Appendix G.3

TERRESTRIAL BIODIVERSITY ASSESSMENT

TERRESTRIAL BIODIVERSITY SPECIALIST ASSESSMENT FOR THE NORMANDIEN WIND ENERGY FACILITY PROJECT

WSP Group Africa Pty (Ltd)

May 2025

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

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Acronyms and Abbreviations

Abbreviation	Explanation
AIS	Alien Invasive Species
AOO	Area of Occupancy
BI	Biodiversity Importance
CA	Conservation Areas
CBA	Critical Biodiversity Areas
CI	Conservation Importance
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
EOO	Extent of Occurrence
ESA	Ecological Support Area
FSBSP	Free State Biodiversity Sector Plan
FI	Functional Integrity
Ha	Hectare
IBA	Important Bird Areas
IUCN	International Union for the Conservation of Nature
KBA	Key Biodiversity Area
MAP	Mean Annual Precipitation
NEMA	National Environmental Management Act
NEMBA	National Environmental Management Biodiversity Act
NFEPA	National Freshwater Ecosystem Priority Areas
PA	Protected Areas
QDS	Quarter Degree Square
RR	Receptor Resilience
SANBI	South African National Biodiversity Institute
SAPAD	South African Protected Areas Database
SAS	Strategic Aquatic Services
SCC	Species of Conservation Concern
SEI	Site Ecological Importance

SWSA	Strategic Water Source Areas
ToPS	Threatened or Protected Species
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	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. He has over 15 years of experience working in the fields of ecology and conservation research and is registered as a Professional Natural Scientist (*Pr.Sci.Nat.*) – Ecological Science, with the South African Council of Natural Scientific Professions (SACNASP). Andrew has worked on projects in several African countries including Botswana, Democratic Republic of Congo, Ethiopia, Ghana, Mozambique, South Africa, Tanzania and Zambia.

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 Normandien Wind Energy Facility Project;
- 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.

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1. Introduction

Hawkhead Consulting was appointed by WSP Group Africa Pty (Ltd), to conduct the Terrestrial Biodiversity Specialist Assessment for the proposed Normandien Wind Energy Facility (WEF) Project (hereafter referred to as the 'Project'), near Harrismith in the Free State 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:

- 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 survey 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 potential negative 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 Plant Species Specialist Assessment and Animal Species Specialist Assessment reports, as well as any other biodiversity-related specialist reports.

1.2. Project Description

1.2.1. Project Background

The proposed Project forms part of the larger Verkykerskop WEF Cluster development. This proposed development comprises three separate projects, each of which, is part of a separate environmental authorisation process:

- Groothoek WEF (up to 300MW);
- Kromhof WEF (up to 300MW); and
- Normandien WEF (up to 300MW) - focus of this specialist report.

The Verkykerskop WEF Cluster also includes separate project components that are related to supporting infrastructure and will be the focus of separate environmental authorisation processes. These include:

- Groothoek up to 132 kV Grid Connection;
- Normandien up to 132 kV Grid Connection; and
- Kromhof up to 132 kV Grid Connection.

1.2.2. Project Location

The proposed Verkykerskop WEF Cluster is located in the Thabo Mofutsanyane District Municipality and Phumelela Local Municipality, near the town of Harrismith, in the Free State Province of South Africa.

1.2.3. Project Technical Details

The technical details of the proposed Project are detailed in Table 1.

Table 1: Proposed project Technical Details.

Details	Information
Applicant Name	Normandien Wind Power (Pty) Ltd
Municipalities	Thabo Mofutsanyana District Municipality Phumelela Local Municipality
Extent	6 067 ha
Buildable area	150 ha
Export Capacity	Up to 300 MW
Power system technology	Wind
Number of Turbines	Up to 37
Rotor Diameter	up to 200 m
Hub Height	up to 200 m
Hard Standing Dimensions	up to 0,8 ha per turbine
Turbine Foundations	Excavation up to 4.5 m deep, constructed of reinforced concrete to support the mounting ring. Once tower established, footprint of foundation is covered with soil.
Substation	1 x 33 kV/132 kV onsite collector substation (IPP Portion) being up to 2ha.
Powerlines	33 kV cabling to connect the wind turbines to the onsite collector substations, to be laid underground where practical.
Construction camp and laydown area	Construction compounds including site office inclusive of Concrete Batching plant of up to 1 ha Site office of 4 ha Laydown area of combined extent of 8 ha
Internal Roads	Up to 8 m in width (operational road surface width excluding V drains and cabling). During construction the disturbed road footprint will be up to 14 m wide including v-drains and trenching for cabling)
O&M Building	O&M office of up to 1 ha.
BESS	Battery Energy Storage System (BESS) (200MW/800MWh).

Details	Information
	Pre-assembled solid state batteries Export Capacity of up to 800 MWh Total storage capacity 200MW Storage capacity of up to 6-8 hours The BESS will be housed in containers covering a total approximate footprint of up to 7 ha

1.3. Study Spatial Scales

Two spatial scales were considered for this specialist study, namely:

- Local Study Area (LSA): The proposed development footprint for the Normandien WEF Project, and all areas encompasses by the Project's site boundary - shown in Figure 1. It is within this area where direct and indirect impacts on terrestrial biodiversity, flora and fauna receptors are likely to occur; and
- Regional Study Area (RSA): Comprises the entire area of influence for the proposed Verkykerskop WEF Cluster development. It encompasses all three separate project sites for the proposed Groothoek WEF, Kromhof WEF and Normandien WEF and is also shown in Figure 1. The RSA formed the spatial focus for the desktop literature and data collation and review and the field programme.

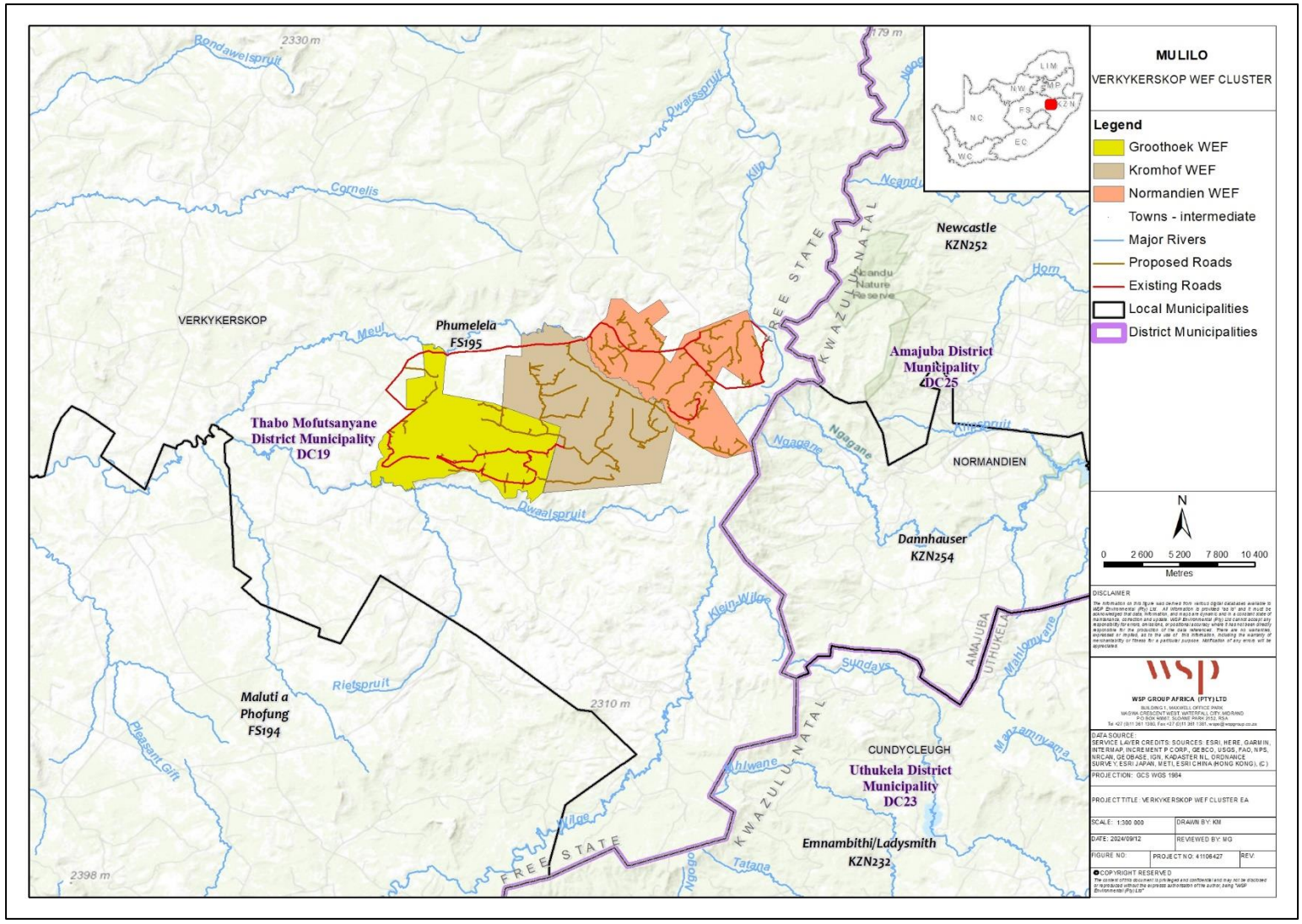
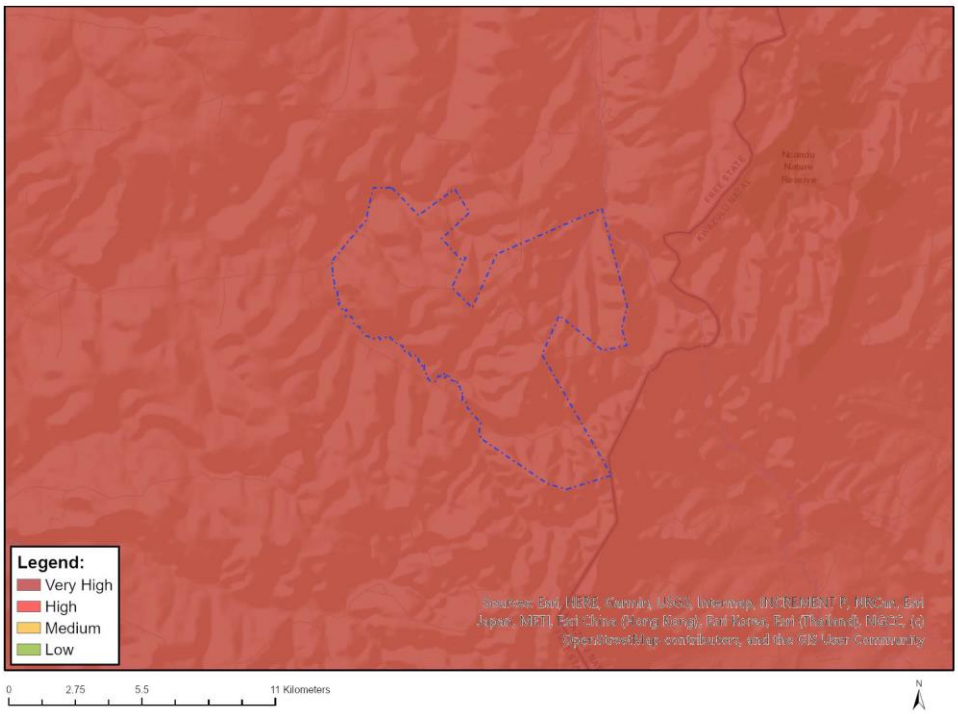


Figure 1: Map showing the location of the proposed Normandien Project site (i.e. the Local Study Area - orange) and the broader Regional Study Area for the Verkykerskop WEF Cluster, which also encompasses the Groothoek WEF and Kromhof WEF project sites.

1.4. Environmental Screening Tool - Project Sensitivities

The proposed Project site was assessed at a desktop level using the 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 several biodiversity conservation features:



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	ESA
Very High	CBA 1
Very High	CBA 2
Very High	ESA 1
Very High	ESA 2
Very High	FEPA Subcatchment
Very High	SWSA (SW) _Northern Drakensberg
Very High	National Protected Area Expansion Strategy (NPAES)

2. Relevant Legislation and Guidelines

Relevant international, national and provincial legislation, as well as 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 2.

Table 2: 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	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. 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: • 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)	The NEMBA is administered by the Department of Forestry, Fisheries and the Environment (DFFE) and provides the framework under the NEMA for the: • 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). Amongst other components, the NEMBA includes: • Lists of Critically Endangered, Endangered, Vulnerable and Protected Species (February 2007), with associated amendments (December 2007 and 3 June 2020) (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
	• National list of threatened terrestrial ecosystems for South Africa (2021 revision), published under Section 51(1)(a) of NEMBA. • National Biodiversity Offset Guideline (2023), which provides guidance on the need to develop biodiversity offsets. 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. Chapter 5 of NEMBA also provides a list of regulations and guidance concerning alien invasive species, including: • A guideline for Monitoring, Control and Eradication Plans (September 2015); • 2020 Alien and Invasive Species Regulations (September 2020); and • 2016 and 2020 Alien and Invasive Species Lists (March 2021).
National Environmental Management: Protected Areas Act (2003)	• 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.
Nature Conservation Ordinance 8 of 1969 for the Free State Province	The Nature Conservation Ordinance 8 of 1969 provides lists of specially protected and protected flora and fauna: • Schedule 1: Protected Game; and • Schedule 6: Protected Plants.
Other Relevant National and Provincial Policies, Plans and Guidelines	Other relevant policies, plans and guidelines that were considered during this study include: • Species Environmental Assessment Guideline (SANBI, 2020); • National Protected Area Expansion Strategy (2018); and • Free State Biodiversity Sector Plan (2019).

3. Study Methodology

The methodology used for this study included a desktop literature review component and a field programme. The various tasks associated with these components are discussed below:

3.1. Desktop Literature Review

The aim of the desktop literature review component was to collate and review data and information pertaining to the terrestrial biodiversity characteristics and conservation context of the RSA and LSA. Reviewed literature and datasets were obtained from a variety of online and literature sources, as discussed below:

- The South African National Biodiversity Institutes (SANBI) Final Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018) was consulted to identify the regional vegetation types relevant to the RSA and LSA;
- Mucina and Rutherford (2011) was reviewed to obtain full descriptions of the relevant regional vegetation type. SANBI (2013) was also reviewed for a biome-level description;
- The National List of Threatened Ecosystems (NEMBA Threatened Ecosystems, 2021) was consulted to determine the conservation status of relevant vegetation types and ecosystems;
- The Free State Biodiversity Sector Plan (MBSP) (2019) spatial data was reviewed to determine the status and distribution of *inter alia*, protected areas, Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA) in the RSA and LSA;
- The Strategic Water Source Areas (SWSA) and Freshwater Ecosystem Priority Area (FEPA) databases were reviewed for information on the hydrological setting and management of the RSA and LSA;
- The South African Protected Areas Database website (SAPAD, 2025) was reviewed to identify protected areas (legally gazetted) and conservation areas in the broader region in which the RSA and LSA are located;
- The DWAF spatial data of Indigenous Forest Patches was consulted to identify any indigenous forests in, or in close proximity to, the RSA and LSA;
- The National Protected Area Expansion Strategy (NPAES) (2018) was assessed to identify any relevant Priority Focus Areas for protected area expansion;
- The presence of Key Biodiversity Areas (KBA) in the landscape was assessed using the Key Biodiversity Areas website (keybiodiversityareas.org); and
- Satellite imagery available on Google Earth Pro and GeoTerra Imagery spatial data were also studied to develop an understanding of general landcover, likely habitat types, and historic- and current on-site disturbances in the LSA and broader RSA.

3.2. Field Programme

The field programme comprised two field surveys; a dry season field survey focusing on fauna sampling was conducted by WSP Africa Pty (Ltd) from the 1st to 5th July 2024; and a wet season survey, comprising both flora and fauna sampling, was conducted by Hawkhead Consulting from the 3rd to 8th March 2025. Sampling was conducted across the entire RSA during both field surveys. The timing of the field surveys covered both the mid-winter dry season and the mid-summer wet season periods, and accordingly, seasonality is not considered a limiting factor.

The sampling methodology was aligned with SANBI (2020) recommendations, and included both flora and fauna surveys, as summarised below (for detailed surveying methods, refer to the Animal Species Specialist Assessment and Plant Species Specialist Assessment reports):

- Vegetation was sampled using meander search transects at representative sites in the main natural habitat units across the RSA. Collected data included habitat character and condition, flora species composition, evidence of current and past disturbances, presence of flora species of conservation concern, and presence of declared alien invasive species;
- Fauna surveys included:
    - Active sampling (e.g., baited motion-triggered camera traps and active searches);
    - Passive sampling methodologies, including direct observations/opportunistic encounters and indirect observations (i.e. identification of fauna tracks, scats, burrows etc.); and
    - Interviews with local farmers to obtain anecdotal evidence of fauna known to be present on-site; and
- While on-site, special emphasis was also placed on assessing *inter alia*:
    - Habitat connectivity within the LSA and across the surrounding landscape (RSA);
    - The presence/potential presence of species of conservation concern based on habitat suitability;
    - Specific sites of potential sensitivity; and
    - The prominent ecological drivers of change in the landscape.

3.3. Delineation and Mapping of Habitat Units

Mapping of habitat units was conducted using a review and analysis of composite Google Earth aerial imagery, coupled with data and observations obtained during the field survey. These were integrated with the wetland delineations developed by WSP Group Africa (Pty) Ltd and the Geoterra Imagery land cover as a base-layer.

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, 2020). 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, 2020).

- **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, 2020).
- **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, 2020).

For tables detailing the rating criteria for Conservation Importance, Functional Integrity and Receptor Resilience and the scoring matrices, refer to Appendix B. Table 3 presents a guideline for interpreting the SEI (SANBI, 2020).

Table 3: 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 (2020).	

4. Assumptions, Uncertainties and Gaps in Knowledge

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

- Field work was conducted over a five-day period in July 2024 and a five-day period in March 2025. The timing of the field surveys therefore covered the mid-winter dry season period and the mid-summer wet season period:
    - The surveys coincided with periods of high fauna presence and activity, and were therefore optimal to assess fauna community composition;
    - The March survey followed sufficient rainfall, resulting in active vegetation growth and flowering. Conditions were therefore optimal to assess vegetation character and flora species composition;
    - Seasonality is therefore not considered a study limitation with respects to flora and fauna sampling;

- Surveying sites were chosen to represent the range of on-site habitats. However, the RSA is extensive and topographically complex, and accordingly not all areas of natural habitat or proposed development footprints could be surveyed during the field programme;
- In line with the above, it is possible that certain cryptic herbaceous taxa (e.g., annuals and geophytes) that are most readily visible or distinguishable at other periods during the wet/growing season, may not have been detected during the field programme;
- It is also possible that certain rare, cryptic, migrating, aestivating or transient fauna species may not have been present and/or observed during the field programme;
- 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
- Mapping of habitat units was conducted manually at a desktop-level, using available aerial imagery, coupled with field observations and supplementary spatial datasets. It must be noted that agricultural landscapes are dynamic and subject to ongoing farming activities. It is thus possible that the character of individual habitat patches may change over time.

5. Regional Vegetation Characteristics

The LSA is located in the Grassland Biome, and according to SANBI's regional mapping of South Africa's vegetation types (2018), the site is dominated by Eastern Free State Sandy Grassland, with small areas mapped as Low Escarpment Moist Grassland (Figure 2). The general characteristics of the Grassland Biome and these vegetation types are discussed in more detail below:

5.1. Grassland Biome

The LSA 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 LSA 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. Eastern Free State Sandy Grassland

Eastern Free State Sandy Grassland is mainly confined to the Free State, with marginal extension into KwaZulu-Natal and Lesotho (Mucina & Rutherford, 2011). The prevailing terrain is flat- to slightly undulating, with certain areas drained by streams and rivers characterised by undulating terrain. Vegetation is characterised by closed grassland, dominated by *Eragrostis curvula, Tristachya leucothrix* and *Themeda triandra*, amongst other grasses and forbs (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 Eastern Free State Sandy Grassland vegetation type, amongst others:

Graminoids: *Themeda triandra, Andropogon appendiculatus, Brachiaria serrata, Cymbopogon pospischilii, Digitaria monodactyla, Digitaria tricholaenoides, Cynodon dactylon, Elionurus muticus, Eragrostis chloromelas, Eragrostis curvula, Eragrostis plana, Heteropogon contortus, Hyparrhenia hirta, Aristida junciformis, Tristachya leucothrix* and *Aristida congesta.*

Herbs: *Berkheya onopordifolia, Berkheya speciosa, Dicoma anomala, Acalypha angustata, Ajuga ophrydis, Anthospermum herbaceum, Berkheya pinnatifida, Crabbea acaulis, pelargonium luridum, Pentanisia prunelloides, Senecio coronatus, Senecio erubescens, Tolpis capensis*, *Haplocarpha scaposa, Helichrysum aureonitens, Helichrysum nudifolium* and *Hilliardiella oligocephala.*

5.3. Low Escarpment Moist Grassland

Low Escarpment Moist Grassland is found in KwaZulu-Natal, Free State and Mpumalanga Provinces. (Mucina and Rutherford, 2011). The landscape is characterised by a complex mountain topography, with generally steep east- and south-facing slopes supporting a closed grassland with *Themeda triandra* and *Hyparrhenia hirta* dominant. Common woody species include *Protea caffra* and *Leucosidea sericea* (Mucina and Rutherford, 2011).

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

Grasses: *Alloteropsis semialata*, *Andropogon schirensis, Brachiaria serrata, Cynodon dactylon, Eragrostis chloromelas, Eragrostis curvula, Eragrostis plana, Eragrostis racemosa, Hyparrhenia hirta, Monocymbium ceresiiforme, Panicum natalense, Themeda triandra* and*, Tristachya leucothrix.*

Herbs: *Acanthospermum australe, Eriosema* cordatum, *Berkheya rhapontica, Cucumis zeyheri, Haplocarpha scaposa, Helichrysum oreophilum, Helichrysum rugulosum, Hilliardiella aristata, Selago densiflora* and *Senecio venosus.*

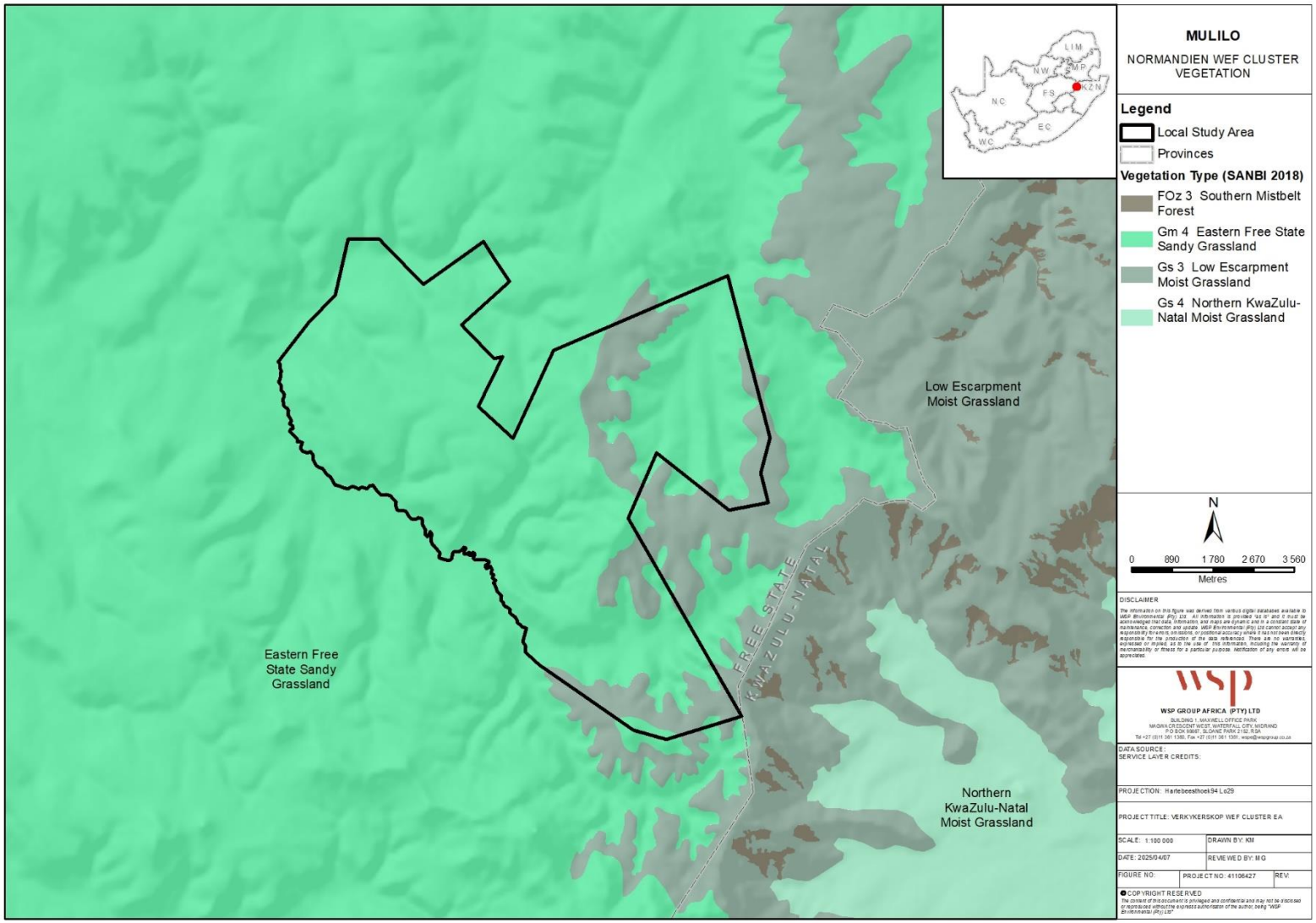


Figure 2: Local study area in relation to the SANBI (2018) vegetation types.

6. Regional Ecological Sensitivity and Conservation Setting

6.1. Nationally and Provincially Threatened Ecosystems

According to the NEMBA Threatened Ecosystems (2021), Eastern Free State Sandy Grassland and Low Escarpment Moist Grassland are not listed as threatened vegetation types at a national level.

It is noted however, that according to the Free State Biodiversity Sector Plan technical report, the adjusted/provincial status of Eastern Free State Sandy Grassland is Vulnerable, with approximately 40% of the vegetation remaining in a natural condition and the remaining extent (approx. 60%) considered modified (Collins, 2024). Approximately 87% of Low Escarpment Moist Grassland remains in a natural condition, with only about 13% considered transformed. Accordingly, Low Escarpment Moist Grassland is not listed at a provincial level, according to Collins (2024).

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

The Free State Biodiversity Sector Plan (FSBSP) technical report (Collins, 2024) recognises five categories of conservation focus; Protected, Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA), Other Natural Areas and Degraded. Definitions for each are presented below:

- **Protected**: Formal 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**: An area that must be maintained in a natural or near-natural state in order to meet biodiversity targets. CBAs should collectively meet biodiversity targets for all ecosystem types, as well as for species and ecological processes that depend on natural or near-natural habitat, that have not already been met in the protected area network. Two CBA categories are recognised:
    - CBA Irreplaceable (CBA1): An area that is irreplaceable or near-irreplaceable for meeting biodiversity targets. There are no, or very few other options, for meeting biodiversity targets for the features associated with the site;
    - CBA Optimal/Important (CBA2): An area that has been selected as the best option for meeting biodiversity targets, based on complementarity, efficiency and/or avoidance of conflict with other land or resource uses;
- **Ecological Support Area**: An area that must be maintained in at least fair ecological condition (seminatural/moderately modified state) in order to support the ecological functioning of a CBA or protected area, or to generate or deliver ecosystem services, or to meet remaining biodiversity targets for ecosystem types or species when it is not possible or not necessary to meet them in natural or near-natural areas;
- **Other Natural Areas**: An area in a good or fair ecological condition (natural, near-natural or semi-natural) that is not required to meet biodiversity targets for ecosystem types, species or ecological processes. One of five broad categories on a CBA map; and
- **Degraded**: Refers to land with no natural habitat remaining (NNR)

The spatial delineations of the Free State Biodiversity Sector Plan in relation to the LSA are shown in Figure 4.

Virtually the entire LSA is mapped as either CBA or ESA. The eastern portion is mapped as ESA 1, with small areas delineated as ESA 2. The western portion of the LSA is mostly delineated as CBA 1, with small areas mapped as CBA 2 and 'Other' (see Figure 4).

It is noted that the FSBSP mapping is done at a fairly course-scale, and as a result there may be spatial inaccuracies, particularly when the scale of analysis is fine, such as when dealing with the boundaries of individual cultivated fields. Excluding these small, modified patches, the remaining extensive tracts of CBA land in the LSA are important and functional natural habitat.

The continued integrity and protection of these CBA's is crucial to meet conservation targets. The presence of CBA 1 and CBA 2 land in the LSA is therefore a concern with respects to terrestrial biodiversity management and it is recommended that, as far as possible, proposed Project infrastructure should be sited to avoid impacting CBAs.

There is a greater range of land uses permissible in ESAs. However, the functional state of these areas should not be compromised by proposed Project infrastructure or activities. Proposed Project infrastructure should therefore also ideally not impact designated ESA.

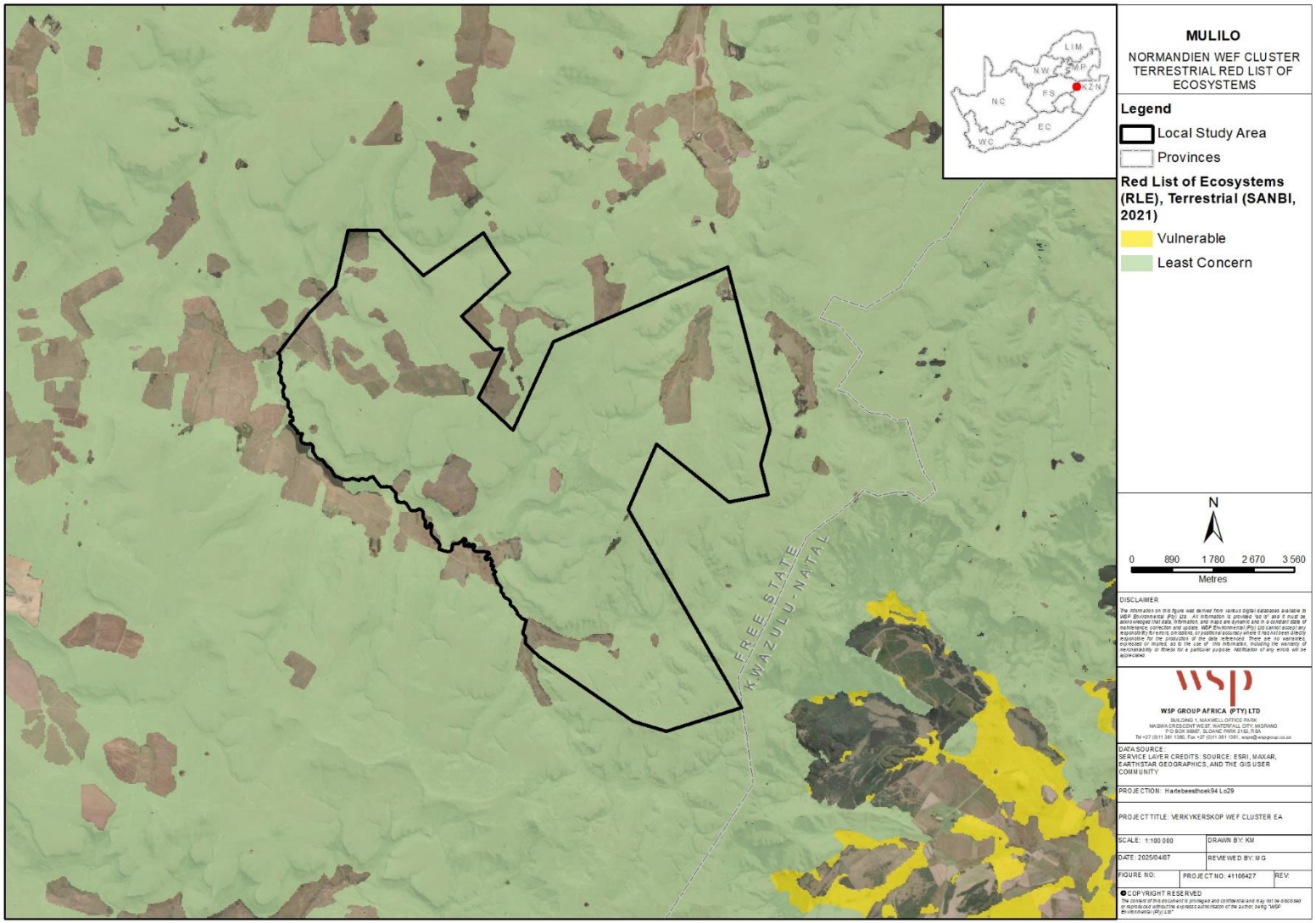


Figure 3: Local study area in relation to delineations of the National Red List of Terrestrial Ecosystems.

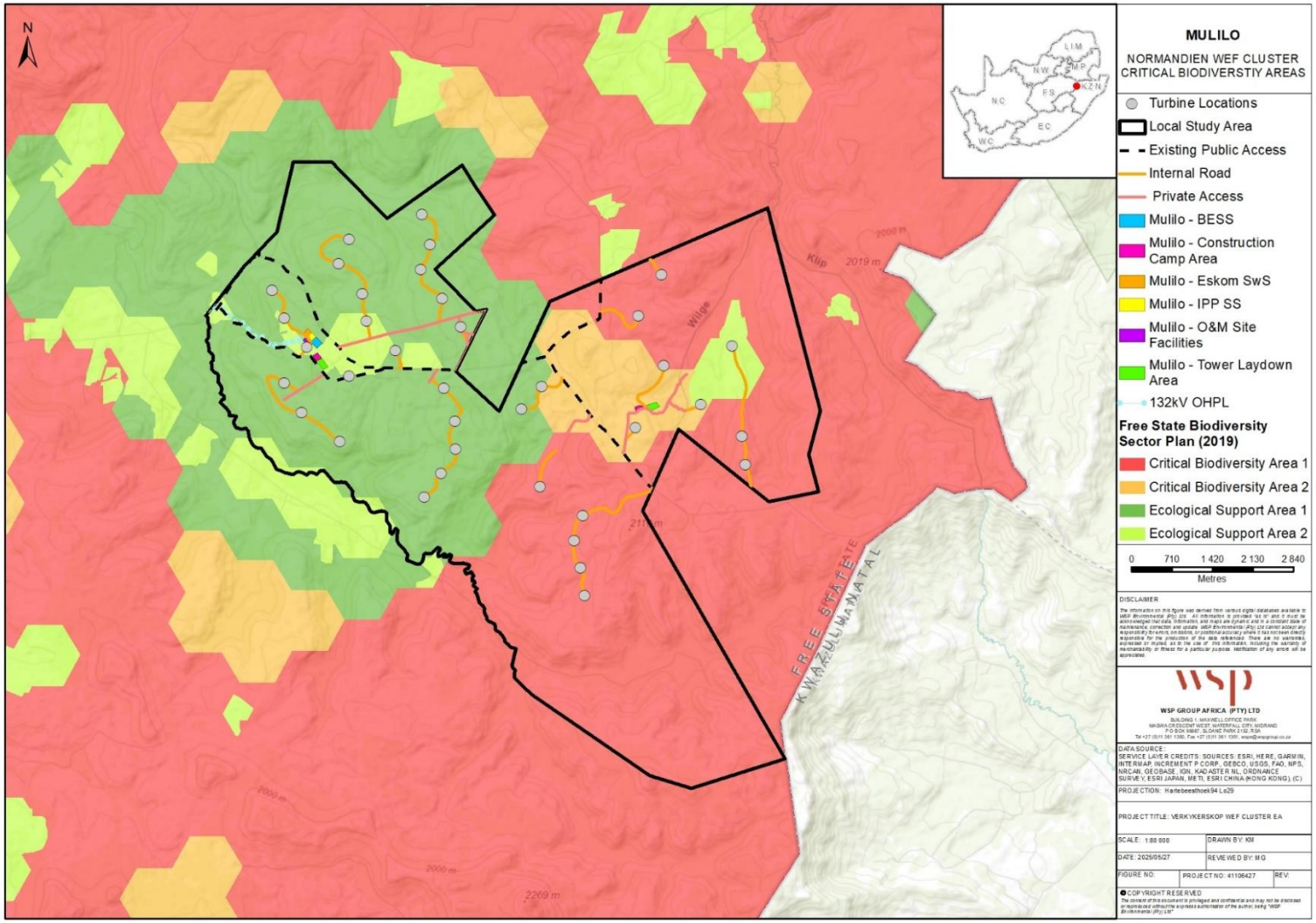


Figure 4: Local study area and proposed infrastructure layout in relation to mapped Critical Biodiversity Areas and Ecological Support Areas, as per the FSBSP (2019).

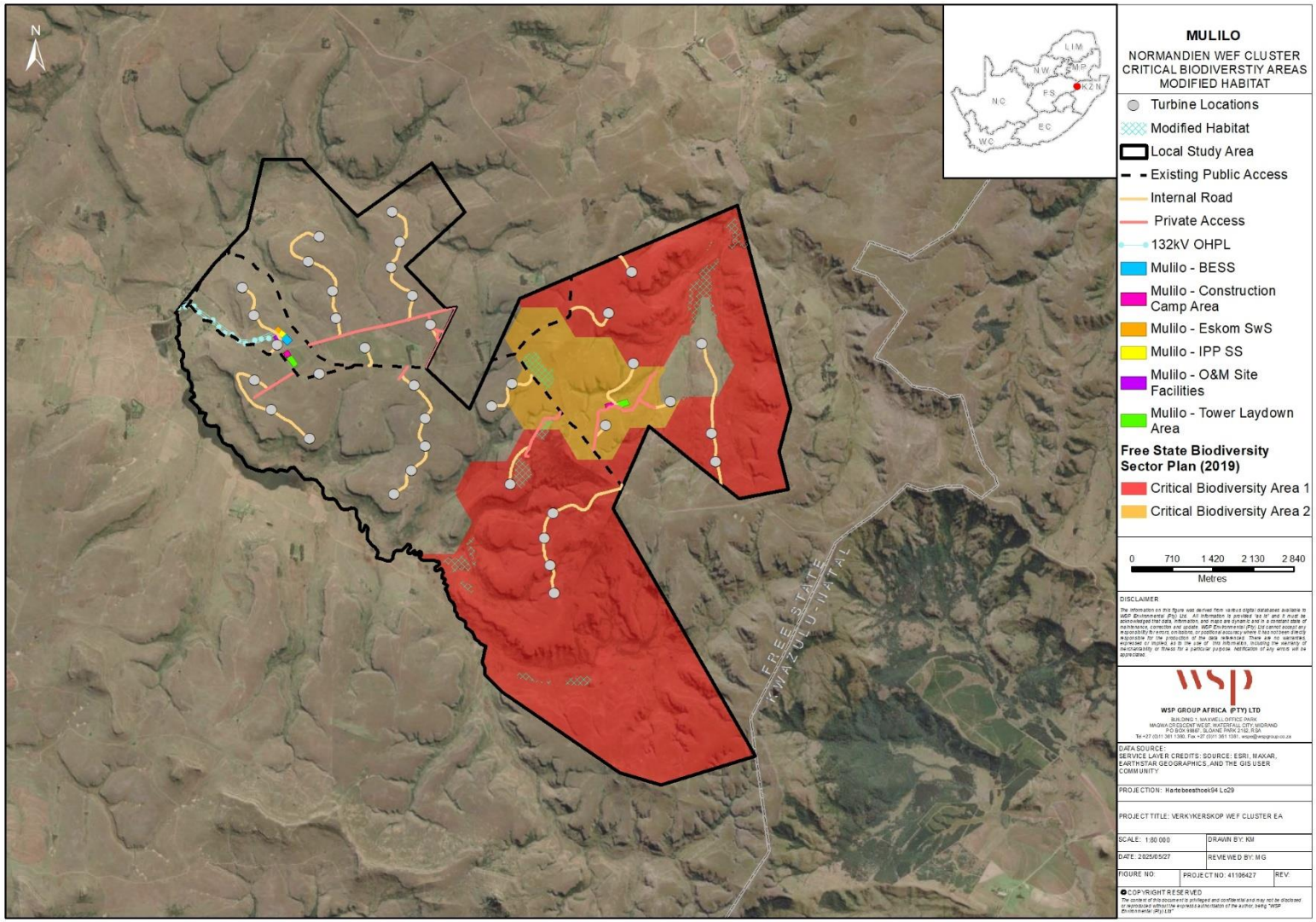


Figure 5: Patches of CBA land that are actually modified (hatched area) and characterised by cultivation or old lands.

6.3. Water Management

6.3.1. Strategic Water Source Areas

The LSA is located within a mapped Strategic Water Source Area (SWSA) known as the Northern Drakensberg SWSA (shown in Figure 6). This SWSA extends in a broader band from just west of Newcastle in KwaZulu-Natal south-westward to the Drakensberg range along the South Africa – Lesotho international border.

6.3.2. Freshwater Ecosystem Priority Area Sub-Catchment

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).

According to the mapping of FEPAs, the far eastern portion of the LSA is mapped as a FEPA. The remaining (western) portion is delineated as 'Upstream' (Figure 7).

According to 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.

6.4. Indigenous Forests

No indigenous forests occur in the LSA. The LSA is dominated by large tracts of natural grassland, with patches of wooded shrubland. Indigenous forests are therefore not included as receptor for the impact assessment, or considered further in this report.

6.5. Protected Areas and Conservation Areas

The LSA is not located in, or borders a recognised protected area. The closest protected areas are shown in Figure 8 and include:

- Ngandu Private Forest and Grassland Reserve;
- Umsonti Private Nature Reserve;
- Normandien Protected Environment;
- Upper Wilge Protected Environment; and
- Ora Nature Reserve.

6.6. 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 National Protected Area Expansion Strategy (2018), the entire LSA is mapped as Priority Focus Areas for protected area expansion, as shown in Figure 9.

6.7. Key Biodiversity Areas

South Africa's Important Bird Areas (IBA) network is currently being replaced by the concept of Key Biodiversity Areas (KBA). KBAs 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).

Unlike IBAs, which only focus on bird conservation, KBAs are more holistic and consider a broader range of biodiversity, including mammals, herpetofauna (reptiles and amphibians), flora and many other taxa. Identified IBAs are automatically considered KBAs.

The northern portions of the LSA are located within the formerly recognised Grassland IBA. Most of the western and central portions are located within the Eastern Free State Escarpment KBA (KBA ID S471). This is a large KBA that covers approximately 1570 km^2 of the Free State Province (KBAP, 2025). It meets the KBA threshold for three KBA criteria, with eight species qualifying for one or more criteria:

- Criterion A1 is met due to the presence of significant portions of six threatened species (KBAP, 2025);
- Criterion B2 is met due the presence of an assemblage of co-occurring range-restricted bird species (KBAP, 2025); and
- Criterion E is met due to the site being irreplaceable for the global persistence of two species (KBAP, 2025).

Table 4: Key biodiversity elements triggering KBA criteria for the Eastern Free State Escarpment KBA.

Taxonomic Group	Scientific Name	Common Name	Red List Category	KBA Criteria
Aves	*Hemimacronyx chloris*	Yellow-breasted Pipit	Vulnerable	A1b
Aves	*Sarothura ayresi*	White- winged Flufftail	Critically Endangered	A1a
Aves	*Spizocorys fringillaris*	Botha's lark	Endangered	A1a, A1c, B2
Aves	*Sylvia nigricapillus*	Bush Blackcap	Vulnerable	A1b, B2
Mammalia	*Redunca fulvorufula*	Mountain Reedbuck	Endangered	A1c
Source: KBAP (2025)				

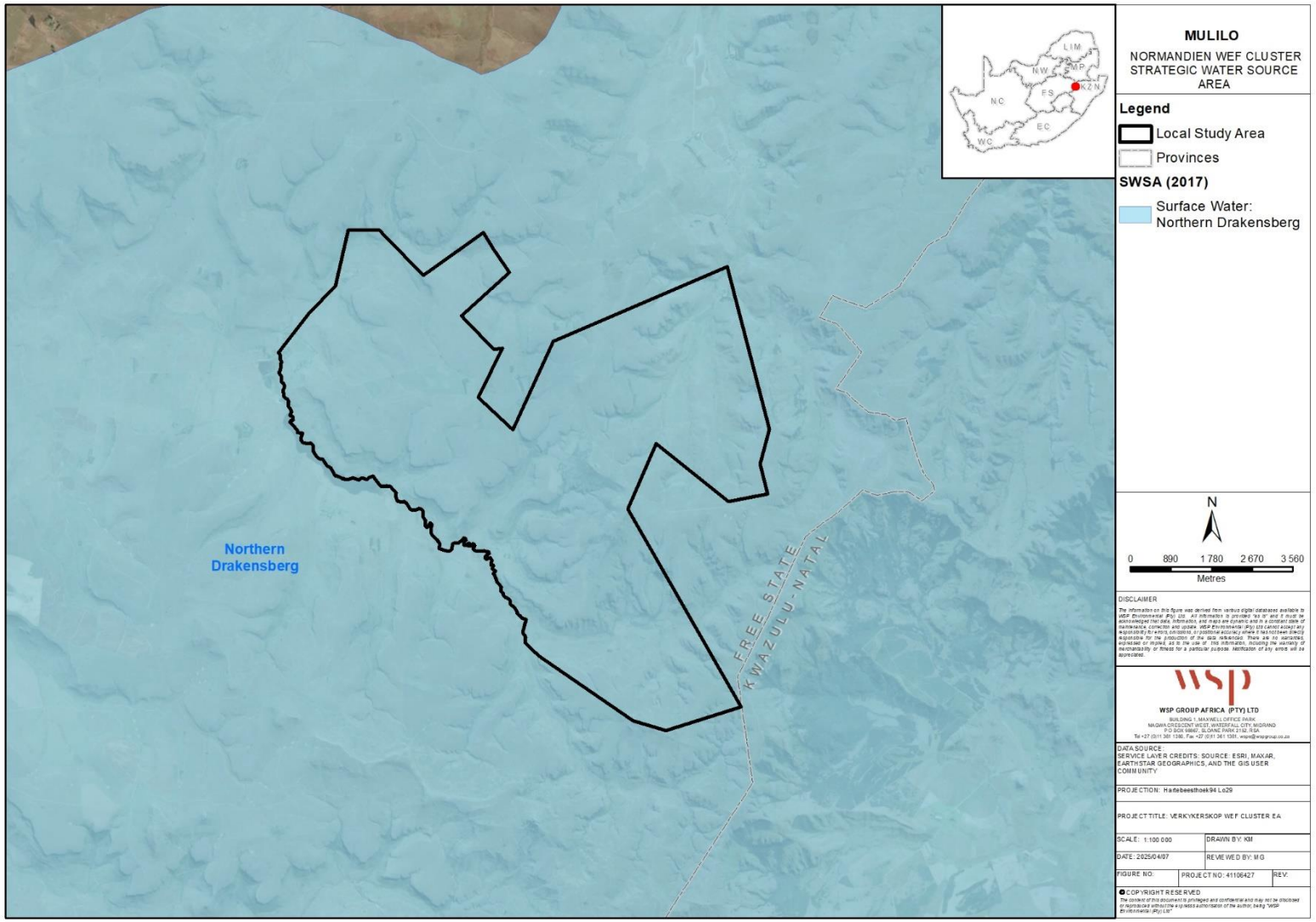


Figure 6: LSA in relation to Strategic Water Source Areas.

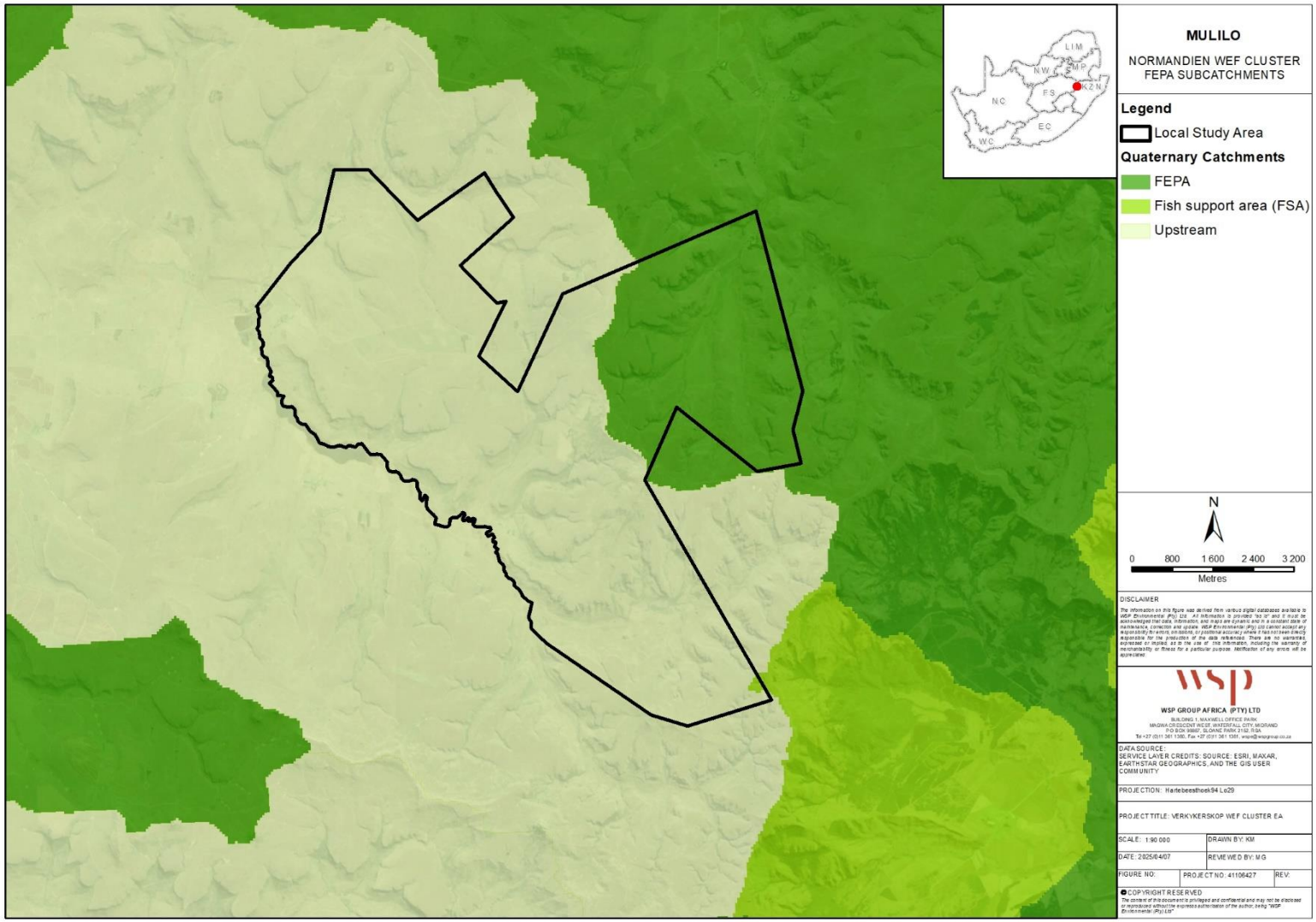


Figure 7: LSA in relation to recognised Freshwater Ecosystem Priority Area.

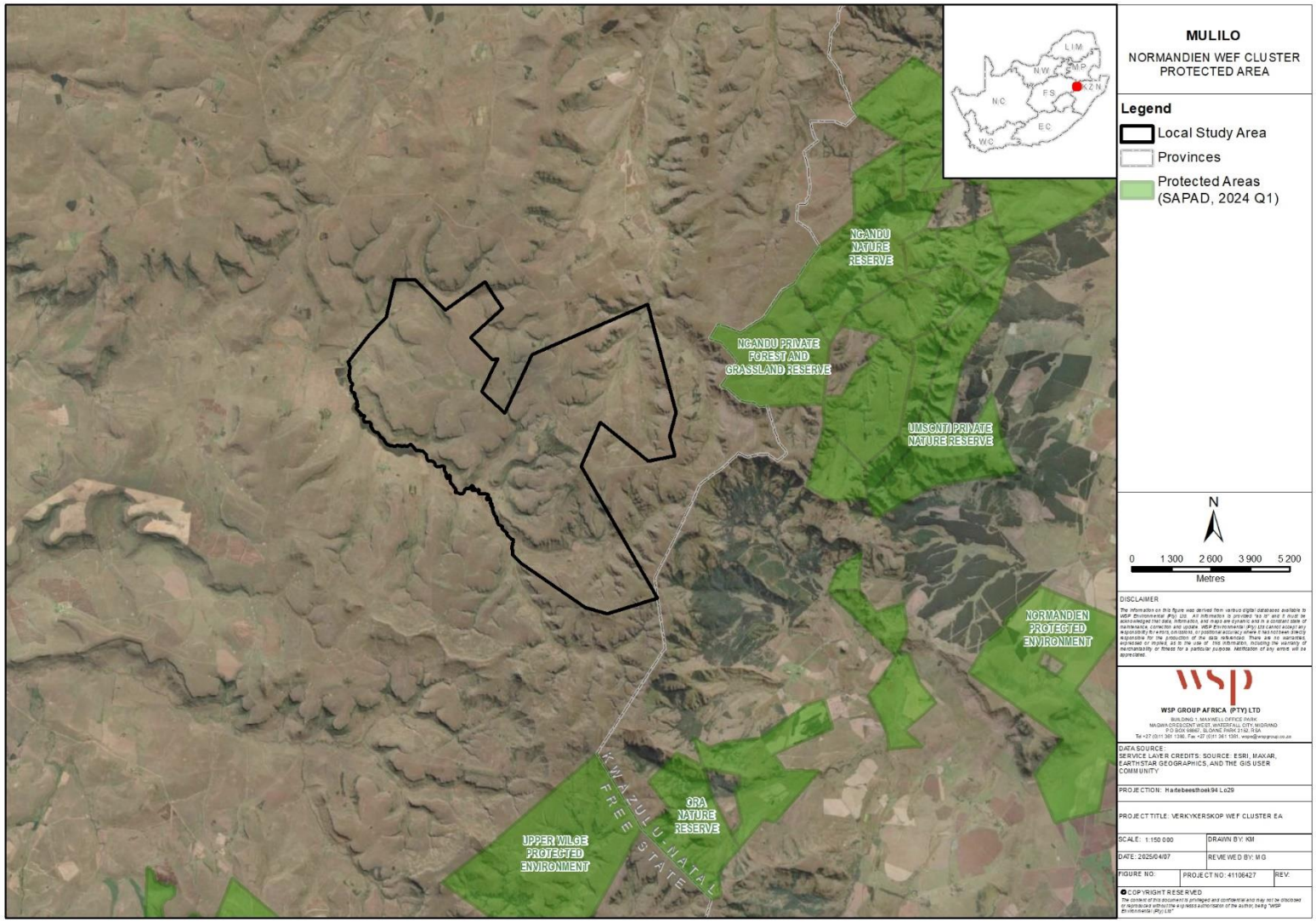


Figure 8: LSA and Protected Areas in the region.

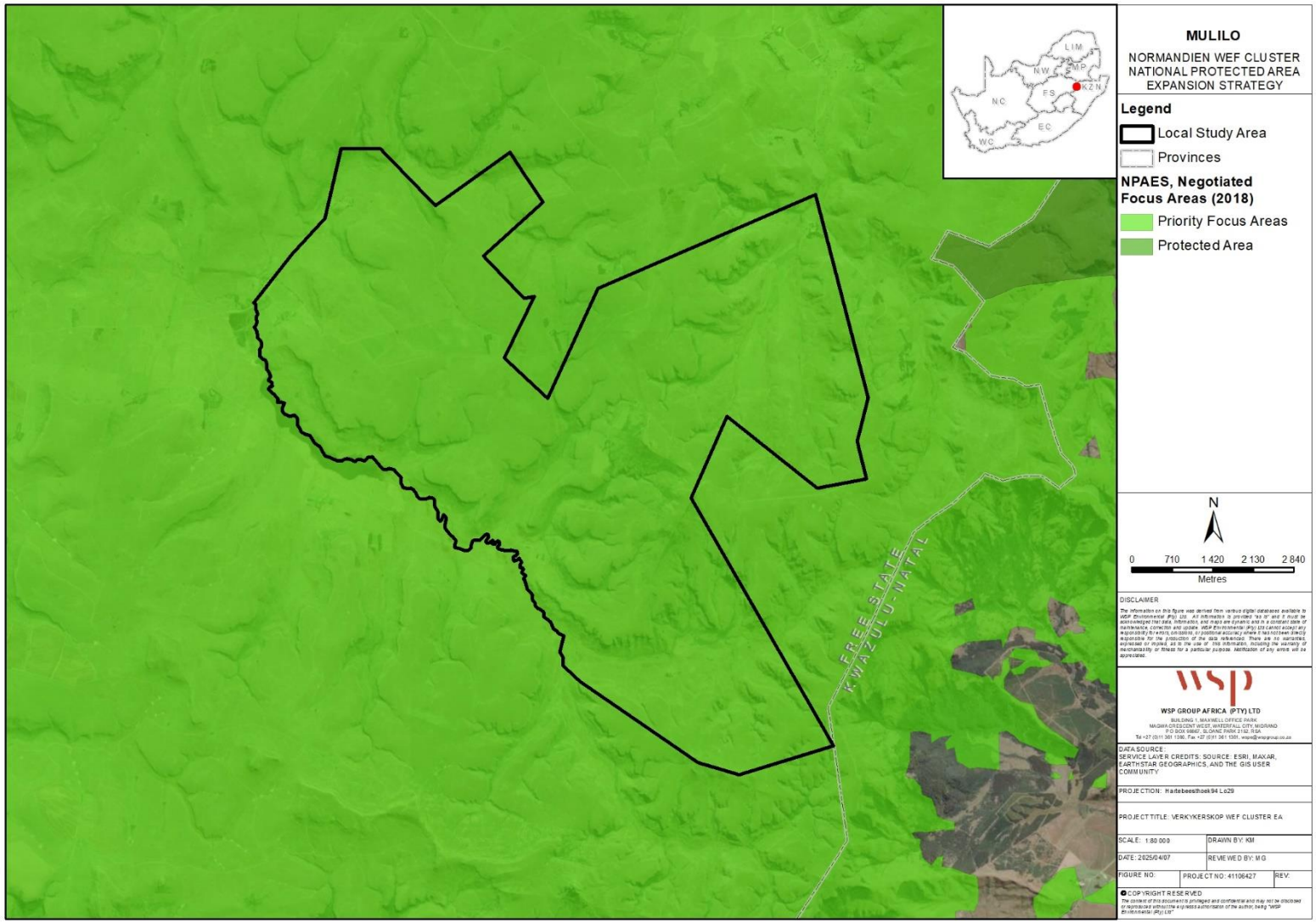


Figure 9: LSA in relation to national Priority Focus Area, as per the National Protected Areas Expansion Strategy (2018).

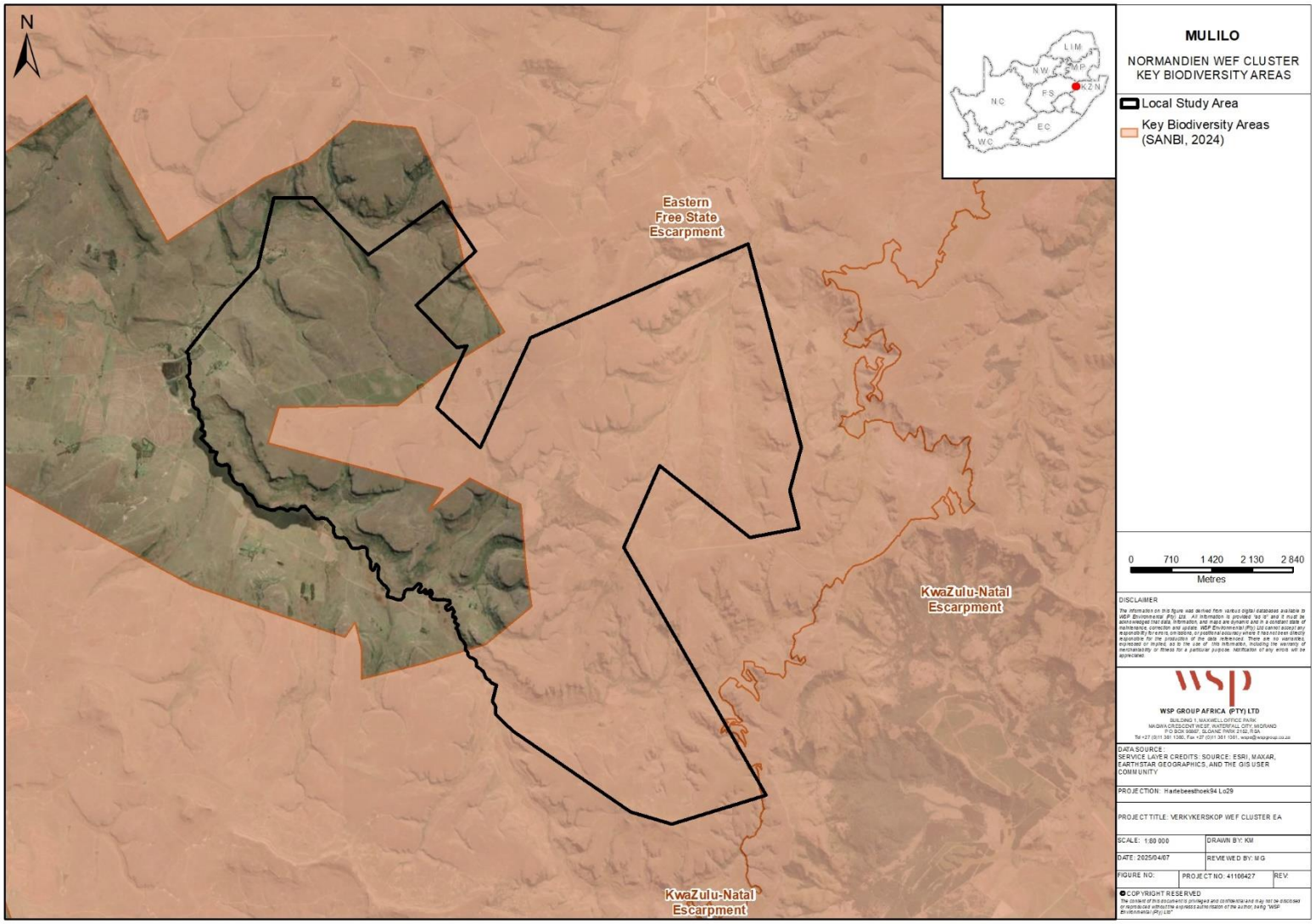


Figure 10: LSA in relation to the Eastern Free State Escarpment Key Biodiversity Area.

7. Landscape Context and Existing Impacts on Terrestrial Biodiversity

The following notes describe the general landscape context and major existing impacts (anthropogenic activities and infrastructure) that were observed during the 2025 field programme:

- The RSA is a rural agricultural landscape, characterised by extensive tracts of natural habitat, with localised patches of modified habitat (cultivated fields);
- Outside of crop growing, the primary agricultural land use is livestock farming with cattle and sheep;
- Linear infrastructure in the RSA includes gravel district roads, farms roads, powerlines and farm fences;
- Alien invasive species (AIS) were noted in the RSA; however, they are not abundant and typically colonise disturbed locations, such as the road verges, edges of cultivated field and other degraded locations; and
- Other anthropogenic activities and infrastructure that have resulted in small-scale and localised habitat modification include farm residences and various agriculture structures (barns).

8. Habitat Units

Based on data collected during the field programme, six primary habitat units comprising three natural habitat units and three modified habitat units, were identified across the RSA, and are relevant to the LSA:

Natural Habitats

- Natural Dry Grassland;
- Rocky Shrubland;
- Moist Grassland (incl. rivers and streams);

Modified Habitats

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

Habitat units are described, with accompanying photographs, in the sections below**Error! Reference source not found.Error! Reference source not found.**. A habitat unit map for the LSA is shown in Figure 11.

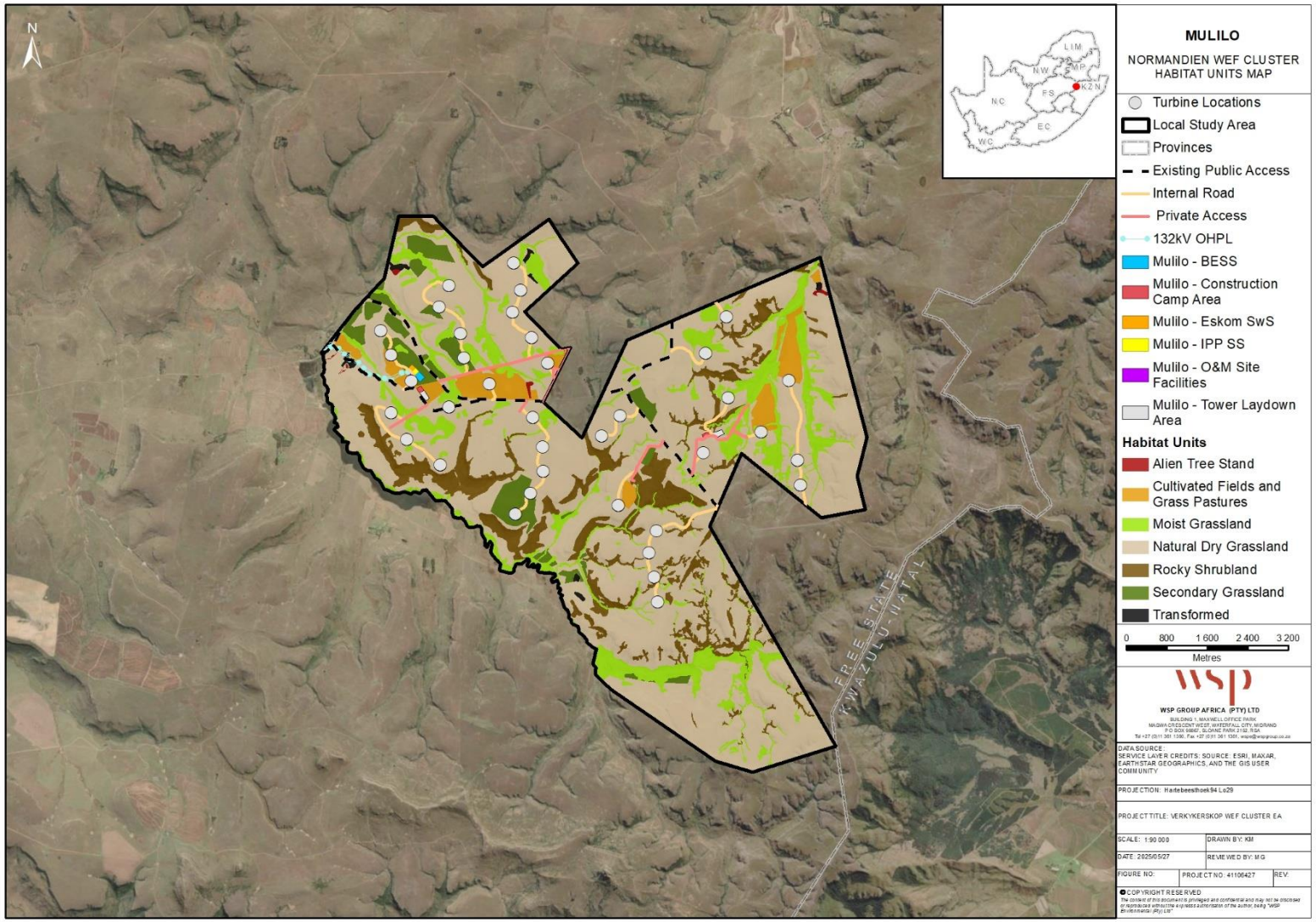


Figure 11: Habitat unit map of the local study area, showing the proposed infrastructure layout.

8.1.1. Natural Dry Grassland

This is a large and variable habitat unit that covers the extensive rolling hills of the RSA. Structurally, vegetation is characterised by low closed grassland, as per Edwards (1983) structural classification.

Natural Dry Grasslands are characterised by a diverse flora assemblage, comprising a mixture of grasses and forb/herb species. Common grasses recorded include *inter alia*; various *Eragrostis* species such as *Eragrostis chloromelas, Eragrostis curvula, Eragrostis plana* and *Eragrostis racemosa,* as well as *Aristida junciformis, Cymbopogon pospischilii, Sporobolus africanus, Themeda triandra* and *Tristachya leucothrix.*

Common herbs/forbs recorded include *inter alia*; *Berkheya onopordifolia, Berkheya setifera, Commelina africana, Helichrysum nudifolium* var*. nudifolium, Helichrysum rugulosum, Hilliardiella elaeagnoides and Richardia brasiliensis*.* Woody species generally occur at low abundances and as scattered individual small trees and shrubs, with denser woody aggregations present in transition areas between Natural Dry Grassland and areas of Rocky Shrubland. Common woody species recorded include *Diospyros lycioides* subsp. *lycioides, Leucosidea sericea, Searsia dentata, Searsia discolor* and *Seriphium plumosum* (*denotes an alien species).

Common declared alien invasive species recorded in this unit include *Verbena bonariensis* and *Verbena rigida.* Both taxa are listed as NEMBA Category 1b alien invasive species.

Sensitivity Aspects

- Natural Dry Grassland is a natural habitat unit, with generally low levels of disturbance;
- Extensive intact tracts of grassland are present and provide important habitat for a variety of flora and fauna. These areas 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;
- One Red List flora species, namely *Khadia carolinensis* (Vulnerable) was recorded at two locations in this habitat unit in the LSA. Habitat suitability assessments also suggest that several additional Red List flora species may also be present in this habitat unit;
- Several provincially Protected flora taxa were also recorded in this habitat unit; and
- Natural Dry Grasslands are therefore considered to have floristic importance and sensitivity.

Figure 12: Typical Natural Dry Grassland.

Figure 13: extensive tracts of intact Natural Dry Grassland are present on-site.

8.1.2. Rocky Shrubland

Rocky Shrubland characterises many of the rocky hillsides, slopes and valleys in the RSA. Vegetation structure is variable and strongly dependent on aspect. As per Edwards (1983) structural classification, tall- to high closed shrubland characterises the cooler and moister south-facing hillsides and ridges, as well as the deeper valley areas. A more open vegetation structure, approximating tall open shrubland, typically occurs on the drier north-facing hillsides and ridges.

Compositionally, *Leucosidea sericea* is the dominant woody species in this unit and is particularly prevalent on moist south-facing hillsides and slopes, where it often forms dense, almost mono-specific stands. *Leucosidea sericea* is a common bush encroacher that typically increases in abundance in response to high levels of livestock grazing. This species is generally less abundant on north-facing slopes, with other woody taxa more evident, including *Diospyros lycioides* subsp. *lycioides, Euclea crispa, Searsia dentata, Searsia pallens* and *Searsia pyroides.*

Other less abundant woody species recorded in this unit include *inter alia*; *Buddleja salviifolia, Calpurnia aurea, Cussonia paniculata, Halleria lucida, Gymnosporia buxifolia, Kiggelaria africana, Myrsine africana, Protea roupelliae* and *Rhamnus prinoides.*

Common species recorded in the herbaceous layer include various grasses, such as *Digitaria eriantha Eragrostis chloromelas, Eragrostis curvula, Eragrostis plana, Eragrostis racemosa* and *Sporobolus africanus,* as well as forbs, such as *inter alia*; *Acalypha angustata, Berkheya setifera, Hermannia transvaalensis* and *Hermannia depressa.*

Declared alien invasive species recorded in this unit include *Cotoneaster franchetii* and *Opuntia ficus-indica.* Both taxa are listed as NEMBA Category 1b alien invasive species.

Sensitivity Aspects

- Rocky Shrubland is a natural habitat unit, with generally low levels of disturbance;
- In the grassland dominated habitat matrix, this well-wooded and rocky habitat unit significantly increases landscape-scale habitat heterogeneity, and provides important corridor and refugia habitat for a variety of flora and fauna;
- No national Red List flora species were recorded in this habitat unit. However, habitat suitability assessments suggest that several flora SCC may be present; and
- This habitat unit therefore is considered to have floristic importance and sensitivity.

Figure 14: South-facing hillside, dominated by Leucosidea sericea.

Figure 15: Rocky Shrubland below a rocky ridge/cliff face.

8.1.3. Moist Grassland

This is a broad habitat unit that encompasses the range of drainage features across the RSA, including rivers and stream channels, as well as other wetland type habitats.

In typical moist grassland habitat, vegetation structure typically comprises low- to tall closed grassland. Along certain river/stream sections that are characterised by an increase in woody taxa, vegetation structure ranges from tall-open shrubland to short-closed woodland (*sensu*. Edwards, 1983).

Common graminoid species along recorded include various reed, grass and sedge species, such as *Agrostis eriantha, Andropogon appendiculatus, Aristida junciformis, Cyperus congesta, Eragrostis curvula, Eragrostis gummiflua, Eragrostis plana, Leersia hexandra, Miscanthus junceus, Panicum schinzii, Paspalum distichum, Paspalum dilatatum*, Phragmites australis, Scirpoides burkei, Setaria sphacelata, Themeda triandra* and *Typha capensis.* Common forbs recorded in this habitat unit include *inter alia*; *Centella asiatica, Commelina africana, Chironia palustris, Gunnera perpensa, Helichrysum aureonitens, Helichrysum mundtii, Oenothera roseus*, Rumex crispus** and *Trifolium repens*.*

Common woody species occurring along rivers and streams include *Leucosidea sericea* (which can be dominant), as well as *Salix mucronata, Searsia pyroides* and the alien's *Salix babylonica, Populus* x *canescens* and *Populus nigra* trees.

Declared alien invasive species recorded in this unit include *inter alia*; *Cirsium vulgare*, *Populus* x *canescens, Solanum sisymbriifolium* and *Verbena bonariensis.* Apart from *Populus* x *canescens*, which is listed as NEMBA Category 2, these taxa are all listed as Category 1b alien invasive species.

Sensitivity Aspects

- Moist Grassland is a natural habitat unit, with varying levels of anthropogenic disturbance mostly associated with historic cultivation and alien species establishment;
- Moist Grassland and associated watercourses habitats (rivers and streams) 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 national Red List species were recorded in this habitat unit; however, several provincially Protected flora species were recorded, and habitat suitability assessments also suggest that several flora SCC are likely to be present; and
- Moist Grassland and the associated watercourse habitats are therefore considered to have floristic importance and sensitivity.

Figure 16: Typical moist grassland habitat.

Figure 17: Broad open water body.

Figure 18: Rocky mountain stream, flanked by Leucosidea sericea trees.

Figure 19: Stream flanked by Salix mucronata trees and moist grassland.

8.1.4. Secondary Grassland

Secondary Grassland habitat characterises former cultivated fields that have been abandoned and left fallow, and over several years have regenerated to form a secondary, but indigenous grassland vegetation community (commonly termed 'old lands').

Like undisturbed Natural Dry Grasslands, vegetation structure is low closed grassland (Edwards, 1983). Common grasses include *Aristida congesta* var. *congesta, Cynodon dactylon*, *Eragrostis plana, Eragrostis chloromelas, Eragrostis curvula* and *Sporobolus africanus.*

Common forbs are present in areas of this habitat unit, and include, *inter alia*; *Acalypha angustata Selago densiflora, Helichrysum callicomum, Helichrysum rugulosum, Helichrysum nudifolium* var. *nudifolium, Hermannia transvaalensis, Hypochaeris radicata, Richardia brasiliensis* and *Solanum elaeagnifolium.*

Sensitivity Aspects

- Secondary Grassland is a modified habitat unit. Many of these areas have however, been stable for a long period, and as a result, retain some of the functional attributes of adjacent natural grasslands. They therefore provide supporting/buffering habitat for adjacent areas of natural habitat;
- No national Red List flora species were recorded in this habitat unit. Considering their disturbed nature, it is considered unlikely that any flora SCC are present; and
- Secondary Grasslands in the study area have low floristic importance or sensitivity.

Figure 20: Secondary Grassland habitat associated with a former cultivated field.

8.1.5. Cultivated Fields and Grass Pastures

Cultivated Fields and Grass Pastures are typically present in low-lying bottomland areas that are characterised by deep, moist soils in RSA. Some however, were noted in flat, high-lying areas.

Both Cultivated Fields and Grass Pastures are subject to regular anthropogenic disturbance. Cultivated agricultural fields are regularly ploughed, planted with crop plants (e.g. maize) and harvested.

Grass pastures have been planted with palatable indigenous grasses species, such as *Chloris gayana, Digitaria eriantha* and *Eragrostis curvula*, and are regularly mown and baled to provide forage for livestock.

Sensitivity Aspects

- Cultivated Fields and Pastures are a modified habitat unit;
- These areas have been, or are currently, subject to regular and intense anthropogenic disturbances;
- No flora SCC were recorded in this habitat unit and none are considered likely to be present; and
- Cultivated Fields and Grass Pastures have no floristic importance or sensitivity.

Figure 21: Cultivated field under maize production.

Figure 22: Recently mown and baled grass pasture.

8.1.6. Alien Tree Stands

Stands of alien trees are not abundant or extensive in the RSA. Structurally, this habitat unit comprises closed woodland, as per Edwards (1983). Common alien tree species noted include *Eucalyptus* species and *Populus x canescens*. Little indigenous vegetation is present in well-established alien tree stands.

Sensitivity Aspects

- Alien tree stands are a modified habitat;
- No flora SCC were recorded in this habitat unit, and none are likely to be present; and
- Alien Tree Stands have no floristic importance or sensitivity.

Figure 23: Stand of Eucalyptus trees

Figure 24: Stand of Populus x canescens trees

9. Flora Species of Conservation Concern

This section presents a summary discussion on flora SCC taken from the Plant Species Specialist Assessment Report.

One Red List flora species was recorded in the LSA during the field programme, namely *Khadia carolinensis* (Vulnerable). *Khadia carolinensis* was recorded at two locations in Natural Dry Grassland. Both locations are impacted by the current proposed Project layout. Habitat suitability assessments also indicate that several other Red List flora species may potentially be present in the LSA, and therefore potentially impacted by proposed Project activities. These are listed in Table 5.

For additional information on Red List flora potentially occurring in the RSA and LSA, including habitat preferences and a 'probability of occurrence', refer to the Plant Species Specialist Assessment Report for the proposed Project.

Table 5: Threatened flora species that occur or potentially occur on-site.

Family	Scientific Name[#]	National Red List Status	NEMBA ToPS List (2007)	Free State Conservation Status
Aizoaceae	*Khadia carolinensis*	Vulnerable	-	-
Aizoaceae	*Khadia alticola*	Rare	-	-
Lauraceae	*Ocotea bullata*	Endangered	-	-
Fabaceae	*Lotononis amajubica*	Rare	-	-
Scrophulariaceae	*Zaluzianskya distans*	Rare	-	-
Rosaceae	*Prunus africana*	Vulnerable	-	-
Ranunculaceae	*Anemone fanninii*	Near Threatened	-	-
Hyacinthaceae	*Eucomus bicolor*	Near Threatened	-	Protected
Polygalaceae	*Polygala praticola*	Vulnerable	-	-
Hyacinthaceae	*Merwilla plumbea*	Near Threatened	Vulnerable	Protected
-	Sensitive species 851	Vulnerable	-	-
-	Sensitive species 1248	Vulnerable	-	-
-	Sensitive species 998	Endangered	-	-
-	Sensitive species 1252	Vulnerable	-	Protected

[#]The names of specific taxa that are regarded as being susceptible to overexploitation have been redacted and are not presented in this report. These species are referred to by their assigned 'sensitive species number', as per the species assessment guidelines (SANBI, 2020).

10. Fauna Species of Conservation Concern

This section presents a summary discussion on fauna SCC taken from the Animal Species Specialist Assessment Report. For additional information on fauna SCC occurring and potentially occurring in the RSA, refer to the Animal Species Specialist Assessment Report.

The large and intact patches of natural habitat in the RSA and LSA provide important life-cycle habitat for a diverse fauna community, that includes numerous fauna SCC. During the field survey, four mammal SCC were documented in the RSA, namely:

- Grey Rhebok (*Pelea capreolus*) - Near Threatened;

- Brown Hyaena (*Parahyaena brunnea*) - Near Threatened
- Serval (*Leptailurus serval*) - Near Threatened; and
- Cape Clawless Otter (*Aonyx capensis*) - Near Threatened.

Habitat suitability assessments conducted for the Animal Species Specialist Assessment also indicate that several additional fauna SCC 'possibly' or 'probably' occur in the RSA and LSA and therefore may potentially be impacted by proposed Project activities in the LSA. It is noted that the observed fauna SCC are associated with grassland and wetland-type habitats, and the integrity and connectivity of these habitat patches is important to maintaining local metapopulation dynamics and the continued persistence of on-site fauna SCC.

11. Key Ecological Attributes and Processes

11.1. Habitat Corridors, Resources and Refugia

The LSA and broader RSA comprise extensive tracts of natural habitat, occurring on a highly varied topography that is characterised by low hills and mountains that are bisected by various drainage features. Areas of modified habitat (mostly Cultivated Fields) are present, but these are mostly confined to low-lying areas, where deeper soils facilitate crop production.

Prominent linear infrastructure noted during the field programme include gravel district roads, farms roads and tracks, as well as numerous farm fences. Although these linear features have caused some degree of habitat fragmentation, overall habitat connectivity remains very high due to the extensive areas of undisturbed natural habitat.

The Rocky Shrubland habitat unit is characterized by acute altitudinal changes, exposed rocks, and indigenous woody vegetation, which in the general grassland-dominated habitat matrix, significantly increases habitat heterogeneity and provides diverse micro-habitats for flora and fauna.

Amongst other impacts, the proposed Project will impact local habitat connectivity through habitat loss and fragmentation, and this may affect various ecological processes, such as *inter alia*, wildfire patterns, fauna movement and foraging, and flora propagule dispersal.

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 the character of terrestrial vegetation and flora.

11.2.1. Wildfire – Grassland Burning

Fire is a natural, albeit often human initiated, disturbance agent in grassland ecosystems. Mesic Highveld Grasslands are considered fire-prone and fire-dependent landscapes, and fire is essential to the maintenance of biodiversity patterns and ecological processes (SANBI, 2013). Wildfires have several key ecological effects with respects to terrestrial biodiversity, including:

- Removal of moribund vegetation and increasing plant productivity and palatability, which improves grazing for wild herbivores;
- 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.

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

Fire is considered an important driver of change. It is anticipated that the proposed Project may result in altered wildfire patterns due to increased habitat fragmentation. It is also possible however, that the number of accidental fires initiated from proposed on-site Project infrastructure may increase. Changes in local fire may impact vegetation productivity, which may affect the local fauna and flora diversity community, including SCC.

11.2.2. Herbivory - Livestock Grazing and Trampling

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 grassland habitats, this typically manifests as a reduction in palatable grass species and a reduction in grassland productivity (Scholes, 2009). Excessive cattle grazing and trampling can also cause soil erosion and gulley formation and modify and homogenise vegetation structure.

Livestock grazing and trampling are considered important drivers of change. However, it is unlikely to that proposed Project activities will alter livestock grazing patterns.

11.2.3. Alien Invasive Species Colonisation

Several alien invasive plant species were recorded on-site during the field programme. These have the potential to spread into areas of natural habitat, where they may competitively exclude many indigenous species. This will 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 flora and 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, and one capable of negatively impacting terrestrial biodiversity

12. General Sensitivity and Site Ecological Importance

The ecological importance (SEI) of identified habitat units in the LSA were assessed using the SANBI (2020) 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 25.

To assess the overall ecological sensitivity of the LSA, additional regional factors were also considered, as discussed below:

- **Biodiversity Significance**: Significant portions of the LSA are delineated as CBA 1 and CBA 2, with remaining areas mapped as either ESA 1 or ESA 2. These areas are crucial to meeting provincial targets for biodiversity patterns and ecological processes, and their continued conservation is therefore important;
- **Threatened Vegetation Types**: Eastern Free State Grassland, which dominates the LSA, is not considered a threatened vegetation type at a national level, according to NEMBA Threatened Ecosystems (2021). It is however, considered to be Vulnerable at a provincial level, according to the Free State Biodiversity Sector (Collins, 2024). Natural habitat should therefore, in general, be managed as sensitive and any potential negative impacts should be minimised; and
- **Watercourse/Wetland Importance**: Water courses and wetlands (discussed under the Moist Grassland habitat unit in this report) are functionally important from both a hydrological and biodiversity perspective, and delineated wetlands (refer to the wetland specialist study report) are subject to restrictions with respects to infrastructure development.

Based on these considerations, the findings of this specialist assessment confirm the 'Very High' sensitivity rating of the DFFE screening tool for the LSA.

Table 6: Site Ecological Importance of habitat unit

Habitat Unit	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Natural Dry Grassland	MEDIUM: Confirmed or highly likely occurrence of CR, EN, VU species (=*Khadia carolinensis*, VU A3c) >50% of receptor contains natural habitat to support SCC.	VERY HIGH: Very large (>100 ha) intact area for any conservation status of ecosystem type. High habitat connectivity serving as a functional ecological corridor. Limited road network between intact habitat patches. Only minor current negative ecological impacts (livestock grazing), with no signs of major disturbance.	HIGH	MEDIUM: Habitat that can recover slowly to restore >75% of the original species composition and functionality	HIGH
Rocky Shrubland on Hillsides and Ridges	MEDIUM: Confirmed or highly likely occurrence of CR, EN, VU species. >50% of receptor contains natural habitat to support SCC.	VERY HIGH: Very large (>100 ha) intact area for any conservation status of ecosystem type. High habitat connectivity serving as a functional ecological corridor. Only minor current negative ecological impacts (livestock grazing), with no signs of major disturbance.	HIGH	MEDIUM: Habitat that can recover slowly to restore >75% of the original species composition and functionality	HIGH
Moist Grassland	MEDIUM: Confirmed or highly likely occurrence of CR, EN, VU species.	VERY HIGH: Very large (>100 ha) intact area for any conservation status of ecosystem type.	HIGH	MEDIUM: Habitat that can recover slowly to restore >75% of the original species	HIGH

Habitat Unit	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
	>50% of receptor contains natural habitat to support SCC.	High habitat connectivity serving as a functional ecological corridor. Only minor current negative ecological impacts (livestock grazing).		composition and functionality	
Secondary Grassland	LOW: No confirmed populations of SCC. < 50% of receptor contains natural habitat.	LOW: Good habitat connectivity, with potentially functional ecological corridors and a regularly used road network. BUT, Several major past and current impacts (=ploughing).	LOW	MEDIUM: Habitat that can recover slowly to restore >75% of the original species composition and functionality	LOW
Cultivated Fields	VERY LOW: No confirmed or highly likely populations of SCC or range-restricted species. No natural habitat remaining.	VERY LOW: Several major current negative ecological impacts.	VERY LOW	VERY HIGH: Habitat that can recover rapidly to restore >75% of the original species composition and functionality.	VERY LOW
Alien Tree Stands	VERY LOW: No confirmed or highly likely populations of SCC or range-restricted species. No natural habitat remaining.	VERY LOW: Several major current negative ecological impacts.	VERY LOW	VERY HIGH: Habitat that can recover rapidly to restore >75% of the original species composition and functionality.	VERY LOW

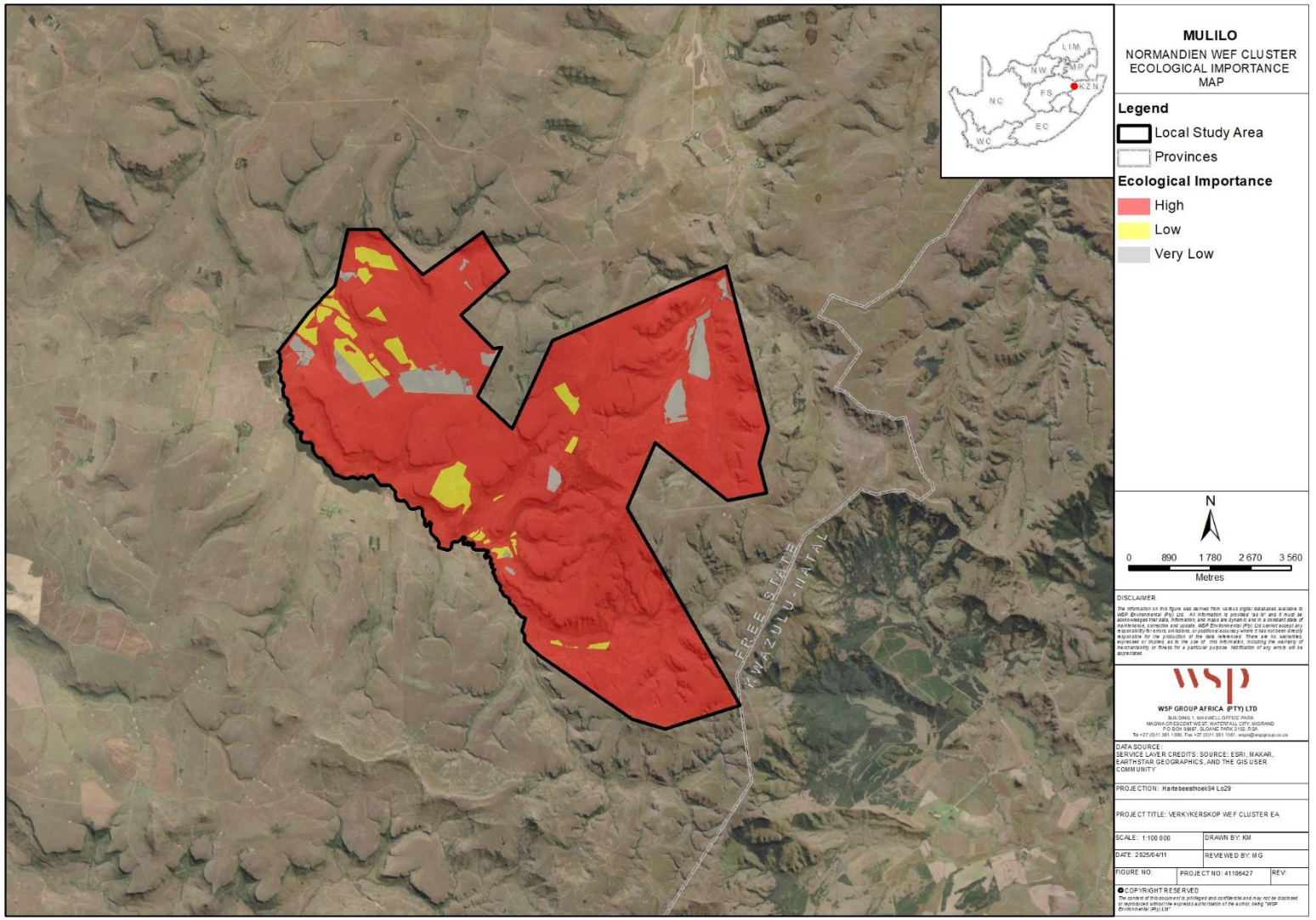


Figure 25: Site Ecological Importance and the current proposed layout of the Project infrastructure

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 direct[1], indirect[2], secondary[3] as well as cumulative[4] impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e., residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[5] 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 26 below.

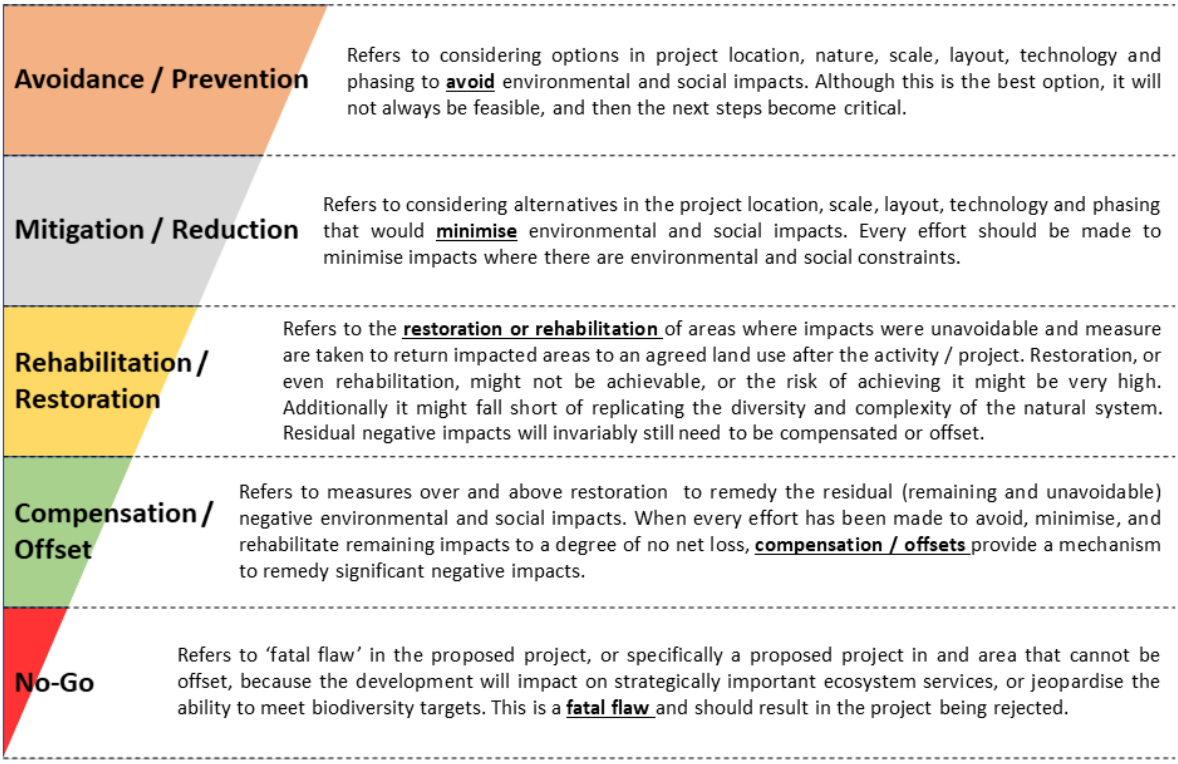


Figure 26: Mitigation Sequence/Hierarchy

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 impacts in Section 13.3.4. A summary table presented in Table 10.

This impact assessment section should be read in conjunction with the impact assessments presented in the Animal Species Specialist Assessment and Plant 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. The proposed Project will result in the clearing of natural vegetation for infrastructure development.

Based on the placement of currently mapped proposed turbine, road and supporting infrastructure, it is anticipated that at least 82.53 ha of natural habitat is likely to be directly impacted by construction activities, with Table 8 presenting the approximate extent of habitat loss and disturbance for each habitat unit. The current proposed Project layout in relation to the identified habitat units is shown in Figure 27. It is noted that all impacted habitat is designated as CBAs and ESAs – refer to Table 9.

The impact prior to further mitigation is considered to be of very high magnitude. 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.

Several management/mitigation measures can be taken to minimise impact significance, including: where possible repositioning turbines and internal roads to areas of modified habitat to avoid directly impacting natural habitat and CBAs; in areas of natural habitat, in-field micro-siting of turbine and road footprints to already disturbed sites; minimising disturbance footprints to the absolute necessary for construction and operational purposes; and, rehabilitating all disturbed areas after construction.

With the application of these, and other recommended mitigation measures, impact magnitude can be reduced to medium, and it can be confined to the site scale. Duration can be reduced to the long-term, and probability to medium. This results in an after-mitigation impact of "Medium" significance.

Notwithstanding the above, considering the extent of CBA and ESA land across the LSA, even with adjustments to the infrastructure layout it is anticipated that CBA and ESA land will be directly impacted and it will be necessary to offset these losses through the develop a biodiversity offset programme for the proposed Project.

Table 8: Approximate extent of possible impacts on the identified habitat units, based on the current proposed Project layout.

Habitat Unit	Approx. Extent in Local Study Area (Ha)	Approx. Extent of Habitat Loss & Disturbance (Ha)
Natural Dry Grassland	5 447.57	74.40
Rocky Shrubland	734.20	1.51
Moist Grassland	910.45	6.63
Secondary Grassland	369.61	9.37
Cultivated Fields and Grass Pastures	310.62	8.13
Alien Tree Stands	12.79	0.15

Table 9: Approximate extent of impacts on Critical Biodiversity Areas and Ecological Support Areas, based on the current proposed Project layout.

Critical Biodiversity Areas and Ecological Support Areas	Approximate Extent of Possible Habitat Loss / Disturbance
CBA 1	19.81
CBA 2	16.30
ESA 1	51.31
ESA 2	13.05

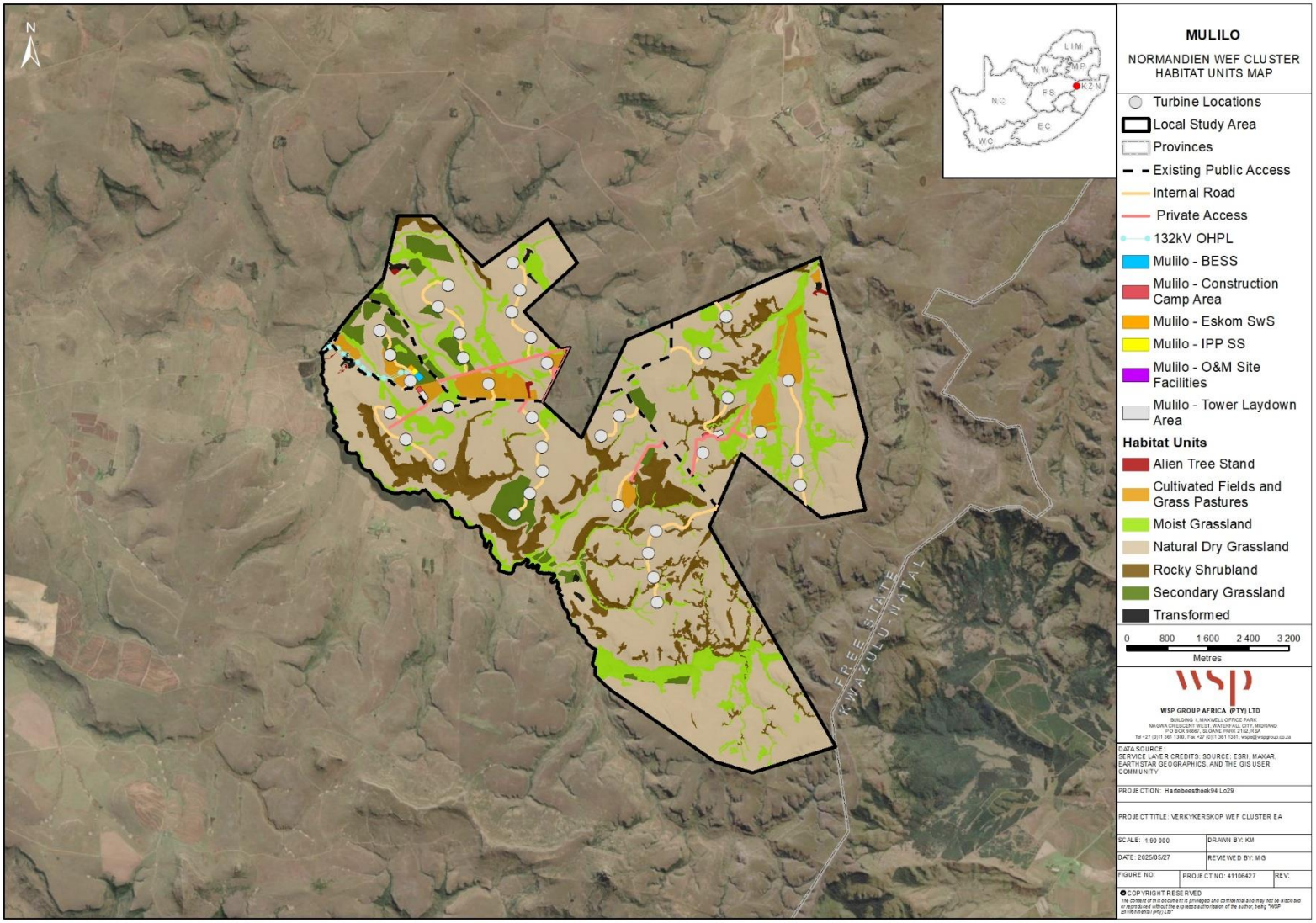


Figure 27: Habitat units and the currently proposed infrastructure layout.

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 is likely to cause the fragmentation of natural habitat, and this will reduce habitat connectivity, which may have negative ecological impacts including *inter alia*, increased edge-effect disturbances and altered wildfire patterns.

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

Various mitigation measures can be implemented to habitat fragmentation, including: aligning access roads with existing access roads and farm tracks; in-field micro-siting of new roads to already disturbed sites; minimising the clearance footprint to the minimum area required for construction and operational purposes; and, rehabilitating all disturbed footprints.

With these measures, impact magnitude can be reduced to medium. Duration can be reduced to the long-term, and probability to medium, but spatial scale will remain local. This results in a residual impact of "Medium" 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.

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 LSA 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 habitat	Direct loss and disturbance of natural habitat	Construction	Negative	Low	5	2	3	5	5	**75**	**N3**	3	1	3	4	3	**33**	**N2**
					Significance	**N3 - High**							**N2 - Medium**						
Impact 2:	Terrestrial habitat	Fragmentation reducing natural habitat connectivity and integrity	Construction	Negative	Low	5	2	3	5	5	**75**	**N3**	3	2	3	4	3	**36**	**N2**
					Significance	**N3 - High**							**N2 - Medium**						
Impact 3:	Terrestrial habitat	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 habitat	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 habitat	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 habitat	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 - Low**						
DECOMISSIONING																			
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 habitat	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 habitat	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 habitat	Cumulative impact of loss, disturbance and fragmentation of natural habitat	Construction	Negative	Moderate	5	3	3	5	5	**80**	**N3**	2	3	3	4	2	**24**	**N1**
					Significance	**N3 - High**							**N1 - Low**						

13.3.4. Cumulative Impacts

Cumulative impacts refer to the successive, incremental, and/or combined effects of a project, activity, or action when considered alongside other existing, planned, or reasonably foreseeable developments. The assessment and management of cumulative impacts focus on those impacts that are scientifically significant or of concern to affected receptors.

Cumulative impacts are evaluated within the project's area of influence, which includes:

- Areas directly impacted by the proposed Project;
- Surrounding regions influenced by other existing and planned projects; and
- Broader geographic and temporal scales where unplanned but predictable impacts may emerge.

The cumulative impact assessment provides a foundation for understanding the broader ecological context of the Verkykerskop WEF cluster in general and the Normandien WEF in particular. It evaluates the additive effects of the proposed Project in conjunction with other renewable energy developments within the region with the goal of proposing actionable measures to mitigate cumulative impacts where feasible.

Cumulative impacts with existing and planned facilities may occur during construction and operation of the proposed WEF. While one project may not have a significant negative impact on sensitive resources or receptors, the collective impact of the projects may increase the severity of the potential impacts.

Several WEF in the surrounding area were considered for the cumulative impact assessment. Those within a 50 km radius of the Verkykerskop WEF cluster are listed in Table 11 and shown in Figure 28.

Table 11: WEF Projects within 50 km of the Verkykerskop WEF Cluster.

Project Name	Applicant	Status	Reference Number	Distance Away (km)
Newcastle Gas Engine Power Plant (NGEPP), Newcastle, KwaZulu-Natal Province.	Newcastle Energy (Pty) Ltd	Refused	14/12/16/3/3/2/2074	36
Proposed Upgrade of Karbochem boilers and electricity project in Newcastle	Distributed Energy Generation (Pty) Ltd	In process	14/12/16/3/3/1/1164	37
Proposed Upgrade of Karbochem boilers and electricity project in Newcastle - Amendment	Distributed Energy Generation (Pty) Ltd	Approved	14/12/16/3/3/1/1164/AM1	37

Project Name	Applicant	Status	Reference Number	Distance Away (km)
Proposed Newcastle solar energy facility near Newcastle, KwaZulu-Natal Province	Building Energy (Pty) Ltd	Refused	14/12/16/3/3/1/1225	38
Proposed Newcastle WEF 2 and associated grid infrastructure near Newcastle, KwaZulu-Natal Province	Mulilo Newcastle Wind Power 2 (Pty) Ltd	Refused	14-12-16-3-3-2-2213	34
Proposed Mulilo Newcastle WEF and associated grid infrastructure near Newcastle, KwaZulu-Natal Province	Mulilo Newcastle Wind Power (Pty) Ltd	Approved	14-12-16-3-3-2-2457	40
Proposed Mulilo Newcastle WEF 2 and associated grid infrastructure near Newcastle, KwaZulu-Natal Province	Mulilo Newcastle Wind Power 2 (Pty) Ltd	Approved	14-12-16-3-3-2-2458	43

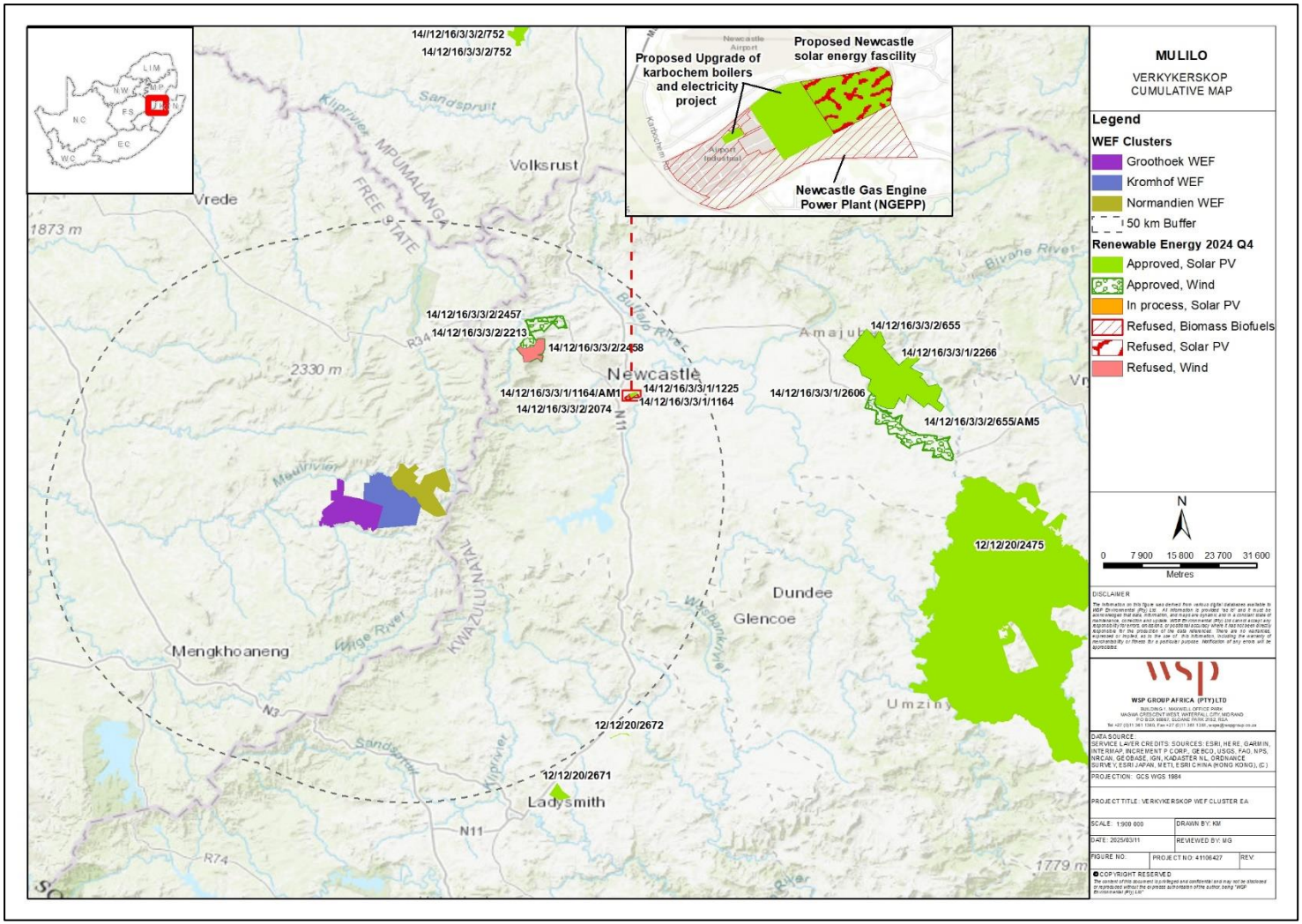


Figure 28: Map showing WEF Projects within a 50 km radius of the Verkykerskop WEF Cluster.

13.3.4.1. Cumulative impact of natural habitat loss, disturbance and fragmentation.

Collectively, the various projects associated with the Verkykerskop WEF cluster, as well as the additional projects within a 50 km radius (listed in Table 11), will cause direct habitat loss, disturbance and fragmentation through vegetation clearing that is greater in extent than that of a single project, and this is a cumulative impact of concern with respects to terrestrial biodiversity.

Prior to any form of mitigation, the cumulative impact on terrestrial biodiversity from vegetation clearing is rated 'high'. The proposed Project's contribution to cumulative impacts can be minimised by strictly implementing the required mitigation measures and addressing any significant residual impacts via additional conservation actions. The cumulative impacts can therefore be reduced to 'Low' significance.

14. Assessment of the No Go Alternative

If the proposed Project does not proceed, it is expected that the existing/current agricultural land use practices (i.e., crop cultivation, cattle, and sheep farming) will continue across the LSA. Consequently, the condition and character of on-site natural habitat, along with current flora SCC, will likely remain unchanged.

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:

- Construction (incl. Pre-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 12**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 12: Summary of proposed impact mitigation actions.

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	Terrestrial Habitat	Direct loss and disturbance of natural habitat.	<u>Avoidance</u> • As far as possible, proposed Project infrastructure should be located outside of land designated CBA 1 and CBA 2 (refer to Table 13 for recommendations concerning repositioning of turbines); • As far as possible proposed permanent Project infrastructure (e.g., wind turbines, access roads) should be located in areas of modified habitat (i.e., Cultivated Fields); • All temporary construction footprints, (e.g., construction camps, laydown areas), should <u>only</u> be located in areas of modified habitat (refer to Table 13); • 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	N/A	Avoidance, Minimisation, Rehabilitation & Offsetting	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
			and other relevant management measures. <u>Minimisation</u> • 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; • No heavy vehicles should travel beyond the marked/demarked work zones; • Removed topsoil should be stockpiled and used to rehabilitate all disturbed areas. <u>Rehabilitation</u> A rehabilitation/ landscaping protocol should be developed and implemented to stabilise and revegetate all non-operational sites that				

Ref No.	Category	Potential impact/risk	Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			have been disturbed by construction activities. The protocol should include: • 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 construction and require revegetation; and • Active revegetation should be conducted using grass species that are indigenous, locally-occurring and perennial. <u>Offsetting</u> • Following finalisation of the Project infrastructure layout and quantification of habitat losses, it is anticipated that				

Ref No.	Category	Potential impact/risk	Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			biodiversity offsetting will be required to offset the losses of CBAs; • The biodiversity offset programme should be developed should be developed under consultation with the provincial conservation authority and in line with the NEMBA National Biodiversity Offset Guideline (2023).				
1.2	Terrestrial Habitat	Fragmentation reducing natural habitat connectivity and integrity	<u>Avoidance and Minimisation</u> See mitigation measures for *Direct loss and disturbance of natural habitat*, and • All proposed access roads should be aligned, as far as possible, with existing farm roads/tracks, and wherever possible micro-sited to already disturbed sites; • New access roads should be as direct as possible, minimizing their length while respecting the landscape's ecology and topographical constraints (refer to Table 13 for additional examples). <u>Rehabilitation</u>	N/A	Avoidance and Minimisation	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
			See rehabilitation measures for *Direct loss and disturbance of natural habitat.*				
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 sites disturbed by proposed Project activities. The plan must include: • 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.	Guidelines for Monitoring, Control and Eradication of AIS (DEA, 2015)	Minimisation	During Construction Phase	Project Manager
1.4	Terrestrial Habitat	Increased soil erosion and sedimentation	• All sites disturbed by construction activities should be contoured, stabilised and actively revegetated, as per the rehabilitation/ landscaping protocol; and	N/A	Minimisation & Rehabilitation	During Construction Phase	Project Manager

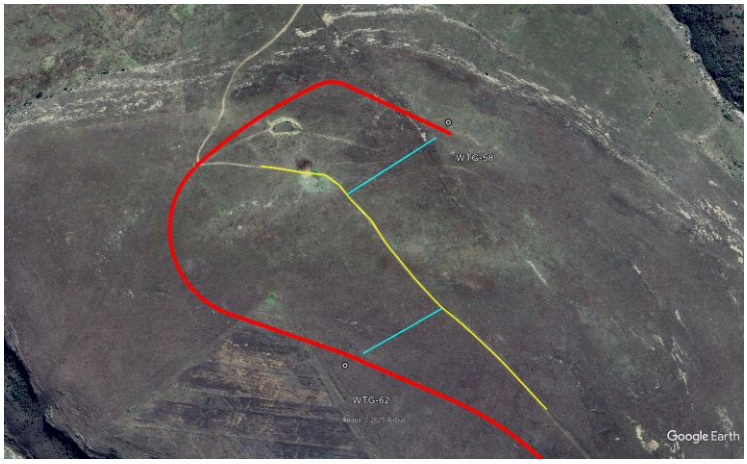
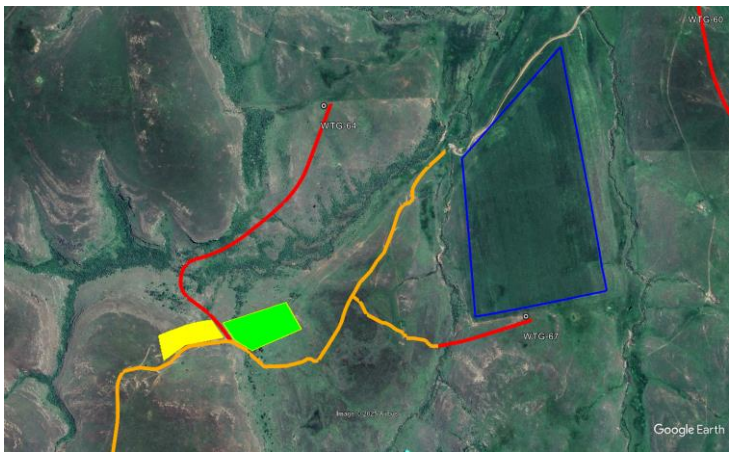
Ref No.	Category	Potential impact/risk	Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			• Erosion and sedimentation prevention and control measures (e.g., brush-packing, gabions and silt-traps) should be implemented at any sites of erosion or sedimentation.				
2. Operational phase							
2.1	Terrestrial Habitat	Establish and spread of alien invasive species	• 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	• The Project proponent should approach all relevant farmers and the local fire protection association (FPA) to investigate developing a co-ordinated Grassland Burning Management Programme; • 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
			• 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	• 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	• 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

Table 13 presents possible opportunities for the localised (i.e., small-scale) repositioning of certain turbine footprints to further avoid directly impacting CBA land. Also presented in Table 13**Error! Reference source not found.** is further guidance (with examples) on the optimal routing of proposed access roads and positioning of temporary infrastructure / facilities.

Table 13: Additional recommendations concerning turbines repositioning and the alignment / positioning of access roads and temporary infrastructure.

Turbine Name.	**Habitat Unit**	**MBSP Designation**	**Comment and Recommendations**
Localised turbine repositioning recommendations to reduce direct impacts on Critical Biodiversity Aereas (CBAs) and/or natural habitat.			
WTG - 86	Natural Dry Grassland	CBA 1	WTG-86 and its access road lie adjacent to a Cultivated Field in land designated CBA 1. It is recommended that WTG-86 should be moved to the north-east into the Cultivated Field, and that the access road be aligned with the existing farm track.
WTG - 67	Natural Dry Grassland	CBA 2	WTG-67 and its access road lie adjacent to a Cultivated Field in land designated CBA 2. It is recommended that WTG-67 should be moved to the north into the Cultivated Field, and that the access road also be repositioned into the Cultivated Field.
General Recommendations			
Access road alignments			• All proposed access roads should be aligned, as far as possible, with existing farm roads/tracks, and wherever possible micro-sited to already disturbed sites; and • New access roads should be as direct as possible, minimizing their length while respecting the landscape's ecology and topographical constraints (see example below).
			Example: The proposed access road (red) to WTG-58 and WTG-62 in Normandien LSA isn't aligned with the existing farm track (yellow line) and meanders unnecessarily. This road should follow the existing vehicle track's footprint for as long as possible, with newly cut roads to the turbines taking the shortest possible distance, as shown by the blue lines.

Turbine Name.	Habitat Unit	MBSP Designation	Comment and Recommendations
			
Positioning of temporary infrastructure (i.e., laydown areas, construction camps)			• All temporary construction footprints, (e.g., construction camps, laydown areas), should only be located in areas of modified habitat (e.g., cultivated fields) (see example below).
			Example: The proposed laydown area (green) and construction camp (yellow) in the east of the Normandien LSA should be repositioned approx. 500 m to the east into the existing cultivated field (blue). 

16. Monitoring Measures

The following section presents the proposed measures for monitoring and reporting on the implementation of the impact mitigation actions presented in the preceding section.

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 decommissioning 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;
- Operational; and
- Decommissioning.

Table 14 presents a summary of the proposed monitoring actions during the construction, operational and decommissioning phases.

Table 14: Summary of monitoring measures

Ref. No.	Category	Method for monitoring	Time period	Frequency of monitoring	Mechanism for monitoring compliance	Responsible person
1. Construction and Operational phase						

1.1	Alien invasive species	• Annual on-site alien invasive species monitoring should be conducted. Monitoring should focus on:
		  ○ 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	• 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: ○ All sites disturbed during decommissioning;	Wet/growing season	Annually during decommissioning 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
		○ Wetland areas adjacent to former development sites; and • Monitoring should assess species type and density, and these data should inform the scope of ongoing alien invasive species control.				

17. Reasoned Opinion and Environmental Impact Statement

17.1. Summary of Main Findings

The LSA and the broader RSA are characterised by large intact tracts of natural habitat, comprising Natural Dry Grassland, Moist Grassland and Rocky Shrubland.

Two regional vegetation types characterise the LSA, namely Eastern Free State Sandy Grassland and Low Escarpment Moist Grassland. According to the NEMBA Threatened Ecosystems (2021), neither vegetation type is listed as threatened at a national level. It is noted however, that according to the Free State Biodiversity Sector Plan technical report, the adjusted/provincial status of Eastern Free State Sandy Grassland is Vulnerable.

In terms of conservation planning, large portions of the LSA are designated as CBA and ESA under the Fee State Biodiversity Conservation Plan (2019). The continued integrity and protection of CBAs is crucial to meet conservation targets, and the functional state of ESAs should not be compromised. The presence of CBA and ESA land in the LSA is therefore a concern with respects to terrestrial biodiversity management.

According to the National Protected Area Expansion Strategy (2018), the entire LSA is mapped as Priority Focus Areas for protected area expansion. Portions of the LSA are also located in the Eastern Free State Escarpment Key Biodiversity Area.

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. Both flora and fauna SCC were recorded on-site during the field programme, and habitat suitability assessments suggest that several other SCC may be present.

The National Web Based Screening Tool rated the Terrestrial Biodiversity Theme for the Project site as 'Very High' sensitivity. The findings of this study confirm that patches of undisturbed natural habitat in the LSA have a Very High sensitivity rating.

Several potential negative impacts on terrestrial biodiversity have been identified and assessed for the proposed Project for both pre- and post-mitigation scenarios. The successful implementation of the recommended mitigation measures presented in this report can effectively manage many of the identified impacts. It is recommended that all mitigation and management measures should be incorporated into the proposed Project's environmental management plan (EMP).

It is noted however, that even with adjustments to the infrastructure layout, CBA and ESA land will still be directly impacted by proposed Project activities. Additional conservation measures, such as the development of a biodiversity offset programme, will therefore be necessary to offset these CBA and ESA losses. A biodiversity offset programme should therefore be developed under consultation with the provincial conservation authority and in line with the NEMBA National Biodiversity Offset Guideline (2023).

17.2. Conditions to be Included in the Environmental Authorisation

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

17.3. Specialist Opinion

In accordance with the outcomes of the impact assessment and taking cognisance of the baseline conditions and impact management measures presented herein, the proposed Project is not deemed to present significant negative ecological issues or impacts, and it should thus be authorised.

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

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

Terrestrial Ecologist
Hawkhead Consulting

Appendix A: Curriculum Vitae – Andrew Zinn

Hawkhead Consulting

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

Details

Andrew David Zinn
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South Africa
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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.

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Appendix B: Methodology Supplement

Rating criteria for Conservation Importance, Functional Integrity and Receptor Resilience and the scoring matrices, as per (SANBI, 2020).

The ecological sensitivity of habitats in the study area was determined using the protocol for evaluating site ecological importance (SEI) as published in SANBI's Species Assessment Guideline (SANBI, 2020). 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, 2020).
- **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, 2020).
- **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, 2020).

Table 1: Conservation Importance (CI) criteria.

Conservation Importance (CI)	Fulfilling Criteria
Very High	• Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global EOO of < 10km^2; • 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	• Confirmed of highly likely occurrence of CR, EN, VU species that have a global EOO of > 10km^2, 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	• 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	• 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	• 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	• 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	• 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	• 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	• 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	• 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
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 and Section 13.3
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 to Section 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 5, Section 6 & Section 13
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 & Section 13

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 6.5
2.3.7.4. priority areas for protected area expansion, including- a) the way in which in which the proposed development will compromise or contribute to the expansion of the protected area network;	Section 6.6
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 6.3.1
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 6.3.2
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 6.4
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 3 & Appendix A
3.1.2. a signed statement of independence by the specialist;	Page 3
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 & 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 3.1 & Section 3.2
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 6.2, Section 13
3.1.7. additional environmental impacts expected from the proposed development;	Section 13
3.1.8. any direct, indirect and cumulative impacts of the proposed development;	Section 13
3.1.9. the degree to which impacts and risks can be mitigated;	Section 15
3.1.10. the degree to which the impacts and risks can be reversed;	Section 15
3.1.11. the degree to which the impacts and risks can cause loss of irreplaceable resources;	Section 15

Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity	Relevant Section in Report
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
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;	N/A
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 17
3.1.15. any conditions to which this statement is subjected.	Section 17
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 EMPr, 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