportion of persons over 65 years has doubled from 4.3% to 8.7% within the same period.

Education

Based on the information contained in the GSDF, 75.9% of persons 20 years and older had some secondary schooling in Gauteng. Persons achieving matric or higher in Gauteng made up 52.4%, which was about 20% greater than the national rate. Around 10% of those over 20 years had some higher-level schooling, with the highest proportion observed in Tshwane (13.2%) followed by Johannesburg (10.8). Approximately 7.8% of Gauteng adults have no schooling in comparison to South Africa's 18.1%. The Local Economic Development for Gauteng indicates that Sedibeng district has the lowest proportional adult education attainment levels, with 9.2% of the adult population having no form of schooling.

Gauteng also has the highest portion (14.3%) of highly skilled formal employees in South Africa. Linked to this, is Gauteng's high rate of employment (50.6%), which is 1.3 times greater than the national rate (38.9%). This reflects Gauteng's role as the economic hub of South Africa and its importance for the overall GDP of the country.

Economic development

Gauteng has a high Human Development Index figure (0.76) and follows the Western Cape (0.78) as the second highest province in South Africa. In terms of per capita income, the Gauteng Province has the highest per capita income of all nine provinces, however, income distribution is extremely skewed,

with a high percentage of the population living in poverty. Gauteng's Gini coefficient is 0.62, compared to South Africa's 0.63 makes it slightly more equal than the country as a whole.

Economic sectors

Although the smallest province in South Africa, Gauteng contributes over 30% of the country's GDP, and around 10% of the total GDP of sub-Saharan Africa. The financial, real estate and business services sector is the largest contributor to the provincial GDP, contributing approximately 22.8% in 2013. This highlights the province's importance as the financial seat of South Africa. Gauteng is home to over 100 foreign and local banks' head offices, stockbrokers, and insurance giants.

The manufacturing and wholesale sectors are also key economic sectors, contributing 16.5% and 12.6% to the provinces GDP respectively. It is estimated that around 40% of South Africa's manufacturing and finance activity is done in Gauteng, as well as around 30% of the country's wholesale, retail, motor trade and accommodation.

Employment

The first quarter labour market snapshot for 2022 showed that in Gauteng employment has increased across six of the 10 sectors with key drivers including the Manufacturing, Community Services, and Trade Sectors. Employment in the mining sector has also increased to above pre-COVID levels in this time. In contrast, employment in the Private Households as well as Construction and Transport sectors has decreased in recent years, which mirrors national trends.

6.3.5.2 Economic overview

Mining

Despite mining sector contributing only 3.3% of Gauteng's Gross Domestic Product, mining sits at the core of the WRDM and contributes over 50% of Gross Value Add. This is prevalent in Merafong City Local Municipality (MCLM), as not only does one in four people in the region rely on mining for employment, but mining sector also contributes to 29.1% GDP locally. Gold and uranium are the primary materials mined in the region.

Manufacturing

Around 40% of South Africa's manufacturing is done in Gauteng, and the manufacturing sector contributes over 16% to the overall GDP of the province. Locally, despite sectoral employment only contributing 7.2% the MCLM manufacturing sector has grown significantly since 2011 and contributed 20.8% to local GDP in 2016.

Finance, Real Estate, and Business Services

The finance and business sector are growing steadily and contributed 13.8% to MCLM GDP in 2016. This has resulted in the decline in the number of people employed in the mining sector since 2011 being offset by the growth in employment in this sector as well as the trade sector during this time.

Renewable energy

The Merafong Growth and Development Strategy offers an outline for the future development of the area, and both the Green Economy and Industrial Beneficiation have been identified as significant drivers to revitalise the economy and mining towns of West Rand. The Merafong Solar Farm Cluster Concept and Bio-energy farm proposes a Solar Farm Cluster and Bio- energy farm in Merafong City,

in order to develop a renewable energy sector and reindustrialise and create opportunities in local downstream sectors like manufacturing industries and reduce electricity costs and carbon footprint in both private and public sectors.

6.3.5.3 Social environment

The social environment can therefore be described is a working agricultural / mining environment. The sensitivity of the homesteads in the area to the proposed project will be assessed during the Assessment Phase.

Figure 6-33 - Location of homesteads in the vicinity of the site (yellow place marks)

6.3.6 RISK

The following is extracted from the High-level Safety, Health and Environment Risk Assessment compiled by ISHECONcc and included as ***Appendix G.10****.*

The following issues should be considered:

- Lithium-ion BESS:
  - noxious smoke,
  - fires/explosions.
- Vanadium redox flow BESS:
  - suitable secondary spill containment for the large volume of electrolyte.
- General:
  - agricultural area.
  - small scale commercial interests, e.g., holiday resort, hotel, guest houses.

- location of farmsteads and water resources.
- commercial mining farther from the facility, i.e., over 5km.

Due to the possibility of noxious smoke from fires, any lithium BESS should be located over 500m from residences. The current prosed location is over 500m from any farm houses and over 2500m from the closest residential areas of Fochville. The dominant wind directions in the area are likely to be from the north. Any noxious smoke would likely blow from the proposed BESS installations towards and farming developments on the southern side which are over 100m away.

Figure 6-35 below shows the location of the various BESS installation with a 500m blue circle around the BESS. It also shows the location of near-by farmhouses / occupied facilities with a 500m red circle around each.

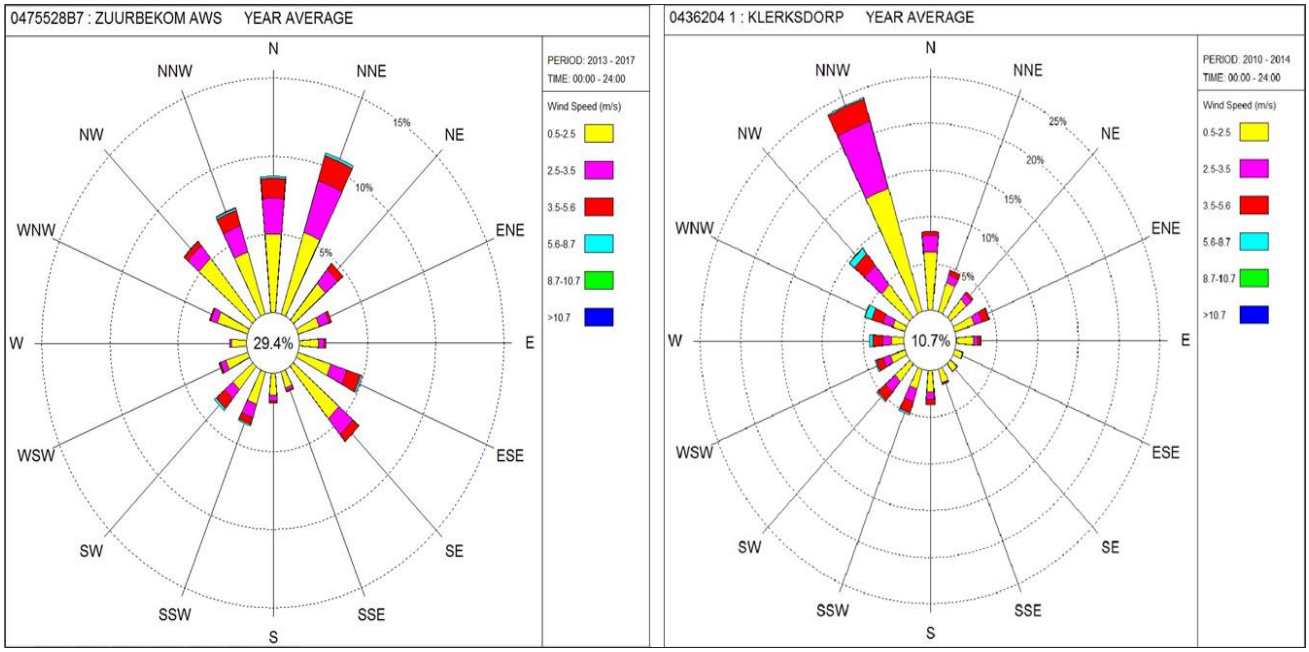


Figure 6-34 - Some Wind Rose Information for the broader area

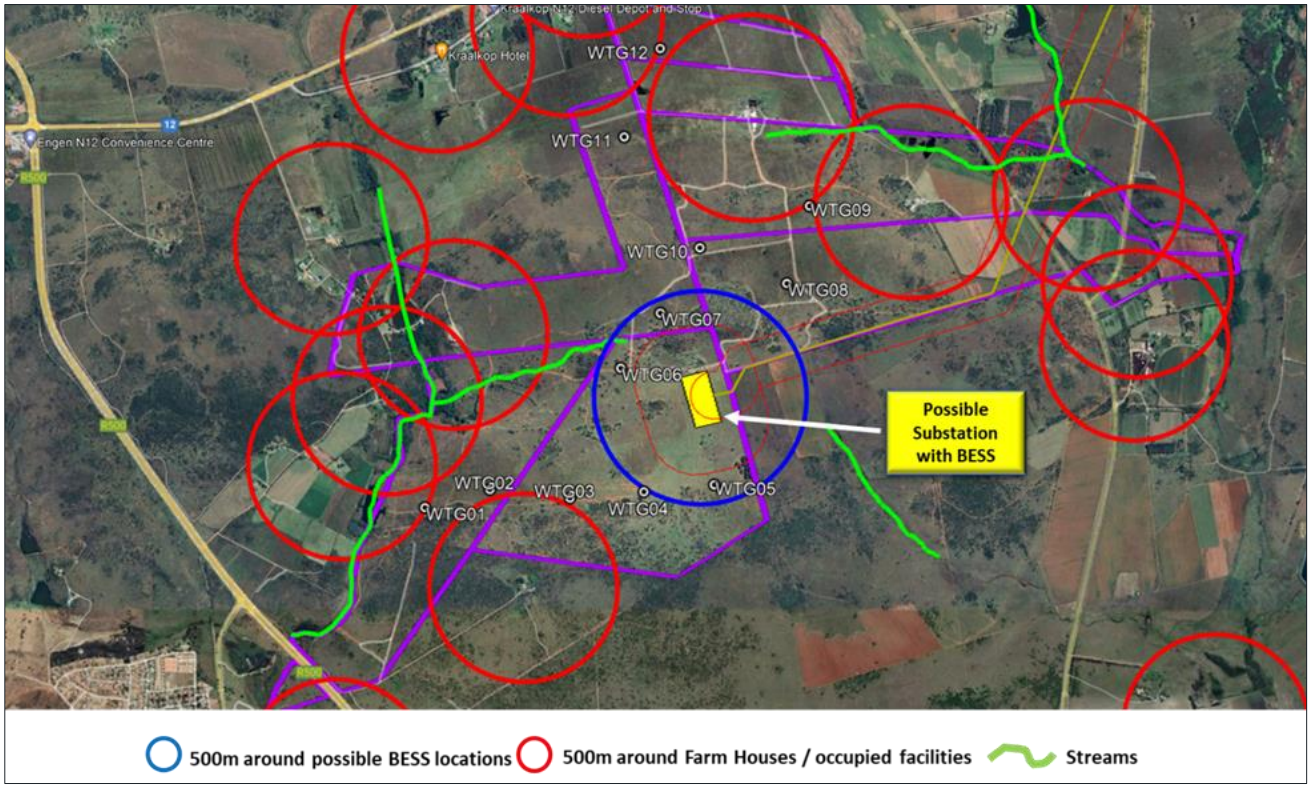


Figure 6-35 - Satellite Image of the area showing the location of farmsteads / buildings (red circles) in relation to the proposed project infrastructure (blue circle)

6.3.6.1 Health and Safety

As shown in **Figure 6-35**, there are numerous farmstead facilities in the general area, there are none in close proximity to the proposed BESS location. The closest farmsteads are over 1000m from the proposed BESS area.

6.3.6.2 Environment

- Supplies of water should be protected from possible chemical contamination.
- Should redox flow batteries be the chosen technology, it is suggested that the facilities be located a suitable distance away from water courses/sources.
- With lithium containers, large releases of liquids would only occur in the event of battery fire and emergency services applying fire water to a container which is unlikely in a remote location.
- It is suggested that the BESS facilities be located a suitable distance away from water courses/sources. The current proposed location does not appear to be close to any major water sources but refer to other aquatic specialist studies for specific details of separation distances.

6.3.7 NOISE CLIMATE

*The following is extracted from the Noise Report compiled by Enviro-Acoustic Research cc and included as **Appendix G.8**.*

6.3.7.1 Potential noise sources

Construction Phase

Construction equipment

It is estimated that construction will take approximately 24 – 36 months subject to the final design of the WEF, weather and ground conditions, including time for testing and commissioning. The construction process will consist of the following principal activities:

- Site survey and preparation;
- Establishment of site entrance, internal access roads, contractors' compound and passing places;
- Civil works to sections of the public roads to facilitate with turbine delivery;
- Site preparation activities will include clearance of vegetation at the footprint of each turbine as well as crane hard-standing areas. These activities will require the stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site;
- Construct foundations – due to the volume of concrete that will be required, an on-site batching plant will be required to ensure a continuous concreting operation. The source of aggregate is yet to be determined but is expected to be derived from an offsite source or brought in as ready-mix. If the stones removed during the digging of foundations are suitable as an aggregate this may be used as the aggregate in the concrete mix.
- Transport of components & equipment to site – all components will be brought to site in sections by means of flatbed trucks. Additionally, components of various specialized construction and lifting equipment are required on site to erect the wind turbines and will need to be transported to site. The typical civil engineering construction equipment will need to be brought to the site for the civil works (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.). The transportation of ready-mix concrete to site or the materials for onsite concrete batching will result in a temporary increase in heavy traffic (one turbine foundation may require up to 100 concrete trucks, and is undertaken as a continuous pour);
- Establishment of laydown & hard standing areas - laydown areas will need to be established at each turbine position for the placement of wind turbine components. Laydown and storage areas will also be required to be established for the civil engineering construction equipment which will be required on site. Hard standing areas will need to be established for operation of the cranes. Cranes of the size required to erect turbines are sensitive to differential movement during lifting operations and require a hard-standing area;
- Erect turbines - a crane will be used to lift the tower sections into place and then the nacelle will be placed onto the top of the assembled tower. The next step will be to assemble or partially assemble the rotor on the ground; it will then be lifted to the nacelle and bolted in place. A small crane will likely be needed for the assembly of the rotor while the large crane will be needed to put it in place;
- Construct substation - the underground cables carrying the generated power from the individual turbines will connect at the substation. The construction of the substation would require a site survey; site clearing and levelling (including the removal / cutting of rock outcrops) and construction of access road/s (where required); construction of a substation terrace and foundation; assembly, erection and installation of equipment (including transformers); connection of conductors to equipment; and rehabilitation of any disturbed areas and protection of erosion sensitive areas;

- Establishment of ancillary infrastructure - A workshop as well as a contractor's equipment camp may be required. The establishment of these facilities/buildings will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction. A laydown area for building materials and equipment associated with these buildings will also be required; and
- Site rehabilitation - once construction is completed and all construction equipment are removed; the site will be rehabilitated where practical and reasonable.

There are a number of factors that determine the audibility as well as the potential of a noise impact on receptors. Maximum noises generated can be audible over a large distance, however, these maximum noises are generally of very short duration. If maximum noise levels however exceed 65 dBA at a receptor, or if it is clearly audible with a significant number of instances where the noise level exceeds the prevailing ambient sound level with more than 15 dB, the noise can increase annoyance levels and may ultimately result in noise complaints.

Blasting

Blasting may be required as part of the civil works to clear obstacles or to prepare foundations. Should a borrow pit be used to supply rocks for construction purposes, blasting could also be expected. However, no information regarding the use, or even the feasibility of such a borrow pit is known.

However, blasting will not be considered for the following reasons:

- Blasting is highly regulated, and control of blasting to protect human health, equipment and infrastructure will ensure that any blasts will use minimum explosives and will occur in a controlled manner. With regards to blasting in borrow pits, explosives are used with a low detonation speed, reducing vibration, sound pressure levels and air blasts. The breaking of obstacles with explosives is also a specialized field, and when correct techniques are used, it causes less noise than using a rock-breaker.
- People are generally more concerned over ground vibration and air blast levels that might cause building damage than the impact of the noise from the blast.
- Blasts are an infrequent occurrence, with a loud but a relative instantaneous character. Potentially affected parties normally receive sufficient notice (siren), and the knowledge that the duration of the siren noise as well as the blast will be over relatively fast, resulting in a higher acceptance of the noise.

Traffic

A potential significant source of noise during the construction phase is additional traffic to and from the site, as well as traffic on the site. The use of a borrow pit(s), on site crushing and screening and concrete batching plants will significantly reduce heavy vehicle movement to and from the site.

Construction traffic is expected to be generated throughout the entire construction period, however, the volume and type of traffic generated will be dependent upon the construction activities being conducted, which will vary during the construction period. Noise levels due to traffic can be estimated using various different noise algorithms.

Operational Phase

The proposed development would be designed to have an operational life of up to 25 years with the possibility to further expand the lifetime of the WEF. The only development related activities on-site will be routine servicing (access roads and light traffic) and unscheduled maintenance. The noise

impact from maintenance activities is insignificant, with the main noise source being the wind turbine blades and the nacelle (components inside) as highlighted in the following sections.

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. These sources normally have different characteristics and can be considered separately. In addition, there are other noise sources of lower levels, such as the substations and traffic (maintenance).

Wind Turbine Noise: Aerodynamic sources

Aerodynamic noise is emitted by a wind turbine blade through a number of sources such as:

- Self-noise due to the interaction of the turbulent boundary layer with the blade trailing edge.
- Noise due to inflow turbulence (turbulence in the wind interacting with the blades).
- Discrete frequency noise due to trailing edge thickness.
- Discrete frequency noise due to laminar boundary layer instabilities (unstable flow close to the surface of the blade).
- Noise generated by the rotor tips.

Therefore, as the wind speed increases, noises created by the wind turbine also increase. At a low wind speed the noise created by the wind turbine is generally (relatively) low, and increases to a maximum at a certain wind speed when it either remains constant, increase very slightly or even drops.

Wind Turbine: Mechanical sources

Mechanical noise is normally perceived within the emitted noise from wind turbines as an audible tone(s) which is subjectively more intrusive than a broad band noise of the same sound pressure level. Sources for this noise are normally associated with:

- the gearbox and the tooth mesh frequencies of the step-up stages;
- generator noise caused by coil flexure of the generator windings which is associated with power regulation and control;
- generator noise caused by cooling fans; and
- control equipment noise caused by hydraulic compressors for pitch regulation and yaw control.

Tones are noises with a narrow sound frequency composition (e.g., the whine of an electrical motor). Annoying tones can be created in numerous ways: machinery with rotating parts such as motors, gearboxes, fans and pumps often create tones. An imbalance or repeated impacts may cause vibration that, when transmitted through surfaces into the air, can be heard as tones. Pulsating flows of liquids or gases can also create tones, which may be caused by combustion processes or flow restrictions. The best and most well-known example of a tonal noise is the buzz created by a flying mosquito.

Where complaints have been received due to the operation of wind farms, tonal noise from the installed wind turbines appears to have increased the annoyance perceived by the complainants and has indeed been the primary cause for complaint.

However, tones were normally associated with the older models of turbines. All turbine manufacturers have started to ensure that sufficient forethought is given to the design of quieter gearboxes and the

means by which these vibration transmission paths may be broken. Through the use of careful gearbox design and/or the use of anti-vibration techniques, it is possible to minimize the transmission of vibration energy into the turbine supporting structure. The benefits of these design improvements have started to filter through into wind farm developments which are using these modified wind turbines. New generation wind turbine generators do not emit any clearly distinguishable tones.

Low Frequency Noise

Low frequency sound is the term used to describe sound energy in the region below ~200 Hz. The rumble of thunder and the throb of a diesel engine are both examples of sounds with most of their energy in this low frequency range. Infrasound is often used to describe sound energy in the region below 20 Hz.

Almost all noise in the environment has components in this region although they are of such a low level that they are not significant (wind, ocean, thunder). Sound that has most of its energy in the 'infrasound' range is only significant if it is at a very high level, far above normal environmental levels.

Because of the low rotational rates of the blades of a wind turbines, the peak acoustic energy radiated by large wind turbines is in the infrasonic range with a peak in the 8-12 Hz range. For smaller machines, this peak can extend into the low-frequency "audible" (20-20KHz) range because of higher rotational speeds and multiple blades.

It should be noted that a number of studies highlighted that these sounds are below the threshold of perception (BWEA, 2005), although this should be clarified. Most acousticians would agree that the low frequency sounds are inaudible to most people, yet, there are a number of studies that highlight that it can be more perceptible to people inside their houses as well as people that are more sensitive to low frequency sounds.

Low frequency noise is always present around us as it is produced by both man and nature. While problems have been associated with older downwind wind turbines in the 1980s, this has been considered by the wind industry and modern upwind turbines do not suffer from the same problems. Low Frequency Noise however has been very controversial in the last few years with the anti-wind fraternity claiming measurable impacts, with governments and wind-energy supporter studies indicating no link between low-frequency sound and any health impacts.

Amplitude modulation

Although considered rare, there is one other characteristic of wind turbine sound that increases the sleep disturbance potential above that of other long-term noise sources. The amplitude modulation (AM) of the sound emissions from the wind turbines creates a repetitive rise and fall in sound levels synchronized to the blade rotation speed, sometimes referred to as a “swish” or “thump”.

Pedersen (2003) highlighted a weak correlation between sound pressure level and noise annoyance caused by wind turbines. Residents complaining about wind turbines noise perceived more sound characteristics than noise levels. People were able to distinguish between background ambient sounds and the sounds the blades made. The noise produced by the blades lead to most complaints. Most of the annoyance was experienced between 16:00 and midnight. This could be an issue as noise propagation modelling would be reporting an equivalent, or “average” sound pressure level, a parameter that ignores the “character” of the sound.

That AM can be a risk and significantly increase the annoyance with WEFs cannot be disputed. It has been reported with a number of recent studies confirming this significant noise characteristic.

However, even though there are thousands of wind turbine generators in the world, amplitude modulation is still one subject receiving the least complaints and due to these very few complaints, little research went into this subject. It is important to note that it is not possible to predict whether AM may occur, nor to calculate the potential related impact.

Battery Energy Storage Systems

The developer proposes to include a BESS at their WEF to store energy for use at a later time or date using electro-chemical solutions. The typical components of a BESS are:

- The battery system which could consist of:
  - Multiple cells,
  - The battery management system; and,
  - The battery thermal management system.
- Components required for the reliable operation of the overall system, including:
  - Energy management system; and,
  - System thermal management.
- Power electronics that can be grouped into the conversion unit (such as an invertor), which manage the power flow between the grid and battery, including the required control and monitoring components, voltage sensing units and thermal management of power electronic components (fans or climate control system).

There could be numerous such BESS modules running in parallel to increase the total storage capacity of the system up to the desired or needed capacity.

While certain components 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.

Transformer noises (Substations)

Also known as magnetostriction , is when the sheet steel used in the core of the transformer tries to change shape when being magnetised. When the magnetism is taken away, the shape returns, only to try and deform in a different manner when the polarity is changed.

This deformation is not uniform; consequently, it varies all over a sheet. With a transformer core being composed of many sheets of steel, these deformations are taking place erratically all over each sheet, and each sheet is behaving erratically with respect to its neighbour. The resultant is the “hum” frequently associated with transformers. While this may be a soothing sound in small home appliances, various complaints are logged in areas where people stay close to these transformers. At a voltage frequency of 50 Hz, these “vibrations” take place 100 times a second, resulting in a tonal noise at 100Hz.

However, this is a relatively easy noise to mitigate with the use of acoustic shielding and/or placement of the transformer and will not be considered further in this ENIA study. Substations in addition generate low noise levels, with the hum from the transformers inaudible further than 200 m from the transformers.

Transmission Line Noise (Corona noise)

Corona noise is caused by the partial breakdown of the insulation properties of air surrounding the conducting wires. It can generate an audible and radio-frequency noise, but generally only occurs in humid conditions, as provided by fog or rain. A minimum line potential of 70kV or higher is generally required to generate corona noise depending on the electrical design. Corona noise does not occur on domestic distribution lines.

Corona noise has two major components: a low frequency tone associated with the frequency of the AC supply (100 Hz for 50 Hz source) and broadband noise. The tonal component of the noise is related to the point along the electric waveform at which the air begins to conduct. This varies with each cycle and consequently the frequency of the emitted tone is subject to great fluctuations. Corona noise can be characterised as broadband 'crackling' or 'buzzing', but fortunately it is generally only a feature that occurs during fog or rain.

It will not be further investigated, as corona discharges results in:

- Power losses,
- Audible noises,
- Electromagnetic interference,
- A purple glow,
- Ozone production; and
- Insulation damage.

As such Electrical Service Providers, such as ESKOM, go to great lengths to design power transmission equipment to minimise the formation of corona discharges. In addition, it is an infrequent occurrence with a relatively short duration compared to other operational noises.

6.3.7.2 Existing Ambient Sound Levels

Ambient sound levels were measured over a 6-night period from 3 to 9 May 2023 at four locations, resulting in more than 2,000 daytime and 1,000 night-time measurements. Each measurement was collected over a 10-minute period and included a number of sound level descriptors, including; equivalent values, minimum and maximum levels, statistical sound levels as well as spectral information. Confidence levels in the resulting data are high and it is expected that the ambient sound level data would be applicable of other locations in the area.

Bird communication noises were significant and generally dominant, with road traffic noises audible at all the measurement locations. Road traffic noises were dominant at the first measurement location (approximately 300m from the N12 road).

Considering the average fast-weighted sound level data collected in the area:

- Daytime fast-weighted sound levels ranged from 27 to more than 70 dBA, with average daytime sound levels being 48.2 dBA. This is typical of a rural to sub-urban noise district and, considering the developmental character, a rating level of 50 dBA (typical of a suburban noise district) will be assumed for the daytime period; and
- Night-time fast-weighted sound levels ranged from 31 to more than 60 dBA, with average night-time sound levels being 44.4 dBA. This is higher than the noise levels expected for a rural to suburban district (based on the developmental character). While this residual noise level is more typical of an urban noise district, this assessment will recommend a rating level of 40 dBA (typical of a sub-urban noise district, based on the developmental character).

Wind turbines do emit noises at sufficient levels to propagate over large distances and this assessment indicates a potential noise impact on the closest receptors. The closest identified Noise-sensitive receptors is shown in **Figure 6-36** and **Figure 6-37**.

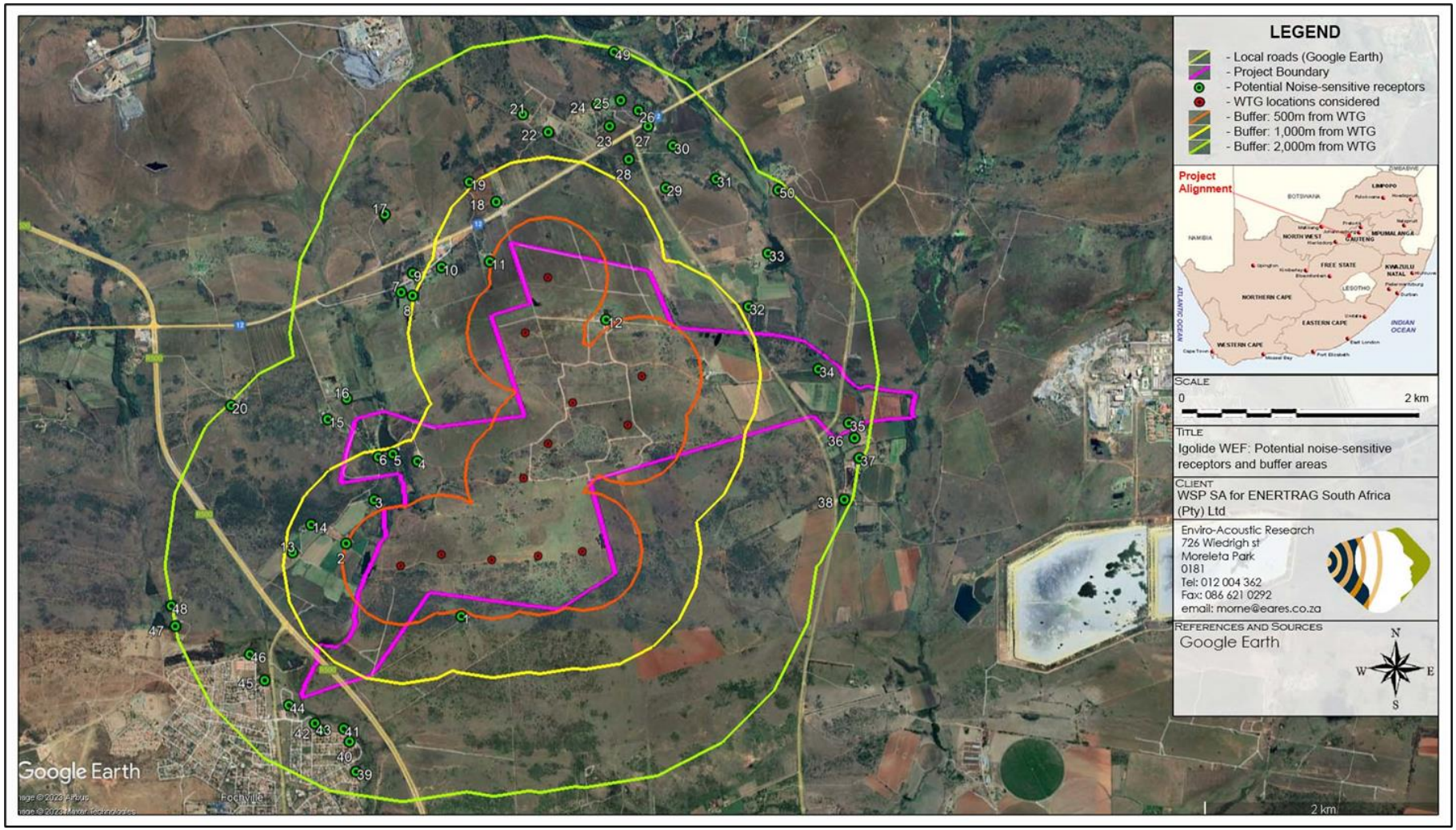


Figure 6-36 - Aerial Image indicating closest identified Noise-sensitive developments

Figure 6-37 - Aerial Image indicating output of the online screening tool

7 SITE SENSITIVITY AND VERIFICATION

Specialist assessments were conducted in accordance with the Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes, which were promulgated in Government Notice No. 320 of 20 March 2020 and in Government Notice No. 1150 of 30 October 2020 (i.e. "the Protocols"), or Appendix 6 of the EIA Regulations, depending on which legislation apply to the assessment under consideration. A summary of the DFFE screening tool, the applicable legislation as well as the specialist sensitivity verification are detailed in **Table 7-1** below. The site verification process is discussed in **Section 7.1** below.

Table 7-1 - Assessment Protocols and Site Sensitivity Verifications

Specialist Assessment	Assessment Protocol	DFFE Screening Tool Sensitivity	Specialist Sensitivity Verification
Agricultural Compliance Statement	*Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources by onshore wind and/or solar photovoltaic energy generation facilities where the electricity output is 20 megawatts or more*	High Sensitivity	Medium Sensitivity
Terrestrial Biodiversity Impact Assessment (including Plant and Animal Species Themes)	*Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity*	Very High Sensitivity	Low Sensitivity
	Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species	Medium Sensitivity	Low Sensitivity
	Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species	Medium Sensitivity	Low Sensitivity
Aquatic Biodiversity Impact Assessment	*Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity*	Very high Sensitivity	Medium Sensitivity
Avifauna Impact Assessment	*Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species*	High Sensitivity	Medium Sensitivity
Bat Impact Assessment	*Site Sensitivity Verification Requirements where a specialist Assessment is required but no Specific Assessment Protocol has been prescribed*	High Sensitivity	High and Medium Sensitivity

Specialist Assessment	Assessment Protocol	DFFE Screening Tool Sensitivity	Specialist Sensitivity Verification
Archaeological and Cultural Heritage Impact Assessment	*Site Sensitivity Verification Requirements where a specialist Assessment is required but no Specific Assessment Protocol has been prescribed*	Low Sensitivity	Medium Sensitivity
Palaeontology Impact Assessment	*Site Sensitivity Verification Requirements where a specialist Assessment is required but no Specific Assessment Protocol has been prescribed*	Medium Sensitivity	Low Sensitivity
Visual (Landscape) Impact Assessment (including Flicker)	*Site Sensitivity Verification Requirements where a specialist Assessment is required but no Specific Assessment Protocol has been prescribed*	Very High Sensitivity	Medium Sensitivity
Social Impact Assessment	*Site Sensitivity Verification Requirements where a specialist Assessment is required but no Specific Assessment Protocol has been prescribed*	No Sensitivity Identified	Low to medium sensitivity
Noise Impact Assessment	*Site Sensitivity Verification Requirements where a specialist Assessment is required but no Specific Assessment Protocol has been prescribed*	Very High Sensitivity	Medium Sensitivity
Civil Aviation (Wind) Theme	*Site Sensitivity Verification Requirements where a specialist Assessment is required but no Specific Assessment Protocol has been prescribed*	High Sensitivity	High Sensitivity
Defence (Wind) Theme	*Site Sensitivity Verification Requirements where a specialist Assessment is required but no Specific Assessment Protocol has been prescribed*	Medium Sensitivity	Medium Sensitivity
RFI (Wind) Theme	*Site Sensitivity Verification Requirements where a specialist Assessment is required but no Specific Assessment Protocol has been prescribed*	Low Sensitivity	Low Sensitivity

7.1 ENVIRONMENTAL SENSITIVITIES

The proposed site boundary, as indicated in Section 3.1, was assessed by the specialists as part of desktop assessments and subsequent fieldwork.

7.1.1 SOILS AND AGRICULTURAL POTENTIAL

The screening tool rating of the agricultural sensitivity of the assessment area is a minimum of low, an average of medium in the areas occupied by the turbines, and a maximum of high (**Figure 7-1**). The screening tool rating is because part of the assessment area is classified as cropland in the data set used by the screening tool. However, that data set is outdated. The only croplands occur in the

vicinity of the tar road in the eastern part of the farm, which is not where the wind farm is proposed. All land across the wind farm site is no longer used as cropland and has not been cropped in at least the last twenty years according to the historical imagery available on Google Earth. This land should not, therefore, still be classified as cropland and allocated high sensitivity because of it. The agricultural assessment therefore disputes that any of the wind farm site is within crop boundaries. The agricultural assessment therefore disputes the rating of the sensitivity by the screening tool and verifies the assessment area as being of medium agricultural sensitivity.

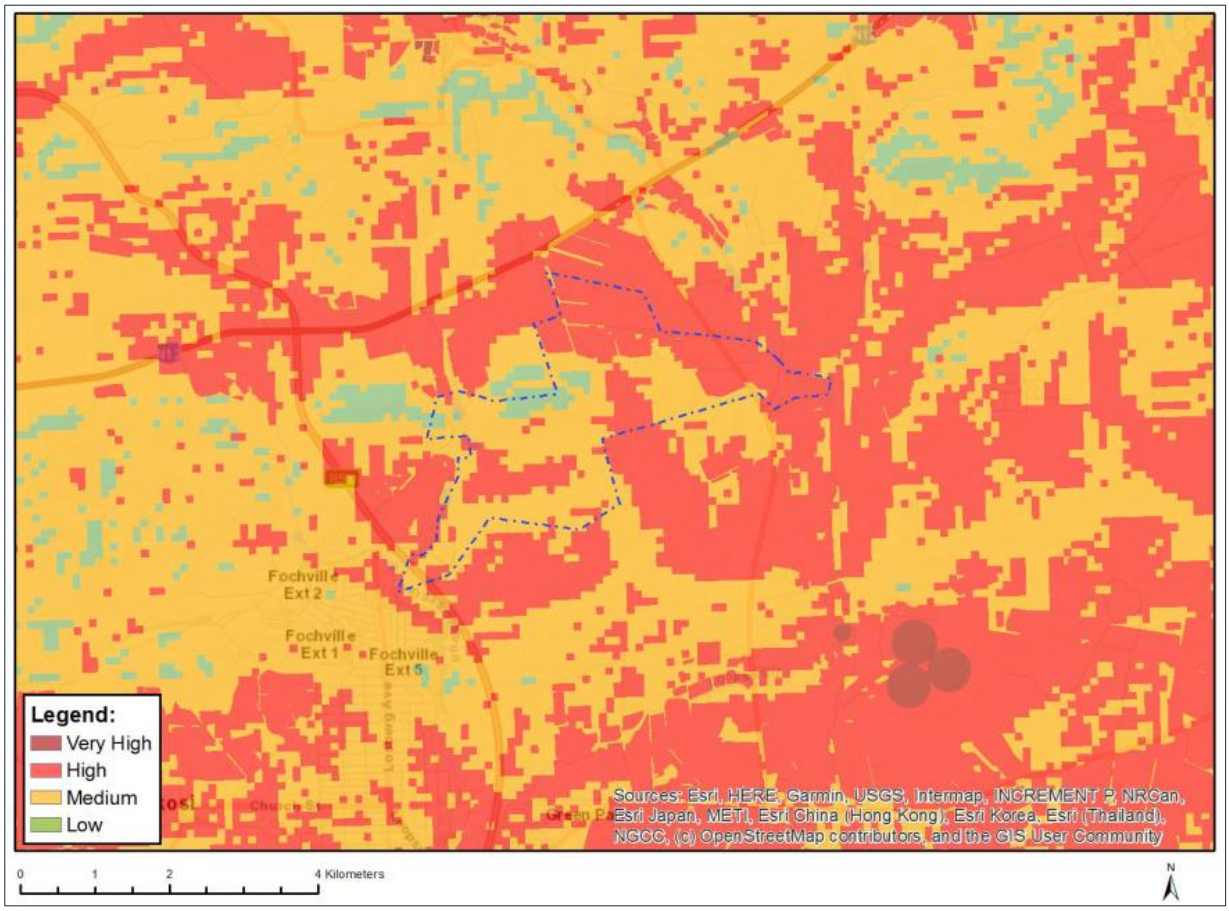


Figure 7-1 - Map of Agriculture Sensitivity

Source: DFFE Screening Report

7.1.2 TERRESTRIAL BIODIVERSITY, PLANT SPECIES AND ANIMAL SPECIES

The Screening Tool rated the sensitivity of the Relative Terrestrial Biodiversity Theme as very high based on the presence of CBAs, ESAs, PAES and a vulnerable ecosystem (**Figure 7-2**).

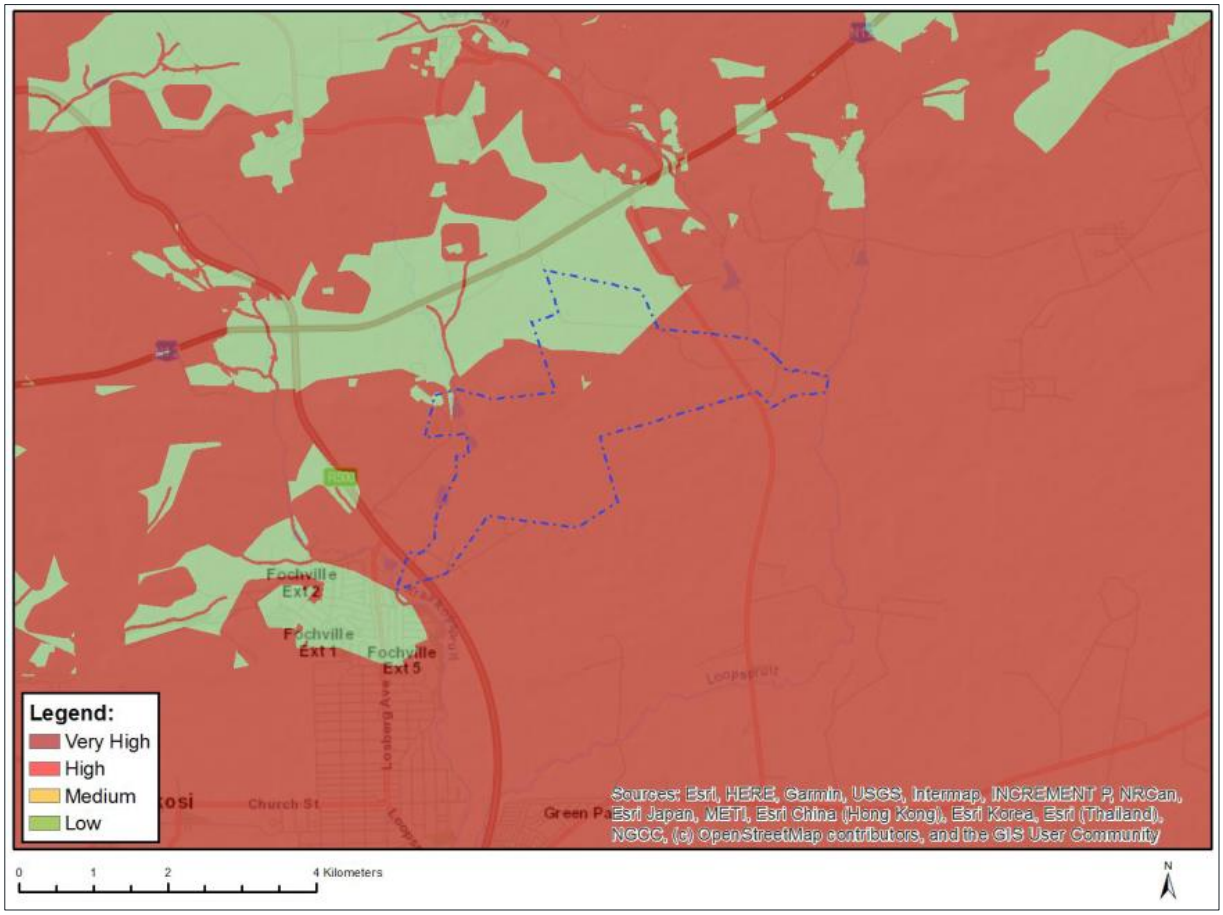


Figure 7-2 - Map of Terrestrial Biodiversity Sensitivity

This theme considers the presence of protected areas, National Protected Area Expansion Strategy (NPAES), CBAs, ESAs and National Freshwater Ecosystem Priority Areas (NFEPAs).

- The study area is not located in a protected area nor does it fall in an area earmarked as PAES. The nearest PAES focus area is approximately 25 km distant.
- Our background study indicated that there are CBAs as well as ESAs on site but none of the turbines were located within the areas demarcated as CBA or ESA. Overall the impact of the development within the identified CBAs and ESAs is believed to be small.
- Our background study confirmed that the Rand Highveld Grassland vegetation type on site is listed as Vulnerable whereas the Gauteng Shale Mountain Bushveld is Least Concern. The turbines are currently located in both the Rand Highveld Grassland and the Gauteng Shale Mountain Bushveld.
- The Freshwater Ecosystem Priority Areas (FEPAs) or water catchments are priority areas for conserving freshwater ecosystems and supporting sustainable use of water resources and upstream management areas. Based on the site assessment of the vegetation most of the area mapped as upstream FEPA was rated as being of low or moderate sensitivity and FEPAs were not flagged by the Screening Tool

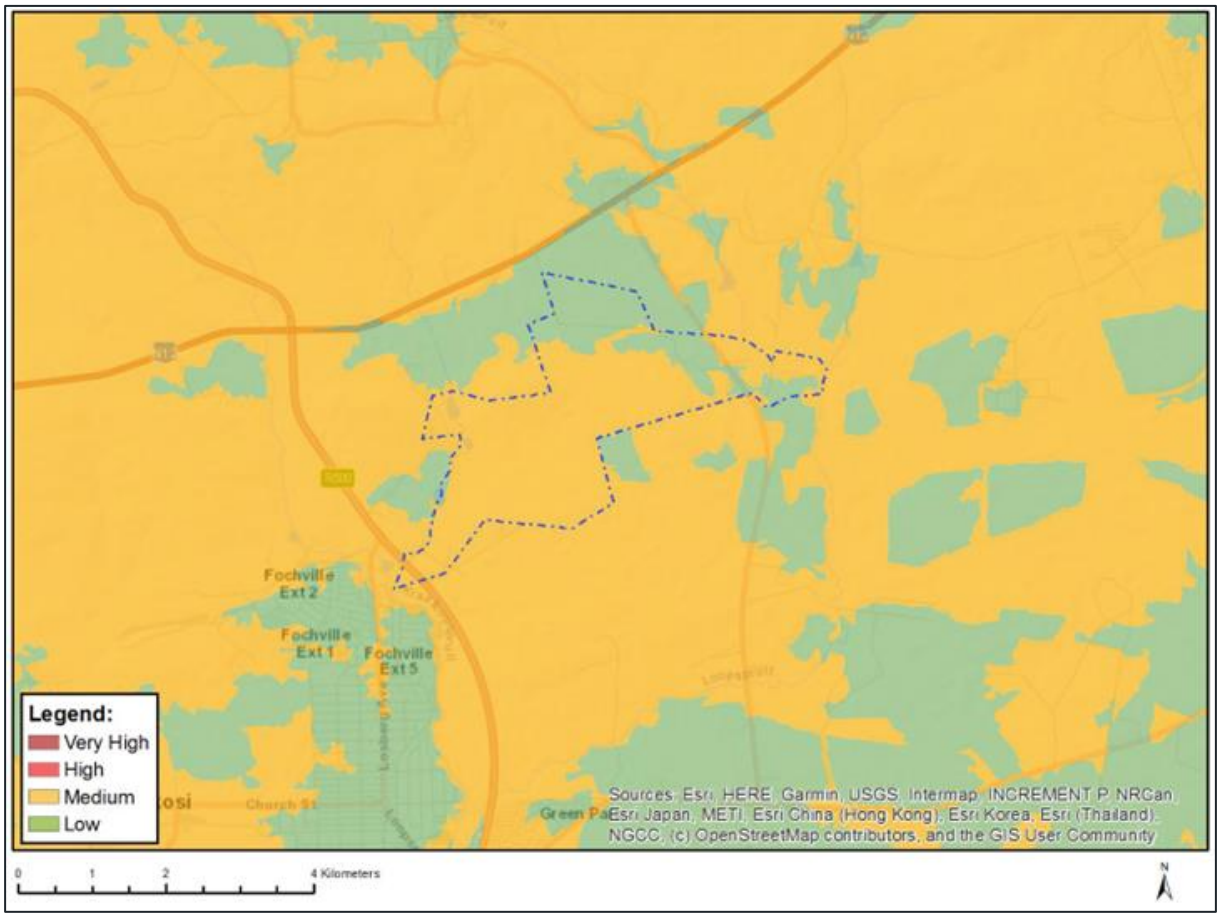


Figure 7-3 - Map of plant species sensitivity

The Screening tool rates the Plant species theme as a medium sensitivity (**Figure 7-3**). The site surveys and sensitivity model applied in the site indicated that most of site had a low sensitivity. None of the SCC highlighted by the Screening Tool were recorded on site and the Gauteng C-Plan did not reflect their possible occurrence on site.

- *Khadia beswickii* (VU) occurs in rocky habitats on shallow soil (sheetrock) but was not recorded on site.
- Species 691 occurs in damp depressions in shallow soil over rock sheets. This type of habitat occurs on a small area on site but the species was not encountered during the vegetation survey.
- The wooded habitats on site may present suitable habitat for sensitive plant species 1248 and 1252 on the list, but they were not encountered during the site survey. Furthermore, the rocky habitats (sheets) and wooded habitats were avoided in the layout of the infrastructure on the Igolide site.

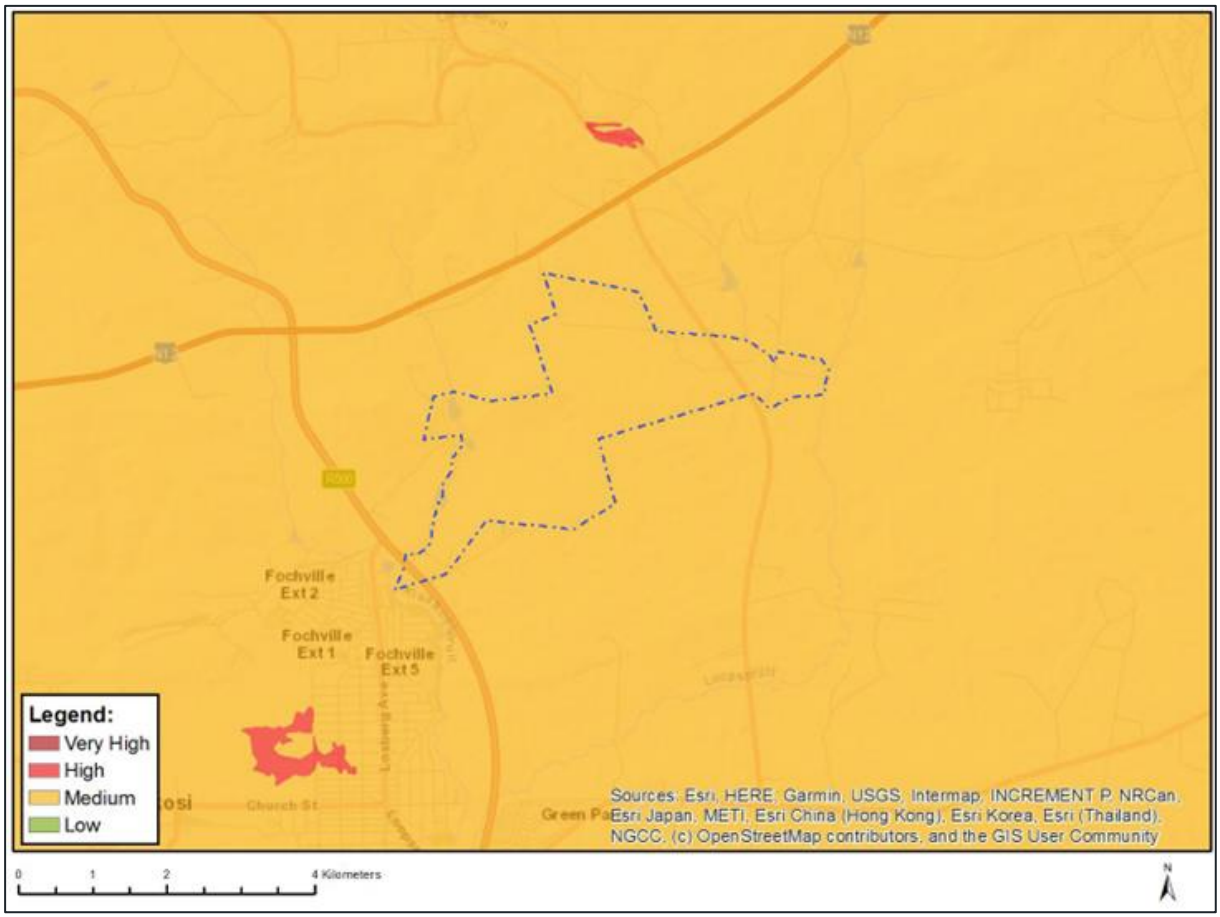


Figure 7-4 - Map of animal species sensitivity

The Screening Tool identifies a medium sensitivity for the animal species theme (**Figure 7-4**).

- The avifaunal component will be addressed by the avifaunal specialist.
- Our background study confirmed the probable presence of the two Lepidopteran species (Animal Demography Unit reptile map) in the region, although they were not recorded during the site visit and their host plant (*Ocimum obovatum*) was not encountered during the site survey. None of the Lepidopteran species highlighted by the Screening Tool are listed on the ADU database for the site and are unlikely to occur since their host plant was not encountered on site.
- The Screening Tool listed *Clonia uvarovi* (Orthoptera) as SCC. According to the RSA Red List, *Clonia uvarovi* (Orthoptera) is rated as Vulnerable. It inhabits tall savanna woodland. The habitat on site could be described as bushveld which may be marginally suitable for the species.
- The Maquassie Musk Shrew *Crocidura maquassiensis* (VU) depends on wetlands as suitable habitat in savanna and grassland. Although it has a wide inferred extent of occurrence, it appears to be patchily distributed. It has not been reported from Gauteng or North West Province post-1999 and thus there is a very low probability for it to occur on site.
- Suitable habitat for the spotted-necked otter Hydrictis maculicollis is available on site. It occurs widespread, but it is restricted to areas of permanent fresh water offering good shoreline cover and an abundant prey base. The watercourses were however avoided by the development and buffer zones are applicable.

- Based on the results of the site assessment, overall, the sensitivity for the animal theme can be rated as low if the suggested mitigation measures are followed. The threatened animal species should not be negatively affected by the WEF.

7.1.3 AQUATIC BIODIVERSITY

The proposed infrastructure footprint was assessed at a desktop level using the National Web-based Environmental Screening Tool. According to the Tool, the Aquatic Biodiversity Theme for the Project Area is rated 'Very High Sensitivity' due to the presence of wetland features and areas mapped as Aquatic Critical Biodiversity Areas (CBAs), in and around the LSA (**Figure 7-5**). The site-based sensitivity is considered to be high sensitivity.

Figure 7-5 - Map of Aquatic Biodiversity Sensitivity

Source: DFFE Screening Report

7.1.4 AVIFAUNA

The project site and immediate environment is classified as Medium sensitivity for bird species according to the Terrestrial Animal Species Theme (**Figure 7-6**). The Medium sensitivity classification is linked to the potential occurrence of African Grass Owl *Tyto capensis* (Regionally Vulnerable), White-bellied Bustard *Eupodotis senegalensis* (Regionally Vulnerable), and Caspian Tern *Hydroprogne caspia* (Regionally Vulnerable).

The project site contains confirmed habitat for Species of Conservation Concern (SCC), namely African Grass Owl and Secretarybird (Globally Endangered and Regionally Vulnerable), as defined in the Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial animal species (Government Gazette No 43855, 30 October 2020). During the on-site surveys, two SCC were also recorded. These SCC were: Lanner Falcon (Regionally Vulnerable), and Secretarybird (Globally Endangered and Regionally Vulnerable).

Based on the Site Sensitivity Verification survey and the integrated pre-construction monitoring conducted at the project site, the classification of High sensitivity for avifauna is suggested for the Igolide WEF.

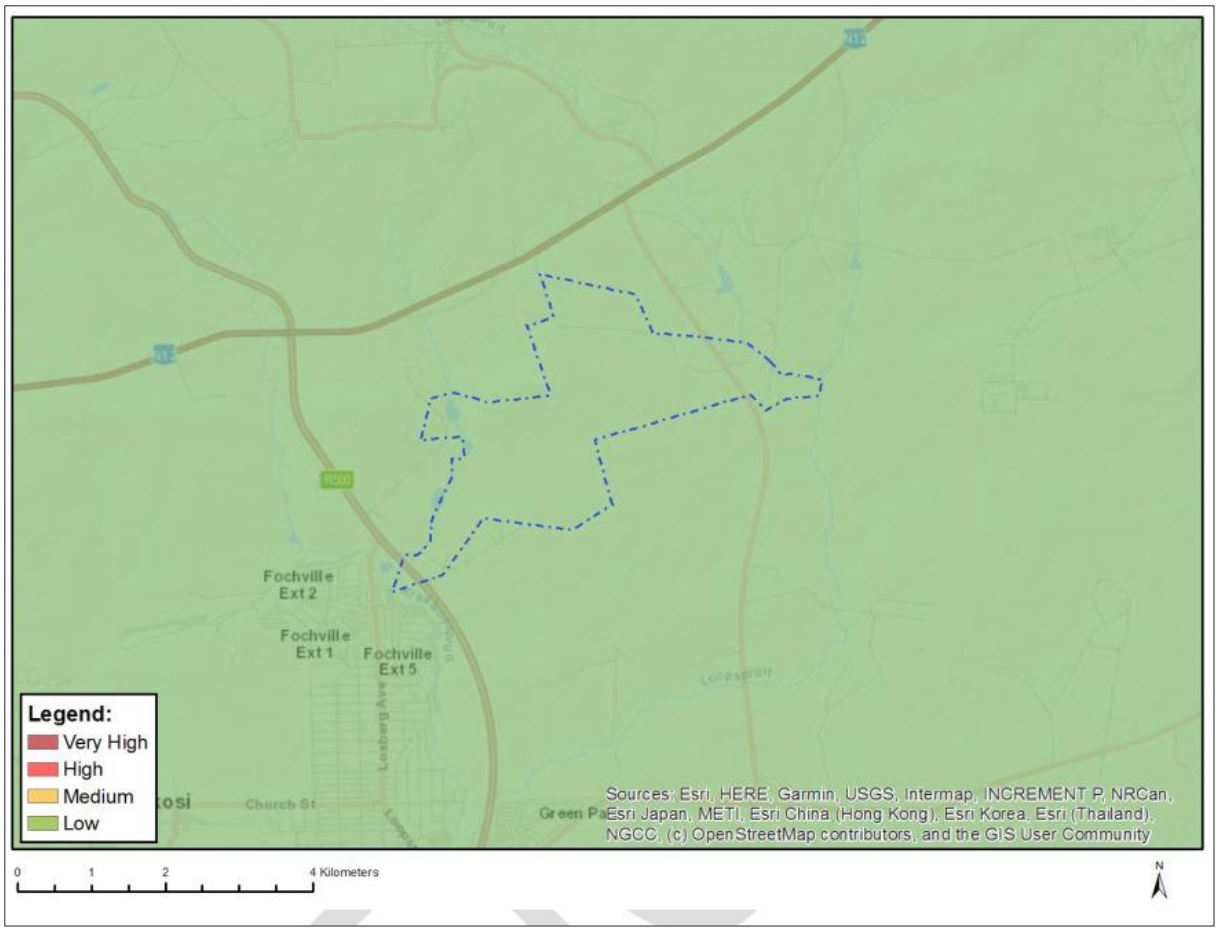


Figure 7-6 - Map of Avian Sensitivity

Source: DFFE Screening Report

7.1.5 BATS

In **Figure 7-7**, the red areas indicate high bat sensitivity hydrology features which are wetlands or a 500m buffer around these wetlands and/or rivers. Orange areas are designated medium sensitivity due to the presence of croplands. The remaining areas are not assigned any sensitivity by the Screening Tool. The sensitivities of the National Screening Tool have been considered by the specialist, however the sensitivity map produced with this scoping study deviates somewhat from the Screening Tool which is considered a courser output. The deviations are based on detailed site visits and rigorous assessment of satellite features.

The methodology of the Site Sensitivity Verification process involved for the site to be evaluated by comparing the amount of surface rock (possible roosting space), topography (influencing surface rock in most cases), vegetation (possible roosting spaces and foraging sites), climate (can influence insect numbers and availability of fruit), and presence of surface water (influences insects and acts as a source of drinking water) to identify bat species that may be impacted by wind turbines. These comparisons were done by briefly studying the geographic literature of each site, available satellite imagery and by ground truthing with site visits. Species probability of occurrence based on the above-mentioned factors were estimated for the site and the surrounding larger area, but also considers species historically confirmed on site as well as surrounding areas.

The bat sensitivity map produced by the specialist, based on the methodology described above, is relatively similar to the Screening Tool sensitives with regards to the identification of several water courses and open water sources as high sensitivity areas.

The sensitivities identified in the specialist assessment have been verified by the above-mentioned methodology.

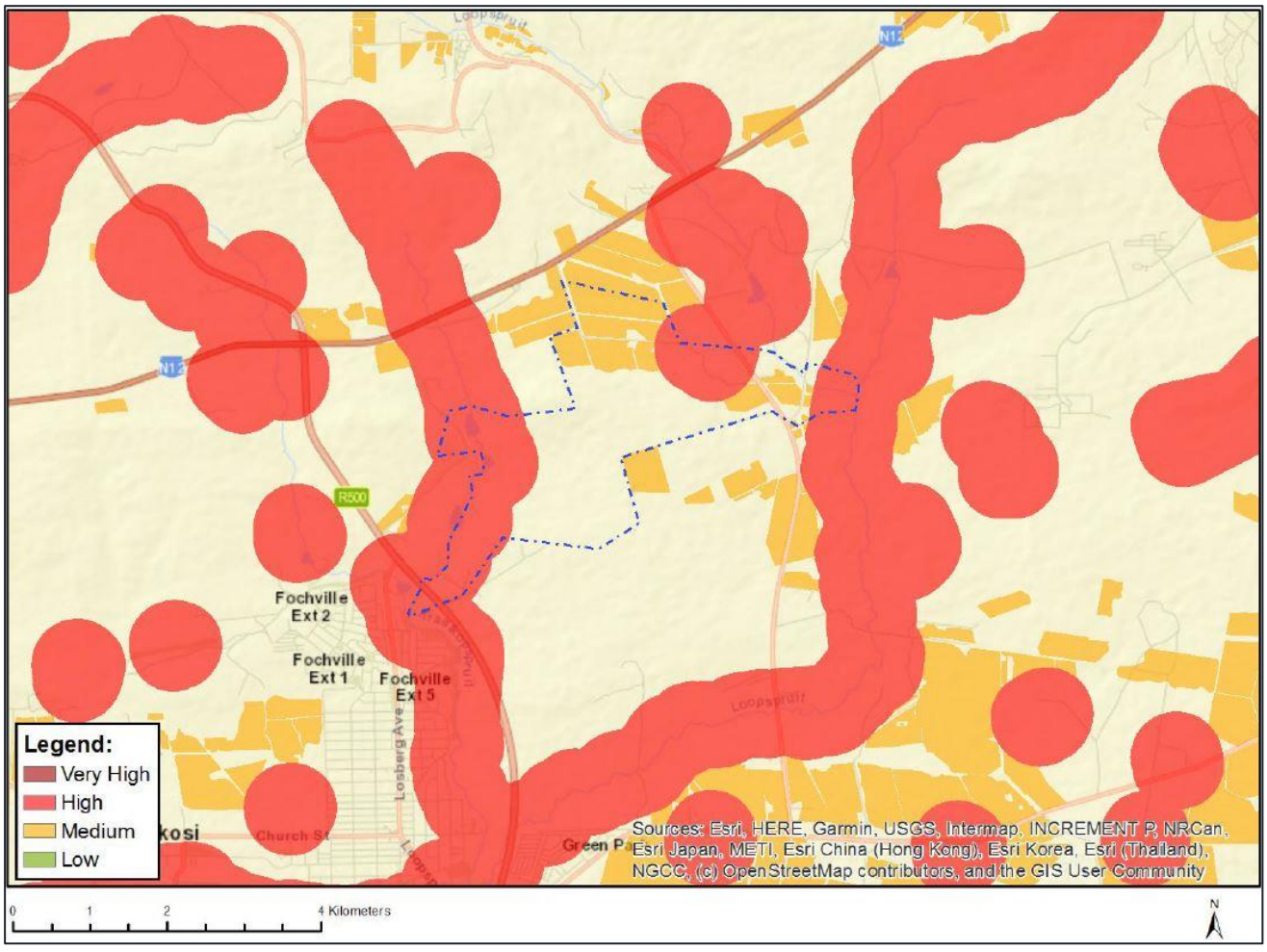


Figure 7-7 - Possible bat sensitivity features and areas wind energy for Igolide Wind Farm according to the National Environmental Screening Tool

Figure 7-8 depicts the sensitive areas of the site, based on features identified to be important for foraging and roosting of the species that most commonly occur on site. Thus, the sensitivity map is based on species ecology and habitat preferences.

Considering the current layout, and a blade length of 100m, the blade overhangs of Turbines 1, 2, 5, 8, 9, 11 and 12 are intruding into high bat sensitivity buffers (Table 7-3). These turbines must be relocated to have their blade overhang outside of the bat high sensitivity buffers prior to the layout receiving Environmental Authorisation.

Table 7-2: Description of parameters used in the construction of the sensitivity map.

Last revision	June 2023
High sensitivities and 200m buffers	Valley bottom wetlands.
	Pans and depressions.
	Dams.
	Clumps of larger trees especially when close to farm buildings and water sources
	Farm building and structures especially when close to irrigated land, water sources and clumps of trees.
	Drainage lines capable of supporting riparian vegetation.
	Other water bodies and other sensitivities such as manmade structures, buildings, houses, barns and sheds.
Moderate sensitivities and 150m buffers	Looser smaller groups of trees
	Seasonal drainage lines.

Table 7-3: Igolide Wind Farm turbines located within bat sensitive areas and buffers.

Bat sensitive area	Turbines within sensitivity feature (based on a 100m blade length)
High bat sensitivity area (no-go areas)	None
High bat sensitivity buffer (no-go areas)	WTG 1, 2, 5, 8, 9, 11, 12
Moderate bat sensitivity area	WTG 1, 3, 4, 5, 7
Moderate bat sensitivity buffer	WTG 2, 6, 8, 10

Table 7-4: 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	These areas are 'no-go' zones and 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 (no-go areas).
High Sensitivity buffer	These areas are 'no-go' zones and 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.

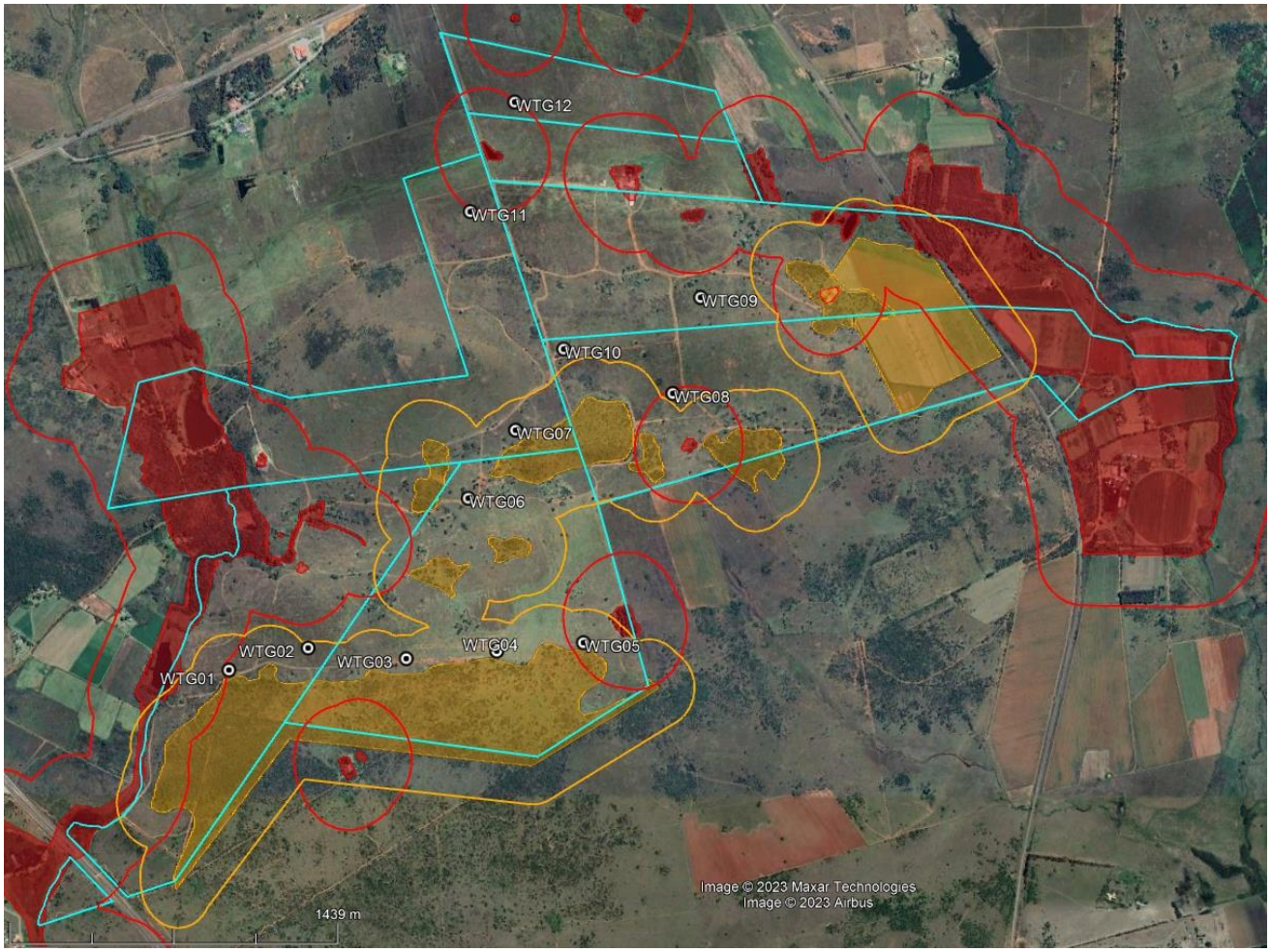


Figure 7-8 - Bat sensitivity map of the proposed Igolide Wind Farm site, showing moderate and high sensitivity zones and their buffers.

7.1.6 ARCHAEOLOGICAL AND CULTURAL HERITAGE

The DFFE Screening Tool shows the archaeological and heritage sensitivity as being low throughout the study area (**Figure 7-9**). The aerial photography survey showed very clearly that there are many archaeologically sensitive areas scattered across the study area. A number of farm buildings were also shown to pre-date 1938. All are assigned high sensitivity pending in-field assessment.

Sites of Grade IIIA (high cultural significance), IIIB (high cultural significance) and GPA (medium cultural significance) should be regarded as being of high sensitivity. GPB sites (low cultural significance) can be seen as medium, while GPC sites (very low significance) are low sensitivity. It is unlikely that any of the sites and structures identified here as sensitive would be of less than medium cultural significance.

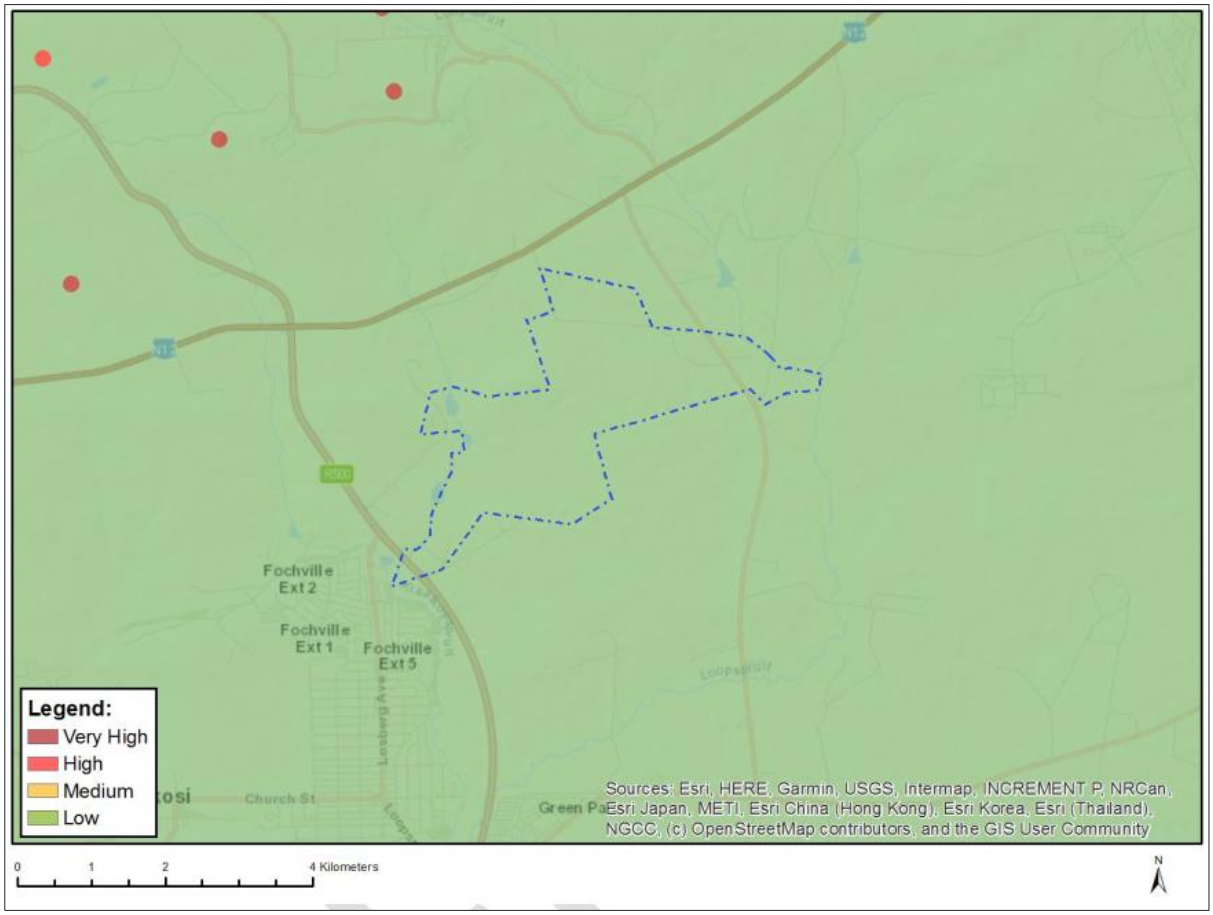


Figure 7-9 - Map of Archaeological and Heritage Sensitivity

Source: DFFE Screening Report

7.1.7 PALAEONTOLOGY

The palaeontological sensitivity of the WEF sites under consideration are presented in **Figure 7-10** and **Figure 7-11**. The sites are mostly on moderately fossiliferous Hekpoort Formation (green on SAHRIS and orange in the DFFE map) and on the highly fossiliferous Timeball Hill Formation (SAHRIS orange; DFFE dark orange). The southwestern corner is on the moderately fossiliferous Silverton Formation, most probably the basal Boven Shale Member. It has been interpreted as a high-stand facies tract that reflects the advance of an epeiric sea onto the Kaapvaal Craton from the east, and therefore the underlying Daspoort Formation would represent a low-stand facies tract or a transgressive systems tract.

There is consensus in the geological literature that the Silverton Formation environment was a high energy one with shallow to deep water shales being deposited as sub-storm wave-base pelagic deposits, within an epeiric embayment on the Kaapvaal Craton. Several sub aqueous dykes and volcanic eruptions have also been recorded. The formation is dated between 2240 and 2080 Ma and this is too old for anybody fossils so the only fossils were microscopic algae and bacteria which if preserved, are in the form of the trace fossils such as stromatolites or microbial mats. There are no records of such trace fossils in the Silverton formation although they are present in the overlying Magaliesberg Formation.

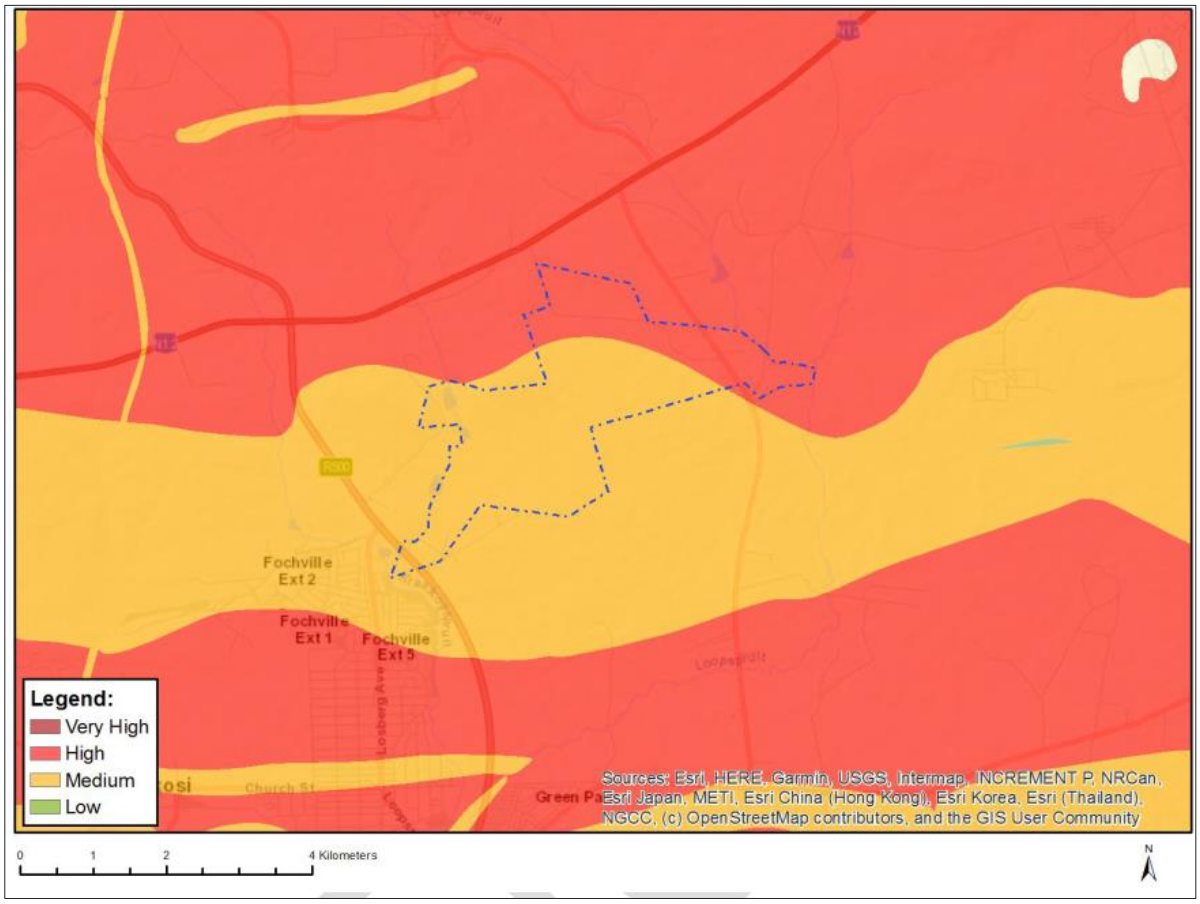


Figure 7-10 - Map of Palaeontological Sensitivity

Source: DFFE Screening Report

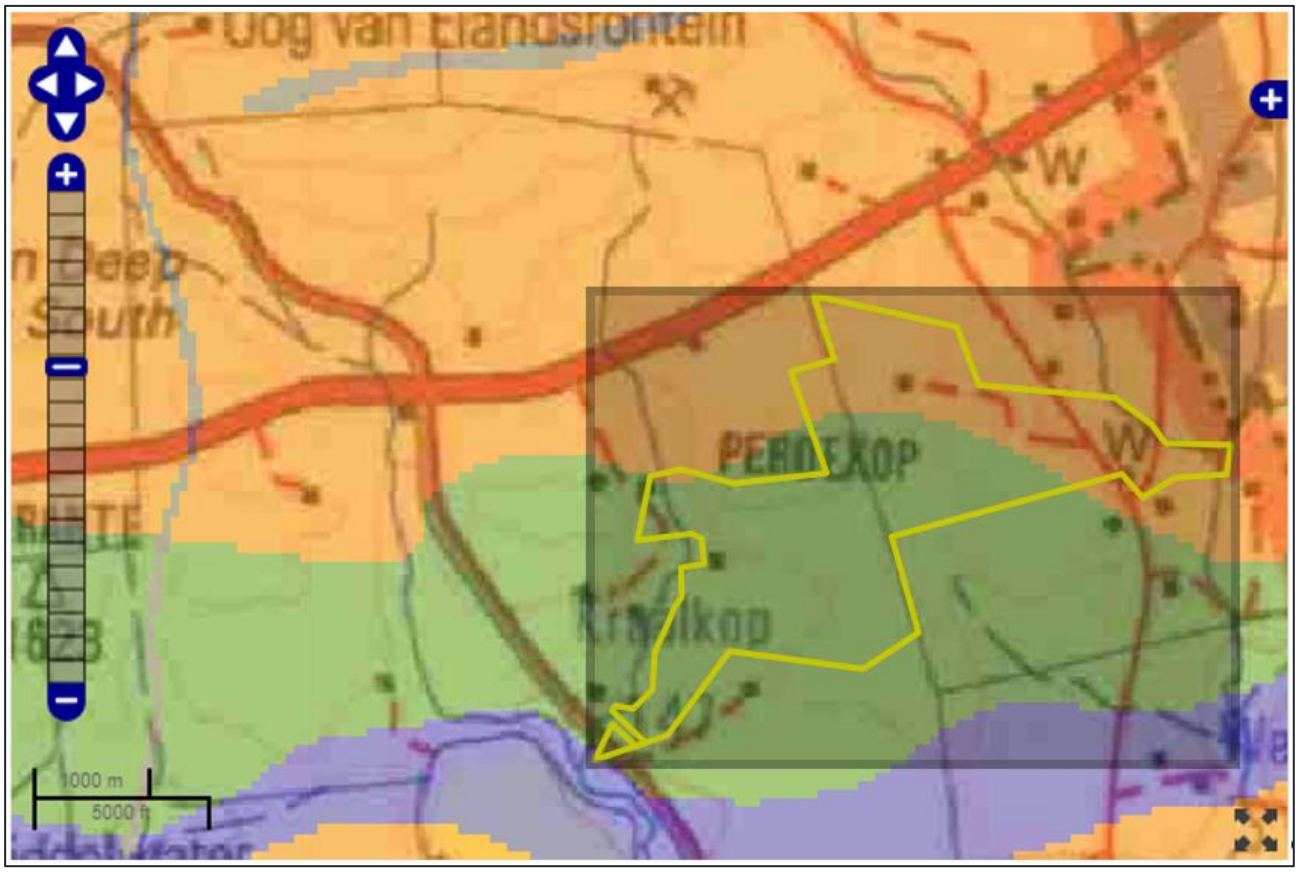


Figure 7-11 - SAHRIS palaeosensitivity map for the site for the proposed Igolide WEF with the project boundary indicated within the yellow outline

Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

7.1.8 VISUAL (LANDSCAPE)

In assessing visual sensitivity of the proposed Igolide WEF, consideration was given to the Landscape Theme of the Screening Tool. Under the Landscape Theme, the tool identifies areas of Very High Sensitivity across the Igolide WEF project area (**Figure 7-12**). According to the Screening Tool, the high sensitivity rating is associated with “mountain tops and high ridges” and steep slopes (greater than 1:4) as well the fact that the western portion of the project area is within 2 km of a town or village. Based on these criteria, most of the project area would be ruled out for WEF development.

The flicker theme demarcates areas (1 km buffers) of sensitivity around identified receptors in the area (**Figure 7-13**). Under this theme, potential flicker receptors have been identified within the project area, or within 1 km of the site boundary. Buffers demarcated around these receptors have been assigned a “very high” sensitivity rating.

The Screening Tool provides a very high level, desktop assessment and as such the results of the study must be viewed against the findings of the field investigation as well as factors affecting visual impact, such as:

- the presence of visual receptors;
- the distance of those receptors from the proposed development; and

- the likely visibility of the development from the receptor locations.

Although the Screening Tool identifies significant areas of very high landscape and flicker sensitivity, the site sensitivity verification exercise conducted in respect of this VIA found little evidence to support this sensitivity rating. Desktop terrain analysis, confirmed by the field investigation, did not indicate the presence of mountain tops or high ridges within the project area and although there are some distinct hills with steep slopes, these are fairly isolated and the average slopes across the remainder of the project area are relatively flat.

The sensitivity rating for the project area is also influenced by its proximity to the town of Fochville. Considering the level of landscape transformation and degradation associated the town and its surrounds however, there is little evidence of very high levels of landscape sensitivity within a 2 km radius of the town.

The presence of receptors, either within the Igolide WEF project area, or within 500m of the project area boundary, was confirmed by the site sensitivity verification exercise. However, an assessment of receptor locations using Google Earth showed that there were no receptors present at some of the locations identified by the Screening Tool. The remaining (confirmed) receptors were factored into the sensitivity analysis, together with a 500m buffer which is considered sufficient to reduce any adverse effects of shadow flicker.

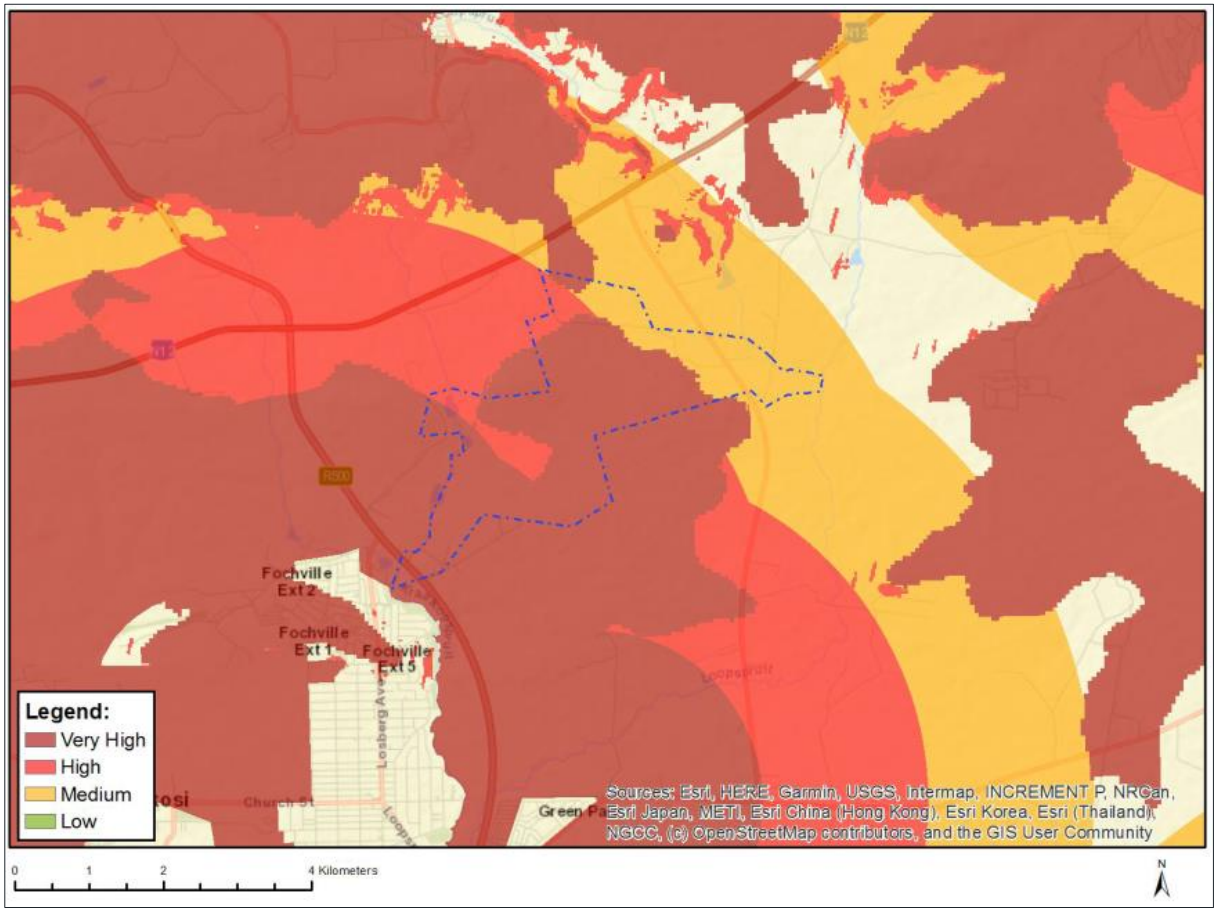


Figure 7-12 - Map of Landscape Sensitivity

Source: DFFE Screening Report

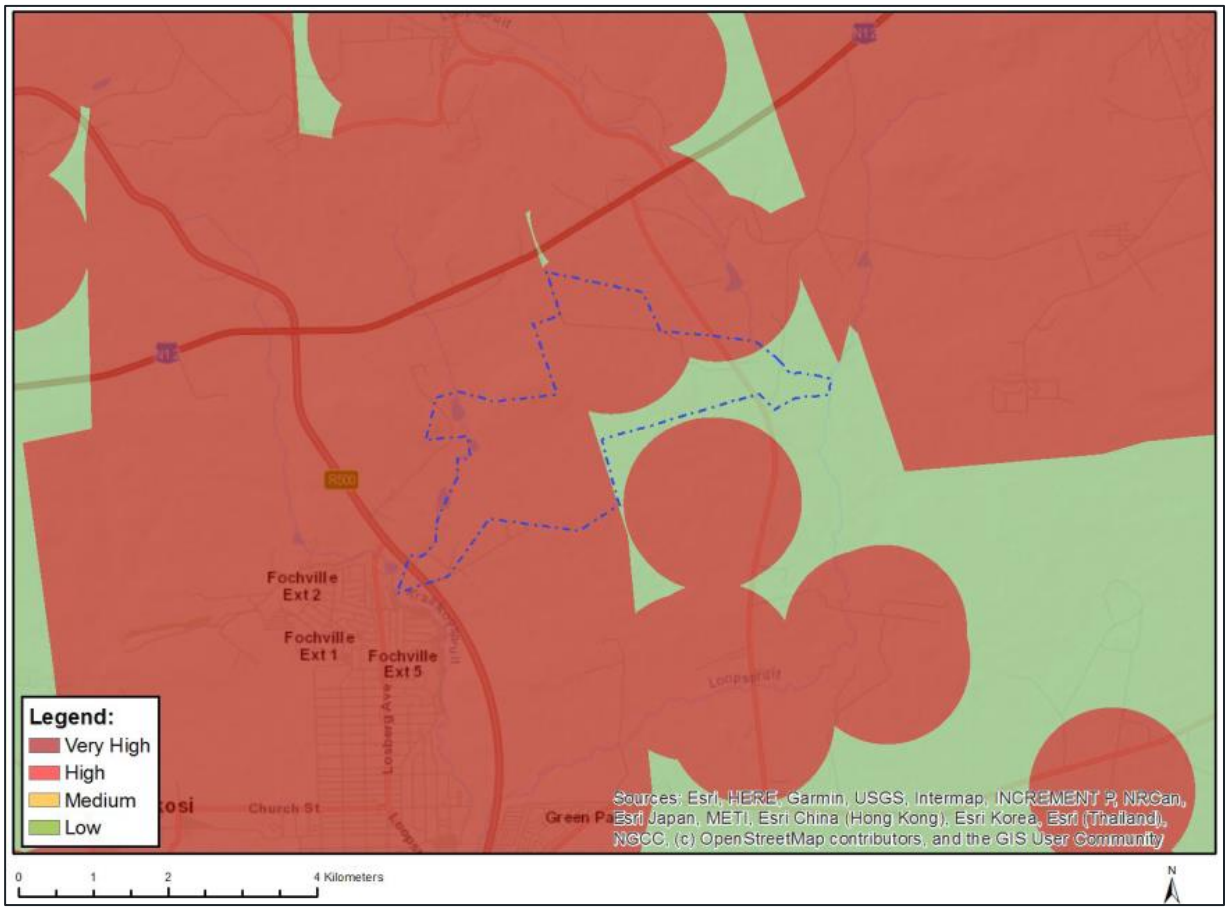


Figure 7-13 - Map of Flicker Sensitivity

Source: DFFE Screening Report

7.1.9 SOCIAL

No preliminary socio-economic sensitivities or sensitivity rating was identified or provided based on the DFFE Screening Tool (i.e., a preliminary sensitivity rating was not provided that could then be confirmed or altered based on further assessment).

It was determined by the specialist that the site would have a low to medium sensitivity rating based on the following:

- The planning documents relevant to the site do not identify significant or inherent constraints to appropriate development. Considered as a whole, the planning documents reviewed recognise the importance of integrated and diversified economic development that makes optimal use of the area's comparative advantages and creates economic opportunities. The concept of a renewable energy project is therefore broadly supported provided environmental impacts and impacts on other land uses and potentials are acceptable.
- Tourism facilities and attractions in the areas are very limited and sparsely distributed reducing tourism sensitivities. However, it should be recognised that the area is relatively isolated with wilderness quality and limited signs of civilisation which contributes to its tourism potential. It has a remote sense of place which makes it more sensitive to potential impacts on tourism and also on surrounding landowners and communities.

- Given its remote and relatively isolated location, the site would be relatively sensitive to the influx of people, including job seekers, that may be associated with the project. The influx of large numbers of people are not thought likely and these risks should be manageable and are common to most larger projects.
- The area is sensitive, in a positive sense, to increased economic opportunities as they are much needed as reflected in low employment and income levels. Projects that can provide such opportunities are therefore to be encouraged where possible.

7.1.10 NOISE

The online screening tool identified a number of areas that may have a “very high” sensitivity to noise (**Figure 7-14**); and the desktop assessment identified a number of potentially noise-sensitive receptors within the areas identified to have a “very high” sensitivity to noise by the online screening tool.

Due to the number of potential noise-sensitive locations in the area, it is recommended that the potential significance of the noise impact be assessed on the verified receptors in a noise specialist study.

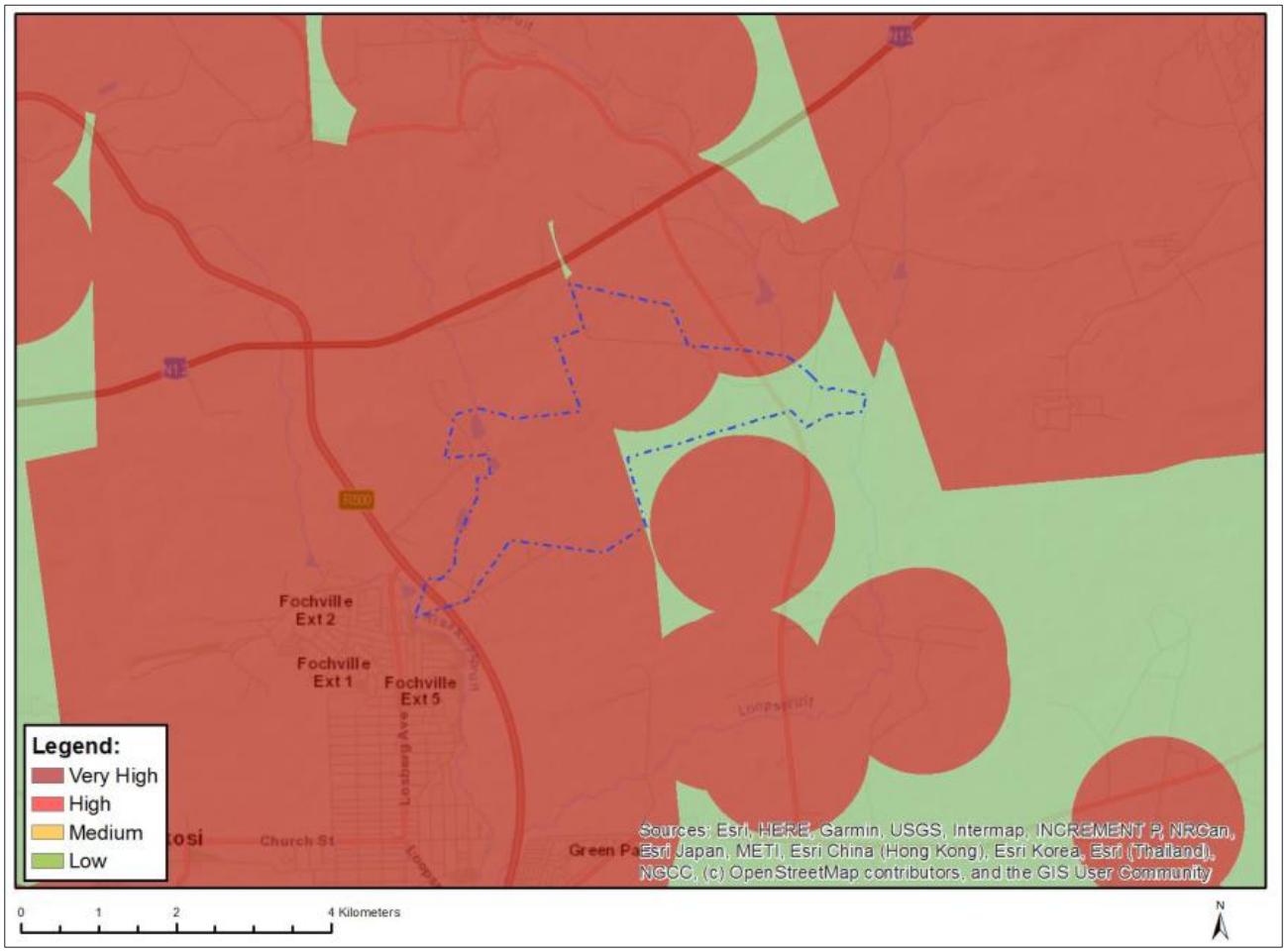
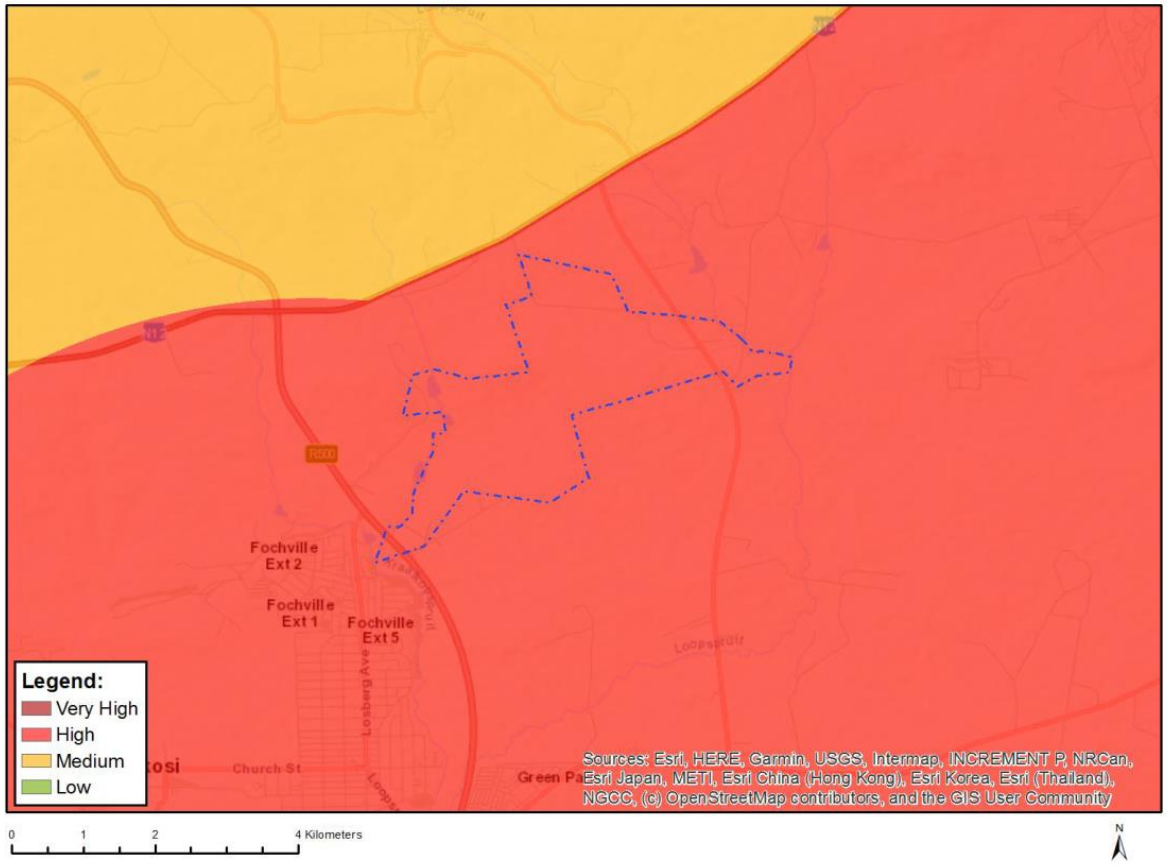


Figure 7-14 - Map of noise sensitivity

7.1.11 CIVIL AVIATION

Figure 7-15 illustrates the civil aviation theme sensitivity from the screening report generated on 27 March 2023.

MAP OF RELATIVE CIVIL AVIATION (WIND) THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Within 8 km of other civil aviation aerodrome
High	Dangerous and restricted airspace as demarcated
Medium	Between 8 and 15 km of other civil aviation aerodrome

Figure 7-15: DFFE Civil Aviation Theme

According to the DFFE Screening Tool Report, civil aviation is regarded as having high sensitivity. The proposed development site is located within 8 km of civil aviation aerodromes. The relevant Authorities have been included on the project stakeholder database. As of the 1st of May 2021, ATNS has been appointed as the new Obstacle application Service Provider for Wind farms and

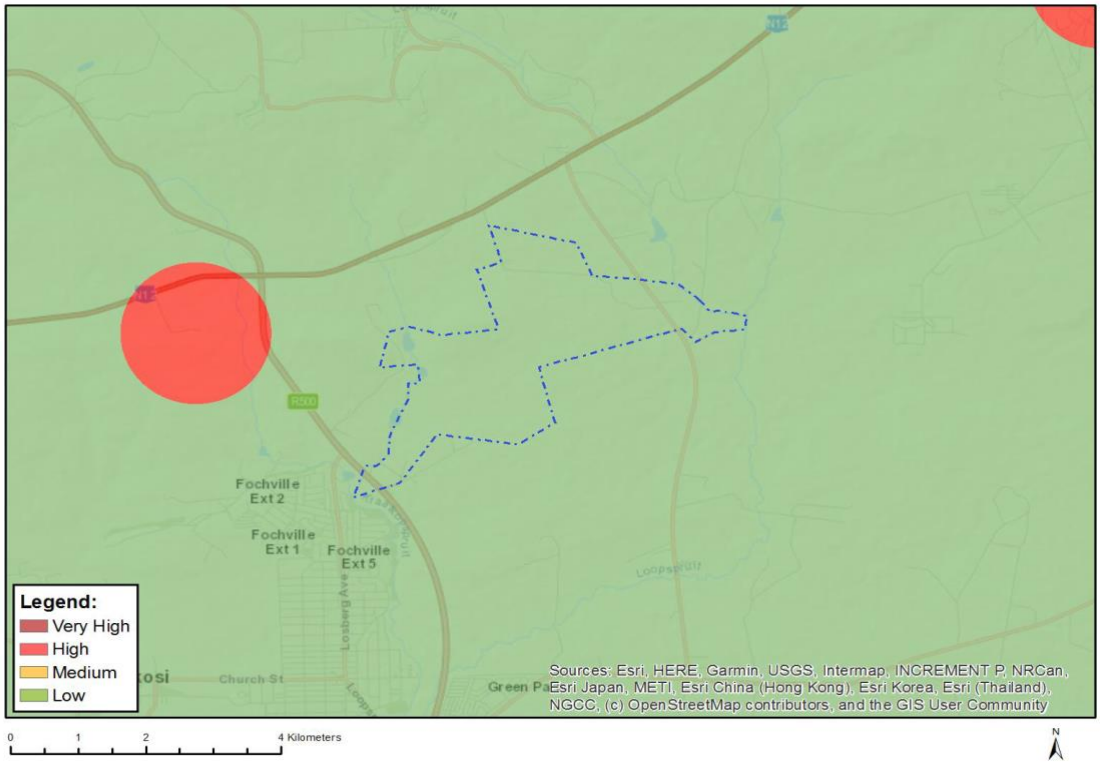
later Solar Plants. Their responsibility would pertain to the assessments, maintenance, and all other related matters in respect to Windfarms and in due time Power Plant assessments. Where required, an Application for the Approval of Obstacles will also be submitted to ATNS and the required permits will be obtained prior to the development of the project. The SACAA has been included on the project stakeholder database. They will be informed of the proposed Project, and comment will be sought. An Application for the Approval of Obstacles will also be submitted to SACAA by the Applicant.

As this theme has been identified as a high sensitivity, a compliance statement will be included in the EIA Phase.

7.1.12 RFI

Figure 7-16 illustrates the RFI theme sensitivity from the screening report generated on 27 March 2023.

MAP OF RELATIVE RFI (WIND) THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity for telecommunications;None;More than 60 km from a Weather Radar installation

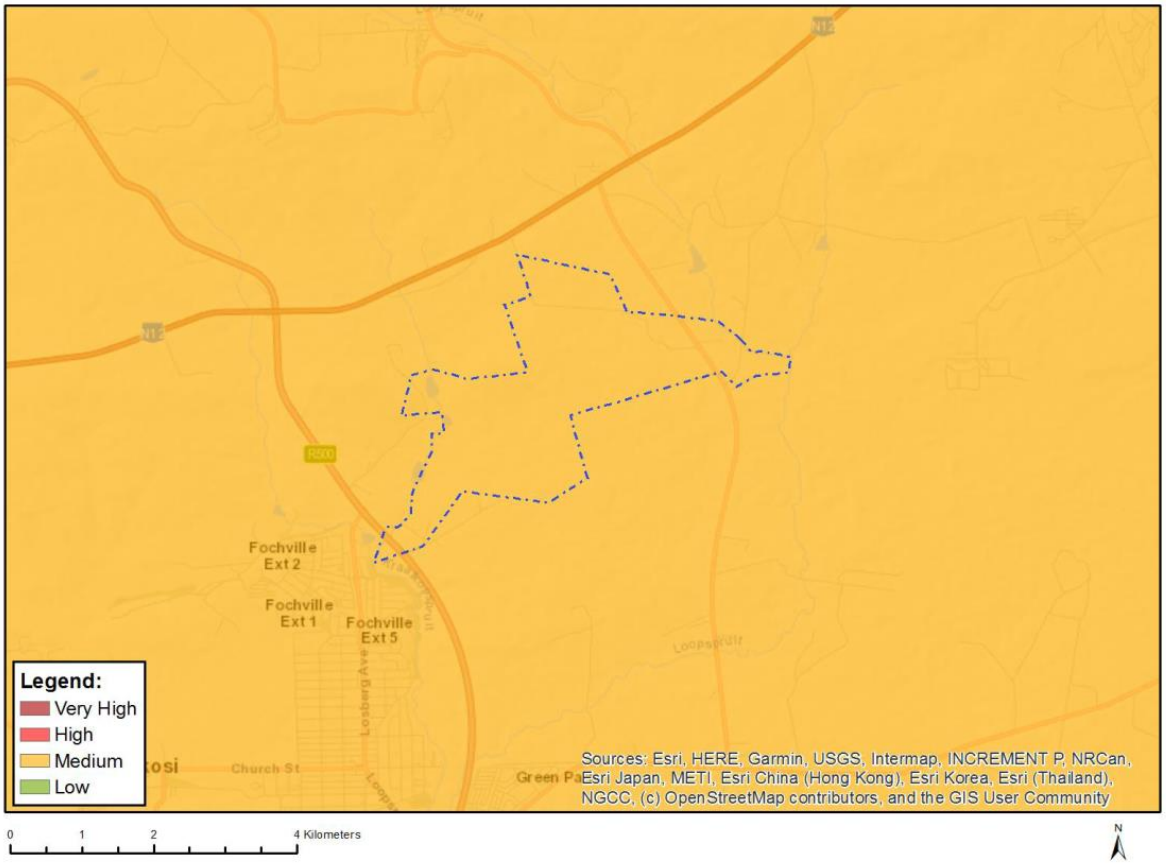
Figure 7-16: DFFE RFI Theme

The RFI theme is considered low sensitivity and therefore compliance statement is not required. However the relevant stakeholders have been included on the project stakeholder database i.e. SARAO, SKA and SAWS. In the event that any high sensitivity issues are raised by the stakeholders the required compliance statement will be included in the draft EIAr.

7.1.13 DEFENCE

Figure 7-17 illustrates the Defence theme sensitivity from the screening report generated on 27 March 2023.

MAP OF RELATIVE DEFENCE (WIND) THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Defence Site

Figure 7-17: DFFE Defence Theme

The Department of Defence has been included on the project stakeholder database. They will be informed of the proposed Project, and comment will be sought. As this theme has been identified as a Medium sensitivity, a compliance statement will be included in the EIA Phase.

7.2 SENSITIVITY MAPPING

A preliminary consolidated environmental sensitivity map (**Figure 7-18**) has been compiled based on the sensitivities and buffers outlined in the specialist studies.

The environmental sensitivities identified on site are included in **Table 7-5**. The footprint avoids the very high (no-go) areas.

Table 7-5 - Environmental Sensitivities identified by specialists

Discipline	Sensitivity Criteria	Relevant Infrastructure	Exceptions
Agriculture	High: ▪ Land capability value of 4- 67 - 10	No Turbines or buildings in these areas	-
Aquatic Ecology	▪ A loss/disturbance buffer zone of 100m should be maintained around wetlands	No Turbines or buildings in these areas. Linear infrastructure such as powerlines, roads and cables are allowed to traverse these areas subject to relevant approvals.	-
Heritage	No-go: ▪ Grade IIIA features (high cultural significance)	No infrastructure in these areas.	-
	▪ IIIB (high cultural significance)		-
	▪ GPA sites (medium cultural significance		-
Avifauna	▪ Wind turbine exclusion zone = 50m buffer around drainage lines, wetlands, dams	No Turbines in these areas.	-
Bats	▪ High Sensitivities and 200m buffer	No Turbines or blade overhang in these areas Buildings and Linear infrastructure such as powerlines, roads and cables are allowed in these areas	-
	▪ Moderate Sensitivities and 150m buffer	Turbines within these areas may require priority during post-construction	-

Discipline	Sensitivity Criteria	Relevant Infrastructure	Exceptions
		studies, and in some instances, there is a higher likelihood that mitigation measures may need to be applied to them Buildings and Linear infrastructure such as powerlines, roads and cables are allowed in these areas	
Terrestrial Ecology	▪ Drainage lines = 32m buffer zone	No Turbines or buildings in these areas. Linear infrastructure such as powerlines, roads and cables are allowed to traverse these areas subject to relevant approvals.	-
Visual	▪ flicker theme demarcates areas = 1 km buffers around occupied residences	No Turbines in these areas.	The ridges are not considered to be “no go areas”, but rather should be viewed as zones where turbine placement would be least preferred.
Noise	▪ 500m buffer from receptors	No Turbines in these areas.	

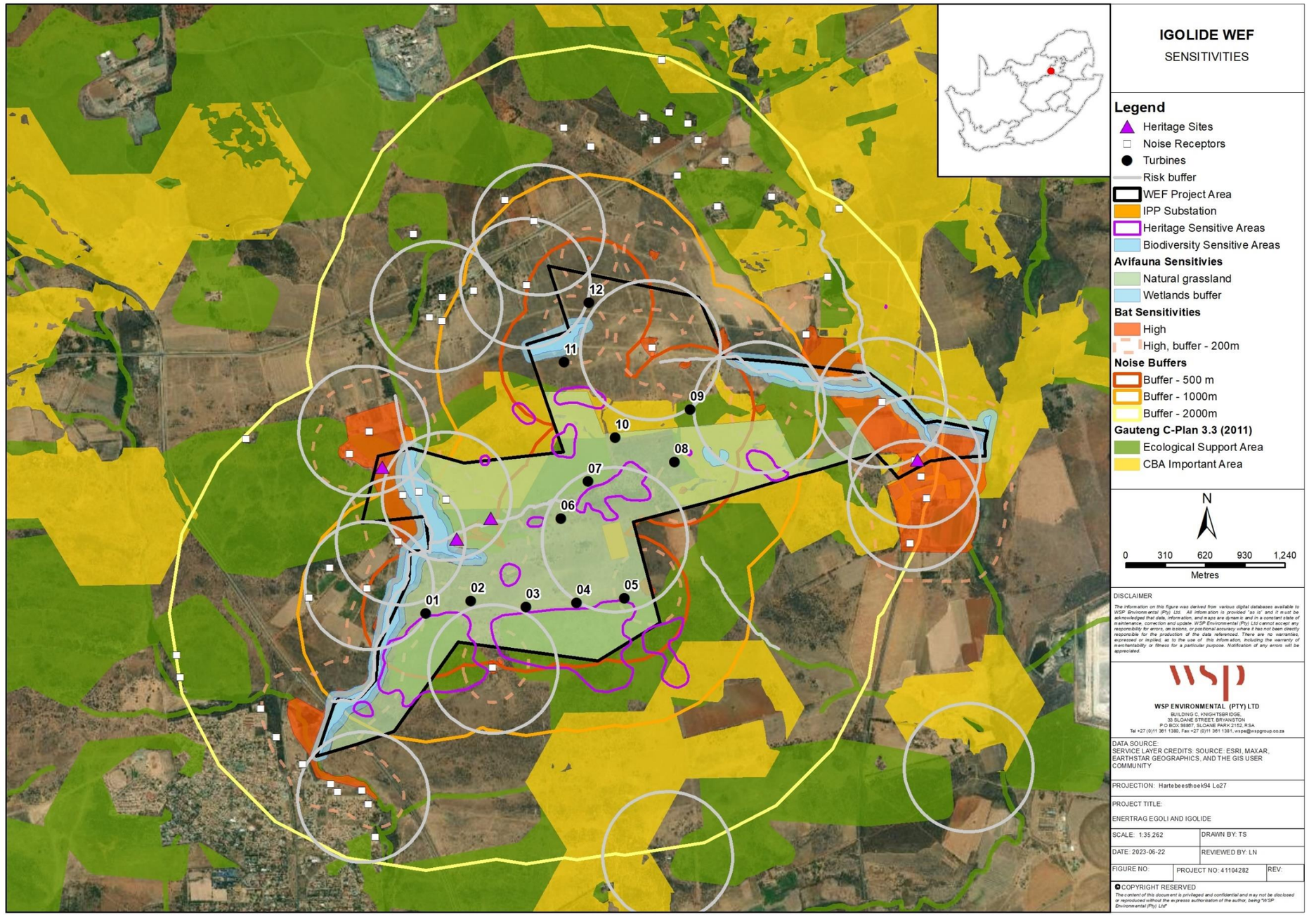


Figure 7-18 - Environmental Feature Sensitivity Map for the Igolide WEF development

8 POTENTIAL IMPACTS

8.1 IDENTIFICATION OF POTENTIAL IMPACTS

The scoping phase of a S&EIR process is aimed to identify potential impacts that are most likely to be significant and which need to be assessed as part of the S&EIR process. The determination of anticipated impacts associated with the proposed development is a key component to the S&EIR process. This Chapter identifies the anticipated environmental and social impacts associated with the proposed project.

The issues identified stem from those aspects presented in **Section 6** and the description of project components and phases as outlined in **Section 3**. Each significant issue identified is to be investigated further during the S&EIR process. Non-significant issues will be scoped out of the study with reasonable consideration given within the Scoping Report.

The potential environmental and social impacts of the Igolide WEF development have been identified at a high level and are discussed in **Table 8-1**. These impacts and mitigation measures will be further assessed during the EIA Process. The Impact Assessment Rating for these impacts are included in **Section 8.2**.

Table 8-1 – Potential impacts

Aspect	Impact	C	O	D	Mitigation Measures
Agriculture Potential	**Occupation of land:** Agricultural land directly occupied by the development infrastructure will become restricted for agricultural use, with consequent potential loss of agricultural productivity for the duration of the project lifetime.	✓	✓		▪ A system of storm water management, which will prevent erosion on and downstream of the site, will be an inherent part of the engineering on site. 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. ▪ Any excavations done during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 30 cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. When the excavation is back-filled, the topsoil must be back-filled last, so that it remains at the surface. Topsoil should only be stripped in areas that are excavated. Across the majority of the site, including construction lay down areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface.-
	Soil erosion and degradation: Erosion can occur as a result of the alteration of the land surface run-off characteristics, predominantly through the establishment of hard surface areas including roads. Loss of topsoil can result from poor topsoil management during construction related excavations.	✓	✓	✓	
	Increased financial security for farming operations: Reliable and predictable income will be generated by the farming enterprises through the lease of the land to the energy facilities. This is likely to increase their cash flow and financial security and could improve farming operations and productivity through increased investment into farming.	✓	✓		
Avifauna	Displacement due to disturbance associated with the construction of the wind turbines and associated infrastructure	✓			▪ No turbines should be constructed in the turbine exclusion buffer zones as indicated in the sensitivity map. ▪ Restrict construction to the immediate infrastructural footprint. Access to remaining areas should be strictly controlled to minimise disturbance of priority species. This recommendation especially applies within the very high and high sensitivity areas depicted in the sensitivity map.

Aspect	Impact	C	O	D	Mitigation Measures
					▪ Minimise removal of natural vegetation and rehabilitate natural vegetation post-construction where possible. ▪ Prioritise upgrading existing roads (where the requisite roads authority permission has been issued) over constructing new roads. ▪ Apply noise and dust control measures according to best practice in the industry. ▪ Strictly implement the recommendations of ecological specialists to reduce the level of habitat loss.
	Habitat transformation resulting from the wind turbines and associated infrastructure: Total/partial displacement of priority species from breeding/feeding/roosting areas		✓		▪ No turbines should be constructed in the turbine exclusion buffer zones as indicated in the sensitivity map. ▪ Restrict construction to the immediate infrastructural footprint where possible. Access to remaining areas should be strictly controlled to minimise disturbance of priority species. This recommendation especially applies within the very high and high sensitivity areas depicted in the sensitivity map. ▪ Once operational, vehicle and pedestrian access to the site should be controlled and restricted to the facility footprint as much as possible to prevent unnecessary destruction of vegetation. ▪ Formal live-bird monitoring should commence following initial turbine operation, as per the Best Practice Guidelines to determine the extent to which priority species displacement has occurred. Operational monitoring should be undertaken for the first two (preferably three) years of operation, and then repeated every five years thereafter for the operational lifetime of the facility.
	Bird mortality and injury resulting from collisions with the wind turbines:		✓		▪ No turbines should be constructed in the turbine exclusion buffer zones as indicated in the sensitivity map.

Aspect	Impact	C	O	D	Mitigation Measures
	Population reduction of priority species.				▪ Formal live-bird monitoring and carcass searches (daily) should be conducted in the operational phase, as per the Best Practice Guidelines at the time to assess collision rates. ▪ If estimated annual collision rates indicate unacceptable mortality levels of priority species exceeding mortality thresholds as determined by the avifaunal specialist in consultation with other experts (e.g., BLSA), additional measures must be implemented, such as shut down on demand or other proven measures (if available at the time).
	Electrocution of priority species on the onsite sub-stations and internal 33kV network: Population reduction of priority species.		✓		▪ Use underground cabling as much as is practically possible. ▪ Where the use of overhead lines is unavoidable, raptor-friendly pole design should be used, with appropriate mitigation measures for complicated pole structures (e.g., insulation of live components to prevent electrocutions on terminal structures and pole transformer), as recommended by the Avifaunal Specialist. ▪ Apply insulation reactively in the substation if significant electrocutions of SCC are recorded.
	Collisions of priority species with the internal 33kV network: Population reduction of priority species.		✓		▪ Use underground cabling as much as is practically possible. ▪ All above-ground internal medium voltage lines must be marked with Eskom approved Bird Flight Diverters according to the applicable Eskom standard.
	Noise pollution and environmental disruption during the decommissioning phase:			✓	▪ Restrict dismantling to the immediate infrastructural footprint where possible. Access to remaining areas

Aspect	Impact	C	O	D	Mitigation Measures
	Total/partial displacement of priority species from breeding/feeding/roosting areas.				should be strictly controlled to minimise disturbance of priority species. This recommendation especially applies within the very high and high sensitivity areas depicted in the sensitivity map. ▪ Apply noise and dust control measures according to best practice in the industry. ▪ Prioritise use of existing access roads during the decommissioning phase and avoid construction of new roads where feasible. ▪ The recommendations of the ecological and botanical specialist studies must be strictly implemented, especially as far as limitation of the activity footprint is concerned.
Bats	Loss of foraging habitat by clearing of vegetation.	✓			▪ Adhere to the sensitivity map criteria. Rehabilitate cleared vegetation where possible at areas such as laydown yards.
	Roost destruction during earthworks.	✓		✓	▪ Adhere to the sensitivity map criteria, choose location alternatives that don't intrude into high bat sensitivities.
	Bat mortalities by blade impact or barotrauma (resident bats)		✓		▪ Avoid no-go areas by adhering to the sensitivity map. The blade overhangs of Turbines 1, 2, 5, 8, 9, 11 and 12 are intruding into high bat sensitivity buffers. These turbines must be relocated to have their blade overhang outside of the bat high sensitivity buffers prior to the Final Site Layout Plan being approved. Where needed, and if indicated during EIA phase, reduce blade movement at selected turbines and high-risk bat activity times/weather conditions. Acoustic deterrents are developed well enough to be trialled and may be recommended during operational monitoring. Refer to Section 6.

Aspect	Impact	C	O	D	Mitigation Measures
	Bat mortalities by blade impact or barotrauma (migrating bats)		✓		▪ Avoid no-go areas by adhering to the sensitivity map. The blade overhangs of Turbines 1, 2, 5, 8, 9, 11 and 12 are intruding into high bat sensitivity buffers. These turbines must be relocated to have their blade overhang outside of the bat high sensitivity buffers prior to the Final Site Layout Plan being approved. Where needed, and if indicated during EIA phase, reduce blade movement at selected turbines and high-risk bat activity times/weather conditions. Acoustic deterrents are developed well enough to be trialled and may be recommended during operational monitoring. Refer to Section 6. If the WEF is in a migration path, appropriate measures should be be applied to ensure that the WEF bat mortalities are below a sustainable threshold.
	Increased bat mortalities due to light attraction and habitat creation.		✓		▪ Only use lights 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 all infrastructure buildings. For buildings, avoid tin roofs and roof structures that offer entrance holes into the roof cavity. The storm water drainage plan must avoid creations of artificial ponds/open water sources or wetlands near turbines (closer than 300m from any turbine base), of the proposed Igolide WEF. As such artificial water sources will increase insect activity and therefore bat activity in the area.
Terrestrial Biodiversity	**Loss of natural vegetation.** Natural vegetation will be cleared for new access roads, upgrading of existing tracks, laydown and construction sites, compound areas, substation, turbines and crane pads. The removal of indigenous vegetation may cause a	✓			▪ A walkthrough would be needed prior to construction to microsite infrastructure to ensure that sensitive species and/or habitats are avoided.

Aspect	Impact	C	O	D	Mitigation Measures
	loss of individuals of threatened, protected and/or endemic species and will also be accompanied by a loss of faunal habitat. However, no threatened or endemic species were found on site and only one provincially protected species with a Least Concern status was recorded. None of the SCC listed by the Screening Tool, were recorded on site. Vegetation loss is generally also associated with increased water run-off and erosion (see indirect impacts). Since the turbine footprint is relatively small and spread across the site, the loss of prime habitat within the Gauteng Shale Mountain Bushveld and the Rand Highveld Grassland vegetation types will be small. Service roads generally have a larger impact on vegetation clearance than the turbines, however since the roads will have a gravel surface animal movement should still be possible. Beyond the permanent infrastructure footprint, environmental functions and processes should however, not be altered. The on-site is not located in prime Rand Highveld Grassland habitat, but appears to have been degraded and is therefore classified as Other Natural Areas (ONAs) according to the CBA map of Gauteng				▪ Construction crew, in particular the drivers, should undergo environmental training (induction) to increase their awareness of environmental concerns. This includes awareness as to remaining within demarcated construction areas, no littering, handling of pollution and chemical spills, avoiding fire hazards and minimising wildlife interactions. ▪ Ensure that all temporary use areas e.g., laydown areas and construction camp, are located in areas of low sensitivity. ▪ Footprints of the turbines, crane pads, roads, construction and substation locations should be clearly demarcated. Vegetation clearance should be confined to the footprint of the development and unnecessary clearance should be avoided. ▪ The watercourses, rocky outcrops and rocky sheets should be avoided. ▪ All vehicles are to remain on demarcated roads and no driving through the veld should be allowed. ▪ No collection of ‘fuelwood’ should be allowed on site. ▪ The ECO is to provide supervision on vegetation clearing activities and other activities which may cause damage to the environment, especially when construction commences and most vegetation clearing is taking place. ▪ River/stream crossings should be placed in areas without extensive wetlands and preferably in rocky areas where the risk of disruption and erosion is low. All river/stream crossings should be inspected by the aquatic specialist during final design of the layoutto ensure that optimal and acceptable locations have been chosen for river crossings. River/stream crossings should be specifically designed not to impede or disrupt the direction and flow

Aspect	Impact	C	O	D	Mitigation Measures
					of the water. Specific guidelines of the aquatic specialist should be followed. ▪ No plants may be translocated or otherwise uprooted or disturbed without express permission from the ECO.
	The potential loss of threatened, protected and endemic plant species. The loss of the vegetation for new access roads, upgrading of existing tracks, construction site, substation, turbines and crane pads may cause a loss of individuals of threatened, protected or endemic plant species. The site visit did however, not reveal the presence of any species with an IUCN threatened status. Only one provincially protected plant species was present on site, i.e. Gladiolus permeabilis. As the protected plant species at the site is not threatened, the loss of a small number of individuals (if any) is not likely to threaten the local or regional population of this species. The loss of some individuals of protected species is unlikely to alter the patterns or processes of the natural system, in the sense that environmental functions and processes will temporarily or permanently cease. Gladiolus permeabilis is found in Habitats 2 & 3 which were avoided by the development. Nevertheless, permits need to be obtained for the destruction or removal of provincially specially protected or protected species	✓			▪ A walkthrough would be needed prior to construction to microsite infrastructure to ensure that sensitive species and/or habitats are avoided ▪ Placement of infrastructure should be done in such a way as to minimise the impact on protected species. ▪ Construction crew, in particular the drivers, should undergo environmental training (induction) to make them aware of the importance of protected species. ▪ Permits are required for removal of protected species prior to construction, should avoidance not be possible.
	Loss of faunal habitat. The loss of the vegetation due to new access roads, upgrading of existing tracks, construction site, substation, turbines and crane pads will be accompanied by a loss of faunal habitat.	✓			▪ Vegetation clearance should be confined to the smallest possible footprint of the development and unnecessary clearance should be avoided.

Aspect	Impact	C	O	D	Mitigation Measures
	The rare species reported for the Igolide site is the mountain reedbuck Redunca fulvorufula and its presence and its status of “Endangered” should be taken into account when developing the Igolide site. The Screening Report refers to the Maquassie musk shrew Crocidura maquassiensis and the spotted-necked otter Hydrictus maculicollis as species of concern. Crocidura maquassiensis depends on wetlands as suitable habitat, whereas Hydrictus maculicollis is restricted to areas of permanent fresh water, offering good shoreline cover and an abundant prey base. Crocidura maquassiensis has not been reported from Gauteng or North West Province post-1999 and thus there is a very low probability for it to occur on site. Marginally suitable habitat for the spotted-necked otter is available on site. However, even if the species did occur on site it is unlikely that they would be affected by the development since their habitats will be avoided by the development. The two Lepidopteran species are unlikely to occur on site because their host plant was not recorded on site. The insect Clonia uvarovi inhabits tall savanna woodland, while the habitat on site could be decribed as bushveld which may be marginally suitable for the species. Furthermore, the turbines are not located in any bushveld habitats				▪ Construction crew, in particular the drivers, should undergo environmental training (induction) to increase their awareness of environmental concerns. ▪ Speed limits should be set on all roads and strictly adhered to. ▪ Development should avoid drainage lines and rocky outcrops. The outcrops may be favoured habitat for reptiles and other species (e.g., hyrax or dassie) since they offer protection from predators. ▪ Proper waste management procedures should be in place to avoid waste lying around and to remove all waste material from the sites. ▪ Observe buffer zones along drainage lines.
	Direct faunal mortalities due to construction and increased traffic. Faunal mortalities may be caused by construction at the footprint of the infrastructure, construction vehicles or other operational activities and by electrical fences, should they be erected around the construction site and	✓		✓	▪ Construction crew, in particular the drivers, should undergo environmental training to increase their awareness of environmental concerns in order to reduce the number of road kills. The crew should also be made aware of not harming or collecting species such as snakes, tortoises and owls which are often persecuted.

Aspect	Impact	C	O	D	Mitigation Measures
	substation. In particular slow-moving species such as tortoises, might be prone to these mortalities. When animals ingest waste material or become ensnared in wires, fatalities might occur. Larger more mobile fauna such as antelope and larger predators will most likely move away from areas of high activity during the construction phase. Smaller and less-mobile animals are not as capable of moving away and may seek shelter down burrows and other shelter sites. None of the SCC listed in the Screening Tool were encountered on site and generally these species occur at a low density and thus it is unlikely that they would be directly encountered by people at the Igolide WEF				▪ Proper waste management procedures should be in place to avoid litter, food, or other foreign material from lying around and to all waste material should be removed from the site. ▪ No activity, including night driving, should be allowed at the site. ▪ Speed limits should be set on all roads on site. ▪ Personnel should not be allowed to roam into the veld. ▪ Ensure that cabling and electrical infrastructure at the site are buried sufficiently deeply to avoid being excavated by fauna and that where such infrastructure emerges above-ground that it is sufficiently protected from gnawing animals. ▪ Any dangerous fauna (e.g., snakes, scorpions) that are encountered during construction should not be handled or molested by construction staff and the ECO or other suitably qualified persons should be contacted to remove the animals to safety. ▪ Holes and trenches should not be left open for extended periods of time and should only be dug when needed for immediate construction. Trenches that may stand open for some days, should have an escape ramp to allow any fauna that fall in to escape. ▪ Should electrical fences be erected it must be done according to the norms and standards of the Nature Conservation Authorities in Gauteng. ▪ Access to the site should be strictly regulated to reduce the opportunities for poaching.
	Increased dust deposition. Increased dust deposition may harm physiological processes of plants and a reduction in the photosynthetic capacity of the plants may occur. The dust layer on the	✓		✓	▪ Excessive dust can be reduced by spraying water onto the soil.

Aspect	Impact	C	O	D	Mitigation Measures
	vegetation may also discourage herbivores from grazing or browsing. The increased dust levels will be temporary.				
	Increased human activity, noise and light levels. Construction activities will increase human presence, noise and light levels at the site. These activities may affect animal behaviour. Increased noise and light levels associated with the construction phase are temporary	✓			▪ The SANS standards should be adhered to in terms of noise levels. ▪ No construction should be done at night. ▪ If there is any part of the site that needs to be lit at night for security reasons, then appropriate lighting should be installed to minimise negative effects on nocturnal animals.
	Construction of Roads Roads are referred to under several impacts, but a summary is provided in this section. Even in natural regions roads are intrusive and destructive and cause a disturbance. Their construction destroys the vegetation, leads to compaction of the soil and loss of habitat for small animals. Roads create barriers for small animals, cutting off dispersal routes and fragmenting habitats. Animals crossing or moving along roads can become easy targets for predators. Compacted roads also impact on the movement of subterranean and burrowing animals. Dust kicked up by vehicles coat the roadside plants making them less attractive to animals. Poorly planned roads often result in water erosion problems and busy roads affect the movement of especially shy animals. Some destruction of the vegetation adjacent to the footprint will also inevitably occur when preparing the sites. Unnecessary clearing of vegetation beyond the footprint of the development can however, largely be avoided	✓			▪ Wherever possible, existing roads should be used. ▪ The construction of a road should be done in the most environmentally sensitive manner possible. ▪ A suitably qualified person should plan, design and supervise the proper construction of roads to minimize the impact on the environment. ▪ Roads should be provided with run-off structures to reduce the risk of erosion. ▪ Proper road maintenance procedures should be in place. ▪ A long-term commitment to the maintenance of the road should be accepted. Roads can easily become ruts and erosion gullies if not properly planned and maintained. ▪ Driving in wet clayey soils after rain also result in deep tracks that damage the road surface and lead to other users bypassing such areas, thereby forming new tracks alongside the original ones. ▪ River/stream crossings should not be placed in areas with extensive wetlands and preferably in areas where the risk of disruption and erosion is low. All river/stream crossings should be inspected by the aquatic specialist

Aspect	Impact	C	O	D	Mitigation Measures
					to ensure that optimal and acceptable locations have been chosen for river crossings. ▪ River/stream crossings should be specifically designed not to impede or disrupt the direction and flow of the water. Specific guidelines of the aquatic specialist should be followed.
	Establishment of alien vegetation. As a result of the clearance of indigenous vegetation and resulting degradation, alien species might invade the area. Twenty declared invasive species were noted on site and increased vehicle traffic may further facilitate the introduction of seeds of alien species. Infestation by invasive alien species may cause changes to the structure and functioning of the ecosystem which often exacerbate the further loss of indigenous vegetation. Bare areas that are not actively rehabilitated and areas receiving runoff are particularly vulnerable to alien infestation	✓	✓	✓	▪ Implement a monitoring program for the early detection of alien invasive plant species. ▪ A control program should be employed to combat declared alien invasive plant species in the most environmentally friendly manner that does not result in undesirable secondary impacts. ▪ Herbicides for the control of alien species should be applied according to the relevant instructions and by appropriately trained personnel. ▪ No alien species should be used in rehabilitation or landscaping. ▪ Use only plants and seed collected on-site for revegetation. ▪ Cleared areas may need to be fenced-off during rehabilitation to exclude livestock and wildlife. ▪ Material brought onto site e.g., building sand should be regularly checked for the germination of alien species.
	Increased water run-off and erosion. Increased erosion (water and wind) and water run-off will be caused by the clearing of the indigenous vegetation and compaction of soil. The roads traversing hill slopes will be the main source of erosion if not properly constructed and provided with water run-off structures. In	✓	✓	✓	▪ Clearing of vegetation, compaction and levelling should be restricted to the footprint of the proposed development. ▪ All roads should have water diversion structures with energy dissipation features to slow and disperse the water into the receiving area.

Aspect	Impact	C	O	D	Mitigation Measures
	addition, the hardened surfaces created by the roads, crane pads and other infrastructure elements will increase runoff, which will pose an erosion risk in the areas receiving the water, even if these areas have not been disturbed. Increased run-off and erosion could affect hydrological processes in the area and change water and silt discharge into the streams. The site lies within the summer rainfall region and can experience intense thundershowers, which will increase the potential for erosion. On slopes, active rehabilitation and mitigation measures to prevent erosion will be required				▪ A rehabilitation and revegetation plan should be developed as part of the EMP. ▪ Regular monitoring of the site during construction for erosion problems. ▪ Silt traps should be used where there is a danger of topsoil eroding and entering streams and other sensitive areas. ▪ If applicable, topsoil should be removed and stockpiled, then reapplied as soon as possible in order to facilitate regeneration of the natural vegetation on cleared areas. ▪ Where applicable, construct stabilisation structures on slopes to prevent erosion. ▪ Reduce activity on site after large rainfall events when the soils are wet. No driving off hardened roads until soils have dried out and the risk of bogging down has decreased. ▪ A suitably qualified person should plan, design and supervise the proper construction of roads to minimise the impact on the environment.
	Changes in animal behaviour. The increased human presence and/or construction operations will increase noise levels as well as light levels at night. The increased human presence, elevated noise and light levels, loss of animal habitat and compaction of soils may alter the behavioural patterns of some animals. Some of these changes may favour certain species and negatively affect others and consequently change the composition of the animal communities. Species with small territories will be negatively affected as well as species that live in the soil.	✓			▪ Construction crew should undergo environmental training, by way of an induction course, to increase their awareness of environmental concerns. ▪ Development should avoid rocky outcrops and wetlands. ▪ Soil compaction should be kept to a minimum by restricting driving to designated roads. ▪ If there is any part of the site that needs to be lit at night for security reasons, then appropriate lighting should be installed to minimise negative effects on nocturnal animals. ▪ No activity should be allowed at the site between sunset and sunrise.

Aspect	Impact	C	O	D	Mitigation Measures
	Research elsewhere showed that the response of animals to wind energy facilities was highly species-specific and could range from avoidance to a positive reaction. The response was apparently also depended on the level of predation, with no impact noted where predation pressure was low. Wind farms affect large terrestrial mammals mainly through an increase in human activity within the wind farm area. During the construction phase, the mobile large-mammal carnivores and ungulates may temporarily avoid the site, but when construction ceases and human presence decreases, these animals generally acclimate to the wind energy infrastructure. The impact on burrowing fauna may be higher, since these animals are usually sensitive to soil tremors and disturbances, and consequently they will likely move away from construction areas. It is anticipated that the impact of the Igolide site on the fauna would mostly be temporary, i.e. during the construction phase				▪ The mitigation measures as indicated by the noise specialist must be adhered to.
	Direct faunal mortalities. Faunal mortalities may be caused by maintenance vehicles or other maintenance activities, electric fences and ingestion of waste material. In particular slow-moving species such as tortoises, might be prone to road mortalities. Fatalities might also arise when animals become ensnared in wires or in electric fences. Bird collisions with the wind turbine blades will be addressed by the avifaunal and bat specialists. Although activity at the site is likely to be relatively low during operation, some impact on fauna may still occur as a result of personnel present on site as well as the operation of maintenance vehicles. Direct interactions		✓		▪ Maintenance crew should undergo environmental training, by way of an induction course, to increase their awareness of environmental concerns. ▪ Access to the site should be strictly controlled. ▪ All excess wires, cables and waste material should be removed from the site. ▪ All vehicles at the site should adhere to a low-speed limit and slow-moving fauna such as tortoises on roads should be moved off the road. ▪ Electrical fences should be erected according to the norms and standards of the Nature Conservation Authorities in Gauteng.

Aspect	Impact	C	O	D	Mitigation Measures
	between the turbines and terrestrial fauna (excluding avifauna and bats) are likely to be low. Major risk factors during operation are likely to be from vehicle collisions with fauna				
	Increased light and noise levels and changes in animal behaviour. The loss of vegetation cover, compacting of soils, increased noise levels and the increased human presence will alter animal behavioural patterns by making certain areas unavailable and making roads difficult to traverse, Some animal species will be more affected than others. These species might undergo a reduction in their population size. According to Todd & Skowno (2014), small mammals, reptiles and amphibians are not likely to move away from the turbines on account of the noise as these animals do not rely on sound to forage and rely largely on plant cover and other avoidance measures to avoid predators. Although frogs communicate with their calls, the pitch of the noise generated by the turbines is not likely to be similar to that of the frogs and a significant impact is unlikely. Fauna which rely heavily on hearing for foraging or predator avoidance are potentially worst affected by the noise. This would include species such as bat-eared foxes that rely extensively on hearing for prey detection and species such as hares which rely on hearing for predator avoidance. However, it is difficult to predict the impact on these species without entering into a high degree of speculation as there has been little research on this topic and hence there is no baseline in terms of known impacts due to turbine noise on fauna, especially within the South African context. However, noise due to		✓		▪ The mitigation measures as indicated by the noise specialist must be adhered to. ▪ Construction crew should undergo environmental training, by way of an induction course, to increase their awareness of environmental concerns. ▪ Soil compaction should be kept to a minimum by restricting driving to designated roads. ▪ If there is any part of the site that needs to be lit at night for security reasons, then appropriate lighting should be installed to minimise negative effects on nocturnal animals. ▪ No activity should be allowed at the site between sunset and sunrise.

Aspect	Impact	C	O	D	Mitigation Measures
	turbines at the site will be variable and related to wind direction and operating conditions among other factors. As most fauna are adaptable with regards to noise, it is likely that any affected fauna would adapt to the local conditions and it is not likely that there would be any ecosystem-level or trophic impacts due to turbine noise. According to Todd & Skowno (2014) the possibility that predators such as jackal and caracal would prey more heavily on livestock or wildlife as a result of turbine noise, is not a likely scenario				
Heritage	**Impacts to archaeological resources** Direct impacts to palaeontological resources would occur during the construction phase when equipment is brought onto site and grubbing, and excavation begin. The current layout shows no turbines within known archaeological sites. This means that it is likely that roads would also be able to avoid the sites, but there is still the possibility that further sites exist.	✓		✓	▪ Mitigation would entail micrositing infrastructure to avoid impacts and, if necessary, sampling and recording parts of sites that might be directly impacted. ▪ A rehabilitation plan in place to ensure that the site is returned to its current condition.
	Impacts to graves Direct impacts to graves would occur during the construction phase when equipment is brought onto site and grubbing, and excavation begin. No graves are currently known in the study area	✓		✓	▪ Ensure that any chance finds are reported.
	Impacts to the cultural landscape Note that the Iron Age landscape is also significant as a cultural landscape but is included under impacts to archaeology above. Direct impacts to the cultural landscape would occur during the construction phase when equipment is brought onto site and work begins.	✓	✓	✓	▪ Mitigation will entail avoiding visually sensitive hilltops, placing ancillary infrastructure in visually secluded locations, and ensuring that all areas not required during operation are rehabilitated. The construction phase should be kept as sort as possible. ▪ Ensure that all maintenance activities remain in designated and approved areas and making use of an

Aspect	Impact	C	O	D	Mitigation Measures
	Because the landscape already has industrial features related to gold mining and an existing transmission line crosses its eastern part, the consequence is low and, although an impact will occur, it is only rated medium negative before mitigation.				early-warning system to switch the red lights on only when required. This latter measure may be less significant in the context of a landscape in which large industrial facilities occur and guidance should be sought from the visual consultant. ▪ A rehabilitation plan in place to ensure that the site is returned to its current condition.
Palaeontology	**Impact on the palaeontological heritage:** 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 only some of the rocks are the correct age and type to contain trace fossils, namely stromatolites or microbialites in the Timeball Hill and Silverton Formations. There is an extremely small chance that fossils from beneath soils in the dolomites may be disturbed. Therefore, a Fossil Chance Find Protocol has been added to this report (Annexure 1). Taking account of the defined criteria, the potential impact to fossil heritage resources is very low.	✓			▪ The impact on the palaeontological heritage can be reduced greatly by a palaeontologist conducting a pre-construction walk-through of the site during final micro-siting/layout finalisation to look for fossils and remove any scientifically important fossils with the relevant SAHRA permit. ▪ Ensure that any chance finds are reported
Geotechnical	**Soil Erosion:** ▪ Increased stormwater velocity. ▪ Increase in soil and wind erosion due to clearing of vegetation. ▪ Creation of drainage paths along access tracks. ▪ Sedimentation of non-perennial features and excessive dust.	✓	✓		▪ Rehabilitation of affected areas (such as revegetation). ▪ Construction of temporary berms and drainage channels to divert surface water. ▪ Minimize earthworks and fills. ▪ Use existing road network and access tracks where possible. ▪ Apply correct engineering design and construction of gravel roads and water crossings. ▪ Control stormwater flow. ▪ Use temporary berms and drainage channels to divert surface water.

Aspect	Impact	C	O	D	Mitigation Measures
					▪ Minimize earthworks. ▪ Rehabilitation of affected areas (such as revegetation). ▪ Reinstate channelized drainage features. ▪ Strip, stockpile and re-spread topsoil.
	Oil spillages: Contamination of ground and surface water resources from heavy plant leading to quality deterioration of the water resources.	✓	✓		▪ Vehicle and construction machinery repairs to be undertaken in designated areas with proper soil protection. ▪ Frequent checks and conditional monitoring of vehicles and machinery.
	Disturbance of fauna and flora: The displacement of natural earth material and overlying vegetation leading to erosion.	✓			▪ Limit and control excavations.
	Slope stability: Slope instability around structures.	✓			▪ Avoid steep slope areas. ▪ Design cut slopes according to detailed geotechnical analysis.
	Seismic activity: Damage of proposed development.	✓	✓		▪ Design according to expected peak ground acceleration.
Visual (including Flicker)	Visual Impacts – Construction : ▪ Large construction vehicles, equipment and construction material stockpiles will alter the natural character of the study area and expose visual receptors to impacts associated with construction.	✓			▪ Carefully plan to mimimise the construction period and avoid construction delays. ▪ Where possible, restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.

Aspect	Impact	C	O	D	Mitigation Measures
	▪ Construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. ▪ Temporary stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact. ▪ Dust emissions and dust plumes from increased traffic on the gravel roads serving the construction site may evoke negative sentiments from surrounding viewers. ▪ Surface disturbance during construction would expose bare soil resulting in visual scarring of the landscape and increasing the level of visual contrast with the surrounding environment. ▪ Potential visual pollution resulting from littering on the construction site.				▪ Inform receptors within 1km of the WEF development area of the construction programme and schedules. ▪ Maintain a neat construction site by removing rubble, litter and waste materials regularly. ▪ Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. ▪ Position storage / stockpile areas in unobtrusive positions in the landscape, where possible. ▪ Make use of existing gravel access roads where possible. ▪ Limit the number of vehicles and trucks travelling to and from the construction site, where possible. ▪ Ensure that dust suppression techniques are implemented: • on all access roads; • in all areas where vegetation clearing has taken place; • on all soil stockpiles.
	Visual Impacts - Operation: ▪ The development may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. ▪ The proposed WEF and associated infrastructure will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts. ▪ Shadow flicker may impact nearby receptors. ▪ Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke negative sentiments from surrounding viewers.		✓		▪ Turbine colours should adhere to CAA requirements. Bright colours and logos on the turbines should be kept to a minimum. ▪ Inoperative turbines should be repaired promptly, as they 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 turbines of similar height and scale to lessen the visual impact. ▪ As far as possible, limit the number of maintenance vehicles which are allowed to access the site. ▪ Ensure that dust suppression techniques are implemented on all gravel access roads.

Aspect	Impact	C	O	D	Mitigation Measures
	▪ The nighttime visual environment will be altered as a result of operational and security lighting at the proposed WEF.				▪ As far as possible, limit the amount of security and operational lighting present on site (whilst adhering to relevant safety standards). ▪ Light fittings for security at night should reflect the light toward the ground and prevent light spill. ▪ Lighting fixtures should make use of minimum lumen or wattage whilst adhering to relevant safety standards. ▪ Mounting heights of lighting fixtures should be limited, or alternatively foot-light or bollard level lights should be used. ▪ If possible, make use of motion detectors on security lighting. ▪ Where possible, the operation and maintenance buildings should be consolidated to reduce visual clutter. ▪ Non-reflective surfaces should be used where possible.
	Visual Impacts – Decommissioning: ▪ Vehicles and equipment required for decommissioning will alter the natural character of the study area and expose visual receptors to visual impacts. ▪ Decommissioning activities may be perceived as an unwelcome visual intrusion. ▪ Dust emissions and dust plumes from increased traffic on the gravel roads serving the decommissioning site may evoke negative sentiments from surrounding viewers. ▪ Surface disturbance during construction would expose bare soil resulting in visual scarring of the landscape and increasing the level of visual contrast with the surrounding environment. ▪ Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind			✓	▪ All infrastructure that is not required for post-decommissioning use should be removed. ▪ Carefully plan to minimize the decommissioning period and avoid delays. ▪ Maintain a neat decommissioning site by removing rubble and waste materials regularly. ▪ Position storage / stockpile areas in unobtrusive positions in the landscape, where possible. ▪ Ensure that dust suppression procedures are maintained on all gravel access roads throughout the decommissioning phase. ▪ All cleared areas should be rehabilitated as soon as possible.

Aspect	Impact	C	O	D	Mitigation Measures
	blowing over these disturbed areas could result in dust which would have a visual impact. ▪ Decommissioned infrastructure left on the site may be visually intrusive				
Aquatic Biodiversity	**Direct loss of wetland habitat:** Site establishment and construction of the proposed project infrastructure, such as access roads, wind turbine foundations and temporary laydown infrastructure could lead to the permanent loss of wetland habitat within the Project footprint. Based on the current proposed layout of the wind turbine location, which is outside of wetland habitat, this impact is expected to have a medium probability of occurrence and a medium impact consequence, resulting in a Medium impact significance prior to the implementation of mitigation measures and can be reduced to a Low significance with the application of recommended mitigation measures. Should any wetland habitat be lost this impact cannot be mitigated and wetland offset will be required.	✓			▪ Identification of areas to be avoided (including buffers): • Areas of undisturbed, natural grassland and wetland habitat should be avoided to the extent possible. Areas of direct loss that cannot be avoided must be addressed via additional conservation actions/offsets as required. • A loss/disturbance buffer zone of at least 100 m should be maintained between the maximum extent of construction works and the outer boundary of wetlands and riparian zones. ▪ Minimisation: • To prevent loss of natural habitat in wetlands beyond the direct disturbance footprint, prior to any vegetation clearing, the development footprints should be clearly marked out with flagging tape/posts in the field. Vegetation clearing should be restricted to the proposed project footprints only, with no clearing permitted outside of these areas. • The extent of disturbance should be limited by restricting all construction activities to the servitude as far as practically possible. • Locate all laydown areas and temporary construction infrastructure at least 100 m from the edge of delineated wetlands. • Wetland/river crossings should be constructed utilizing designs that ensure that hydrological integrity of the affected wetlands is preserved, and natural flow
	Changes in wetland health/functioning: Bulk earthworks involved in site development in the immediate catchment of wetlands have the potential to cause indirect impacts on nearby wetland habitat through compaction/removal of recharge or interflow soils, as well as increased sediment deposition to downslope wetland ecosystems in stormwater runoff. If not carefully managed, the potential impact could be moderately severe, and the likelihood highly probable, resulting in an impact of medium significance. Mitigation measures to address the potentially reduced wetland functioning, such	✓			

Aspect	Impact	C	O	D	Mitigation Measures
	as distribution of flow around turbine foundations and road crossing to affected downslope wetland systems could reduce the consequence of the potential impacts and likelihood of occurrence of the potential impact.				regimes are maintained (i.e., no impoundment upstream of crossings, or flow concentration downstream of crossings. • Ideally construction activities within wetlands should take place in winter (during the dry season). Where summer construction is unavoidable, temporary diversions of the streams might be required. • Install erosion prevention measures prior to the onset of construction activities. Measures should include low berms on approach and departure slopes to crossings to prevent flow concentration, sediment barriers along the lower edge of bare soil areas, placement of hay bales around the within wetland construction areas, and re-vegetation of disturbed areas as soon as possible.
	Soil Erosion: The removal of wetland vegetation for the construction of the proposed development could result in an increase of bare soil/surfaces in the study area which could lead to increased runoff, ultimately resulting in soil erosion. The occurrence of soil erosion is considered moderately probable during construction and could have a moderate consequence on wetland soil, resulting in a medium impact significance without mitigation. With the implementation of mitigation measures it is anticipated that the probability and consequence of this impact can be reduced, ultimately resulting in a residual impact of Low significance.	✓	✓		
	Establishment and spread of alien invasive species	✓	✓		▪ Alien Invasive Species Management: • An alien and invasive species management plan should be developed for the Project, which includes details of strategies and procedures that must be implemented on site to control the spread of alien and invasive species. A combined approach using both chemical and mechanical control methods, with periodic follow-up treatments informed by regular monitoring, is recommended. ▪ Biodiversity Management Plan:

Aspect	Impact	C	O	D	Mitigation Measures
					• Specific provision for biodiversity conservation, including details of any required offsets, should be made in the project BMP/BAP, in alignment with the objectives of the Gauteng Biodiversity Sector Plan. ▪ Inclusion of a practical framework and schedule, details of key performance indicators, and recommended monitoring protocols for the delivery of existing and currently recommended mitigation measures in the BMP is recommended.
Social	**Creation of local employment, training, and business opportunities:** ▪ Direct impacts: • Creation of temporary employment opportunities • Creation of business and procurement opportunities ▪ Indirect impacts: • Support for local economy. • Creation of training and skills development opportunities.	✓	✓		Mitigation and enhancement measures to be identified during EIA Phase
	Presence of construction workers in the area on local communities: ▪ Direct impacts: • Disruption of existing family structures and social networks • Anti-social behaviour of construction workers		✓		

Aspect	Impact	C	O	D	Mitigation Measures
	• Increase in substance abuse, crime, sexually transmitted diseases. • Unplanned pregnancies. ▪ Indirect impacts: • Impact on psychological well-being of local communities. • Resentment of outsiders and tension within local communities.				
	Influx of job seekers: ▪ Direct impacts: • Disruption of existing family structures and social networks • Anti-social behaviour of construction workers • Increase in substance abuse, crime, sexually transmitted diseases. • Unplanned pregnancies. • Pressure on local services. ▪ Indirect impacts: • Impact on psychological well-being of local communities. • Resentment of outsiders and tension within local communities.	✓	✓		
	Risk to safety, livestock, and farm infrastructure: ▪ Direct impacts:	✓			

Aspect	Impact	C	O	D	Mitigation Measures
	• Damage of gates, fences, etc. • Injuries to and loss of livestock • Break-ins, and theft of from local farms. • Damage of local farm roads. ▪ Indirect impacts: • Exposure to outside people of farming operations and risk to farming operations. • Increased risk of stock-theft.				
	Increased risk of grass fires: ▪ Direct impacts: • Damage of gates, fences, etc. • Injuries to and loss of livestock ▪ Indirect impacts: • Impact on stocking levels and future farming operations. • Increased risk of stock-theft.	✓			
	Nuisance impacts associated with construction related activities: ▪ Direct impacts: • Dust impacts, and impact on quality of life and also crops and grazing. • Noise impacts, and impact on quality of life. • Safety of farmers due to movement of construction vehicles • Damage of local farm roads. ▪ Indirect impacts:	✓			

Aspect	Impact	C	O	D	Mitigation Measures
	• Limited indirect impacts				
	Impacts associated with loss of farmland: ▪ Direct impacts: • Loss of grazing and or crops ▪ Indirect impacts: • Impact on future farming operations. • Impact on employment opportunities on the farm.	✓			
	Improve energy security and support the renewable energy sector: ▪ Direct impacts: • Improve energy security • Reduce reliance on coal. • Support renewable energy ▪ Indirect impacts: • Address climate change impacts		✓		
	Generate income for affected landowners ▪ Direct impacts: • Additional income to support farming ▪ Indirect impacts: • Opportunity to invest and expand farming operations and create more employment opportunities on the farm.		✓		

Aspect	Impact	C	O	D	Mitigation Measures
	Benefits associated with the socio-economic development contributions: ▪ Direct impacts: • Support local economic development • Create employment opportunities • Create skills development and training opportunities • Improve basic services ▪ Indirect impacts: • Up-grade local municipalities and improve quality of life of local communities		✓		
	Visual impact and impact on sense of place ▪ Direct impacts: • Change in rural sense of place • Indirect impacts: • Potential impact on property values and hospitality operations.		✓		
	Potential impact on property values: ▪ Direct impacts: • Change in rural sense of place and impact on property values. ▪ Indirect impacts: • Potential impact on hospitality operations.		✓		

Aspect	Impact	C	O	D	Mitigation Measures
	Potential impact on tourism ▪ Direct impacts: • Change in rural sense of place and impact on tourism activities. ▪ Indirect impacts: • Potential impact on future development of hospitality operations.		✓		
Traffic	**Noise emissions:** Increase in noise due to increase in traffic.	✓	✓		▪ Pre-notification of affected parties regarding construction activities to minimize complaints regarding noise and vibration nuisance. ▪ Deliveries must be staggered, and trips must be scheduled to occur outside of peak traffic periods. ▪ All trucks and vehicles removing soil from the site are to be covered to prevent spills. ▪ Dust suppression of gravel roads during the construction and decommissioning phases, as required. ▪ Regular maintenance of gravel roads by the Contractor during the construction and decommissioning phases. ▪ The use of mobile batching plants and quarries on or in close proximity to the site would decrease the impact on the surrounding road network. ▪ Staff and general trips should occur outside of peak traffic periods as far as possible. ▪ 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. Consent from the relevant parties will be required to do so.
	Dust emissions: Decrease in ambient air quality due to dust.	✓			

Aspect	Impact	C	O	D	Mitigation Measures
					▪ 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. 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. ▪ Design and maintenance of internal roads. The internal gravel roads will require grading with a road grader to obtain a flat even surface and the geometric design of these gravel roads needs to be confirmed at detailed design stage. This process is to be undertaken by a civil engineering consultant or a geometric design professional. The road designer should take cognizance that roads need to be designed with smooth, relatively flat gradients to allow an abnormal load vehicle to ascend to the top of a hill. ▪ Accommodation of secure material storage on site to allow for staggered delivery of materials. ▪ Noise, dust, and exhaust pollution cannot be completely mitigated.

Aspect	Impact	C	O	D	Mitigation Measures
					▪ Where possible, the following measures will significantly reduce the impact: • Encouraging workers to travel outside peak hour periods. • Dust suppression as well as maintenance of internal roads.
Noise	▪ Increases in noise levels at closest receptors. ▪ Noise levels exceeding the SANS 10103 rating level.	✓			▪ Scoping level assessment is insufficient, and a full ENIA is required.
	Increases in noise levels at closest receptors, though WTG will only operate during periods with increased wind speeds. The desired daytime (LR,d rating level of 55 dBA. Currently a suburban to urban noise district, with a desired night-time LR,n rating level of 45 dBA.		✓		▪ Scoping level assessment is insufficient, and a full ENIA is recommended.

8.2 SUMMARY OF IMPACT SIGNIFICANCE SCREENING

This section provides an overview of the likely significance of construction phase (**Table 8-2**), operational phase (**Table 8-3**) and decommissioning phase (**Table 8-4**) presenting the results of the impact screening tool based on two criteria, namely probability and consequence (outlined in Section 2.5). This is used as a guide to determine whether additional assessment may be required in the EIA phase. Impacts will be refined and assessed during the EIA phase.

Table 8-2 – Significance of potential construction phase impacts

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
Agricultural Potential	Occupation of land	Negative	2	4	Medium
	Soil erosion and degradation	Negative	3	1	Low
Avifauna	Noise pollution and environmental disruption from construction activity: Disturbance of birds & displacement effects	Negative	2	4	Medium
Bats	Loss of foraging habitat by clearing of vegetation.	Negative	4	1	Medium
	Roost destruction during earthworks.	Negative	2	3	Medium
Terrestrial Biodiversity (Direct)	Loss of natural vegetation	Negative	3	1	Low
	The potential loss of threatened, protected and endemic plant and animal species	Negative	2	1	Very Low
	Loss of faunal habitat	Negative	3	1	Low
	Direct faunal mortalities	Negative	2	1	Very Low
	Increased dust deposition	Negative	3	1	Low
	Construction of Roads	Negative	3	3	Medium
	Increased noise & light levels and human activity	Negative	2	4	Medium

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
Terrestrial Biodiversity (Indirect)	Establishment of alien vegetation	Negative	3	1	Low
	Increased erosion and water run-off	Negative	2	4	Medium
	Changes in animal behaviour	Negative	3	1	Low
Heritage	Impacts to palaeontology	Positive	2	2	Low
	Impacts to archaeology	Negative	2	2	Low
	Impacts to graves	Negative	1	3	Low
	Impacts to the cultural landscape	Negative	4	2	Medium
Palaeontology	Impact on the palaeontological heritage	Negative	2	2	Low
Geotechnical	Soil erosion	Negative	4	2	Medium
	Oil Spillages	Negative	4	2	Medium
	Disturbance of fauna and flora	Negative	3	1	Low
	Slope stability	Negative	2	2	Low
	Seismic activity	Negative	3	2	Medium
Traffic	Noise emissions	Negative	4	2	Medium
	Dust emissions	Negative	4	2	Medium
Visual	Visual Impacts	Negative	3	2	Medium
Aquatic Biodiversity	Direct loss of wetland habitat	Negative	3	3	Medium
	Erosion	Negative	3	3	Medium
	Establishment and spread of AIS	Negative	3	2	Medium
	Changes in wetland health/ functioning	Negative	3	3	Medium

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
	Contamination of riparian systems	Negative	3	3	Medium
Social	Creation of local employment, training, and business opportunities	Positive	4	1	Medium
	Impact of construction workers on local communities	Negative	4	1	Medium
	Influx of job seekers	Negative	4	1	Medium
	Risk to safety, livestock, and farm infrastructure	Negative	4	1	Medium
	Increased risk of grass fires	Negative	4	1	Medium
	Nuisance impacts	Negative	4	1	Medium
	Loss of farmland	Negative	4	1	Medium
Noise	Increases in noise levels at closest receptors	Negative	3	2	Medium

Table 8-3 – Significance of potential operational phase impacts

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
Agricultural Potential	Soil erosion and degradation	Negative	3	1	Low
	Increased financial security for farming operations	Positive	2	2	Low
Avifauna	Habitat transformation resulting from the wind turbines and associated infrastructure	Negative	2	4	Medium

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
	Bird mortality and injury resulting from collisions with the wind turbines	Negative	3	3	Medium
	Electrocution of priority species on the onsite sub-stations and internal 33kV network	Negative	3	3	Medium
	Collisions of priority species with the internal 33kV network	Negative	3	3	Medium
Bats	Bat mortalities by blade impact or barotrauma (resident bats)	Negative	4	3	High
	Bat mortalities by blade impact or barotrauma (migrating bats)	Negative	3	4	High
	Increased bat mortalities due to light attraction and habitat creation.	Negative	4	3	High
Terrestrial Biodiversity (Direct)	Direct faunal mortalities	Negative	1	2	Very Low
	Increased light and noise levels and changes in animal behaviour	Negative	3	1	Low
Terrestrial Biodiversity (Indirect)	Establishment of alien vegetation	Negative	3	1	Low
	Increased erosion and water run-off	Negative	2	3	Medium
Aquatic Biodiversity	Spread of AIS	Negative	3	3	Medium
	Increased run-off, Erosion	Negative	3	3	Medium
Heritage	Impacts to the cultural landscape	Negative	4	2	Medium
Geotechnical	Soil erosion	Negative	2	2	Low

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
	Potential oil spillages	Negative	3	2	Medium
	Seismic activity	Negative	3	2	Medium
Traffic	Noise emissions	Negative	3	1	Low
	Dust emissions	Negative	3	1	Low
Visual	Visual Impacts	Negative	4	2	Medium
Social	Improve energy security and support renewable sector	Positive	4	1	Medium
	Creation of employment and business opportunities	Positive	4	1	Medium
	Generate income for affected landowners	Positive	4	1	Medium
	Socio-economic development contributions	Positive	4	1	Medium
	Sense of place	Negative	4	1	Medium
	Property values	Negative	4	1	Medium
	Potential impact on tourism	Negative	4	1	Medium
Noise	Increases in noise levels at closest receptors	Negative	3	1	Low

Table 8-4 – Significance of potential decommissioning phase impacts

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
Agricultural Potential	Occupation of land	Negative	2	4	Medium
	Soil erosion and degradation	Negative	3	1	Low
Avifauna	Total/partial displacement of priority species from	Negative	2	4	Medium

Aspect	Impact	Nature	Probability	Consequence	Significance (Before Mitigation)
	breeding/feeding/roosting areas				
Terrestrial Biodiversity (Direct)	Increased dust deposition	Negative	3	1	Low
Terrestrial Biodiversity (Direct)	Direct faunal mortalities	Negative	2	1	Very Low
Terrestrial Biodiversity (Indirect)	Establishment of alien vegetation	Negative	3	1	Low
Terrestrial Biodiversity (Indirect)	Increased erosion and water run-off	Negative	3	1	Low
Heritage	Impacts to the cultural landscape	Negative	4	2	Medium
Geotechnical	Soil erosion	Negative	4	2	Medium
	Potential oil spillages	Negative	4	2	Medium
	Disturbance of fauna and flora	Negative	3	1	Low
	Slope stability	Negative	2	2	Low
Visual	Visual Impacts	Negative	3	2	Medium
Social	Social impacts associated with retrenchment	Negative	3	1	Low

9 CUMULATIVE IMPACT ASSESSMENT

Although the objective of the NEMA S&EIA process is to undertake an impact and risk assessment process, inclusive of cumulative impacts, which is essential to assessing and managing the environmental and social impacts of projects, it may be insufficient for identifying and managing the incremental impacts on areas or resources used or directly affected by a given development from other existing, planned, or reasonably defined developments at the time the risks and impacts are identified.

IFC PS 1 recognizes that, in some instances, cumulative effects need to be considered in the identification and management of environmental and social impacts and risks. For private sector management of cumulative impacts, IFC considers good practice to be two pronged:

- Effective application of and adherence to the mitigation hierarchy in environmental and social management of the specific contributions by the project to the expected cumulative impacts; and
- Best efforts to engage in, enhance, and/or contribute to a multi-stakeholder, collaborative approach to implementing management actions that are beyond the capacity of an individual project proponent.

Even though Performance Standard 1 does not expressly require, or put the sole onus on, private sector clients to undertake a cumulative impact assessment (CIA), in paragraph 11 it states that the impact and risk identification process "*will take into account the findings and conclusions of related and applicable plans, studies, or assessments prepared by relevant government authorities or other parties that are directly related to the project and its area of influence" including "master economic development plans, country or regional plans, feasibility studies, alternatives analyses, and cumulative, regional, sectoral, or strategic environmental assessments where relevant*."

Cumulative impacts are those that result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones. For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognized as important on the basis of scientific concerns and/or concerns of affected communities (IFC GPH).

Evaluation of potential cumulative impacts is an integral element of an impact assessment. In reference to the scope for an impact assessment, IFC's Performance Standards specify that "*Risks and impacts will be analysed in the context of the project's area of influence. This area of influence encompasses…areas potentially impacted by cumulative impacts from further planned development of the project, any existing project or condition, and other project-related developments that are realistically defined at the time the Social and Environmental Assessment is undertaken; and (iv) areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.*" (IFC 2006).

A cumulative impact assessment is the process of (a) analysing the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and natural environmental and social external drivers on the chosen Valued Environmental and Social Components (VECs) over time, and (b) proposing concrete measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible (IFC GPH).

Only one renewable energy development occurs in the region within a 30 km radius from the Igolide site, namely the Sibanye Gold Limited Solar PV 200 MW (DFFE Reference: 14/12/16/3/3/2/919) (**Figure 9-1**). This project has been approved.

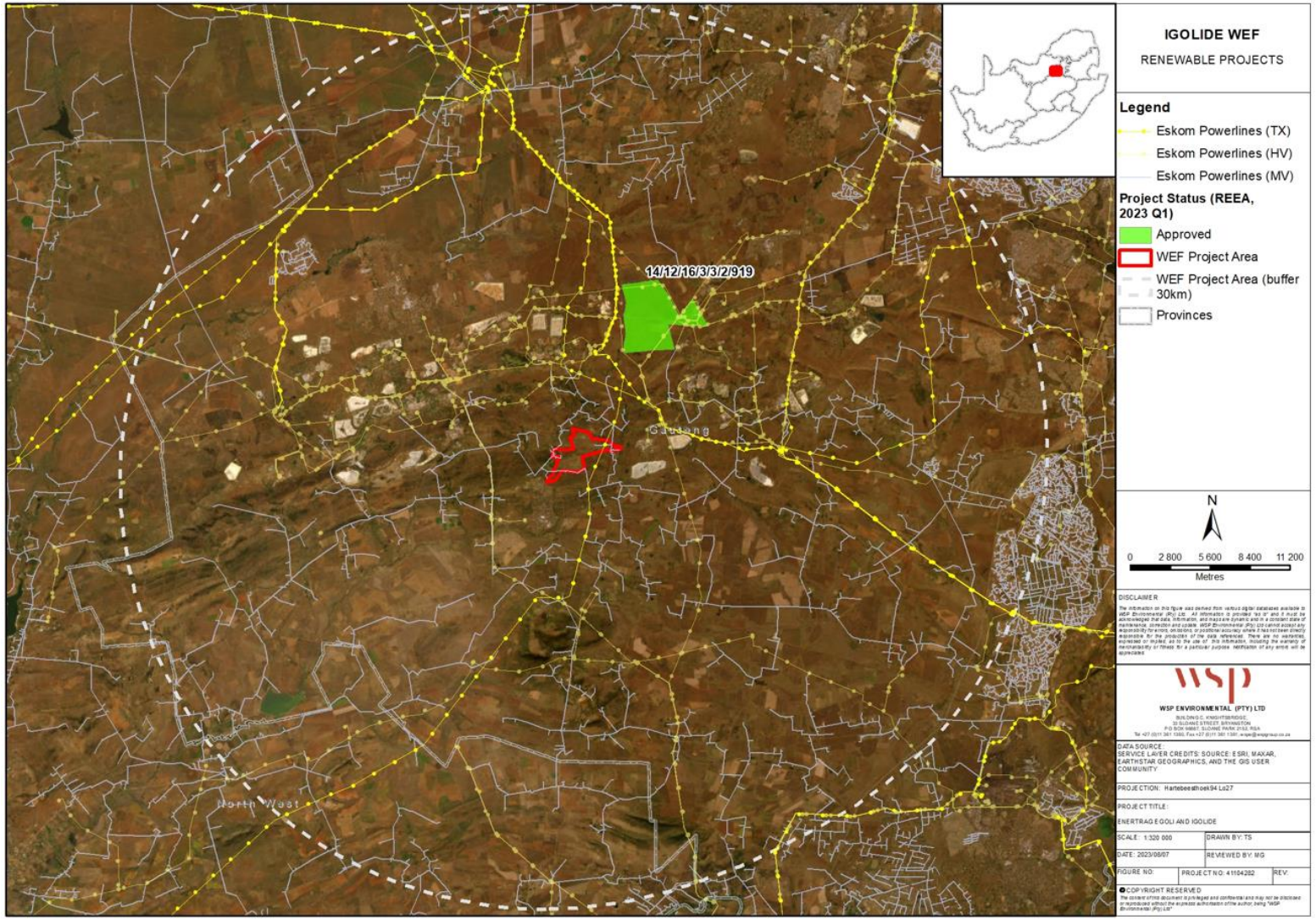


Figure 9-1 - Renewable Energy Projects with 30km of the Igolide WEF

9.1 AGRICULTURAL POTENTIAL

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.

The most important concept related to a cumulative impact is that of an acceptable level of change to an environment. A cumulative impact only becomes relevant when the impact of the proposed development 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.

The potential cumulative agricultural impact of importance is a regional loss (including by degradation) of future agricultural production potential.

The defining question for assessing the cumulative agricultural impact is this:

- What loss of future agricultural production potential is acceptable in the area, and will the loss associated with the proposed development, when considered in the context of all past, present or reasonably foreseeable future impacts, cause that level in the area to be exceeded?

Department of Forestry, Fisheries and the Environment (DFFE) requires compliance with a specified methodology for the assessment of cumulative impacts. This is positive in that it ensures engagement with the important issue of cumulative impacts. However, the required compliance has some limitations and can, in the opinion of the author, result in an over-focus on methodological compliance, while missing the more important task of effectively answering the above defining question.

This cumulative impact assessment will consider all renewable energy projects within a 30 km radius. The quantification of the cumulative impact will be done in detail in the EIA phase. This is highly likely to confirm that the cumulative impact of loss of future agricultural production potential is low. The development is highly likely to have an acceptable impact on the agricultural production capability of the area and therefore be recommended for approval from a cumulative agricultural impact point of view.

9.2 TERRESTRIAL BIODIVERSITY

The existing and proposed developments within 30 km from the site that were taken into consideration for cumulative impacts include:

- Renewable energy projects:
    - Only one renewable energy development occurs in the region within a 30 km radius from the Igolide site:
        - EAP: Aurecon SA Pty Ltd
        - Applicant: Sibanye Gold Limited
        - Development: Solar PV 200 MW
        - Status: Approved
        - DEA Reference: 14/12/16/3/3/2/919

This development falls in the Gauteng Shale Mountain Bushveld vegetation type that has a status of “Least Concern”. The following cumulative impacts are anticipated, and measures to mitigate these impacts are proposed.

- Vegetation loss and habitat destruction (proposed mitigation measures):
  - All projects should adhere to the site-specific recommendations of the ecologists to ensure that impacts are mitigated where possible.
  - Placement of infrastructure should be done in such a way that no SCC are affected, and CBAs avoided.
  - Positioning of the wind turbines in the most environmentally responsible manner is crucial. Aquatic Biodiversity.
- Compromising integrity of CBA, ESA and NPAES (proposed mitigation measures):
  - Avoid placing turbines and other large infrastructure in CBAs.
  - Minimise the development footprint as far as possible.
  - Stringent construction-phase monitoring of activities at the site to ensure that mitigation measures are adhered to and that the overall ecological impact of the development is maintained at a low level.
  - Align roads and other infrastructure so that transformation within the CBAs and ESAs is minimised.
  - The use of structures which may inhibit movement of fauna, e.g., mesh or electric fencing should be avoided where feasible.
- Reduced ability to meet conservation obligations and targets (proposed mitigation measures):
  - Ensure that sensitive habitats are avoided.
  - Minimise the development footprint as far as possible.
- Loss of landscape connectivity and disruption of broad-scale ecological processes (proposed mitigation measures):
  - Minimising the development footprint wherever possible.
  - Revegetation of all cleared and bare areas created by the facility with local species.
  - Fences and other structures which impede faunal movement should be avoided.
  - Roads should not have steep curbs.

Overall, the significance of the cumulative impacts is expected to below, with some cumulative impacts being rated as moderate.

9.3 AVIFAUNA

- Total or partial displacement due to disturbance and habitat transformation associated with the construction and decommissioning of the WEF and associated infrastructure.
- Total or partial displacement due to habitat transformation associated with the operation of the wind turbines.
- Collisions with the wind turbines.
- Electrocutions and collisions with the onsite substations and internal 33kV network.

9.4 BATS

Table 9-1 outlines the Cumulative impacts identified in respect of bats.

Table 9-1 - Identified Bat Cumulative Impacts

Potential impact	Impact significance (without mitigation)	Possible mitigation
Construction phase		
Loss of foraging habitat by clearing of vegetation.	Probability (4) and Consequence (1) = Significance Medium	Each facility to adhere to its respective sensitivity map criteria. Rehabilitate cleared vegetation where possible at areas such as laydown yards.
Roost destruction during earthworks.	Probability (2) and Consequence (2) = Significance Low	Each facility to adhere to its respective sensitivity map criteria. Choose location alternatives for the Igolide WEF facility that don't intrude into high bat sensitivities.
Operational phase		
Bat mortalities by blade impact or barotrauma (resident bats)	Probability (4) and Consequence (3) = Significance High	Each facility to avoid no-go areas by adhering to their respective sensitivity map. Where needed, and if indicated during EIA phase, reducing blade movement at selected turbines and high-risk bat activity times/weather conditions. Acoustic deterrents are developed well enough to be trialled and may be recommended during operational monitoring. Refer to Section 6.
Bat mortalities by blade impact or barotrauma (migrating bats)	Probability (3) and Consequence (4) = Significance High	Each facility to avoid no-go areas by adhering to their respective sensitivity map. Where needed, and if indicated during EIA phase, reducing blade movement at selected turbines and high-risk bat activity times/weather conditions. Acoustic deterrents are developed well enough to be trialled and may be recommended during operational monitoring. Refer to Section 6. Each WEF in a migration path should apply appropriate mitigation measures to ensure that each facility's bat mortalities are below a sustainable threshold.

Potential impact	Impact significance (without mitigation)	Possible mitigation
Increased bat mortalities due to light attraction and habitat creation.	Probability (4) and Consequence (3) = Significance High	Each facility to only use lights 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 all infrastructure buildings. For buildings, avoid tin roofs and roof structures that offer entrance holes into the roof cavity. The storm water drainage plan must avoid creations of artificial ponds/open water sources or wetlands near turbines (closer than 300m from any turbine base), of the proposed Igolide WEF turbines. As such artificial water sources will increase insect activity and therefore bat activity in the area.

9.5 HERITAGE

Cumulative impacts to archaeological resources could be of concern since there is no doubt that other archaeological sites have been lost due to agricultural activities and mining in the wider area. Some of these impacts are visible on aerial photography. Cumulative impacts to the landscape are not expected to be of much concern because of the many gold mines occurring in the area.

9.6 PALAEONTOLOGY

As far as the palaeontology is concerned, there are no cumulative impacts because each site is unique and may or may not have fossils. Stromatolites may be scattered over the landscape, but their distribution is erratic and unpredictable. If a stromatolite outcrop occurs this would an aerially small concentration of fossils and very unlikely to extend beyond tens of metres. Therefore, projects on adjacent land parcels are unlikely to add any impact on this project.

9.7 GEOTECHNICAL

- Erosion - The displacement of natural earth material and overlying vegetation leading to:
  - Exposure of upper soil
  - Increase in stormwater velocity.
  - Soil washed downslope into drainage channels leading to sedimentation.
  - The erosion of these slopes will be exacerbated during periods of heavy rainfall.
- Potential of oil spillages:
  - Contamination of ground and surface water resources from heavy plant leading to quality deterioration of the water resources.
- Slope stability Slope instability around structures.
- Seismic activity:

- Damage of proposed development.

9.8 TRAFFIC

- Construction phase:

To assess the cumulative impact, it will be assumed that all authorised and proposed renewable energy projects within the vicinity of the site, would be constructed at the same time. It must be noted that this is a conservative approach.

There is one (1) renewable energy projects located within a 55km radius of the site. The project is the authorised Sibanye Gold Limited 200MW Solar PV plant and its associated infrastructure (DEA/EIA/0000297/2016). This site is located approximately 8km northeast of the site.

The total estimated construction peak hour trips are summarised in Table 9-2. The conservative estimate, and the likelihood of occurrence is considered low due to the following:

- Renewable energy projects are affected by funding and economic viability.
- projects targeted to supply energy to the national grid are subject to a highly competitive.
- bidding process. Only a handful of projects would be selected to enter into a power purchase agreement with Eskom.
- even if all renewable energy projects are constructed and decommissioned on 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.

Table 9-2 - Estimated Cumulative construction trips

Developments	Megawatt	Estimated peak hour construction traffic
Igolide WEF	100	42
Sibanye Gold Limited Solar PV	200	Conservative estimate of 60 trips
Total trips		102

- Operational phase:

The total estimated operational peak hour trips are summarised in Table 9-3.

Table 9-3 - Estimated Cumulative operational trips

Developments	Megawatt	Estimated peak hour traffic
Igolide WEF	100	12
Sibanye Gold Limited Solar PV	200	12
Total trips		24

9.9 VISUAL

Existing mining / quarrying and associated industrial development have already resulted in large scale visual impacts, especially to the north and east of the project area. These developments have significantly altered the sense of place and visual character in the broader region.

Renewable energy facilities have the potential to cause large-scale visual impacts, and although the level of transformation already present in the landscape will reduce the contrast and overall visual impact of the new development, the incremental change in the landscape will be increased and the visual impacts on surrounding visual receptors would be exacerbated. The South African Renewable Energy EIA Application Database from DFFE (REEA_OR_2022_Q4) records only one approved renewable energy project within 30kms of the project area, this being a 200MW Solar Photovoltaic (PV) facility located adjacent to Sibanye Gold Mine. This project is however located some 6.5 km north-east of the project area, in close proximity to extensive, well-established mining developments and as such it is not anticipated that this development will result in any significant cumulative impacts affecting the landscape or the visual receptors within the visual assessment zone for the Igolide WEF.

From a visual perspective, the concentration of renewable energy facilities near existing mining development as proposed will further change the visual character of the area on the periphery of Fochville and alter the inherent sense of place, extending an increasingly industrial character into the broader area, and resulting in significant cumulative impacts. It is however anticipated that these impacts could be mitigated to acceptable levels with the implementation of the recommended mitigation measures.

Cumulative Visual Impacts Include:

- Additional renewable energy developments in the broader area will alter the natural character of the study area towards a more industrial landscape and expose a greater number of receptors to visual impacts.
- Visual intrusion of multiple renewable energy developments may be exacerbated, particularly in more natural undisturbed settings.
- Additional renewable energy facilities in the area would generate additional traffic on gravel roads thus resulting in increased impacts from dust emissions and dust plumes.
- The night time visual environment could be altered as a result of operational and security lighting at multiple renewable energy facilities in the broader area.

9.10 SOCIAL

The potential impact of the proposed WEF and associated infrastructure on the areas sense of place is likely to be limited. The cumulative impacts are also likely to be low with mitigation. This will be confirmed during the assessment phase.

- Cumulative impact on sense of place:

The establishment of renewable energy projects do have the potential to have a cumulative impact on an areas sense of place. The significance will depend on the location and number of REFs proposed. This will be informed by the findings from the site visit and review of the VIA.

- Cumulative impacts on local services:

The establishment of renewable energy projects do have the potential to have a cumulative impact on local services, specifically accommodation and emergency services. The significance will depend on the number of REFs proposed and timing of construction.

- Cumulative impacts on local economy:

The establishment of renewable energy projects do have the potential to create benefits in terms of creating employment, business, and skills development opportunities for the local municipality. The significance will depend on the number of REFs proposed and timing of construction.

10 PLAN OF STUDY FOR EIA

10.1 PLAN OF STUDY FOR EIA TERMS OF REFERENCE

Table 10-1 outlines the structure of the plan of study as required in terms of Appendix 2 of GNR 982.

Table 10-1 – Plan of Study Requirements

Plan of Study Chapter	Information Requirements as per GNR 982
Description of EIA Tasks	▪ A description of the tasks that will be undertaken as part of the environmental impact assessment process.
Description of Alternatives	▪ A description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity.
Aspects to be Assessed in the EIA Process	▪ A description of the aspects to be assessed as part of the environmental impact assessment report process.
Specialist Studies	▪ Aspects to be assessed by specialists.
Impact Assessment Methodology	▪ A description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists. ▪ A description of the proposed method of assessing duration and significance.
Environmental Impact Report	▪ Contents of EIAR as specified in GNR 982 (as amended) Annexure 2
Stakeholder and Authority Engagement	▪ An indication of the stages at which the competent authority will be consulted. ▪ Particulars of the public participation process that will be conducted during the environmental impact assessment process.

10.2 OVERVIEW OF THE EIA PHASE TASKS

The EIA phase will consist of the following tasks; each of these tasks is detailed separately in the following sub-sections:

- Specialist studies;
- Continuation of authority and stakeholder engagement;
- Assessment of the significance of potential impacts; and
- Preparation of the EIA Report.

10.3 DESCRIPTION OF ALTERNATIVES

The EIA process identifies two types of project alternatives:

- Concept Level Alternatives, which relate to the site, technology and process alternatives
- Detailed Level Alternatives which relate to mitigation measures

The feasibility of the higher-level Concept Alternatives have been considered and assessed within **Section 4** of this report. The Detailed Level Alternatives which relate to mitigation measures, will be addressed within the EIA Report.

10.4 ASPECTS TO BE ASSESSED IN THE EIA PROCESS

Table 10-2 outlines the key aspects that were identified in the scoping phase; these aspects will be subject to further assessment in the EIA Phase.

Table 10-2 – Summary of aspects to be addressed in the EIA Phase

Environmental Aspect	Impact
Terrestrial Biodiversity	▪ The clearing of natural vegetation. ▪ The potential loss of threatened, protected, CITES listed and/or endemic plants/animals. ▪ Loss of faunal habitat. ▪ Direct faunal mortalities due to construction and increased traffic. ▪ Increased dust deposition. ▪ Increased human activity, noise and light levels. ▪ Establishment of alien vegetation. ▪ Increased water run-off and erosion. ▪ Changes in animal behaviour. ▪ Cumulative impacts
Aquatic Biodiversity	▪ Decrease in habitat integrity ▪ Decrease in aquatic ecosystem integrity ▪ Stress on water resources ▪ Flow Modification ▪ Water quality impacts ▪ Aquatic ecosystem integrity ▪ Loss of aquatic habitat and biota ▪ Aquatic ecosystem integrity ▪ Cumulative impacts
Avifauna	▪ Habitat destruction ▪ Disturbance of birds & displacement effects ▪ Bird fatality ▪ Cumulative impacts
Bats	▪ Loss of foraging habitat by clearing of vegetation. ▪ Roost destruction during earthworks. ▪ Bat mortalities by blade impact or barotrauma (resident bats) ▪ Bat mortalities by blade impact or barotrauma (migrating bats) ▪ Increased bat mortalities due to light attraction and habitat creation. ▪ Cumulative impacts

Environmental Aspect	Impact
Heritage	▪ Impacts to archaeological resources ▪ Impacts to graves ▪ Impacts to the cultural landscape ▪ Cumulative impacts
Traffic	▪ Increased Road Incidents ▪ Road Degradation ▪ Dust ▪ Intersection Safety ▪ Increased Road Incidents ▪ Cumulative impacts
Visual (including Flicker)	▪ Visual effect of construction activities on scenic resources and sensitive receptors ▪ Cumulative impacts
Geotechnical	▪ Soil Erosion: ▪ Increase in soil and wind erosion due to clearing of vegetation. ▪ Oil spillages: ▪ Disturbance of fauna and flora: ▪ Slope stability: ▪ Seismic activity: ▪ Cumulative impacts
Social	▪ Impacts on regional employment and incomes associated with project activities and expenditure ▪ Impacts associated with the funding of local socio-economic development, enterprise development and shareholding ▪ Impacts associated primarily with the influx of people ▪ Impacts on tourism ▪ Impacts on surrounding landowners and communities ▪ Cumulative impacts
Noise	▪ Noise emissions ▪ Cumulative impacts

10.5 SPECIALIST STUDIES TO BE UNDERTAKEN

The following specialist assessments have been commissioned for the EIA Phase:

- Agricultural Impact Assessment;
- Terrestrial Biodiversity Impact Assessment;
- Aquatic Biodiversity Impact Assessment;
- Plant Species Impact Assessment;
- Animal Species Impact Assessment t;
- Avifauna Impact Assessment;
- Bat Impact Assessment;
- Heritage Impact Assessment;
- Palaeontological Impact Assessment;

- Traffic Impact Assessment;
- Qualitative Risk Assessment;
- Desktop Geotechnical Assessment;
- Visual Impact Assessment (including Flicker);
- Socio-Economic Impact Assessment;
- Defence Compliance Statement; and
- CAA Compliance Assessment

It should be noted that the specialist studies will be undertaken according to the procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and Section 44 of the NEMA (GNR 320, dated 20 March 2020), where applicable.

10.6 IMPACT ASSESSMENT METHODOLOGY

10.6.1 ASSESSMENT OF IMPACTS AND MITIGATION

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

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct[3], indirect[4], secondary[5] as well as cumulative[6] impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[7] presented in **Table 10-3.**

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

Table 10-3 – Impact Assessment Criterion and Scoring System

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

10.6.2 IMPACT MITIGATION

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation

and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

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

The mitigation sequence/hierarchy is shown in **Figure 10-1** below.

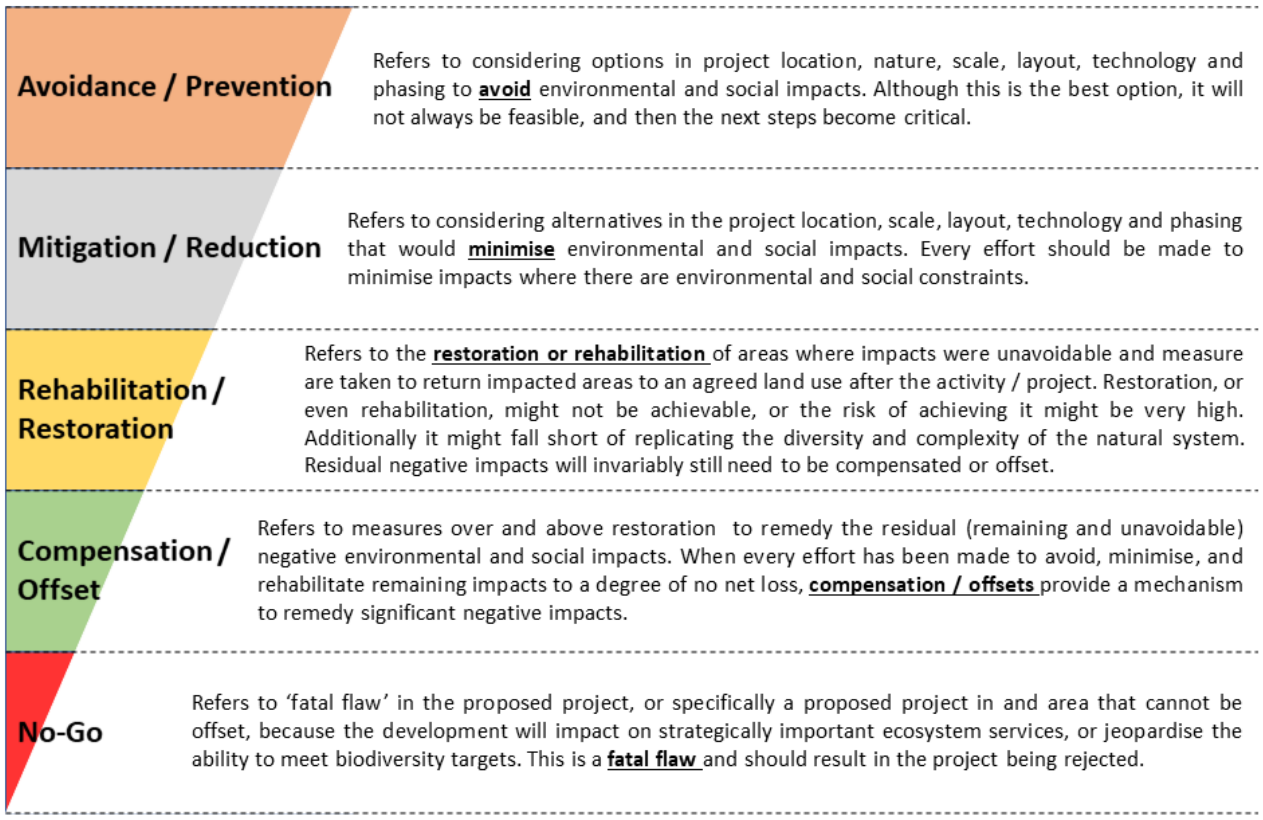


Figure 10-1 - Mitigation Sequence/Hierarchy

The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their

original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

10.7 ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Once the FSR has been approved the proposed project will proceed into detailed EIA phase, which involves the detailed specialist investigations.

WSP will produce a Draft EIA Report after the completion of the required specialist studies. The Draft EIAR will provide an assessment of all the identified key issues and associated impacts from the Scoping phase. All requirements as contemplated in the EIA Regulations, 2014 (GNR 982, as amended) will be included in the Draft EIAR.

The Draft EIAR will contain, inter alia, the following:

- Details of the EAP who prepared the report and the expertise of the EAP to carry out the S&EIR process, including a curriculum vitae;
- The location of the activity, including the 21 digit Surveyor General code of each cadastral land parcel, where available, the physical address and farm name; and the coordinates of the boundary of the property or properties;
- A plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale;
- A description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for; and a description of the associated structures and infrastructure related to the proposed project;
- 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;
- A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location;
- A motivation for the preferred development footprint within the approved site;
- A full description of the process followed to reach the proposed development footprint within the approved site;
- Details of the public participation process undertaken;
- 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;
- The environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
- The impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts;
- The methodology used in determining and ranking of potential environmental impacts and risks;
- Positive and negative impacts;
- An assessment of each identified potentially significant impact and risk;
- The possible mitigation measures that could be applied;
- An environmental impact statement;
- A description of any assumptions, uncertainties and gaps in knowledge;

- A reasoned opinion as to whether the proposed activity should or should not be authorised;
- An undertaking under oath or affirmation by the EAP; and
- An EMPr.

10.8 STAKEHOLDER AND AUTHORITY ENGAGEMENT

Public participation during the EIA phase revolves around the review of the environmental impact assessment findings, which will be presented in the Draft EIA Report. All stakeholders will be notified of the progress to date and availability of the Draft EIA Report, via mail, email and/or SMS. A legislated period of 30 consecutive days will be allowed for public comment. Reports will be made available in the following way:

- Distribution for comment at central public places, which were used during the Scoping phase;
- The document will be made available to download from the WSP and Datafree websites; and
- Copies of CDs will be made available on request.

The EIA phase will provide the following information to I&APs:

- Initial Site Plan;
- Alternatives;
- A description of activities and operations to be undertaken;
- Baseline information;
- Specialist studies;
- Impact assessment; and
- Management measures.

The information outlined above will be presented in one or more of the following:

- Notifications;
- Scoping Report;
- EIA Report; and
- EMPr.

All comments received during the EIA phase will be recorded in the Comments and Responses table within the SER, which will be included in the draft and final EIA Reports. The final EIA Report will incorporate public comment received on the Draft EIA Report and will be made available for public review with hard copies distributed mainly to the authorities and key stakeholders.

All stakeholders will receive a letter notifying them of the authority's decision.

11 CONCLUSION AND WAY FORWARD

This FSR contains:

- A description of the existing and proposed activities;
- A description of the alternatives considered to date;
- An outline of the proposed process to be followed;
- Information on the EAP and stakeholders who have chosen to participate in the project;
- An outline of the environment in which the project falls;
- Information on the potential environmental impacts to be studied in more detail during the EIAR phase of the project; and
- Information on the proposed specialist studies to be undertaken.

A number of environmental impacts have been identified as requiring some more in-depth investigation and the identification of detailed mitigation measures. Therefore, a detailed EIA is required to be undertaken in order to provide an assessment of these potential impacts and recommend appropriate mitigation measures.

The recommendation of this report is that detailed specialist studies as outlined in Section 10.5 are undertaken.

The DSR was made available for review from **26 June to 27 July 2023**. All issues and comments submitted to WSP during the scoping phase have been incorporated in Section 3 of the SER (Appendix D of the FSR). The FSR will be submitted to the DFFE, as the competent authority.

If you have any further enquiries, please feel free to contact:

WSP Group Africa (Pty) Ltd

Attention: Jashmika Maharaj

(T) 011 552 4300

(E): jashmika.maharaj@wsp.com

Appendix A

EAP CV

Appendix B

EAP DECLARATION

Appendix C

SPECIALIST DECLARATIONS

Appendix D

STAKEHOLDER ENGAGEMENT REPORT

Appendix E

MAPS

Appendix F

DFFE SCREENING TOOL REPORT

Appendix G

SPECIALIST STUDIES

Appendix G.1

TERRESTRIAL BIODIVERSITY ASSESSMENT

Appendix G.2

AGRICULTURAL COMPLIANCE STATEMENT

Appendix G.3

AVIFUANA ASSESSMENT

Appendix G.4

AQUATIC IMPACT ASSESSMENT

Appendix G.5

GEOTECHNICAL ASSESSMENT

Appendix G.6

HERITAGE IMPACT ASSESSMENT

Appendix G.7

PALAEONTOLOGICAL IMPACT ASSESSMENT

Appendix G.8

NOISE IMPACT ASSESSMENT

Appendix G.9

SOCIAL IMPACT ASSESSMENT

Appendix G.10

RISK ASSESSMENT

Appendix G.11

TRAFFIC IMPACT ASSESSMENT

Appendix G.12

VISUAL IMPACT ASSESSMENT

Appendix G.13

BAT IMPACT ASSESSMENT

Building 1, Maxwell Office Park
Magwa Crescent West, Waterfall City
Midrand, 1685
South Africa

wsp.com