BIODIVERSITY ASSESSMENT AS PART OF THE ENVIRONMENTAL IMPACT ASSESSMENT AND AUTHORISATION PROCESS FOR THE PROPOSED LETHABO 4.5KM 132KV POWERLINE , FREE STATE PROVINCE

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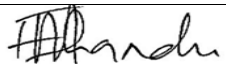
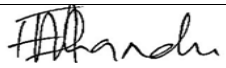
Co-Author	F. Mhandu (**Pr Nat Sci)**	ES-DIGES-Lethabo-VegAss-10/2023	
Approved By	F. Mhandu **(Pr Nat Sci)**	ES-DIGES-Lethabo-VegAss-10/2023	

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The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken by EnviroSHEQ Consulting (Pty) Ltd and its staff reserve the right to modify aspects of the report including the recommendations if and when new information becomes available from ongoing research or further work in this field, or pertaining to this investigation.

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EXECUTIVE SUMMARY

EnviroSHEQ Consulting (Pty) Ltd was appointed by DIGES Group (herein DIGES) to conduct a vegetation assessment of the sites designated for construction of the Lethabo 4.5 km 132 kV powerline that will transmit power from the proposed Lethabo solar plant to the existing substation north east of the Lethabo power station. The study focused on describing the vegetation ecological characteristics of the project area and its immediate surrounds to identify and assess possible negative ecological impacts that may result from the proposed project. This document presents the findings of the study.

The terms of reference for this assessment were as follows:

- To conduct a floral and fauna survey of the study site;
- To survey the occurrence or potential occurrence of conservation important plant species (Species of Conservation Concern (SCC) on the proposed study site;
- To assess the relative vegetation sensitivity (conservation importance and ecological function) of the study site and incorporate the findings into a sensitivity map;
- Indicate the likely impacts of the proposed powerline on the natural environment and on and adjacent to the site.
- To identify and consider all sensitive landscapes including rocky ridges, wetlands and any other ecologically important features, if present.

For background information, the relevant maps, aerial photographs and other information on the natural environment of the concerned area were obtained. Further, the desktop assessment also included a review of the Ecological Assessment Report for the proposed Lethabo Solar Energy facility to be build next to the Lethabo power station where the proposed powerline will be connecting to. A one-day field assessment was undertaken on 24 February 2023, to determine the ecological status of the study area. A reconnaissance 'walkabout' was initially undertaken to determine the general habitat types found throughout the study area and, following this, specific study sites were selected that were considered to be representative of the habitats found within the area, with special emphasis being placed on areas that may potentially support Red Data Listed (RDL) species and/ or other floral Species of Conservation Concern (SCC). Sites were investigated on foot to identify the occurrence of the dominant plant species and habitat diversities

Two site corridor alternatives were proposed for assessment. Corridor A refers to the corridor in close proximity to the road from the proposed solar power plant whereas Corridor B refers to the deviation of Corridor A from the existing substation. Of significance to note is the existence of powerlines that run within the same proposed two corridors i.e., Corridor A and B. The proposed powerline corridor alternatives run from the north-eastern side of the Lethabo power station (S26° 44' 33.34" E 27° 58' 32.62") site where the substation is located to the southern part of the power station under the jurisdiction of the Metsimaholo municipality, Free State Province. The project area is approximately 10km southeast of Vereeniging and 14km northeast of Sasolburg. The area is depicted in Figures 1 and 2.

The findings of the field assessment indicate that the vegetation within the two alternative corridors is transformed, with low plant species richness and no red data plant species present. The terrestrial habitat associated with the study area is of low to intermediate sensitivity. Widespread anthropogenic impacts from current use and some level of alien and invasive plant proliferation have degraded the available floral habitat associated with the site.

The proposed site is situated within Central Free State grassland, which is not considered to be vulnerable however, the Free State Biodiversity Conservation Assessment classifies the study area as Ecological Support Areas 1 and 2. No threatened plant species were confirmed during fieldwork and no Near Threatened and protected species were recorded. In total, 23 plant species were recorded from the proposed corridors. No threatened fauna species were recorded.

The major impacts on fauna are likely to occur during the construction phase due to the increased human presence at the sites as well as the operation of heavy machinery. This will however be temporary, no RDB species are likely to be impacted, and in the longer-term impact on fauna would be low. With mitigation and regulation of human activity at this site, these impacts can likely be reduced to an acceptable level as is the case currently.

Based on this sensitivity assessment, the following recommendations can be made:

i) All infrastructure are to be situated within the boundaries of the assessed corridors.

The impact on fauna is expected to be small to negligent. Presence of indigenous terrestrial vertebrates within the study area is low due to current land use. Animals that may be permanently present can be relocated or will move away during construction, and may resettle after construction, depending on safety specifications necessitated by the development. No restricted or specific habitat of vertebrates exists on the study area and will be affected by the proposed development; especially if the proposed development remains outside the recommended buffers around wetland and seepage areas.

In conclusion, both corridors are viable as there are no significant impacts associated with the development of any of the proposed corridors that cannot be reduced to a manageable level through mitigation. As such, there are no reasons from a terrestrial ecology perspective that the development should not proceed. Provided the recommendations suggested in this report are followed, there is no objection to the proposed development in terms of the terrestrial ecosystems of the study area.

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LIST OF ABBREVIATIONS USED IN THIS ASSESSMENT

BGIS	Biodiversity Geographic Information Systems
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CR	Critically Endangered
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EN	Endangered
ESA	Ecological Support Areas
EW	Extinct in the Wild
GIS	Geographic Information System
GPS	Global Positioning System
IBA	Important Bird Area
IUCN	International Union for the Conservation of Nature
LC	Least Concern
MAP	Mean Annual Precipitation
MAPE	Mean Annual Potential for Evaporation
MASMS	Mean Annual Soil Moisture Stress
MAT	Mean Annual Temperature
MNR	Municipal Nature Reserve
NBA	National Biodiversity Assessment (2011)
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NT	Near Threatened
NWA	National Water Act
NYBA	Not Yet Been Assessed
PES	Present Ecological State
POC	Probability of Occurrence
PRECIS	Pretoria Computer Information Systems
QDS	Quarter Degree Square (1:50,000 topographical mapping references)
RDL	Red Data List
RE	Regionally Extinct
SABAP 2	Southern African Bird Atlas 2
SANBI	South African National Biodiversity Institute

SAPAD	South Africa Protected Area Database
SCC	Species of Conservation Concern
TSP	Threatened Species Programme
VU	Vulnerable

1. INTRODUCTION & BACKGROUND

1.1. Introduction

EnviroSHEQ Consulting (Pty) Ltd was appointed by DIGES Group (herein DIGES) to conduct a terrestrial biodiversity assessment of the sites designated for construction of the 4.5 km 132 kV powerline that will transmit power from the authorised Lethabo solar plant to the existing substation. The study focused on describing the vegetation ecological characteristics of the project area and its immediate surrounds (hereafter referred to as the study area), to identify the fauna, to identify and assess possible negative ecological impacts that may result from the proposed project. This document presents the findings of the study.

1.2. Rationale for this assessment

It is widely recognised that it is of utmost importance to conserve natural resources to maintain ecological processes and life support systems for plants, animals and humans. To ensure that sustainable development takes place, it is therefore important that the environment is considered before relevant authorities approve any development. This led to legislation protecting the natural environment. The amended environmentally related legislation such as Environmental Conservation Act (Act 73 of 1989), the National Environmental Management Act, 1998 (NEMA) (Act 107 of 1998), the National Environmental Management Biodiversity Act, 2004 (NEMBA). (Act 10 0f 2004) and the National Water Act 1998 (Act 36 of 1998) ensure the protection of ecological processes, natural systems and natural beauty as well as the preservation of water resources and biotic diversity in the natural environment. It also ensures the protection of the environment against disturbance, deterioration, defacement or destruction as a result of man-made structures, installations, processes or products or human activities.The National Environmental Management : Biodiversity Act (10/2004) : revised national list of ecosystems that are threatened and in need of protection (G 47526 was also used to check for threatened International and national Red Data lists have also been produced for various threatened plant and animal taxa.

All components of the ecosystems (physical environment, including water resources, vegetation, animals) of a site are interrelated and interdependent. A holistic approach is therefore imperative to effectively include the development, utilisation and where necessary conservation of the given natural resources in an integrated development plan, which will address all the needs of the modern human population (Bredenkamp & Brown 2001). To evaluate and assess the vegetation, it is necessary to make an inventory of the ecosystems on the site. This inventory should then serve as a scientific and ecological basis for the planning exercises.

1.3. Scope of the assessment

The terms of reference for this assessment were as follows:

- To conduct a floral and fauna survey of the study site;
- To survey the occurrence or potential occurrence of conservation important plant species Species of Conservation Concern (SCC) on the proposed study site;
- To assess the relative vegetation sensitivity (conservation importance and ecological function) of the study site and incorporate the findings into a sensitivity map;
- Indicate the likely impacts of the proposed powerline on the natural environment and on and adjacent to the site.
- To identify and consider all sensitive landscapes including rocky ridges, wetlands and any other ecologically important features, if present.

1.3.1 Flora

Desktop

Vegetation communities were identified before fieldwork using GoogleTM Earth imagery. Red Data plant species listed for the quarter-degree grid, in which the study area is situated, and surrounding grids in the PRECIS database from the South African National Biodiversity Institute (SANBI), were used to produce a list of the most likely threatened species, which was searched for during fieldwork. Further, the desktop assessment also included a review of the Ecological Assessment Report for the proposed Lethabo Solar Energy facility to be build next to the Lethabo power station where the proposed powerline will be connecting to.

Fieldwork

Fieldwork was conducted over one day in February 2023. As explained above, the proposed powerline corridor sites were surveyed on foot using the approximate position as there are no exact positions of the towers. These were pre-loaded onto a Montana 680 GPS and were used to delimit the area in which to search for any conservation-important species of flora and fauna as listed under the National Forests Act (No. 30 of 1998), National Environmental Management: Biodiversity Act (No. 10 of 2004) Threatened and Protected Species Lists (GG Notice 256, 2015) and the various national Red Data Lists and relevant provincial legislation The location of any species found was recorded using the GPS. Plants were listed according to each of the vegetation communities identified during the desktop phase.

1.3.2 Fauna

Desktop

Lists of conservation-important mammals, birds, reptiles and frogs potentially occurring within the project area were prepared using data from Friedmann & Daly (2004), the Southern African Bird Atlas Project 2 http://sabap2.adu.org.za/, Taylor et al. (2015), Minter et. The above data were captured mostly at a quarter-degree spatial resolution but were refined by excluding species unlikely to occur within the study area, due to unsuitable habitat characteristics (e.g. altitude and land use). The potential occurrence of fauna in the study area was predicted based on knowledge of the known habitat requirements of each species.

1.4. Assumptions, Limitations and Knowledge Gaps

The following assumptions and limitations apply to this report:

- The biodiversity assessment was confined to the study area and did not include the neighbouring and adjacent properties. These were considered as part of the desktop assessment;
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most floral and faunal communities were accurately assessed and considered, with all relevant online sources and background information utilised to improve on the overall understanding of the study area's ecology;
- Due to the nature and habits of most faunal taxa, it is unlikely that all species would have been observed during a field assessment of limited duration. Due to the locality of the study area within a power station vicinity where continuous anthropogenic activities occur, the cyclical nature of many species' life stages, as well as the season of the assessment, resulted in very few faunal species being observed. As such, background data (desktop) and literature studies (previous studies undertaken in the immediate area) were used to further infer faunal species composition and sensitivities in relation to the available habitat;
- Sampling, by its nature, means that not all individuals are assessed and identified. Some species and taxa associated with the study area may have been missed during the assessment; and
- The data presented in this report are based on one site visit, undertaken on the 24th of February 2023. A more accurate assessment would require that assessments take place in all seasons of the year. However, on-site data was augmented with all available desktop data. Together with project experience in the area, the findings of this assessment are considered to be an accurate reflection of the ecological characteristics of the study area.

1.5 Site Location

Two site corridor alternatives were proposed for assessment. Corridor A refers to the corridor in close proximity to the road from the proposed solar power plant whereas Corridor B refers to the deviation of Corriodor A from the existing substation.Of significance to note is the existance of powerlines that run within the same proposed two corridors i.e Corridor A and B. The proposed powerline corridor alternatives run from the north-eastern side of the Lethabo power station (S26° 44' 33.34" E 27° 58' 32.62") site where the substation is located to the southern part of the power station under the jurisdiction of the Metsimaholo municipality, Free State Province. The project area is approximately 10km southeast of Vereeniging and 14km northeast of Sasolburg. The area is depicted in Figures 1 and 2.

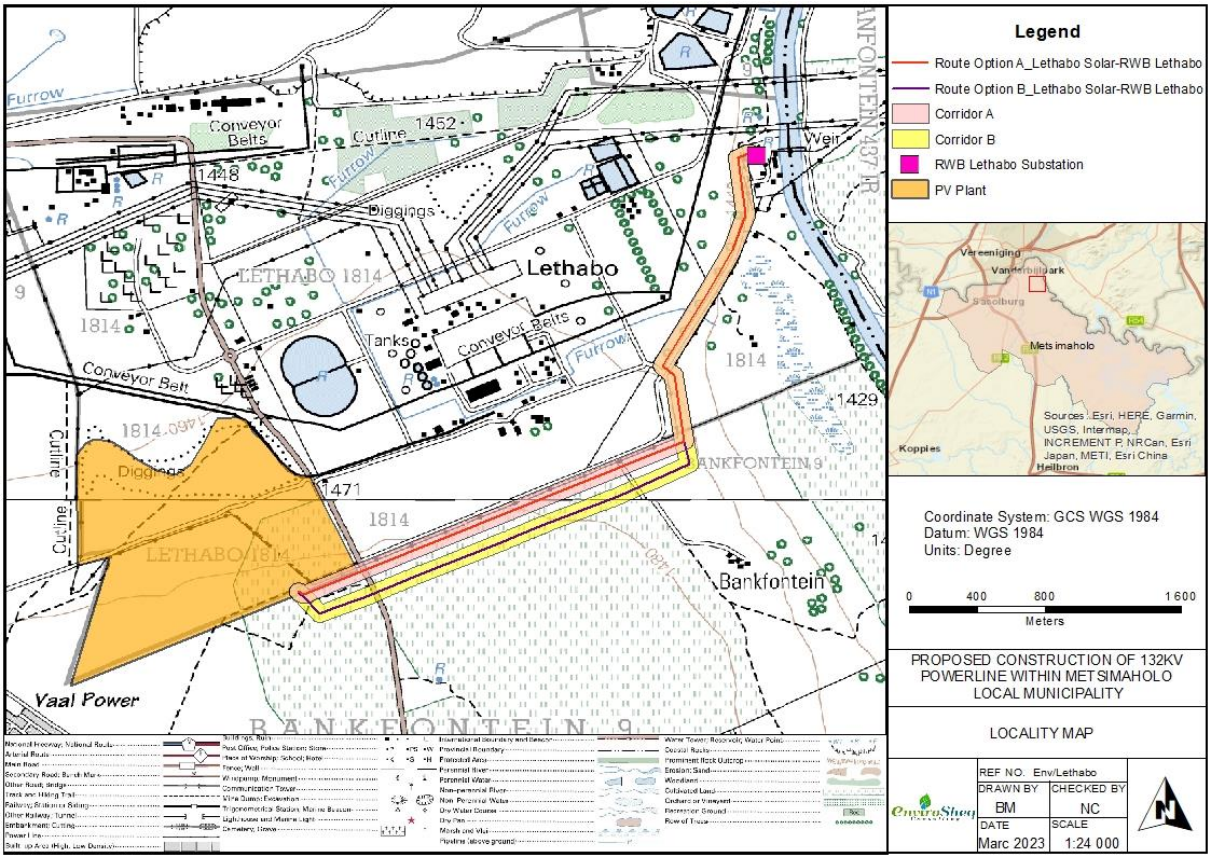

Figure 1: Locality Map

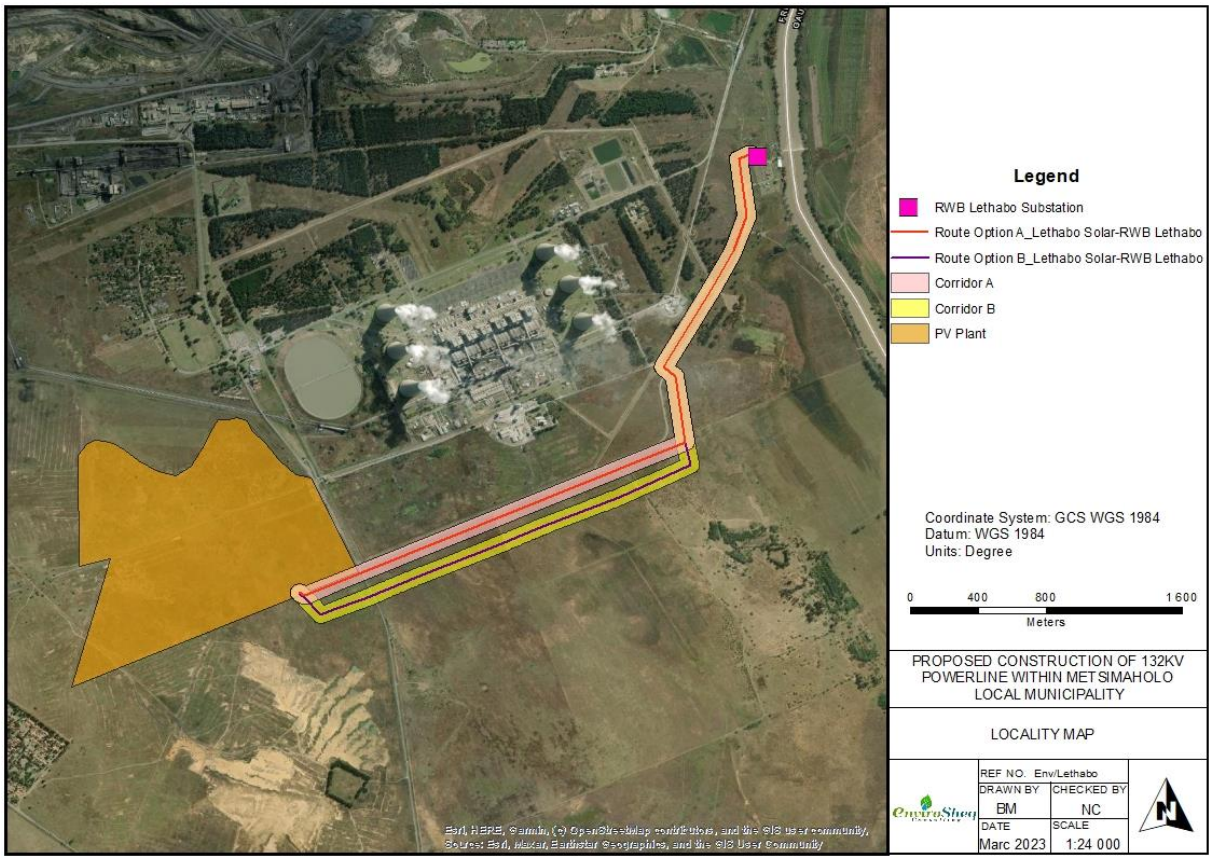

Figure 2: Locality Map-Google image

1.5.1 Biodiversity Baseline Description

National Vegetation Types

According to Mucina & Rutherford (2006), the study area is situated within the Central Free State Grassland type. This vegetation type is described briefly below, based on the account in Mucina & Rutherford (2006).

Central Free State Grassland

The specific characteristics associated with these vegetation types are discussed below:

Distribution - Free State Province and marginally into Gauteng Province: A broad zone from around Sasolburg in the north to Dewetsdorp in the south. Other major settlements located within this unit include Kroonstad, Ventersburg, Steynsrus, Winburg, Lindley and Edenville. Altitude 1 300–1 640 m, most of the area at 1 400–1 460 m.

Vegetation & Landscape Features - plains sup- porting short grassland, in natural condition dominated by *Themeda triandra* while *Eragrostis curvula* and *E. chloromelas*

become dominant in degraded habitats. Dwarf karoo bushes establish in severely degraded clayey bottomlands. Overgrazed and trampled low-lying areas with heavy clayey soils are prone to Acacia karroo encroachment.

Geology & Soils -Sedimentary mudstones and sandstone mainly of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) as well as those of the Ecca Group (Karoo Supergroup) found in the extreme northern section of this grassland, giving rise to vertic, melanic and red soils (typical forms are Arcadia, Bonheim, Kroonstad, Valsrivier and Rensburg)—typical of Dc land type (dominating the landscape). The less common intrusive dolerites of the Jurassic Karoo Dolerite Suite support dry clayey soils typical of the Ealand type.

Climate-Summer-rainfall seasonal precipitation region, with MAP 560 mm. Much of the rainfall is of convectional origin and peaks in December to January. The overall MAT around 15°C. Incidence of frost relatively high (43 days on average).

Important Taxa-Graminoids*: Aristida adscensionis (d), A. congesta (d), Cynodon dactylon (d), Eragrostischlo-romelas (d), E. curvula (d), E. plana (d), Panicum coloratum (d), Setaria sphace- lata (d), Themeda triandra (d), Tragus koelerioides (d), Agrostis lachnantha, Andropogon appendiculatus, Aristida bipartita, A. canescens, Cymbopogon pospischilii, Cynodon transvaalensis, Digitaria argyrograpta, Elionurus muticus, Eragrostis lehman- niana, E. micrantha, E. obtusa, E. racemosa, E. trichophora, Heteropogon contortus, Microchloa caffra, Setaria incrassata, Sporobolus discosporus. Herbs: Berkheya onopordifolia var. onopordifolia, Chamaesyce inaequilatera, Conyza pinnata, Crabbea acaulis, Geigeria aspera var. aspera, Hermannia depressa, Hibiscus pusillus, Pseudognaphalium luteo-album, Salvia steno-phylla, Selago densiflora, Sonchus dregeanus. Geophytic Herbs: Oxalis depressa, Raphionacme dyeri. Succulent Herb: Tripteris aghillana var. integrifolia. Low Shrubs: Felicia muricata (d), Anthospermum rigidum subsp. pumilum, Helichrysum dregea-num, Melolobium candicans, Pentzia globosa.*

Conservation Vulnerable. Target 24%. Only small portions enjoy statutory conservation (Willem Pretorius, Rustfontein and Koppies Dam Nature Reserves) as well as some protection in private nature reserves. Almost a quarter of the area has been transformed either for cultivation or by the building of dams (Allemanskraal, Erfenis, Groothoek, Koppies, Kroonstad, Lace Mine, Rustfontein and Weltevrede). No serious infestation by alien flora has been observed, but the encroachment of dwarf karoo shrubs becomes a problem in the degraded southern parts of this vegetation unit. Erosion is low (45%), moderate (30%) or very low (20%).

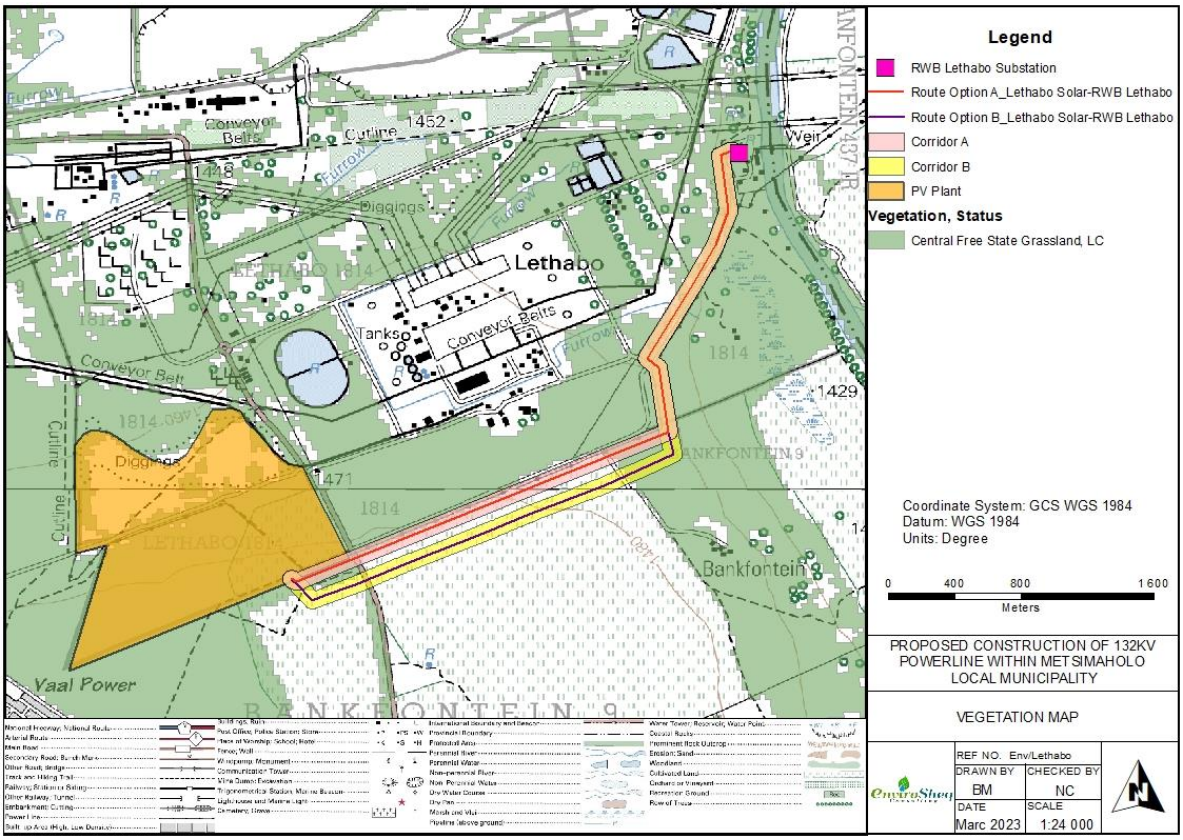

Figure 3 : Vegetation map

2. LEGISLATIVE & CONSERVATIONAL PLANNING REQUIREMENTS

The following legislative requirements were considered during the assessment:

2.1 National Environmental Management Act (NEMA) (Act 107 of 1998);

2.1.1 Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes

The report was compiled to fulfil the requirement for a **Terrestrial Biodiversity Assessment** as per the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA (GNR 320), **as gazetted on 20 March 2020.** This report is undertaken as supporting information as part of a greater environmental application process and is compliant in terms of the requirements in the above regulations in terms of Terrestrial Biodiversity.

2.2 National Environmental Management: Biodiversity Act (NEMBA) (Act No. 10 of 2004);

The objectives of this act are (within the framework of NEMA) to provide for:

- The management and conservation of biological diversity within the Republic of South Africa and of the components of such diversity;
- The use of indigenous biological resources in a sustainable manner;
- The fair and equitable sharing among stakeholders of the benefits arising from bioprospecting involving indigenous biological resources;
- To give effect to ratify international agreements relating to biodiversity which are binding to the Republic;
- To provide for cooperative governance in biodiversity management and conservation; and
- To provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act

This act alludes to the fact that management of biodiversity must take place to ensure that the biodiversity of the surrounding areas is not negatively impacted upon, by any activity being undertaken, to ensure the fair and equitable sharing among stakeholders of the benefits arising from indigenous biological resources.

Furthermore, a person may not carry out a restricted activity involving either:

- A specimen of a listed threatened or protected species;

- Specimens of an alien species; or
- A specimen of a listed invasive species without a permit.

Table 1 : Data coverages used to inform the ecological resource assessment.

Data/ Coverage Type	Relevance	Source
South African Vegetation Map (GIS Coverage)	Classify vegetation types and determination of reference primary vegetation.	SANBI (2018)
National Biodiversity Assessment – Threatened Ecosystems (GIS Coverage)	Determination of national threat status of local vegetation types.	SANBI (2018)
The Virtual Museum (Online search)	Online and literature sources such as Mammal Map, Reptile Map, Frog Map and the Reptile Atlas.	Fitz Patrick Institute of African Ornithology (2022)
SAPAD – South Africa Protected Areas Database (GIS Coverage)	Shows the location of protected areas within the region	http://egis.environment.gov.za DEA (2022)
SACAD – South Africa Conservation Areas Database (GIS Coverage)	Shows the location of conservation areas within the region	http://egis.environment.gov.za DEA (2022)

2.2.2 Explanations of Red Data classes

(After Raimondo *et al.* 2009):

Critically Endangered (CR): A species is Critically Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Critically Endangered, indicating that the species is facing an extremely high risk of extinction.

Implications for development: RED LIST SPECIES: No further loss of natural habitat should be permitted as the species is on the verge of extinction. The Threatened Species Programme must be informed immediately, providing details of the location, size and threats to the subpopulation.

Endangered (EN): A species is Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Endangered, indicating that the species is facing a very high risk of extinction.

Implications for development: RED LIST SPECIES:

Case A: If the species has a restricted range (EOO < 2 000 km2), recommend no further loss of habitat. If range size is larger, the species is possibly long- lived but widespread, and limited habitat loss may be considered under certain circumstances, such as the

implementation of an offset whereby another viable, known subpopulation is formally conserved in terms of the National Environmental Management: Protected Areas Act (Act 57 of 2003), and provided that the subpopulation to be destroyed does not occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.

Case B, C, D: No further loss of habitat should be permitted as the species is likely to go extinct in the near future if current pressures continue. All remaining subpopulations have to be conserved if this species is to survive in the long term.

Vulnerable (VU): A species is Vulnerable when the best available evidence indicates that it meets at least one of the five IUCN criteria for Vulnerable, indicating that the species is facing a high risk of extinction.

Implications for development: RED LIST SPECIES:

Case D: This species either constitutes less than 1 000 individuals or is known from a very restricted range. No further loss of habitat should be permitted as the species' status will immediately become either Critically Endangered or Endangered, should habitat be lost. The Threatened Species Programme must be informed immediately, providing details of the location, size and threats to the subpopulation.

Case B, C: The species is approaching extinction but there are still a number of subpopulations in existence. Recommend no further loss of habitat as this will increase the extinction risk of the species.

Case A: If the species has a restricted range, EOO < 2 000 km2, recommend no further loss of habitat. If range size is larger, the species is possibly long-lived but widespread, and limited habitat loss may be considered under certain circumstances, such as the implementation of an offset whereby another viable, known subpopulation is formally conserved in terms of the Protected Areas Act, and provided that the subpopulation to be destroyed does not occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.

Near Threatened (NT): A species is Near Threatened when available evidence indicates that it nearly meets any of the IUCN criteria for Vulnerable and is therefore likely to become at risk of extinction in the near future.

Implications for development: ORANGE LIST SPECIES:

Case D: Currently known from fewer than 10 locations, therefore preferably recommend no loss of habitat. Should loss of this species' habitat be considered, then an offset that includes conserving another viable subpopulation (in terms of the Protected Areas Act) should be implemented, provided that the subpopulation to be destroyed does not occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities. The Threatened Species Programme must be informed immediately, providing details of the location, size and threats to the subpopulation.

Case B, C: The species is approaching thresholds for listing as threatened but there are still a number of subpopulations in existence and therefore there is need to minimise loss of habitat. Conservation of subpopulations is essential if they occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.

Case A: If the species has a restricted range, EOO < 2 000 km2, then recommend no further loss of habitat. If range size is larger, the species is possibly long-lived but widespread, and limited habitat loss may be considered. Conservation of subpopulations is essential if they occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant biodiversity conservation plan or (iii) on a site associated with additional ecological sensitivities.

Critically Rare: A species is Critically Rare when it is known to occur at a single site but is not exposed to any direct or plausible potential threat and does not otherwise qualify for a category of threat according to one of the five IUCN criteria.

Case B, C: The species is approaching extinction but there are still several subpopulations in existence. Recommend no further loss of habitat as this will increase the extinction risk of the species.

Case A: If the species has a restricted range, EOO < 2 000 km2, recommend no further loss of habitat. If range size is larger, the species is possibly long-lived but widespread, and limited habitat loss may be considered under certain circumstances, such as the implementation of an offset whereby another viable, known subpopulation is formally conserved in terms of the Protected Areas Act, and provided that the subpopulation to be destroyed does not occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.

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Case A: If the species has a restricted range, EOO < 2 000 km2, then recommend no further loss of habitat. If the range size is larger, the species is possibly long-lived but widespread, and limited habitat loss may be considered. Conservation of subpopulations is essential if they occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant biodiversity conservation plan or (iii) on a site associated with additional ecological sensitivities.

Critically Rare: A species is Critically Rare when it is known to occur at a single site, but is not exposed to any direct or plausible potential threat and does not otherwise qualify for a category of threat according to one of the five IUCN criteria.

Implications for development: ORANGE LIST SPECIES: This is a highly range-restricted species, known from single or isolated sites, and therefore no loss of habitat should be permitted as it may lead to extinction of the species. The Threatened Species Programme is not aware of any current threats to this species and should be notified without delay. The Threatened Species Programme must be informed immediately, providing details of the location, size and threats to the subpopulation.

Rare: A species is Rare when it meets at least one of four South African criteria for rarity, but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to one of the five IUCN criteria.

Implications for development: ORANGE LIST SPECIES: The species is likely to have a restricted range, be highly habitat specific, or have small numbers of individuals, all of which makes it vulnerable to extinction should it lose habitat. Recommend no loss of habitat. The Threatened Species Programme is not aware of any current threats to this species and should be notified without delay. The Threatened Species Programme must be informed immediately, providing details of the location, size and threats to the subpopulation.

Declining: A species is Declining when it does not meet or nearly meet any of the five IUCN criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened, but threatening processes are causing a continuing decline of the species.

Implications for development: ORANGE LIST SPECIES: The species is declining but the population has not yet reached a threshold of concern; limited loss of habitat may be permitted. Should the species is known to be used for traditional medicine and if individuals will not be conserved in situ, plants should be rescued and used as mother stock for medicinal plant cultivation programmes.

Data Deficient - Insufficient Information (DDD): A species is DDD when there is inadequate information to make an assessment of its risk of extinction, but the species is well defined. Listing of species in this category indicates that more information is required and that future research could show that a threatened classification is appropriate.

Implications for development: ORANGE LIST SPECIES:

Case D: This species is very poorly known, with insufficient information on its habitat, population status or distribution to assess it. However, it is highly likely to be threatened. If a Data Deficient species will be affected by a proposed activity, the subpopulation should be well surveyed, and the data sent to the Threatened Species Programme. The species will be reassessed and the new status of the species, with a recommendation, will be provided within a short timeframe. The Threatened Species Programme must be informed immediately, providing details of the location, size and threats to the subpopulation.

Case T: There is uncertainty regarding the taxonomic status of this species, but it is likely to be threatened. Contact the taxonomist working on this group to resolve.

its taxonomic status; the species will then be reassessed by the Threatened Species Programme.

Least Concern: A species is Least Concern when it has been evaluated against the IUCN criteria and does not qualify for any of the above categories. Species classified as Least Concern are considered at low risk of extinction. Widespread and abundant species are typically classified in this category.

Implications for development: GREEN LIST SPECIES: Development is not expected to affect the conservation status of this species. Species removal may still be subject to provincial or national legislation.

Data Deficient - Taxonomically Problematic (DDT): A species is DDT when taxonomic problems hinder the distribution range and habitat from being well defined, so that an assessment of risk of extinction is not possible.

Implications for development: GREEN LIST SPECIES: Implications for development: GREEN LIST SPECIES: Development is not expected to affect the conservation status of this species. Species removal may still be subject to provincial or national legislation.

2.3 Conservation of Agricultural Resources Act (CARA, Act 43 of 1983)

Removal of the alien and weed species encountered in the application area must take place to comply with existing legislation (amendments to the regulations under the CARA, 1983 and Section 28 of the NEMA, 1998). Removal of species should take place throughout the construction and operation, phases.

3. STUDY METHODOLOGY

The following techniques and tools were used in the assessment:

3.1 Baseline Data / Desktop Assessment

Initial preparations:

For background information, the relevant maps, aerial photographs and other information on the natural environment of the concerned area were obtained. Further , the desktop assessment also included a review of the Ecological Assessment Report for the proposed Lethabo Solar Energy facility to be build next to the Lethabo power station where the proposed powerline will be connecting to.

3.2 Site visit

A one-day field assessment was undertaken on 24 February 2023, to determine the ecological status of the study area. A reconnaissance 'walkabout' was initially undertaken to determine the general habitat types found throughout the study area and, following this, specific study sites were selected that were considered to be representative of the habitats found within the area, with special emphasis being placed on areas that may potentially support Red Data Listed (RDL) species and/ or other floral Species of Conservation Concern (SCC). Sites were investigated on foot to identify the occurrence of the dominant plant species and habitat diversities.

3.3 Vegetation and Flora Assessment

Vegetation Surveys

Vegetation surveys were undertaken by first identifying different habitat units and then analysing the floral species composition that was recorded during detailed floral assessments using the step point vegetation assessment methodology. Different transect lines were chosen throughout the entire study area within areas that were perceived to best represent the various plant communities. Floral species were recorded and a species list was compiled for each habitat unit. These species lists were also compared with the vegetation expected to be found within the relevant vegetation types as described in Section 4, which serves to provide an accurate indication of the ecological integrity and conservation value of each habitat unit (Evans & Love, 1957; Owensby, 1973).

Vegetation Index Score

The Vegetation Index Score (VIS) was designed to determine the ecological state of each habitat unit defined within an assessment site. This enables an accurate and consistent description of the PES concerning the study area in question. The information gathered during the assessment also contributes towards sensitivity mapping, leading to a more truthful representation of ecological value and sensitive habitats.

Each defined habitat unit is assessed using separate data sheets (Appendix B) and all the information gathered then contributes to the final VIS score. The VIS is derived using the following formulas:

VIS = [(EVC) + (SI x PVC) + (RIS)]

Where:

- EVC is extent of vegetation cover;
- SI is structural intactness;
- PVC is percentage cover of indigenous species and
- RIS is recruitment of indigenous species.

Each of these contributing factors is individually calculated as discussed below. All scores and tables indicated in blue are used in the final score calculation for each contributing factor.

1. EVC=[(EVC1+EVC2)/2]

EVC 1 – Percentage Natural vegetation cover						
Vegetation cover %	0 %	1-5 %	6-25 %	26-50 %	51-75 %	76-100 %
Site score						
EVC 1 Score	0	1	2	3	4	5

EVC 2 – Total site disturbance						
Disturbance score	0	Very low	Low	Moderate	High	Very high
Site score						
EVC 1 Score	5	4	3	2	1	0

2. SI=(SI1+SI2+SI3+SI4)/4)

	Trees (S1)		Shrubs (S2)		Forbs (S3)		Grasses (S4)	
Score	Present state	Perceived reference state	Present state	Perceived reference state	Present state	Perceived reference state	Present state	Perceived reference state
Continuous								
Clumped								
Scattered								
Sparse								

*Present State (P/S) = currently applicable for each habitat unit , *Perceived Reference State (PRS) = if in pristine condition

Each SI score is determined regarding the following scoring table of vegetation distribution for the present state versus the perceived reference state.

	Present state (P/S)			
Perceived reference state (PRS	Continuous	Clumped	Scattered	Sparse
Continuous	**3**	**2**	**1**	**0**
Clumped	**2**	**3**	**2**	**1**
Scattered	**1**	**2**	**3**	**2**
Sparse	**0**	**1**	**2**	**3**

3. *PVC=[(EVC)-(exotic x 0.7) + (bare ground x 0.3)]*

Percentage vegetation cover (exotic)						
	0 %	1-5 %	6-25 %	26-50 %	51-75 %	76-100 %
Site score						
EVC 1 Score	0	1	2	3	4	5
Percentage vegetation cover (bare ground)						
	0 %	1-5 %	6-25 %	26-50 %	51-75 %	76-100 %
	0	1	2	3	4	5

4. RIS

Extent of indigenous species recruitment	0 %	Very low	Low	Moderate	High	Very high
RIS						
RIS Score	0	1	2	3	4	5

The final VIS scores for each habitat unit are then categorised as follows:

Vegetation Index Score	Assessment Class	Description
22-25	A	Unmodified, natural
18-22	B	Largely natural with few modifications
14-18	C	Moderately modified
10-14	D	Largely modified
5-10	E	The loss of natural habitat extensive
<5	F	Modified completely

Floral Habitat Sensitivity

The floral habitat sensitivity of each habitat unit was determined by calculating the mean of five different parameters which influence floral communities and provide an indication of the overall floristic ecological integrity, importance and sensitivity of the habitat unit. Each of the following parameters are subjectively rated on a scale of 1 to 5 (1 = lowest and 5 = highest):

- **Floral SCC**: The confirmed presence or potential for floral SCC or any other significant species, such as endemics, to occur within the habitat unit;
- **Unique Landscapes**: The presence of unique landscapes or the presence of an ecologically intact habitat unit in a transformed region;
- **Conservation Status**: The conservation status of the ecosystem or vegetation type in which the habitat unit is situated based on local, regional and national databases;
- **Floral Diversity**: The recorded floral diversity compared to a suitable reference condition such as surrounding natural areas or available floristic databases; and
- **Habitat Integrity**: The degree to which the habitat unit is transformed based on observed disturbances which may affect habitat integrity.

Each of these values contributes equally to the mean score, which determines the floral habitat sensitivity class in which each habitat unit falls. A conservation and land-use objective is also assigned to each sensitivity class which aims to guide the responsible and sustainable utilization of the habitat unit in question. To present the results use is made of spider

diagrams to depict the significance of each aspect of floral ecology for each vegetation type. The different classes and land-use objectives are presented in the table below:

Table 2: Floral Habitat Sensitivity Score

Score	Rating Significance	Conservation Objective
1> and <2	Low	Optimise developmental potential
2> and <3	Moderately Low	Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects.
3> and <4	Intermediate	Preserve and enhance the biodiversity of the habitat unit and surrounds while optimising development potential.
4> and <5	Moderately High	Preserve and enhance the biodiversity of the habitat unit limiting development and disturbance.
5	High	Preserve and enhance the biodiversity of the habitat unit, no-go alternative must be considered.

The vegetation/habitats were stratified into relatively homogeneous units on recent Google images of the area. The vegetation descriptions were based on total floristic composition, following established vegetation survey techniques (Mueller-Dombois & Ellenberg 1974; Westhoff & Van der Maarel 1978). Data recorded included a list of the plant species present, including trees, shrubs, grasses and forbs. Comprehensive species lists were therefore derived for each plant community / ecosystem present on the site. These vegetation survey methods have been used as the basis of a national vegetation survey of South Africa (Mucina *et al*. 2000) and are considered to be an efficient method of describing vegetation and capturing species information. Notes were additionally made of any other features that might have an ecological influence.

The identified systems are not only described in terms of their plant species composition, but also evaluated in terms of the potential habitat for red data plant species.

Critically Endangered, Endangered, Vulnerable and Protected Species (NEMBA species, TOPS species) were evaluated against the list published in Department of Environmental Affairs and Tourism Notice No. 2007 (National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)).

Protected trees were identified following the list of nationally protected trees published in Government Notice No. 29062 3 (2006) (National Forests Act, 1998 (Act No. 84 0f 1998), as Amended (Department of Water Affairs Notice No 897, 2006).

Lists of Red Data plant species for the area were obtained from the SANBI data bases, with updated threatened status, (Raimondo *et al* 2009). These lists were then evaluated in terms of habitat available on the site, and also in terms of the present development and presence of man in the area.

Alien invasive species were evaluated according to the Conservation of Agricultural Resources Act (Act No.43 of 1983) as listed in Henderson (2001) and other weeds Bromilov (2010) were indicated. Medicinal plants were indicated according to Van Wyk, Van Oudthoorn & Gericke (1997).

3.4 Floral Species of Conservational Concern Assessment

Prior to the field visit, a record of floral SCC and their habitat requirements was acquired from SANBI for the Quarter Degree Square in which the study area is situated, as well as relevant regional, provincial and national lists. Throughout the floral assessment, special attention was paid to the identification of any of these SCC as well as the identification of suitable habitats that could potentially support these species. The Probability of Occurrence (POC) for each floral SCC was determined using the following calculations wherein the distribution range for the species, specific habitat requirements and level of habitat disturbance were considered. The accuracy of the calculation is based on the available knowledge about the species in question, with many of the species lacking in-depth habitat research.

Each factor contributes an equal value to the calculation

Table 3: Floral Species of Conservational Concern Assessment Method

Distribution						
	Outside of known distribution range					Inside of known distribution range
Site Score						
Standard Score	0	1	2	3	4	5
Habitat Availability						
	No Habitat Available					Habitat Available
Site Score						
Standard Score	0	1	2	3	4	5
Habitat Disturbance						
	No Habitat Disturbance	Very Low	Low	Moderate	High	Very High
Site Score						
Standard Score	5	4	3	2	1	0

Distribution + Habitat availability + Habitat disturbance] / 15 x 100 = POC%

The following **conservation value** categories were used for the evaluation of the site:

Table 4: Conservation value categories

Ranking	Description
High**:**	Ecologically sensitive and valuable land with high species richness and/or sensitive ecosystems or red data species that should be conserved and no development allowed.
Medium-high:	Land where sections are disturbed but which is in general ecologically sensitive to development/disturbances.
Medium	Land on which low-impact development with limited impact on the vegetation/ecosystem could be considered for development. It is recommended that certain portions of the natural vegetation be maintained as open space
Medium-low	Land of which small sections could be considered to conserve but where the area, in general, has little conservation value
Low	Land that has little conservation value and that could be considered for development with little to no impact on the vegetation

3.5 Sensitivity

High and Low sensitivity is indicated as follows:

Table 5: Sensitivity Rating

Ranking	Description
High:	High and Medium-High conservation priority categories mentioned above are considered to have a High sensitivity and development should not be supported. Portions of vegetation with a Medium conservation priority should be conserved
Low	Medium, Medium-Low and Low conservation priority categories mentioned above are considered to have a Low sensitivity and development may be supported

3.6 Plant Species Status

Plant species recorded in each plant community with an indication of the status of the species by using the following symbols:

A = Alien woody species
D = Dominant
d = subdominant
G = Garden or Garden Escape
M = Medicinal plant species
P = Protected trees species
p = provincially protected species
RD = Red data listed p

3.7 Species Richness

Species Richness is interpreted as follows: Number of indigenous species recorded in the sample plots representing the plant community. Alien woody species and weeds are not included

Table 6: Species Richness

No of Species	Category
1-24	Low
25-39	Medium
40-59	High
60+	Very High

4. RESULTS OF THE ASSESSMENT

Corridor A and Corridor B (a deviation of Corridor A) have undergone vegetation transformation as a result of current and historic activities. Large areas of secondary grassland are also present as a result of edge effects associated with these activities, such as woody encroachment and alteration of fire frequency and intensity. Thus, three habitat units are present in the study area or close to the boundary of the study site, namely the Transformed / Degraded Habitat Unit, the Secondary grassland Habitat Unit and the Wetland Habitat Unit. These habitat units are discussed in more detail below. The wetland habitat unit is discussed in the wetland report.

For this specific report, the sections are described as follows:

Section A- refers to Corridor A and Corridor B

Section B- refers to the section of the powerline from where Corridor A and B end to the RWB substation.

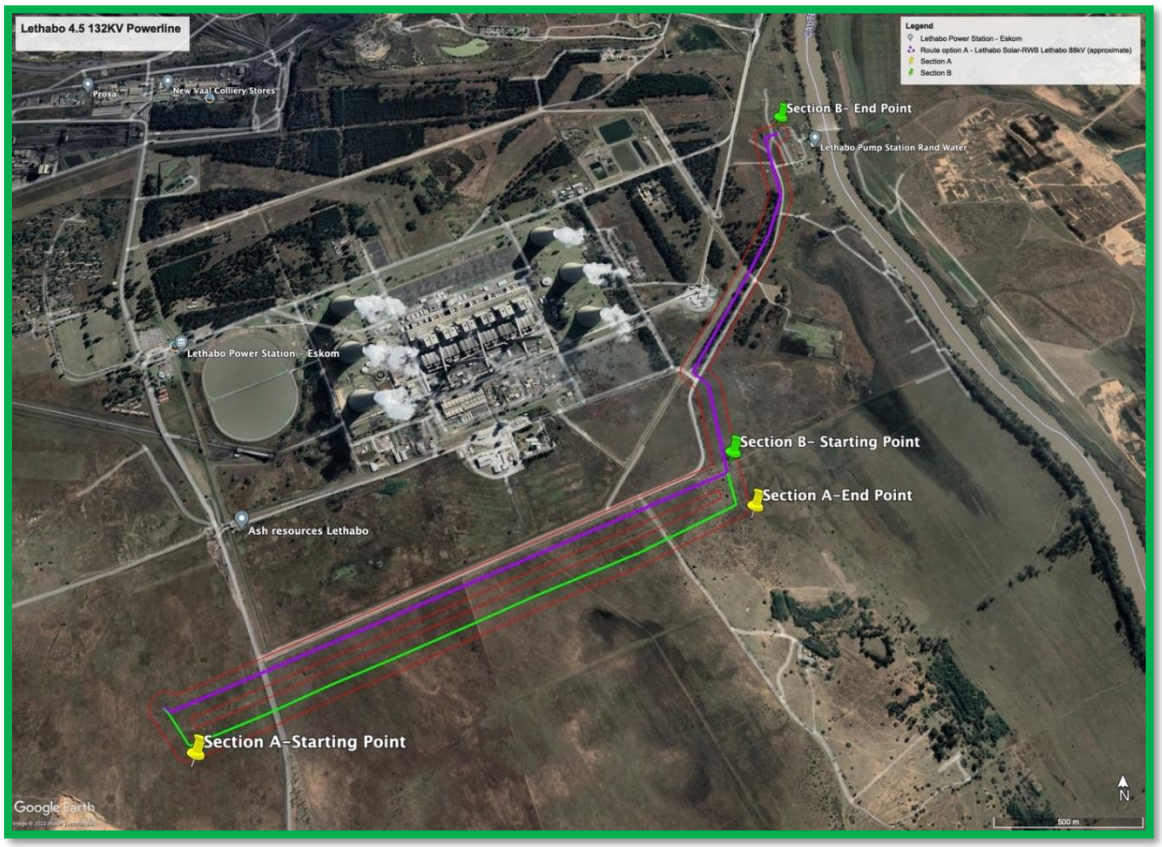

Figure 4 - Study area sections

4.1 All Sites

Section A vegetation consists of a relatively dense herbaceous layer and covers most of Corridor A and Corridor B. There is a high presence of *Digitaria eriantha* and *Eragrostis curvula*. A large presence of alien invasives, most notable *Tagetes minuta* (Khaki Weed) is still indicative of the disturbed nature of this vegetation and it is expected that species composition may still change considerably over the next few years if left as is.

Section B consists of mainly tall stands of eucalyptus and a dense layer of grass species. A small section of the area in proximity to the curve where section A and B intersect has moister soil conditions, which has led to the establishment of some facultative wetland species. This moisture may be due to continued water spillage from adjacent pipelines or stormwater drains. The dense grass layer is invaded by Category 1b alien invasive *Verbena bonariensis*, which can gradually displace more of the natural vegetation. Some of the species recorded on site are as follows:

Aristida adscensionis (d), A. congesta (d), Cynodon dactylon (d), Eragrostischlo- romelas (d), E. curvula (d), E. plana (d), Panicum coloratum (d), Setaria sphace- lata (d), Themeda triandra (d), Tragus koelerioides (d), Agrostis lachnantha, Andropogon appendiculatus, Aristida bipartita, A. canescens, Cymbopogon pospischilii, Cynodon transvaalensis, Digitaria argyrograpta, Elionurus muticus, Eragrostis lehman- niana, E. micrantha, E. obtusa, E. racemosa, E. trichophora, Heteropogon contortus, Microchloa caffra, Setaria incrassata, Sporobolus discosporus. Herbs: Berkheya onopordifolia var. onopordifolia, Chamaesyce inaequilatera, Conyza pinnata, Crabbea acaulis, Geigeria aspera var. aspera, Hermannia depressa, Hibiscus pusillus, Pseudognaphalium, Salvia steno- phylla, Selago densiflora, Sonchus dregeanus. Geophytic Herbs: Oxalis depressa, Raphionacme dyeri. Succulent Herb: Tripteris aghillana var. integrifolia. Low Shrubs: Felicia muricata (d), Anthospermum rigidum subsp. pumilum, Helichrysum dregea- num, Melolobium candicans, Pentzia globosa.

Photographs below show typical vegetation in both Section A and B of the study site

Section B -The photogram shows dominant grass vegetation on site

Figure 5 : Section A – Corridor A and B

Section B- The site is largely transformed with eucalyptus tree stands.

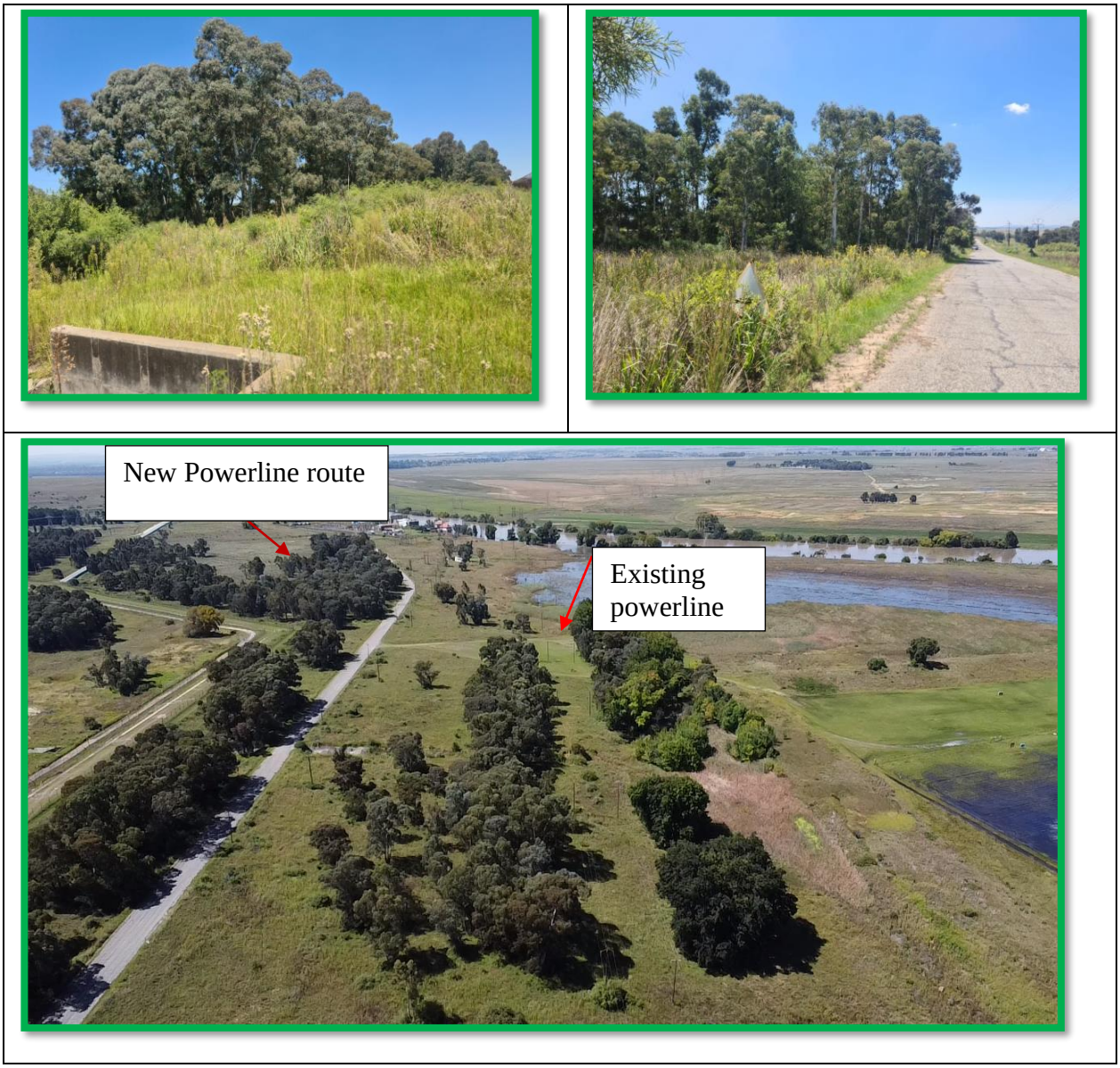

Figure 6: Section B – Corridor A

As can be observed from the site photographs presented above, the habitat unit and vegetation is uniform across the entire sites. The site borders with a Critical Biodiversity Area and No Natural Areas The proposed sites are dominated by grass species and densely populated eucalyptus species. The vegetation within this habitat unit comprises dense stands of creeping ground cover, shrubs and a few small-sized trees. This habitat unit is comprised of also indigenous floral species, predominantly grass species with several indigenous tree species being observed. The sites that are close to the existing infrastructure such as the powerline, roads and canals/ stormwater exhibit signs of long-term habitat

disturbance from anthropogenic activities. Overall the site-sensitive rating was regarded to fall within the Medium-Low and Low conservation priority categories mentioned above are considered to have a Low sensitivity and development may be supported.

The results of the assessment are presented in the figures and tables below.

4.2 Vegetation Index Score for the site

Table 7: Vegetation Index Score

Section	Vegetation Index Score	Assessment Class	Description
Section A	16	**C**	**Moderately modified**
Section B	**12**	**D**	**Largely modified**

4.3 Floral SCC Assessment

An assessment considering the presence of any plant species of concern, as well as suitable habitat to support any such species was undertaken. The complete SANBI PRECIS Red Data Listed plants as well as the conservation list were acquired for the Quarter Degree Square (QDS).

Threatened species are species that are facing a high risk of extinction. Any species classified in the IUCN categories Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) is a threatened species.

SCC are species that have high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare and Declining.

There were no species of conservational concern (SCC) observed all the assessed corridors.

4.4 Alien and Invasive Plant Species

Alien invaders are plants that are of exotic origin and are invading previously pristine areas or ecological niches (Bromilow, 2001). Not all weeds are exotic in origin but, as these exotic plant species have very limited natural "check" mechanisms within the natural environment, they are often the most opportunistic and aggressively growing species within the ecosystem. Therefore, they are often the most dominant and noticeable within an area. Disturbances of the ground through trampling, excavations or landscaping often lead to the dominance of exotic pioneer species that rapidly dominate the area. Under natural conditions, these pioneer species are overtaken by sub-climax and climax species through natural veld succession. This process however takes many years to occur, with the natural vegetation never reaching the balanced, pristine species composition before the disturbance. There are many species of indigenous pioneer plants, but very few indigenous species can out-compete their more aggressively growing exotic counterparts. Alien vegetation invasion causes degradation of the ecological integrity of an area, causing (Bromilow, 2001):

- A decline in species diversity;
- Local extinction of indigenous species;
- Ecological imbalance;
- Decreased productivity of grazing pastures and
- Increased agricultural input costs.

The table below indicates the alien and invader species identified during the site assessment along with their relevant categories according to the NEMBA Alien and Invasive Species Regulations (2014). Most of these species were encountered in the transformed and secondary grassland habitat units.

Table 8 : Alien Species

Species	English name	Type of Origin	NEMBA Category**
Bidens pilosa	*Blackjack*	*South America*	*N/A*
Conyza bonariensis	*Hairy Horseweed*	*North America*	*N/A*
Solanum elaeagnifolium	*Silverleaf Nightshade*	*North America*	*1b*
Sonchus oleraceus	*Sow-Thistle*	*Europe, Asia and North America*	*N/A*
Solanum elaeagnifolium	*Silverleaf Nightshade*	*North America*	*1b*
Sonchus oleraceus	*Sow-Thistle*	*Europe, Asia and North America*	*N/A*
Tagetes minuta	*Tall khaki weed*	*South America*	*N/A*
Taraxacum officinale	*Common Dandelion*	*Eurasia*	*N/A*
Populus x canescens	*Grey Poplar*	*Europe and Asia*	*2*
Plantago lanceolata	*Ribwort*	*Europe*	*N/A*
Verbena tenuisecta	*Fine leaf verbena*	*South America*	*N/A*

Verbena bonariensis	*Purple top*	*South America*	*1b*

**Categories according to NEMBA (Alien and Invasive Species Regulations, 2014)
Category 1a - Invasive species that require compulsory control.
Category 1b - Invasive species that require control by means of an invasive species management programme.
Category 2 - Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread.
Category 3 - Ornamentally used plants that may no longer be planted.

From the table above it is clear that a moderate to high diversity of alien species occurs within the study area, especially within the transformed areas. Should the proposed development proceed , alien species located within the corridor of the proposed powerline need to be removed on a regular basis as part of maintenance activities according to the CARA (Act No. 43 of 1983).

4.5 Medicinal Plant Species in the study areas

Medicinal plant species are not necessarily indigenous species, with many of them regarded as alien invasive weeds. The table below presents a list of dominant plant species with traditional medicinal value, plant parts traditionally used and their main applications. These medicinal species are all commonly occurring species and are not confined to the study area. The list is as follows:

Table 9: Medicinal species

Species	Name	Plant parts used	Medicinal uses
Helichrysum krausii	Everlasting	Leaves, twigs and sometimes the roots	Many ailments are treated, including coughs, colds, fever, infections, headache and menstrual pains. It is a popular ingredient in wound dressing.
Vernonia oligocephala	Bitterbossie	Leaves and twigs	Abdominal pain and colic. Rheumatism, dysentery, and diabetes.
Plantago lanceolata	Ribwort plantain	Leaves	Anti-inflammatory and expectorant. Used to treat wounds, inflammation of skin and against catarrhs of the respiratory tract and inflammation of mouth and throat.
Conyza canadensis	Horseweed fleabane	Herb	Astringent, diarrhoea, diuretic, colds, insect repellent

A low diversity of medicinal plant species is present, and all the species are widespread thus the proposed construction is not likely to pose a significant threat to medicinal species locally and regionally. The low abundance of medicinal plants is likely due to long-term anthropogenic activities, dumping of waste and human settlement and the proliferation of alien invasive species which compete

with the indigenous plants and alter the natural habitat.

4.6 Sensitivity Mapping for all sites

Table 10: Sensitivity Analysis for All Sites

Study Section	Habitat Unit	C-Plan Sensitivity	Conservation Objective	Development Implications
Section A (Corridor A & B)	Transformed Grasslands	Very High	The area falls within Ecological Support Areas 1 and 2 with the longer section within Ecological Support Area 2	Despite the loss of vegetation associated with the proposed land use, there are no significant development implications to the proposed site and the surrounding areas as the site is in a transformed state.
Section B	Transformed Grasslands with densely populated eucalyptus	Very High	The section falls mainly within Ecological Support Areas 1 and 2 with the longer section within Ecological Support Area 2	Despite the loss of vegetation associated with the proposed land-use, there are no significant development implications to the proposed site and the surrounding areas as the site is in a transformed state.

Figure 7 below conceptually illustrates the considered view that the area has some ecological significance due to the sites located in an ecological area. The illustration does depict low to medium sensitivity in terms of floral SCC, habitat intactness, threat status of the habitat type, the presence of unique landscapes and overall levels of diversity rather it shows high levels of disturbance. The table below presents the sensitivity class of the site.

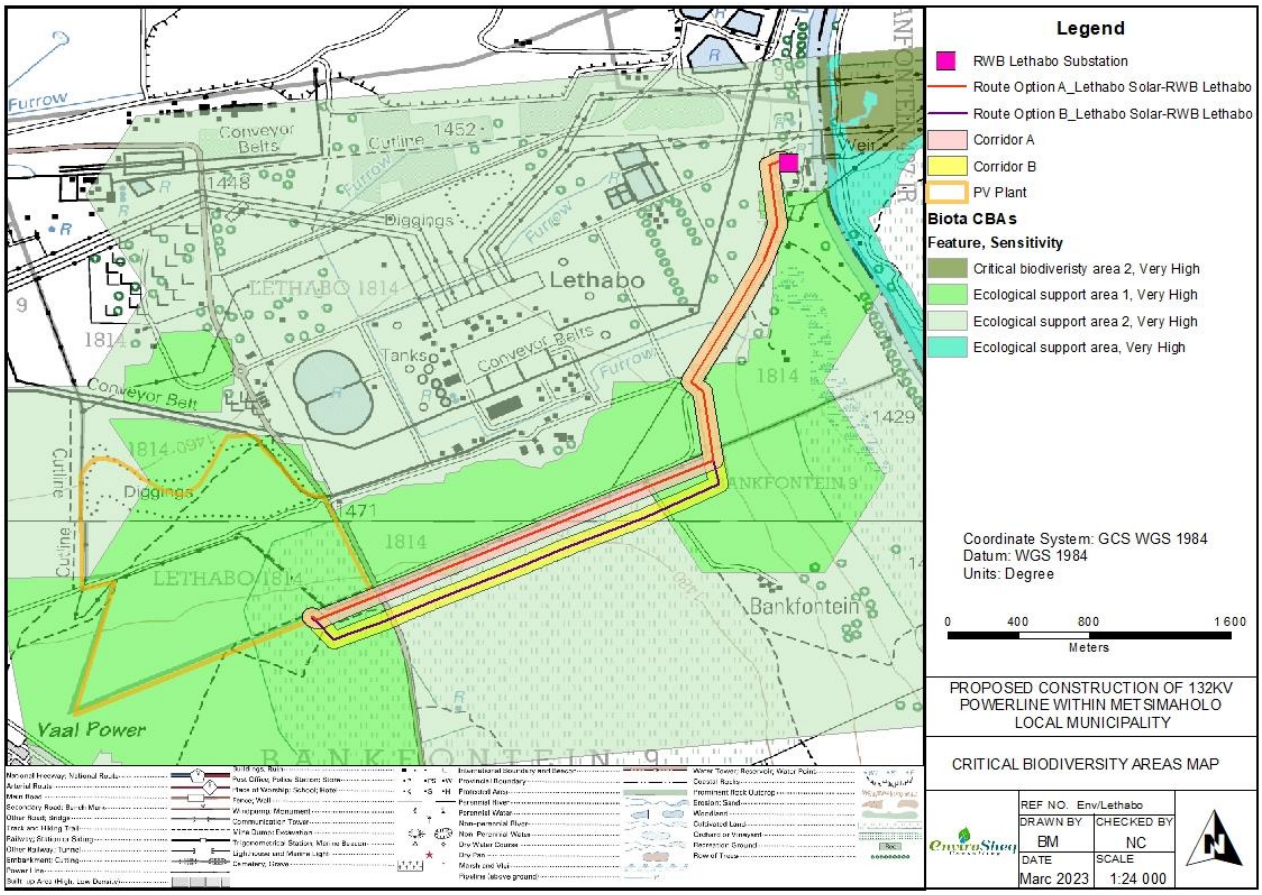

Figure 7: Site Sensitivity

4.7 Priority Areas

Priority areas include formal and informal protected areas (nature reserves); important bird areas (IBAs); RAMSAR sites; National freshwater ecosystem priority areas (NFEPA) and National protected areas expansion strategy (NPAES) areas. The study area is not situated within, or adjacent to, any priority areas. See Figure 8.

4.8 Critical Biodiversity Areas and Ecological Support Areas

The study area is not within any Critical Biodiversity Areas (CBAs) however all the sites are located within Ecological Support Area (ESA).

4.9 Floral Habitat Sensitivity

All mapped wetland areas are classified as areas of High Sensitivity within the study area. The sections traversed by the proposed powerline were rated as shown in the table 11.

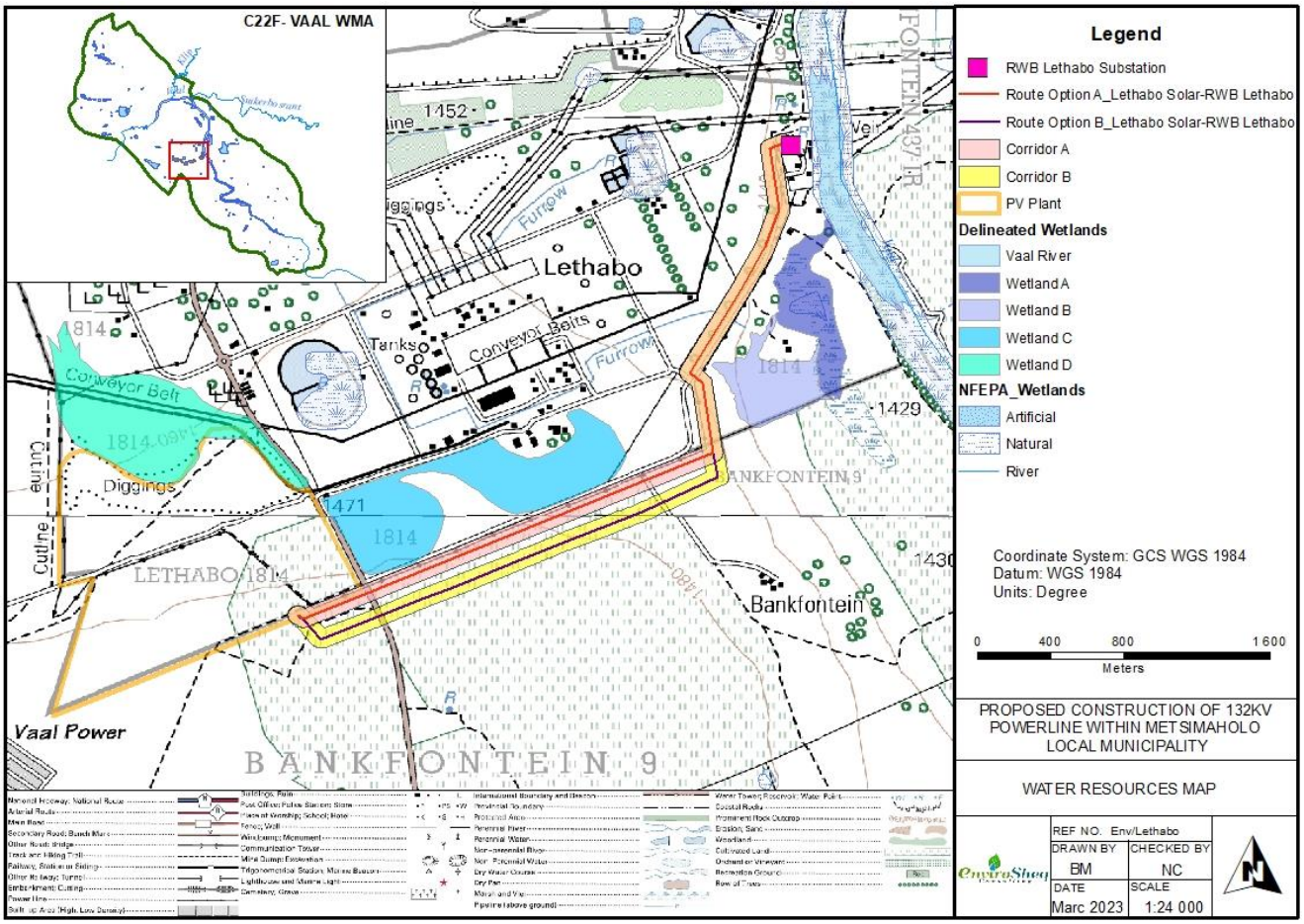

Figure 8: Priority Areas

Table 11: Floral Habitat Sensitivity

Section	Score	Rating Significance	Conservation Objective
Section A	3.2	Intermediate	Preserve and enhance the biodiversity of the habitat unit and surrounds while optimising development potential.
Section B	2.3	Moderately Low	Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects.

4.10 Species Richness

Species Richness is interpreted as follows: Number of indigenous species recorded in the sample plots representing the plant community. Alien woody species and weeds are not included.

Section	No of Species	Category
Section A & B	23	Low

4.11 Amphibians, Reptiles and Mammals

A list of protected vertebrate species (reptiles, birds, and mammals) that could occur in the study area according to the ADU and SANBI databases, as well as Apps (2000) is presented in Appendix A.

During the site assessment, small burrows of Yellow Mongoose (Cynictis penicillata) were observed in section B of the site. Hares (Lepus saxatilis and L. capensis) which is a terrestrial vertebrate was on the site.

5. IMPACT ASSESSMENT

Issues or Activity	Direct / Indirect/ Cumulative	General Impact	Spatial Scale	Temporary scale/ Duration	Severity/ Beneficial Scale	Certainty Scale/ Likelihood	Significance Pre-Mitigation	Mitigation Measures	Significance Post-Mitigation
CONSTRUCTION PHASE									
ECOLOGICAL IMPACT ASSESSMENT									
Impact on Habitat for Floral Species	Direct	During the construction phase, the clearing of vegetation will lead to the loss of natural vegetation	Site (1)	Medium-term (2)	Low (1)	Probable (2)	Low Impact (8)	• During the design phase , aim to have connection routes coinciding with the existing tracks or fence lines to reduce the disturbance to vegetation and avoid creating new tracks and areas of compaction and maintenance machinery. • ,The construction footprint must be surveyed and demarcated prior to construction commencing. • A site plan must be developed showing location of the site camp lay-down area and the plan must be approved by the ECO before construction begins. Where vegetation has been cleared outside of the construction footprint, site rehabilitation in terms of soil stabilisation and revegetation must be undertaken Should there be SCC identified, the SCC must be relocated to a nursery or native habitat.	Low Negative Impact
Impact on Floral Diversity	Direct	During the construction phase the clearing of vegetation will lead to loss of natural vegetation	Site (1)	Medium-term (2)	Low (1)	Probable (2)	Low Impact (8)		Low Negative Impact
Impact on Floral SCC	Direct	During the construction phase the clearing of vegetation will lead to loss of natural vegetation	Site (1)	Medium-term (2)	Low (1)	Probable (2)	Low Impact (8)		Low Negative Impact
Impact on Floral SCC	Cumulative	During the construction phase the clearing of vegetation will lead to loss of natural vegetation	Site (1)	Short Term (1)	Moderate (2)	Probable (2)	Low Impact (8)		Low Negative Impact

Issues or Activity	Direct / Indirect/ Cumulative	General Impact	Spatial Scale	Temporary scale/ Duration	Severity/ Beneficial Scale	Certainty Scale/ Likelihood	Significance Pre-Mitigation	Mitigation Measures	Significance Post-Mitigation
CONSTRUCTION PHASE									
Impact on Fauna	Direct	Loss of Habitat	Site (1)	Medium-term (2)	Low (1)	Probable (2)	Low Impact (8)	• Clearance of vegetation must only be done on areas earmarked to avoid disturbance of the ecosystem.	Low Negative Impact

5.1 Cumulative Impacts

Cumulative effects are commonly understood as the impacts which combine from different projects, and which result in significant change, which is larger than the sum of all the impacts. Cumulative effects can be characterised according to the pathway it follows. One pathway could be the persistent additions from one process. Another pathway could be the compounding effect from one or more processes. Cumulative effects can therefore occur when impacts are: (1) additive (incremental); (2) interactive; (3) sequential; or (4) synergistic. (DEAT, 2004). It is in this regard that this section seeks to address and assess the cumulative impact of the proposed project.

The proposed 132kV powerline will be 4.5km long and will traverse across transformed ecosystems. The ecosystem has been transformed from its pristine state due to various historical and current anthropogenic activities happening around the area which include power generation, road infrastructure development, farming and last but not least construction of a network of power transmission and distribution lines spanning thousands of kilometers from the Lethabo power station. Of significance to note is that within the proposed corridors there are existing power transmission lines that have been build over time and the observation has been that these lines apart from contributing to the nature of the transformed ecosystem due to clearance of vegetation at pilon station, there is no significant contribution to the degradation of the environment as compared to the other activities accruing around the area. It is in this regard that the anticipated cumulative impact from the proposed powerline on habitat for floral species, floral diversity, floral SCC and on fauna will be of insignificant nature.

6. CONCLUSION

The findings of the field assessment indicate that the vegetation within the two alternative corridors is transformed, with low plant species richness and no red data plant species present. The terrestrial habitat associated with the study area is of low to intermediate sensitivity. Widespread anthropogenic impacts from current use and some level of alien and invasive plant proliferation have degraded the available floral habitat associated with the site.

The ecology of the proposed powerline corridor was assessed over one day in February 2023. The proposed site is situated within Central Free State grassland which is not considered to be vulnerable. However, the Free State Biodiversity Conservation Assessment classifies the study area as Ecological Support Areas 1 and 2. No threatened plant species were confirmed during fieldwork and no Near Threatened and protected species were recorded. In total, 23 plant species were recorded from the proposed corridors. No threatened fauna species were recorded.

The major impacts on fauna are likely to occur during the construction phase due to the increased human presence at the sites as well as the operation of heavy machinery. This will however be temporary, no RDB species are likely to be impacted, and in the longer-term impact on fauna would be low. With mitigation and regulation of human activity at this site, these impacts can likely be reduced to an acceptable level as is the case currently.

Based on this sensitivity assessment, the following recommendations can be made:

i. All infrastructure are to be situated within the boundaries of the assessed corridors.

The impact on fauna is expected to be small to negligent. Presence of indigenous terrestrial vertebrates within the study area is low due to current land use. Animals that may be permanently present can be relocated or will move away during construction, and may resettle after construction, depending on safety specifications necessitated by the development. No restricted or specific habitat of vertebrates exists on the study area and will be affected by the proposed development; especially if the proposed development remains outside the recommended buffers around wetland and seepage areas.

In conclusion, both corridors are viable as there are no significant impacts associated with the development of any of the proposed corridors that cannot be reduced to a

manageable level through mitigation. As such, there are no reasons from a terrestrial ecology perspective that the development should not proceed. Of significance to note is that there will be no impact anticipated at the existing substation and that the proposed corridors are located within the same environment and as such there is clearly no advantage or disadvantage in proceeding with any of the two alternatives.

Provided the recommendations suggested in this report are followed, there is no objection to the proposed development in terms of the terrestrial ecosystems of the study area.

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8. APPENDICES

APPENDIX A- Red data terrestrial vertebrate species previously recorded in the area.

Common Name	Species Name	Threat Status
Amphibians		
Pyxicephalus adspersus	Giant Bull Frog	Near Threatened
Reptiles - Serpents		
Homoroselaps dorsalis	Striped Harlequin Snake	Near Threatened
Chiroptera - Bats		
Miniopterus fraterculus	Lesser Long-fingered Bat	Near Threatened
Myotis tricolor	Temminck's Myotis	Near Threatened
Rhinolophus darlingi	Darling's Horseshoe Bat	Near Threatened
Rhinolophus clivosus	Geoffroy's Horseshoe Bat	Near Threatened
Rhinolophus blasii	Blasius's Horseshoe Bat	Vulnerable
Insectivora - Insectivores		
Suncus varilla	Lesser Dwarf Shrew	Data deficient
Suncus infinitesimus	Least Dwarf Shrew	Data deficient
Crocidura mariquensis	Swamp Musk Shrew	Data deficient
Crocidura maquassiensis	Makwassie Musk Shrew	Vulnerable
Atelerix frontalis	Southern African Hedgehog	Near Threatened
Muridae - Gerbils		
Tatera leucogaster	Bushveld Gerbil	Data Deficient
Rodentia - Rodents		
Lemniscomys rosalia	Single-Striped Grass Mouse	Data Deficient
Mystromys albicaudatus	African White-tailed Rat	Endangered

APPENDIX B

1. EVC=[(EVC1+EVC2)/2]

EVC 1 – Percentage Natural vegetation cover						
Vegetation cover %	0 %	1-5 %	6-25 %	26-50 %	51-75 %	76-100 %
Site score						*
EVC 1 Score	0	1	2	3	4	5

EVC 2 – Total site disturbance						
Disturbance score	0	Very low	Low	Moderate	High	Very high
Site score			*			
EVC 1 Score	5	4	3	2	1	0

2. SI=(SI1+SI2+SI3+SI4)/4) =2.5

	Trees (S1)		Shrubs (S2)		Forbs (S3)		Grasses (S4)	
Score	Present state	Perceived reference state	Present state	Perceived reference state	Present state	Perceived reference state	Present state	Perceived reference state
Continuous							*	*
Clumped								
Scattered	*	*		*		*		
Sparse			*		*			

*Present State (P/S) = currently applicable for each habitat unit , *Perceived Reference State (PRS) = if in pristine condition

Each SI score is determined with reference to the following scoring table of vegetation distribution for present state versus perceived reference state.

	Present state (P/S)			
Perceived reference state (PRS	Continuous	Clumped	Scattered	Sparse
Continuous	**3**	**2**	**1**	**0**
Clumped	**2**	**3**	**2**	**1**
Scattered	**1**	**2**	**3**	**2**
Sparse	**0**	**1**	**2**	**3**

3. *PVC=[(EVC)-(exotic x 0.7) + (bare ground x 0.3)]*

Percentage vegetation cover (exotic)						
Vegetation Cover	0 %	1-5 %	6-25 %	26-50 %	51-75 %	76-100 %
Site score	*					
PVC 1 Score	0	1	2	3	4	5
Percentage vegetation cover (bare ground)						
Vegetation Cover	0 %	1-5 %	6-25 %	26-50 %	51-75 %	76-100 %
Site Score						*

PVC Score	0	1	2	3	4	5

4. RIS

Extent of indigenous species recruitment	0 %	Very low	Low	Moderate	High	Very high
RIS		*				
RIS Score	0	1	2	3	4	5

EVC=4

SI=2.5

RIS=1

PVC=5.5

VIS =(EVC) + (SI x PVC)+(RIS)= 18,75. The site shows that it is largely natural with few modifications

The final VIS scores for each habitat unit are then categorised as follows:

Vegetation Index Score	Assessment Class	Description
22-25	A	**Unmodified, natural**
18-22	B	**Largely natural with few modifications**
14-18	C	**Moderately modified**
10-14	D	**Largely modified**
5-10	E	**The loss of natural habitat extensive**
<5	F	**Modified completely**

APPENDIX C – DECLARATION

I, Frank Mhandu, declare that --

General declaration:

- I act as the independent specialists in this application.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, regulations, and all other applicable legislation.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

Name of company: *Envirosheq Consulting*

Date: 25 March 2023

APPENDIX D -IMPACT ASSESSMENT METHODOLOGY

Methodology Description

The purpose of impact assessment is to identify and evaluate the likely significance of the potential impacts on identified receptors and natural resources according to a defined assessment criterion, to develop and describe measures that will be taken to avoid, minimize, reduce or compensate for any potential adverse environmental effects and to report the significance of the residual impacts that remain following mitigation.

The adequate assessment and evaluation of the potential impacts and benefits associated with the project necessitates the development of a scientific methodology that will reduce the subjectivity involved in making such evaluations. A clearly defined methodology is clearly outlined in this report on how to accurately determine the significance of the predicted impact on, or benefit to, the surrounding natural and/or social environment. For this, the project must be considered in the context of the area and the people that will be affected.

Impact Prediction Methodology

There are a number of ways that impacts may be described and quantified. An impact is essentially any change to a resource or receptor brought about by the presence of the Project component or by the execution of a Project related activity. Impact assessment will also be done for the anticipated cumulative impacts defined below

Cumulative Impacts

Cumulative impacts occur when a proposed project activity acts together with other activities (other projects) to impact on the same environmental or social resources or receptor. Cumulative impacts have been defined as "the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted".

The impact assessments in the Basic Assessment Report of the proposed project will consider the cumulative impacts of past and present projects in that all impacts are assessed against the present day baseline. The present day baseline includes impacts of past and present projects that have shifted the original natural conditions to the present day conditions. Thus, the cumulative impacts section will consider potential reasonably defined developments that could act together with the proposed project to impact on common receptors.

Rating of Potential Impacts

The potential environmental impacts associated with the proposed project will be evaluated according to its nature, extent, duration, intensity, probability and significance of the impacts, whereby:

- Nature: A brief written statement of the environmental aspect being impacted upon by a particular action or activity.
- Extent: The area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact. For example, high at a local scale, but low at a regional scale;
- Duration: Indicates what the lifetime of the impact will be;
- Intensity: Describes whether an impact is destructive or benign;
- Probability: Describes the likelihood of an impact actually occurring; and
- Cumulative: In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area

CRITERIA	DESCRIPTION			
EXTENT	National (4) The whole of South Africa	Regional (3) Provincial and parts of neighbouring provinces	Local (2) Within a radius of 2 km of the construction site	Site (1) Within the construction site
DURATION	Permanent (4) Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient	Long-term (3) The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter. The	Medium-term (2) The impact will last for the period of the construction phase, where after it will be entirely negated	Short-term (1) The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase

		only class of impact which will be non-transitory		
INTENSITY	Very High (4) Natural, cultural and social functions and processes are altered to extent that they permanently cease	High (3) Natural, cultural and social functions and processes are altered to extent that they temporarily cease	Moderate (2) Affected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way	Low (1) Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected
PROBABILTY OF OCCURANCE	Definite (4) Impact will certainly occur	Highly Probable (3) Most likely that the impact will occur	Possible (2) The impact may occur	Improbable (1) Likelihood of the impact materialising is very low

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

*SIGNIFICANCE = EXTENT +DURATION + INTENSITY X PROBABILITY (S = E + D + I * P)*

Impacts Criteria For The Rating Of Classified

Low impact (3 -10 points)	A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction or operating procedure.
Medium impact (11 -20 points)	Mitigation is possible with additional design and construction inputs.
High impact (21 -30 points)	The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
Very high impact (31 - 48 points)	Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a "very high impact" is likely to be a fatal flaw.
Status	Denotes the perceived effect of the impact on the affected area.
Positive (+)	Beneficial impact.

Negative (-)	Deleterious or adverse impact.
Neutral (/)	Impact is neither beneficial nor adverse.
It is important to note that the status of an impact is assigned based on the status quo – i.e. should the project not proceed. Therefore not all negative impacts are equally significant.	