

Appendix G.2

TERRESTRIAL ASSESSMENT



TERRESTRIAL BIODIVERSITY SPECIALIST ASSESSMENT FOR THE PROPOSED ABO UVEMVANE WIND ENERGY FACILITY 1

August 2026



Submitted to:
WSP Group Africa Pty (Ltd)
Building 1, Maxwell Office Park
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South Africa



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Acronyms and Abbreviations

Abbreviation	Explanation
AIS	Alien Invasive Species
AOO	Area of Occupancy
BESS	Battery Energy Storage System
BI	Biodiversity Importance
CA	Conservation Areas
CBA	Critical Biodiversity Areas
CI	Conservation Importance
C-Plan	Conservation Plan
CR	Critically Endangered
DFFE	Department of Fisheries, Forestry and the Environment
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
EN	Endangered
EOO	Extent of Occurrence
ESA	Ecological Support Area
FEPA	Freshwater Ecosystem Protection Area
FI	Functional Integrity
GDARD	Gauteng Department of Agricultural and Rural Development
Ha	Hectare
IBA	Important Bird Areas
KBA	Key Biodiversity Areas
MBSP	Mpumalanga Biodiversity Sector Plan
MTPA	Mpumalanga Tourism and Parks Agency
NEMA	National Environmental Management Act
NEMBA	National Environmental Management Biodiversity Act
NEMPA	National Environmental Management Protected Areas Act
NFEPA	National Freshwater Ecosystem Priority Areas

Abbreviation	Explanation
NPAES	National Protected Area Expansion Strategy
NT	Near Threatened
O&M	Operation and Maintenance
PA	Protected Areas
PAOI	Project's Area of Influence
QDS	Quarter Degree Square
REEA	Renewable Energy Environmental Authorisation
RR	Receptor Resilience
SANBI	South African National Biodiversity Institute
SAPAD	South African Protected Areas Database
SCC	Species of Conservation Concern
SEI	Site Ecological Importance
SWSA	Strategic Water Source Areas
ToPS	Threatened or Protected Species
VU	Vulnerable
WEF	Wind Energy Facility

Details of the Expertise of the Specialist

	Specialist Information
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Affiliations	Member of the South African Council of Natural Scientific Professions Member of the South African Wildlife Management Association Member of the South African Association of Botanists
Summary of Past Experience	<p>Andrew Zinn is a terrestrial ecologist with Hawkhead Consulting. In this role, he conducts varied specialist ecology studies, including flora and fauna surveys, for baseline ecological assessments and ecological impact assessments.</p> <p>Andrew has 17 years of experience working in the fields of ecology and conservation research and is registered as a Professional Natural Scientist (<i>Pr.Sci.Nat.</i>) – Ecological Science, with the South African Council of Natural Scientific Professions (SACNASP).</p> <p>Andrew has worked on projects in several African countries including Botswana, Democratic Republic of Congo, Ethiopia, Ghana, Mozambique, South Africa, Tanzania and Zambia.</p>
Refer to Appendix A for a full Curriculum Vitae of Andrew Zinn.	

Declaration of Independence by Specialist

I, Andrew Zinn, declare that I –

- Act as the independent specialist for the undertaking of a specialist section for the proposed ABO Uvemvane Wind Energy Facility 1;
- Do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed;
- Do not have, nor will have, a vested interest in the proposed activity proceeding;
- Have no, and will not engage in, conflicting interests in the undertaking of the activity; and
- Undertake to disclose, to the competent authority, any information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document.



1. Introduction

Hawkhead Consulting was appointed by WSP Group Africa Pty (Ltd), on behalf of ABO Uvemvane Wind Energy Facility 1 (Pty) Ltd, to conduct the Terrestrial Biodiversity Specialist Assessment for the proposed ABO Uvemvane Wind Energy Facility 1 Project (hereafter referred to as the 'Project'), near Heidelberg in Gauteng Province and Balfour in Mpumalanga Province, South Africa.

1.1. Scope and Purposes of this Report

This specialist study focused on terrestrial biodiversity, and was conducted in line with the 'Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in Terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, When Applying for Environmental Authorisation', and specifically the:

- Protocol for the Specialist Assessment and Minimum Content Requirements for Environmental Impacts on Terrestrial Biodiversity.

The primary scope of work included:

- Reviewing and summarising pertinent biodiversity information presented in relevant ecological, conservation and biodiversity datasets and literature;
- Conducting a field programme of the Project site to collect field data to verify the ecosystem and biodiversity character and sensitivity of the site and surrounding landscape;
- Identifying and assessing the nature and extent of potential impacts on terrestrial biodiversity and ecosystems associated with the proposed Project; and
- Recommending appropriate biodiversity mitigation, management and monitoring measures for inclusion in the proposed Project's Environmental Management Plan (EMP) and/or Biodiversity Management Plan (BMP).

Predicated on the above scope items, the purpose of this report is therefore to 1) present a baseline description and sensitivity analysis of terrestrial biodiversity relevant to the site and its surrounding landscape, 2) assess the potential impacts of the proposed Project on on-site biodiversity; 3) detail appropriate management and monitoring measures to avoid/mitigation identified impacts and guide on-site biodiversity management; and 4) provide an impact statement on the appropriateness of the proposed Project with respects to terrestrial biodiversity conservation.

This report should be read in conjunction with the other specialist ecology reports for the proposed Project, including *inter alia*, the Plant Species Specialist Assessment report and Animal Species Specialist Assessment report.

1.2. Project Description

ABO Uvemvane Wind Energy Facility 1 (Pty) Ltd proposes the development of ABO Uvemvane Wind Energy Facility 1 (WEF 1), a commercial wind energy generation facility comprising up to 20 turbines and with a total generation capacity of up to 170 MWac in capacity, as well as associated infrastructure – refer to Table 1 for a summary of the proposed Project description.

The proposed WEF would be located approximately 9 km west of the town of Balfour in the Mpumalanga Province in the Dipaleseng Local Municipality, within the Gert Sibande District

Municipality, and approximately 14km south-east of the town Heidelberg in the Gauteng Province in the Lesedi & Midvaal Local Municipalities within the Sedibeng District Municipality.

Table 1: Summary of the proposed Project.

Infrastructure	WEF 1
MWac	Up to 170
Development Footprint	Approx. 67.2 ha
Access Points	Five existing access points
Internal Road Lengths	Up to 31 km
Electrical Infrastructure Hub (with collector substation, substation, and BESS infrastructure)	Three locations to be assessed as options, only one will be constructed (up to 7 ha)
Temporary Laydown Areas	Four, totalling up to 15 ha.

It is anticipated that the proposed WEF would have a total (permanent) development footprint of up to 67.2 ha, which is approximately 1.12% of the total site (i.e., affected properties) area. The affected properties are indicated in Table 2.

A development area (i.e., the full extent of the affected properties as well as beyond, where appropriate) has been identified for the proposed development. Within this identified development area, a development footprint has been defined in a manner which has considered the environmental sensitivities present on the affected properties and intentionally remains outside of highly sensitive areas. All affected properties in their entirety have been considered in this S&EIA process (which includes the independent specialists' assessment undertaken hereunder) and assessed in terms of the suitability from an environmental and social perspective. The location of the proposed Project and the siting of the Project infrastructure within the assessed study area has been informed by the recommendations of the specialists following their field assessments, where relevant.

It is important to note at the outset that the exact specifications of the proposed Project components will be determined during the detailed engineering design phase prior to construction (subsequent to the issuing of an EA, should such an authorisation be granted), but that the information provided below is seen as the maximum development scenario for the proposed development.

The proposed facility would comprise the following (to be located within the proposed development footprint):

- Up to 20 turbines with the following maximum specifications:
 - Maximum hub height 180 m;
 - Maximum blade length 100 m;
 - Maximum rotor diameter 200 m;
 - Maximum capacity per turbine 10 MW;
 - A transformer at the base of each turbine;
 - Concrete turbine foundations up to 1 ha each;
 - Turbine, crane, and blade hardstands (included in the abovementioned 1 ha).
- Primary/main access roads as well as internal road reticulation (note that existing roads/disturbed areas would be used as far as possible, and for the proposed roads, a

corridor of up to 12 m wide may be temporarily impacted upon during construction and be rehabilitated to up to 10 m wide after construction), inclusive of stormwater infrastructure where relevant.

- 4 Temporary laydown areas/ construction compounds (includes concrete batching), totalling up to 15 ha, would be fenced with access control; and/or
- Battery Energy Storage System (BESS) to be located within the electrical infrastructure hub described under “associated infrastructure” below.

Associated infrastructure would include the following (to be located within the proposed development footprint):

- Associated internal electrical reticulation/ cabling (i.e., low- and medium voltage powerlines), underground as far as is feasible, and to run within the proposed road footprint/route as far as possible;
- A 33kV overhead/underground line to connect the northern and southern portions of the facility;
- On-site electrical infrastructure hub up to 7 ha in extent (note there are 3 locations to be assessed as options, however only 1 will be constructed) consisting of:
 - On-site substation and associated infrastructure;
 - Additional step-up/ transformation/ collector/switchyard infrastructure;
 - Auxiliary buildings (including, but not limited to, Operation and Maintenance (O&M) building/s, admin building/s, workshop/s, gatehouse/s, security building/s, control centre/s, office/s, visitor centre/s, warehouse/s, etc.);
 - May include the installation of a communications tower and lighting mast on site with a maximum height of 32 m and 25m respectively; and/or
 - BESS.

Five access points are proposed, four of these are off existing unnamed farm roads (originating from the D1220 and P243/1), and one is off Lagerspoort Road from Heidelberg - Balfour Road (R23). Access roads would be developed both to the site and within the site (i.e., between Project components).

The operations of the proposed facility would require some servicing, noting that the operational electrical requirements would be nominal and would be supplied by the facility on site. Water would be required for sanitation use by operational staff (drinking and washing hands, food, etc) as well as for cleaning of equipment, and scheduled internal cleaning of building, and dust control on internal roads (where needed). Water would ideally be sourced from the local municipality, in terms of a Service Level Agreement established between the Municipality and the Proponent. If this is not possible, then further options, such as sourcing water from a private services provider, will be investigated. Where required, a storage tank (i.e., Jo-Jo tank) of up to approximately 10,000L may be used on site for temporary water storage. Sanitation requirements would be minimal, given that there would not be many operational staff. Sanitation for auxiliary buildings would be connected to the existing municipal sewage system. If the Municipality does not approve, or have capacity for, such a connection, sewage would be stored in the conservancy tank and collected either by a honey-sucker truck or by a service provider (Contractor) for treatment at a licensed disposal site. Alternatively, a standalone system would be used (i.e., porta-loos) which would be regularly serviced

by an independent contractor. Note that it is not intended to make use of soakaways or on-site treatment solutions. Refuse/solid waste produced would also be nominal (approximately two wheelie bins per week) and would ideally be removed by the Municipality, however, if this is not possible, the Operator would employ private contractors to remove the refuse and dispose of it appropriately.

The construction phase would also require water and sanitation, with these aspects being the primary responsibility of the Contractor. However, it would be preferable for water to be sourced from the local Municipality (where available), with alternative arrangements (for example, bringing water in with trucks) being made where necessary. Solid waste would also be produced and would be managed in accordance with the requirements in the Environmental Management Programme (EMPr).

Stormwater drainage systems may be constructed on site to ensure that stormwater run-off from site is appropriately managed. Water from these systems is not likely to contain any chemicals or hazardous substances and would be released into the surrounding environment based on the natural drainage contours.

Temporary water pipelines may be installed on site during construction for water supply to inter alia the concrete batching plant and the O&M building complex for domestic use and sanitation. Possible groundwater abstraction on site for purposes of the batching plant could be considered, if required, considering any necessary and relevant legal requirements. There would be no other specific stormwater and/or landscaping initiatives undertaken as part of the proposed WEF, other than any interventions prescribed by the relevant specialist/s through the S&EIA process.

Blade patterning may be implemented as a recommended avian mitigation, in accordance with the Blade Patterning Guidelines (SAWEA & BirdLife South Africa, 2024).

The connection for the project within could occur at these via a new loop-in-loop-out connection or via a direct connection to one of the two nearby substations. Note that the EGI component of the WEFs will be subject to separate environmental impact assessments.

Alternatives:

The proposed development as described above has been assessed with the following alternatives:

1. 33kV overhead/underground line to connect northern and southern parts of the facility:
 - A 100 m assessment corridor should be assessed; the actual servitude width would only be 22m;
 - The line is approximately 8km long and a conservative average span length of approximately 100 m can be assumed for assessment purposes, although actual spans may be longer (depending on final engineering design and terrain);
 - Two route alternatives to assess;
2. BESS Technology: With regard to the proposed BESS, the technology thereof is dynamic and so the specific type/technology to be developed would be selected based on market demands and technology availability at the time of construction. Therefore, both Lithium-ion and redox-flow are assessed as technology alternatives, with Lithium-ion being the current preferred technology; and

3. The No-go alternative has also been assessed, noting that the property does hold existing development rights (i.e., Agriculture) and so, not developing the proposed development does not necessarily mean that there would be no changes or impacts on the site.

Table 2: Affected properties.

Affected Property	SG Code
The Remaining Extent of Portion 2 of the Farm Lagerspoort Number 406	TOIR00000000040600002
Portion 17 (a Portion of Portion 3) of the Farm Lagerspoort Nr 406	TOIR00000000040600017
Remaining Extent of Portion 4 of the Farm De Hoek 411	TOIR00000000041100004
Portion 45 of the Farm Lagerspoort 406	TOIR00000000040600045
Portion 7 of the Farm Lagerspoort Number 406	TOIR00000000040600007
Portion 19 of the Farm De Hoek No 411	TOIR00000000041100019
Remaining Extent of Portion 2 of the Farm Modderfontein 410	TOIR00000000041000002
The Farm Orion No 413	TOIR00000000041300000
Remaining Extent of Portion 5 of the Farm Lagerspoort 406	TOIR00000000040600005
Portion 7 of the Farm Driefontein 405	TOIR00000000040500007
Remaining Extent of Portion 9 of the Farm Malanskraal No 407	TOIR00000000040700009
Remaining Extent of Portion 2 of the Farm Malanskraal 407	TOIR00000000040700002
Portion 12 (a Portion of Portion 2) of the Farm Malanskraal 407	TOIR00000000040700012
Remaining Extent of Portion 2 of the Farm Driefontein 405	TOIR00000000040500002
Remaining Extent of the Farm Driefontein 405	TOIR00000000040500000
Remainder of Portion 6 (Kingsmead) of the Farm Malanskraal 407	TOIR00000000040700006
Portion 17 (a Portion of Portion 8) of the Farm Malanskraal No 407	TOIR00000000040700017
Farm Bothas Spruit Nr. 404	TOIR00000000040400000
Portion 16 (a Portion of Portion 4) of the Farm Malanskraal No 407	TOIR00000000040700016
Remaining Extent of Portion 13 (a Portion of Portion 2) of the Farm Malanskraal 407	TOIR00000000040700013
Remainder of Portion 18 (a Portion of Portion 3) of the Farm Malanskraal 407	TOIR00000000040700018
Portion 1 of the Farm Weltevreden Nr. 449	TOIR00000000044900001

1.3. Defining the Project's Area of Influence

A Project's Area of Influence (PAOI) is defined according to important ecosystem processes and functions that may be impacted by the proposed Project's infrastructure and activities (SANBI, 2026).

The PAOI delineated for this specialist study consists of the various farms and farm portions identified by the Project Proponent as the technically suitable footprint for the WEF development (Figure 1.). This is the area within which direct and indirect impacts on the biodiversity receptors addressed in this report may arise. It should be noted that during the initial baseline studies a larger study area covering various neighbouring properties was defined and assessed.

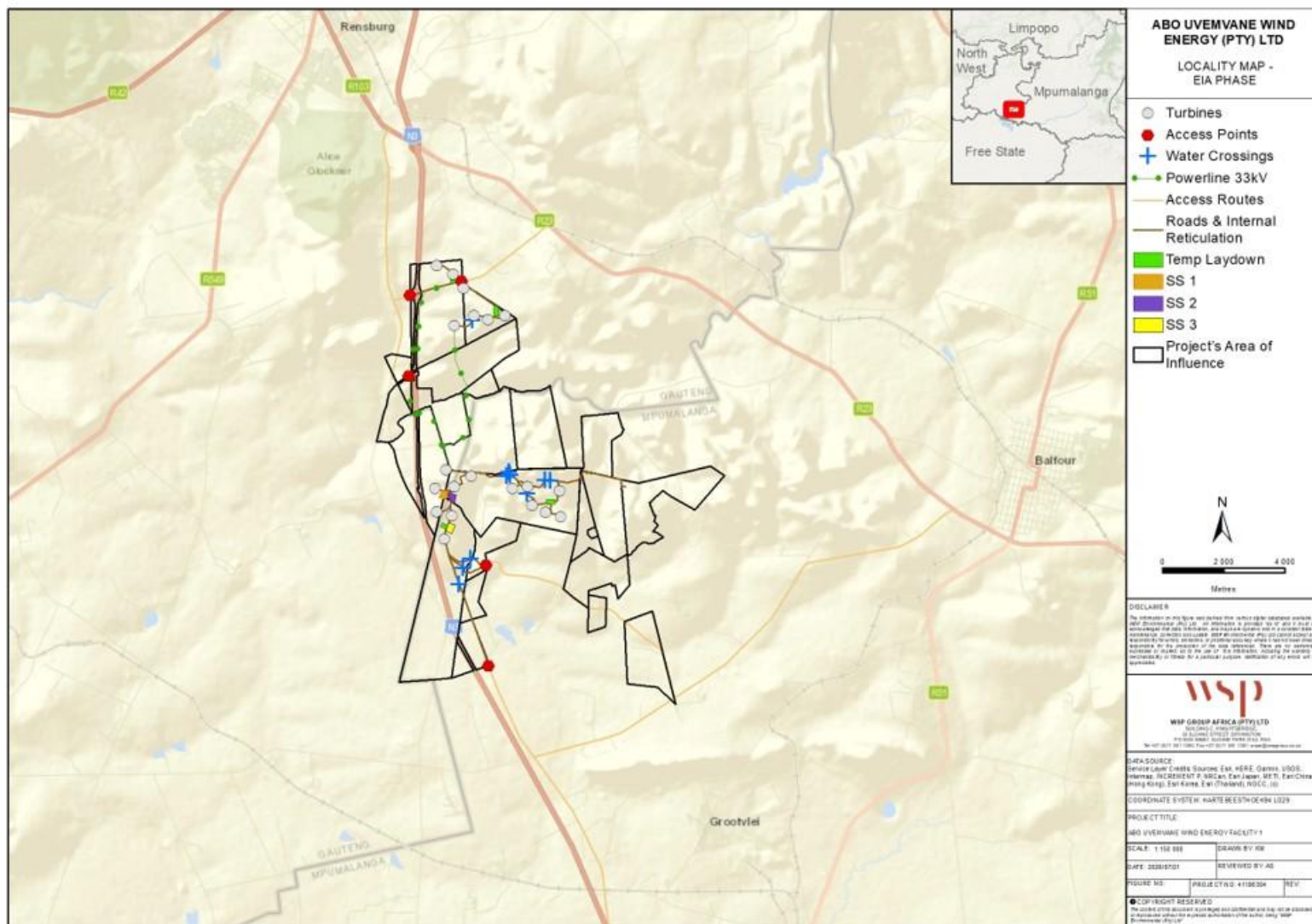


Figure 1 Map showing the regional location and extent of the Project's Area of Influence defined for the impact assessment phase.

1.4. Environmental Screening Tool - Project Sensitivities

The PAOI and its surrounds were assessed at a desktop level using the Department of Fisheries, Forestry and the Environment (DFFE) National Web-based Environmental Screening Tool. According to the sensitivity report output, the Terrestrial Biodiversity Theme is rated 'Very High Sensitivity' due to the presence of the following features:

- Critical Biodiversity Area 1;
- Critical Biodiversity Area 2;
- Ecological Support Areas 1;
- Ecological Support Areas 2;
- Ecological Support Areas: Landscape corridor;
- Ecological Support Area: Local corridor;
- National Protected Area Expansion Strategy;
- Soweto Highveld Grassland – Vulnerable; and
- Tsakane Clay Grassland – Endangered.

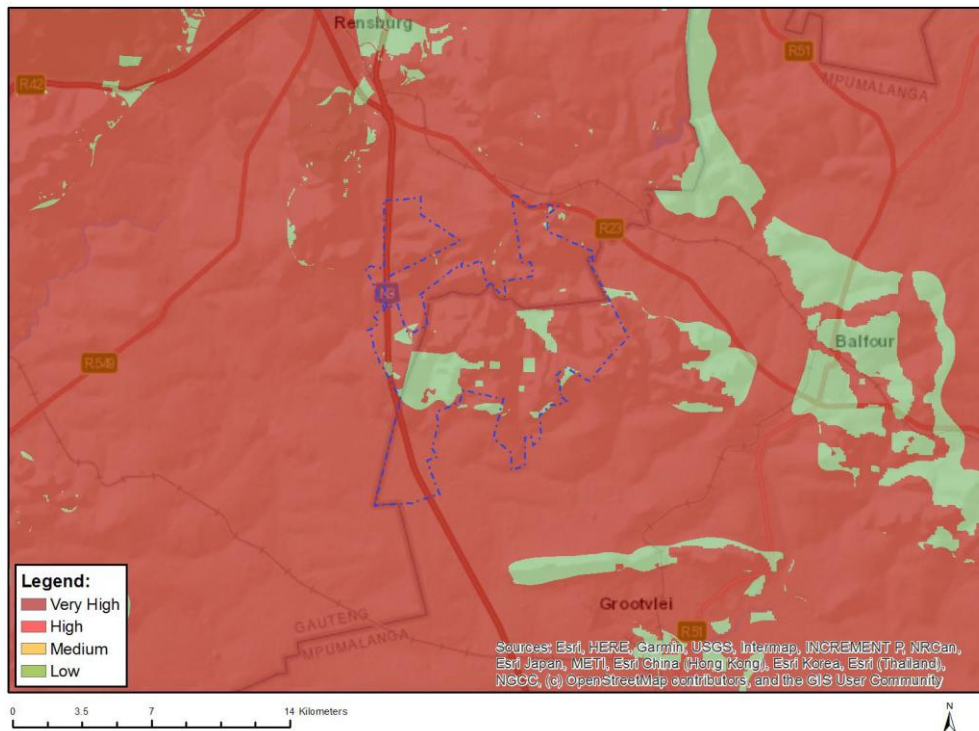


Figure 2: Screening report sensitivity for the Terrestrial Biodiversity theme.

2. Relevant Legislation and Guidelines

National and provincial legislation, associated guidelines and policies that are relevant to the environmental and biodiversity, and which were used to guide the Terrestrial Biodiversity Specialist Assessment are listed in Table 3.

Table 3: Relevant environmental and biodiversity legislation and guidelines.

Applicable Legislation and Guideline	Relevance to the Proposed Project
National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA)	<p>Section 24 of the NEMA, headed “Environmental Authorisations” sets out the provisions which are to give effect to the general objectives of Integrated Environmental Management, and laid down in Chapter 5 of the NEMA. In terms of section 24(1), the potential impact on the environment of listed activities must be considered, investigated, assessed and reported on to the competent authority charged by the NEMA with granting of the relevant environmental authorisation. In terms of section 24F(1) of the NEMA no person may commence an activity listed or specified in terms of section 24(2)(a) or (b) unless the competent authority has granted an environmental authorisation for the activity.</p> <p>Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA (1998), when applying for environmental authorisation, the following is relevant to this study:</p> <ul style="list-style-type: none"> • Protocol for the specialist assessment and report content requirements for environmental impacts on terrestrial biodiversity.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA)	<p>The NEMBA is administered by the Department of Forestry, Fisheries and the Environment (DFFE) and provides the framework under the NEMA for the:</p> <ul style="list-style-type: none"> • Management and conservation of South Africa’s biodiversity; • The protection of species and ecosystems that warrant protection; • The fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; and • The establishment and functions of a South African National Biodiversity Institute (SANBI). <p>Amongst other components, the NEMBA includes:</p> <ul style="list-style-type: none"> • Lists of Critically Endangered, Endangered, Vulnerable and Protected Species (February 2007), with associated amendments (December 2007) (ToPS), published under Section 56(10) of NEMBA; • Threatened or Protected Species Regulations (February 2007); and

Applicable Legislation and Guideline	Relevance to the Proposed Project
	<ul style="list-style-type: none"> National list of threatened terrestrial ecosystems for South Africa (2022 revision), published under Section 51(1)(a) of NEMBA. National Biodiversity Offset Guideline (2023), which provides guidance on the need to develop biodiversity offsets. <p>The purpose of ToPS lists and regulations are to regulate the permit system concerning restricted activities involving specimens of listed threatened or protected species. The primary purpose of listing threatened ecosystems is to reduce the rate of ecosystem and species extinction by identifying ‘witness’ sites’ of exceptionally high conservation value and enabling and facilitating proactive management of these ecosystems.</p> <p>Chapter 5 of NEMBA also provides a list of regulations and guidance concerning alien invasive species, including:</p> <ul style="list-style-type: none"> A guideline for Monitoring, Control and Eradication Plans (September 2015); 2020 Alien and Invasive Species Regulations (September 2020); and Alien and Invasive Species Lists (March 2021).
National Environmental Management: Protected Areas Act (2003) (NEMPA)	<ul style="list-style-type: none"> The NEMPA provides the framework under the NEMA for the protection and conservation of South Africa’s biodiversity through the establishment of a system of protected areas that represent the country's diverse ecosystems, landscapes, and seascapes; and The NEMPA sets out mechanisms and processes for declaring and managing protected areas, including protected environments, with an emphasis on intergovernmental cooperation and public involvement.
Mpumalanga Nature Conservation Act (Act No. 10 of 1998)	<p>Amongst other provisions, the Mpumalanga Nature Conservation Act (Act No. 10 of 1998) provides lists of specially protected and protected flora and fauna. Of particular relevance to this specialist study are species of game/wild animals and flora that are listed under:</p> <ul style="list-style-type: none"> Schedule 1: Specially Protected Game; Schedule 2: Protected Game; Schedule 4: Protected Wild Animals; Schedule 11 and 12: Protected and Specialist Protected Plants.
Nature Conservation Ordinance 12 of 1983, as amended by Gauteng General Law Amendment Act 4 of 2005.	<p>Amongst other provisions, the Nature Conservation Ordinance provides lists of specially protected and protected flora and fauna. Of particular relevance are Schedule 2, 2A, 4, 7, 11 and 12 concerning Protected and Specially Protected fauna and flora.</p>
Other Relevant national and Provincial Policies, Plans and Guidelines	<p>Other relevant policies, plans and guidelines that were considered during this study include:</p>

Applicable Legislation and Guideline	Relevance to the Proposed Project
	<ul style="list-style-type: none"> • Species Environmental Assessment Guideline, Version 3.1 (2022) and Version 4.1. (2026); • National Protected Area Expansion Strategy (2018); • Best practice Guidelines for Implementing the Mitigation Hierarchy in South Africa – Draft February 2023. (EWT, 2023); • Mpumalanga Protected Areas Expansion Strategy – 20 Year Plan; • Mpumalanga Biodiversity Sector Plan (2024); • Gauteng Conservation Plan (Version 4) (2024); • The Ridges Guideline (2019) for Gauteng Province; • The Red List Plant Guideline (2018) for Gauteng Province; and • Gauteng Department of Agriculture and Rural Development Requirements for Biodiversity Assessments Version 3.

3. Study Methodology

The study methodology comprised a desktop literature review and an on-site field programme, both undertaken in accordance with the Species Environmental Assessment Guidelines, Version 3.1 (SANBI, 2022), with subsequent reporting updated where necessary to align with Version 4.1 (SANBI, 2026). The specific tasks associated with the desktop literature review and field programme are outlined below:

3.1. Desktop Literature Review

The aim of the desktop literature review component was to collate and review data and information pertaining to terrestrial biodiversity that may occur in the PAOI and surrounding landscape, based on historic distribution ranges or recent records.

Literature and data that were reviewed to provide an overview of the biodiversity attributes and conservation context of the PAOI and surrounding landscape were obtained from a variety of online and literature sources, as discussed below:

- The South African National Biodiversity Institute's (SANBI) Final Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018) was consulted to identify the regional vegetation types relevant to the PAOI;
- Mucina and Rutherford (2011) was reviewed to obtain full descriptions of the relevant regional vegetation types. Scholes and Walker (1993) and SANBI (2013) were also reviewed for biome-level descriptions;
- The NEMBA Revised National List of Threatened Ecosystems – 2022 (NEMBA Threatened Ecosystems, 2022) was consulted to determine the conservation status of relevant vegetation types and ecosystems;
- The Mpumalanga Biodiversity Sector Plan (MBSP) (2024) and the Gauteng Conservation Plan (C-Plan) (Version 4) were reviewed to determine the status and distribution of *inter alia*, protected areas, Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA) in the PAOI. Information on the triggering criteria for the MBSP CBAs was obtained from the Mpumalanga Parks and Tourism Agency (MPTA);
- The Strategic Water Source Areas (SWSA) and Freshwater Ecosystem Priority Area (FEPA) databases were reviewed for information on the hydrological setting of the PAOI;
- The spatial data of Indigenous Forest Patches was consulted to identify any indigenous forests in, or in close proximity to, the PAOI;
- The South African Protected Areas Database website (SAPAD, 2026) was reviewed to identify protected areas (legally gazetted) and conservation areas in the landscape in which the PAOI is located;
- The National Protected Area Expansion Strategy (NPAES) (2018) and the Mpumalanga Protected Area Expansion Strategy (20 Year Plan) were assessed to identify Priority Focus Areas for protected area expansion that overlap with the PAOI;
- The Key Biodiversity Areas (KBA) website was assessed to identify any KBAs in the region in which the PAOI is located. Marnewick, *et al.*, (2015) was also reviewed for descriptions of any relevant Important Bird Areas (IBA);
- Ridge spatial data for Gauteng Province were reviewed in relation to the PAOI;

- Provincial spatial data on Mpumalanga’s Climate Change Corridor Network and Intact Grassland Patches were consulted to assess the PAOI in relation to these mapped features; and
- Satellite imagery available on Google Earth Pro was studied to develop an understanding of general landcover, likely habitat types, and historic and current on-site disturbances.

3.2. Field Programme

The field programme consisted of two seasonal surveys: a dry-season survey was conducted from 29 July to 2 August 2024 and focused on fauna sampling; and a wet-season survey was conducted from 20 to 24 January 2025, and targeted both fauna and flora:

- Field work focused on assessing *inter alia*, the general condition and composition of natural and semi-natural habitats, characterising on-site flora and fauna communities, and verifying the site’s sensitivity with respects to terrestrial biodiversity;
- Sampling methodologies were aligned with SANBI (2022) recommendations:
 - Vegetation and flora were sampled using timed-meander searches. These were conducted at representative sites in the main natural habitat units across the PAOI;
 - Fauna (excl. bats and avifauna) were sampled using both active (e.g. camera traps, Sherman traps) and passive surveying methods (i.e., visual observations and indirect observations of tracks, scats, burrows, etc.). Anecdotal evidence was also collected from local owners and users;
- Special emphasis was placed on the presence/potential presence of species of conservation concern (SCC), habitat connectivity, and sites/habitats of importance and sensitivity.

For detailed information on surveying methods, refer to the Animal Species and Plant Species Specialist Assessment reports.

3.3. Delineation and Mapping of Habitat Units

Mapping of the main habitat units in the PAOI was based on a desktop analysis of composite satellite/aerial imagery, coupled with field data and observations obtained during the field programme.

3.4. Assessment of Site Ecological Importance

The ecological importance of habitat units was determined using the protocol for evaluating site ecological importance (SEI) as published in SANBI’s Species Assessment Guideline (SANBI, 2026). SEI is considered to be a function of the biodiversity importance (BI) of a receptor and its resilience to impacts (receptor resilience, RR), as per:

$$SEI = BI + RR.$$

Biodiversity importance is a function of conservation importance (CI) and the functional integrity (FI) of the receptor, as per:

$$BI = CI + FI$$

- **Conservation Importance** is defined as “the importance of a site for supporting biodiversity features of conservation concern present, e.g., populations of IUCN threatened and Near

Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes” (SANBI, 2026).

- **Functional Integrity** is defined as “A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts” (SANBI, 2026).
- **Receptor Resilience** is defined as “the intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention” (SANBI, 2026).

For tables detailing the rating criteria for Conservation Importance, Functional Integrity and Receptor Resilience and the scoring matrices, refer to Appendix B. Table 4 presents a guideline for interpreting the SEI (SANBI, 2026).

Table 4: Guidelines for interpreting SEI in the context of the proposed development activities

Site Ecological Importance	Interpretation in relation to proposed development activities
Very High	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.
Source: SANBI (2026).	

4. Assumptions, Uncertainties and Gaps in Knowledge

The following assumptions, uncertainties and gaps in knowledge are highlighted for this biodiversity assessment:

- It is assumed that flora and fauna species data (e.g., species lists and distribution records) obtained from online databases are accurate and up to date. However, it is acknowledged that these resources may contain limitations or discrepancies due to outdated information or misidentifications;
- The field programme comprised two five-day field surveys: July/August 2024 (mid-winter dry season) and January 2025 (mid-summer wet season). The dry- and wet season surveys coincided with periods of high fauna presence and activity and were thus optimal to assess

fauna community composition. With respects to flora, the wet season survey was conducted following adequate rainfall. Vegetation was actively growing and flowering and conditions were therefore optimal for assessing flora species composition and vegetation condition. Seasonality was therefore not considered a limiting factor with respects to this specialist assessment;

- Notwithstanding the above, it is possible that certain herbaceous taxa (e.g., annuals and geophytes) that are most readily visible or distinguishable at other periods during the year, may not have been detected during the field survey;
- The absence or non-recording of a specific fauna species, at a particular time, does not necessarily indicate that 1) the species does not occur there; 2) the species does not utilise resources in that area; or 3) the area does not play an ecological support role in the ecology of that species; and
- Given the difficulty of fully sampling and characterising the abundance and distribution of fauna species in the PAOI during the short period of time allocated to field work, the baseline descriptions were qualitative.

5. Regional Vegetation Characteristics

The PAOI contains elements of both the Grassland and Savanna Biomes, and according to SANBI's regional mapping of South Africa's vegetation types (2018), is represented by four vegetation types, namely Soweto Highveld Grassland (Gm 8), Tsakane Clay Grassland (Gm 9), Andesite Mountain Bushveld (SVcb 11), and Gold Reef Mountain Bushveld (SVcb 9) (Figure 3). The general characteristics of the Grassland and Savanna Biomes, and the relevant regional vegetation types are discussed in more detail below:

5.1. Grassland Biome

The PAOI is located in the Grassland Biome, which covers approximately 28% of South Africa and is the dominant biome of the central plateau and inland areas of the eastern subcontinent (SANBI, 2013). Grasslands are typically situated in moist, summer rainfall regions that experience between 400 mm and 2000 mm of rainfall per year. Vegetation consists of a dominant field-layer comprising grasses and herbaceous perennials, with little-to-no woody plants present.

South Africa's grassland ecosystems are parsed into five groups, with the PAOI located in the Mesic Highveld Grasslands group (SANBI, 2013). Mesic Highveld Grasslands occur at mid-altitudes and experience warm, wet summers (MAP 700-1200 mm) and cold winters. They are typically highly productive sourveld grasslands that are dominated by long-lived perennial grasses (SANBI, 2013).

Fire is common in Mesic Highveld Grasslands and maintains these ecosystems in a relatively treeless form (SANBI, 2013). Apart from their importance as rich stores of biodiversity, grasslands are critically important water production landscapes, constituting about half of South Africa's Strategic Water Source Areas (SANBI, 2013).

5.2. Savanna Biome

The savanna biome is the largest biome in South Africa, covering approximately 35% of the country's land surface (Scholes and Walker, 1993). Savannas are characterised by a dominant grass layer, overtopped by a discontinuous, yet distinct woody plant component. Primary determinants of savanna composition, structure and functioning are; fire, a distinct seasonal climate, substrate type, and browsing and grazing by large herbivores (Scholes and Walker, 1993).

Compositionally, Africa's savannas are distinguished as either fine-leaved savannas or broad-leaved savannas. The distribution of these forms is based primarily on soil fertility (Scholes and Walker, 1993); fine-leaved savannas occur on nutrient rich soils and are dominated by microphyllous woody species of the Fabaceae family (most commonly indigenous *Acacia*'s). These savannas have a productive and diverse herbaceous layer that is dominated by grasses, and can support large populations of mammalian herbivores (Scholes and Walker, 1993). Conversely, broad-leaved savannas usually occur on nutrient poor soils and are dominated by macrophyllous woody species from the Combretaceae family (common genera: *Combretum* & *Terminalia*). Compared to fine-leaved savannas, broad-leaved savannas are less productive and support a lower herbivore biomass (Scholes and Walker, 1993).

5.3. Regional Vegetation Types

5.3.1. Soweto Highveld Grassland

Soweto Highveld Grassland extends in a broad band between Johannesburg and Ermelo in the north, and Perdekop and the Vaal River in the south (Mucina & Rutherford, 2011). Vegetation is characterised by short- to medium-high density tufted grassland, occurring on gently to moderately undulating plains (Mucina & Rutherford, 2011). Grasslands are typically dominated by *Themeda triandra*, along with several other co-dominant species. These grasslands are interrupted by small wetlands and rocky ridges and outcrops (Mucina & Rutherford, 2011).

In Mucina and Rutherford's (2011) regional vegetation type descriptions, important plant taxa are those species that have a high abundance, a frequent occurrence (not being particularly abundant), or are prominent in the landscape within a particular vegetation type. They recognise the following species as important taxa in Soweto Highveld Grassland vegetation type, amongst others:

Graminoids: *Themeda triandra*, *Andropogon appendiculatus*, *Brachiaria serrata*, *Cymbopogon pospischilii*, *Cynodon dactylon*, *Elionurus muticus*, *Eragrostis capensis*, *Eragrostis chloromelas*, *Eragrostis curvula*, *Eragrostis plana*, *Heteropogon contortus*, *Hyparrhenia hirta*, *Setaria sphacelata*, *Aristida junciformis*, *Aristida congesta*, *Aristida bipartita* and *Paspalum dilatatum*.

Herbs: *Hermannia depressa*, *Euryops gilfillanii*, *Geigeria aspera*, *Graderia subintegra*, *Haplocarpha scaposa*, *Helichrysum rugulosum*, *Helichrysum nudifolium*, *Lippia scaberrima*, *Senecio coronatus*, *Vernonia oligocephala* and *Wahlenbergia undulata*.

5.3.2. Tsakane Clay Grassland

Tsakane Clay Grassland occurs in pockets along a narrow band from Soweto to Springs, towards Vereeniging and between Balfour and Standerton, in Gauteng and Mpumalanga Provinces (Mucina and Rutherford, 2011). The landscape is characterised by flat to slightly undulating grassy plains and low hills. Vegetation includes short dense grasslands, dominated by several highveld grass species and several forb species (Mucina and Rutherford, 2011).

Mucina & Rutherford (2011) list the following flora species as being important or characteristic taxa in Tsakane Clay Grassland:

Grasses: *Brachiaria serrata*, *Cynodon dactylon*, *Cynodon hirsutus*, *Digitaria ternata*, *Elionurus muticus*, *Eragrostis chloromelas*, *Eragrostis plana*, *Eragrostis racemosa*, *Heteropogon contorts*, *Hyparrhenia hirta*, *Seteria sphacelata*, *Themeda triandra*, *Andropogon schirensis*, *Cymbopogon caesius*, *Melinis nerviglumis* and *Seteria nigrirostris*.

Herbs: *Acanthospermum australe*, *Eriosema salignum*, *Euryops transvaalensis*, *Gerbera viridifolia*, *Helichrysum nudifolium*, *Helichrysum rugulosum*, *Hermannia depressa*, *Nidorella hottentotica*, *Senecio coronatus*, *Senecio inornatus*, *Hypoxis rigidula*, *Striga asiatica*, *Tephrosia capensis* and *Chaetacanthus setiger*.

5.3.3. Andesite Mountain Bushveld

Andesite Mountain Bushveld is found across several separate occurrences in Gauteng, North-West, Mpumalanga and Free State Provinces. This vegetation type is characterised by medium-tall thorny

bushveld, with a well-developed grass layer on hillslopes and the valleys of undulating landscapes (Mucina and Rutherford, 2011).

Mucina & Rutherford (2011) list the following flora species as being important or characteristic taxa in Andesite Mountain Bushveld:

Trees and Tall Shrubs: *Dombeya rotundifolia*, *Celtis africana*, *Combretum molle*, *Diospyros lycioides* subsp. *lycioides*, *Gymnosporia polyacantha*, *Euclea crispa*, *Protea caffra*, *Searsia pyroides* var. *pyroides*, *Searsia rigida*, *Senegalia caffra*, *Vachellia karroo*, *Zanthoxylum capense* and *Ziziphus mucronata*.

Grasses: *Hyparrhenia hirta*, *Setaria sphacelata*, *Themeda triandra*, *Digitaria eriantha*, *Elionurus muticus*, *Eragrostis racemosa*, *Eragrostis superba*, *Panicum maximum*, *Cymbopogon pospischilii*, *Digitaria eriantha* and *Eragrostis curvula*.

Herbs: *Commelina africana*, *Vernonia natalensis*, *Vernonia oligocephala* and *Aloe greatheadii* var. *davyana*.

5.3.4. Gold Reef Mountain Bushveld

Gold Reef Mountain Bushveld occurs along rocky west-east trending ridge and hill systems in the North-West, Gauteng, Free State and Mpumalanga Provinces (Mucina and Rutherford, 2011). Vegetation comprises a mixture of trees and grasses, with dense woody vegetation dominated by *Senegalia caffra* associated with south-facing slopes (Mucina and Rutherford, 2011).

Mucina & Rutherford (2011) list the following flora species as being important or characteristic taxa in Gold Reef Mountain Bushveld:

Trees and Tall Shrubs: *Dombeya rotundifolia*, *Celtis africana*, *Combretum molle*, *Englerophytum magalismsontanum*, *Ochna pretoriensis*, *Gymnosporia buxifolia*, *Mystroxylon aethiopicum*, *Protea caffra*, *Searsia leptodictya*, *Vangueria infausta*, *Vangueria parvifolia*, *Canthium gilfillanii*, *Ehretia rigida*, *Grewia occidentalis*, *Senegalia caffra* and *Ziziphus mucronata*.

Low Shrubs: *Athrixia elata*, *Pearsonia cajanifolia*, *Searsia magalismsontana* subsp. *magalismsontana*, *Searsia rigida* var. *rigida* and *Ancylobothrys capensis*.

Grasses: *Loudetia simplex*, *Panicum natalense*, *Trachypogon spicatus*, *Alloteropsis semialata*, *Bewsia biflora*, *Digitaria tricholaenoides*, *Diheteropogon amplexans*, *Tristachya biseriata* and *Tristachya leucothrix*.

Herbs: *Helichrysum nudifolium*, *Helichrysum rugulosum*, *Pentanisia angustifolia*, *Senecio venosus*, *Xerophyte retinervis*, *Cheilanthes hirta*, *Hypoxis hemerocallidea* and *Pellaea calomelanos*.

6. Regional Ecological Sensitivity and Conservation Setting

6.1. Nationally Threatened Ecosystems

According to the NEMBA Revised National List of Threatened Ecosystems (2022), Andesite Mountain Bushveld and Gold Reef Mountain Bushveld are not threatened. Soweto Highveld Grassland however, is listed as Vulnerable, while Tsakane Clay Grassland is listed as Endangered. Both of these vegetation types have experienced large-scale habitat loss and modification due to cultivation, urbanisation, mining, dam building and road infrastructure. Considering the conservation status of Soweto Highveld Grassland and Tsakane Clay Grassland, any potential losses associated with the proposed Project are a concern. The remaining extent of Soweto Highveld Grassland and Tsakane Clay Grassland, as mapped by SANBI are shown in Figure 4.

The proposed Project layout has been intentionally configured to avoid placing infrastructure within natural habitat areas classified as Soweto Highveld Grassland and Tsakane Clay Grassland. While the layout generally avoids patches of Tsakane Clay Grassland, small portions of Soweto Highveld Grassland will still be affected in the PAOI.

6.2. Terrestrial Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs)

Both the MBSP (2024) and the Gauteng C-plan (2024) recognise three primary categories of conservation land; protected areas, critical biodiversity areas (CBA) and ecological support areas (ESA). Land not designated under these three categories is essentially 'other natural areas' or 'modified habitats'. Definitions for each category are listed below:

- **Protected Areas:** Protected areas recognised in terms of the National Environmental Management Protected Areas Act, No. 57 of 2003, that are currently considered to meet biodiversity targets;
- **Critical Biodiversity Area:** Areas (outside of Protected Areas) that are required to meet provincial biodiversity targets for biodiversity pattern (species and ecosystems) and ecological processes. They should remain in a natural state and maintained in good ecological condition. Both the MBSP and the Gauteng C-plan recognise two CBA ranks, viz. CBA Irreplaceable and CBA Optimal under the MBSP, and CBA 1 and CBA 2 under the Gauteng C-Plan;
- **Ecological Support Area:** Play an important role in supporting the ecological functioning of critical biodiversity areas or for generating or delivering important ecosystem services. They support landscape connectivity and resilience to climate change adaptation. They need to be maintained in at least an ecologically functional state;
- **Other Natural Areas:** Often retain much of their natural character and may contribute significantly to maintenance of viable species populations and natural ecosystem functioning, and may provide important ecological infrastructure and ecosystem services. They are not, however, prioritized for immediate conservation action (under the MBSP); and
- **Modified:** Often referred to as transformed, these areas have lost a significant proportion (or all) of their natural biodiversity and in which ecological processes have broken down (in some cases irretrievably), as a result of biodiversity-incompatible land-use practices such as ploughing, hardening of surfaces, mining, cultivation and the construction of houses or other built infrastructure.

The spatial delineations of the MBSP and the Gauteng C-Plan in relation to the PAOI are shown in Figure 5. Field observations and aerial imagery indicate that certain CBA/ESA patches have been disturbed by past/current cultivation and therefore do not comprise undisturbed natural habitat (these are shown in Figure 6).

The MBSP delineations indicate that portions of the east and centre of the PAOI are classified as CBA Irreplaceable, with smaller areas designated as CBA Optimal and ESAs. The remaining areas are categorized as “other natural areas” or “modified habitats.” The statuses of the MBSP CBA delineated habitat patches in the PAOI and surrounding landscape are predicated on a combination of the following attributes, as per data received from the Mpumalanga Parks and Tourism Agency (MPTA) (M. Lötter):

- Vegetation:
 - Andesite Mountain Bushveld;
 - Soweto Highveld Grassland;
 - Tsakane Clay Grassland;
 - Gold Reef Mountain Bushveld;
- Wetlands:
 - Central Bushveld Group One;
- Amphibians:
 - Giant Bullfrog (*Pyxicephalus adspersus*);
- Invertebrate:
 - *Chrysoritis aureus buffer*;
 - *Chrysoritis aureus* (GDARD model);
- Plants:
 - *Brachycorythis conica* subsp. *transvaalensis*;
- Process:
 - Escarpment south;
 - Climate change refugia;
 - Macro-corridor connecting to Gauteng CC corridor;
 - Critical linkages; and
 - Core corridor.

The Gauteng C-Plan delineations designate large areas of the Gauteng portion of the PAOI as ESAs with smaller areas designated as CBA 1 and CBA2. Triggering criteria for the Gauteng C-Plan designated CBAs include Red List plant, bird and invertebrate habitats, Orange List plant habitat, bioclimatic zones, priority quaternary catchments and primary vegetation.

The continued ecological functioning and integrity of CBAs is required to meet provincial conservation targets for biodiversity patterns (species and ecosystems) and ecological processes. Accordingly, activities that cause transformation (i.e., developmental activities) in CBAs should be avoided. Although most proposed Project infrastructure have been positioned, as far as possible, to avoid CBAs or align with existing disturbance footprints, portions of the proposed access road network traverse CBA patches and may result in losses and disturbances.

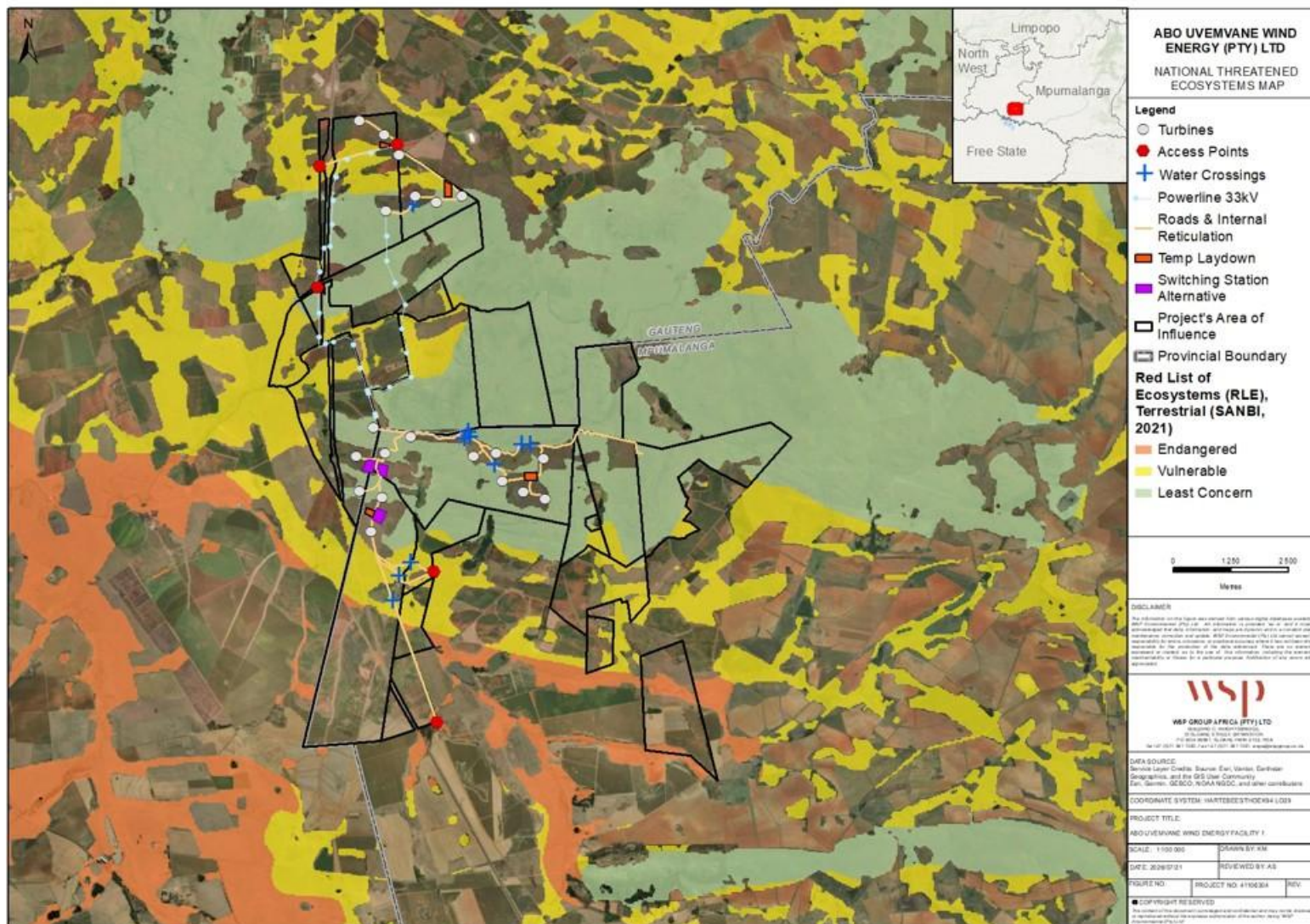


Figure 4: PAOI in relation to the Red List of Ecosystems mapping data.

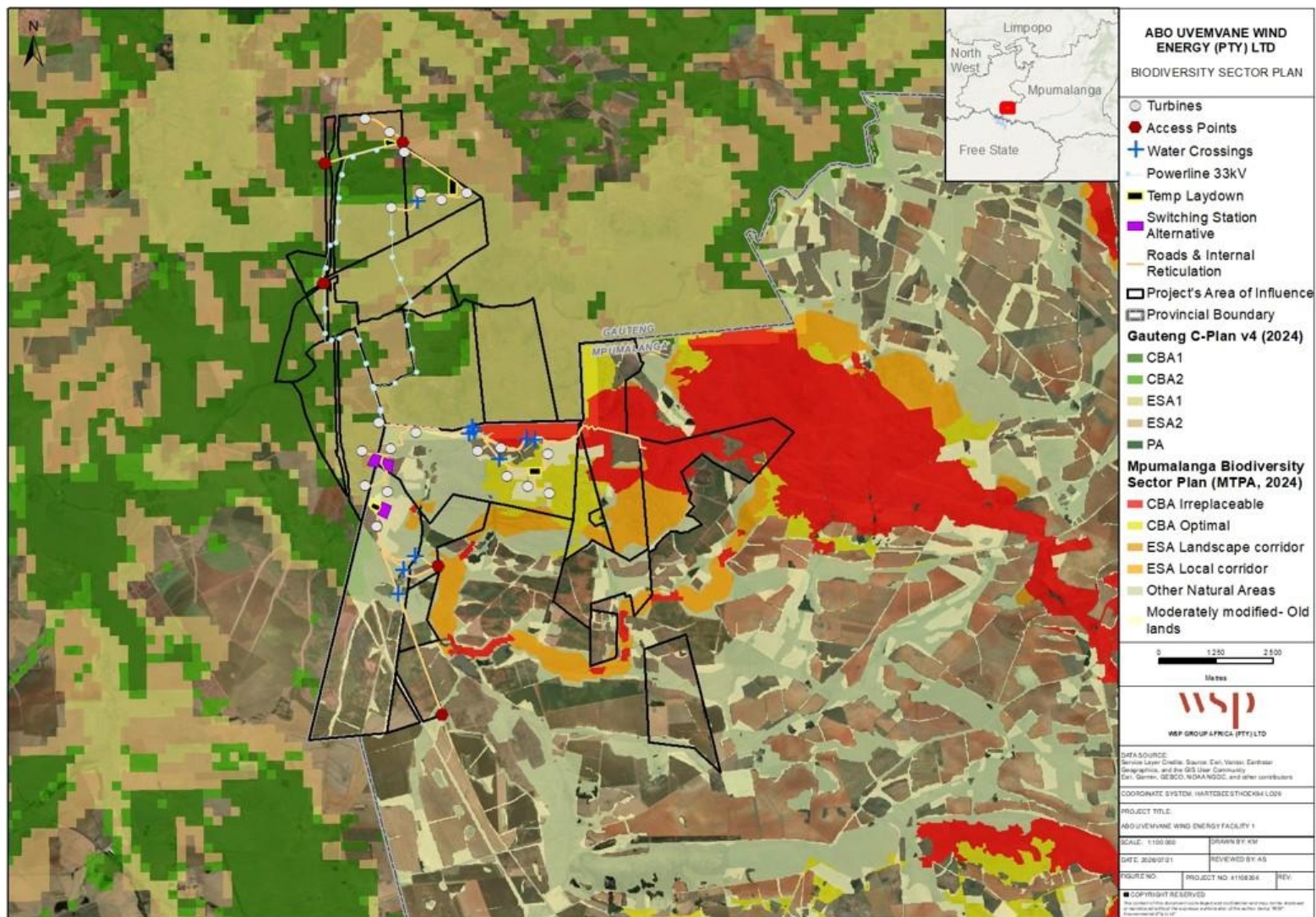


Figure 5: PAOI in relation to mapped Protected Areas, CBAs and ESAs, as per the Gauteng C-Plan (2024) and the MBSP (2024).

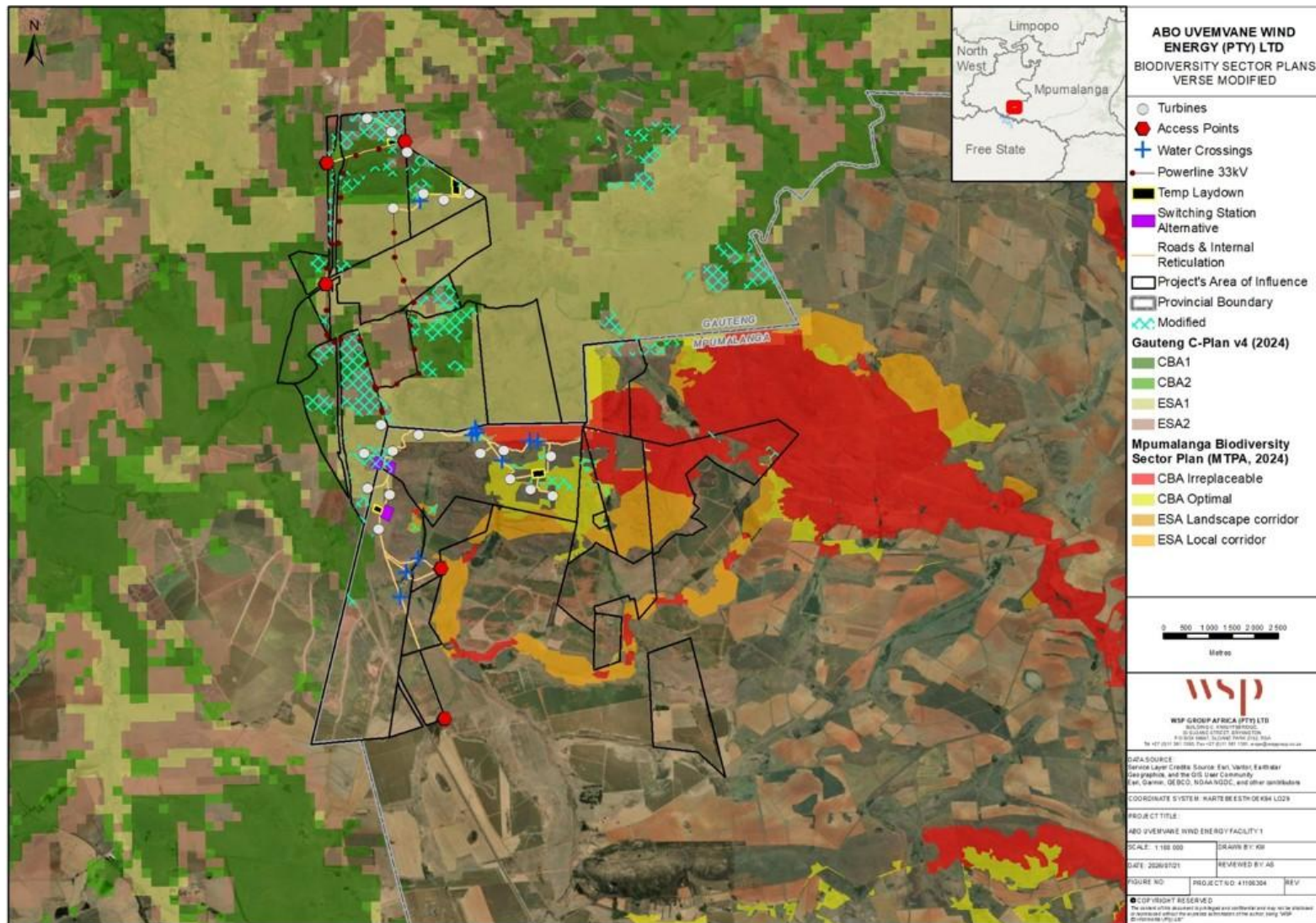


Figure 6: CBAs and ESAs that have been disturbed by past/current cultivation activities.

6.3. Strategic Water Source Areas

Strategic Water Source Areas (SWSA) are regions that yield a disproportionately high volume of water relative to their size. Although mapped SWSAs occupy only 10% of the combined land area of South Africa, Lesotho, and Eswatini, they provide approximately 50% of the total water supply to these countries (SANBI, 2023). Due to their vital contribution to national water supply, they are recognised as key features of South Africa's water security. Sustaining the ecological integrity of SWSA is therefore essential to ensure long-term water availability (SANBI, 2023). The PAOI is not located in a SWSA for groundwater or surface water (see Figure 7). SWSAs were therefore not included as a receptor for the impact assessment or considered further in this report.

6.4. Freshwater Ecosystem Priority Areas

Freshwater Ecosystem Priority Areas (FEPA) are rivers and wetlands required to meet biodiversity targets for freshwater ecosystems. Essentially, these areas were identified at a national level as priority areas for conserving freshwater ecosystems and supporting the sustainable use of water resources, as well as upstream catchment management areas (Driver, *et al.*, 2012). FEPAs should be maintained in a natural/near natural condition, and anthropogenic activities in Upstream Management Areas should be carefully managed to prevent degradation of downstream FEPAs. The site does not lie within a National Freshwater Ecosystem Priority Area (FEPA) River Sub catchment (Belcher, 2026). The PAOI is located in a 'Migration Corridor', as per the mapping of FEPA shown in Figure 8. This corridor is mostly associated with the Suikersbosrand River, which runs through the centre of the PAOI.

6.5. Indigenous Forests

No indigenous forests are present in the PAOI. Indigenous forests were therefore not included as receptor for the impact assessment or considered further in this report.

6.6. Protected Areas and Conservation Areas

The PAOI is not located in a formal protected area (Figure 9). The nearest protected areas are Alice Glöckner Provincial Nature Reserve and Suikerbosrand Nature Reserve, both of which are managed by the Gauteng Provincial Government:

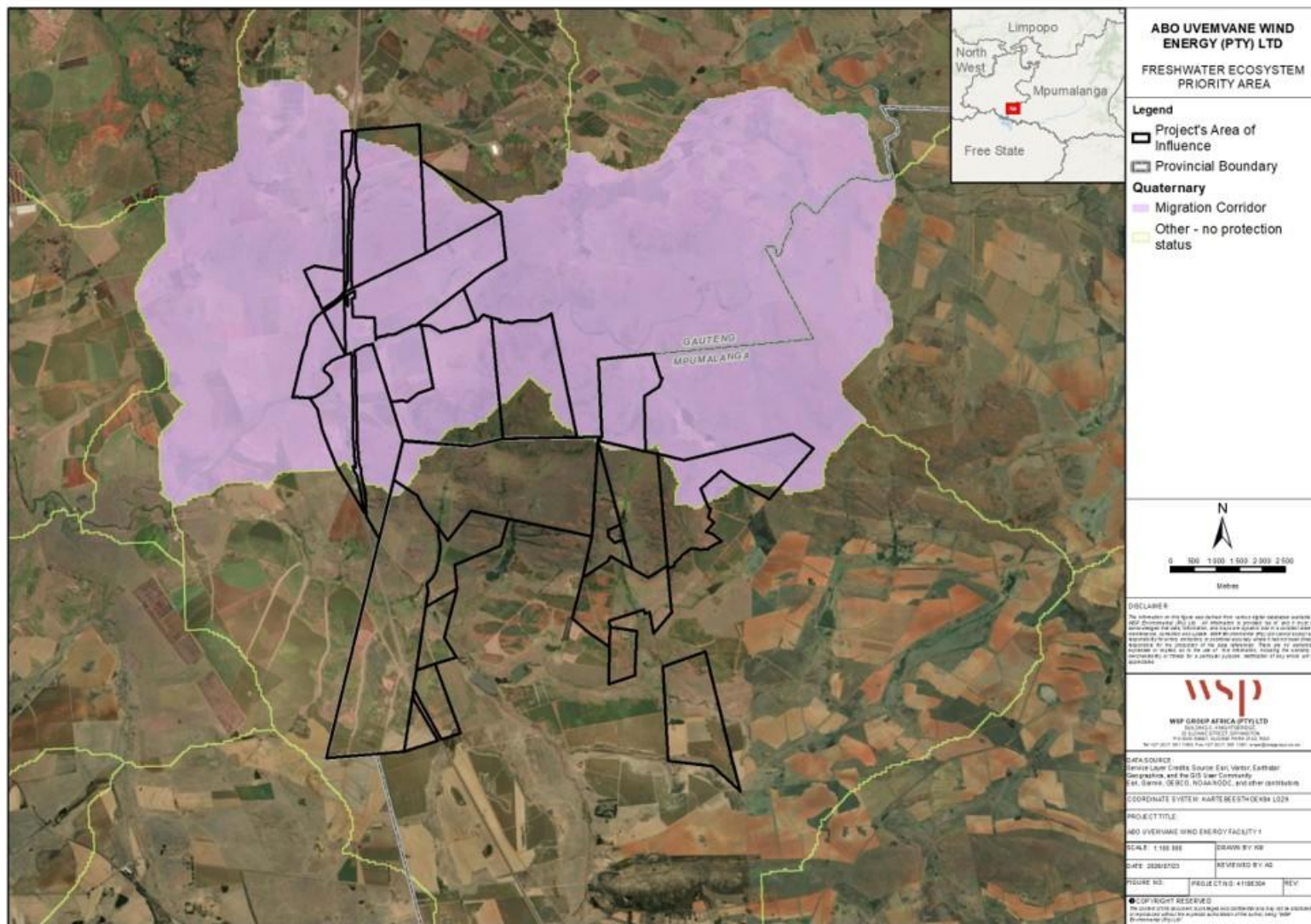
- Alice Glöckner Provincial Nature Reserve is 155.40 ha in extent and located approximately 3.2 km north-west of the PAOI; and
- Suikerbosrand Nature Reserve is about 11 333 ha in extent and located approximately 13 km north-west of the PAOI.

Amongst other biodiversity attributes, both nature reserves are recognised as butterfly hotspots, with *Aloeides dentatis dentatis*, *Chrysoritis aureus*, *Orachrysops mijburghi* and *Metisella meninx* listed as important species of conservation concern for these reserves (Henning *et al.*, 2009).

6.7. Priority Focus Areas for Protected Area Expansion

Priority Focus Areas for protected area expansion are large, intact and unfragmented areas of high biodiversity importance, that are suitable for the creation/expansion of protected areas (Driver, *et al.*, 2012). Land-use planning and decision making should avoid fragmenting Priority Focus Areas, to prevent such areas from being excluded from future protected area expansion. (Driver, *et al.*, 2012).

According to the delineations of the National Protected Area Expansion Strategy (2018), large portions of the PAOI are mapped as Priority Focus Areas, as shown in Figure 10. These are mirrored across the portions of the PAOI that fall within Mpumalanga Province, according to the Mpumalanga's Protected Area Expansion Strategy – 20 Year Plan. Certain components of the proposed Project infrastructure fall within mapped Priority Focus Areas. Many of these components have, however, been located within patches of Secondary Grassland (old lands) rather than in areas of intact natural habitat. This positioning reduces potential negative impacts on the ecological functioning of the affected and adjacent portions of the Priority Focus Area network.



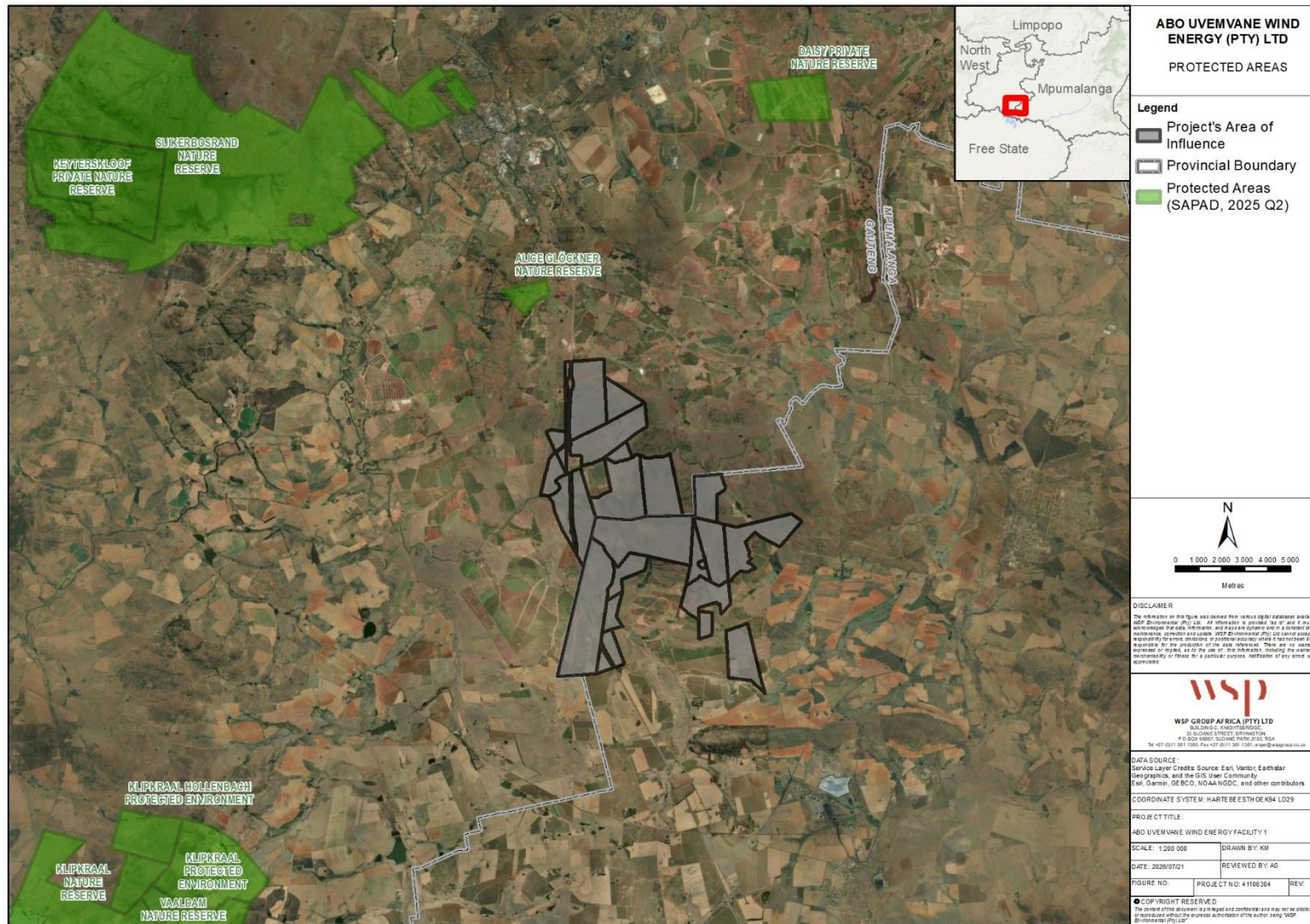
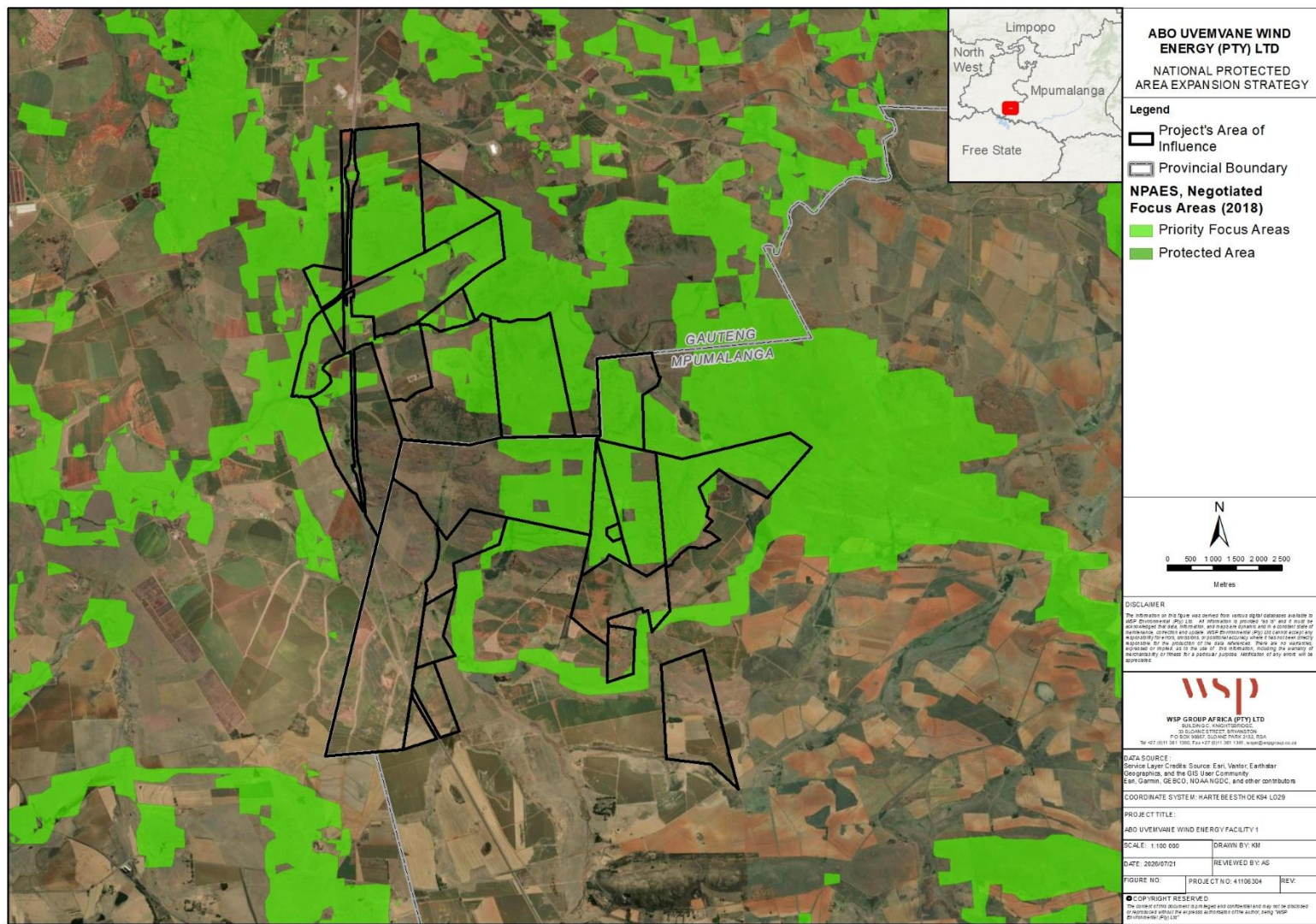


Figure 9: Protected areas and environments in the landscape surrounding the PAOI.



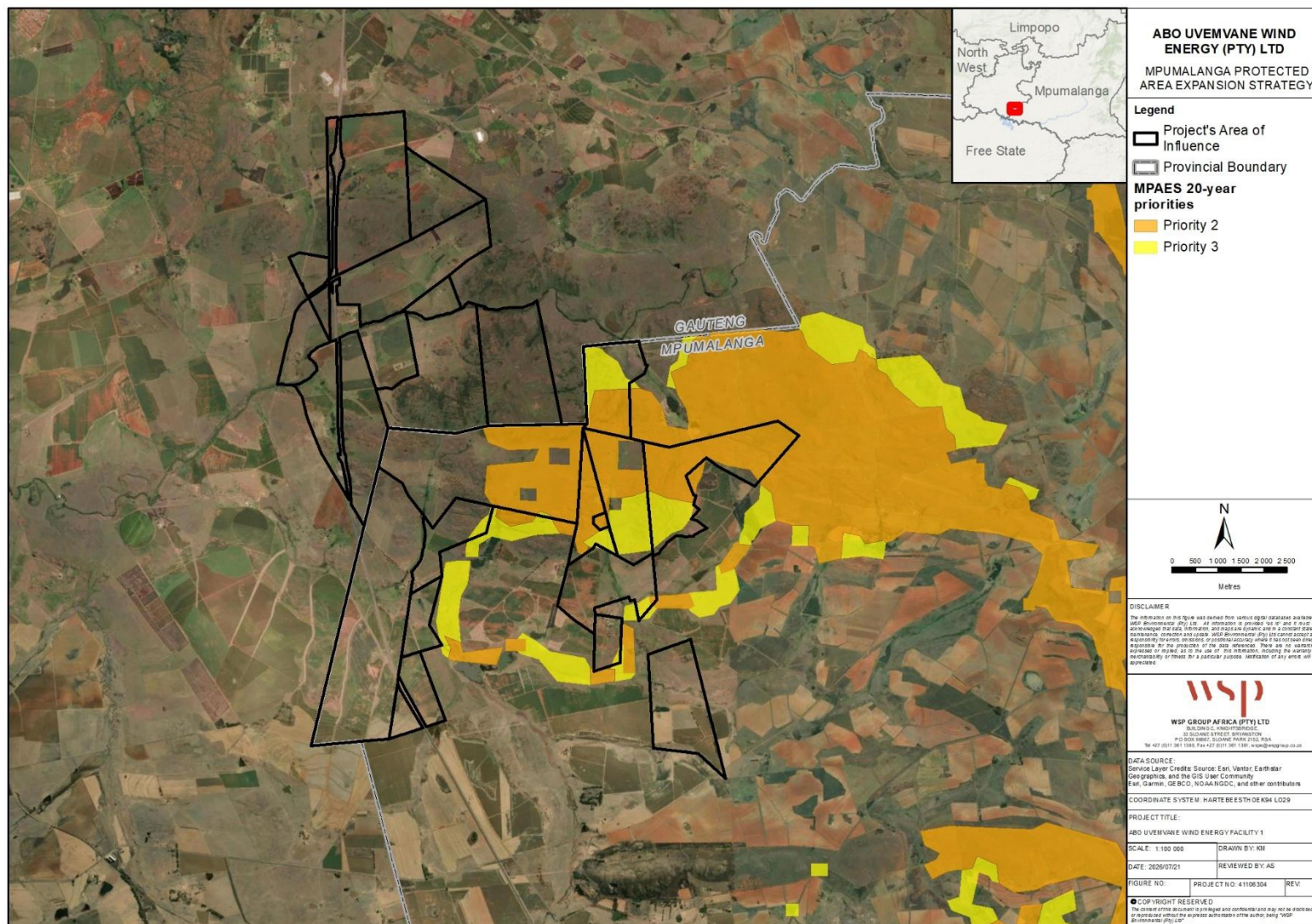


Figure 11: PAOI in relation to provincial Priority Focus Area, as per the Mpumalanga Protected Areas Expansion Strategy – 20 Year Plan.

6.8. Key Biodiversity Areas

Key Biodiversity Areas (KBA) are sites of global importance for species and their habitats (SANBI, 2024). They are identified by applying the Global Standard for the Identification of Key Biodiversity Areas that was developed by the International Union for the Conservation of Nature (IUCN) (SANBI, 2024). In total, 260 individual KBAs covering 356 000 km² have been identified in South Africa. These include South Africa's former network of Important Bird Areas (IBA) (SANBI, 2014).

The PAOI is not located in, or in close proximity to, a recognised KBA (Birdlife International, 2025). The closest KBAs are Suikerbosrand Nature Reserve (Site ID 100947), located to the north-east of the PAOI, and Devon Grasslands (Site ID 100757), which is located to the east. These are shown in Figure 12.

6.9. Climate Change Corridor Network

The Mpumalanga Climate Change Corridor Network shows a Climate Change Focal (Refugia) Area along the Gauteng-Mpumalanga border within the PAOI. Large areas in the west of PAOI are also designated as Critical Link Corridors, with smaller sections identified as Core Corridors and Supporting Corridors (Figure 13). These corridors are recognized at a provincial level as crucial connections between identified Refugia, allowing species and ecosystems to move and adapt to climate change. Large-scale modification of these corridors through infrastructure development will compromise their compatibility with respects to climate change adaptation. It must be noted that the delineations of the Mpumalanga Climate Change Corridor Network are limited to Mpumalanga Province (as shown in Figure 13), and do not extend into adjacent areas of Gauteng Province.

6.10. Intact Grassland Patches

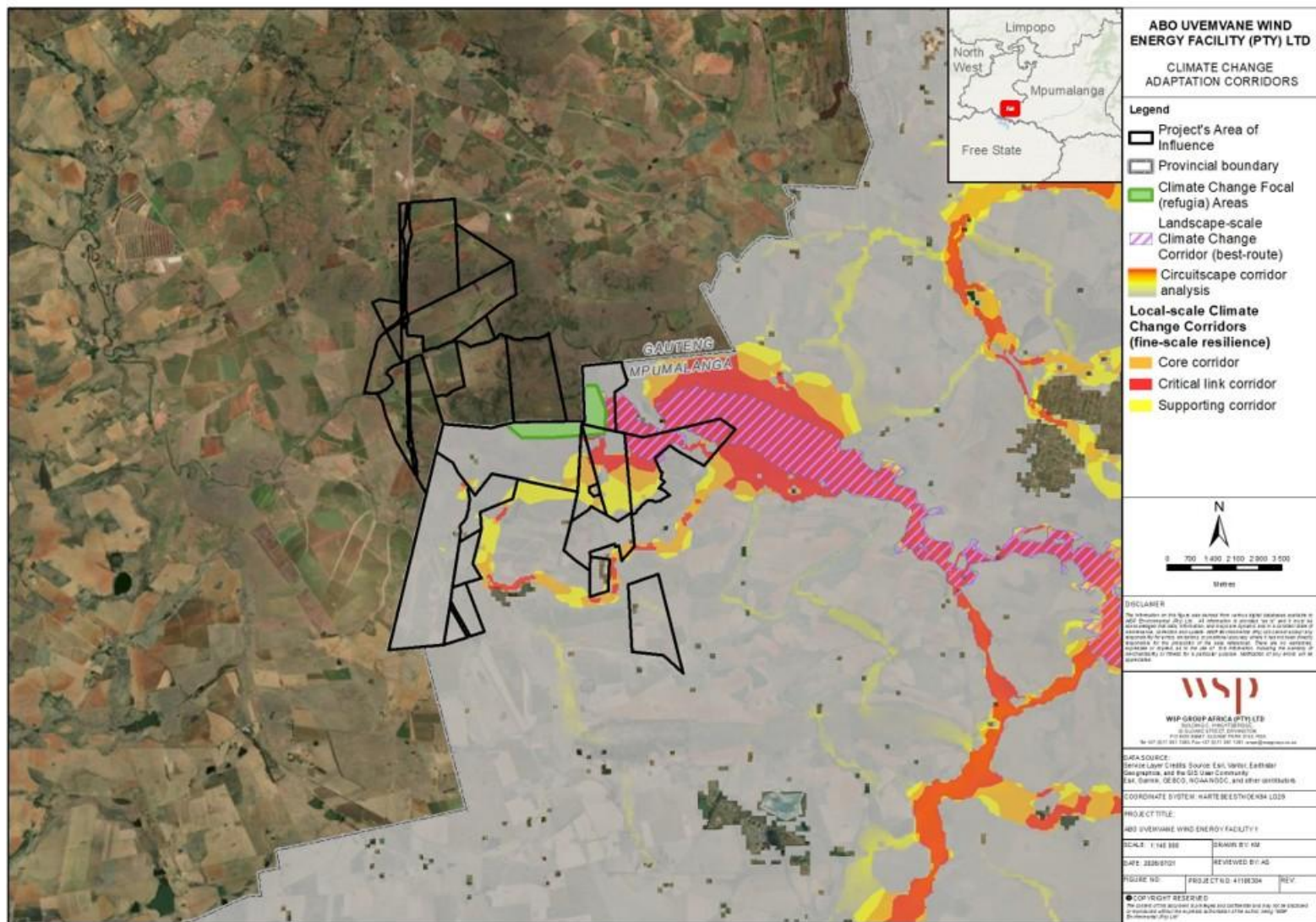
At a provincial level, MTPA has delineated a network of large 'Intact Grasslands'. These are grassland patches that are typically large (>100 ha) and well-connected across the landscape and have been identified by the provincial authorities through modelling as important for maintaining connectivity in support of *inter alia*, species populations, ecological processes and climate change adaption. No intact grasslands are located in or intersect the PAOI, as per the mapping of Mpumalanga Province's network of large intact and connected grassland patches (Figure 14)..

6.11. Rocky Ridges

Ridge ecosystems are recognised as important biodiversity features, harbouring diverse flora and fauna communities, including several species of conservation concern. They also play an important role in many ecological (dispersal) and hydrological (water recharge) processes (refer to Section 11 for additional discussion on the ecological importance of ridges). Ridges in Gauteng Province have been mapped and classified based on their degree of transformation (refer to Table 5 for ridges classes). Figure 15 illustrates the ridge classifications within the PAOI, and shows various areas designated as Class 1 ridges. As far as possible, rocky ridges were avoided through careful placement of infrastructure to prevent disturbance to these important landforms. In instances where complete avoidance was not possible, infrastructure has typically been positioned along the outer edge of the delineated ridge, often within the mapped buffer zone, rather than within the core rocky feature itself. Disturbances should also be restricted to the absolute minimum required for construction and the turbine footprints should be orientated as much as possible within the designated buffer zones. This will reduce potential impacts and helps maintain the integrity of the ridge system as far as practicable.

Table 5: Gauteng Ridge Classification

Class	Description
Class 1 Ridges	5% or less of the area has been transformed by human activity. Comprises approximately 58% of Gauteng's ridges.
Class 2 Ridges	More than 5% but less than 35% of the ridge has been transformed by human activity. Comprises approximately 23% of Gauteng's ridges.
Class 3 Ridges	Ridges that have been transformed by 35% or more, but less than 65% as a result of human activity. Comprises approximately 8% of Gauteng's ridges.
Class 4 Ridges	Ridges that have been transformed by 65% or more as a result of human activity. Comprises approximately 11% of Gauteng's ridges.



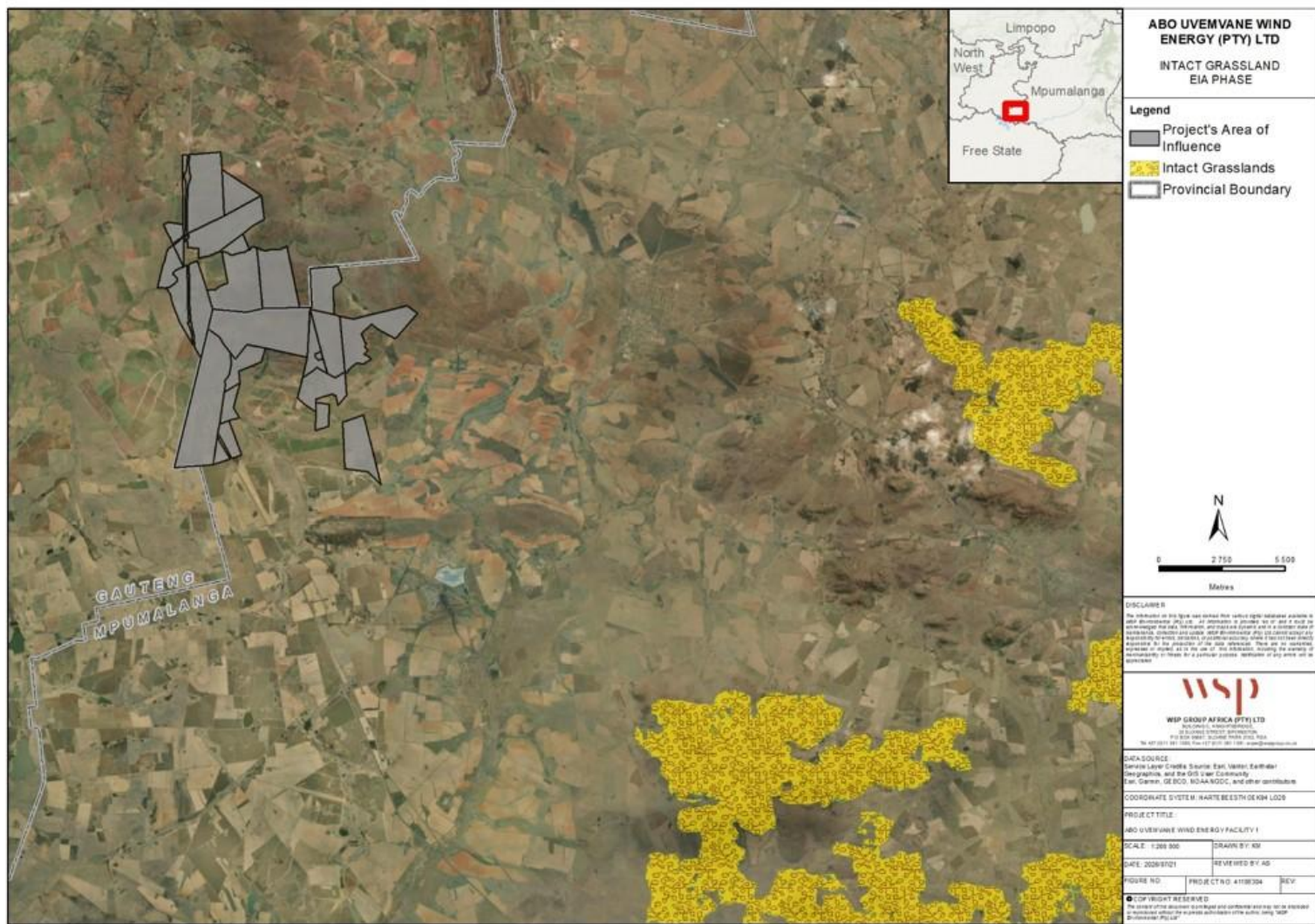


Figure 14: MPTA mapped Intact Grasslands in the landscape surrounding the PAOI.

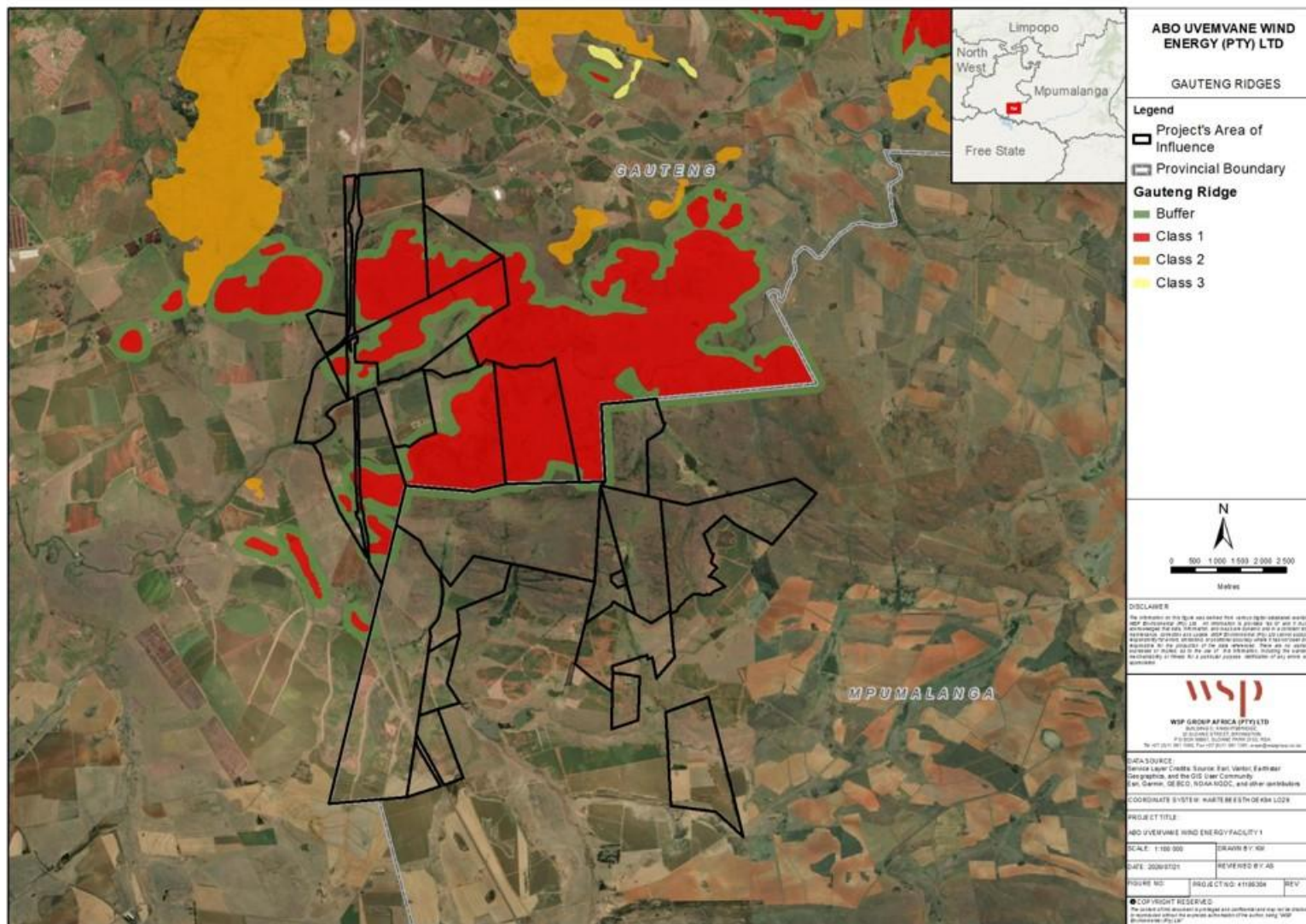


Figure 15: Gauteng Rocky Ridge classification and the PAOI.

7. Landscape Context and Existing Impacts on Terrestrial Biodiversity

The following notes summarise the general landscape context and exiting/current impacts observed in the PAOI during the field programme:

- The PAOI is large and encompasses a series of rocky ridges and hills, bisected by the Suikerbosrand River and numerous small water courses and streams;
- Most of the land in the centre of the PAOI remains natural and under wildlife or livestock management, with isolated cultivated fields also present. Cultivated fields are more prevalent along the flat and open periphery of the PAOI;
- Stands of alien invasive trees including *Acacia dealbata*, *Acacia mearnsii*, *Eucalyptus camaldulensis* and *Populus x canescens* are present in the PAOI, but are not currently abundant or widespread;
- Game/livestock fences typically delineate farm boundaries and numerous internal fences further partition farms into smaller game or grazing camps. The PAOI is also fragmented by many farm roads/tracks, as well as larger district and national roads, such as the N3 Highway, which bisects the PAOI along its western boundary; and
- Agricultural land uses (i.e., crop production and livestock farming) dominate most of the land surrounding the PAOI, and accordingly large areas are modified by cultivated fields.

8. Habitat Units in the PAOI

Seven habitat units were identified in the PAOI during the field survey. These include four natural habitats and three modified habitats:

Natural Habitats

- Mountain Bushveld;
- Rocky Shrubland and Grassland;
- Watercourses (Rivers and Wetlands);
- Natural Dry Grassland;

Modified Habitats

- Secondary Grassland;
- Alien Tree Stands; and
- Cultivated Fields.

These habitat units are described, with accompanying photographs, in Section 8.1 through to Section 8.7. **Error! Reference source not found.** **Error! Reference source not found.** A habitat unit map for the PAOI is shown in Figure 16.

8.1. Mountain Bushveld

Mountain Bushveld is a variable habitat unit, that dominates the taller rocky hills and mountains in the north of the PAOI. Vegetation structure ranges from low open bushveld to low- and short closed bushveld depending on slope position, as per Edwards (1983) structural classification, and this generally grades into the Natural Dry Grassland habitat unit.

The woody component is dominated by broad-leafed species. The herbaceous layer is moderately- to well-developed, except in very rocky sites, and in most areas is grass dominated, although forbs are common to locally abundant (Figure 17 and Figure 18).

Dominant woody species generally include *Diospyros lycioides*, *Searsia leptodictya* and *Searsia pyroides*, with several other taxa also common or diagnostic, such as *Aloe marlothii*, *Cussonia paniculata*, *Dombeya rotundifolia*, *Euclea crispa*, *Gymnosporia buxifolia*, *Lippia javanica*, *Rhoicissus tridentata*, *Vangueria parvifolia* and *Ziziphus mucronata*.

Species commonly recorded in the herbaceous layer of areas of Mountain Bushveld include grasses, such as *Brachiaria serrata*, *Eragrostis chloromelas*, *Eragrostis curvula*, *Hyparrhenia hirta*, *Melinis nerviglumis*, *Setaria sphacelata*, *Themeda triandra* and *Tristachya leucothrix*, and various forbs including *inter alia*; *Acalypha angustata*, *Berkheya setifera*, *Commelina africana* var. *barberae*, *Hilliardiella oligocephala*, *Hypoxis acuminata*, *Ipomoea ommaneyi*, *Pentanisia angustifolia* and *Pseudopegolettia tenella*.

Sensitivity Aspects

- The Mountain Bushveld that characterises the rocky hills and mountains in the PAOI is a natural habitat unit;
- These areas provide important habitat for a variety of flora and fauna, and at both local- and regional scales they increase habitat heterogeneity and play a vital role as landscape corridors and refugia;
- No flora SCC were recorded within Mountain Bushveld. However, the Endangered Mountain Reedbuck (*Redunca fulvorufula fulvorufula*) was confirmed in this habitat unit and habitat-suitability assessments also indicate that several other flora and fauna SCC may also be present – refer to Section 9 and Section 10 for additional information on recorded and potentially occurring SCC.



Figure 17: Typical Mountain Bushveld



Figure 18: Typical Mountain Bushveld

8.2. Rocky Shrubland and Grassland

Rocky shrubland and grassland characterises the low, but very rocky hills and ridges in the southern portion of the PAOI. Vegetation structure is variable and ranges from low closed grassland to low- to high open shrubland (*sensu*. Edwards, 1983). Woody vegetation is dominated by broad-leaved species and the herbaceous layer is poor- to moderately developed, and generally grass dominated (Figure 19 and Figure 20).

Dominant woody species include *Protea caffra*, *Searsia magalismontana* and *Vangueria parvifolia*. Other common woody taxa include *Ancylobothrys capensis*, *Brachylaena rotundata*, *Clusia pulchella*, *Cussonia paniculata*, *Englerophytum magalismontanum*, *Lopholaena coriifolia* and *Mundulea sericea*.

Common graminoids species recorded include *Cyperus rupestris*, *Eragrostis chloromelas*, *Eragrostis curvula*, *Eragrostis trichophora*, *Melinis nerviglumis*, *Loudetia simplex*, *Microchloa caffra* and *Tristachya leucothrix*, while common forbs include *inter alia*; *Cleome maculata*, *Commelina africana* var. *barberae*, *Helichrysum lepidissimum*, *Hilliardiella aristata*, *Hypoxis acuminata*, *Indigofera melanadenia*, *Phymaspermum athanasioides* and *Tritonia nelsonii*.

Sensitivity Aspects

Rocky Shrubland and Grassland shares many of the same sensitivity features as Mountain Bushveld:

- Rocky Shrubland and Grassland in the PAOI is a natural habitat unit;
- These areas provide important habitat for a variety of flora and fauna, and at both local- and regional scales, they increase habitat heterogeneity and play a vital role as landscape corridors and refugia;
- No flora SCC were recorded within Rocky Shrubland and Grassland. However, the Endangered Mountain Reedbuck was confirmed in this habitat unit and habitat-suitability assessments also indicate that several other flora and fauna SCC may also be present.



Figure 19: Typical area of Rocky Shrubland and Grassland.



Figure 20: Area of Rocky Shrubland and Grassland dominated by *Protea caffra* trees.

8.3. Watercourses (Rivers and Wetlands)

This is a variable habitat unit that is associated with the drainage features in the PAOI, including large watercourses, such as the Suikerbosrand River, as well as smaller drainage lines and wetland systems.

Vegetation structure along larger rivers and streams ranges from low- to short open bushveld, with certain areas characterised by low- to short closed bushveld (Figure 21). In more typical wetland areas, vegetation structure is typically characterised by low- to tall closed grassland (Figure 22) (*sensu*. Edwards, 1983).

Common woody species generally recorded along rivers and streams include a mixture of *Celtis africana*, *Diospyros lycioides*, *Leucosidea sericea*, *Salix mucronata*, *Searsia leptodictya*, *Searsia pyroides* and the alien trees *Gleditsia triacanthos*, *Salix babylonica* and *Sesbania punicea*. Some notable variations include dense, closed-canopy stands of *Olea europaea* that characterise certain mountain valley streams, and thickets dominated by *Leucosidea sericea* that characterise overgrazed river and drainage line portions.

Common flora species recorded include grasses and sedges such as *Andropogon appendiculatus*, *Digitaria eriantha*, *Cyperus congesta*, *Eleocharis limosa*, *Eragrostis curvula*, *Eragrostis gummiflua*, *Eragrostis plana*, *Kyllinga erecta*, *Panicum maximum*, *Panicum schinzii*, *Paspalum distichum*, *Paspalum dilatatum**, *Scirpoides burkei*, *Setaria sphacelata* and *Themeda triandra*. The tall reed *Phragmites australis*, as well as the bulrush *Typha capensis* are also present in certain areas. Common forbs recorded in this habitat unit include inter alia; *Berkheya bipinnatifida*, *Berkheya radula*, *Berkheya speciosa*, *Bidens pilosa**, *Centella asiatica*, *Cleome maculata*, *Commelina africana*, *Chironia palustris*, *Monopsis decipiens* and *Senecio inornatus* (*denotes alien species).

Sensitivity Aspects

- Watercourse habitats play a crucial role in maintaining terrestrial biodiversity, ecological processes and the hydrological functioning (e.g., filtration and flood attenuation) of the landscape.
- These habitats significantly increase landscape-scale habitat connectivity, and thus provide important ecological corridors.
- No flora SCC were recorded within Watercourse habitat. However, several fauna SCC including Serval (*Leptailurus serval*), Cape Clawless Otter (*Aonyx capensis*) and Vlei Rat

(*Otomys cf. auratus*) – all Near Threatened, were confirmed in this habitat unit and habitat-suitability assessments also indicate that several other flora and fauna SCC may also be present.



Figure 21: The Suikerbosrand River, flanked by both woody and herbaceous flora species.



Figure 22: Valley-bottom wetland, with an artificial farm dam.



Figure 23: Mountain valley, characterised by closed-canopy woodland dominated by *Olea europaea*.



Figure 24: Drainage line encroached by *Leucosidea sericea* thickets.

8.4. Natural Dry Grassland

Natural grasslands occur throughout the PAOI, where they typically grade into areas of Mountain Bushveld or Rocky Shrubland and Grassland. Structurally, vegetation comprises low closed grassland, as per Edwards (1983).

Generally, this habitat unit is species rich and considered a primary vegetation community. Compositionally, vegetation is dominated by grasses, although forbs and some woody species are present and can be locally abundant (Figure 25 and Figure 26).

Common grass species recorded in areas of natural grassland include *Brachiaria serrata*, *Cymbopogon caesius*, *Cymbopogon pospischilii*, *Eragrostis chloromelas*, *Eragrostis curvula*, *Harpochloa falx*, *Hyparrhenia hirta*, *Melinis nerviglumis*, *Setaria sphacelata*, *Themeda triandra* and *Tristachya leucothrix*. In overgrazed or trampled areas of this habitat unit, the species composition is similar to areas of Secondary Grassland, and characterised by a prevalence of *Eragrostis* species.

Commonly recorded forbs include *Acalypha angustata*, *Berkheya setifera*, *Cleome maculata*, *Cyanotis speciosa*, *Hermannia depressa*, *Hilliardiella aristata*, *Hilliardiella oligocephala*, *Hypoxis acuminata*, *Ipomoea ommaneyi*, *Ledebouria luteola*, *Senecio inornatus*, *Senecio oxyriifolius* and *Scabiosa columbaria*.

Woody species generally occur as scattered individual- or small aggregations of medium-sized trees and shrubs. Common species include *Cussonia paniculata*, *Diospyros lycioides*, *Euclea crispa*, *Leucosidea sericea*, *Osteospermum moniliferum*, *Protea caffra* and *Seriphium plumosum*. The dwarf shrubs *Elephantorrhiza elephantina*, *Searsia discolor* and *Ziziphus zeyheriana* were also frequently recorded.

Sensitivity Aspects

- Natural Dry Grassland in the PAOI is a natural habitat unit;
- These areas provide important habitat for a variety of flora and fauna, and also act as important ecological corridors, increasing local habitat connectivity and facilitating various ecological processes such as, *inter alia*, flora and fauna movement and dispersal;
- No flora SCC were recorded within Natural Dry Grassland. However, the Endangered Mountain Reedbuck was confirmed in this habitat unit and habitat-suitability assessments also indicate that several other flora and fauna SCC may also be present.



Figure 25: Typical example of natural grassland in the PAOI.



Figure 26: Forb dominated area of natural grassland.

8.5. Secondary Grassland

Secondary grasslands characterise former cultivated fields ('old lands') that have been left fallow, and over several years, have regenerated into a recovering (secondary) grassland community.

In line with Edwards (1983), vegetation structure is low closed grassland. Compositionally, Secondary Grasslands exhibit lower diversity compared to areas of natural grassland, and are typically dominated by a small number of grass species – mostly *Eragrostis* species, such as *Eragrostis chloromelas*, *Eragrostis curvula* and *Eragrostis trichophora* (shown in Figure 27). The tall, robust thatching grasses *Hyparrhenia hirta* also prevalent in certain areas of Secondary Grassland (Figure 28).

Other recorded grasses include *Cynodon dactylon*, *Digitaria eriantha*, *Eragrostis gummiflua*, *Eragrostis racemosa*, *Melinis nerviglumis*, *Pogonarthria squarrosa*, *Setaria sphacelata*, *Themeda triandra* and *Tristachya leucothrix*.

Few forbs are present in areas of this habitat unit, and include, *inter alia*; *Cleome monophylla*, *Commelina africana*, *Cyanotis speciosa*, *Gomphrena celosioides**, *Helichrysum callicomum*, *Helichrysum nudifolium* var. *nudifolium*, *Hilliardiella oligocephala*, *Ipomoea ommaneyi* and *Solanum elaeagnifolium**.

Woody species occurs as scattered individual small shrubs, and typically include *Diospyros lycioides*, *Elephantorrhiza elephantina*, *Searsia rigida* and *Seriphium plumosum*.

Sensitivity Aspects

- Secondary Grassland is a modified habitat unit;
- These areas have been stable for a long period, and as a result retain some of the functional attributes of natural grasslands; and
- No flora SCC were recorded in Secondary Grassland and considering their disturbed nature, it is considered unlikely that any flora SCC are present. These areas may however, provide supporting habitat for certain fauna SCC.



Figure 27: *Eragrostis* dominated secondary grassland.



Figure 28: *Hyparrhenia hirta* dominated secondary grassland.

8.6. Alien Tree Stands

Alien tree stands are present in the PAOI. These generally occur as small, localised single-species stands. Structurally, they are defined as closed woodland, as per Edwards (1983). Dominant tree species dominating these stands in the PAOI include *Acacia mearnsii*, *Eucalyptus* species and *Populus x canescens* (Figure 29 and Figure 30). Little to no indigenous vegetation is present in well-established alien tree stands.

Sensitivity Aspects

- Alien tree stands are considered modified habitat;
- No flora or fauna SCC were recorded in this habitat unit, and considering the heterogeneity of the PAOI and broader landscape it is unlikely that these areas comprise important functional or supporting habitat for such species.



Figure 29: Small stand/windrow of *Eucalyptus camaldulensis* trees.



Figure 30: Stand of *Populus x canescens* trees encroaching in a wetland in the PAOI.

8.7. Cultivated Fields

Several cultivated fields, including both pivot-irrigated and dry-land crop fields, are present across the PAOI. Most occur on the flatter edges of the PAOI, although there are a small number of fields in low-lying areas within the interior of the PAOI.

This habitat unit includes both actively/currently used cultivated fields that are regularly disturbed and denuded of indigenous vegetation (Figure 31), and well as fallow fields that have not been ploughed/cultivated in the recent past, but still remain either unvegetated or dominated by a combination of alien and indigenous ruderal plants and weeds.

Sensitivity Aspects

- Cultivated fields are considered a modified habitat Unit;
- They have been, or are currently, subject to regular and intense anthropogenic disturbance. When not dominated by a monoculture of crop species, these areas are typically colonised by several alien weeds, including some declared AIS; and
- No flora or fauna SCC were recorded in this habitat unit, and it is unlikely that such species will be present.



Figure 31: Recently ploughed cultivated field.

9. Flora Species of Conservation Concern

The following notes summarise the key findings of the Plant Species Specialist Assessment with respects to flora SCC and protected species occurring and potentially occurring in the PAOI:

- No flora SCC were recorded in the PAOI during the field programme. However, considering the size and availability and diversity of natural habitat in the PAOI, habitat suitability assessments indicate that it is possible that flora SCC may be present in areas of undisturbed natural habitat in the broader PAOI. Most proposed Project infrastructure has been positioned within areas already disturbed by human activity, and the likelihood of flora SCC occurring within these specific development footprints is therefore low; and
- Several flora species recorded in the PAOI during the field programme are listed as Protected on the Mpumalanga Nature Conservation Act (Act No. 10 of 1998) and/or Gauteng's Nature Conservation Ordinance 12 of 1983 (as amended).

For additional information refer to the Plant Species Specialist Assessment report.

10. Fauna Species of Conservation Concern

The following notes summarise the key findings of the Animal Species Specialist Assessment with respects to fauna SCC occurring and potentially occurring in the PAOI:

- During the 2024 and 2025 field programme, six free-roaming mammal SCC were confirmed in the PAOI, namely:
 - Mountain Reedbuck (*Redunca fulvorufula fulvorufula*) – Endangered;
 - Serval (*Leptailurus serval*) - Near Threatened;
 - Cape Clawless Otter (*Aonyx capensis*) - Near Threatened;
 - Vlei Rat (*Otomys cf. auratus*) - Near Threatened;
 - Grey Rhebok (*Pelea capreolus*) - Near Threatened;
 - Southern African Hedgehog (*Atelerix frontalis*) - Near Threatened;
- An additional two actively-managed/farmed mammal SCC were also recorded in the PAOI, viz. Sable Antelope (*Hippotragus niger niger*) - Vulnerable and Roan Antelope (*Hippotragus equinus*) – Vulnerable. Both antelope species are extralimital within the PAOI. They would therefore not currently be included in national Red List conservation assessments, as their conservation value would be regarded as 'uncertain'; and
- The PAOI comprises large areas of diverse natural habitat, and habitat suitability assessments indicate that several other fauna SCC are likely to be present.

For additional information on the observed mammal SCC, refer to the Animal Species Specialist Assessment report.

11. Key Ecological Attributes and Processes

11.1. Habitat Corridors, Resources and Refugia

The PAOI is characterised by its combination of extensive tracts of natural habitat occurring on a topographically diverse landscape. Most of the PAOI is dominated by a series of rocky hills and ridges, which are interspersed by grassy plains and river valleys (e.g. Suikerbosrand River). Modified

habitats, such as Cultivated Fields and Secondary Grasslands, are present, but mostly occur on the edges of the PAOI, or on the flat portions of its interior.

Prominent linear infrastructure in the PAOI includes numerous game fences, internal farm roads and tracks, and larger district and even national roads (i.e., N3 highway). Despite the presence of modified habitat patches and linear infrastructure, overall habitat connectivity within the PAOI, and to the adjacent landscape, remains relatively high.

Rocky outcrops and ridges, such as those in the PAOI, are recognised for their high biodiversity importance, and for their role as landscape corridors, refugia and as critical hydrological features (read Pfab, 2001). The combination and interaction of several factors including altitude, aspect, slope, geology, soils, light and hydrological patterns create highly diverse and unique micro-habitats that significantly increase local- and landscape-scale habitat heterogeneity. This in turn, promotes a high degree of both flora and fauna diversity (Pfab, 2001).

Outside the boundary of the PAOI, the landscape is generally flatter and increasingly dominated by modified habitats, primarily cultivated fields. Natural habitats in this broader region tend to exist as smaller, fragmented patches, frequently linked to drainage systems.

On a larger regional scale, the PAOI is not located within, or in close proximity to, a Key Biodiversity Area nor are areas of the POAI mapped as part of Mpumalanga's Intact Grasslands. It is noted though that the rocky ridges and hills within the PAOI are part of a discontinuous chain of mountains extending southeast and northwest. This chain includes Alice Glöckner Provincial Nature Reserve (approximately 3.2 km) and Suikerbosrand Nature Reserve approximately 13 km to the northwest. The natural ridge habitat within the PAOI therefore likely plays an important functional role in landscape-scale ecological processes. These include source-sink metapopulations dynamics, such as providing habitat refugia, and facilitating dispersal through corridors or stepping stones. Portions of natural habitat within and adjacent to the PAOI have also been identified as being important for climate change adaptation, with focal areas as well as critical link, core and supporting corridors present.

11.2. Dynamic Ecological Processes and Drivers of Change

The following notes summarise the key ecological processes and drivers of change that are present in the landscape and their possible influence on terrestrial biodiversity and ecological processes.

11.2.1. Alien Invasive Species Colonisation

Although present, alien invasive species are not overly abundant in the PAOI. This notwithstanding, stands of large woody taxa such as *Acacia dealbata*, *Acacia mearnsii*, *Eucalyptus camaldulensis* and *Populus x canescens* were noted. Species like *Acacia dealbata*, *Acacia mearnsii*, and *Populus x canescens* are particularly aggressive invaders and if not actively controlled, will continue to spread into adjacent natural habitat, where they will shade-out and competitively exclude many indigenous woody and herbaceous species. This can have several deleterious impacts on the integrity and function of these habitats, such as *inter alia*:

- A loss of natural habitat and floristic diversity, with the resulting habitat patches unable to support diverse fauna communities;
- A reduction in grass productivity for grazing herbivores, and

- Increased exposed soil surfaces and incidences of erosion.

The spread of alien invasive vegetation is therefore considered a significant driver of change in the PAOI and surrounding landscape, and one capable of negatively impacting terrestrial biodiversity. The proposed Project may create temporary and localised sites where alien invasive species could establish and this will need to be managed.

11.2.2. Wildfire – Burning

Fire is a natural, albeit often human initiated, disturbance agent in both grasslands and savannas, which are considered fire-prone and fire-dependent landscapes. Fire is essential to the maintenance of biodiversity patterns and ecological processes (SANBI, 2013).

Wildfires have several key ecological effects, including:

- Removal of moribund vegetation and increasing plant productivity and palatability, which improves grazing for wild herbivores, and stimulates germination / flowering of fire-adapted flora species (e.g., certain orchid species);
- Controls the encroachment of both alien and indigenous woody plant species and weeds; and
- Increases overall habitat heterogeneity by creating a structural mosaic of tall- and short grassland, and closed- and open wooded areas.

Notwithstanding the positive ecological benefits of fire, wildfires that are too frequent, or too intense, can have negative consequences for terrestrial biodiversity. These include the killing of fauna species (typically slow-moving taxa, or taxa trapped by fences) and fire-sensitive flora species, and the homogenisation of on-site habitat, which can limit the availability of key adaptive resources and reduce biodiversity.

Fire is considered an important driver of change in the PAOI. It is anticipated that the proposed Project could affect fire patterns in the PAOI through increased habitat fragmentation and or an increase in fires from shorting/faulty electrical infrastructure.

11.2.3. Herbivory – Wildlife and Livestock Grazing and Trampling

Both wildlife (game) and livestock farming are common in the PAOI and surrounding landscape. High levels of grazing (overgrazing) and trampling by herbivores is a common cause of dryland degradation (Scholes, 2009). Overgrazing occurs when herbivores (both wildlife and domestic) are kept at excessive stocking rates and/or are able to concentrate their grazing to a limited foraging area, without suitable rest periods.

A common degradation syndrome that is linked to overgrazing, at least in part, is a change in plant species composition. In both grassland and savanna habitats, this typically manifests as a reduction in palatable grass species and a reduction in grassland productivity (Scholes, 2009). In savannas, overgrazing can also lead to bush encroachment, i.e., an increase in woody species and a reduction in grasses. These phenomena can, in turn, negatively affect local fauna communities. Excessive trampling can also cause soil erosion and gully formation, which can reduce the integrity of terrestrial habitats, as well as aquatic habitats (rivers and streams) through increased sedimentation. Grazing and trampling are considered potentially important drivers of change in the PAOI. It is

anticipated that the proposed Project will not impact wildlife and livestock grazing intensity and frequency across the PAOI.

12. General Sensitivity and Analysis of Site Ecological Importance

To assess the general ecological sensitivity of the PAOI with respects to terrestrial biodiversity, regional- and local factors were considered:

- **Biodiversity Significance:** Large sections of the PAOI are designated as Critical Biodiversity Areas (CBAs) under both the MBSP (2022) and the Gauteng C-Plan (Version 4). Several biodiversity attributes contribute to these designations including *inter alia*, the confirmed/potential presence of flora and fauna SCC, primary habitat, threatened ecosystems, and various essential ecological processes (refer to Section 6.2). CBAs are important for achieving provincial biodiversity targets;
- **Threatened Ecosystems:** Soweto Highveld Grassland (VU) and Tsakane Clay Grassland (EN) characterise portions of grassland in the north and south of the PAOI. At a national-level, both vegetation types have experienced large-scale habitat loss and modification due to various anthropogenic activities, and both are thus listed as threatened vegetation types;
- **Other ecological features:** Rivers and Wetlands - the Suikerbosrand River runs through the centre of the PAOI, while numerous other smaller streams and wetlands are also present. Watercourses and wetlands are crucial for regional hydrology and biodiversity conservation, with several flora and fauna SCC known, or likely to be present, in these habitats in the PAOI. Ridges - ridges are recognised as important biodiversity features, harbouring diverse flora and fauna communities, including several SCC. They also play an important role in many ecological (dispersal) and hydrological (water recharge) processes.

Based on these considerations, the findings of this specialist study confirm the DFFE screening tool rating of 'Very High' sensitivity for patches of natural habitat in the PAOI.

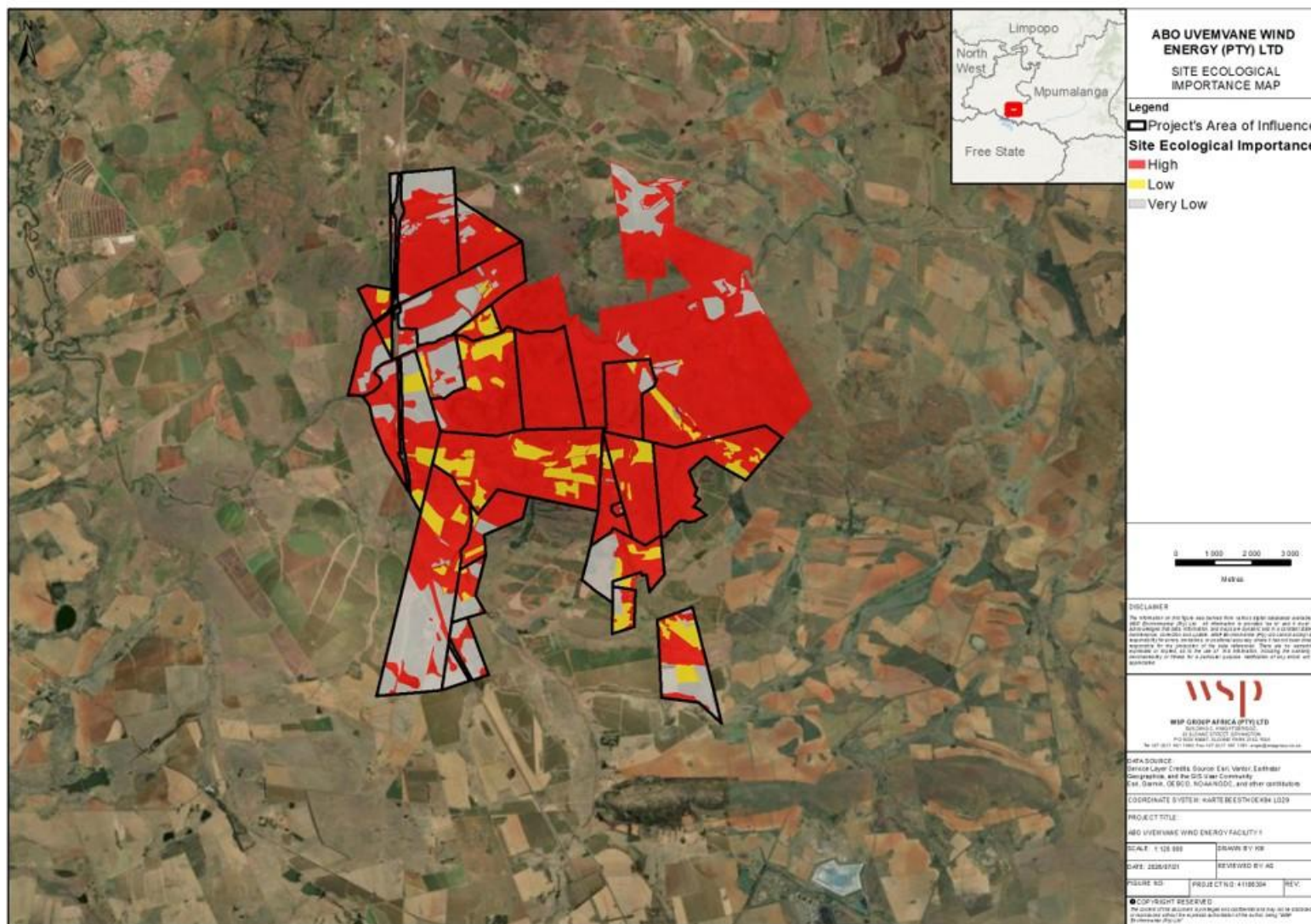
The site-specific ecological importance (SEI) of identified habitat units in the PAOI were further assessed using the SANBI (2026) protocol (refer to Section 3.4 and Appendix B for the methodology). The results of the assessment are presented in Table 6, and shown in Figure 32.

Table 6: Site Ecological Importance of habitat unit in the PAOI

Habitat Unit	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Mountain Bushveld	<u>HIGH</u> : <u>Confirmed</u> or highly likely occurrence of CR, EN, VU species (= Mountain Reedbuck, EN & several NT species).	<u>HIGH</u> : Large intact area for any conservation status ecosystem types. Good habitat connectivity with potentially functional ecological corridors. Only minor current negative ecological impacts with limited signs of major past disturbance and good rehabilitation potential.	HIGH	<u>MEDIUM</u> : Habitat that can recover slowly (~ more than 10 years) to restore >75% of the original species composition and functionality of the receptor functionality	HIGH
Rocky Shrubland and Grassland	<u>HIGH</u> : <u>Confirmed</u> or highly likely occurrence of CR, EN, VU species (= Mountain Reedbuck, EN & several NT species).	<u>HIGH</u> : Large intact area for any conservation status ecosystem types. Good habitat connectivity with potentially functional ecological corridors. Only minor current negative ecological impacts with limited signs of major past disturbance and good rehabilitation potential.	HIGH	<u>MEDIUM</u> : Habitat that can recover slowly (~ more than 10 years) to restore >75% of the original species composition and functionality of the receptor functionality	HIGH
Watercourses (Rivers and Wetlands)	<u>HIGH</u> : <u>Confirmed</u> or <u>highly likely</u> occurrence of CR, EN, VU species. Small area of natural habitat of EN or VU ecosystem type (=several NT species; Soweto Highveld Grassland, VU & Tsakane Clay, EN).	<u>HIGH</u> : Large intact area for any conservation status ecosystem types. Good habitat connectivity with potentially functional ecological corridors.	HIGH	<u>MEDIUM</u> : Habitat that can recover slowly (~ more than 10 years) to restore >75% of the original species composition and functionality of the receptor functionality	HIGH

Habitat Unit	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
		Only minor current negative ecological impacts with limited signs of major past disturbance and good rehabilitation potential.			
Natural Dry Grassland	<u>HIGH</u> : Confirmed or <u>highly likely</u> occurrence of CR, EN, VU species. Small area of natural habitat of EN or VU ecosystem type (= Mountain Reedbuck, EN; several NT species; Soweto Highveld Grassland, VU & Tsakane Clay, EN).	<u>HIGH</u> : Large intact area for any conservation status ecosystem types. Good habitat connectivity with potentially functional ecological corridors. Only minor current negative ecological impacts with limited signs of major past disturbance and good rehabilitation potential.	HIGH	<u>MEDIUM</u> : Habitat that can recover slowly (~ more than 10 years) to restore >75% of the original species composition and functionality of the receptor functionality	HIGH
Secondary Grassland	<u>LOW</u> : No confirmed populations of SCC. < 50% of receptor contains natural habitat.	<u>LOW</u> : Good habitat connectivity, with potentially functional ecological corridors and a regularly used road network. BUT, Several major past and current impacts (=ploughing).	LOW	<u>MEDIUM</u> : Habitat that can recover slowly to restore >75% of the original species composition and functionality.	LOW

Habitat Unit	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Alien Tree Plantations	<u>VERY LOW</u> : No confirmed or highly likely populations of SCC or range-restricted species. No natural habitat remaining.	<u>VERY LOW</u> : Several major current negative ecological impacts.	VERY LOW	<u>VERY HIGH</u> : Habitat that can recover rapidly to restore >75% of the original species composition and functionality.	VERY LOW
Cultivated Fields	<u>VERY LOW</u> : No confirmed or highly likely populations of SCC or range-restricted species. No natural habitat remaining.	<u>VERY LOW</u> : Several major current negative ecological impacts.	VERY LOW	<u>VERY HIGH</u> : Habitat that can recover rapidly to restore >75% of the original species composition and functionality.	VERY LOW



13. Terrestrial Biodiversity Impact Assessment

13.1. Impact Assessment Methodology

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 direct¹, indirect², secondary³ as well as cumulative⁴ 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 criteria⁵ presented in Table 7.

Table 7: Impact Assessment Criteria 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

¹ Impacts that arise directly from activities that form an integral part of the Project.

² Impacts that arise indirectly from activities not explicitly forming part of the Project.

³ Secondary or induced impacts caused by a change in the Project environment.

⁴ Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects

⁵ 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.

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
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

13.2. 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 33 below.

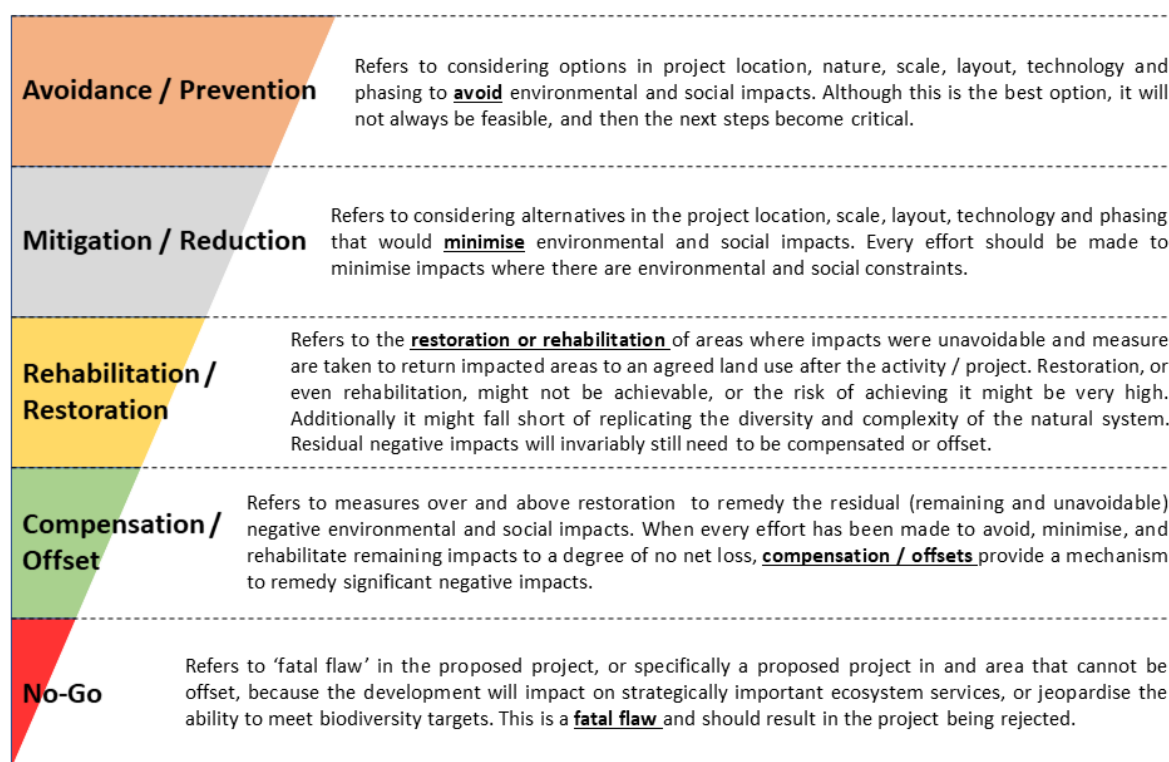


Figure 33: Mitigation Sequence/Hierarchy

A discussion on assessed impacts for each phase (i.e., Construction Operational and Decommissioning) of the proposed Project is provided in sections below, along with an analysis of anticipated cumulative impact in Section 13.3.4. A summary table presented in Table 10.

Although there is overlap, the below section should be read alongside the corresponding sections in the Plant Species- and Animal Species Specialist Assessment reports.

13.3. Assessment of Impacts on Terrestrial Biodiversity

13.3.1. Construction Phase

13.3.1.1. Direct loss and disturbance of natural habitat

Habitat loss refers to the removal or complete degradation of natural habitat. In terrestrial ecosystems, this primarily occurs through vegetation clearing and bulk earth works during construction. Habitat disturbance refers to the modification of habitat to the extent that it loses important functionality. These impacts can negatively impact ecosystem functioning and integrity, and the viability of local fauna and flora populations, including that of SCC. Within the context of the proposed Project, negative impacts to designated CBAs and threatened ecosystems are a particular concern due to the sensitivity of these areas.

In line with the application of the mitigation hierarchy, the infrastructure layout has undergone a series of revisions to reduce potential negative impacts on biodiversity, amongst other environmental and social sensitivities.

From a biodiversity perspective, a key focus of the mitigation strategy has been the spatial avoidance of sensitive habitats, particularly CBAs and threatened vegetation types. Accordingly, most proposed Project infrastructure has been located in patches of modified habitat, such as Secondary Grassland (old lands) and Cultivated Fields, or to within natural habitat that is not classified as CBAs or a threatened ecosystem. The proposed access road network has also been aligned, wherever feasible, with existing district roads and farm tracks to limit the extent of new disturbance and fragmentation. Nonetheless, it is noted that natural habitat loss and disturbance will still occur as a result of construction activities, such as vegetation clearing and earth works.

Based on the current infrastructure layout, it is anticipated that up to 40.90 ha of natural habitat may be impacted by construction activities - Table 8 presents the approximate extent of habitat loss for each habitat unit, while Figure 34 shows the proposed Project layout in relation to the habitat unit map. Expected losses comprise approximately 2.47 ha of Soweto Highveld Grassland, which is listed as a Vulnerable ecosystem. Moreover, despite avoidance measures, impacts to CBA 1 and CBA 2 will also occur, with Table 9 presenting the approximate extent of possible losses and disturbance.

Regarding the proposed Project's alternative substation and powerline options/alternatives:

- From a terrestrial biodiversity perspective, of the three proposed site options Substation Site 2 is preferred. This proposed site is situated entirely within a patch of Secondary Grassland (old lands) that is designated as 'Heavily Modified' by the MBSP (2024). The development of this site would therefore result in the lowest impact on natural habitat. Substation Site 3 is the next most preferred option, as it is located within grassland classified as 'Moderately Modified' by the MBSP (2024). Substation Site 1 intersects a small patch of Natural Dry Grassland mapped as 'Other Natural Areas' by the MBSP (2024), and is therefore the least preferred location for this facility; and
- Regarding the two proposed 33 kV powerline routes, the preferred option is longer (± 8.3 km compared to ± 5.6 km for the alternative), but for most of its alignment it follows major existing linear infrastructure, specifically the N3 highway and a district gravel road, where habitat is already transformed and fragmented. In contrast, the alternative route traverses less fragmented habitat. Given the substantial disturbance zone associated with the N3, co-locating new linear infrastructure along this corridor will reduce additional impacts on terrestrial biodiversity.

Natural habitat loss and disturbance from the proposed Project is of very high magnitude prior to mitigation. Duration of impact will be permanent, and habitat within and potentially adjacent to the development footprints (local) will be impacted. Probability is rated definite. This results in an impact of "high" significance.

In combination with avoidance measures, a suite of additional mitigation measures, centred on minimisation and rehabilitation measures have also been recommended. These include, *inter alia*, the infield micro-siting of infrastructure to localized sites of disturbances, the restriction of disturbance footprints to the minimum area required for construction, and the active rehabilitation

of disturbed areas footprints, followed by the active control or erosion and eradication of alien invasive plant establishment. Specific key measures that are recommended include:

- The maintenance road in the east of the PAOI intersects an area designated CBA Irreplaceable (as per the MBSP, 2024). This route should not be subject to any construction or upgrading activities. It must be traversed in its existing condition, with all vehicle-related disturbances during its use strictly controlled and rehabilitated to prevent negative impacts;
- Wind Turbines 05, 06 and 07 should be oriented in a manner that ensures the majority of their disturbance footprints are contained within the designated ridge buffer; and
- If feasible, the two existing farm roads that provide access to the facility from the south, should be formalised and upgraded rather than establishing the proposed new route to the north of these that requires the development of water-crossing. This will further reduce impacts on Soweto Highveld Grassland.

Through the application of the mitigation hierarchy and integration of recommended measures at each step of the hierarchy, the post-mitigation impact magnitude can be reduced to high, while the impact's spatial extent can be reduced to the site only. Duration can be reduced to the life of the proposed Project (i.e. long-term), and probability to low. This results in an after-mitigation impact of "Low" significance

Table 8: Approximate extent of possible loss/disturbance of habitat units.

Habitat Unit	Approx. Extent of Loss & Disturbance (ha)		
	Project Infrastructure (excl. powerlines)	33kV Powerline Route ⁶	
		Preferred	Alternative
Mountain Bushveld	0.01	0.01	0.08
Rocky Shrubland and Grassland	3.81	0.00	0.00
Natural Dry Grassland	35.39	0.38	0.29
Watercourse (rivers and wetlands)	1.25	0.05	0.03
Secondary Grassland	31.50	0.09	0.06
Alien Tree Stands	1.78	0.2	0.00
Cultivated Fields	8.36	0.24	0.10

Table 9: Approximate extent of possible loss/disturbance of CBA, ESA and threatened ecosystems.

Conservation Category	Approximate Extent of Loss & Disturbance (ha)		
	Project Infrastructure (excl. powerlines)	33kV Powerline Route	
		Preferred	Alternative
Gauteng C-Plan (2024)			
CBA 1	0.77	0.29	0.11
CBA 2	0.32	0.06	
ESA 1	19.85	0.21	0.30
ESA 2	19.04	0.23	0.14
MBSP (2024)			

⁶ Powerline loss/disturbance calculations based on an inter-pylon span of 100m and an approximate pylon construction/disturbance footprint of 10mx10m.

Conservation Category	Approximate Extent of Loss & Disturbance (ha)		
	Project Infrastructure (excl. powerlines)	33kV Powerline Route	
		Preferred	Alternative
CBA Irreplaceable	1.73	0.00	0.00
CBA Optimal	0.85	0.00	0.00
Threatened Ecosystems			
Soweto Highveld Grassland (Vulnerable)	2.29	0.18	0.07

13.3.1.2. Fragmentation reducing natural habitat connectivity and integrity

Habitat fragmentation is caused when vegetation clearing and/or the development of infrastructure (e.g., roads and fences) result in the partitioning of habitat into smaller, discontinuous patches. This leads to altered habitat configuration that typically manifests as an increase in patch number and isolation, yet a decrease in overall patch size. These alterations change the ecological properties of remaining patches (edge effects) and can affect various ecological processes (e.g. fire patterns) and metapopulation dynamics, such as fauna dispersal, movement and migration, and flora pollination and propagule dispersal. This can, in turn, affect flora and fauna species richness and population stability.

The proposed access and internal road network has mostly been aligned with existing district roads and farm tracks. However, existing road upgrades coupled with the cutting of the proposed new access roads is likely to cause some habitat fragmentation, and this may reduce habitat connectivity, which may have negative ecological impacts including *inter alia*, increased edge-effect disturbances.

Prior to mitigation, this impact has a high magnitude, permanently affecting natural habitat within and potentially adjacent to the development footprint (local). It is also considered to have a high probability, resulting in an impact of “Medium” significance.

Several mitigation measures can be implemented to reduced habitat fragmentation - these have been discussed under Section 13.3.1.1. With these measures, impact magnitude can be reduced to medium. Duration can be reduced to the long-term, and probability to low, but spatial scale will remain local. This results in a residual impact of “Low” significance.

13.3.1.3. Establishment and spread of alien invasive species

Seventeen NEMBA listed AIS have been recorded during the field survey. Habitat disturbances caused by vegetation clearing and earth works during construction can facilitate the establishment and spread of these AIS. Alien plant infestations can spread exponentially, suppressing or replacing indigenous vegetation. This may impact ecological integrity and functioning and terrestrial biodiversity, which may impact terrestrial biodiversity.

Before mitigation, impact magnitude is high, while the duration is long term, and the impact has a high probability of occurrence. The spatial extent of AIS spread is local. Prior to mitigation, the establishment and spread of AIS is rated an impact of “medium” significance.

This impact is relatively easy to mitigate though the implementation of an AIS control programme during the construction phase. This impact can be reduced to a low magnitude, with a short-term duration. Spatial extent will be reduced to the site only and the probability of the impact occurring as predicted would be reduced to low. After mitigation, this impact is rated to be of “Low” significance.

13.3.1.4. Increased soil erosion and sedimentation

The topography of the study is very hilly, and characterised numerous steep hillsides and slopes. It is therefore potentially very susceptible to erosion. Vegetation clearance and earth works associated with construction activities is likely to increase potential incidences of soil erosion. This has the potential to cause serious habitat degradation at erosion sites and also lead to the sedimentation of downstream drainage features. High levels of erosion, coupled with drainage feature sedimentation can impact the integrity and functioning of affected habitats, and reduce terrestrial biodiversity.

Before mitigation, impact magnitude is high, while duration is long-term and it has a high probability. The spatial extent is local. Prior to mitigation, increased soil erosion and sedimentation is rated an impact of “medium” significance.

This impact is relatively easy to mitigate with active interventions, such as *inter alia*, correct contouring and rehabilitation of disturbed sites, and the erection of erosion control infrastructure and silt traps, where required. With the implementation of the required mitigation measures during the construction phase, this impact can be reduced to a low magnitude, with a short-term duration. Spatial extent will be reduced to the site only and the probability of the impact occurring as predicted would be reduced to low. After mitigation, this impact is rated to be of “Low” significance

13.3.2. Operational Phase

13.3.2.1. *Establishment and spread of alien invasive species*

The potential establishment and spread of AIS will continue to be an impact of concern during the operational phase.

Before mitigation, impact magnitude is high, while duration is long-term and the impact has a medium probability of occurring as predicted. The spatial extent of alien invasive species spread is local. Prior to mitigation, the establishment and spread of alien invasive species is rated an impact of “medium” significance.

With the continued implementation of an active alien species control programme during the operational phase this impact can be reduced to a low magnitude, with a short-term duration. Spatial extent will be reduced to the site only and probability at low. After mitigation, this impact is rated to be of “Low” significance

13.3.2.2. *Increase in wildfires from Project workers or faulty infrastructure*

Wildfires are considered a natural and important disturbance agent in grassland ecosystems, and are essential to the maintenance of biodiversity patterns and ecological processes. They are also important in maintaining grassland productivity for local livestock farmers. An increase in unplanned or undesirable wildfires from faulty Project infrastructure or accidental/intentional fire-setting by Project workers may negatively impact various ecological processes, which may affect terrestrial biodiversity and grassland productivity.

Before mitigation, this impact is of medium magnitude, with a long-term duration affecting terrestrial biodiversity within and potentially adjacent to the development footprint (local). It is also considered to have a medium probability, resulting in an impact of “medium” significance.

With the application of the recommended mitigation measures, impact magnitude can be reduced to low. Duration can be reduced to the short-term, and probability to improbable, but spatial scale will remain local. This results in a residual impact of “Very Low” significance.

13.3.3. Decommissioning Phase

13.3.3.1. *Establishment and spread of alien invasive species*

As Project infrastructure is dismantled and removed from site during the decommissioning phase, the associated disturbances are likely to facilitate additional alien invasive species colonisation and spread from disturbed sites.

Before mitigation, impact magnitude is high, while duration is long-term and the impact has a high probability of occurring as predicted. The spatial extent of alien invasive species spread is local. Prior to mitigation, the establishment and spread of alien invasive species is rated an impact of “medium” significance.

With the continued implementation of an active alien species control programme during decommissioning and for a defined period thereafter, this impact can be reduced to a low magnitude, with a short-term duration. Spatial extent will be reduced to the site only and the probability of the impact occurring would be low. After mitigation, this impact is rated to be of “Low” significance

13.3.3.2. Increased soil erosion and sedimentation

Earth works during decommissioning may increase potential incidences of soil erosion, which may also lead to the mobilisation and transportation of sediment into drainage features.

Before mitigation, impact magnitude is high, while duration is long-term and it has a high probability. The spatial extent is local. Prior to mitigation, increased soil erosion and sedimentation is rated an impact of “medium” significance.

With the implementation of the required mitigation measures during the decommissioning phase, this impact can be reduced to a low magnitude, with a short-term duration. Spatial extent will be reduced to the site only and the probability of the impact occurring as predicted would be reduced to low. After mitigation, this impact is rated to be of “Low” significance.

Table 10: Impact assessment scoring for terrestrial biodiversity

CONSTRUCTION																			
Impact number	Receptor	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating	(M+	E+	R+	D)x	P=	S	Rating
Impact 1:	Terrestrial biodiversity	Direct loss and disturbance of natural habitat	Construction	Negative	Low	5	2	3	5	5	75	N3	4	1	3	4	2	24	N1
Significance						N3 - High							N1 - Low						
Impact 2:	Terrestrial biodiversity	Fragmentation reducing natural habitat connectivity and integrity	Construction	Negative	Low	4	2	3	5	4	56	N2	3	2	3	4	2	24	N1
Significance						N2 - Medium							N1 - Low						
Impact 3:	Terrestrial biodiversity	Establishment and spread of alien invasive species	Construction	Negative	High	4	2	3	4	4	52	N2	2	1	3	2	2	16	N1
Significance						N2 - Medium							N1 - Low						
Impact 4:	Terrestrial biodiversity	Increased soil erosion and sedimentation	Construction	Negative	High	4	2	3	4	4	52	N2	2	1	3	2	2	16	N1
						N2 - Medium							N1 - Low						
OPERATIONAL																			
Impact number	Receptor	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S		(M+	E+	R+	D)x	P=	S	
Impact 1:	Terrestrial biodiversity	Establishment and spread of alien invasive species	Operational	Negative	High	4	2	3	4	3	39	N2	2	1	3	2	2	16	N1
Significance						N2 - Medium							N1 - Low						
Impact 2:	Terrestrial biodiversity	Increase in wildfires from Project workers or faulty infrastructure	Construction	Negative	High	3	2	3	4	3	36	N2	2	2	1	2	1	7	N1
						N2 - Medium							N1 – Very Low						
DECOMMISSIONING																			
Impact number	Receptor	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S		(M+	E+	R+	D)x	P=	S	
Impact 1:	Terrestrial biodiversity	Establishment and spread of alien invasive species	Decommissioning	Negative	High	4	2	3	4	4	52	N2	2	1	3	2	2	16	N1
Significance						N2 - Medium							N1 - Low						
Impact 2:	Terrestrial biodiversity	Increased soil erosion and sedimentation	Decommissioning	Negative	High	4	2	3	4	4	52	N2	2	1	3	2	2	16	N1
Significance						N2 - Medium							N1 - Low						
CUMULATIVE																			
Impact number	Receptor	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S		(M+	E+	R+	D)x	P=	S	
Impact 1:	Terrestrial biodiversity	Cumulative impact of loss, disturbance and fragmentation of natural habitat	Construction	Negative	Moderate	5	3	3	5	5	80	N3	3	3	3	4	2	26	N1
Significance						N3 - High							N1 - Low						

13.3.4. Cumulative Impacts

According to the Renewable Energy Environmental Authorisation (REEA) Q4 2024 database and data received from MTPA, several approved renewable energy development projects are located across the broader region surrounding the PAOI (Figure 35). Within a 50 km radius of the PAOI, these include *inter alia*, Suikerbos PV 1 and Suikerbos PV 2, Suikerbos PV 3, Suikerbos PV 4, Waterall Solar Park, Lethabo Power Station Solar PV Facility. It is also noted that additional infrastructure elements associated with this proposed Project, such as the required grid connection (which will form part of a separate authorisation process), will also take place in the surrounding landscape and will have negative ecological impacts. It is within the context of these various projects that cumulative impacts associated with the proposed Project were assessed below:

13.3.4.1. Cumulative impact on fauna SCC due to natural habitat loss, disturbance and fragmentation

Large portions of the landscape in which the PAOI is located are already modified and fragmented as a consequence of historic and current agriculture, amongst other land uses. This places significant pressure on the functioning and integrity of remaining natural and semi-natural habitat patches, and their ability to support terrestrial biodiversity.

Although the individual development footprints of each of the planned/proposed renewable energy developments listed above are expected to be relatively small, the combined effects of habitat loss, fragmentation and disturbance from vegetation clearing and earth works are likely to negatively affect broader-scale ecological habitat integrity and functioning. This in turn, can negatively impact the metapopulation dynamics of local flora and fauna SCC. The combined effects of habitat loss, fragmentation and disturbance of these various renewable energy projects is therefore a cumulative impact of concern.

Prior to any form of mitigation, the cumulative impact on terrestrial biodiversity resulting from habitat loss, disturbance and fragmentation is rated 'high'. The proposed Project contribution to cumulative impacts can be minimised by strictly and successfully implementing the mitigation measures detailed in this report, and if required, addressing any significant residual impacts via additional conservation actions. The cumulative impact can be thus reduced to 'Low' significance.

14. Assessment of the No Go Alternative

Should the proposed Project not proceed, it is anticipated that existing agricultural and game farming activities will persist across the PAOI. Consequently, the ecological condition of on-site natural habitats and the composition of flora and fauna communities will probably remain unchanged from the current status quo. It is, however, noted that the on-site properties hold existing agricultural development rights, and it is therefore possible that portions of the land may be converted for agricultural use (e.g., cultivation) in the future.

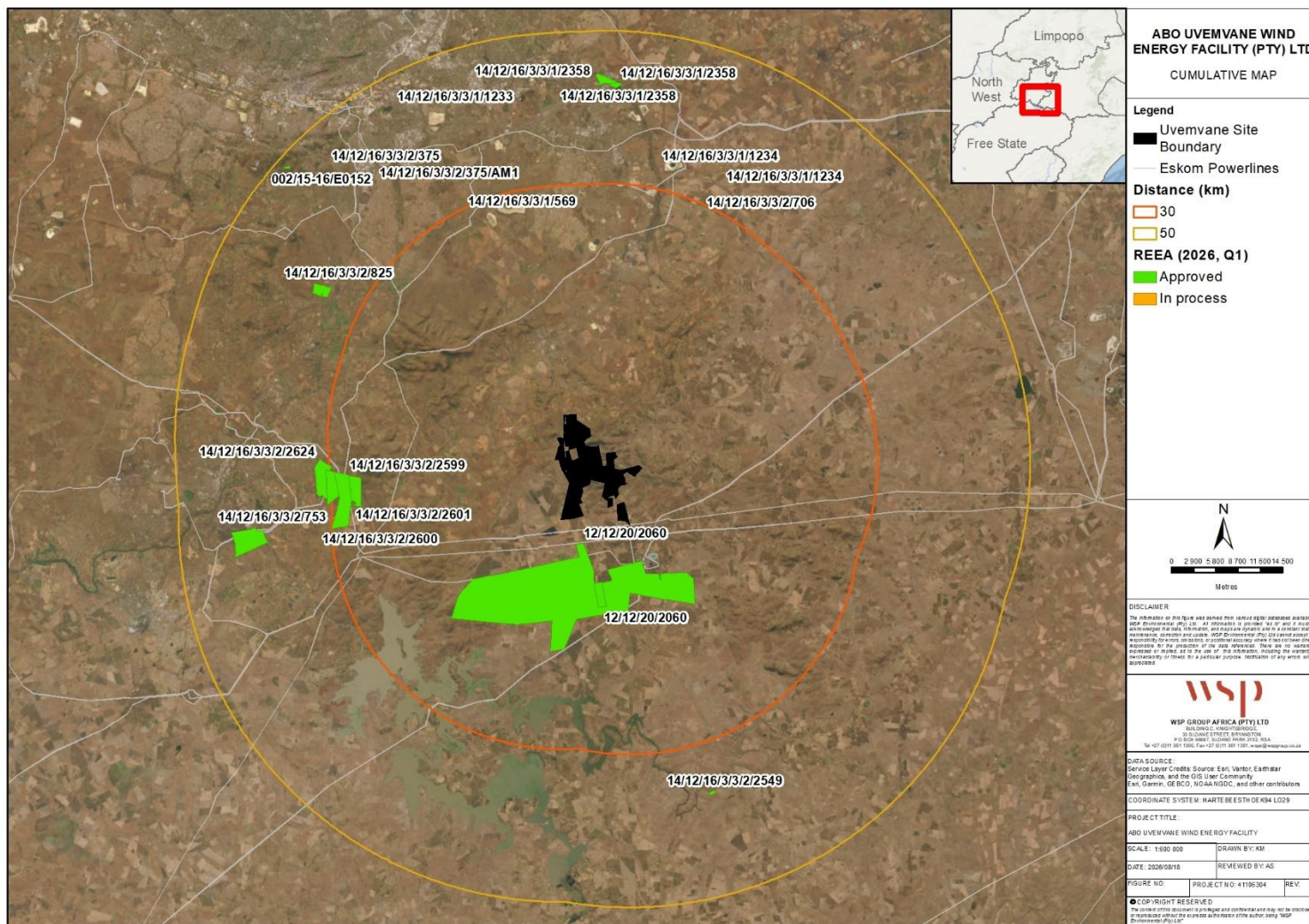


Figure 35: Map showing other renewable energy projects in the broader region surrounding the PAOI.

15. Mitigation Measures

The following section presents the proposed impact management actions to avoid, minimise and/or manage the potential impacts/risks which were assessed in the preceding section.

As with the assessment of potential impacts/risks, the impact management actions have been arranged according to the following main Project phases:

- Pre-Construction and Construction;
- Operational; and
- Decommissioning

For each impact management action, the following information is provided:

- Category: The category within which the potential impact/risk occurs;
- Potential impact/risk: Identified potential impact/risk resulting from the pre-construction, construction, operation, and decommissioning of the proposed Project;
- Description: Description of the possible impact management action;
- Prescribed standards or practices: Prescribed environmental standards or practices with which the impact management action must comply. Note that only key standards or practices have been listed;
- Mitigation type: The type of mitigation measure. This includes the following:
 - Avoidance;
 - Minimisation;
 - Rehabilitation or restoration;
 - Offsetting;
- Time period: The time period when the impact management actions must be implemented; and
- Responsible persons: The persons who will be responsible for the implementation of the impact management actions.

Table 11**Error! Reference source not found.** presents a summary of the proposed impact mitigation actions during the pre-construction, construction, operational, and decommissioning phases of the proposed Project.

Table 11: Summary of proposed impact mitigation measures.

Ref No.	Category	Potential impact/risk	Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
1. Pre-Construction and Construction Phase							
1.1	Natural Habitat	Direct loss and disturbance of natural habitat.	<p><u>Avoidance</u></p> <ul style="list-style-type: none"> As far as possible, proposed Project infrastructure should be located outside of land designated CBA 1 and CBA 2 and natural habitat classified as Vulnerable and Endangered; <ul style="list-style-type: none"> The maintenance road in the east of PAOI that intersects CBA Irreplaceable land must not be upgraded. It should be used in its current condition, with all vehicle-related disturbance strictly controlled and rehabilitated to avoid negative impacts; Wind Turbines 05, 06 and 07 should be oriented in a manner that ensures the majority of their disturbance footprints are contained within the designated ridge buffer; 	N/A	Avoidance, Minimisation & Rehabilitation	During Pre-Construction and Construction Phase	Project Manager

Ref No.	Category	Potential impact/risk	Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			<ul style="list-style-type: none"> ○ If feasible, the two existing farm roads that provide access to the facility from the south, should be formalised and upgraded rather than establishing the proposed new route to the north of these that requires the development of a water-crossing; ● As far as possible proposed permanent Project infrastructure should be located in areas of modified habitat (i.e., Cultivated Fields and Secondary Grassland); <ul style="list-style-type: none"> ○ It is recommended that Substation Site 2 is selected as the preferred site. This site is entirely located within Secondary Grassland (old lands). ● All temporary construction footprints, (e.g., construction camps, laydown areas), should <u>only</u> be located in areas of modified habitat: <ul style="list-style-type: none"> ○ It is recommended that Temporary Laydown Area 2 should be relocated to a nearby cultivated 				

Ref No.	Category	Potential impact/risk	Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			<p>field or confined entirely within the Secondary Grassland patch that comprises the northern portion of its current footprint;</p> <ul style="list-style-type: none"> • A pre-construction walkdown of the approved development footprints should be conducted during the wet/growing season to identify sensitive biodiversity and inform the micro-siting of Project infrastructure to already disturbed sites and other relevant management measures. <p><u>Minimisation</u></p> <ul style="list-style-type: none"> • All vegetation clearing for the Project should be restricted to the proposed Project footprints only, with no clearing permitted outside of these footprints; • The footprints to be cleared of vegetation should be clearly demarcated, prior to construction, to prevent unnecessary clearing outside of these areas; 				

Ref No.	Category	Potential impact/risk	Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			<ul style="list-style-type: none"> No heavy vehicles should travel beyond the marked/demarked work zones; Removed topsoil should be stockpiled and used to rehabilitate all disturbed areas. <p><u>Rehabilitation</u></p> <p>A rehabilitation/ landscaping protocol should be developed and implemented to stabilise and revegetate all non-operational sites that have been disturbed by construction activities. The protocol should include:</p> <ul style="list-style-type: none"> The correct stockpiling of topsoil that was cleared from development footprints during site preparation; The correct contouring of the post-construction landform to limit potential erosion; Compacted soils should be ripped and loosened to facilitate vegetation establishment; Topsoil removed during construction should be applied to all non-operational sites that were disturbed during 				

Ref No.	Category	Potential impact/risk	Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			<p>construction and require revegetation; and</p> <ul style="list-style-type: none"> Active revegetation should be conducted using grass species that are indigenous, locally-occurring and perennial. 				
1.2	Terrestrial Habitat	Fragmentation reducing natural habitat connectivity and integrity	<p><u>Avoidance and Minimisation</u></p> <p>See mitigation measures for <i>Direct loss and disturbance of natural habitat</i>, and</p> <ul style="list-style-type: none"> All proposed access roads and powerlines should be aligned, as far as possible, with existing linear infrastructure (roads/tracks), and wherever possible micro-sited to already disturbed sites. <p><u>Rehabilitation</u></p> <p>See rehabilitation measures for <i>Direct loss and disturbance of natural habitat</i>.</p>	N/A	Avoidance and Minimisation	During Pre-Construction and Construction Phase	Project Manager
1.3	Terrestrial Habitat	Establish and spread of alien invasive species	An AIS control and eradication plan must be developed for the Project that focuses on controlling and eradicating AIS occurring at	Guidelines for Monitoring,	Minimisation	During Construction Phase	Project Manager

Ref No.	Category	Potential impact/risk	Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			<p>sites disturbed by proposed Project activities. It is recommended that the plan should be developed with input and guidance from an invertebrate specialist regarding the management of threatened butterfly species. Operationally, the plan should include:</p> <ul style="list-style-type: none"> • Identification of AIS management units • Prioritisation of sites and species requiring control; • Targets and indicators of success; • Scheduling of AIS control; • Species-specific control methods, using a combined approach of both chemical and mechanical control methods; and • Provision for follow-up treatments, as informed by regular AIS monitoring. 	Control and Eradication of AIS (DEA, 2015)			
1.4	Terrestrial Habitat	Increased soil erosion and sedimentation	<ul style="list-style-type: none"> • All sites disturbed by construction activities should be contoured, stabilised and actively revegetated, as per the rehabilitation/ landscaping protocol; and • Erosion and sedimentation prevention and control measures (e.g., brush-packing, gabions and silt-traps) should 	N/A	Minimisation & Rehabilitation	During Construction Phase	Project Manager

Ref No.	Category	Potential impact/risk	Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			be implemented at any sites of erosion or sedimentation.				
2. Operational phase							
2.1	Terrestrial Habitat	Establish and spread of alien invasive species	<ul style="list-style-type: none"> Active alien invasive species control should continue throughout the operational phase, as per the approved AIS control and eradication programme. 	Guidelines for Monitoring, Control and Eradication of AIS (DEA, 2015)	Minimisation	During Operational Phase	Facility Manager
2.2	Terrestrial Habitat	Increase in wildfires from Project workers or faulty infrastructure	<ul style="list-style-type: none"> As a component of the pre-operational planning phase, the Project proponent should engage all relevant farmers and the local Fire Protection Association (FPA) to explore the development of a coordinated Grassland Burning Management Programme. This programme should be informed by specialist guidance concerning maintaining and protecting habitat for the threatened butterfly species; As required, firebreaks should be maintained around infrastructure that are susceptible to faults/shorts that may cause accidental wildfires; and 	N/A	Avoidance and Minimisation	During Operational Phase	Facility Manager

Ref No.	Category	Potential impact/risk	Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			<ul style="list-style-type: none"> Construction- and maintenance workers should be trained on the dangers of wildfire and the need to actively prevent unplanned/accidental fires. 				
3. Decommissioning phase							
3.1	Terrestrial Habitat	Establish and spread of alien invasive species	<ul style="list-style-type: none"> Active alien invasive species control should continue on an annual basis during the decommissioning phase and annual follow-up control should be carried out for a five- year period following decommissioning. 	Guidelines for Monitoring, Control and Eradication of AIS (DEA, 2015)	Minimisation	Annually during decommissioning and annually for a five-year period after decommissioning	Facility Manager
3.2	Terrestrial Habitat	Increased soil erosion and sedimentation	<ul style="list-style-type: none"> All sites disturbed by decommissioning activities should be stabilised and actively revegetated, as per the rehabilitation/ landscaping protocol; and Erosion prevention and control measures (e.g., brush-packing, gabions, silt-traps) should be implemented at any sites of erosion and sedimentation. 	N/A	Rehabilitation	During the Decommissioning Phase	Facility Manager

16. Monitoring Measures

The following section presents the proposed monitoring actions for monitoring and reporting on the implementation of the impact mitigation actions presented in the preceding Section **Error! Reference source not found.**

The content of this section is largely based on the monitoring requirements outlined in Appendix 4 of the EIA Regulations, 2014.

For each monitoring action, the following information is provided:

- Category: The category within which the potential impact and/or risk occurs
- Potential impact/risk: Identified potential impact/risk resulting from the pre-construction, construction, operation, and closure of the proposed Project
- Method for monitoring : The method for monitoring the implementation of the recommended mitigation measures
- Time period: The time period over which the monitoring actions must be implemented
- Frequency of monitoring: The frequency of monitoring the implementation of the recommended mitigation measures
- Mechanism for monitoring compliance: The mechanism for monitoring compliance with the impact management actions
- Responsible persons: The persons who will be responsible for the implementation of the monitoring actions

As with the impact management actions, the proposed monitoring actions have been arranged according to the following project phases:

- Construction and Operational; and
- Decommissioning.

Table 12 presents a summary of the proposed monitoring actions during the construction, operational and decommissioning phases.

Table 12: Recommended additional monitoring measures

Ref. No.	Category	Method for monitoring	Time period	Frequency of monitoring	Mechanism for monitoring compliance	Responsible person
1. Construction and Operational Phases						
1.1	Alien invasive species	<ul style="list-style-type: none"> Annual on-site alien invasive species monitoring should be conducted. Monitoring should focus on: <ul style="list-style-type: none"> All sites disturbed during the construction phase; Wetland areas adjacent to construction sites; and Monitoring should assess species type and density, and these data should inform the scope of ongoing alien invasive species control. 	Wet/growing season	Annual	Annual Monitoring Report	Project Manager
2. Decommissioning Phase						
2.1	Alien invasive species	<ul style="list-style-type: none"> Alien invasive species monitoring should be conducted on an annual basis during decommissioning and annually for a five-year period following decommissioning. Monitoring should focus on: <ul style="list-style-type: none"> All sites disturbed during decommissioning; 	Wet/growing season	Annually during decommissioning and for a five-year period after decommissioning	Annual Monitoring Report	Facility Manager

Ref. No.	Category	Method for monitoring	Time period	Frequency of monitoring	Mechanism for monitoring compliance	Responsible person
		<ul style="list-style-type: none"> ○ Watercourses adjacent to development sites; and ● Monitoring should assess species type and density, and these data should inform the scope of ongoing alien invasive species control. 				

17. Biodiversity Management/Action Plan

It is recommended that during the pre-construction planning phase all terrestrial biodiversity mitigation and monitoring measures, including those outlined in the Terrestrial Biodiversity, Plant Species, and Animal Species Specialist Assessment Reports, as well as all management measures recommended in other ecological specialist studies, should be consolidated into a single, integrated Biodiversity Management/Action Plan (BMP/BAP) for the proposed Project.

A single, consolidated BMP/BAP will provide an integrated and practical framework that encompasses, aligns and guides all aspects of biodiversity management throughout the various life-cycle phases of the Project.

18. Reasoned Opinion and Environmental Impact Statement

18.1. Summary of Main Findings

The PAOI is characterised by extensive tracts of diverse natural habitat, dominated by rocky hills and ridges and interspersed with grassy plains and river valleys. These factors create myriad micro-habitats that support terrestrial biodiversity.

Four regional vegetation types characterise the PAOI, of which two are threatened according to NEMBA Threatened Ecosystems (2021), namely Soweto Highveld Grassland (Vulnerable) and Tsakane Clay Grassland (Endangered). Large areas of the PAOI are also classified as CBAs and ESAs according to the delineations of the MBSP (2024) and the Gauteng C-Plan (2024). The continued integrity and protection of threatened vegetation types and CBAs is crucial to meet conservation targets. The presence of these sensitive features is therefore a particular concern with respects to terrestrial biodiversity management. The PAOI is also characterised by other environmental and conservation planning features that may be negatively impacted by the proposed Project, including Priority Focus Areas for protected area expansion, rocky ridges, Freshwater Ecosystem Priority Areas, and climate change adaption corridors.

On-site natural habitats provide important habitat for flora and fauna, and contribute to broader habitat connectivity, which is an important component of maintaining various landscape-scale ecological processes and terrestrial biodiversity. Fauna SCC, including the Mountain Reedbuck (EN) were recorded on-site during the field programme, and habitat suitability assessments suggest that several other fauna SCC and indeed flora SCC may be present on-site. The DFFE screening tool rated the Terrestrial Biodiversity Theme for the PAOI as 'Very High' sensitivity, and the findings of this study confirm this sensitivity rating for patches of natural habitat.

The infrastructure layout has undergone a series of revisions in line with the mitigation hierarchy to avoid and minimise potential negative impacts on sensitive biodiversity features. These have *inter alia*, prioritised where possible the placement of wind turbines in areas of modified habitat and the alignment of proposed access roads with existing district gravel roads and farms tracks. Nonetheless, potential negative impacts on terrestrial biodiversity remain, and these have been identified and assessed for the proposed Project for both pre- and post-mitigation scenarios. Several management measures have been recommended in this report to further minimise and rehabilitate negative impacts, and if successfully implemented these will effectively reduce impact significance. It is

recommended that all relevant mitigation and management measures for the proposed Project should be incorporated into an integrated Biodiversity Management/Action Plan.

18.2. Conditions to be Included in the Environmental Authorisation

No additional conditions are recommended for inclusion in the proposed Project's environmental authorisation.

18.3. Specialist Opinion

In accordance with the outcomes of the impact assessment, and taking cognisance of the baseline conditions presented herein, as well as the impact management measures, the proposed Project, is not deemed to present significant negative ecological issues or impacts on terrestrial biodiversity, and there are no identified constraints that would prevent the proposed Project from being authorised.

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This report has been compiled by Andrew Zinn (Hawkhead Consulting).



Andrew Zinn (*Pr.Sci.Nat.*)



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Appendix A: Curriculum Vitae – Andrew Zinn



Curriculum Vitae of Andrew Zinn (*Pr.Sci.Nat.*)

Details

Andrew David Zinn
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South Africa
Date of birth: 14 July 1982
Nationality: South African

Profile

I am an ecologist with an M.Sc. Degree in Resource Conservation Biology and 15 years of experience working in biodiversity consulting and ecological research. I am registered with the South African Council of Natural Scientific Professions as a Professional Natural Scientist. I currently work as an independent consulting ecologist, with Hawkhead Consulting. During my career I have worked on projects in remote areas in several African countries including South Africa, Botswana, Democratic Republic of the Congo, Ethiopia, Ghana, Mozambique, Tanzania and Zambia. I have also previously worked in the United Kingdom and the United Arab Emirates.

Education and Qualifications

- University of the Witwatersrand, M.Sc. Resource Conservation Biology (2013).
- University of KwaZulu-Natal, BSc. Hons. Ecology and Conservation Biology (2005).
- University of KwaZulu-Natal, BSc. Zoology and Grassland Science (2004).
- Bryanston High School, Johannesburg. Matric Exemption. (2000).

Affiliations

- Member of the South African Council of Natural Scientific Professions – Professional Natural Scientist (400687/15).
- Member of the South African Wildlife Management Association
- Member of the South African Association of Botanists

Work Experience

1. Independent Ecologist

Hawkhead Consulting, South Africa

September 2020 – Present

Consulting ecologist focusing on terrestrial ecology. I specialise in conducting baseline flora and fauna surveys, ecological impact assessments, and developing mitigation and management programmes for projects and operations in various industry sectors. Core services and responsibilities include, amongst others:

- Biodiversity study design and implementation;
- Biodiversity baseline and impact assessment reporting;
- Mitigation measure design and application;
- Vegetation surveys and vegetation community mapping;
- Fauna surveys for mammals, birds, reptiles and amphibians;
- Development of biodiversity management plans;
- Development of rehabilitation and revegetation plans; and
- Alien invasive species control and eradication plans.

2. Ecologist

Golder Associates Africa, South Africa

June 2011 – September 2020

Ecologist responsible for the management and implementation of baseline biodiversity studies and ecological impact assessments for development projects in the mining, power generation, transport, land development and industrial development sectors throughout sub-Saharan Africa. Role responsibilities included project management, technical review, biodiversity study design and implementation, flora and fauna surveys, biodiversity baseline and impact assessment reporting, development of biodiversity management plans, rehabilitation plans and alien invasive species control and eradication plans. These studies were conducted to satisfy national environmental regulations and/or international financing requirements, including the International Finance Corporation's (IFC) Performance Standard 6 (PS6)

3. Independent Ecologist

Subcontracted to KPMG, United Arab Emirates

March – April 2011

Subcontracted to KPMG as a subject matter expert (ecology) on the internal audit of Sir Bani Yas Island's Conservation Department (United Arab Emirates). The audit focused on evaluating the efficacy of the island's various conservation practices, including game management, feed provisioning, carnivore breeding and monitoring, veterinary care and vegetation maintenance.

4. Environmental Consultant

WSP Environment and Energy, South Africa

August 2008 – March 2011

Environmental consultant, responsible for a range of environmental projects and services including managing environmental authorisation processes (BAs and EIAs), facilitating stakeholder engagement processes, conducting compliance audits, developing environmental management programmes and conducting specialist ecological studies.

5. Research Technician

Yale University, Kruger National Park, South Africa

October 2007 – May 2008

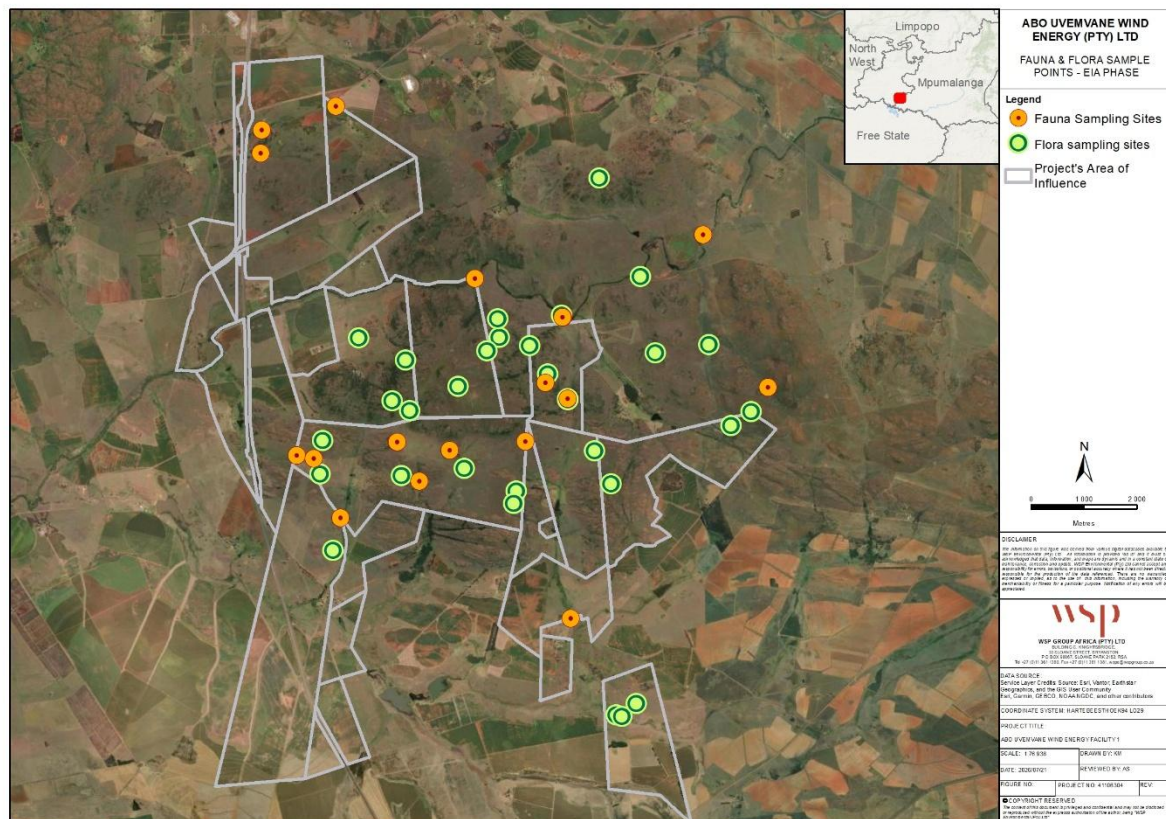
Research technician on the Savanna Convergence Experiment (SCE). The SCE project was a long-term cross-continental study that investigated the role of mega-herbivores in fire-grazing interactions and their influence on vegetation dynamics. Responsible for collecting and analysing vegetation composition and productivity data, as well as herbivore distribution data.

Publications

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Appendix B: Methodology Supplement

Appendix B 1: Location of field programme sampling points



Appendix B 2: Rating criteria for Conservation Importance, Functional Integrity and Receptor Resilience and the scoring matrices, as per (SANBI, 2026).

The ecological sensitivity of habitats in the PAOI was determined using the protocol for evaluating site ecological importance (SEI) as published in SANBI's Species Assessment Guideline (SANBI, 2026). SEI is considered to be a function of the biodiversity importance (BI) of a receptor and its resilience to impacts (receptor resilience, RR), as per:

$$SEI = BI + RR.$$

Biodiversity importance is a function of conservation importance (CI) and the functional integrity (FI) of the receptor, as per:

$$BI = CI + FI$$

- **Conservation Importance** is defined as “the importance of a site for supporting biodiversity features of conservation concern present, e.g., populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystems types, through predominantly natural processes” (SANBI, 2026).
- **Functional Integrity** is defined as “A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts” (SANBI, 2026).
- **Receptor Resilience** is defined as “the intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention” (SANBI, 2026).

Table 1: Conservation Importance (CI) criteria.

Conservation Importance (CI)	Fulfilling Criteria
Very High	<ul style="list-style-type: none"> • Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global EOO of < 10km²; • Any area of natural habitat of a CR ecosystem type or large area (>0.1 % of the total ecosystem type extent) of natural habitat of an EN ecosystem type; and • Globally significant populations of congregatory species (>10% of global population).
High	<ul style="list-style-type: none"> • Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10km², IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining; • Small area (>0.01% but <0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (>0.1%) of natural habitat of VU ecosystem type; • Presence of Rare species; • Globally significant populations of congregatory species (>1% but < 10% of global population).
Medium	<ul style="list-style-type: none"> • Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals; • Any area of natural habitat of threatened ecosystem type with status of VU; • Presence of range-restricted species; and • >50% of receptor contains natural habitat to support SCC.
Low	<ul style="list-style-type: none"> • No confirmed or highly likely populations of SCC; • No confirmed or highly likely populations of range-restricted species; and • <50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	<ul style="list-style-type: none"> • No confirmed and highly unlikely populations of SCC; • No confirmed and highly unlikely populations of range-restricted species; and • No natural habitat remaining.

Table 2: Functional Integrity (FI) criteria.

Functional Integrity (FI)	Fulfilling Criteria
Very High	<ul style="list-style-type: none"> • Very large (>100 ha) intact area for any conservation status of ecosystem type or >5a ha for CR ecosystem type; • High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches; • No or minimal current negative ecological impacts with no signs of major disturbance (e.g., ploughing)
High	<ul style="list-style-type: none"> • Large (>5 ha but < 100 ha) intact area for any conservation status ecosystem types; • Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches; and • Only minor current negative ecological impacts (e.g., few livestock utilising area) with no signs of major past disturbance (e.g., ploughing) and good rehabilitation potential.
Medium	<ul style="list-style-type: none"> • Medium (>5ha but < 20 ha) semi-intact area for any conservation status ecosystem type or >20 ha for VU ecosystem type; • Only narrow corridors of good connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches; • Mostly minor current negative ecological impacts with some major impacts (e.g., established population of alien invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	<ul style="list-style-type: none"> • Small (> 1 ha but <5ha) area; • Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential; and • Several minor and major current negative ecological impacts.
Very Low	<ul style="list-style-type: none"> • Very small (<1 ha) area; • No habitat connectivity except for flying species or flora with wind-dispersed seeds; • Several major current negative ecological impacts.

$$BI = CI + FI$$

Biodiversity Importance (BI) Rating Matrix

Biodiversity Importance (BI)		Conservation Importance				
		Very High	High	Medium	Low	Very Low
Functional Integrity	Very High	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

Table 3: Receptor Resilience criteria (RR)

Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (~less than 5 years) to restore >75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impacts occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5-10 years) to restore >75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impacts occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	Habitat that can recover slowly (~ more than 10 years) to restore >75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impacts occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impacts occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

$$SEI = BI + RR$$

Site Ecological Importance (SEI) Rating Matrix

Site Ecological Importance		Biodiversity Importance				
		Very High	High	Medium	Low	Very Low
Receptor Resilience	Very Low	Very High	Very High	High	Medium	Low
	Low	Very High	Very High	High	Medium	Very Low
	Medium	Very High	High	Medium	Low	Very Low
	High	High	Medium	Low	Very Low	Very Low
	Very High	Medium	Low	Very Low	Very Low	Very Low

Table 4: Guidelines for interpreting SEI in the context of the proposed development activities.

Site Ecological Importance	Interpretation in relation to proposed development activities
Very High	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

Appendix C: Compliance with Terrestrial Biodiversity Protocol.

Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity	Relevant Section in Report
The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:	
2.3.1. a description of the ecological drivers or processes of the system and how the proposed development will impact these	Section 11 & Section 13.3
2.3.2. ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site;	Section 11
2.3.3. the ecological corridors that the proposed development would impede including migration and movement of flora and fauna;	Section 11
2.3.4. the description of any significant terrestrial landscape features (including rare or important flora- faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments;	Section 5, Section 6 & Section 8
2.3.5. a description of terrestrial biodiversity and ecosystems on the preferred site, including: a) main vegetation types; b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified; c) ecological connectivity, habitat fragmentation, ecological processes and fine scale habitats; and d) species, distribution, important habitats (e.g., feeding grounds, nesting sites, etc.) and movement patterns identified.	Section 5 to Section 11
2.3.6. the assessment must identify any alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification; and	Section 12 & 15
2.3.7. the assessment must be based on the results of a site inspection undertaken on the preferred site and must identify: 2.3.7.1. terrestrial critical biodiversity areas (CBAs), including: a) the reasons why an area has been identified as a CBA; b) an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation; c) the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s); d) the impact on ecosystem threat status; e) the impact on explicit subtypes in the vegetation; f) the impact on overall species and ecosystem diversity of the site; and g) the impact on any changes to threat status of populations of species of conservation concern in the CBA	Section 6.2 & Section 13.3
2.3.7.2. terrestrial ecological support areas (ESAs), including: a) the impact on the ecological processes that operate within or across the site; b) the extent the proposed development will impact on the functionality of the ESA; and c) loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or	Section 6.2, Section 11 & Section 13.3

Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity	Relevant Section in Report
introducing barriers that impede migration and movement of flora and fauna	
2.3.7.3. protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including – a) an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;	Section 6.6
2.3.7.4. priority areas for protected area expansion, including- a) the way in which the proposed development will compromise or contribute to the expansion of the protected area network;	Section 6.7
2.3.7.5. SWSAs including: a) the impact(s) on the terrestrial habitat of a SWSA; and b) the impacts of the proposed development on the SWSA water quality and quantity (e.g., describing potential increased runoff leading to increased sediment load in water courses);	Section 6.3
2.3.7.6. FEPA sub-catchments, including a) the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;	Section 6.4 & Section 13.3
2.3.7.7. indigenous forests, including: a) impact on the ecological integrity of the forest; and b) percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.	Section 6.5
3.1. The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:	
3.1.1. contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Page 8 & Appendix A
3.1.2. a signed statement of independence by the specialist;	Page 8
3.1.3. a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment	Section 3.4 & Section 4
3.1.4. a description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Section 3.2 & Section 13.1
3.1.5. a description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 4
3.1.6 a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Section 6.1, Section 2 & Section 12
3.1.7. additional environmental impacts expected from the proposed development;	Section 13.3
3.1.8. any direct, indirect and cumulative impacts of the proposed development;	Section 13.3
3.1.9. the degree to which impacts and risks can be mitigated;	Section 13.3
3.1.10. the degree to which the impacts and risks can be reversed;	Section 13.3
3.1.11. the degree to which the impacts and risks can cause loss of irreplaceable resources;	Section 13.3
3.1.12. proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Section 15 & Section 16

Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity	Relevant Section in Report
3.1.13. a motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate;	Section 12 & Section 18
3.1.14. a substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Section 18
3.1.15. any conditions to which this statement is subjected.	Section 16.2
3.2. The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report including the mitigation and monitoring measures as identified, which must be incorporated into the EMP, where relevant.	EAP to incorporate
3.2.1. A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	EAP to incorporate