Appendix H.16

TERRESTRIAL BIODIVERSITY

Dalmanutha Wind (Pty) Ltd

DALMANUTHA WIND ENERGY FACILITY EIA

Terrestrial Biodiversity Specialist Assessment

41105385
APRIL 2023

PUBLIC

Dalmanutha Wind (Pty) Ltd

DALMANUTHA WIND ENERGY FACILITY EIA

Terrestrial Biodiversity Specialist Assessment

TYPE OF DOCUMENT (VERSION) PUBLIC

PROJECT NO. 41105385

OUR REF. NO. 41105385

DATE: APRIL 2023

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Final			
Date	May 2023			
Prepared by	Aisling Dower			
Signature				
Checked by				
Signature				
Authorised by				
Signature				
Project number	41105385			
Report number	01			
File reference	\\corp.pbwan.net\za\Central_Data\Projects\41100xxx\41103722 - Dalmanutha WEF\41 ES\01-Reports\04-Specialists\Biodiversity\Terrestrial bio (WEF EIA)\Dalmanutha WEF TBSA			

CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

Enertrag South Africa (Enertrag SA) is proposing the establishment of a wind energy facility (WEF) and associated infrastructure at Dalmanutha, Mpumalanga (Figure 1-1).

WSP was appointed to undertake the necessary terrestrial ecological baseline surveys (vegetation and flora, fauna) and impact assessment reports, in support of the environmental regulatory process required to authorise development related activities. In addition, WildSkies Consulting and Volant Environmental were appointed directy by Enertrag SA to conduct 24 months of preconstruction bird monitoring, and 12 months of preconstruction bat monitoring – the results of these studies are also factored into this overall Terrestrial Biodiversity Specialist Assessment (TBSA) report.

1.1 PURPOSE OF THE REPORT

This report summarises the baseline terrestrial biodiversity and ecosystems of areas that will be impacted by the two proposed WEF infrastructure alternatives at Dalmanutha, and documents the assessment of the potential impacts of the proposed Project on terrestrial ecosystems and biodiversity, i.e. vegetation communities, flora species, bats and birds, and other fauna species of concern - as described in the Terrestrial Plant Species Specialist Assessment (2023a), the Avifauna Specialist Assessment (WildSkies, 2023), the Bat Impact Assessment (Volant Environmental, 2023)) the Terrestrial Fauna Species Specialist Assessment (Hawkhead, 2023b).

The report also summarises the recommended recommended measures for the mitigation of any negative impacts for inclusion in the updated EMPr for the Project, to ensure that the relevant South African biodiversity legislative and policy requirements are satisfactorily met; and proposes additional measures as required.

1.2 PROJECT LOCATION AND EXTENT

The Project is composed of the Dalmanutha Wind Energy Facility (WEF), situated near Belfast, within the Emakhazeni Local Municipality, in the Mpumalanga Province (Figure 1-1). Two alternative options have been proposed for the Dalmanutha WEF;

- Alternative 1 consists of up to 70 turbines and associated infrastructure (Battery Energy Storage System (BESS), access roads etc).
- Alternative 2 consists of a combination of up to 44 turbines and solar PV, plus associated infrastructure (BESS, access roads etc) in a ~160 ha footprint.

These are described in full in the ESIA, and are shown on Figure 1-2 and Figure 1-3.

1.3 STUDY AREA

The study area for the Project (Figure 1-4.) was defined as follows:

- Local Study Area (LSA): The proposed development footprint 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.

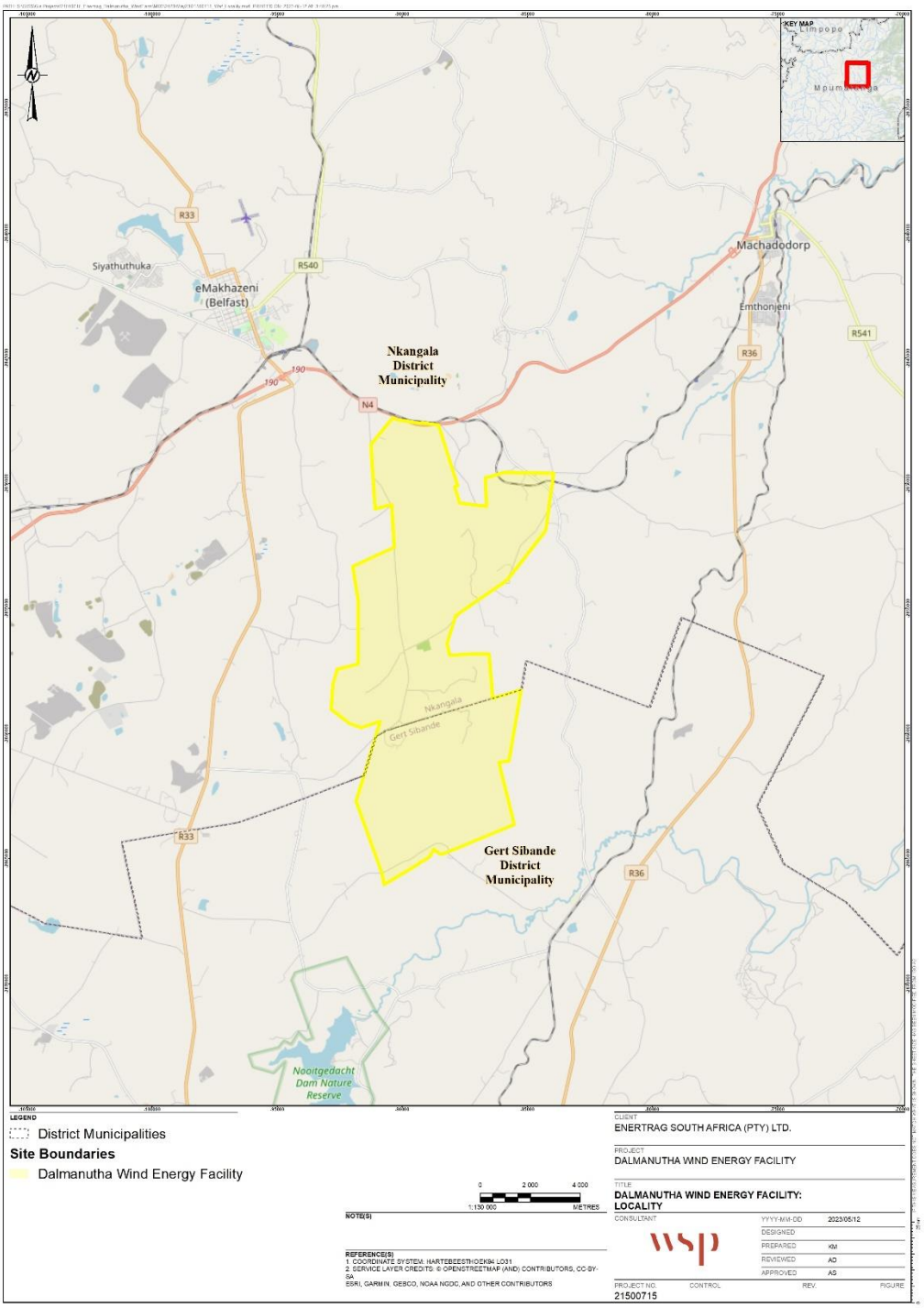

Figure 1-1 - Dalmanutha WEF

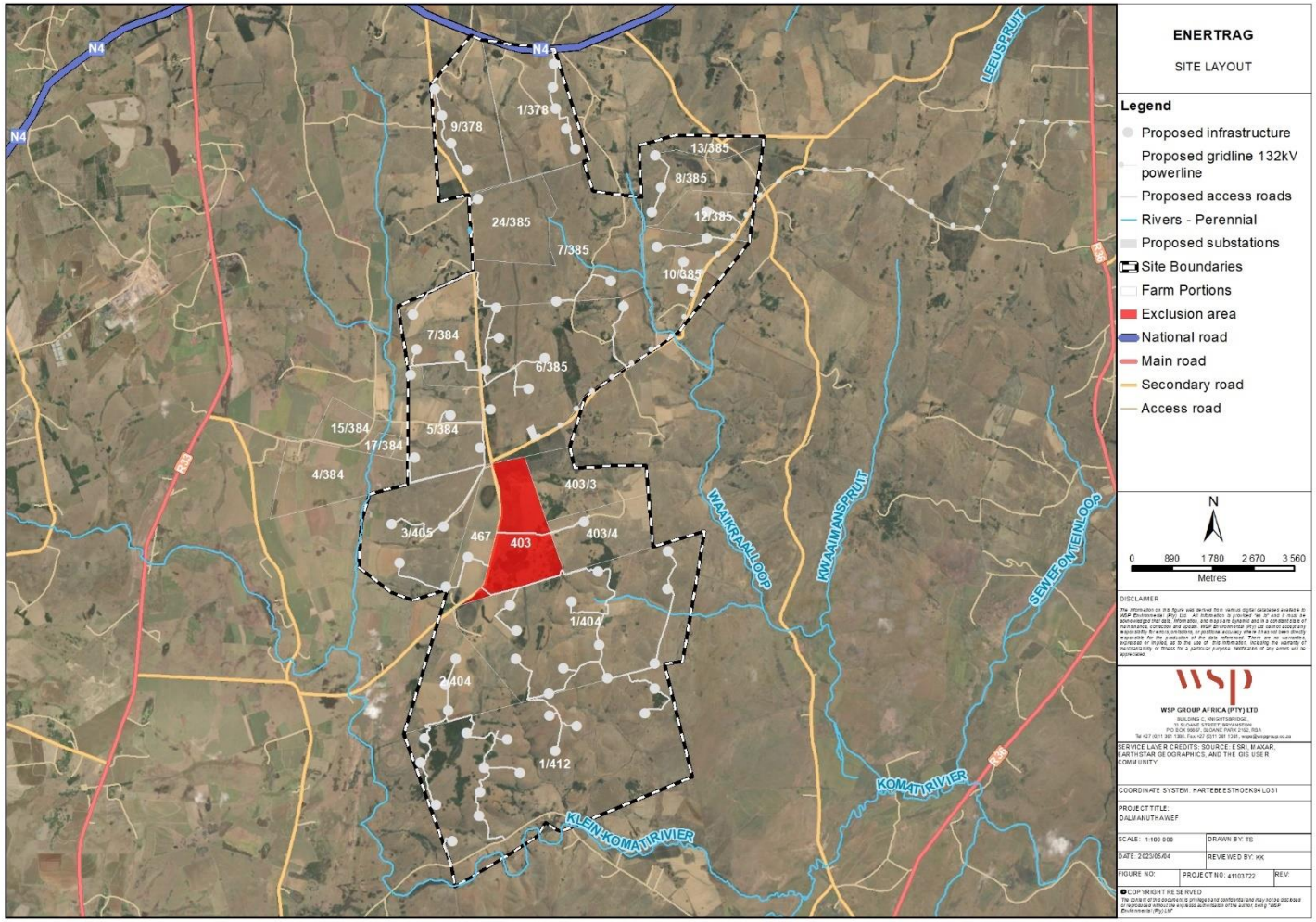

Figure 1-2 - Alternative 1

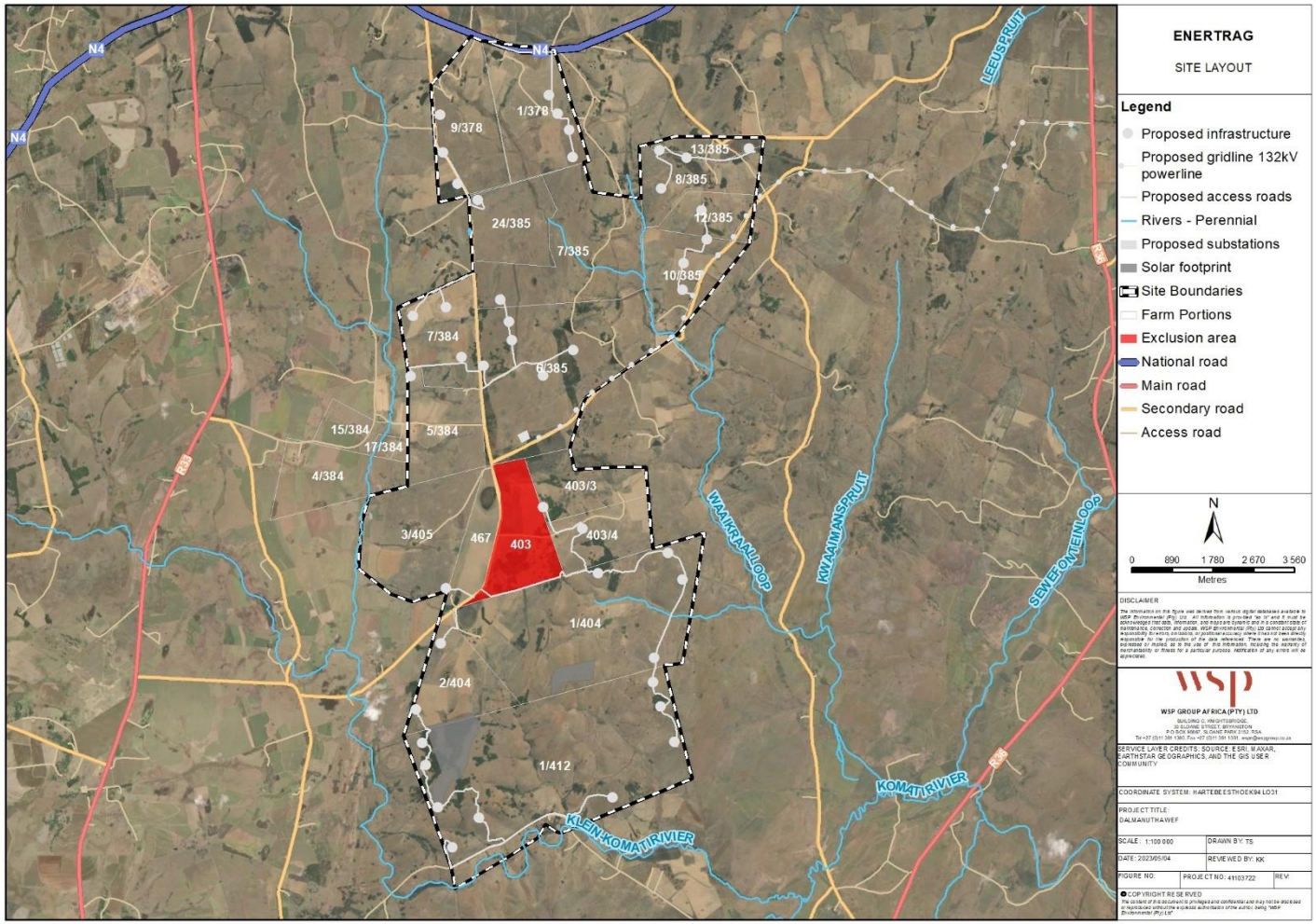

Figure 1-3 - Alternative 2

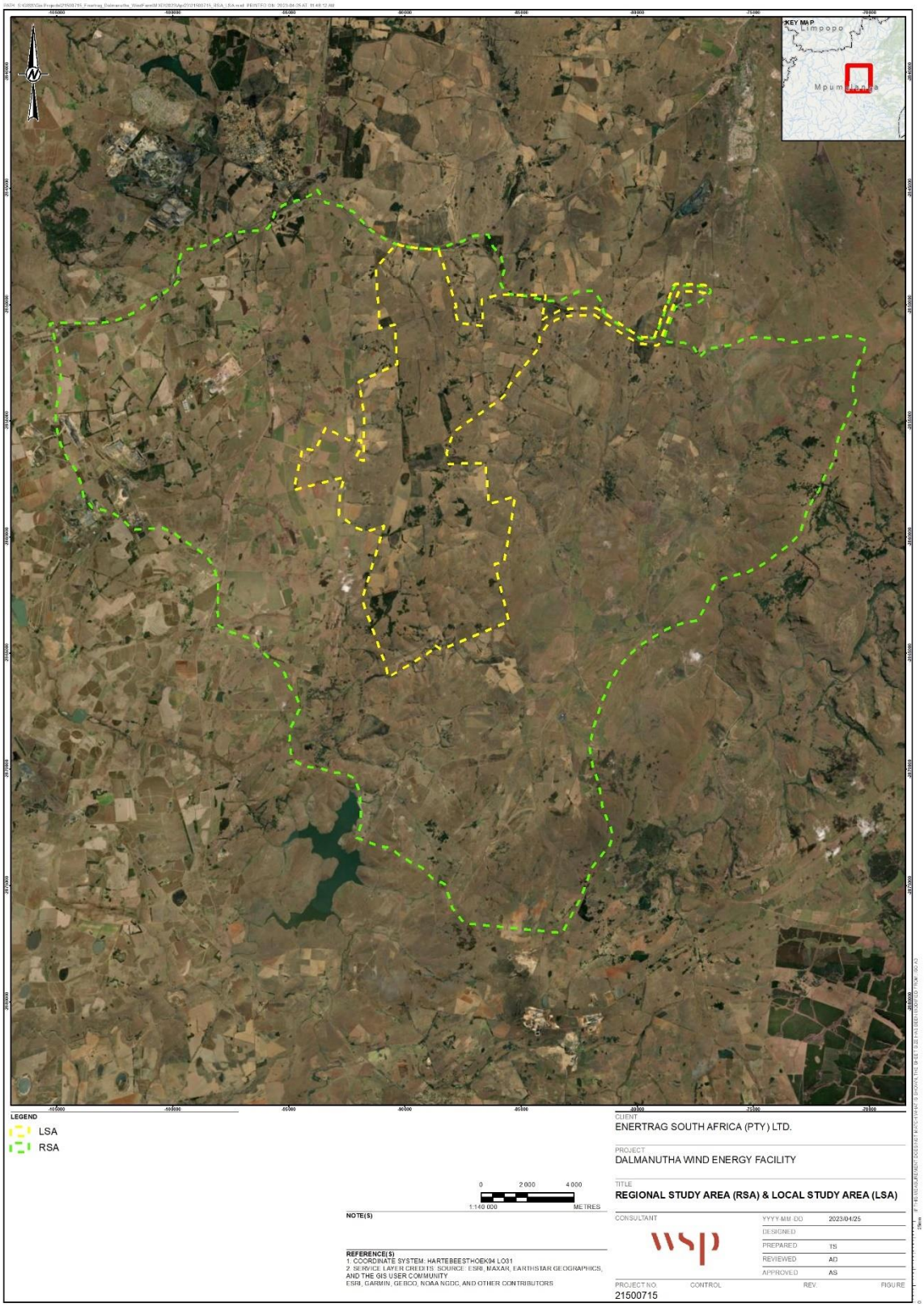

Figure 1-4 - Regional and local study areas

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:
  - 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);
- Mpumalanga Nature Conservation Act (Act No. 10 of 1998);
- Mpumalanga Biodiversity Sector Plan (Lötter, 2015).
- 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);
- Draft National Biodiversity Offset Guideline (2022); and
- Species Environmental Assessment Guideline (SANBI, 2020).

3 METHODOLOGY

The terrestrial biodiversity baseline description and impact assessment took cognisance of Government Notice No. 320, published in 2020 under the National Environmental Management Act (1998) concerning 'Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Theme in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (1998), when applying for Environmental Authorisation'.

In line with the assessment and reporting requirements set out in the protocol, this assessment included two main study components; a desktop literature review, which was then supplemented by information gathered during terrestrial vegetation, bats, birds and fauna surveys conducted in 2022-2023.

3.1 LITERATURE REVIEW

The aim of the desktop literature review component was to collate and review available ecological information related to important biodiversity and ecosystem features in the Dalmanutha WEF area of influence, including presence of protected areas or important conservation areas, key ecological processes and functions, and the likely composition and structure of local flora and fauna communities.

The existing available datasets that were reviewed and consolidated to assess terrestrial ecosystems and associated fauna, flora and vegetation include:

1) A general vegetation type description relevant to the broader study area was obtained from Mucina and Rutherford (2011);

2) The formal conservation context of the region at a provincial and national level was established based on the Mpumalanga Biodiversity Sector Plan (2019), the National List of Threatened Ecosystems (NEMBA Threatened Ecosystems, 2011), the South African Protected Areas Database (SAPAD), the South African Conservation Areas Database (SACAD) and the national protected area expansion strategy;

3) A preliminary review of land cover and habitat types was undertaken at a desktop level using available satellite imagery and GeoTerraImage national land cover classifications (2020);

4) For bats, a desktop study was undertaken to estimate the likelihood of specific species of bats being present at the proposed WEF. In addition, a search was conducted to determine if any caves or mine shafts are located close to the LSA as these are often used by bats as roosts; and

5) For birds, Southern African Bird Atlas Project data (SABAP1 - Harrison et al, 1997) for the relevant quarter degree squares covering the LSA, and the Southern African Bird Atlas Project 2 data, available at the pentad level (http://sabap2.adu.org.za/v1/index.php)(accessed at www.mybirdpatch.adu.org.za) was consulted.

3.2 SITE SENSITIVITY VERIFICATION

A desktop analysis of available satellite imagery, biodiversity datasets and published literature was conducted to confirm the indicated sensitivity of the site under consideration (i.e. the proposed development footprint), to determine the need for full Terrestrial and/or Aquatic Biodiversity Specialist Assessments, accompanying Terrestrial Plant or Animal Species specialist assessments, or Compliance Statements.

The desktop assessment of site sensitivity was supplemented by preliminary data gathered during the scoping phase bird survey (WildSkies, 2023), during fauna field surveys that were conducted in May 2022, and during meetings held with landowners with knowledge of locations of important areas of flora diversity, held during April 2022. The objectives of the scoping and site sensitivity verification site visits/meetings were to:

- Assess the suitability of the study area for the support of bird, bat and other fauna species of conservation concern with potential to occur within the proposed infrastructure footprint and surrounds, to scope the appropriate level of effort for the avifauna, bat and other fauna baseline assessments;
- Identify priority areas for botanical survey during flowering season;
- Confirm the various levels of sensitivity ascribed for the LSA by the DFFE National Screening Tool report.

3.3 TERRESTRIAL BIODIVERSITY SPECIALIST ASSESSMENT

The terrestrial biodiversity specialist assessment draws upon available data, published information, local knowledge and synthesises the findings of the comprehensive terrestrial vegetation and fauna specialist surveys conducted during 2022, and subsequent impact assessments, which are described in detail in the Terrestrial Plant Species Specialist Assessment (Hawkhead, 2023a) and Terrestrial Animal Species Specialist Assessment (Hawkhead, 2023b) that accompany this application; and the bird and bat preconstruction monitoring studies (WildSkies, 2023; and Volant Environmental, 2023).

3.4 STUDY ASSUMPTIONS AND LIMITATIONS

Data used for specialist assessment

The baseline description is based on available national datasets and published literature for the Dalmanutha/Dullstroom Plateau region, supplemented by field surveys conducted as follows:

- Mammal surveys conducted from 21 -24 June 2022 (dry season), and 24 – 28 October 2022 (wet season);
- Herpetofauna surveys conducted from 24 – 28 October 2022;
- Invertebrate surveys conducted from 21 -24 June 2022, and 24 – 28 October;
- Vegetation and flora surveys done during October 2022 in the rainy season.
- 24 months of preconstruction avifauna monitoring surveys, spanning all seasons
- 12 months of preconstruction bat monitoring, spanning all seasons.

It is therefore considered that there are no sampling or information limitations pertaining to the baseline description of terrestrial ecosystems, assessment of impacts, or the recommendations contained in this report.

Assumptions, uncertainties, or gaps in knowledge

The following assumptions, uncertainties or gaps in knowledge were highlighted:

- Vegetation and flora: Little summer rain had fallen prior to the field visit. Moreover, portions of the study area had also been recently burnt prior to the field survey and displayed little new season regrowth. It is thus possible that certain flora taxa, including inter alia short-lived annuals, geophytes, cryptic species or dormant deciduous species, that are most readily visible or distinguishable when in leaf or flower later in the wet/growing season following sufficient rain, may have been overlooked during field visit.

- Vegetation and flora: large tracts of grassland in the north of the study area had recently been converted to cultivated fields at the time of field survey; some of these changes may not be reflected in the vegetation mapping.
- Fauna: fieldwork was conducted over four days in June and five days in October; considering the size of the LSA it is possible that rare, cryptic or transient fauna species were overlooked – as such, baseline descriptions were qualitative, and consideration was given to species that were considered likely to be present, though not confirmed during surveys;
- Birds: Various biases and challenges inherent in the methods that were employed to collect data are set out in the avifauna assessment report. Some of the key points include the potential effect of the presence of observers on site on bird behaviour, bias towards detection of larger birds, difficulties with walked transects, and the absence of established thresholds for fatality rates for priority bird species in South Africa.
- Bats: detectors did not record between 12 and 15 July and 10 and 22 May 2022 due to battery failure. In addition, SD cards were stolen from DAL 1, DAL 2 and DAL 3 and no data was captured between 1 October and 26 November 2021. Nevertheless, minimum requirements for survey duration were still met.

4 TERRESTRIAL BIODIVERSITY BASELINE

The LSA is situated in a landscape that is characterised by rolling 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.

The regional study area coincides with the Steenkampsberg Important Bird Area (IBA) and Dullstroom Plateau Grasslands, which are considered to be of exceptional biodiversity value due to their support of bird species including Blue Crane, Wattle Crane, Grey Crowned Crane, Blue Korhaan, Southern Bald Ibis, Whitewinged Flufftail, Yellowbreasted Pipit and Rudd's Lark, mammals including Robust Golden Mole, Roughhaired Golden Mole, Cape Molerat, Oribi and Welwitch's Hairy Bat; one amphibian, *Bufo gariepensis nubicolus*; twenty plant species including *Eucomis vandermerwei, Gladiolus cataractarum Gladiolus malvinus, Nerine gracilis, Streptocarpus denticulatus* and *Watsonia occulta*; and two vegetation types including the Steenkampsberg Montane Grassland and Dry Afromontane Forest (MPTA, 2013). The RSA forms part of the Lydenburg Centre of Plant Endemism and also includes important sub-catchments; provides an escarpment corridor; contains important caves, pans and wetlands; and is considered important for grassland and forest processes (MPTA, 2013).

4.1 SITE SENSITIVITY VERIFICATION

The proposed infrastructure footprint was assessed at desktop level using the National Web-based Environmental Screening Tool.

According to the Tool, the Terrestrial Biodiversity Theme for the LSA is rated as 'Very High Sensitivity', due to its overlap with land mapped as:

- 'Critical Biodiversity Area' (CBA) 1, CBA2;
- Ecological Support Area: Landscape Corridor and Local Corridors (MBSP, 2019);
- Freshwater Ecosystem Priority Area (FEPA) sub-catchments;
- Endangered (Eastern Highveld Grassland, KaNgwane Montane Grassland) ecosystems;
- Protected Areas Expansion Strategy.

The National Web Based Screening Tool also indicated that the majority of the LSA is considered to be of 'Medium sensitivity' in terms of the Plant Species Theme on account of the potential presence of at least 19 flora species of conservation concern (e.g. *Khadia carolinensis, Asclepias dissona, Miraglossum davyi*).

The LSA is considered to be of 'Medium' – 'High' sensitivity in terms of the Animal Species Theme, due to the potential presence of the range-restricted Badplaas Black Millipede (*Doratogonus furculifer*) which is listed as Endangered on the IUCN Red List (Rudolf et al., 2021), and the mammals Robust

Golden Mole (*Amblysomus robustus* – VU[1] (Rampartab & Bronner, 2016)), Rough-haired Golden Mole (*Chrysospalax villosus* - VU), Maquassie Musk Shrew (*Crocidura maquassiensis* – VU), Spotted-necked Otter (*Hydrictis maculicollis* – VU), and Oribi (*Ourebia ourebi ourebi* - EN).

The relative avian sensitivity in the screening tool report for the LSA is mapped as Low – the opposite has been found to be case over the course of the scoping site visits, and 24 months of pre-construction bird monitoring surveys that have been done in support of the baseline phase.

The LSA is considered to be of High sensitivity for bats, due to the presence of wetland and riparian habitat which bats utilise for foraging, and to a lesser degree (Medium sensitivity) due to the presence of croplands – also a foraging environment for bats.

4.2 MAIN VEGETATION TYPES

Three major vegetation types occur across the LSA; these include Eastern Highveld Grassland, KaNgwane Montane Grassland, and Steenkampsberg Montane Grassland (FIGURE X), the former two of which are considered Endangered in terms of ecosystem threat status at a national level.

Mapped vegetation communities within the LSA, including locally important habitat types (e.g. forest gorge habitat) and their functional integrity and ecological importance, are summarised in Table 4-1.

Table 4-1 – Ecological importance of mapped vegetation communities in the LSA

Vegetation Community	Analysis
Cultivated Fields	A modified vegetation community, that has been heavily impacted by anthropogenic activity. Typically characterised by high-levels of ongoing disturbance and either denuded of vegetation (recently ploughed) and/or dominated by non-indigenous flora species. The ecological importance of this vegetation community is rated **Very Low**.
Alien Tree Plantations	A modified vegetation community, that is characterised by an almost complete dominance of alien invasive tree species. Little indigenous flora is present. It is noted that plantations do provide refuge habitat for sensitive fauna species. Notwithstanding this functional attribute, the ecological importance of the Alien Tree Plantations vegetation community is rated **Very Low**.
Dry Mixed Grassland	This is a large and variable vegetation community, that ranges from undisturbed to localised sites of disturbance and alien wattle colonisation. Dry mixed grassland constitutes important natural habitat for a variety of flora and fauna species, including many SCC. This community also play an important role in maintaining landscape connectivity, and in buffering rocky grassland and moist grassland/wetland habitats. The conservation importance and functional integrity of this vegetation community are both rated high, resulting in a high biodiversity importance

[1] Conservation status are at the national level, unless specified otherwise (i.e. IUCN or regional red lists)

	score. Receptor resilience is rated high-medium, resulting in an ecological importance rating of **Medium**.
Disturbed Grassland	Disturbed grassland is a subclimax vegetation community that has regenerated following past disturbance. Habitat is stable and essentially retains the functional attributes of undisturbed grassland habitat. This community is rated as having a medium functional integrity, but low conservation importance. The biodiversity importance of disturbed grassland community is thus low. Receptor resilience is rated high, resulting in an ecological importance rating of **Low**.
Rocky Grassland	Rocky grassland is a natural vegetation community, that is confined to ridge areas and localised sites embedded within the broader study area habitat matrix. The prominence of large rock outcrops and the presence of indigenous woody flora species, increases local-scale habitat heterogeneity and flora and fauna diversity. Several flora and fauna SCC have been recorded in this community, or have a high probability of occurrence. The functional integrity and conservation importance of the Rocky grassland are both rated high, resulting in a high biodiversity importance score. Receptor resilience is rated medium, and accordingly ecological importance is rated **High**.
Moist Grassland and Wetland	The Moist grassland and wetland community maintains several important ecological functions / traits, including its role in local hydrological patterns, providing linear and largely intact movement and dispersal corridors for fauna and flora, and promoting local-scale habitat heterogeneity. Moreover, several flora and fauna SCC have been recorded in this community, or have a high probability of occurrence. The functional integrity and conservation importance of the Moist grassland and wetland are both rated high, resulting in a high biodiversity importance score. Receptor resilience is rated medium, and accordingly ecological importance is rated **High**.
Forested Gorge Habitat	In the context of the study area, this is a small, but unique community, that is characterised by well-developed indigenous forest, flanked by tall vegetated rocky cliffs. The complex topographical template supports numerous microhabitats, which significantly contribute to local-scale habitat heterogeneity and the flora and fauna diversity of the study area. Several flora SCC have a high probability of occurrence in this community. The functional integrity and conservation importance of this community are rated high. The biodiversity importance of disturbed grassland community is thus high. Receptor resilience is rated low, and accordingly ecological importance is rated **Very High** (due to the very small extent of this community in the study area, it is not reflected on vegetation maps).

The interaction between mapped vegetation communities and areas mapped as CBA and ESA in the MBSP is summarised in Table A-1 in Appendix A. Some areas of cultivated fields and AIS stands coincide with areas mapped as CBA1, CBA2, and ESAs – these areas are thus not expected to contribute to provincial conservation targets in their current state – although an opportunity for changed management/rehabilitation may exist.

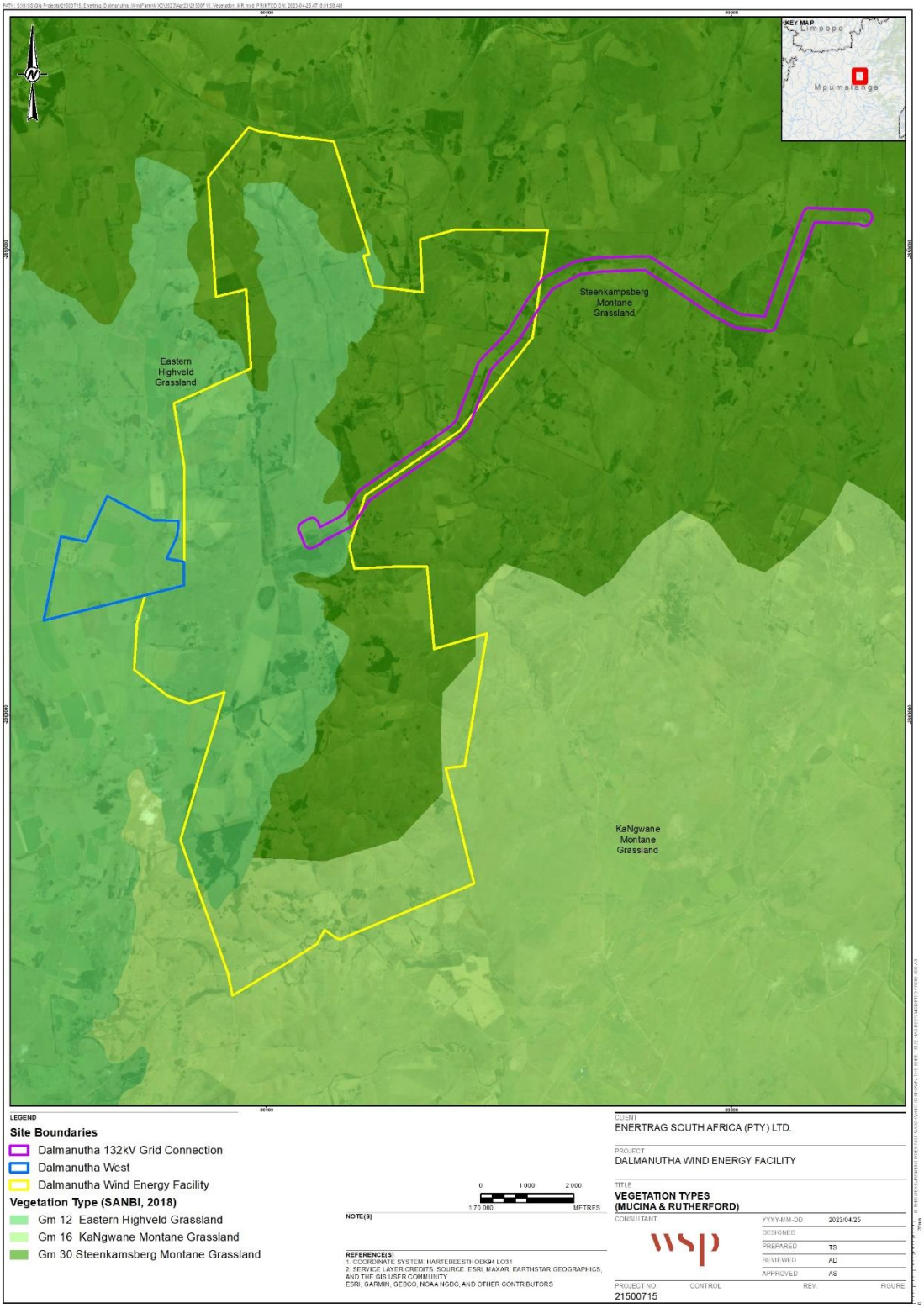

Figure 4-1 - Vegetation types (SANBI 2018, after Mucina and Rutherford, 2011)

4.3 THREATENED ECOSYSTEMS

Eastern Highveld Grassland and KaNgwane Montane Grassland are the dominant ecosystems in the LSA (Figure 4-1), and both are considered Endangered in terms of ecosystem threat status at a national level.

Only a very small fraction of Eastern Highveld Grassland is conserved in statutory reserves (Nooitgedacht Dam and Jericho Dam Nature Reserves) and approximately 44% has been transformed, primarily by cultivation, forestry, mines, urbanisation and the building of dams. Similarly, Mucina and Rutherford (2011) indicate that only 0.4% of KaNgwane Montane Grassland is formally conserved, with forestry and cultivation the main threats to this vegetation type.

It is noted that small portions of the north of the study area also form part of the Dullstroom Plateau Grassland (MP4) ecosystem, which is listed as an Endangered ecosystem under the NEMBA (2011). This ecosystem comprises both the grassland and forest biomes and extends from Die Berg in the north to the town of Belfast in the south. It is delineated based on the presence of breeding and feeding habitat for cranes and Rudd's Lark. Thirty-three threatened and endemic flora and fauna species are known from the ecosystem. Other important attributes of this ecosystems include escarpment corridors, and the presence of pans and wetlands, having overall importance for grassland and forest processes.

4.4 ECOLOGICAL DRIVERS

The key drivers of change that are present in the landscape and their possible influence on the character of terrestrial vegetation and habitats in the study area include fire, agricultural practises, and the proliferation of alien and invasive species (AIS).

WILDFIRE – GRASSLAND BURNING

Fire is considered a natural, albeit often human initiated disturbance agent in grassland ecosystems. Both Mesic Highveld Grassland and High-altitude Grassland, which characterise Mpumalanga's grassland ecosystems, are considered fire-prone and fire-dependent landscapes, and fire is essential in the maintenance of their biodiversity patterns and ecological processes (SANBI, 2013). Key ecological benefits of fire, with respect to flora communities, include:

- Removal of moribund vegetation, which enhances plant primary productivity, and stimulates germination / flowering of fire-adapted species (e.g., certain orchid species);
- Controls the encroachment of some alien and indigenous woody plant species and weeds – however it can also promote the spread of some species such as wattle (*Acacia* sp.); and
- Increased overall habitat heterogeneity by creating a structural mosaic of tall- and short grassland.

Large portions of the study area were burnt prior to the wet-season field visit; fire is therefore considered an important ecological process and driver of change in the study area.

HERBIVORY - GRAZING BY LIVESTOCK

Livestock rearing is a common faming activity in the LSA, with cattle and sheep farming observed during the field survey. High levels of grazing (overgrazing) by domestic livestock is a common cause of dryland degradation (Scholes, 2009). Overgrazing occurs when herbivores (both wildlife and domestic) are kept at excessive stocking rates and/or are able to concentrate their grazing to a limited foraging area, without suitable rest periods. A common degradation syndrome that can be linked to

overgrazing, at least in part, is a change in plant species composition. In grassland habitats, this typically manifests as a reduction in palatable grasses and grass productivity (Scholes, 2009). In severe cases, overgrazing coupled with trampling, can result in decreases in vegetation cover, increased incidences of erosion, and a reduction in botanical diversity.

Livestock grazing, particularly by cattle, which unlike sheep farming, occurs throughout the study area, is considered an important ecosystem driver in the study area. However, at its current levels it is considered unlikely to impact botanical diversity and flora SCC.

The development of the Project itself is unlikely to affect this driver of change within the LSA. However, an opportunity for improved grassland management exists through the implementation of restoration activities that are likely to be required as part of any necessary offset plan for the Project.

ALIEN INVASIVE SPECIES COLONISATION

Significant portions of the study area are dominated by stands of alien invasive woody species. The two wattle species (*Acacia dealbata and Acacia mearnsii*) are particularly aggressive invaders and have formed dense infestations throughout the study area. If not actively controlled, wattle trees will continue to spread into adjacent natural habitat, where they will shade-out and competitively exclude many indigenous woody and herbaceous species. This will have several deleterious impacts on the integrity and function of these habitats, such as:

- A loss of natural habitat and floristic diversity, with the remaining habitat patches unable to support diverse fauna communities;
- A reduction in grass productivity for grazing herbivores, and
- Increased exposed soil surfaces and incidences of erosion.

The spread of alien invasive vegetation is therefore considered a significant driver of change in the study area and surrounding landscape, and one capable of severely negatively impacting flora diversity and the presence of both flora and fauna SCC, particularly ground-dwelling small mammals and herpetofauna.

The groundwork activities associated with the construction phase of the Project have the potential to exacerbate the spread of AIS particularly along road edges, and at the boundaries of disturbed areas. However, Project infrastructure (for Alternative 2 in particular) have been deliberately sited on areas of wattle infestation, so that these AIS stands can be removed as part of the incorporated environmental measures being implemented in the Project design. In addition, an AIS management plan will be developed and implemented throughout the LSA as an outcome of both the wetland rehabilitation plan, and restoration activities as part of offset proposals for terrestrial habitats – the Project could therefore eventually have a net positive impact on the extent of AIS in the LSA.

4.5 ECOLOGICAL CORRIDORS AND CONNECTIVITY

Despite localised areas of modified and disturbed habitat (mostly associated with cultivation and alien tree plantations), and the presence of linear infrastructure, such as farm roads, powerline servitudes, railways and farm fences, habitat connectivity in the study area and across the broader landscape remains relatively high.

Key habitats associated with the high levels of landscape-scale connectivity include the large areas of grassland and wetland habitats that span the LSA. These areas provide a large network of dispersal corridors for flora propagules as well as ground-dwelling fauna species, and also have importance for

a variety of bird species, and particularly migrating waterbirds which rely on a network of connected wetland sites as stopovers and for navigation purposes during migration (Deboelpaep *et al.,* 2022).

The area of forested gorge habitat is also considered a site of importance in the study area. Considering the overall dominance of grassland habitat and modified habitats, the presence of this fine-scale indigenous forest habitat, flanked by vegetated rocky cliffs, is unique within the study area and increases local-scale habitat heterogeneity, which reflects in overall flora diversity.

The proposed WEF development is not expected to significantly alter wetland ecological corridors/connectivity in the LSA for ground-dwelling species, since a 100 m buffer around all wetlands/watercourses was applied for turbine siting purposes, and while some road crossings of wetlands will be upgraded, upstream and downstream connectivity will be retained.

The siting of turbines at least 100 m outside of wetland/watercourse habitat for both alternatives is expected to partially reduce the risk of collision to birds using migratory flyways; Alternative 2 is preferred in this regard since it specifically replaces some higher risk turbines with solar developments, which pose low risk to flying birds.

4.6 ANIMAL SPECIES

The majority of the study area is characterised by open terrestrial grassland habitat (comprising the Dry Mixed Grassland, Disturbed Grassland and Rocky Grassland vegetation communities). These range from grasslands occurring on flat or slightly undulating plains to rocky grassland occurring along mountain ridges and at rocky outcrops. Grassland habitats support the majority of the diverse fauna assemblages that are known from the Highveld region, and those that were recorded in the LSA (Hawkhead, 2023b). Large portions of grasslands in the study area are hilly and remote, and have relatively low levels of human accessibility. These areas are particularly important for larger mammal species (e.g., antelope) that may be sensitive to anthropogenic disturbances such as hunting. Areas of rocky grassland also provide specific niche habitat for rupicolous fauna (e.g., reptiles, Rocky hyrax). The presence of free-roaming medium-sized antelope (particularly Mountain Reedbuck *Redunca fulvorufula fulvorufula* and Southern Reedbuck *Redunca arundinum*) suggests that the availability, heterogeneity (diversity) and condition (integrity) of suitable habitats on-site are high and that these areas are able to sustain a mammal assemblage that approaches a contemporary reference community for the landscape.

Wetland habitats are functionally very important, and several aquatic and semiaquatic fauna species (e.g., otters, amphibians) are dependent upon them. Many other fauna species will also use these areas as key resource habitats for grazing (antelope), sheltering and hunting (predators). A high diversity of Red-listed bird species occur on site, many of which utilise wetland and grassland habitat for foraging and breeding purposes – e.g. Yellow-breasted Pipit (*Anthus chloris*), Blue Crane (*Grus paradisea*), White-bellied Bustard (*Eupodotis senegalensis*), Secretarybird (*Saggitarius serpentarius*) which have been confirmed on site, and potentially White-winged flufftail (*Sarothrura ayersi*), which occurs in nearby Middelpunt (the only confirmed breeding site for this Criticially Endangered species), in sedge-dominated habitat similar to that which occurs in parts of the mapped wetlands within the LSA.

Alien tree plantations also play a role in fauna support, providing well-wooded refuge areas that are likely to be used by fauna that may be sensitive to hunting and other forms of anthropogenic disturbance. It is also expected that certain nocturnal fauna shelter among the trees during the day and emerge at night to forage in the adjacent open grasslands. The frequent sighting of a small troop

of Vervet Monkey (*Chlorocebus pygerythrus*) in close proximity to stands of alien trees in study area during both the wet and dry season surveys is interesting, as it highlights the increased habitat heterogeneity provided by these well-wooded, yet anthropogenic and modified habitats in the study area and surrounding landscape.

The bat species that have been confirmed within the LSA during pre-construction monitoring surveys (Volant Environmental, 2023) are all considered Least Concern in terms of conservation status, occurring broadly in southern Africa. Acoustic monitoring detected increased activity during the breeding season, suggesting that some bat species may have nearby breeding colonies, and it is suspected that some species (e.g. Yellow house bat *Scotophilus dingani*) may utilise buildings in the LSA for breeding roosts, whilst some Myotis species have been known to utilise plantation woodland for breeding roosts – similar to wattle stands present throughout the LSA. Three active Cape serotine (Laephotis capensis) roosting sites were identified within the LSA, all of which were within occupied houses. Together with water resources, such habitats were considered to be of Medium sensitivity for bat species, and a 200m buffer around these stipulated for turbine and infrastructure siting purposes.

4.7 COMBINED SITE SENSITIVITY

The combined site sensitivity for all terrestrial ecology receptors, i.e. bats, avifauna, vegetation/flora and other fauna, as defined in each of the specialist reports, is illustrated on Figure X for Alternative 1, and Figure Y for Alternative 2.

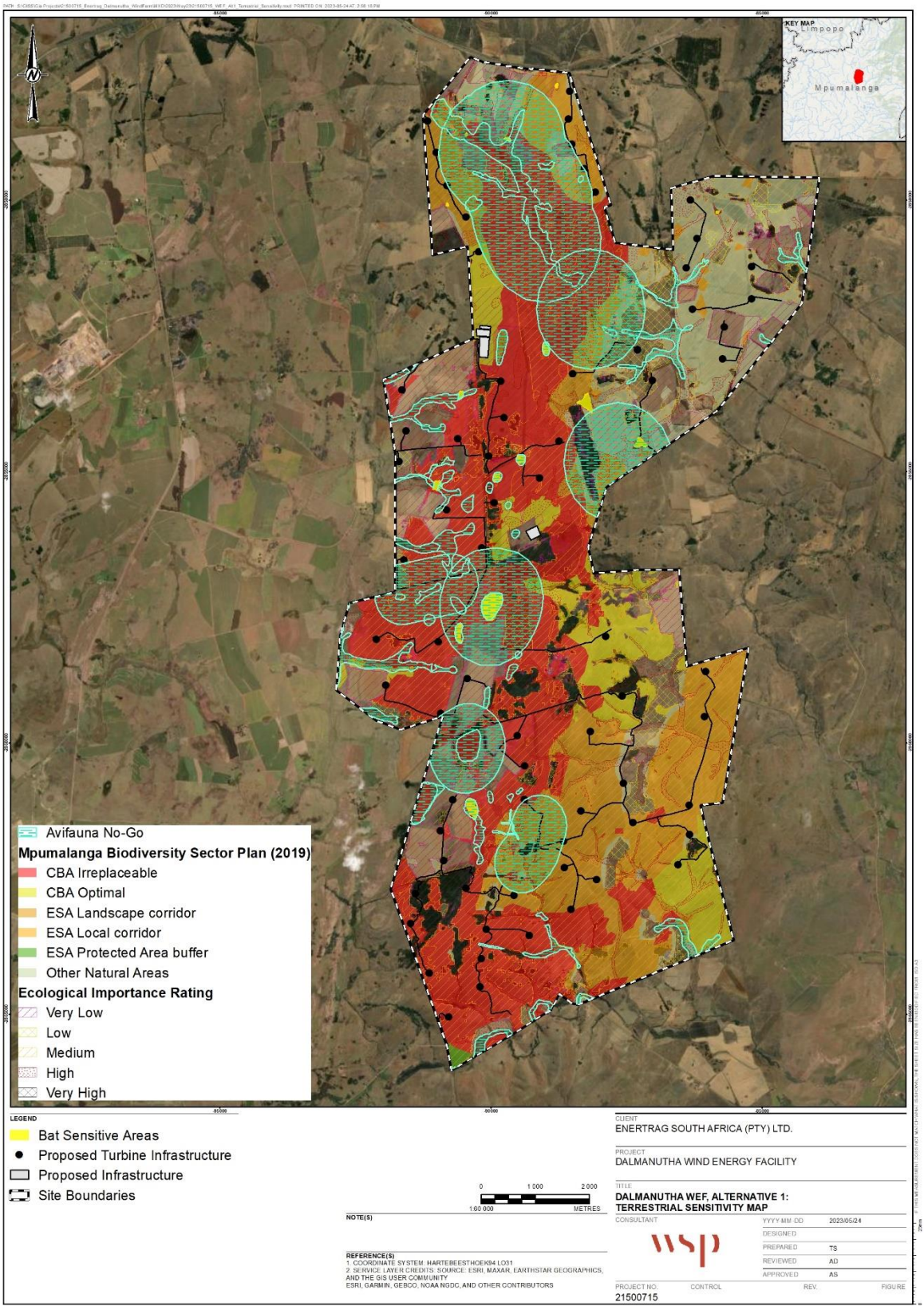

Figure 4-2 - Alternative 1 - combined site sensitivity

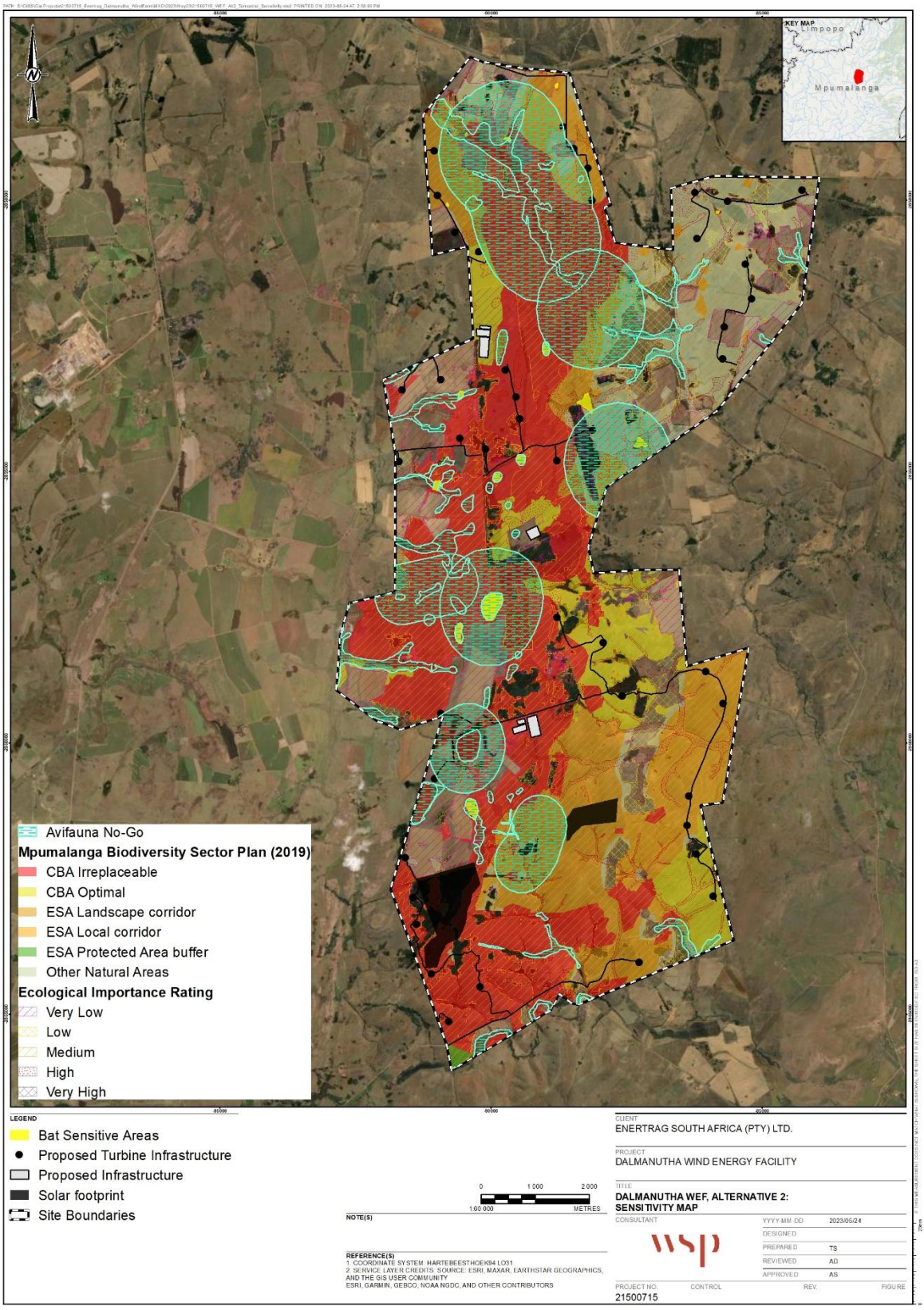

Figure 4-3 - Alternative 2 - combined site sensitivity

5 TERRESTRIAL BIODIVERSITY ASSESSMENT

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 MBSP, 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 (Table 5-1). These residual impacts were used to inform the assessment of potential lasting effects on CBAs, ESAs, Protected Areas/Priority Areas for Protected Area expansion, Indigenous forests, and FEPA subcatchments.

The specific assessment of the potential impacts of each Project Alternative on terrestrial species and ecosystem receptors, is available in the terrestrial plant species specialist assessment (Hawkhead, 2023a), terrestrial animal species specialist assessment (Hawkhead, 2023b), bat species specialist assessment (Volant Environmental, 2023) and avifauna specialist assessment (Wildskies, 2023) that accompany this application.

Table 5-1 – Significant residual impact summary

Receptor	Impact	Alt. 1	Alt. 2
Construction			
Aquatic ecosystems (wetlands)	Loss of wetland habitat	Moderate	Moderate
Avifauna	Habitat destruction	Moderate	Moderate
Terrestrial animal species	Loss and disturbance of fauna habitat	Moderate	Moderate
Terrestrial plant species	Loss and disturbance of flora habitat	Moderate	Moderate
Operation			
Avifauna	Collision of birds with turbines causing mortality	High	High
Cumulative			
Avifauna	Collision of birds with turbines causing mortality	High	High

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

The Mpumalanga Biodiversity Sector Plan (MBSP) technical report (Lotter, 2015) defines five categories of conservation focus; protected areas, critical biodiversity areas (CBA), ecological support areas (ESA), other natural areas, and modified habitats. Definitions for each are listed below. These areas present risks to the Project in terms of impact, as well as opportunities for contribution to

achieving provincially-set targets for biodiversity conservation, through focused biodiversity management planning and adherence to the mitigation hierarchy at EIA stage:

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

Much of the LSA is mapped as CBAs and ESAs (Figure 5-1), due to the presence of natural grassland and wetland as presented in the national landcover dataset (GTI, 2020). It is noted that some of these areas were observed to be transformed for agriculture during the baseline field programme. A key outcome of the vegetation and flora baseline study which was conducted during the peak (flowering) season (late October 2022) therefore was the development of the vegetation map of the LSA (Figure 5-2), which defines the location and extent of natural and modified vegetation communities (Table A-1 Appendix A) – including areas mapped as CBA/ESA in Figure 5-1.

Some areas of cultivated fields and AIS stands coincide with areas mapped as CBA1, CBA2, and ESAs – these areas are thus not expected to contribute to provincial conservation targets in their current state – although an opportunity for improved management/rehabilitation may exist through the implementation of offsets in the LSA to address irreversible and permanent loss of natural habitats.

The predicted loss of natural terrestrial habitats loss (i.e. loss of Disturbed Grassland, Dry Mixed Grassland, and Rocky Grassland) in each vegetation group within the LSA, for each Project alternative, are summarised on Table 6-1. 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. In addition, loss of areas mapped as 'Moist Grassland and Wetland' in the terrestrial vegetation dataset were not included, since these areas are already accounted for in the wetland habitat loss discussion in the Aquatic Biodiversity Specialist Assessment (WSP, 2023) that accompanies this application.

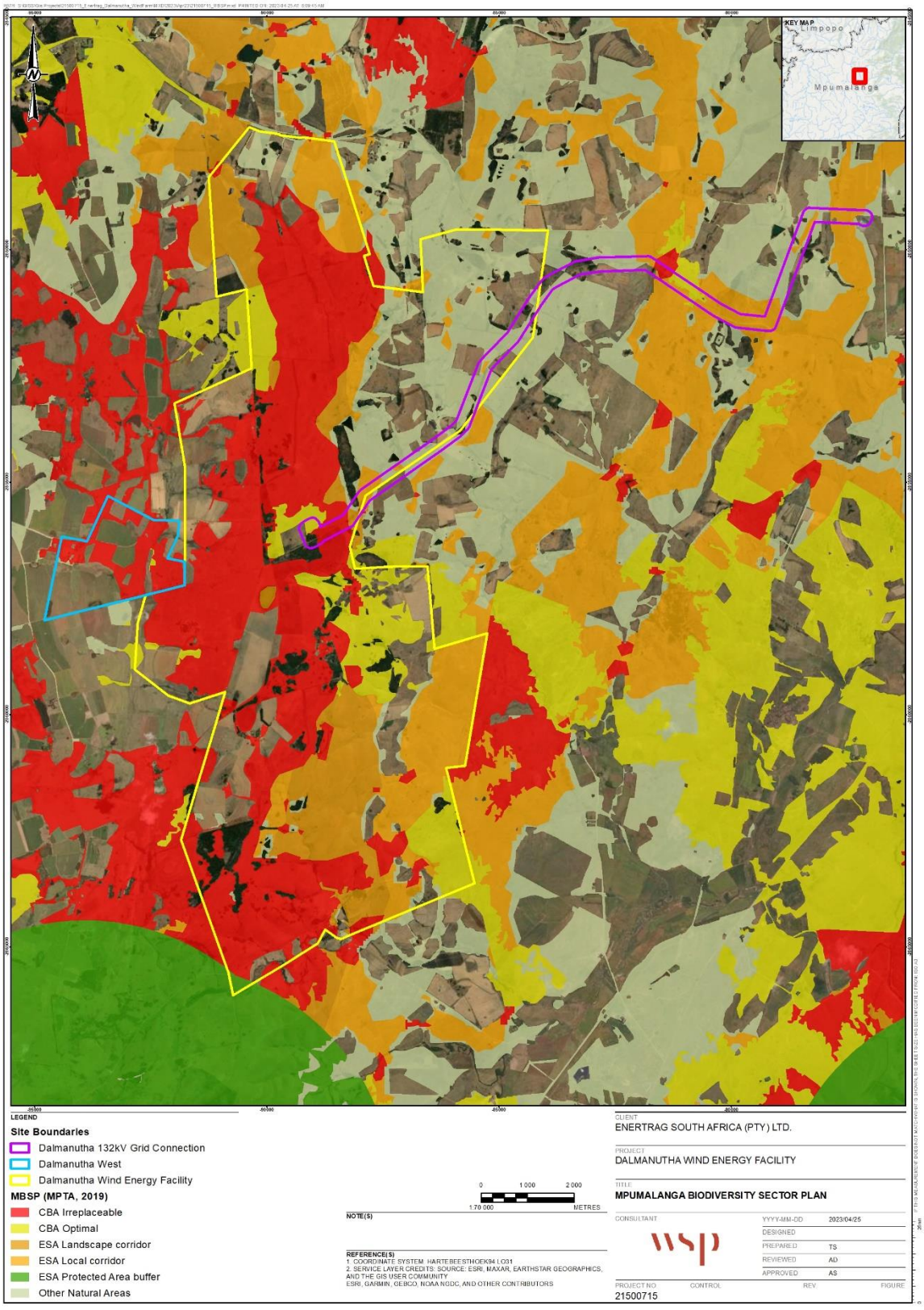

Figure 5-1 - Mpumalanga Biodiversity Sector Plan

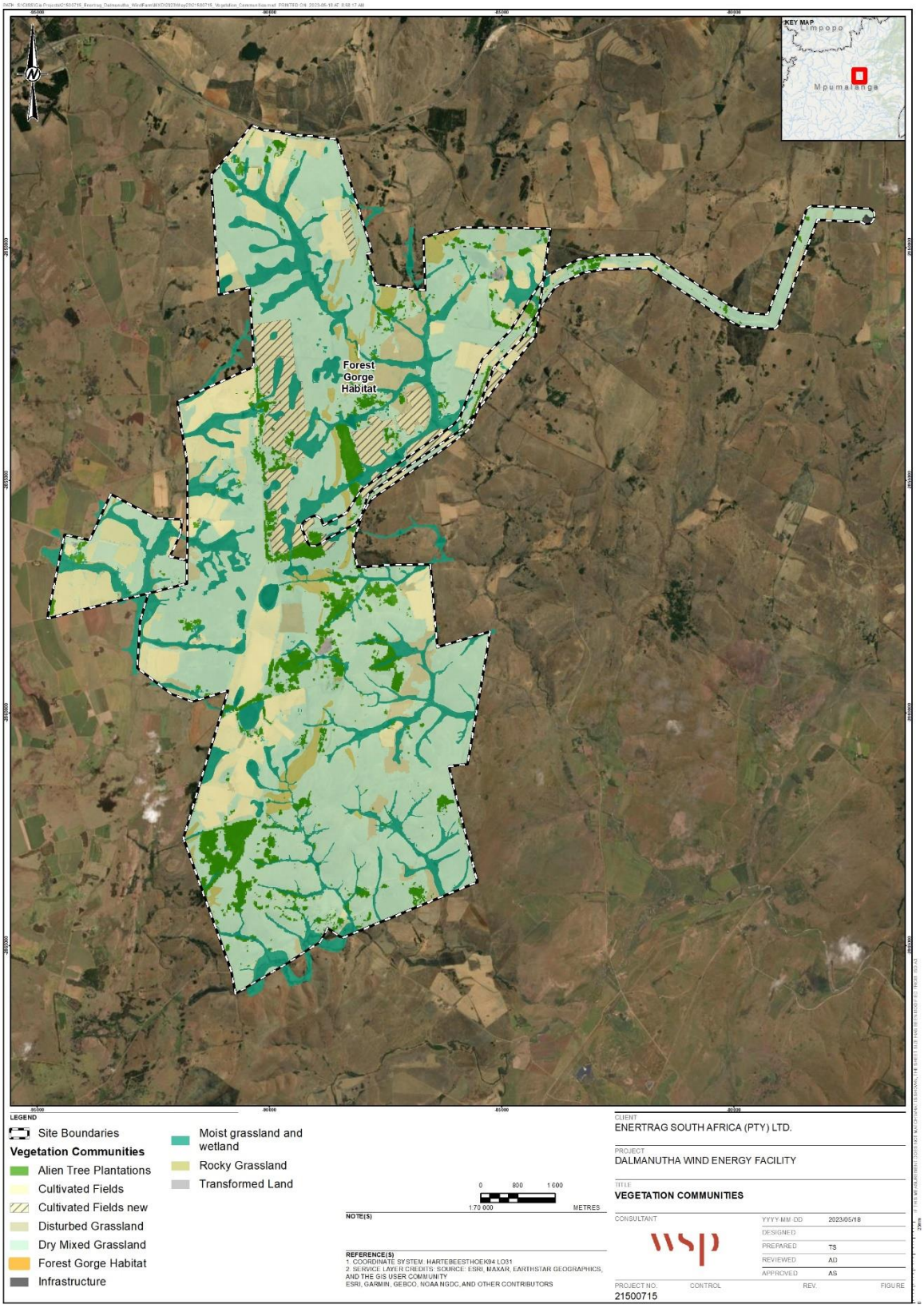

Figure 5-2 - Mapped vegetation communities in LSA

While it is clear that in its current incarnation, Alternative 2 would result in an increased area of natural habitat loss compared to Alternative 1; it is noted that there is much greater scope to optimise the layout of project components (particularly solar arrays, and BESS infrastructure) to reduce the amount of natural habitat loss within CBA1 and CBA2, which is expected to reduce the initial figures presented in Table 5-2. This consideration in the development of final layouts will be of critical importance in the context of the ecosystem threat status - particularly for Eastern Highveld Grassland and KaNgwane Montane Grassland which are already Endangered, and as such additional losses should be avoided to the extent possible.

Table 5-2 – Extent of loss of mapped CBA and ESA

MBSP category and Vegetation Communities	Extent of loss (ha)
Dalmanutha WEF, Alternative 1	**56.39**
CBA Irreplaceable	**23.89**
Eastern Highveld Grassland	17.31
KaNgwane Montane Grassland	5.77
Steenkampsberg Montane Grassland	0.81
CBA Optimal	**4.28**
Eastern Highveld Grassland	0.39
KaNgwane Montane Grassland	1.01
Steenkampsberg Montane Grassland	2.88
ESA Landscape corridor	**11.69**
Eastern Highveld Grassland	0.01
Steenkampsberg Montane Grassland	11.68
ESA Local corridor	**7.70**
Eastern Highveld Grassland	0.00
KaNgwane Montane Grassland	1.47
Steenkampsberg Montane Grassland	6.23
ESA Protected Area buffer	**0.10**
KaNgwane Montane Grassland	0.10
Other Natural Areas	**8.73**
Eastern Highveld Grassland	0.02
KaNgwane Montane Grassland	0.01
Steenkampsberg Montane Grassland	8.71
Dalmanutha WEF, Alternative 2	**128.86**
CBA Irreplaceable	**67.39**
Eastern Highveld Grassland	61.13
KaNgwane Montane Grassland	5.93
Steenkampsberg Montane Grassland	0.34
CBA Optimal	**6.23**
Eastern Highveld Grassland	0.32
KaNgwane Montane Grassland	1.56

MBSP category and Vegetation Communities	Extent of loss (ha)
Steenkampsberg Montane Grassland	4.35
ESA Landscape corridor	**39.89**
KaNgwane Montane Grassland	1.16
Steenkampsberg Montane Grassland	38.73
ESA Local corridor	**7.38**
KaNgwane Montane Grassland	2.20
Steenkampsberg Montane Grassland	5.19
ESA Protected Area buffer	**0.16**
KaNgwane Montane Grassland	0.16
Other Natural Areas	**7.80**
Eastern Highveld Grassland	0.08
KaNgwane Montane Grassland	0.09
Steenkampsberg Montane Grassland	7.63

Ecological processes (e.g. primary production, respiration, energy, carbon and nutrient flow through food webs, reproduction, and decomposition) associated with ESA within the LSA will continue; with the exclusion of areas of habitat that will be permanently lost/transformed as a result of the proposed development.

Once operational, no significant impacts on terrestrial flora and fauna (with the exception of avifuana), or wetland/riparian systems are anticipated (Table 6-1); as such the functionality of ESAs within the LSA is expected to remain largely unchanged. However, the presence of the turbines in the LSA creates a significant barrier to movement for bird species of conservation concern, posing a high risk of collision and subsequent mortality of individual birds. Although Alternative 2 is considered preferable based on the predicted reduction of the likely impact in terms of reduced risk of bird collisions with turbines causing mortality, and reduced direct loss of wetland habitat; loss of individuals of bird species of conservation concern remains an impact of high significance post-mitigation.

5.2 PRIORITY AREAS FOR PROTECTED AREA EXPANSION

Much of the LSA coincides with areas that have been identified as Priority Focus Areas as part of the National Protected Area Expansion Strategy (2016) (Figure 5-3), which are aligned with the MBSP CBAs and ESAs (Figure 5-1).

The Project will result in the loss of some areas of natural habitat that would otherwise contribute to the provincial conservation targets, which may affect the utility of the area as an area for expansion of nearby protected areas.

Figure 5-3 - National Protected Area Expansion Strategy

5.3 PROTECTED AREAS

No nationally protected areas are situated within the LSA, with the closest feature listed on the National Protected Areas Register (DFFE, 2022) being the Nooitgedacht Dam Nature Reserve, which lies at the southern-most extent of the RSA.

The northern extent of the LSA overlaps with the Steenkampsberg Important Bird Area (IBA), which consists primarily of rolling high-altitude grassland interspersed with rocky outcrops, and encompasses the Lakenvlei wetland which hosts the Critically Endangered White-winged Flufftail (*Sarothrura ayersi*) (BirdLife International, 2022). The IBA also has importance due to its support of other threatened wetland birds including Corncrake (*Crex crex*) and various crane species.

Middlepunt Nature Reserve is situated approximately 17 km to the north of the LSA. This reserve has recently (March 2023) acquired RAMSAR status, due to its support of White-winged Flufftail, as well as other threatened and endemic bird species including Blue Crane (*Anthropoides paradiseus*), Secretarybird (*Sagittarius serpentarius*), African grass owl (*Tyto capensis*) and Denham's bustard (*Neotis denhami*) (RAMSAR, 2023). The impact of the potential collision risk posed by the Project on bird species of conservation concern, could affect the specific biodiversity values for which nearby protected areas (e.g. Middelpunt Nature Reserve / RAMSAR site) have been designated.

5.4 FEPA SUBCATCHMENTS

A residual impact of moderate significance (Table 6-1) as a result of the loss of between 1.95 ha (Alternative 1) and 1.45 ha (Alternative 2) of wetland habitat is predicted for both WEF Alternatives. In addition, loss of terrestrial habitat in the catchment of wetlands/riparian systems within the LSA could impinge upon the ecological integrity of these systems, until such a time as construction phase impacts of vegetation clearing and soil removal have ceased and been rehabilitated. In the long-term, no significant impacts are anticipated during the operational phase. The implementation of a wetland rehabilitation plan within the LSA to offset the predicted Project losses of wetlands could ultimately have a positive impact on habitat condition and species in the FEPA sub-catchment, provided that it is successfully and timeously implemented.

5.5 INDIGENOUS FORESTS

While no indigenous forest habitat is mapped at the national level in the LSA (GTI, 2020) within the study area, an area of ecologically sensitive indigenous forest was identified toward the central part of the LSA (Hawkhead, 2023a; Table 4-1).

No direct (loss) or indirect (degradation) impacts on the ecological integrity of this natural indigenous forest are anticipated as a result of the development of either Project Alternative.

6 PROPOSED IMPACT MANAGEMENT MEASURES

Environmental measures that have been incorporated in the Project design so that potential impacts on terrestrial species and ecosystems can be avoided/minimised, are described in Section 7.1; and additional mitigation measures that have been prescribed in each of the biodiversity specialist reports with the aim of mitigating potential Project impacts to acceptable levels are summarised in Section 7.2.

6.1 INCORPORATED ENVIRONMENTAL MEASURES

Given the sensitive nature of much of the LSA, a number of environmental mitigation measures were incorporated into the Project design to avoid and minimise potential effects to biodiversity. These include:

- A 100 m buffer was applied to all watercourses (wetlands and riparian systems) and all turbines, laydown and construction camps, and structures (batching plant, wind power factory and yard, on-site IPP substation and BESS) have been sited outside of this buffer area.
- Use will be made of existing access roads/tracks to the extent possible, to minimise the requirement for construction of new access roads.
- Low speed limits (20-40 kph) for all construction and operation vehicles will be clearly signposted and enforced.
- Internal roads will be designed and maintained so that natural drainage patterns and catchments are changed as little as possible.
- Appropriate sanitary facilities will be provided for the duration of the construction and operation and all wastes will be removed to an appropriate waste facility.
- Fuel/chemical storage and usage areas will be sited above any 1:100 year floodline/outside watercourse buffer zones, and limited to demarcated areas in laydown and construction camps, sealed and bunded, with storm water directed around these areas;
- All fuel/chemical/concrete storage areas will be on bunded hard stands to prevent any spills from infiltrating to the underlying soil;
- Grease and oil traps will be installed at refuelling facilities, workshops and fuel storage depots. Drip trays will be used in the plant and workshops.
- An alien and invasive species management procedure will be developed to:
  - Prevent the spread of invasive species and pathogens that may already be present in the surrounding environment;
  - Implement prompt and effective rehabilitation and revegetation (with desirable plant species) where applicable;
  - Implement of ongoing monitoring in Project-occupied land throughout the life of the Project to ensure early detection of new areas of weed and pathogen spread, identify previously unrecorded invasive species, pest and pathogens, and assess the efficacy of prescribed control measures; and

- Provision of all construction contractors and other subcontractors with a copy of the invasive species management procedure, and specific invasive species, pest and pathogen management plans and secure their commitment to adhere to the measures outlined therein.

ALTERNATIVES

Due to the location of the Project in a sensitive area for biodiversity, and further to completion of two years of pre-construction avifauna monitoring and avifaunal sensitivity mapping, and discussions with BirdLife South Africa (BLSA) and Mpumalanga Tourism and Parks Agency (MTPA) at scoping stage, two alternative options (discussed throughout this document) are now being considered for the Project:

- Alternative 1 consists of up to 70 turbines and associated infrastructure (Battery Energy Storage System (BESS), access roads etc).
- Alternative 2 consists of a combination of up to 44 turbines and solar PV, plus associated infrastructure (BESS, access roads etc) in a ~160 ha footprint.

Alternative 2 was developed in response to the confirmed presence of regionally Red-listed bird species that are susceptible to collision with turbines in the LSA, including Cape Vulture, Southern Bald Ibis, Blue Crane, and White-bellied Bustard, as well as the potential presence of White-winged Flufftail.

The reduction in the number of wind turbines from 70 to 44 for Alternative 2 is predicted to reduce (minimise) the likely impact on birds in terms of number of fatalities; however, fatalities are still predicted (WildSkies Ecological Services, 2023).

6.2 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 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.

Avifauna

- A pre-construction avifaunal walk down should be conducted to confirm final layout and identify any sensitivities that may arise between the conclusion of the EIA process and the construction phase.
- No internal medium voltage power lines should be overhead. All such cables should be buried, and follow road verges at all times. Only the 132kV grid connection power line should be above ground (this is assessed in a separate application).
- Any overhead conductors or earth wires should be fitted with an Eskom approved anti-bird collision line-marking device to make cables more visible to birds in flight and reduce the likelihood of collisions.
- The pole design of any overhead power line should be approved by an ornithologist in terms of the electrocution risk it may pose to large birds such as eagles and vultures.
- The combination of turbine hub height and rotor diameter must be optimised to maximise the lower blade tip height above ground. Raising the lower turbine blade tip height from a typical 30m above ground to 50m above ground will reduce collision risk for most species, as most flight is low over the ground.
- A post-construction site inspection must be conducted by an avifaunal specialist to confirm that all aspects have been appropriately handled and in particular that road and hard stand verges do not provide additional substrate for raptor prey species. It is essential that the new wind farm does not create favourable conditions for such mammals in high risk areas. We therefore recommend that within the first year of operations a full assessment of this aspect be made by the ornithologist contracted for post-construction monitoring. If such conditions have been created, case-specific solutions will need to be developed and implemented by the wind farm.
- It is strongly recommended that rodenticides not be used at the newly established Operation and Maintenance (O&M) buildings or around auxiliary infrastructure on the project site. While pest control of this nature may be effective, even so-called “environmentally friendly” rodenticides are toxic and pose significant secondary poisoning risk to predatory avifauna, especially owls.
- A ‘Cape Vulture Food Management Programme’ must be implemented on site to ensure all dead livestock/wildlife on site are removed as soon as possible and made unavailable to vultures for feeding. This programme will reduce the amount of available vulture food on site and reduce vulture-turbine collision risk. This programme will require the deployment of a dedicated (i.e. no other tasks) and adequately resourced (transport, binoculars, GPS, cameras, training) team of staff to patrol the full site and immediate surrounds during all daylight hours. The co-operation of landowners will also be essential to ensure that reported carcasses are disposed of effectively. This programme must be operational by the time the first turbine blades are turning on site and should not wait for Commercial Operations Date (COD). A full detailed method statement for this programme must be designed by an ornithologist prior to COD, and included in the EMPr.
- The landowner agreements should ensure specifically that any vulture feeding sites be stopped from the start of wind farm construction and not used for the full lifespan of the wind farm. Landowners should also be sensitised to the need to cooperate with the above Cape Vulture Food Management Programme.

- Cape Vultures will have to be effectively deterred from roosting on overhead power lines on site. This will need to be achieved well before turbines are operational and maintained through the project lifespan. Eskom Bird Guards (perch deterrents) must be installed on all pylons at the two roost sites, with full coverage of steel cross members (not just above live phases as per Eskom standard). In addition, the team of staff employed to implement the Cape Vulture Food Management Programme described above should also be tasked with patrolling the relevant sections of power line early morning and late evenings to scare any perching vultures away. This should first be trialled by in collaboration with an avifaunal specialist to ensure that such actions don't increase turbine collision risk in the short term by flushing vultures into turbines.
- An Observer-Led Turbine Shutdown on Demand (OLSDOD) programme must be implemented on site from COD. This is required in order to mitigate the risk of turbine collision for priority bird species. This programme must consist of a suitably qualified, trained, dedicated and resourced team of observers present on site for all daylight hours 365 days of the year. This team must be stationed at vantage points with full visible coverage of all turbine locations. The observers must detect incoming priority bird species, track their flights, judge when they enter a turbine proximity threshold, and alert the control room to shut down the relevant turbine/s until the risk has reduced. A full detailed method statement must be designed by an ornithologist prior to COD, and included in the EMPr. The effectiveness of this programme is highly dependent on hiring the correct staff and managing them appropriately. The project must pay careful attention to this aspect if it is to succeed.
- All turbines must have one of their blades painted according to a protocol currently under development by the South African Wind Energy Association (SAWEA) from the outset (i.e. prior to installation). Provision must be made by the developer for the resolution of any technical, warranty or supplier challenges that this may present.
- A bird fatality threshold and adaptive management plan must be designed by an ornithologist for the site prior to the Commercial Operation Date (COD) and included in the EMPr. This plan should identify most importantly the number of bird fatalities of priority species which will trigger a management response, appropriate responses, and time lines for such responses. Fatalities of priority bird species are usually rare events (but with very high consequence) and it is difficult to analyse trends or statistics related to these fatalities as they occur. It is therefore important to have a threshold policy in place proactively to assist adaptive management.
- Any residual impacts after all possible mitigation measures have been implemented will need to be mitigated off site. The facility will need to address other sources of mortality of priority species in a measurable way so as to compensate for residual effects on the facility itself. This will need to be detailed in a Biodiversity Action Plan.
- The "during construction" and "post-construction" monitoring programme outlined in the avifauna impact assessment (WildSkies, 2023) should be implemented according to the latest available version of the Best Practice Guidelines at the time. The findings from Operational Phase monitoring should inform the adaptive management programme to mitigate any impacts on avifauna to acceptable levels.
- The project must keep abreast of new developments in avifauna mitigation (e.g. blade illumination; radar technology; and acoustic deterrents) and implement if deemed necessary and reasonable as per the projects' adaptive management plan.

Bats

- A 200 m buffer to be implemented around sites that are considered to be of Medium Sensitivity to bats (i.e. water sources and potential foraging areas) as recommended by MacEwan (2022);
- A 500 m buffer to be implemented around confirmed bat roosts, within which no turbines should be located
- Adaptive mitigation during operational phase (i.e. application of additional/changed mitigation, further to the findings of operation phase monitoring of bat carcasses, and passive acoustic monitoring), which could include curtailment (as necessary).
- Use of minimal compulsory civil aviation lighting on turbines at night time
- Use of low-intensity, directional (downward) lights, that are non-UV emitting
- Higher cut-in speeds during times of peak activity (October to January), particularly during times of higher levels of bat activity (18:00 – 21:00).

Terrestrial plant species

- Vegetation clearing should be restricted to the proposed Project footprints only, with no clearing permitted outside of these areas;
- The footprints to be cleared should be clearly demarcated prior to construction to prevent unnecessary clearing outside of these areas; and
- No heavy vehicles should travel beyond the marked works zone
- To promote grassland health, local farmers should be approached in order to investigate the potential of developing a co-ordinated grassland burning (wildfire) programme for the study area; and
- To prevent wetland desiccation, the wetland management and protection measures outlined in the wetland impact assessment for the proposed Project should be strictly implemented on site
- An Alien Invasive Species (AIS) Control and Eradication Plan must be developed for the Project, focussed on areas disturbed by construction, and wetland/riparian vegetation. It is recommended that the plan include:
    - A combined approach using both chemical and mechanical control methods; and
    - Periodic follow-up treatments, informed by regular monitoring.
- A wet/growing season field survey for flora SCC should then be conducted within the planned development footprints to determine the identify and number of potentially impacted flora SCC;
    - Wherever possible, infrastructure footprints should be re-aligned/re-positioned to avoid SCC locations;
    - Where re-alignment/re-positioning is not possible, permits should be obtained from the relevant authority to rescue and relocate impacted plants; and
    - A Flora SCC Rescue and Relocation Plan should be developed for the proposed Project to provide guidance on all aspects of SCC rescue and relocation.

Terrestrial animal species

- A Mountain Reedbuck surveying programme should be conducted to determine the population size and spatial use (i.e., territorial configuration) of the study area. These data should then be used to identify the need for any additional and adaptive conservation and management interventions for Mountain Reedbuck to be incorporated in the BMP/BAP;
- Limit the erection of fences or other linear artificial movement barriers to the minimum required to meet facility safety/security requirements.
- A suitably experienced Environmental Control Officer (ECO) should be on-site during vegetation clearing to monitor and manage any wildlife-human interactions;
    - In the event that millipedes are encountered during construction, the ECO should collect a suitable specimen and submit it to a millipede expert for identification. If it is found to be *Doratogonus furculifer*, construction activities at the relevant site should cease immediately, and the ECO should consult the millipede expert and the MPTA with respects to implementing a rescue and relocation managing programme for this species.
- As appropriate, barriers should be erected around construction trenches and excavations to prevent fauna being trapped in these features;
- Any fauna species trapped in construction areas should be safely and correctly relocated to an adjacent area of natural habitat;
- The handling, poisoning and killing of on-site fauna by contractors 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.
- 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
- Project proponent must keep actively informed about new research in the field of vibration impacts on fauna and potential mitigation options;
- Based on the findings of new research in the field of vibration impacts on fauna and potential mitigation options, the biodiversity management plan for the proposed Project should be updated to include additional mitigation measures (as required) for on-site implementation.

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.

7 ACCEPTABILITY OF PROPOSED DEVELOPMENT

From a terrestrial biodiversity perspective, it is preferable to site infrastructure in areas of land that have already been transformed, such as cultivated fields; however, landowners within the LSA, with whom Enertrag will enter lease agreements for the construction and operation of the WEF, prefer that infrastructure is not sited in cultivated areas for economic reasons. This challenges the ability to minimise the loss of natural habitat through Project design. Nevertheless, existing access tracks have been used to the extent possible so that a minimum area of new road construction will be required.

For Alternative 2, where an increase in Project footprint will occur due to the bigger area needed for solar development, the use of areas currently colonised by wattle will be optimised in an effort to minimise potential losses of natural habitat. This, together with the reduced collision risk to bird SCC, makes Alternative 2 a preferred option in terms of acceptability of the proposed development, whether it should receive approval or not.

7.1 CONDITIONS TO APPROVAL

At a minimum, the following conditions to any approval are recommended:

- The indiscriminate clearing of vegetation in natural habitats where solar developments are proposed is not recommended; instead, minimally invasive construction techniques whereby only the supports for PV panels are cleared in such areas will significantly reduce the potential extent of habitat loss in these areas;
- Mowing regimes beneath solar panels situated in natural habitats should be scheduled to ensure that native plant SCC flowering seasons are avoided. Consideration should be given to use of grazing animals for maintenance of vegetation in solar developments;
- A Project Biodiversity Action Plan (BAP) should be developed and implemented;
- Monitoring of impacts on vegetation communities should be done during construction; follow up monitoring should be done subsequent to completion of rehabilitation activities, to ensure that re-vegetation is occurring and confirm that the sites have been rehabilitated;
- Significant residual impacts on biodiversity should be addressed via onsite/offsite offsets as appropriate, in agreement with the relevant conservation authorities;
- A wetland rehabilitation plan with the objective of offsetting the predicted Project losses of wetland habitat should be developed and implemented prior to commencement of the construction phase.

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Appendix A

CBA AND ESA MAPPED VEGETATION COMMUNITIES

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