Mulilo Renewable Energy Developments South Africa (Pty) Ltd

VERKYKERSKOP WIND ENERGY FACILITY (WEF) CLUSTER

BIODIVERSITY OFFSET REPORT

41106427
1 JULY 2025

PUBLIC

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PROJECT NO. 41106427

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1 INTRODUCTION

Mulilo Renewable Projects Development is proposing the development of the Verkykerskop Wind Energy Cluster (VWC) which consists of Groothoek, Kromhof and Normandien WEF's and associated infrastructure. The VWC is situated in the Thabo Mofutsanyane District Municipality and Phumelela Local Municipality, near the town of Harrismith, in the Free State Province of South Africa near Verkykerskop, South Africa. The VWC consists of three separate WEF applications, each with their own 132 kV Grid Connections, within an area spanning approximately 19506 ha in extent. The individual WEFs include Groothoek (6170 ha, GH 300 MW), Kromhof (7269 ha, KH 300 MW) and Normandien (6067 ha, ND 300 MW).

South Africa's National Biodiversity Offset Guideline was gazetted in 2023. It sets out the requirements for the development of a Biodiversity Offset Report (BOR) in support of an application for environmental authorisation (EA). The proposed VWC is considered highly likely to require a biodiversity offset, effectively as a result of its location in an area that supports extensive areas of natural grassland and wetland habitat, some of which has been defined as Critical Biodiversity Areas (CBAs) in the Free State Biodiversity Sector Plan (FSBSP), as well as populations of bird species of conservation concern (SCC) (e.g. Southern Bald Ibis, Species 23, Blue Crane, Secretary bird, Yellow-breasted Pipit, Gurney's Sugarbird, Denham's Bustard, White-bellied Korhaan), many of which are at risk of collision with wind turbines. Although avoidance has been demonstrated and extensive mitigation measures proposed, the anticipated Project interaction with these factors (habitat loss, collision mortality of bird species of concern) are expected to result in significant residual impacts, which would then require offset.

1.1 TERMS OF REFERENCE

South Africa's draft National Biodiversity Offset Guideline was published for public consultation on 25 March 2022, which sets out the requirements for the development of a Biodiversity Offset Report (BOR) in support of an application for environmental authorisation (EA). This report was compiled based on the guidance set out in the draft guideline, and follows the requirements for preparation of the BOR set out in the guideline as follows:

'*Where the biodiversity offset site cannot be identified before the decision-making phase, Biodiversity Offset Reports must, as a minimum, specify the following':*

- That the mitigation hierarchy, including due consideration of project alternatives to avoid or minimise impacts, has been appropriately applied before considering biodiversity offsetting.
- The degree of risk that negative residual impacts cannot be offset (i.e. negative residual impacts on irreplaceable biodiversity and/or major constraints on finding suitable biodiversity offset sites to meet the offset requirements) and how the risk is to be addressed or mitigated.
- A measure of significant residual negative biodiversity impacts which must be offset. The applicable biodiversity offset ratios for impacted ecosystems.
- Any other considerations which are relevant to determining the size and characteristics of the biodiversity offset (for example, impacts on species of conservation concern with specific habitat requirements, impacts on ecological corridors and connectivity in the landscape, and impacts on important ecological infrastructure), and how the size of offset is to be adjusted to take these considerations into account.

- An explicit statement on the required size of the biodiversity offset to remedy the residual negative biodiversity impacts, applying the basic offset ratio and adjustments as appropriate
- The portfolio of candidate biodiversity offset sites, including the likelihood of each site's availability and feasibility.
- The required biodiversity outcomes on each of the candidate biodiversity offset sites identified in the Biodiversity Offset Report.
- The management measures that would need to be employed as part of the biodiversity offset for a defined period, for which the applicant would be responsible. Typically, this period is not less than 30 years, and is longer if the impacting activity, or activities, will last beyond 30 years.

1.2 PROJECT LOCATION AND EXTENT

The VWC is situated in the Thabo Mofutsanyane District Municipality and Phumelela Local Municipality, near the town of Harrismith, in the Free State Province of South Africa near Verkykerskop, South Africa. (Figure 1-1). The entire VWC is regarded as the 'study area' for the compilation of this report.

1.3 STUDY AREA

The study area for the Project was defined as follows:

- **Local Study Area (LSA):** The proposed development footprint (specifically the VWC) plus all areas encompassed by the project site boundary, within which direct and indirect impacts on terrestrial and aquatic biodiversity receptors (i.e. direct habitat loss, fauna mortality) could occur;
- **Regional Study Area (RSA):** The quaternary catchments within which the proposed development is situated which is considered to be an ecologically appropriate area of analysis, within which indirect and/or induced impacts on biodiversity receptors (e.g. dust deposition, sensory disturbance, hydrological changes) could occur.

The LSA and RSA are shown on Figure 1-1, this includes the WEF and Grid areas.

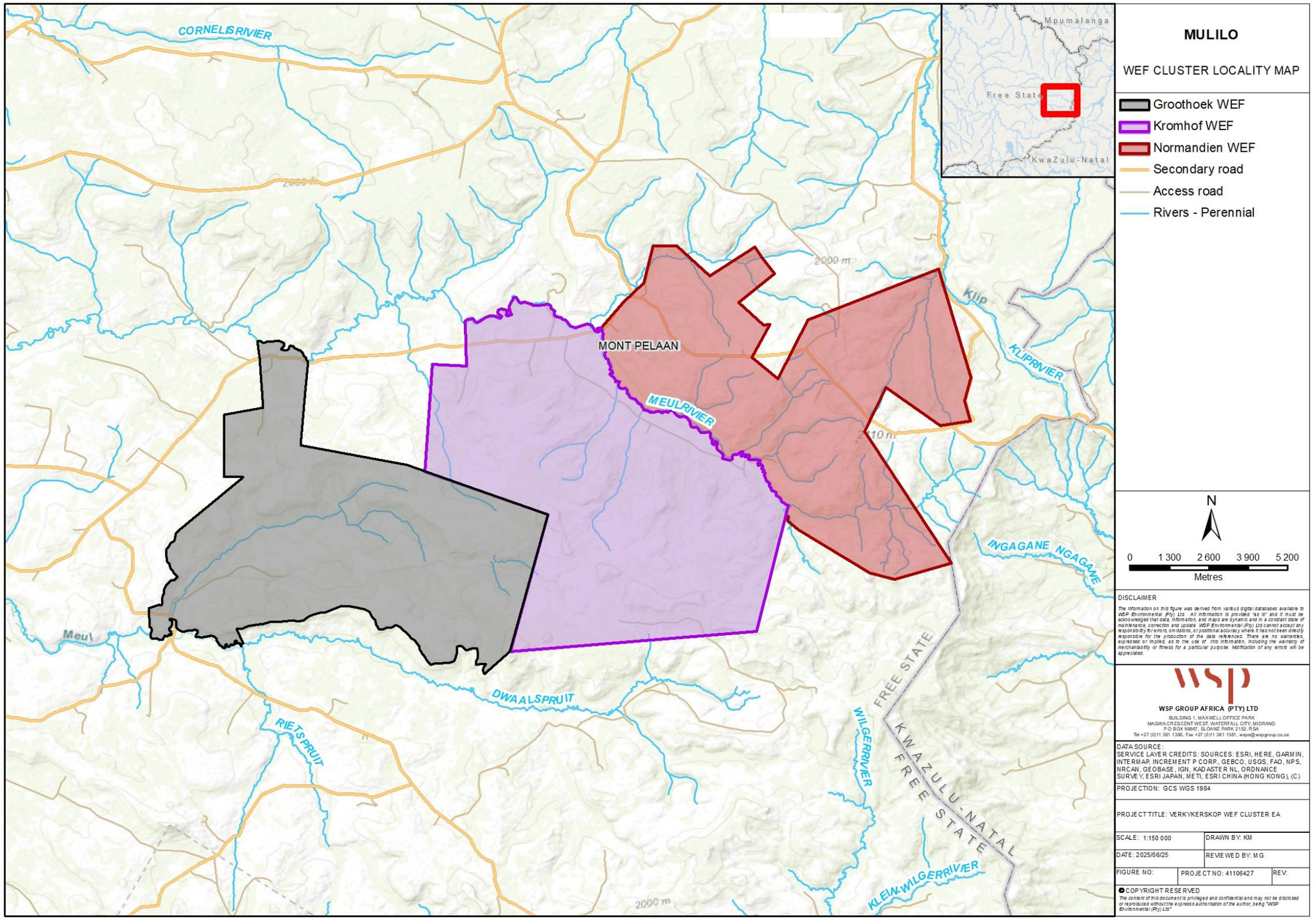

Figure 1-1 - Locality Map of the Proposed Verkykerskop WEF Cluster of Projects (VWC)

2 APPLICABLE LEGISLATION, POLICY AND STANDARDS

Applicable national and provincial legislation, associated regulations and policies that are pertinent to biodiversity, which were used to guide the EIA, include:

- National Environmental Management Act (NEMA) (Act No. 107 of 1998) including Section 24, concerning Procedures for the assessment and minimum criteria for reporting on identified themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA, when applying for environmental authorisation;
  - Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity; and
  - Protocol for the specialist assessment and minimum report content requirements for environmental impacts on aquatic biodiversity;
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA), specifically:
  - Threatened or Protected Species (ToPS) – National lists of critically endangered, endangered, vulnerable and protected species (2007);
  - National list of threatened terrestrial ecosystems for South Africa (2011) (NEMBA Threatened Ecosystems, 2011);
  - National list of alien and invasive species (2016);
- Environment Conservation Act (Act No. 73 of 1989), specifically the Lists of declared weeds and invader plants (CARA, 1983);
- National Water Act (Act No. 36 of 1998);
- Nature Conservation Ordinance 8 of 1969 for the Free State Province;
- Free State Biodiversity Sector Plan (2019).
- National Protected Area Expansion Strategy (2016).

Recent, relevant South African national policies and guidance were also taken into consideration, in the development of the baseline description and impact assessment process, including:

- Draft National Biodiversity Offset Policy (2017);
- National Biodiversity Offset Guideline (2023);
- Species Environmental Assessment Guideline (SANBI, 2020); and
- Wetland offsets: a best-practice guideline for South Africa (Macfarlane et al., 2014).

3 TERRESTRIAL BIODIVERSITY OVERVIEW

The local study area is situated in a landscape that is characterised by high-altitude grassland interspersed by rocky outcrops, with extensive hillslope seep and valley bottom wetlands, and farmlands that are cultivated to varying degrees, but largely consist of secondary grasslands.

3.1 CONSERVATION CONTEXT

3.1.1 TERRESTRIAL CRITICAL BIODIVERSITY AREAS (CBAS) AND ECOLOGICAL SUPPORT AREAS (ESAS)

The LSA was compared to relevant available spatial biodiversity planning datasets, i.e. the Free State Biodiversity Sector Plan (2019) (Figure 3-1), in order to assess the local and regional biodiversity context of the site.

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;
  - ESA1: ESA1 sites are those with minimal degradation.
  - ESA2: ESA2 sites are those with degradation, i.e. they can be totally degraded, but not totally transformed.
- 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 3-1. The entire LSA is mapped as either CBA or ESA. Most of the southern portion of the LSA is mapped as CBA 1, with small patches delineated as CBA 2 or ESA 2. In the north of the LSA, land is mostly mapped as ESA 1 and ESA 2 (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 are 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.

3.1.2 PRIORITY 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 Kromhof, and partial areas of Groothoek and Normandien LSA's are mapped as Priority Focus Areas for protected area expansion, as shown in Figure 3-3. The layout of both turbines as well as roads were refined through a systematic system to avoid priority areas for protected area expansion.

3.1.3 PROTECTED AREAS

The LSA's areas are not located in, or near, a protected area. The closest protected areas are:

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

3.1.4 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 (Hawkhead, 2025a).

3.1.5 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 IBA's, 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.

Only the northern portions of the Normandien LSA are located within the formerly recognised Grassland IBA.

Most of the western and central portions of Normandien, the south and central portion of Kromhof and the eastern portion of Groothoek is located within the Eastern Free State Escarpment KBA (KBA ID S471). This is a large KBA that covers approximately 1570 km² of the Free State Province (KBAP, 2025).

The Eastern Free State Escarpment KBA 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).

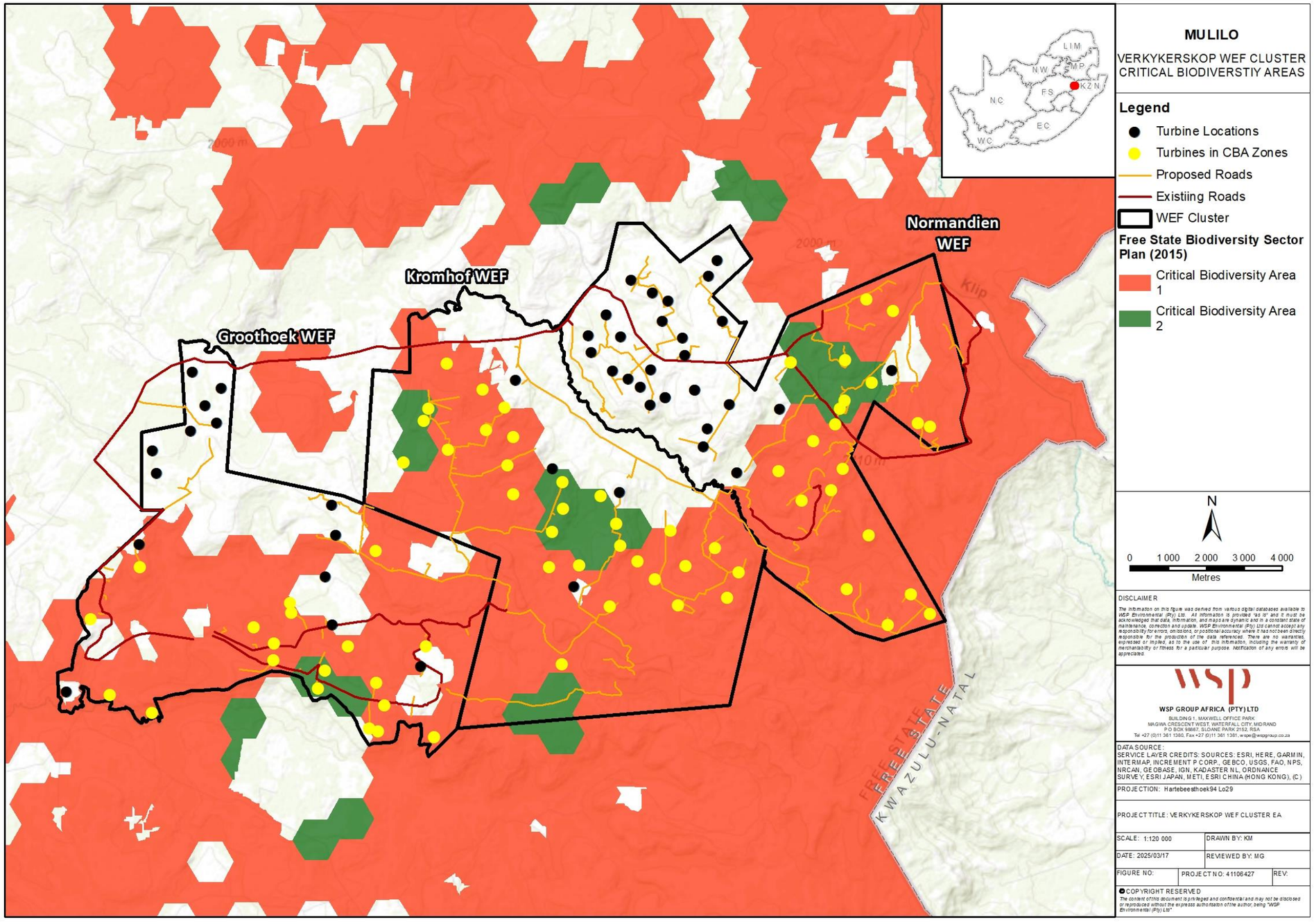

Figure 3-1 – Free State Biodiversity Sector Plan

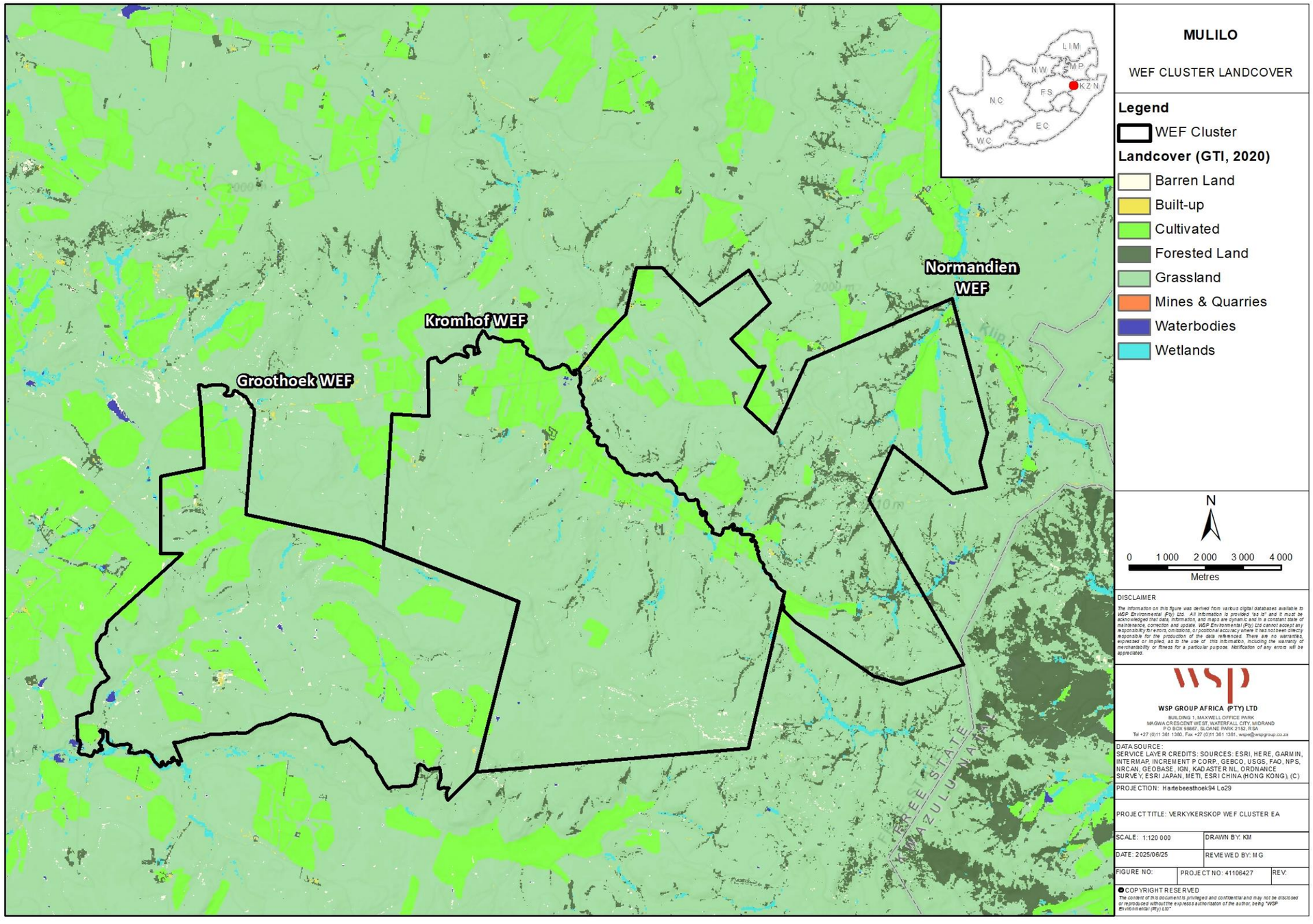

Figure 3-2 - Land Cover Dataset for LSA (GTI, 2020)

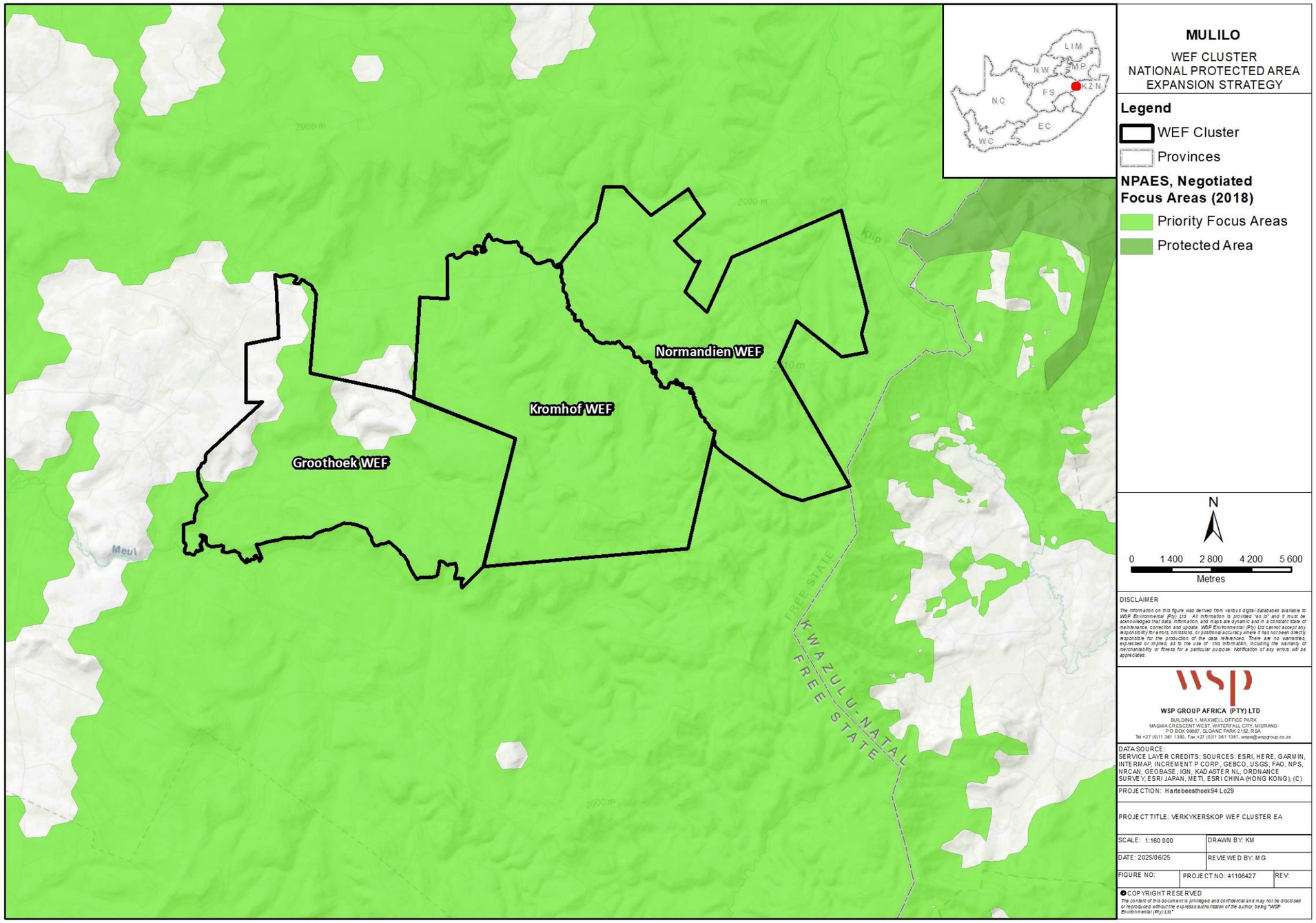

Figure 3-3 - LSA in Relation to National Protected Area Expansion Strategy

3.2 VEGETATION AND FLORA

The LSA's are located in the Grassland Biome, and according to SANBI's regional mapping of South Africa's vegetation types (2018), the Groothoek and Kromhof LSA's comprises of Eastern Free State Sandy Grassland, while Normandien is dominated by Eastern Free State Sandy Grassland, with small areas mapped as Low Escarpment Moist Grassland.

According to the NEMBA Threatened Ecosystems (2021), Eastern Free State Sandy Grassland is 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).

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).

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).

3.2.1 ECOLOGICAL IMPORTANCE OF VEGETATION COMMUNITIES IN THE LSA

The ecological importance of identified vegetation communities mapped in the LSA during baseline studies is summarised in Table 3-1. Natural vegetation communities mapped within the LSA are considered sensitive to development, and where these coincide with CBAs, and project infrastructure, offsets will typically be required according to the draft biodiversity offset guideline.

Table 3-1 - Ecological Sensitive Aspects of Mapped Vegetation Communities in LSA

Vegetation Community	Analysis
Alien Tree Plantations	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.
Natural Dry Grassland	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

Vegetation Community	Analysis
	various ecological processes such as, inter alia, flora and fauna movement and dispersal; Although not recorded in the LSA, one Red List flora species, namely *Khadia carolinensis* (Vulnerable) was recorded in this habitat unit in the broader RSA (recorded in the Normandien WEF Project site). 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 recorded in areas of Natural Dry Grassland; and Natural Dry Grasslands are therefore considered to have floristic importance and sensitivity.
Cultivated Fields and Grass Pastures	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.
Secondary Grassland	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
Rocky Shrubland	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.
Moist Grassland	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

Vegetation Community	Analysis
	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.

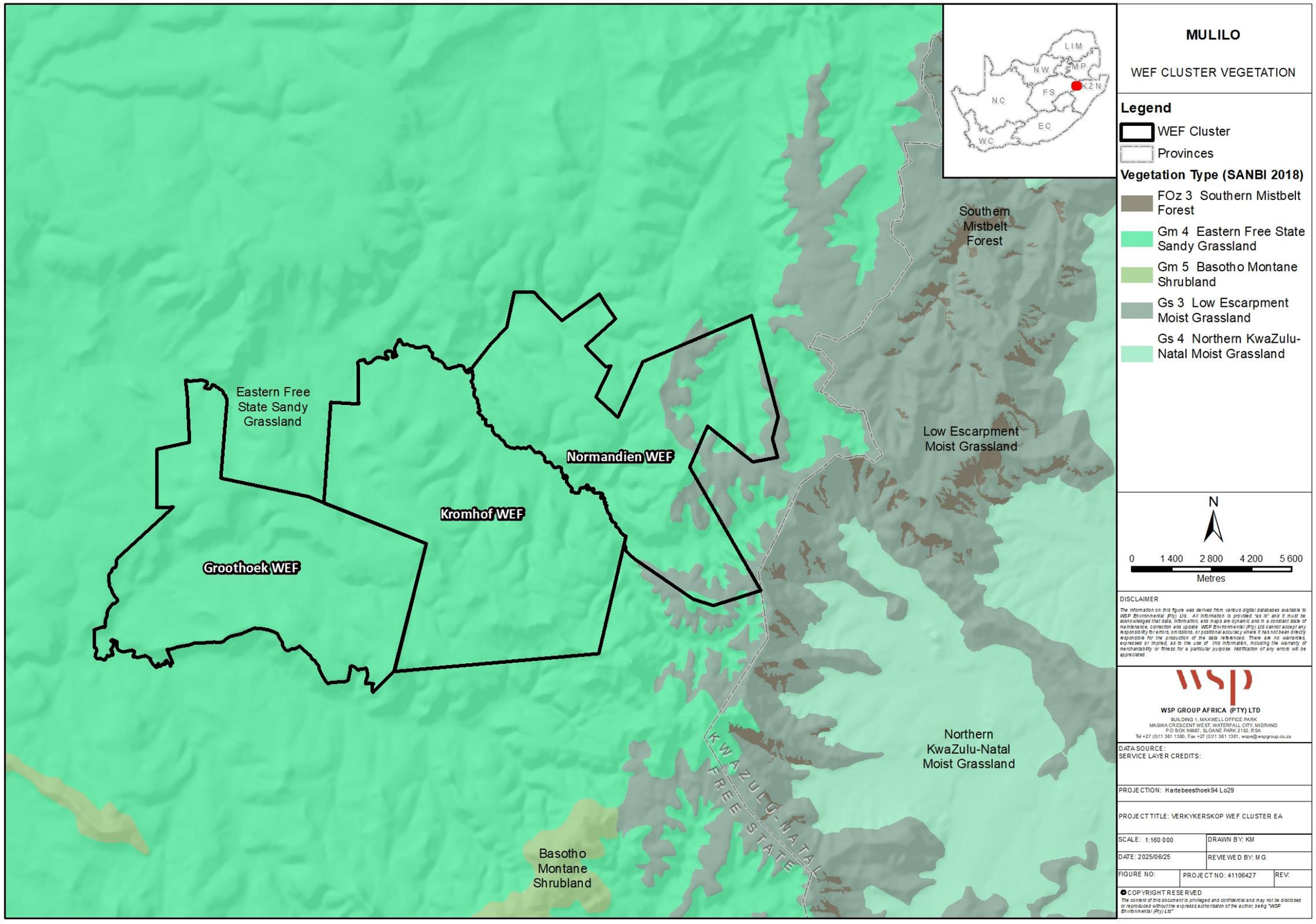

Figure 3-4 - Vegetation Types

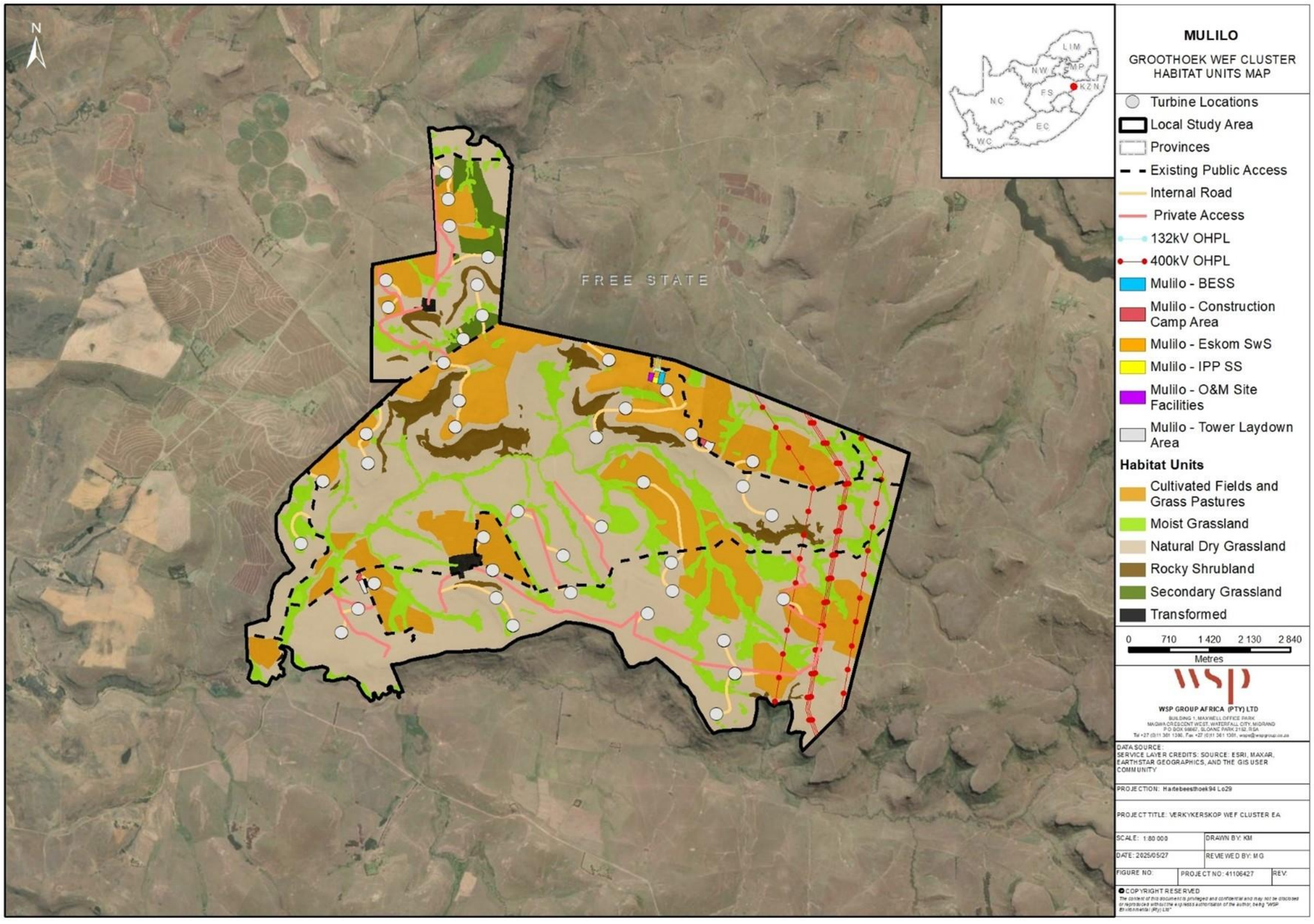

Figure 3-5 – Groothoek Mapped Vegetation Communities

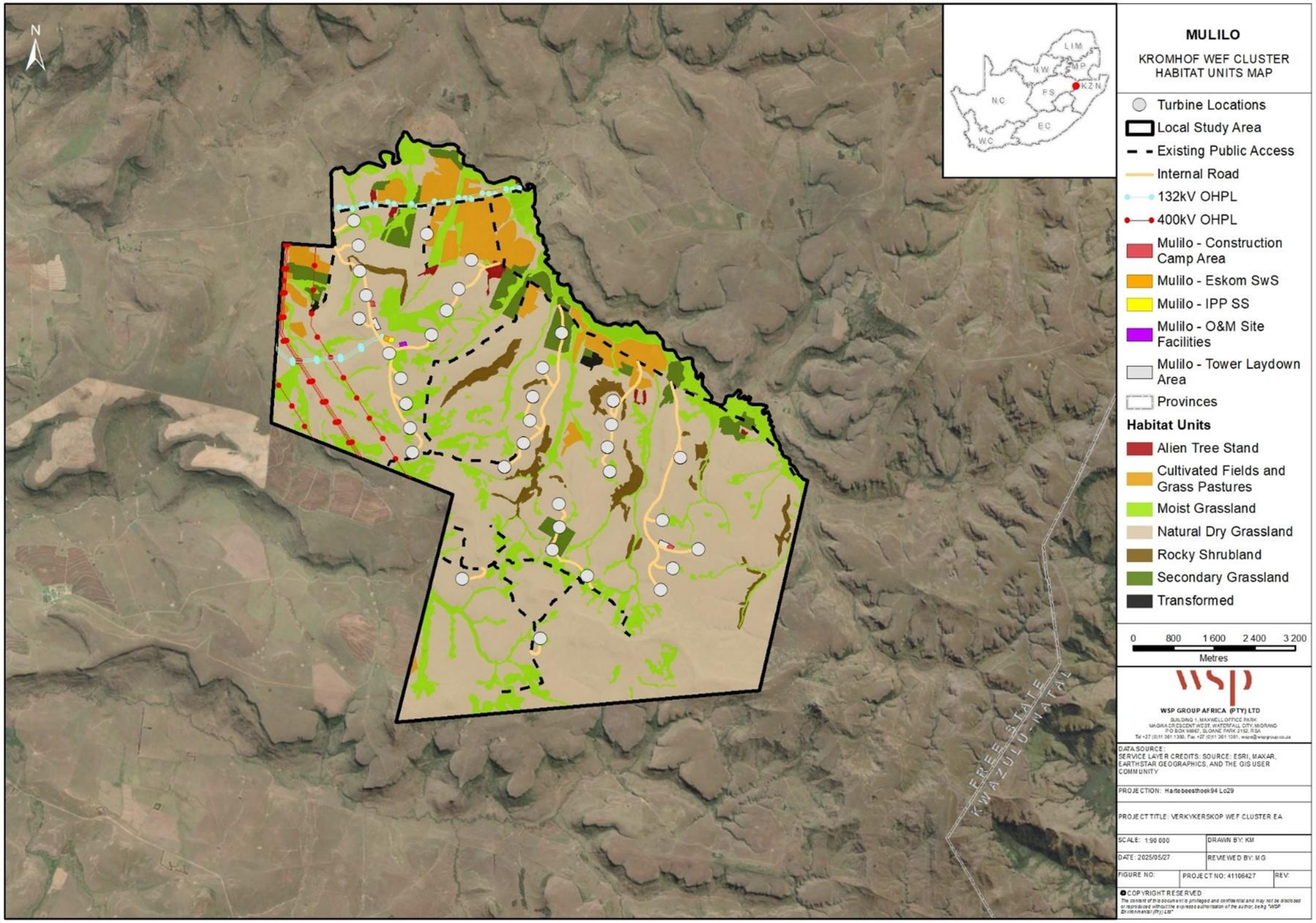

Figure 3-6 - Kromhof Mapped Vegetation Communities

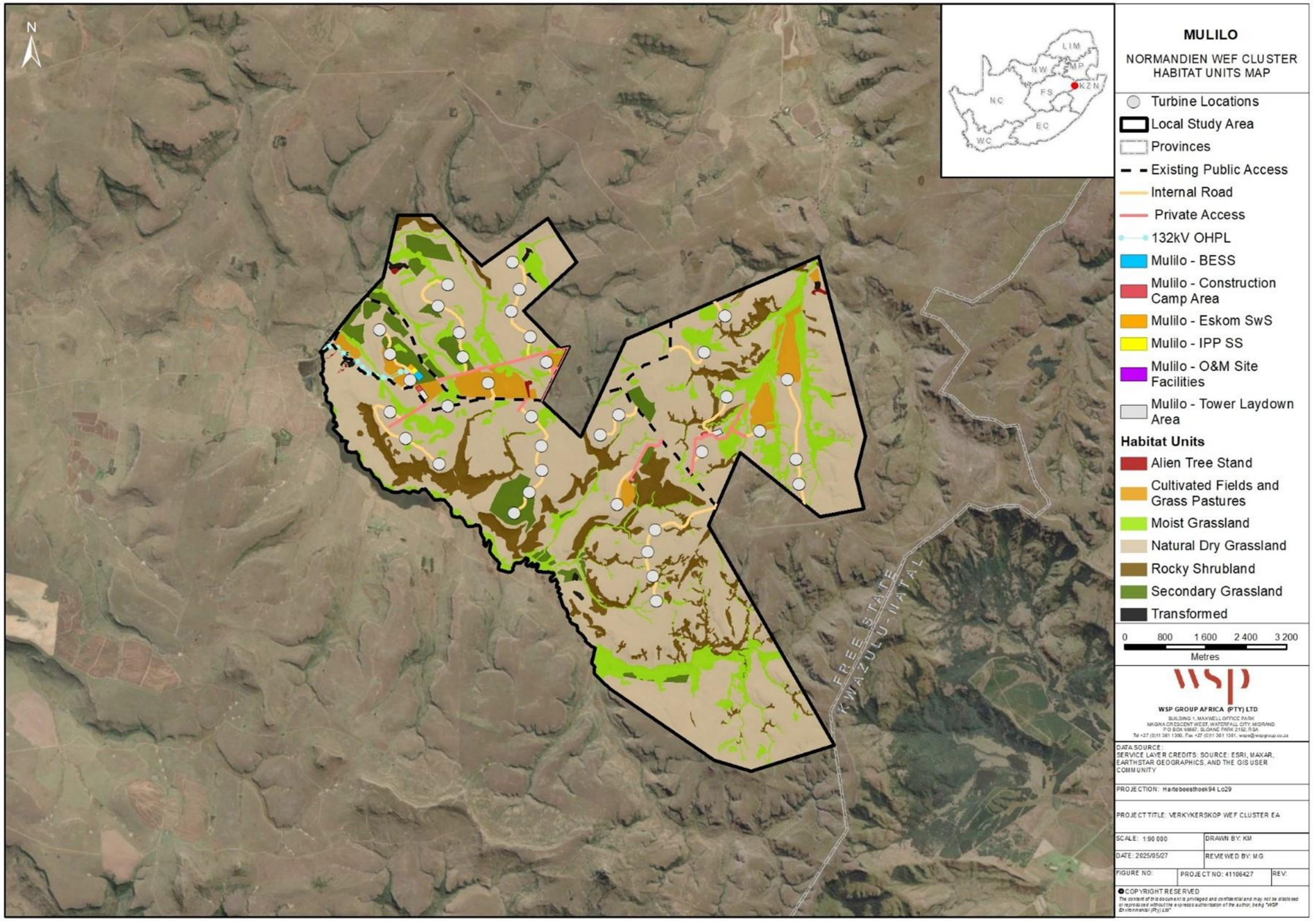

Figure 3-7 – Normandien Mapped Vegetation Communities

3.2.2 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 broader RSA during the field programme, namely *Khadia carolinensis* (Vulnerable). This species was not recorded in the Kromhof or Groothoek sites, but it was recorded at two locations in the Normandian WEF Project site. Suitable habitat for Khadia carolinensis is however present in the LSA, and it is therefore possible that *Khadia carolinensis* occurs on-site.

Habitat suitability assessment indicate that several other Red List flora species may potentially be present in the LSA's, and therefore potentially impacted by proposed Project activities. These are listed in Table 3-2.

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

Table 3-2 - 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).

No flora species listed on the NEMBA ToPS List (2007) were recorded in the RSA during the field programme. Several flora species listed as provincially Protected on the Schedule 6 of the Free State Free State Nature Conservation Ordinance 8 of 1969 were recorded during the field survey, including inter alia *Boophone disticha* and *Eucomis humilis*.

3.3 FAUNA

Fauna species confirmed in the LSA during field surveys conducted during 2024, as well as fauna SCC confirmed/expected to occur, are summarised in the sections that follow. Full details of the methods used, and survey results, are available in the terrestrial fauna specialist assessments (Hawkhead, 2024) that accompany this EA application.

3.3.1 HERPETOFAUNA

Two reptile and two amphibian species were documented in the RSA during the field programme. However, considering the availability and diversity of suitable herpetofauna habitat, ranging from rocky and well-wooded hillsides and valleys, large open watercourses, and areas of open grassland and wetlands, it is likely that the RSA, supports a diverse herpetofauna assemblage.

Indeed, ReptileMAP and FrogMAP records indicate that 27 reptile and 20 amphibian species have previously been recorded in the Quarter Degree Square Grid (QDS) that encompass the RSA (Fitzpatrick Institute of African Ornithology, 2024). These data indicate the most frequently reported reptile taxa include the Common Crag Lizard (*Pseudocordylus melanotus melanotus*), Speckled Rock Skink (*Trachylepis punctatissima*) and the Burchell's Sand Lizard (*Pedioplanis burchelli*), while the most frequently reported amphibian species are the Common River Frog (*Amietia delalandii*) and the Cape River Frog (*Amietia fuscigula*).

The distribution maps presented in Bates et al., (2014) and Du Preez and Carruthers (2009), indicate that up to 56 reptile and 21 amphibian species are known from the region in which the RSA is located.

The DFFE web-based national environmental screening report highlighted Sensitive species 15 as a potential sensitive feature. Sensitive species 15 is listed as Vulnerable on both the regional and provincial Red Lists. It is further listed as Endangered on the NEMBA ToPS List (2007). This species is range-restricted and has an Extent of Occurrence (EOO) estimated at 34 500 km² and an Area of Occupancy (AOO) of 1 149 km². It is restricted to northern Free State and south-western Mpumalanga.

An additional four herpetofauna SCC, comprising three reptile and one amphibian species, potentially occur on-site.

3.3.2 INVERTEBRATES

Data retrieved from the Virtual Museum database lists 13 dragonfly, 63 butterfly, two lacewing, two scorpion and two spider species for the QDS that encompass the RSA. Of the listed taxa, one butterfly (*Orachrysops mijburghi*) and one spider (*Harpactira hamiltoni*) are SCC. The DFFE screening reports also identifies two other threatened invertebrate species as potentially sensitive features, namely *Chrysoritis phosphor borealis and Colonia lalandei*).

3.3.2.1 Orachrysops mijburghi

Orachrysops mijburghi (Endangered) is a butterfly species that is endemic to Gauteng and Free State Provinces. According to Dobson and Dobson (2018), this species is known from five locations, with an EOO of 4 465 km², and has a documented range that extends from Heilbron (in Free State Province) in the south to Suikerbosrand Nature Reserve (near Heidelberg in Gauteng Province) in the north (Dobson and Dobson, 2018). It is noted that the RSA is not included within this documented distribution range, which is far to the north-west of the RSA. It is therefore considered likely that the Virtual Museum record of *Orachrysops mijburghi* in the QDS that encompass the RSA, is probably an error. It is therefore considered unlikely that *Orachrysops mijburghi* is present on-site.

3.3.2.2 Harpactira hamiltoni

*Harpactira hamilton*i is a baboon spider species from the Family Theraphosidae. All baboon spiders are listed as protected at a national level according to the NEMBA ToPS (2007) List. This species is known to occur in grassland and savanna habitats, and suitable habitat is present in the RSA and LSA, and it is therefore probable that *Harpactira hamiltoni* is present.

3.3.2.3 Chrysoritis phosphor borealis

Chrysoritis phosphor borealis is an Endangered butterfly species that is endemic to Mpumalanga and KwaZulu-Natal Provinces and has an EOO of 42 174 km2 (Woodhall, 2018). It has an AOO of 20-200 km2 and is known from only five confirmed locations, with an additional 5-10 locations suspected (Woodhall, 2018). *Chrysoritis phosphor borealis* occurs Afromontane forests surrounded by montane grassland, where they are commonly found near streams (Woodhall, 2018). Although well-wooded hillsides and valleys are present in the RSA and LSA, no Afromontane forests were noted. It is therefore considered unlikely that *Chrysoritis phosphor borealis* is present on-site.

3.3.2.4 Clonia lalandei

Clonia lalandei is a Vulnerable grasshopper species. Its EOO is 15 000 km2, and it is known from only four locations across KwaZulu-Natal, Mpumalanga and Free State Provinces (Bazelet and Naskrecki, 2014). It occurs in grassland and savanna habitats, but little is known of its specific habitat requirements (Bazelet and Naskrecki, 2014). Considering this dearth of habitat information and following the precautionary principle, it is considered possible that *Clonia lalandei* is present on-site

3.3.3 BIRDS

3.3.3.1 Expected Diversity

At the start of the pre-construction monitoring (July 2022) a total of 218 bird species had been recorded during South African Bird Atlas (SABAP2, 2022) surveys within the nine pentads that overlap the VWC. This inventory was considered (at the time) to be a relatively accurate, if not slightly under-representative, portrayal of regional diversity. As such this expected species list was supplemented with additional species known to occur based on Chittenden et al. (2016) and knowledge of avifauna

from the region. As monitoring progressed, 48 species not previously documented by SABAP2 surveys from pentads covering the project area were added. This integrated inventory (including data from SABAP2, Chittenden et al. (2016) and in-field observation), totalling 321 species, was used as the project's species probability list. Of these regionally occurring species, around 246 are considered highly likely to occur on a regular basis in the proposed VWC WEF. However, when considering seasonal variation in species assemblages and local movements, the number of species likely to be encountered on any day in the project area is typically < 120 species.

3.3.3.2 Observed Diversity

Over the course of the pre-construction monitoring (S1-14), a total 244 species were recorded within the VWC during the pre-construction surveys. The presence of one additional species namely White-backed Vulture (an infrequent visitor) was added based on Vulpro (2025) tracking data. Of these, 206 species were recorded, which represents a large proportion (79%) of the 260 species recorded during monitoring projects in the AOI. It also represents a significant proportion (65%) of the expected regional diversity (318 spp.). This inventory is comprehensive and should be considered a good representation of the typical bird assemblage in the proposed VWC. It represents a moderate to high diversity in South Africa. Importantly, a very high proportion of these are red-listed and/or endemic species.

3.3.4 PRIORITYAVIFAUNA SPECIES

3.3.4.1 Diversity

3.3.4.2 Red-listed Species

Of the 88 regionally (Phumelela District) occurring priority species, 51 are regionally red-listed (in South Africa, Lesotho and Eswatini). Of these, 37 were recorded in the VWC. Based on habitat suitability, 32 regionally red-listed species are considered highly likely to occur within the proposed Groothoek WEF. This represents a high number in the South African context. Surveys to date have recorded 27 regionally red-listed species of which 15 are threatened species. Species which remain un-detected include Abdim's Stork, Black Stork, Marsh Owl, White-backed Vulture, Rudd's Lark and Yellow-billed Stork.

Natural plateau grasslands (particularly in the north-eastern corner and along the southern boundary) support populations of threatened high altitude species such as Blue Korhaan, Denham's Bustard, White-bellied Korhaan and Yellow-breasted Pipit, all of which are currently listed as Vulnerable and, apart from Denham's Bustard (which appears to be a summer visitor), are breeding residents. White-bellied Korhaan are concentrated in grasslands near VP3 while Yellow-breasted pipit occur in most of the natural plateau grasslands. During summer visiting Red-footed Falcon forage among large flocks of migrating Amur Falcons. Although suitable habitat exists for the Endangered Rudd's Lark the species was not detected within the plateau grasslands of the proposed Groothoek WEF. It has, however, been recorded nearby (586 m north) in the neighbouring Kromhof WEF and given its cryptic nature and sporadic display patterns its presence in the north-eastern grasslands remains plausible.

A variety of raptors use the various hills and slopes to hunt and / or gain lift. Threatened raptor species closely associated with this habitat include Cape Vulture and Verreaux's Eagle. Other threatened species which are less tied to the highlands include Black Harrier (rare non-breeding winter visitor to the VWC), Blue Crane (Confirmed multiple successful breeding attempts with chicks successfully reared), Secretarybird (no nests in proposed VWC), Southern Bald Ibis (multiple breeding roosts in

Groothoek WEF) and Martial Eagle (no nest in Groothoek WEF but nest buffer marginally overlaps south-western corner).

In terms of wetlands, some of the higher-lying seeps support Striped Flufftail while the larger lower-lying wetlands associated with the Dwaalspruit system see occasional visitation by Grey Crowned Crane (no nests recorded in the Groothoek WEF. No suitable wetland habitat exists for Species 23 in the Groothoek WEF.

3.3.4.3 Migratory Species

Large flocks of migratory birds move across the project area in early summer, the most notable of which being Amur Falcons. The species arrives en-masse to forage over the grasslands on site. During S3, a very large migratory flock (numbering over a thousand birds) was observed moving across the VWC in a dense swarm. Migratory flocks of this size are of global significance. The potential for a significant collision event is a distinct possibility and represents a considerable risk in terms of wind farm development. Accompanying these flocks are small groups of Near-threatened Red-footed Falcon.

3.3.4.4 Endemic Species

A total of 15 South African endemics occur in the region. Lower boulder strewn slopes are almost invariably occupied by small family groups of Ground Woodpecker while the steeper upper slopes are frequented by African Rock Pipit. Pockets of Protea roupelliae woodlands on southern slopes host Gurney's Sugarbird. Non-regionally red-listed species include Buff-streaked Chat, Cape Rock Thrush, Grey-winged Francolin and Pied Starling. Except for Pied Starling (which is ubiquitous) all of these species tend to frequent the higher altitude plateau grassland and rocky grassland habitat.

3.3.4.5 Other Priority Species

Other than Red-listed species, a further 32 regionally occurring species are also considered priority species. These include mainly raptors, red-listed species, large-bodied birds and other species that may be either rare, range restricted or habitat specialists.

Of the 88 regionally (Phumelela District) occurring priority species, 51 are regionally red-listed (in South Africa, Lesotho and Eswatini). Of the regionally occurring priority species, 37 were recorded in the VWC

3.3.4.6 Kromhof

Based on habitat suitability, 39 regionally red-listed species are considered highly likely to occur within the proposed Kromhof WEF. Surveys to date in the proposed Kromhof WEF have recorded 31 red-listed species of which 19 are threatened. This represents a high number in the South African context. Species which remain un-detected include Wattled Crane, Bearded Vulture, White-backed Vulture, Yellow-billed Stork and Botha's Lark.

3.3.4.7 Groothoek

Based on habitat suitability, 32 regionally red-listed species are considered highly likely to occur within the proposed Groothoek WEF. This represents a high number in the South African context. Surveys to date have recorded 27 regionally red-listed species at the proposed Groothoek WEF of which 15 are threatened species. Species which remain un-detected include Abdim's Stork, Black Stork, Marsh Owl, White-backed Vulture, Rudd's Lark and Yellow-billed Stork.

3.3.4.8 Normandien

Based on habitat suitability,39 regionally red-listed species are considered highly likely to occur within the proposed Normandien WEF. Surveys to date in the proposed Normandien WEF have recorded 35 regionally red-listed species of which 23 are threatened (conservation status of Vulnerable or higher). This represents a high number in the South African context. Species which remain un-detected include Bearded Vulture, Yellow-billed Stork and Montagu's Harrier.

3.3.5 BATS

The widespread aerial-feeding Egyptian Free-tailed Bat and Cape Serotine and migratory Natal Long-fingered Bat have been killed most often at wind farms in South Africa (Aronson 2022

3.3.5.1 Groothoek

Bat species which have been detected or which potentially occur in the Verkykerskop WEF cluster study area are listed in Table 2, together with their current Red List status, conservation significance, and turbine fatality risk (as given in MacEwan et al. 2020a). Of 18 bat species that are listed for the study area, 14 species were recorded within the Verkykerskop cluster site. Among these 14 recorded species, seven have a High fatality risk of collision with turbines, and two have a Medium–High fatality risk. Two fruit bat species were rated with a Low potential occurrence.

The 14 months of passive monitoring of bat call activity revealed the presence of at least 12 species in/near the Groothoek WEF site, including the Egyptian Free-tailed Bat (*Tadarida aegyptiaca*), Cape Serotine (*Laephotis capensis*), Natal Long-fingered Bat (Miniopterus natalensis), Lesser Long-fingered Bat (*Miniopterus fraterculus*), Mauritian Tomb Bat (*Taphozous mauritianus*), Little Free-tailed Bat (Mops pumilus), Midas Free- tailed Bat (Mops midas), Long-tailed Serotine (*Cnephaeus hottentotus*), Dusky Pipistrelle (*Pipistrellus hesperidus*), Lesueur's Wing-gland Bat (*Cistugo lesueuri*), Temminck's Myos (*Myotis tricolor*) and *Rhinolophus cervenyi* (which has recently been classified, and does not yet have a common name). Geoffrey's Horseshoe Bat (*Rhinolophus acrotis*) and Swinny's Horseshoe Bat (*Rhinolophus swinnyi*) were not recorded (but could occur) at Groothoek.

3.3.5.2 Kromhof

The 14 months of passive monitoring of bat call activity revealed the presence of at least 13 species in the Kromhof WEF site, including the Egyptian Free-tailed Bat (*Tadarida aegyptiaca*), Cape Serotine (*Laephotis capensis*), Natal Long-fingered Bat (*Miniopterus natalensis*), Lesser Long-fingered Bat (*Miniopterus fraterculus*), Mauritian Tomb Bat (*Taphozous mauritianus*), Little Free-tailed Bat (*Mops pumilus*), Midas Free-tailed Bat (*Mops midas*), Long-tailed Serotine (Cnephaeus hottentotus), Dusky Pipistrelle (*Pipistrellus hesperidus*), Lesueur's Wing-gland Bat (*Cistugo lesueuri*), Temminck's Myos (*Myotis tricolor*), *Rhinolophus cervenyi* (which has recently been classified, and does not yet have a common name), and Swinny's Horseshoe Bat (*Rhinolophus swinnyi*). Geoffrey's Horseshoe Bat (*Rhinolophus acrotis*) was not recorded (but could occur) at Kromhof.

3.3.5.3 Normandien

The 14 months of passive monitoring of bat call activity revealed the presence of at least 14 species in the Normandien WEF site, including the Egyptian Free-tailed Bat (*Tadarida aegyptiaca*), Cape Serotine (*Laephotis capensis*), Natal Long-fingered Bat (*Miniopterus natalensis*), Lesser Long-fingered Bat (*Miniopterus fraterculus*), Mauritian Tomb Bat (*Taphozous mauritianus*), Little Free-tailed Bat (*Mops pumilus*), Midas Free-tailed Bat (*Mops midas*), Long-tailed Serotine (*Cnephaeus hottentotus*), Dusky Pipistrelle (*Pipistrellus hesperidus*), Lesueur's Wing-gland Bat (*Cistugo lesueuri*),

Temminck's Myos (*Myotis tricolor*), Rhinolophus cervenyi (which has recently been classified, and does not yet have a common name), Swinny's Horseshoe Bat (*Rhinolophus swinnyi*), and Geoffrey's Horseshoe Bat (*Rhinolophus acrotis*).

3.3.6 MAMMALS

Twenty-one mammal species were recorded in the RSA during the field programme. Recorded mammals range from small species (e.g., Woodland Dormouse *Graphiurus murinus*), through to medium-sized species, such as Southern Reedbuck (*Redunca arundinum*) and Black-backed Jackal (*Canis mesomelas*). All recorded mammals are free-roaming species, except the Blesbok (*Damaliscus pygargus phillipsi*), which is likely part of a managed/farmed population.

The LSA's and broader RSA are characterised by extensive tracts of suitable, remote and heterogenous natural habitat. Despite the presence of numerous farm fences, habitat connectivity within LSA, as well as across the broader RSA, remains high. These factors, coupled with the low human population density, will promote a rich mammal assemblage, that is anticipated to approximate a contemporary reference community for the region.

3.3.7 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.

From a Bat perspective the widespread aerial-feeding Egyptian Free-tailed Bat and Cape Serotine and migratory Natal Long-fingered Bat have been killed most often at wind farms in South Africa (Aronson 2022).

Of the 18 listed species; the following eight species are regarded by IWS as Species of Conservation Concern (SCC):

- Natal Long-fingered Bat: known to roost in large numbers (sometimes hundreds or thousands of individuals) and to migrate hundreds of kilometres (Miller-Butterworth et al. 2003; Kearney et al. 2017; MacEwan et al. 2016).

- Lesser Long-fingered Bat: endemic to South Africa and Eswatini where the core of its distribution is in the montane grasslands of the escarpment. Cave-dependent and migratory; this species congregates in far smaller numbers than the Natal Long-fingered Bat (Monadjem et al. 2020)
- Temminck's Myotis: Known to undertake seasonal migrations similar to the Natal Long-fingered Bat (Monadjem et al. 2020).
- Long-tailed Serotine: Near-endemic (Monadjem et al. 2020; IUCN 2024-1). This bat occurs widely but sparsely in southern Africa. The patchy distribution of this species is probably due to its specific roosting requirements. Individuals roost in small groups of two to four individuals in caves and rock crevices.
- Lesueur's Wing-gland Bat: Near-endemic to South Africa and Lesotho. Currently Red Listed as Least Concern, but experiencing a global population decline (IUCN 2024-1).
- Swinny's Horseshoe Bat (*Rhinolophus swinnyi*): a rare cavity-roosting species listed as regionally Vulnerable (Child et al. 2016) and endemic to South Africa, where it appears to be associated with temperate Afromontane forests (Monadjem et al. 2020).
- De Winton's Long-eared Bat (*Laephotis wintoni*): Regionally Vulnerable (Child et al. 2016). This species occurs at high altitude (>1 500 m above sea level) in the Free State and Lesotho, where it has been collected from montane grasslands. The echolocation call of this species has not yet been recorded, and little else is known about this species. It is presumed to use crevices in rock faces (Monadjem et al. 2020).
- African Straw-coloured Fruit Bat: Globally and nationally Near Threatened. Known to roost in large numbers and migrate hundreds of kilometres (Monadjem et al. 2020).

Of the eight SCC, the Natal and Lesser long-fingered bats have the Highest risk of fatality from turbines, followed by Temminck's Myotis and the Long-tailed Serotine, which have a Medium-High and Medium fatality risk, respectively. The other SCC have a Low fatality risk. Records in the study region of the High-risk African Straw-coloured Fruit Bat are most likely representative of vagrant individuals.

The nearest known major bat roost is ~103 km north-east of the VWC, in old mine tunnels referred to as Yzermyn. Here, sizeable populations of the migratory Natal Long-fingered Bat, Geoffroy's Horseshoe Bat, Temminck's Myotis, and the Vulnerable endemic Swinny's Horseshoe Bat have been recorded (NSS 2013). Given the distance from the Yzermyn tunnels, the proposed VWC is not expected to have a major impact on bats from that roost site.

However, several active or potential bat roost sites were identified at various locations throughout the cluster. Primary roost locations included farmhouses, outbuildings, and crevices in rocky ridges.

4 AQUATIC BIODIVERSITY OVERVIEW

4.1 CONSERVATION CONTEXT

The relative Aquatic Biodiversity theme sensitivity of the LSA is Very High, due to the presence of aquatic CBAs, wetlands, and freshwater ecosystem priority area quinary catchments (DFFE, 2022).

4.1.1 STRATEGIC WATER SOURCE AREAS (SWSAS)

Strategic Water Source Areas (SWSAs) have historically been defined based on the production of relatively large volumes of runoff which sustain lowland areas downstream. SWSAs are areas such as water catchments, which produce disproportionately greater volumes of water per unit area than

other areas. These areas either: (a) supply a disproportionate (i.e. relatively large) quantity of mean annual surface water runoff in relation to their size and so are considered nationally important; or (b) have high groundwater recharge and where the groundwater forms a nationally important resource; or (c) areas that meet both criteria (a) and (b) (Le Maitre et al., 2018). The proposed VWC is situated within the Northern Drakensberg Surface Water SWSA. The primary objective of SWSAs is to maintain ecosystem functionality across the whole catchment, particularly mindful of activities which impact water quality and quantity (Le Maitre & Lötter, 2021).

4.1.2 FRESHWATER ECOSYSTEM PRIORITY AREA (FEPA) SUB-CATCHMENTS

Both wetland FEPA's and FEPA wetland clusters overlap with the VWC. The aim of identifying wetland clusters is to determine wetlands that exist within a relatively natural landscape in which dispersal between wetlands can occur (e.g. frogs and invertebrates) due to close proximity between systems.

As such, only non-riverine wetlands were used to identify wetland clusters (channelled valley-bottom wetlands, floodplain wetlands and valley head seeps were excluded in the cluster identification process). Unchanneled valley bottom wetlands were treated as non-riverine wetlands. In many areas of the country, wetland clusters no longer exist because the surrounding land has become too fragmented by human impacts.

However, the northern boundary of Kromhof is located within an identified wetland cluster. This indicates that the wetland clusters in the project area are considered to exist within a relatively natural landscape, allowing for connectivity between the systems (ecological corridors). The wetland clusters coincide with the Meul River floodplain, which is therefore considered as an important system.

The northern extent and the southern boundary of the Groothoek study area is identified as FEPA wetland clusters. The northern portion expands into the Meul River floodplain whilst the southern extent is the Dwaalspruit floodplain. The identified wetland clusters are considered to exist within a relatively natural landscape, allowing for connectivity between the systems (ecological corridors) and therefore are listed as important systems.

The western boundary of Normandien is located within an identified wetland cluster. This indicates that the wetland clusters in the project area are considered to exist within a relatively natural landscape, allowing for connectivity between the systems (ecological corridors). The wetland clusters coincide with the Meul River floodplain and therefore is listed as an important system.

4.1.3 WETLAND DELINEATION

The Groothoek study area presents a unique setting which results in two distinct drainage areas (north and central) which have naturally developed due to the topography – the Meul River and tributaries to the north and the Dwaalspruit along the southern extent and tributaries that traverse the central portions of the study area.

The desktop evaluation, and subsequent field survey revealed the presence of one hundred and fifty-five (155) HGM units, falling into five wetland HGM types: Floodplain, valley bottom (channelled and unchanneled), depression and hillslope seepage wetlands.

Table 4-1 – Groothoek Wetland Characteristics

Wetland Type	Extent (Ha)

Floodplain	78.9Ha
Channel Valley Bottom	88.1Ha
Unchanneled Valley Bottom	84.2Ha
Depression	3.3Ha
Seepage	413.2Ha
Total Area of Wetlands	**667.88Ha**

The Kromhof study area presents a unique setting which results in two distinct drainage areas (north and central-south) which have naturally developed due to the topography – the Meul River and tributaries to the north and the Dwaalspruit and tributaries to the south.

The desktop evaluation, and subsequent field survey revealed the presence of one hundred and thirty-five (135) HGM units, falling into the following wetland HGM types: Floodplain, valley bottom (channelled and unchanneled), and hillslope seepage wetlands.

Table 4-2 – Kromhof Wetland Characteristics

Wetland Type	Extent (Ha)
Floodplain	275.11Ha
Channel Valley Bottom	24.75Ha
Unchanneled Valley Bottom	146.13Ha
Depression	0.03Ha
Seepage	519.11Ha
Total Area of Wetlands	**965.41Ha**

The study area presents a unique setting which results in two distinct drainage areas (north and central) which have naturally developed due to the topography – the Meul River and tributaries to the west and the Klip River and tributaries to the northeast.

The desktop evaluation, and subsequent field survey revealed the presence of one hundred and thirty-five (135) HGM units, falling into the following wetland HGM types: Floodplain, valley bottom (channelled and unchanneled) and hillslope seepage wetlands.

Table 4-3 – Normandien Wetland Characteristics

Wetland Type	Extent (Ha)
Floodplain	151.2Ha
Channel Valley Bottom	86.7Ha
Unchanneled Valley Bottom	13.3Ha
Seepage	336.6Ha
Total Area of Wetlands	**587.9Ha**

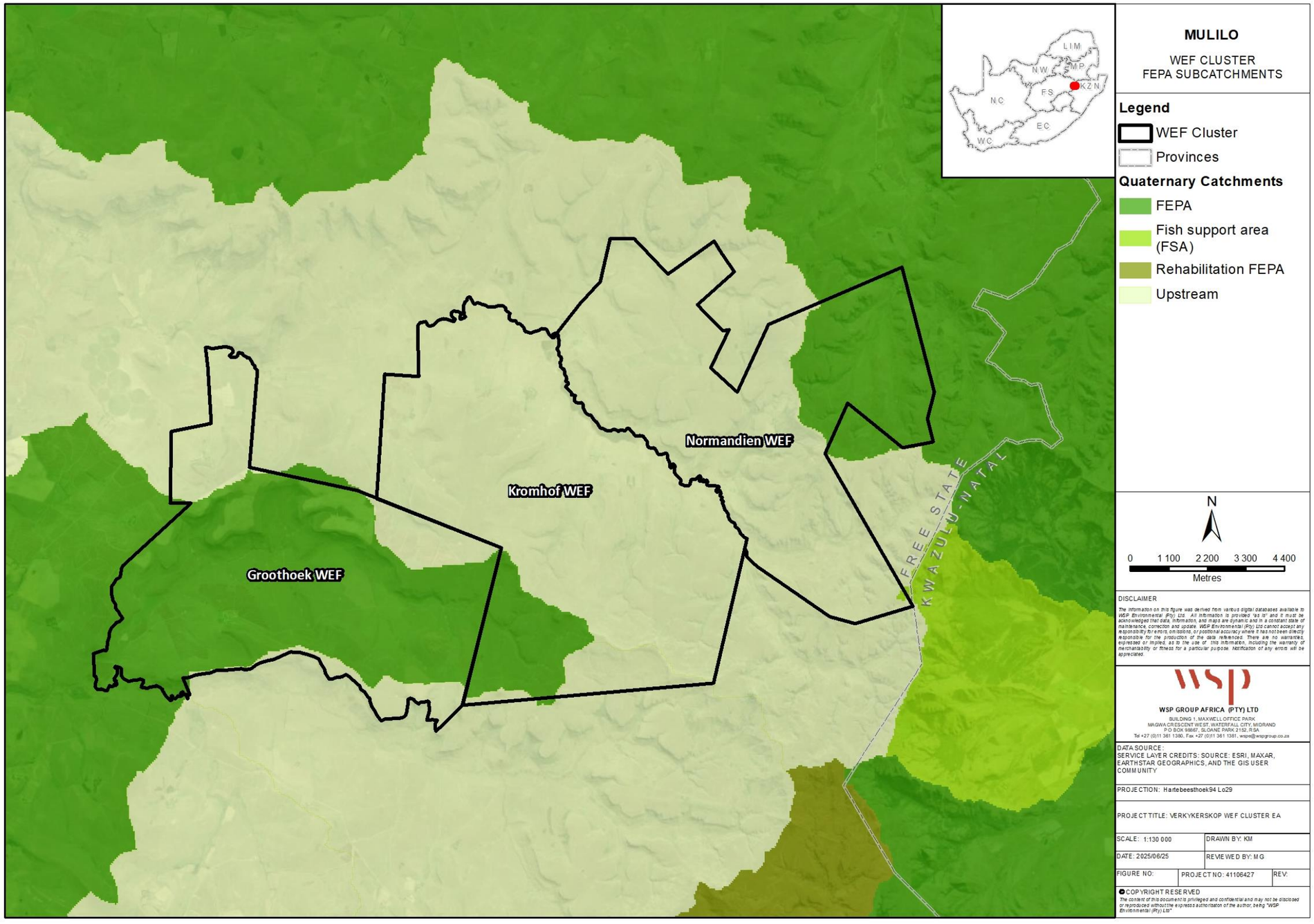

Figure 4-1 - FEPA Sub-Catchment

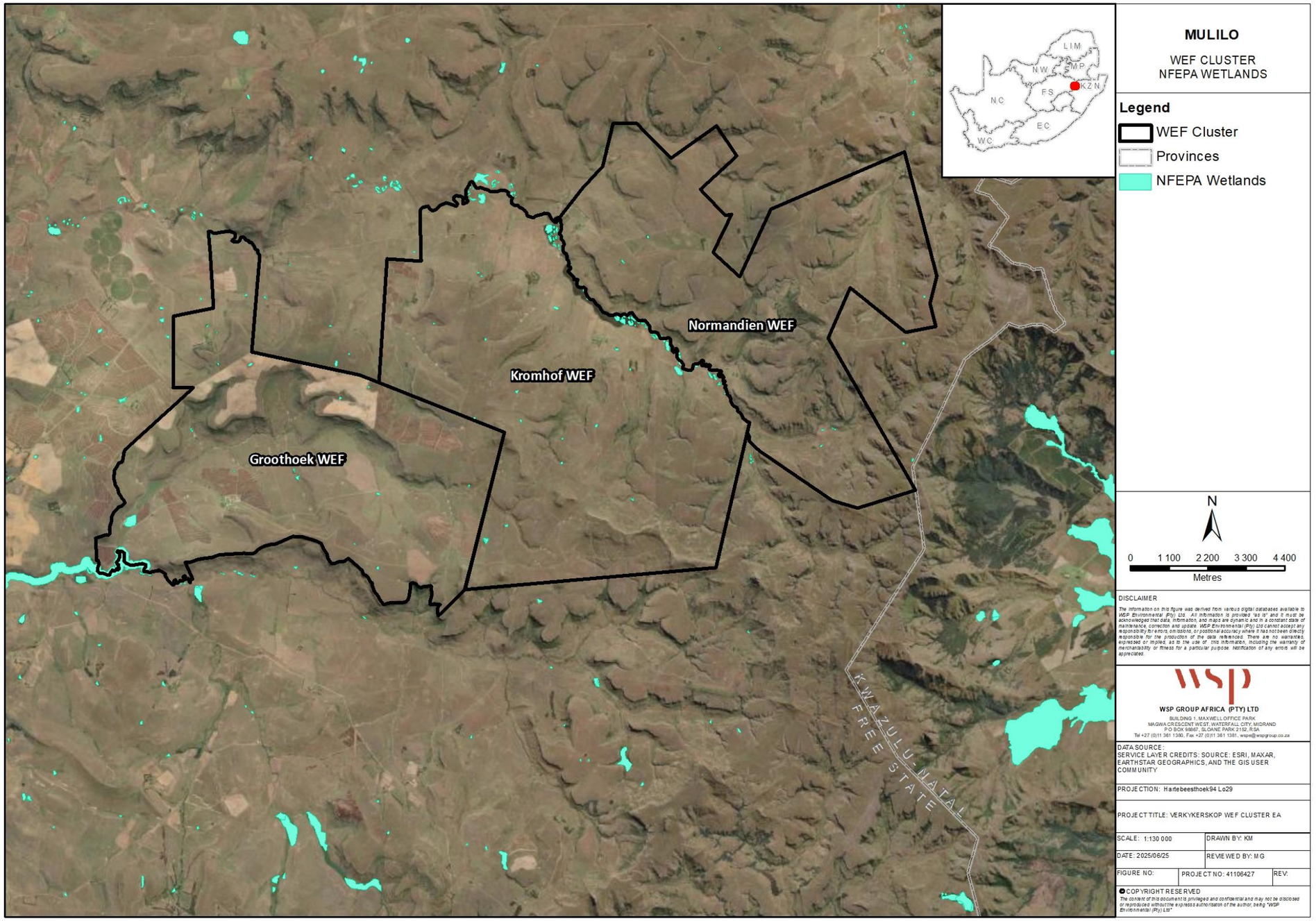

Figure 4-2 - NFEPA Wetlands

5 APPLICATION OF THE MITIGATION HIERARCHY

Biodiversity offsets are the final option in the mitigation hierarchy (Figure 5-1), once all other foregoing steps have been considered to their full extent. Mitigation measures that have been prescribed in each of the biodiversity specialist report are summarised in Section 5.1.

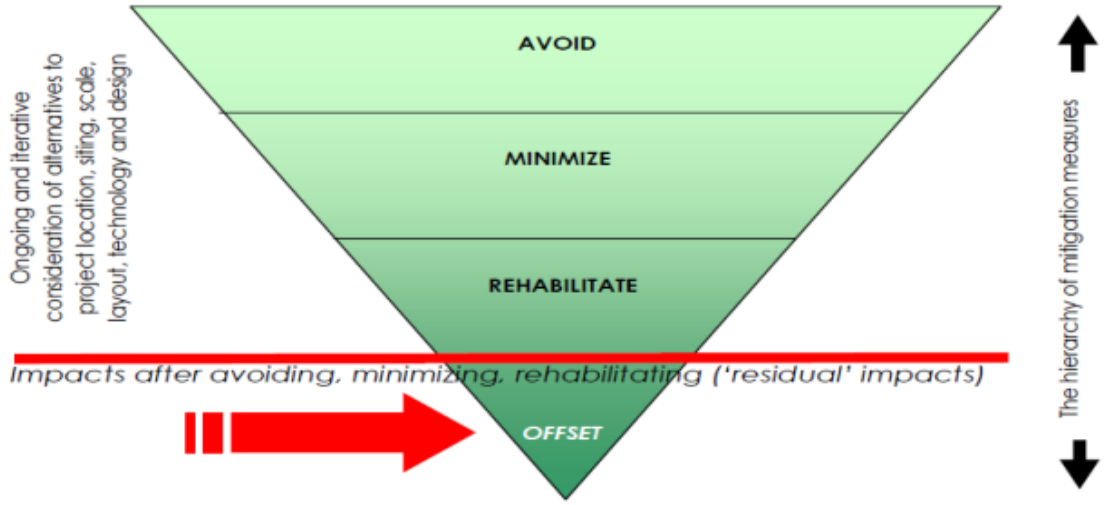

Figure 5-1 - The Mitigation Hierarchy (DFFE, 2022)

5.1 BIODIVERSITY MITIGATION MEASURES

The mitigation measures to minimise Project impacts on species and ecosystem receptors and rehabilitate impacted areas that have been prescribed in the various biodiversity specialist assessments are summarised as follows.

AVOIDANCE AND MINIMISATION MEASURES

All Receptors

- The sensitive (No-Go) areas identified in the terrestrial, avifauna, bat and aquatic biodiversity specialist assessments should be adhered to;
- All temporary construction footprints, including, but not limited to, laydown areas, portable toilets, cement batching plants, wind tower factory etc., should only be located in areas of modified habitat (e.g., cultivated fields and alien tree plantations), and outside and above the 1:100-year floodline;
- Where feasible, permanent proposed Project infrastructure should be located on land that is already modified;
- All human activities associated with construction, operation and decommissioning should be strictly managed according to generally accepted environmental best practice standards, so as to avoid any unnecessary impact on the receiving environment.

- Project access roads should be aligned with existing district and farm roads and tracks to the extent possible.
- All staff, vehicle and machinery activities should be strictly controlled at all times so as to ensure that the absolute minimum of surface area is impacted.
- Care should be taken not to introduce or propagate alien plant species/weeds during construction.

5.1.1.1 Avifauna

- Spatial Avoidance. The establishment of any infrastructure must be avoided in all areas designated in the avifaunal sensitivity map (using the provided GIS spatial data) as all infrastructure exclusion zones;
- It is recommended that all infrastructure is minimised if it cannot be completely avoided within all high sensitivity infrastructure minimisation areas. Turbines which are planned to be placed in these areas due to project feasibility constraints, must be subject to intensive operational shutdown monitoring using observer-based SDOD (bird spotters), backed by an automated SDOD system that uses sophisticated software (e.g. Robin Radar Systems) to integrate camera (e.g. IdentiFlight) and radar (e.g. Robin) surveillance measures; and
- It is recommended that active croplands, close to existing roads, are prioritised for auxiliary infrastructure and wherever possible turbine placement;
- The development areas and access roads should be specifically demarcated so that during the construction phase, only the demarcated areas may be impacted upon;
- A fire management plan needs to be compiled and implemented as informed by species authorities, to restrict the impact fire might have on threatened high altitude passerines;
- Effective and gazetted conservation of these and other remaining natural grasslands through conservation stewardship and appropriate land management practices could reduce the significance of the residual impact;
- In line with the Birdlife 6 October 2022 Guidance Note: Minimising the impacts of infrastructure development on Secretarybirds (*Sagittarius serpentarius*), the developer should commit to respecting nest buffers and minimising the fragmentation large tracts of contiguous grassland habitat. In this regard the avoidance and protection of core habitat for threatened high altitude species and wetlands is key.
- Areas of indigenous vegetation, even secondary communities outside of the direct construction footprint, should not be fragmented or disturbed. Clearing of vegetation should be minimised and avoided where possible. All activities must be restricted to flat areas as far as possible. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon. All footprints to be rehabilitated and landscaped after installation is complete. Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type.
- It is recommended that the clearance footprints for turbines and other infrastructure be thoroughly searched through walkdown to ensure that no nests, especially of threatened high-altitude species are destroyed

- Signpost the entry of roads into areas zoned as core habitat for threatened high altitude species as “Environmentally Sensitive Area Reduce Speed”; and
- All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40km/h), to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.
- Spatial avoidance. At VWC species particularly prone to disturbance include the resident breeding populations of Ground Woodpecker, Sentinel Rock Thrush, White-bellied and Blue Korhaan and Yellow-breasted Pipit. The developer must adhere to the prescribed nest and roost buffers as well as the core habitat for wetland and grassland priority species; and
- Temporal avoidance. High intensity construction activities (e.g. blasting, excavating, earthmoving and turbine installation) should be avoided during the critical breeding window for red-listed resident species (peaks November-February). Southern Bald Ibis bread October-December on site (with a peak in November) while cranes and threatened passerines typically breed December-March with a peak in February on site.

<u>Collision Mitigation</u>

- Spatial avoidance is paramount;
  - Turbines and other collision-risk infrastructure (e.g. powerlines and fences) must be micro-sighted to avoid all areas designated in the sensitivity map (using the provided GIS spatial data) as very high sensitivity for priority species flights (includes flight corridors). Additionally, all collision-risks infrastructure should be minimised unless completely unavoidable in all areas of high sensitivity. Ideally it is recommended that no turbine placements overlap with high sensitivity areas either. Turbines which are planned to be placed in areas of high sensitivity due to project feasibility constraints, must be subject to close operational shutdown monitoring using observer-based SDOD (bird spotters), backed by an automated SDOD system that uses sophisticated software (e.g. Robin Radar Systems) to integrate camera (e.g. IdentiFlight) and radar (e.g. Robin) surveillance measures; and
  - All WEF-related infrastructure (e.g. OMS, BESS, other buildings, substations and roads) including collision-risk infrastructure (e.g. turbines, powerlines and fences) must also be avoided in areas designated as Very High sensitivity for priority species habitat (includes core nest buffers and core habitat for threatened wetland species and high-altitude passerines).
- Temporal avoidance is also recommended. This involves turbine curtailment during peak flight times. The vantage point data revealed a strong diurnal variation in flight activity of priority species. By far the majority of flight activity occurred between 09:30 and 12:30 in winter and 08:30 to 11:30 in summer. Another peak occurs for about an hour before and following sunset when most priority species, particularly Southern Bald Ibis and Martial Eagle, commute back from foraging. Shutdown of selected “risky” turbine locations allowing others to continue operating (provided their continuation is backed by observer and / or camera and radar surveillance), during these times will reduce the risk of turbine collisions. Another key event to consider is the annual migration of Amur Falcon which peaks for about two weeks. Radar and observer-based shutdown will be critical to informing curtailment in this regard;
  - Blade Painting. Due to the high avifaunal sensitivity of the proposed WEF, it is recommended that all turbines have one blade painted in alternating red and white bands during manufacture

(see below for details). This recommendation is made in line with the recently published SAWEA, BLSA (2025) guidelines which stress that experimentation (leaving some blades unpainted as controls), although beneficial for research, should be avoided at high sensitivity WEFs. “Wherever roosts, breeding colonies, or other sensitive areas for red data birds occur within the home range of that species, all blades should be patterned. Killing such species at control turbines is not acceptable and will incur future costs for additional tiers of mitigation. In these cases, BirdLife South Africa and BARESG suggest that all turbines should be patterned for conservation purposes. However, avoidance of High-Risk areas should first be prioritised and blade patterning should be complemented with additional mitigation until blade patterning as a stand-alone mitigation has been proven to be effective” The blades should be painted during manufacturing (significantly more cost effective than once operational). The patterns must be painted in “signal red” upon an otherwise white blade front and back to comply with SACAA regulations. One blade painted per turbine is recommended following Hodos (2003) to minimise the effects of motion smear. Either a solid red blade as in McIsaac (2001) or an alternating red and white patterned blade (as is used at Umoya Energy Hopefield WEF) are acceptable depending on cost and warranty implications). However, the latter is recommended in the context of the Verkykerskop WEF Complex given its success at Hopefield (see Figure 6 1). Deviation from these proven patterns is represents an unjustifiable risk and is not advised in light of the high fatality rates predicted by the pre-construction monitoring. Anticipate and budget for communications and authorisations from SACAA with input from an appropriately qualified SACNASP registered specialist. This mitigation is not a failsafe, it has only been implemented at one operational wind farm in South Africa where Cape Vultures don’t occur. Although promising, more testing is required in a wider range of species and geographical contexts, over more time before any robust assertions can be made with any confidence. As per the mitigation hierarchy, proactive avoidance through site selection and micro-sitting to avoid the potential for collisions in the first place should take precedence over reactive measures to mitigate fatalities

- Turbine tower painting and reflectors. To maximise tower visibility and minimise direct collisions of birds, particularly priority species with poorer visual ability and lower in-flight manoeuvrability such as korhaans, bustards, cranes and grey-winged francolin it is recommended that all towers be painted or fitted with reflective stickers during manufacture in alternating red and white concentric bands up to the bottom end of the rotor sweep zone;
- Observer-based shut down on demand (OSDOD) should be implemented. It is, however, important to note that the efficacy of this system may be limited by the extreme and highly erratic climatic conditions on site. Cloud, mist and rain can dramatically hamper visibility and, therefore, the efficacy of this system for several days at a time. *However, vultures and other priority species were still observed flying in these conditions*. It is recommended that selected turbines may need to be shut down in periods of intense mist and cloud cover. Additionally, topography notably restricts viewshed within the WEF. As such multiple VPs would be required. The large size of the WEF, challenging terrain, road conditions and weather pose logistical challenges. Distance between VPs requires careful planning. Exposure at Groothoek especially with regards to lightning and cold poses a real safety hazard which should be carefully managed. It is recommended that paid lightning warning software is used to warn and evacuate observers from hilltops as necessary during approaching lightning storms or snowfalls. Overall, observer-based SDOD would involve a intensive undertaking by a very large team (likely > 15 core staff members, one team lead and one temp to fill in per WEF) of well-trained observers capable of working (safely) at sub-zero

temperatures in harsh conditions, including snow blizzards. The team would need to be employed full-time and require full company support. The team would require also require high quality long-range VHF radios as well as satellite phones (very limited reception) and be connected by cellphones too. They should also be linked to an emergency response and 4x4 recovery team. It is recommended that observer-based SDOD be the primary line of active collision avoidance, backed by camera and radar SDOD to cover periods of absence or inclement weather;

- Observer led shut down on demand (SDOD) must be implemented in line with the recently published handbook on responsive SDOD in South Africa (Smallie et al. 2025).
- It is important to note that the efficacy of SDOD is not only limited by environmental constraints which reduce visibility such as climate and topography but also by the size and behaviour of priority species. Those unlikely to be effectively protected through observer led SDOD include small species (e.g. Rudd's Lark, Yellow-breasted Pipit or Botha's Lark) as well as those flying by night (e.g. White-winged Flufftail).
- It is also important to consider the speed with which turbines can be shutdown and what implications SDOD may have on service agreements and manufacturer warranties.
- The SDOD program should be undertaken in collaboration with a suitably qualified Avifaunal Specialist, who should be appointed from the onset to oversee performance of the programme for its lifespan.
- The recently published SDOD handbook (Smallie et al. 2025) recommends that a detailed SDOD protocol be compiled and submitted as part of the environmental authorisation process and finalised at least six months prior to the commercial operation date. Considering that this avifaunal pre-construction monitoring report was designed implemented and completed before the publication of the SDOD handbook in June 2025, this aspect represents a separate scope of work which should be commissioned in collaboration with the Mulilo design team with inputs from the automated camera system supplier (e.g. IdentiFlight). This protocol needs to:
  - Assign a priority rating to each turbine for SDOD;
  - Identify high risk target species;
  - Identify high collision risk areas

Spatial coverage (surveillance area):

- Optimise spatial SDOD coverage of turbine field through viewshed analysis
- Work in tandem with Mulilo planning and engineering team to optimise coverage by balancing turbines covered by automated SDOD (likely to be influenced by supplier insight and recommendation) with those covered by observer led SDOD.
- Ground truth the location, accessibility and suitability of potential human observation stations (by an avifaunal specialist).

Temporal Coverage (surveillance period):

- Specify the daily, weekly, and monthly time periods requiring reliable surveillance
- This should account for daily or seasonal variation in collision risk, determined by the target bird species' ecology and behavioural characteristics

- Automated shutdown on demand (ASDOD): Given the size of WEFs, terrain and inclement weather which limit human observer ability a combination of radar and intelligent camera systems (e.g. IdentiFlight) should be used in tandem to allow for near-continuous, automated SDOD. This would require an integrative software solution such as that provided by Robin Radar Systems. Automated SDOD must be conducted continually over the full lifespan of the WEF. Under a realistic scenario where budget constrains the number of cameras that can be fitted, then an experimental project would need to be designed (separate scope of work, by a suitable SACNASP registered avifauna specialist in conjunction with IdentiFlight) using statistical power analysis to decide upon the number and location of placements. Aspects regarding radar positioning, cost, mobility, frequency and training should be decided upon before construction.
- Radar should be considered for all WEFs in the VWC, given the size of WEFs, terrain and inclement weather which limit observer and camera-based surveillance. It is recommended that pre-construction radar monitoring is conducted inform final micro-sighting of turbines. Following this radar monitoring should continue for the life of the project. Radar could prove critical in detecting approaching flocks of Cape Vulture, Southern Bald Ibis and migrating Amur Falcon. It may also prove highly useful to prevent Martial Eagle strikes especially considering the territory defending male over Groothoek “Brad” has been fitted with a GPS tracker. It could also help to refine flight paths and migration routes and assist in assessing areas where Amur Falcon tend to congregate and roost. Investigation may be required to assess radar range and line of sight restriction (through GIS-based viewshed analysis) to establish number of apparatuses required and stations. The EchoTrackTM omni-directional radar-acoustic sampling system provides a range a max horizontal range of 4 km and a vertical range of 2 km (Jenkins et al. 2018). Radar frequency is also an important aspect. Balance between frequencies should be low enough to be useful during the frequent inclement weather yet high enough to detect birds at least as small as Amur Falcon is required. If flexibility and discrimination prove difficult priority should be afforded to calibrating the radar to optimise detection of Cape Vulture, Martial Eagle and Southern Bald Ibis flights. Recommended to be used in conjunction with camera and / or observer-based SDOD. This would require an integrative software solution such as that provided by Robin Radar Systems. The Site is large and topography poses line of sight challenges, may require multiple radar stations. In this regard trailer-based mobile units should be considered to test best stations or adapt seasonally to changes in flight patterns. An investigation would be required to determine the position and duration of radar surveillance if deemed necessary and / or feasible;
- A Vulture Food Management Programme will need to be implemented to ensure all dead livestock/wildlife on site are removed as soon as possible and transferred to designated vulture restaurants sufficiently far away from the WEF. Carrion removal would need to be an intensive undertaking by a team of full-time rangers working in close radio communication with the farmers and bird spotters. Although efforts have been made by Mulilo to design and trial a carrion management program, it is recommended that it should only be fully implemented after environmental authorisation (if granted) to avoid the risk of imposing unnecessarily large-scale foraging habitat constraints on an already threatened species;
- Birthing of livestock near turbines should not be permitted;
- As there are currently no known active vulture restaurants in the immediate vicinity, it is recommended that one be established and maintained by the WEF’s bird management team. The following considerations should be taken into account regarding the establishment of a suitable vulture restaurant site:

- Location: Considering that the prevailing flight pattern is from south (typically from the breeding colony at Nelsonskop) to north (towards the non-breeding roost on the Witkoppe) across the VWC it is recommended that a site be chosen in the region between Nelsonskop and Van Reenen;
- Protection: The vulture restaurant should preferably be located in a nature reserve or on stewardship land (that forms part of the Upper Wilge Protected Environment.;
- Risks: The area selected for the restaurant should be situated away from powerlines and at least 10 km from any large transmission line. Avoid areas close to airstrips and fences (>100 m);
- Terrain: Open, high-lying plateau grasslands should be prioritised while low valleys should be avoided. Ideally the restaurant should be placed close to the escarpment or another large cliff or drop-off to assist vultures to utilise the prevailing orographic winds to easily take-off as required;
- Food supply: Avoid poisoned carrion or animals which have died following use of antibiotics or non-steroidal anti-inflammatories (these animals should be buried as they can kill vultures). If shot remove the lead bullet (poisonous to vultures). Make sure to open the carcass once deployed;

- Develop a contingency mitigation budget to cater for significant mortality events. This budget should allow for research into and effective implementation of adaptive management strategies such as human-based turbine shutdown on demand, habitat alteration, bird deterrence from site, and any others identified as feasible;
- A Biodiversity Management Plan (BMP) must be compiled for the project by an ornithologist prior to construction, outlining critical thresholds for fatalities and the appropriate management response;
- Continue to collaborate with relevant NGOs such as Vulpro, BirdLife South Africa and the Endangered Wildlife Trust (EWT);
- Continue to track martial eagles within the project area. Mulilo recently commissioned a study of this nature, and Dr. Gareth Tate of EWT has already captured and fitted a GPS logger on the first male eagle (May 2024);
- Track Southern Bald Ibis. Dr Carina Pienaar is currently tracking bald ibises from the Witkoppe Roost. It is recommended that she be contacted to consider fitting GPS loggers to fledglings from within the VWC.

5.1.1.2 Bats

- The rotor sweep of the turbine closest to the O&M and IPP buildings (east of these buildings) will encroach on a Medium-High sensitive area and, therefore, should be shifted slightly where possible.
- The rotor sweep of the turbine ± 2.5 km east-south-east of the O&M and IPP buildings will also encroach on a Medium-High sensitive area and, therefore, should be shifted slightly where possible.

- There are four turbines positioned within the 2.5 km Medium sensitive buffer around VK5 where high bat activity was recorded, and the rotor sweep of another two turbines will encroach on this buffer. As such, these six turbines will require curtailment to reduce bat fatalities, as prescribed in this report.
- Every open, functional reservoir within 200 m of a turbine must be permanently sealed or decommissioned prior to operation of the WEF.

5.1.1.3 Terrestrial Plant Species

- 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 only be located in areas of modified habitat;
- A pre-construction walkdown of the approved development footprints should be conducted during the wet/growing season to identify sensitive biodiversity and inform the micro-siting of Project infrastructure to already disturbed sites and other relevant management measures.
- 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.
- A rehabilitation/ landscaping protocol should be developed and implemented to stabilise and revegetate all non-operational sites that have been disturbed by construction activities. The protocol should include:
- 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.
- Additional walkdown surveys of the proposed development footprints should be conducted during the wet/growing season to determine the identity and number of potentially impacted flora SCC;

Data from the walkdown surveys should then be used to inform:

- Additional micro-siting requirements for proposed Project infrastructure, including avoiding a 200 m bugger around Red List species locations, as prescribed by SANBI; and.

The scope of a Flora SCC Management Plan with respects to:

- Management and monitoring of-site Red List flora species populations; and
- Procedure for rescuing and relocating provincial Protected flora species occurring within infrastructure footprints.

5.1.1.4 Terrestrial Animal Species

- 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 only be located in areas of modified habitat;
- A pre-construction walkdown of the approved development footprints should be conducted during the wet/growing season to identify sensitive biodiversity and inform the micro-siting of Project infrastructure to already disturbed sites and other relevant management measures.
- 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.

A rehabilitation/ landscaping protocol should be developed and implemented to stabilise and revegetate all non-operational sites that have been disturbed by construction activities. The protocol should include:

- 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

Fauna SSC:

- Active revegetation should be conducted using grass species that are indigenous, locally-occurring and perennial.
- An Environmental Control Officer (ECO) should be on-site during vegetation clearing to monitor and manage any wildlife-human interactions;
- As appropriate, temporary barriers should be erected around construction trenches and excavations to prevent fauna becoming trapped;
- Any fauna species trapped in construction areas, should be safely and correctly relocated to an adjacent area of natural habitat;

- A low-speed limit (recommended 20-40 km/h) should be enforced on site to reduce wildlife collisions;
- No fauna may be intentionally killed or injured by on-site contractors and workers. Handling, poisoning, snaring and killing of on-site fauna by contractors and workers must be strictly prohibited;
- General noise abatement equipment should be fitted to construction machinery and vehicles;
- Dust suppression using water bowsers should be undertaken on all roads and other sites where dust entrainment occurs;
- The rules and regulations concerning fauna should be communicated to contractors through on-site signage and awareness training; and
- An incidence register should be maintained throughout all phases of the Project detailing any fauna mortalities/injuries caused by on-site activities. The register should be used to identify additional biodiversity management requirements.
- See mitigation measures for Direct loss and disturbance of natural habitat, Fragmentation reducing natural habitat connectivity and integrity, and Injury, mortality and disturbance of Fauna - and:
- During the pre-construction walkdown of the development footprints, additional surveying should be conducted to identifying any Sensitive species 15 burrow sites;
- If Sensitive species 15 burrow sites are confirmed, then additional conservation actions should be identified, compiled in a species-specific management and monitoring plan for Sensitive species 15, and implemented; and
- Key measures that should be included in the plan include the delineation of an avoidance/exclusion buffer of 400 m around each burrow site, as prescribed by SANBI (2020).
- The Project proponent must keep actively informed about new research in the field of vibration impacts on fauna and potential mitigation options; and
- Based on the findings of new research, the biodiversity management plan for the proposed Project should be updated to include additional mitigation measures and these should be implemented on-site.

5.1.1.5 Biodiversity

- 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 only be located in areas of modified habitat;
- A pre-construction walkdown of the approved development footprints should be conducted during the wet/growing season to identify sensitive biodiversity and inform the micro-siting of Project infrastructure to already disturbed sites and other relevant management measures.

- 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.

A rehabilitation/ landscaping protocol should be developed and implemented to stabilise and revegetate all non-operational sites that have been disturbed by construction activities. The protocol should include:

- 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.
- Following finalisation of the Project infrastructure layout and quantification of habitat losses, it is anticipated that 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).

Avoidance and Minimisation

- 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.

5.1.1.6 Aquatic Ecosystems (Rivers and Wetlands)

The assessment of potential impacts to wetlands and rivers determined that with appropriate mitigation measures applied, potential impacts can be reduced to low or very low significance. In addition to mitigation measures proposed in this report to address potential impacts, the following actions have been recommended based on the findings of the current study:

- The developed Aquatic Biomonitoring Programme must be adopted as specified.
- The rivers and proposed 25m buffer should be considered as sensitive areas and all proposed infrastructures (including the 2 aforementioned WTGs) and the activities planned to remain outside

of these areas, though this may not be applicable to linear infrastructure crossings that may be required.

- It is recommended from a best practice perspective that if there is opportunity to shift the turbines that currently fall within wetland habitat to areas outside of the wetland areas, this should be applied in any further design revisions.
- The wetlands and the proposed 30m buffer should be considered as sensitive areas and all proposed infrastructure and the activities planned so as to remain outside of these areas, with the exception of infrastructure that cannot feasibly be shifted.
- The proposed Project should adopt a water and habitat quality preservation mindset throughout the life of the Project to prevent the deterioration of the aquatic ecosystems.
- Some unavoidable wetland/river crossings will be utilised and will require upgrade, mitigation measures that will be applied at these crossings include:
    - A construction method statement for wetland road crossings must be developed by a wetland ecologist and environmental engineer, and implemented on site during construction;
    - Construction should be done in the dry season and completed by the wet season, so that appropriate water management systems are in place for stormwater management;
    - Design of infrastructure should be environmentally and structurally sound and should take into consideration any required restoration of the affected watercourses as well as the reach-scale movement needs of the expected fish assemblages and other migratory fauna;
    - Culvert designs should be such that no fragmentation of the affected systems occurs;
    - Where the gradient allows, culvert design must ensure that the base of the culverts are countersunk in line with the baseflows of the watercourse;
    - Should any sloped culverts be necessary, these should include the use of baffles or a roughened channel to ensure complex flow throughout culvert length (as opposed to laminar flow). Various options for inclusion of baffles are available, and final design selection would require engineering input and consideration of hydraulic roughness through the culvert;
    - The number of culverts installed should be suitable for the gradient, width and flow profiles of the watercourses being crossed so as to avoid upstream inundation, erosion and incision, and alterations to the natural channel;
    - Pipe culverts are to be avoided at all watercourse crossings to limit opportunities of flow confinement and channel incision of the wetland units, drainage lines and rivers. Piped culverts have the additional impact of limiting fish movement between reaches;
    - Designs should account for high flow velocities, which may result in further scouring of the watercourse downgradient of the structure and as such, bed and bank protection downgradient of structures should be considered.
- Site clearing activities should take place at the end of the wet season to minimise the risk of erosion, incision and sedimentation of the associated watercourses, and as far as possible, all remaining construction activities should take place during the dry winter months to minimise impacts as a result of high flows and runoff from exposed soils and materials;

- Ensure a soil management programme is implemented and maintained to minimise the potential for erosion and sedimentation;
- All/any topsoil or building material stockpiles must be protected from erosion, stored on flat areas where runoff will be minimised, and be surrounded by bunds. Stockpiles must also only be stored for the minimum amount of time necessary;
- Erosion berms or suitable water attenuation measures should be installed on roadways and downstream of construction and infrastructure areas to prevent gully formation and siltation of the associated watercourses.
- All erosion noted within the construction/operation footprint should be remedied immediately and included as part of an ongoing rehabilitation plan;
- Only authorised personnel should be allowed within the construction area;
- No material may be dumped or stockpiled within or adjacent to the watercourses;
- No mixing of construction materials such as cement should be permitted within or adjacent to watercourses and no such mixing may occur on bare soils in the surrounding area.

REHABILITATION MEASURES

- A rehabilitation/landscaping protocol should be developed and implemented on-site. The protocol should include the following provisions:
  - Stockpiling of topsoil from development footprints during site preparation;
  - Post-construction, the land form should be correctly contoured to limit potential erosion and 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
  - The location of sites requiring erosion prevention and rehabilitation should be identified through regular field inspections;
  - Locally-occurring indigenous plant species should be used to revegetate all areas disturbed during construction;
  - The re-vegetation programme shall take cognisance of the climatic and seasonal conditions but should generally be undertaken annually starting in spring and early summer.
- Active rehabilitation, re-sloping, and re-vegetation of disturbed riparian areas must take place immediately after construction;
- Active alien invasive species control should continue throughout the operational and decommissioning phase, as per the Project's AIS Control and Eradication Plan. Follow up control should be carried out for a five- year period following decommissioning.
- Develop a wetland rehabilitation and management plan for the remaining wetlands in the Study Area, to offset unavoidable losses of wetland habitat;
- Rehabilitation of wetlands disturbed during construction of wetland crossing upgrades should be implemented as soon as construction is completed.

- 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.
- 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
- Construction- and maintenance workers should be trained on the dangers of wildfire and the need to actively prevent unplanned/accidental fires.

6 RESIDUAL IMPACTS REQUIRING OFFSET

The LSA and Project infrastructure are situated in a high biodiversity value landscape, interacting with extensive areas of natural habitats, areas mapped as terrestrial and aquatic CBAs according to the FSBSP, and an IBA, and supports numerous flora and fauna SCC. As a result, a number of residual impacts of moderate-high significance on species and ecosystem receptors have been identified in the various terrestrial and aquatic biodiversity specialist assessment reports. The full list of residual impacts is provided in Appendix B; significant residual impacts are summarised in Table 6-1.

Table 6-1 - Significant Residual Impact Summary

Aspect	Impact Description	Phase	Character	Without Mitigation	With Mitigation
Terrestrial Biodiversity	Direct loss and disturbance of natural habitat	C	(-)	High	Moderate
	Fragmentation reducing natural habitat connectivity and integrity	C	(-)	High	Moderate
	Establishment and spread of alien invasive species	C/O/D	(-)	Moderate	Low
	Increased soil erosion and sedimentation	C/D	(-)	Moderate	Low
	Increase in wildfires from Project workers or faulty infrastructure	O	(-)	Moderate	Low
	Wetland Loss	C	(-)	Moderate	Moderate

Aspect	Impact Description	Phase	Character	Without Mitigation	With Mitigation
Aquatic Impact Assessment - Wetland impact	Partial loss of wetland habitat as a consequence of the proposed infrastructure development				
	Hydrology Increase in hardened surfaces	C/O	(-)	Moderate	Low
	Geomorphology Sediment transport into wetland habitat and erosion of wetland soils	C	(-)	Moderate	Low
	Water Quality Accidental point source pollution and excessive downstream sedimentation increasing turbidity of watercourses	C	(-)	Moderate	Very Low
	Vegetation Invasion of Alien Invasive Plants (AIPs)	C/O	(-)	Moderate	Very Low
Aquatic Assessment - Aquatic ecosystems impact	Water Quality Modifications due to sedimentation, run-off of construction materials (cement etc.)	C	(-)	Low	Very Low
	Loss of Habitat Direct disruption of riparian habitat	C	(-)	Moderate	Low
	Introduction of alien species Altered ecosystem functioning due to competition with indigenous biota	C	(-)	Moderate	Low
	Water Quality Leakages (e.g. oil and gasoline) from vehicles during maintenance	O	(-)	Moderate	Very Low
	Flow Regime Increased surface flows due to impermeable surfaces	O	(-)	Low	Very Low
	Establishment of alien species Altered ecosystem functioning due to competition with indigenous biota	C	(-)	Moderate	Low
Plant Species	Direct loss and disturbance of natural habitat	C	(-)	High	Moderate
	Fragmentation reducing natural habitat connectivity and integrity	C	(-)	High	Moderate

Aspect	Impact Description	Phase	Character	Without Mitigation	With Mitigation
	Loss of flora of conservation concern	C	(-)	High	Low
	Establishment and spread of alien invasive species	C/O/D	(-)	Moderate	Low
	Increased soil erosion and sedimentation	C/D	(-)	Moderate	Low
	Increase in wildfires from Project workers or faulty infrastructure	O	(-)	Moderate	Low
Animal Species	Direct loss and disturbance of natural habitat	C	(-)	High	Moderate
	Fragmentation reducing natural habitat connectivity and integrity	C	(-)	High	Moderate
	Injury, mortality and disturbance of fauna	C	(-)	Moderate	Low
	Loss of fauna species of conservation concern	C	(-)	Moderate	Low
	Injury and mortality of fauna, including SCC	O	(-)	Moderate	Low
	Vibrations from operating wind turbines	O	(-)	Moderate	Low
	Injury and mortality of fauna, including SCC	D	(-)	Moderate	Low
Avifauna	Loss or Alteration of Habitat	C	(-)	High	High
	Roadkill and other Mortalities	C	(-)	Low	Very Low
	Sensory Disturbance	C	(-)	Low	Very Low
	Collisions with turbines	O	(-)	Very High	High
	Collisions and Electrocutions with Electrical Transmission Lines and Auxiliary Infrastructure	O	(-)	High	Moderate
	Sensory Disturbance	O	(-)	High	Moderate
	Effect on Migratory and Congregatory Species	O	(-)	High	Moderate
	Effect on Migratory and Congregatory Species	D	(-)	Low	Very Low
Bat	Disturbance of bats roosts	C	(-)	High	Low
	Terrestrial habitat loss, and possible displacement of bats	C	(-)	High	Moderate

Aspect	Impact Description	Phase	Character	Without Mitigation	With Mitigation
	Bat fatalities from collision with turbines, and possible population declines	O	(-)	Very High	Moderate
	Declines in certain species populations, the ecosystem services	O	(-)	High	Moderate
	Disturbance of bat roosts	D	(-)	High	Low
	Terrestrial habitat loss, and possible displacement of bats	D	(-)	High	Low

7 TARGETS FOR OFFSET

Since direct loss of wetland and terrestrial habitats cannot be mitigated, these losses must be offset. The results of the application of wetland functional and ecosystem hectare equivalent calculations for wetland losses as a result of the proposed Project components using the revised SANBI and DWS offset guidelines (Macfarlane *et al.,* 2014) and guidance provided in the draft Biodiversity Offset Guidelines (DFFE, 2022) are presented in the following sections.

7.1 WETLAND HABITAT

Details of wetland loss per affected hydrogeomorphic (HGM) unit the summary figures for loss are provided in Table 7-1.

Approximately 6.4ha of wetland habitat will be directly and permanently lost as a result of proposed road and hardstand construction and other infrastructure.

It is noted that these figures are likely to change once the final road layout has been determined. The required wetland offset will then be determined and implemented via the Water Use License.

Table 7-1 - Predicted Wetland Losses to Proposed Project Infrastructure Including Roads and Turbine Hardstands of the new recommended layout

Project	Wetland type	Extent (ha)
Current Layout	Floodplain	6.4
	River	0.01
Subtotal		**6.41**

7.2 TERRESTRIAL HABITAT

Residual impacts on terrestrial habitat were defined as the extent of natural habitats supporting plant/fauna SCC that would be lost as a result of the proposed development options.

The basic and adjusted offset ratios for natural terrestrial habitats are set out in Table 7-2, based on the biodiversity offset ratios look-up table provided in the draft Biodiversity Offset Guideline. When the relevant habitats fall within a CBA1, the ratio is automatically set to 30:1, while the basic ratio for areas within CBA2 is adjusted by increasing it by a factor of 1.5. For other mapped categories, excluding 'heavily modified' and 'modified' areas (i.e. Ecological Support Areas - ESAs and Other Natural Areas - ONA) the basic ratio applies.

Table 7-2 - Basic and Adjusted Biodiversity Offset Ratios for Terrestrial Habitats

Criteria	Basic Ratio (DFFE, 2022)	CBA1	CBA2
Vulnerable ecosystems	5:1	30:1	7.5:1
Eastern Free State Sandy Grassland (LC NEMBA) (VU Provincially)	3:1	30:1	4.5:1
Low Escarpment Moist Grassland (LC)	0:1	30:1	0:1

Mapped vegetation communities within the LSA's that will be lost as a result of the proposed developments were ranked according to their occurrence in CBA1, CBA2, ESA and ONA areas mapped by the FSBSP. Targets were then set for areas of natural habitat loss (i.e. loss of Disturbed Grassland, Wet and Dry Mixed Grassland and Rocky Shrubland) only. Loss of areas of Alien Tree Plantations, Cultivated Fields, Infrastructure and Transformed areas was not included in target setting, even if they occurred within areas mapped as CBA, since their loss is not considered a significant impact. Loss of areas mapped as 'Moist Grassland in the terrestrial vegetation dataset are included, since detailed wetland targets have not been set.

The calculated targets for each vegetation group within the LSA's, for each Project component, are summarised on Table 7-3.

Table 7-3 - Terrestrial Habitat Offset Targets of the new recommended layout

FSBSP category and Vegetation Communities verified infield	Estimated extent of loss based on current design (ha)	Offset Target
VWC	**236.1**	**4167.5**
CBA Irreplaceable	**120**	**3600**
Eastern Free State Sandy Grassland	115	3450
Low Escarpment Moist Grassland	5	150
CBA Optimal	**28.1**	**187.5**
Eastern Free State Sandy Grassland	25	187.5
Low Escarpment Moist Grassland	3.1	0
ESA Landscape corridor	**58**	**290**
Eastern Free State Sandy Grassland	58	0
ESA Local corridor	**30**	**90**
Eastern Free State Sandy Grassland	30	0

From Table 7-3 the values of the various vegetation types that are affected by roads and turbine hard stands are depicted.

8 CANDIDATE OFFSET SITES

Wherever possible, a 'like-for-like' biodiversity offset is preferred so that residual negative impacts on affected biodiversity features are appropriately compensated – ensuring no net loss of that feature on a local or regional scale. In addition, the realities of securing offsets in the long-term depends heavily on securing appropriate areas from a land tenure and/or management perspective. For this reason, the selection of candidate offset sites must focus on nearby habitats within the RSA, where the Project Developer has established relationships with landowners and can capitalise on this for offset planning purposes.

The draft National Biodiversity Offset guideline (DFFE, 2023) requires that the below-listed principles - which are widely recognised in standard offset guidance (e.g. BBOP, 2009) - guide the selection of suitable candidate offset sites; these principles were also applied when identifying potentially suitable areas and required actions for offset:

- *Biodiversity offset sites should be selected for ecological equivalence (the "like-for-like" principle) or, where appropriate, there could be "trading-up" to select an area of relatively high or more urgent conservation priority.*
- *Selection should be guided as far as possible by existing biodiversity priority areas in the landscape (for example, the CBA and ESA network, Freshwater Ecosystem Priority Areas, and focus areas for protected area expansion) and/or areas identified as strategic from an ecological infrastructure perspective (such as Strategic Water Source Areas).*
- *Biodiversity offsets should strive to secure the best examples of the features which have been impacted and to improve connectivity in the landscape between protected and priority areas for biodiversity.*
- *The final selection can be influenced by the reasonable consideration of factors other than the biodiversity value of the different candidate sites, such as: ease of the management of the site by a relevant management authority; and threats to conservation due to conflicting land use rights, claims or land use classification*.

For biodiversity offsets in terrestrial ecosystems, rehabilitation and preferably restoration of areas in modified condition (i.e. no longer natural or near-natural) is seen as an integral part of the required management of the offset site. The guidelines state it is optimal for candidate biodiversity offset sites to be in a good ecological condition (natural or near-natural state), to minimise the additional burden of having to rehabilitate or restore an area (DFFE, 2023); however, some level of rehabilitation of natural habitats with a low level of disturbance is normally anticipated.

Wetland offsets, on the other hand, are often focussed in systems that are moderately modified, where the greatest potential for functional gain can be feasibly achieved via implementation of a wetland rehabilitation plan.

Candidate offset sites and required biodiversity outcomes for wetland and terrestrial habitat are therefore proposed to include:

- Unaffected wetland habitat within the study area:
    - The presence of areas of modified wetland habitat within the LSA;s, representing each of the HGM units that will be lost, presents an opportunity for implementation of a wetland rehabilitation programme within the LSA to compensate wetland loss, through securing functional gains via rehabilitation.

- In targeted wetlands, the objective will be to increase the PES score/category through improvement of wetland health as a result of rehabilitation activities, thereby securing functional gains.
- Both the ecosystem conservation target and functional ha-eq target will be easily achievable within the LSA.
- It is envisaged that any necessary wetland offset will be secured via the necessary landowner agreement for the Water Use License that will be required for the implementation of rehabilitation structures/works in wetlands and watercourses.

- Unaffected terrestrial habitat within the VWC study area:
  - Grassland: areas of natural habitat (i.e. Disturbed Grassland, Dry Mixed Grassland, and Rocky Grassland) within the LSA's; particularly those areas situated within CBA1/CBA2 areas, and adjacent to areas of loss; since landowners of areas where construction will take place are already engaged. The final areas and required extent of offset will be confirmed once the selected Alternative is finalised, final residual impacts quantified, and agreements with landowners secured.
  - Stewardship agreements with landowners and local communities – support conservation and enhancement of dry mixed, disturbed and rocky grasslands, and linked fauna species, through management and protection of high ecological importance natural grasslands in the LSA's. Conservation servitudes may be utilised to give effect to landowner agreements.
  - Areas where land use consists primarily of livestock grazing of open veld, if incorporated into protection-based offset areas, can potentially provide biodiversity support and demonstrate improved ecological integrity in the long-term, if targeted by suitable management plans e.g. grazing management plans, fire management.

8.1 CONCEPTUAL MANAGEMENT MEASURES AND PROGRAMME

The conceptual management measures that would need to be employed as part of the biodiversity offset, and programme for implementation, for which the Project developer would be responsible, are summarised in Table 8-1.

Table 8-1 - Conceptual Offset Management Measures and Programme for Implementation

Management Actions	Pre-construction	Construction	Operation
Agree extent and location of offset sites with authorities			
Secure landowner agreements, including legal processes to register conservation servitudes			
Legal mechanism(s), in terms of which the biodiversity offset site would be secured			
Draft Biodiversity Offset Management Plan			
Public Participation			
Final Biodiversity Offset Management Plan			
Offset management activities, including offsite actions for priority bird species			
Biodiversity monitoring (fauna, operation phase avifauna monitoring) in operational area, and of offset sites			
Adaptive management			

10 RECOMMENDED CONDITIONS FOR ENVIRONMENTAL AUTHORISATION

The environmental management system provided for by NEMA and the EIA Regulations provide for a Competent Authority to grant Environmental Authorisations subject to conditions. In appropriate circumstances a CA may grant an EA subject to the condition that a measurable biodiversity offset is implemented by the EA.

Environmental Authorisation (EA) can, and in the case of Offsets contain conditions, these conditions stipulate the offset requirement in detail. The conditions will also stipulate that the EA holder to enter into a Biodiversity Offset Implementation Agreement with an implementing party. Thus, showing that an agreement may not always be required for and EA to be issued, but will be a binding condition.

The below-listed conditions are proposed for inclusion in the environmental authorisation, should the Project be authorised, based on the guidance provided in the draft National Biodiversity Offset Guideline:

- The Environmental Authorisation (EA) holder must select a biodiversity offset site(s) from an identified candidate portfolio that is sufficient to meet the targets for offset, to be confirmed based on the footprint of the final design (to be determined post EA).
- Only in situations that the proposed offset sites within the LSA are not feasible can the EA holder select a biodiversity offset site that is not identified in the Biodiversity Offset Report but still meets the requirements for a biodiversity offset under the circumstances – in this situation, the guidance of the relevant conservation planning authority, i.e. FS DESTEA , DFFE will be sought.
- A request for the declaration of the chosen biodiversity offset site as a protected area should be submitted to the Minister or an MEC. Other means of securing the biodiversity offset site (such as the registration of a conservation servitude) may be pursued if the Minister or MEC refuses to declare a protected area under the circumstances.
- A Biodiversity Offset Management Plan must be prepared for the biodiversity offset site and incorporated into the EMPr or a Biodiversity Offset Implementation Agreement.
- A Biodiversity Action Plan (BAP) should be prepared for the Project, subsequent to the finalised layout, in consultation with the relevant authorities and conservation organisations.
- A Water Use License must be obtained for road crossings in wetlands, and the need for an offset investigated as part of the Water Use License Application (WULA) process.
- The duration of the liability period for is at least 30 years or as long as the duration of the authorised activity, whichever is longer.

12 REFERENCES

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Appendix A

FLORA SPECIES OF CONCERN

Table A-1 - List of Flora Species Listed as Nationally and Provincially Threatened or Considered of Conservation Concern Recorded and Potentially Occurring in the Study Area

Family	Scientific Name	National Red List Status	Free State Conservation Status	2025 Field Record
Agapanthaceae	*Agapanthus cf. campanulatus*	Least Concern	Protected	Recorded
Amaryllidaceae	*Apodolirion buchananii*	Least Concern	Protected	
Amaryllidaceae	*Boophone disticha*	Least Concern	Protected	Recorded
Amaryllidaceae	*Brunsvigia radulosa*	Least Concern	Protected	Recorded
Amaryllidaceae	*Cyrtanthus breviflorus*	Least Concern	Protected	
Amaryllidaceae	*Crinum bulbispermum*	Least Concern	Protected	Recorded
Amaryllidaceae	*Haemanthus humilis* subsp. *hirsutus*	Least Concern	Protected	
Amaryllidaceae	*Nerine angustifolia*	Least Concern	Protected	Recorded
Apocynaceae	*Asclepias cucullata*	Least Concern	Protected	
Apocynaceae	*Asclepias macropus*	Least Concern	Protected	
Aquifoliaceae	*Ilex mitis var. mitis*	Least Concern	Protected	
Araceae	*Zantedeschia albomaculata*	Least Concern	Protected	Recorded
Araliaceae	*Cussonia paniculata*	Least Concern	Protected	Recorded
Asphodelaceae	*Kniphofia porphyrantha*	Least Concern	Protected	
Asphodelaceae	*Kniphofia cf. baurii*	Least Concern	Protected	Recorded
Asteraceae	*Helichrysum acutatum*	Least Concern	Protected	
Asteraceae	*Helichrysum adenocarpum*	Least Concern	Protected	Recorded
Asteraceae	*Helichrysum albo-brunneum*	Least Concern	Protected	
Asteraceae	*Helichrysum appendiculatum*	Least Concern	Protected	
Asteraceae	*Helichrysum aureum* var. *monocephalum*	Least Concern	Protected	
Asteraceae	*Helichrysum argentissumum*	Least Concern	Protected	Recorded
Asteraceae	*Helichrysum aureonitens*	Least Concern	Protected	Recorded
Asteraceae	*Helichrysum cephaloideum*	Least Concern	Protected	
Asteraceae	*Helichrysum callicomum*	Least Concern	Protected	Recorded
Asteraceae	*Helichrysum chionosphaerum*	Least Concern	Protected	
Asteraceae	*Helichrysum confertifolium*	Least Concern	Protected	
Asteraceae	*Helichrysum cooperi*	Least Concern	Protected	
Asteraceae	*Helichrysum hypoleucum*	Least Concern	Protected	Recorded
Asteraceae	*Helichrysum melanacme*	Least Concern	Protected	
Asteraceae	*Helichrysum miconiifolium*	Least Concern	Protected	
Asteraceae	*Helichrysum monticola*	Least Concern	Protected	
Asteraceae	*Helichrysum mundtii*	Least Concern	Protected	Recorded

Asteraceae	*Helichrysum nudifolium* var. *nudifolium*	Least Concern	Protected	Recorded
Asteraceae	*Helichrysum opacum*	Least Concern	Protected	
Asteraceae	*Helichrysum oreophilum*	Least Concern	Protected	Recorded
Asteraceae	*Helichrysum pallidum*	Least Concern	Protected	Recorded
Asteraceae	*Helichrysum psilolepis*	Least Concern	Protected	
Asteraceae	*Helichrysum rugulosum*	Least Concern	Protected	Recorded
Asteraceae	*Helichrysum spiralepis*	Least Concern	Protected	
Asteraceae	*Helichrysum splendidum*	Least Concern	Protected	
Asteraceae	*Helichrysum subglomeratum*	Least Concern	Protected	
Asteraceae	*Helichrysum sutherlandii*	Least Concern	Protected	
Ericaceae	*Erica caffrorum*	Least Concern	Protected	
Ericaceae	*Erica caffrorum* var. *caffrorum*	Least Concern	Protected	
Ericaceae	*Erica cerinthoides* var. *cerinthoides*	Least Concern	Protected	
Ericaceae	*Erica oatesii* var. *oatesii*	Least Concern	Protected	
Ericaceae	*Erica paniculata*	Least Concern	Protected	
Hyacinthaceae	*Eucomis autumnalis*	Least Concern	Protected	Recorded
Hyacinthaceae	*Eucomis humilis*	Least Concern	Protected	Recorded
Iridaceae	*Dierama pictum*	Least Concern	Protected	
Iridaceae	*Gladiolus crassifolius*	Least Concern	Protected	
Iridaceae	*Gladiolus ecklonii*	Least Concern	Protected	
Iridaceae	*Gladiolus woodii*	Least Concern	Protected	
Iridaceae	*Gladiolus* species (no flowers)	Least Concern	Protected	Recorded
Iridaceae	*Hesperantha baurii* subsp. *baurii*	Least Concern	Protected	
Iridaceae	*Hesperantha coccinea*	Least Concern	Protected	
Iridaceae	*Watsonia confusa*	Least Concern	Protected	
Iridaceae	*Watsonia* species (no flowers)	Least Concern	Protected	Recorded
Orchidaceae	*Disa baurii*	Least Concern	Protected	
Orchidaceae	*Disa brevicornis*	Least Concern	Protected	
Orchidaceae	*Disa cooperi*	Least Concern	Protected	
Orchidaceae	*Disa versicolor*	Least Concern	Protected	Recorded
Orchidaceae	*Disperis fanniniae*	Least Concern	Protected	
Orchidaceae	*Eulophia hians* var. *hians*	Least Concern	Protected	
Orchidaceae	*Eulophia ovalis* var. *ovalis*	Least Concern	Protected	
Orchidaceae	*Habenaria dives*	Least Concern	Protected	

Orchidaceae	*Habenaria epipactidea*	Least Concern	Protected	
Orchidaceae	*Habenaria laevigata*	Least Concern	Protected	
Orchidaceae	*Holothrix incurva*	Least Concern	Protected	
Orchidaceae	*Pterygodium dracomontanum*	Least Concern	Protected	
Orchidaceae	*Pterygodium nigrescens*	Least Concern	Protected	
Orchidaceae	*Satyrium cristatum* var. *longilabiatum*	Least Concern	Protected	
Orchidaceae	*Satyrium longicauda* var. *longicauda*	Least Concern	Protected	
Proteaceae	*Protea roupelliae*	Least Concern	Protected	Recorded

Appendix B

RESIDUAL IMPACTS

Table B-1 – Residual Impacts

Aspect	Impact Description	Phase	Character	Without Mitigation	With Mitigation
Terrestrial Biodiversity	Direct loss and disturbance of natural habitat	C	(-)	High	Moderate
	Fragmentation reducing natural habitat connectivity and integrity	C	(-)	High	Moderate
	Establishment and spread of alien invasive species	C/O/D	(-)	Moderate	Low
	Increased soil erosion and sedimentation	C/D	(-)	Moderate	Low
	Increase in wildfires from Project workers or faulty infrastructure	O	(-)	Moderate	Low
Aquatic Impact Assessment - Wetland impact	Wetland Loss Partial loss of wetland habitat as a consequence of the proposed infrastructure development	C	(-)	Moderate	Moderate
	Hydrology Increase in hardened surfaces	C/O	(-)	Moderate	Low
	Geomorphology Sediment transport into wetland habitat and erosion of wetland soils	C	(-)	Moderate	Low
	Water Quality Accidental point source pollution and excessive downstream sedimentation increasing turbidity of watercourses	C	(-)	Moderate	Very Low
	Vegetation Invasion of Alien Invasive Plants (AIPs)	C/O	(-)	Moderate	Very Low
Aquatic Assessment - Aquatic ecosystems impact	Water Quality Modifications due to sedimentation, run-off of construction materials (cement etc.)	C	(-)	Low	Very Low

Aspect	Impact Description	Phase	Character	Without Mitigation	With Mitigation
	Loss of Habitat Direct disruption of riparian habitat	C	(-)	Moderate	Low
	Introduction of alien species Altered ecosystem functioning due to competition with indigenous biota	C	(-)	Moderate	Low
	Water Quality Leakages (e.g. oil and gasoline) from vehicles during maintenance	O	(-)	Moderate	Very Low
	Flow Regime Increased surface flows due to impermeable surfaces	O	(-)	Low	Very Low
	Establishment of alien species Altered ecosystem functioning due to competition with indigenous biota	C	(-)	Moderate	Low
Plant Species	Direct loss and disturbance of natural habitat	C	(-)	High	Moderate
	Fragmentation reducing natural habitat connectivity and integrity	C	(-)	High	Moderate
	Loss of flora of conservation concern	C	(-)	High	Low
	Establishment and spread of alien invasive species	C/O/D	(-)	Moderate	Low
	Increased soil erosion and sedimentation	C/D	(-)	Moderate	Low
	Increase in wildfires from Project workers or faulty infrastructure	O	(-)	Moderate	Low
Animal Species	Direct loss and disturbance of natural habitat	C	(-)	High	Moderate
	Fragmentation reducing natural habitat connectivity and integrity	C	(-)	High	Moderate

Aspect	Impact Description	Phase	Character	Without Mitigation	With Mitigation
	Injury, mortality and disturbance of fauna	C	(-)	Moderate	Low
	Loss of fauna species of conservation concern	C	(-)	Moderate	Low
	Injury and mortality of fauna, including SCC	O	(-)	Moderate	Low
	Vibrations from operating wind turbines	O	(-)	Moderate	Low
	Injury and mortality of fauna, including SCC	D	(-)	Moderate	Low
Avifauna	Loss or Alteration of Habitat	C	(-)	High	High
	Roadkill and other Mortalities	C	(-)	Low	Very Low
	Sensory Disturbance	C	(-)	Low	Very Low
	Collisions with turbines	O	(-)	Very High	High
	Collisions and Electrocutions with Electrical Transmission Lines and Auxiliary Infrastructure	O	(-)	High	Moderate
	Sensory Disturbance	O	(-)	High	Moderate
	Effect on Migratory and Congregatory Species	O	(-)	High	Moderate
	Effect on Migratory and Congregatory Species	D	(-)	Low	Very Low
Bat	Disturbance of bats roosts	C	(-)	High	Low
	Terrestrial habitat loss, and possible displacement of bats	C	(-)	High	Moderate
	Bat fatalities from collision with turbines, and possible population declines	O	(-)	Very High	Moderate
	Declines in certain species populations, the ecosystem services	O	(-)	High	Moderate
	Disturbance of bat roosts	D	(-)	High	Low
	Terrestrial habitat loss, and possible displacement of bats	D	(-)	High	Low

AFFECTED TERRESTRIAL HABITATS

Table B-2 - Terrestrial Habitat

Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Private Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	3	0.794276
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Private Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA1	Groothoek WEF	1	0.000372
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Private Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	13	3.359117
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Private Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	9	0.76654
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Private Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA2	Groothoek WEF	1	0.140015
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Private Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA1	Groothoek WEF	5	0.768474
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Private Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	1	0.013986
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Private Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	18	13.6332
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Private Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA2	Groothoek WEF	4	3.332955
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Private Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Groothoek WEF	7	3.163117
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Private Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	17	5.304471
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Private Roads	Secondary Grassland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	1	0.000155
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Private Roads	Transformed	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	2	0.086046
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Private Roads	Transformed	Eastern Free State Sandy Grassland	ESA1	Groothoek WEF	1	0.000076
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Private Roads	Transformed	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	2	0.142525
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Alien Tree Stand	Eastern Free State Sandy Grassland	CBA1	Normandien WEF	2	0.098119
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Alien Tree Stand	Eastern Free State Sandy Grassland	ESA1	Kromhof WEF	1	0.001269
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Alien Tree Stand	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	1	0.005015
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	14	4.078928
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA1	Groothoek WEF	3	0.487178
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA1	Kromhof WEF	1	0.03377
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	15	5.724054
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	6	1.074126
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	1	0.020789
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	17	2.127693
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA1	Kromhof WEF	3	0.224864
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA1	Kromhof WEF	1	0.00157
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	1	0.000513
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	5	0.521121
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	3	0.068969
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	1	0.263546
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Moist Grassland	Low Escarpment Moist Grassland	CBA1	Normandien WEF	1	0.05582

Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Moist Grassland	Low Escarpment Moist Grassland	CBA2	Normandien WEF	3	0.081312
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	32	9.945009
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Kromhof WEF	7	2.109786
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Normandien WEF	4	0.505461
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA2	Normandien WEF	3	1.131846
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Groothoek WEF	5	0.569614
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Kromhof WEF	2	0.47682
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	10	3.807599
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	17	4.195466
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	3	0.511166
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	3	0.976548
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Low Escarpment Moist Grassland	CBA1	Normandien WEF	2	0.168747
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Low Escarpment Moist Grassland	CBA2	Normandien WEF	2	0.67953
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Rocky Shrubland	Eastern Free State Sandy Grassland	CBA1	Normandien WEF	1	0.004216
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Transformed	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	3	0.439521
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Transformed	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	1	0.073138
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	2	0.018627
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	1	0.006976
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	3	0.031699
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	2	0.012543
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Transformed	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	2	0.020493
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	4	0.043882
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA1	Groothoek WEF	2	0.009867
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	7	0.101477
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	5	0.054615
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Groothoek WEF	1	0.014269
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	4	0.036599
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA2	Normandien WEF	1	0.011187
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	2	0.018616
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	1	0.010394
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Low Escarpment Moist Grassland	CBA2	Normandien WEF	1	0.010061
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Normandien WEF	1	0.013162
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA2	Normandien WEF	1	0.013709

Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	1	0.019446
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	1	0.041118
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	5	0.129758
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA2	Groothoek WEF	1	0.025111
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	3	0.061086
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	9	0.948457
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA1	Groothoek WEF	1	0.004341
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	41	9.780537
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	5	1.350775
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA1	Groothoek WEF	1	0.050913
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	2	0.076988
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	41	10.1294
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA2	Groothoek WEF	3	0.403159
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Groothoek WEF	6	1.082845
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	24	3.255378
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Rocky Shrubland	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	1	0.224548
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Rocky Shrubland	Eastern Free State Sandy Grassland	ESA1	Groothoek WEF	1	0.3366
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Rocky Shrubland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	2	0.044251
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Secondary Grassland	Eastern Free State Sandy Grassland	ESA1	Groothoek WEF	4	0.438423
Groothoek Layout 22-05-2022.kmz/Groothoek Layout 22-05-2022/Roads/New Internal Roads	Secondary Grassland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	4	0.569847
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Alien Tree Stand	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	1	0.069326
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA1	Kromhof WEF	2	0.146473
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	13	2.306381
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	1	0.197027
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA1	Kromhof WEF	19	3.624538
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA1	Normandien WEF	2	0.106767
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA2	Kromhof WEF	3	0.421274
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA1	Kromhof WEF	2	0.717226
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	1	0.036314
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	1	0.36667
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	6	0.219251
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	3	0.017025
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Kromhof WEF	21	10.05226

Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA2	Kromhof WEF	4	1.854494
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Kromhof WEF	5	0.474878
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	2	0.352783
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	11	1.265081
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Secondary Grassland	Eastern Free State Sandy Grassland	CBA1	Kromhof WEF	1	0.362564
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Secondary Grassland	Eastern Free State Sandy Grassland	ESA1	Kromhof WEF	2	0.508379
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Secondary Grassland	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	6	0.931417
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Transformed	Eastern Free State Sandy Grassland	CBA1	Kromhof WEF	1	0.008433
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	2	0.475208
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	1	0.012148
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA1	Kromhof WEF	1	0.006398
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA2	Kromhof WEF	1	0.02945
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Kromhof WEF	3	0.057099
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA2	Kromhof WEF	2	0.019704
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/Existing Public Roads	Secondary Grassland	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	2	0.036343
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/New Internal Roads	Alien Tree Stand	Eastern Free State Sandy Grassland	ESA1	Kromhof WEF	1	0.001532
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/New Internal Roads	Alien Tree Stand	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	1	0.419037
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/New Internal Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	4	0.709802
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/New Internal Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA1	Kromhof WEF	19	1.404793
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/New Internal Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA2	Kromhof WEF	5	0.223226
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/New Internal Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA1	Kromhof WEF	2	0.132762
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/New Internal Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	1	0.000742
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Kromhof WEF	43	18.43263
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA2	Kromhof WEF	13	5.43235
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Kromhof WEF	9	5.845136
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	6	0.274085
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/New Internal Roads	Rocky Shrubland	Eastern Free State Sandy Grassland	CBA1	Kromhof WEF	1	0.035551
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/New Internal Roads	Rocky Shrubland	Eastern Free State Sandy Grassland	ESA1	Kromhof WEF	1	0.127673
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/New Internal Roads	Secondary Grassland	Eastern Free State Sandy Grassland	CBA1	Kromhof WEF	3	0.35839
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/New Internal Roads	Secondary Grassland	Eastern Free State Sandy Grassland	ESA1	Kromhof WEF	1	0.123491
Kromhof Layout 22-05-2025.kmz/Kromhof Layout 22-05-2025/Roads/New Internal Roads	Secondary Grassland	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	7	1.981884
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Private Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	5	0.653381
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Private Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	2	0.476358

Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Private Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA2	Normandien WEF	2	1.034115
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Private Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	4	0.749661
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Private Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	1	0.185584
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Private Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Normandien WEF	1	0.453374
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Private Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA2	Normandien WEF	3	1.666423
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Private Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	9	3.425033
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Private Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	2	0.374233
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Private Roads	Natural Dry Grassland	Low Escarpment Moist Grassland	CBA2	Normandien WEF	1	1.241198
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Private Roads	Rocky Shrubland	Eastern Free State Sandy Grassland	CBA1	Normandien WEF	1	0.254178
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Private Roads	Rocky Shrubland	Low Escarpment Moist Grassland	CBA2	Normandien WEF	1	0.00034
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Private Roads	Secondary Grassland	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	1	0.074
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Private Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA2	Normandien WEF	1	0.01074
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Private Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	2	0.062844
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Public Roads	Alien Tree Stand	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	1	0.000235
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Public Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	1	0.000515
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Public Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	1	0.052507
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Normandien WEF	2	0.624664
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA2	Normandien WEF	2	0.879977
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	9	2.045473
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	4	0.497963
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Public Roads	Transformed	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	2	0.255332
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Public Roads	Transformed	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	1	0.002892
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	1	0.010079
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Normandien WEF	1	0.012594
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/Existing Public Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	1	0.023556
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	1	0.010209
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	1	0.031432
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Normandien WEF	1	0.01716
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA2	Normandien WEF	1	0.021719
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	4	0.118403
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	1	0.004621
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Natural Dry Grassland	Low Escarpment Moist Grassland	CBA2	Normandien WEF	1	0.022269
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	CBA1	Normandien WEF	1	0.061431

Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	5	0.438029
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	7	0.622393
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA1	Normandien WEF	3	0.021947
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Moist Grassland	Eastern Free State Sandy Grassland	CBA2	Normandien WEF	4	0.300783
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	10	0.890362
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Moist Grassland	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	3	0.348654
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Moist Grassland	Low Escarpment Moist Grassland	CBA1	Normandien WEF	1	0.012092
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Normandien WEF	19	6.170026
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA2	Normandien WEF	9	1.495045
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	43	12.18751
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	5	1.295428
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Natural Dry Grassland	Low Escarpment Moist Grassland	CBA1	Normandien WEF	8	2.223428
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Natural Dry Grassland	Low Escarpment Moist Grassland	CBA2	Normandien WEF	3	0.375353
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Rocky Shrubland	Eastern Free State Sandy Grassland	CBA1	Normandien WEF	3	0.382678
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Rocky Shrubland	Eastern Free State Sandy Grassland	CBA2	Normandien WEF	3	0.559973
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Rocky Shrubland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	1	0.025057
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Secondary Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	9	2.020217
Normandien Layout 22-05-2025.kmz/Normandien Layout 22-05-2025/Roads/New Internal Roads	Secondary Grassland	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	5	0.269513
Turbine	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	5	1.739966
Turbine	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	CBA2	Normandien WEF	1	0.006747
Turbine	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	3	1.087831
Turbine	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	20	9.496009
Turbine	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	1	0.231728
Turbine	Cultivated Fields and Grass Pastures	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	4	1.486039
Turbine	Moist Grassland	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	5	0.663433
Turbine	Moist Grassland	Eastern Free State Sandy Grassland	CBA1	Kromhof WEF	11	1.918817
Turbine	Moist Grassland	Eastern Free State Sandy Grassland	CBA1	Normandien WEF	2	0.407799
Turbine	Moist Grassland	Eastern Free State Sandy Grassland	CBA2	Kromhof WEF	2	0.058551
Turbine	Moist Grassland	Eastern Free State Sandy Grassland	CBA2	Normandien WEF	1	0.263615
Turbine	Moist Grassland	Eastern Free State Sandy Grassland	ESA1	Groothoek WEF	1	0.005979
Turbine	Moist Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	5	0.777565
Turbine	Moist Grassland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	2	0.303346
Turbine	Moist Grassland	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	3	0.199413

Turbine	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Groothoek WEF	19	10.40109
Turbine	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Kromhof WEF	26	12.62229
Turbine	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA1	Normandien WEF	8	4.218604
Turbine	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA2	Groothoek WEF	1	0.750247
Turbine	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA2	Kromhof WEF	9	4.697203
Turbine	Natural Dry Grassland	Eastern Free State Sandy Grassland	CBA2	Normandien WEF	2	0.178317
Turbine	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Groothoek WEF	4	1.658335
Turbine	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Kromhof WEF	5	2.791158
Turbine	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	20	10.72307
Turbine	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	11	2.343331
Turbine	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	1	0.128921
Turbine	Natural Dry Grassland	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	2	0.376617
Turbine	Natural Dry Grassland	Low Escarpment Moist Grassland	CBA1	Normandien WEF	3	2.096749
Turbine	Natural Dry Grassland	Low Escarpment Moist Grassland	CBA2	Normandien WEF	1	0.703795
Turbine	Secondary Grassland	Eastern Free State Sandy Grassland	CBA1	Kromhof WEF	1	0.529325
Turbine	Secondary Grassland	Eastern Free State Sandy Grassland	ESA1	Groothoek WEF	3	0.922937
Turbine	Secondary Grassland	Eastern Free State Sandy Grassland	ESA1	Normandien WEF	4	1.317229
Turbine	Secondary Grassland	Eastern Free State Sandy Grassland	ESA2	Groothoek WEF	4	0.650505
Turbine	Secondary Grassland	Eastern Free State Sandy Grassland	ESA2	Kromhof WEF	4	1.367459
Turbine	Secondary Grassland	Eastern Free State Sandy Grassland	ESA2	Normandien WEF	3	0.62147

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