



**SCIENTIFIC TERRESTRIAL SERVICES**

**BIODIVERSITY ASSESSMENT AS PART OF  
THE PROPOSED EIA AND WUL AMENDMENT  
PROCESS FOR THE MR83 UG TARGETS NEAR  
PILGRIMS REST, MPUMALANGA**

**Part B: Floral Assessment**

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**Report Reference:** STS 210071  
**Date:** March 2022



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## GLOSSARY OF TERMS

Most definitions are based on terms and concepts elaborated by Richardson *et al.* (2011), Hui and Richardson (2017), Wilson *et al.* (2017) and Skowno *et al.* (2019), with consideration to their applicability in the South African context, especially South African legislation [notably the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), and the associated Alien and Invasive Species Regulations, 2020].

<b>Alien species</b> (syn. exotic species; non-native)	A species that is present in a region outside its natural range due to human actions (intentional or accidental) that have enabled it to overcome biogeographic barriers.
<b>Biodiversity Management Plan</b>	A plan aimed at ensuring the long-term survival in nature of an indigenous species, a migratory species, or an ecosystem, published in terms of the Biodiversity Act. Norms and standards to guide the development of Biodiversity Management Plans for Species have been developed. At the time of writing, norms and standards for Biodiversity Management Plans for Ecosystems were in the process of being developed.
<b>Biological diversity or Biodiversity (as per the definition in NEMBA)</b>	The variability among living organisms from all sources including, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part and includes diversity within species, between species, and of ecosystems.
<b>Biome - as per Mucina and Rutherford (2006); after Low and Rebelo (1998).</b>	A broad ecological spatial unit representing major life zones of large natural areas – defined mainly by vegetation structure, climate, and major large-scale disturbance factors (such as fires).
<b>Bioregion (as per the definition in NEMBA)</b>	A geographic region which has in terms of section 40(1) been determined as a bioregion for the purposes of this Act.
<b>Casual species</b>	Those alien species that do not form self-replacing populations in the invaded region and whose persistence depends on repeated introductions of propagules (Richardson <i>et al.</i> 2000; Pyšek <i>et al.</i> 2004). The term is generally used for plants.
<b>Critical Biodiversity Area (CBA)</b>	A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation, and ridges.
<b>Corridor</b>	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
<b>Critically Endangered (CR) (IUCN Red List category)</b>	<b>Applied to both species/taxa and ecosystems:</b> 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. Critically Endangered ecosystem types are considered to be at an extremely high risk of collapse. Most of the ecosystem type has been severely or moderately modified from its natural state. The ecosystem type is likely to have lost much of its natural structure and functioning, and species associated with the ecosystem may have been lost. Critically endangered species are those considered to be at extremely high risk of extinction.
<b>Degradation</b>	The many human-caused processes that drive the decline or loss in biodiversity, ecosystem functions or ecosystem services in any terrestrial and associated aquatic ecosystems.
<b>Disturbance</b>	A temporal change, either regular or irregular (uncertain), in the environmental conditions that can trigger population fluctuations and secondary succession. Disturbance is an important driver of biological invasions.



<b>Driver (ecological)</b>	A driver is any natural or human-induced factor that directly or indirectly causes a change in ecosystem. A direct driver clearly influences ecosystem processes, where an indirect driver influences ecosystem processes through altering one or more direct drivers.
<b>Endangered (EN) (Red List category)</b>	<b>Applied to both species/taxa and ecosystems:</b> 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. Endangered ecosystem types are at a very high risk of collapse. Endangered species are those considered to be at very high risk of extinction.
<b>Endemic species</b>	Species that are only found within a pre-defined area. There can therefore be sub-continental (e.g., southern Africa), national (South Africa), provincial, regional, or even within a particular mountain range.
<b>Ecological Support Area (ESA)</b>	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
<b>Forest (as per Mucina <i>et al.</i> (2021))</b>	"Forest is a vegetation-physiognomic and ecosystem-functional tree-dominated formation often containing several sub-canopy shrub layers, with the tree canopy having crowns overlapping or touching, covering at least 40% of projected cover, and lacking continuous grassy undergrowth."
<b>Habitat (as per the definition in NEMBA)</b>	A place where a species or ecological community naturally occurs.
<b>Indigenous vegetation (as per the definition in NEMA)</b>	Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
<b>Integrity (ecological)</b>	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.
<b>Invasive species</b>	Alien species that sustain self-replacing populations over several life cycles, produce reproductive offspring, often in very large numbers at considerable distances from the parent and/or site of introduction, and have the potential to spread over long distances.
<b>Listed alien species</b>	All alien species that are regulated in South Africa under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004), Alien and Invasive Species Regulations, 2020.
<b>Least Threatened</b>	Least threatened ecosystems are still largely intact.
<b>Native species (syn. indigenous species)</b>	Species that are found within their natural range where they have evolved without human intervention (intentional or accidental). Also includes species that have expanded their range as a result of human modification of the environment that does not directly impact dispersal (e.g., species are still native if they increase their range as a result of watered gardens but are alien if they increase their range as a result of spread along human-created corridors linking previously separate biogeographic regions).
<b>Natural Forest (as per the NFA)</b>	Means a group of indigenous trees- (a) whose crowns are largely contiguous; or (b) which have been declared by the Minister to be a natural forest under section 7(2).
<b>Red Data List (RDL) species</b>	According to the Red List of South African plants ( <a href="http://redlist.sanbi.org/">http://redlist.sanbi.org/</a> ) and the International Union for Conservation of Nature (IUCN), organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.
<b>Riparian Habitat (as per the NWA)</b>	Riparian habitat includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterized by alluvial soils, and which are inundated or flooded to an extent and with a



	frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent areas.
<b>Species of Conservation Concern (SCC)</b>	The term SCC in the context of this report refers to all RDL (Red Data) and IUCN (International Union for the Conservation of Nature) listed threatened species as well as protected species of relevance to the project. These are species and subspecies that are important for South Africa's conservation decision-making processes.
<b>Threatened ecosystem</b>	An ecosystem that has been classified as Critically Endangered, Endangered or Vulnerable, based on an analysis of ecosystem threat status. A threatened ecosystem has lost or is losing vital aspects of its structure, function, or composition. The Biodiversity Act allows the Minister of Environmental Affairs or a provincial MEC for Environmental Affairs to publish a list of threatened ecosystems. To date, threatened ecosystems have been listed only in the terrestrial environment. In cases where no list has yet been published by the Minister, such as for all aquatic ecosystems, the ecosystem threat status assessment in the National Biodiversity Assessment (NBA) can be used as an interim list in planning and decision making. Also see Ecosystem threat status.
<b>Threatened species</b>	A species that has been classified as Critically Endangered, Endangered or Vulnerable, based on a conservation assessment (Red List), using a standard set of criteria developed by the IUCN for determining the likelihood of a species becoming extinct. A threatened species faces a high risk of extinction in the near future.
<b>Vulnerable (VU) (Red List category)</b>	<b>Applied to both species/taxa and ecosystems:</b> 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. An ecosystem type is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for VU and is then considered to be at a high risk of collapse.
<b>Weeds</b>	A plant is a weed ' <i>if, in any specified geographical area, its populations grow entirely or predominantly in situations markedly disturbed by man (without, of course, being deliberately cultivated plants)</i> ' (Baker 1965); in cultural terms, weeds are plants ( <b>not necessarily alien</b> ) that grow in sites where they are not wanted and that have detectable economic or environmental impacts (Pyšek et al. 2004).



## LIST OF ACRONYMS

<b>AIP</b>	Alien and Invasive Plant
<b>BAP</b>	Biodiversity Action Plan
<b>BGIS</b>	Biodiversity Geographic Information Systems
<b>BODATSA</b>	Botanical Database of Southern Africa
<b>CBA</b>	Critical Biodiversity Area
<b>CR</b>	Critically Endangered
<b>EAP</b>	Environmental Assessment Practitioner
<b>E-GIS</b>	Environmental Geographical Information Systems
<b>EIA</b>	Environmental Impact Assessment
<b>EIS</b>	Ecological Importance and Sensitivity
<b>EMPr</b>	Environmental Management Programme
<b>EN</b>	Endangered
<b>ESA</b>	Ecological Support Area
<b>EW</b>	Extinct in the Wild
<b>FEPA</b>	Freshwater Ecosystem Priority Area
<b>FMP</b>	Fire Management Plan
<b>GIS</b>	Geographic Information System
<b>GN</b>	General Notice
<b>GPS</b>	Global Positioning System
<b>Ha</b>	Hectares
<b>IUCN</b>	International Union for Conservation of Nature
<b>LC</b>	Least Concern
<b>MBSP</b>	Mpumalanga Biodiversity Sector Plan
<b>MNCA</b>	Mpumalanga Nature Conservation Act, 1998 [Act No. 10 of 1998]
<b>MTPA</b>	Mpumalanga Parks and Tourism Agency's
<b>NEMBA</b>	National Environmental Management: Biodiversity Act, 2004 [Act No.10 of 2004]
<b>NEMPAA</b>	National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]
<b>NFA</b>	National Forests Act, 1998 [Act No. 84 of 1998]
<b>PES</b>	Present Ecological State
<b>POC</b>	Probability of Occurrence
<b>QDS</b>	Quarter Degree Square
<b>RDL</b>	Red Data Listed
<b>SACNASP</b>	South African Council for Natural Scientific Professionals
<b>SANBI</b>	South African National Biodiversity Institute
<b>SanParks</b>	South African National Parks
<b>SCC</b>	Species of Conservation Concern
<b>STS</b>	Scientific Terrestrial Services
<b>SWSA</b>	Strategic Water Source Area
<b>TGME</b>	Transvaal Gold Mining Estates Limited
<b>TOPS</b>	Threatened or Protected Species
<b>TSF</b>	Tailings Storage Facility
<b>VU</b>	Vulnerable
<b>WUL</b>	Water Use Licence



# 1 INTRODUCTION

## 1.1 Background Information and Project description

Scientific Terrestrial Services CC (STS) was appointed to undertake a terrestrial biodiversity assessment as part of the proposed Environmental Impact Assessment (EIA) and Water Use Licence (WUL) amendment process for the MR83 UG targets near Pilgrims Rest, Mpumalanga.

The assessment included four sites which will henceforth collectively be referred to as the “**MR83 UG Areas**”; individually referred to as Dukes, Frankfort, Morgenzon, and Beta North (Figure 1). The MR83 UG Areas are located within the Mpumalanga Province, with Dukes and Morgenzon roughly 2 km north-west, Beta North approximately 2 km south-west, and Frankfort approximately 9 km north of Pilgrim’s Rest (localities depicted in **Part A: Figures 1 and 2**). As part of the field assessments, a 20 m to 50 m buffer area around the proposed mining activities was ground-truthed (based on site accessibility and safety constraints).

A detailed depiction of the proposed activities to accompany the proposed underground mining activities are presented in **Part A: Figures 3 – 7**.

This report aims to update the defined floral ecology of the MR83 UG Areas and to identify areas of increased Ecological Importance and Sensitivity (EIS), as well as the mapping of such areas, and to update description of the Present Ecological State (PES) of the MR83 UG Areas. The primary objective of the floral assessment is not to compile an exhaustive species list but rather to ensure that sufficient data are collected to describe all the vegetation communities present in the area of interest, to optimise the detection of Species of Conservation Concern (SCC) and to assess habitat suitability for other potentially occurring SCC (SANBI, 2020).





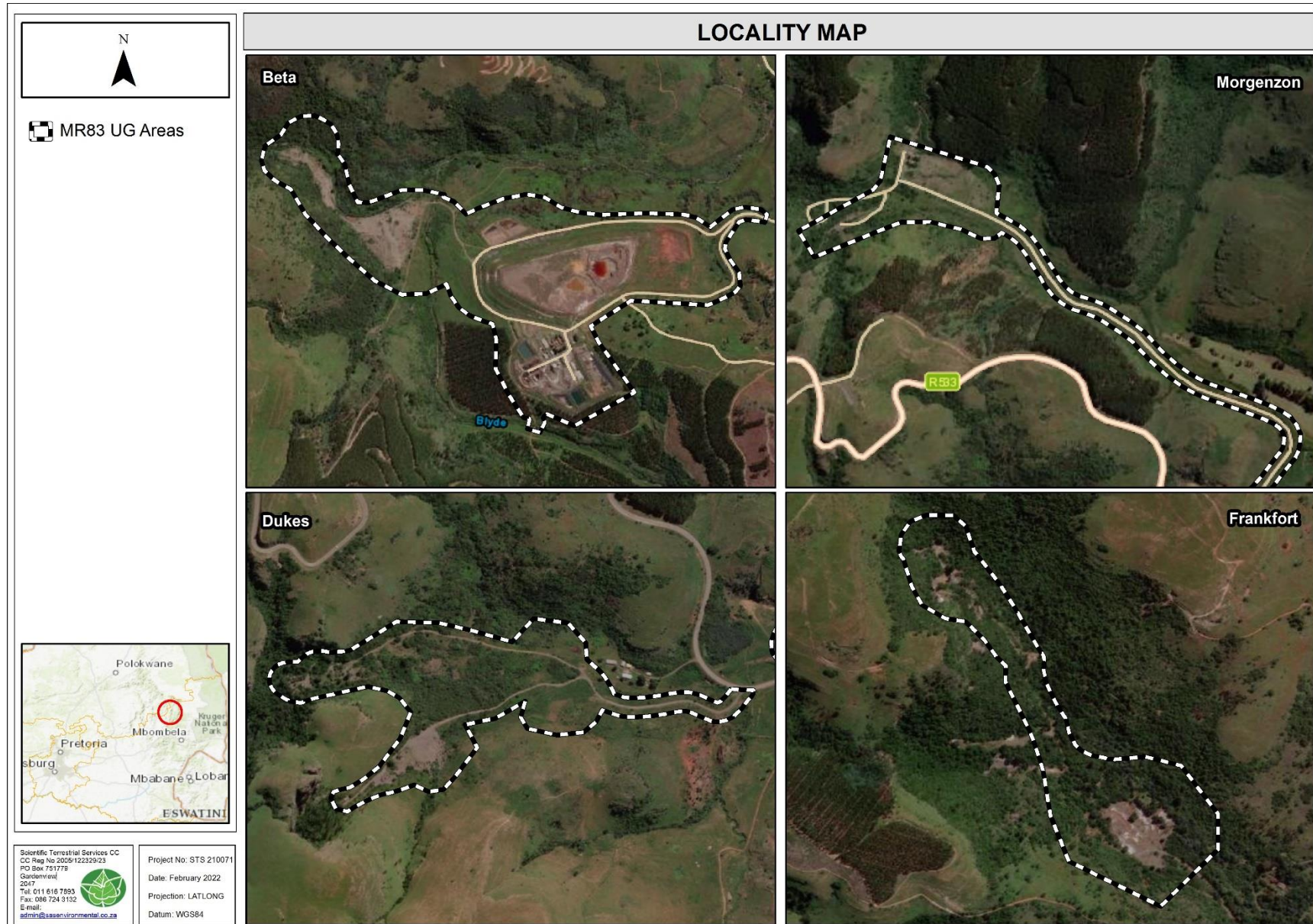


Figure 1: Conceptual illustration of the MR83 UG Areas in relation to surrounding areas.





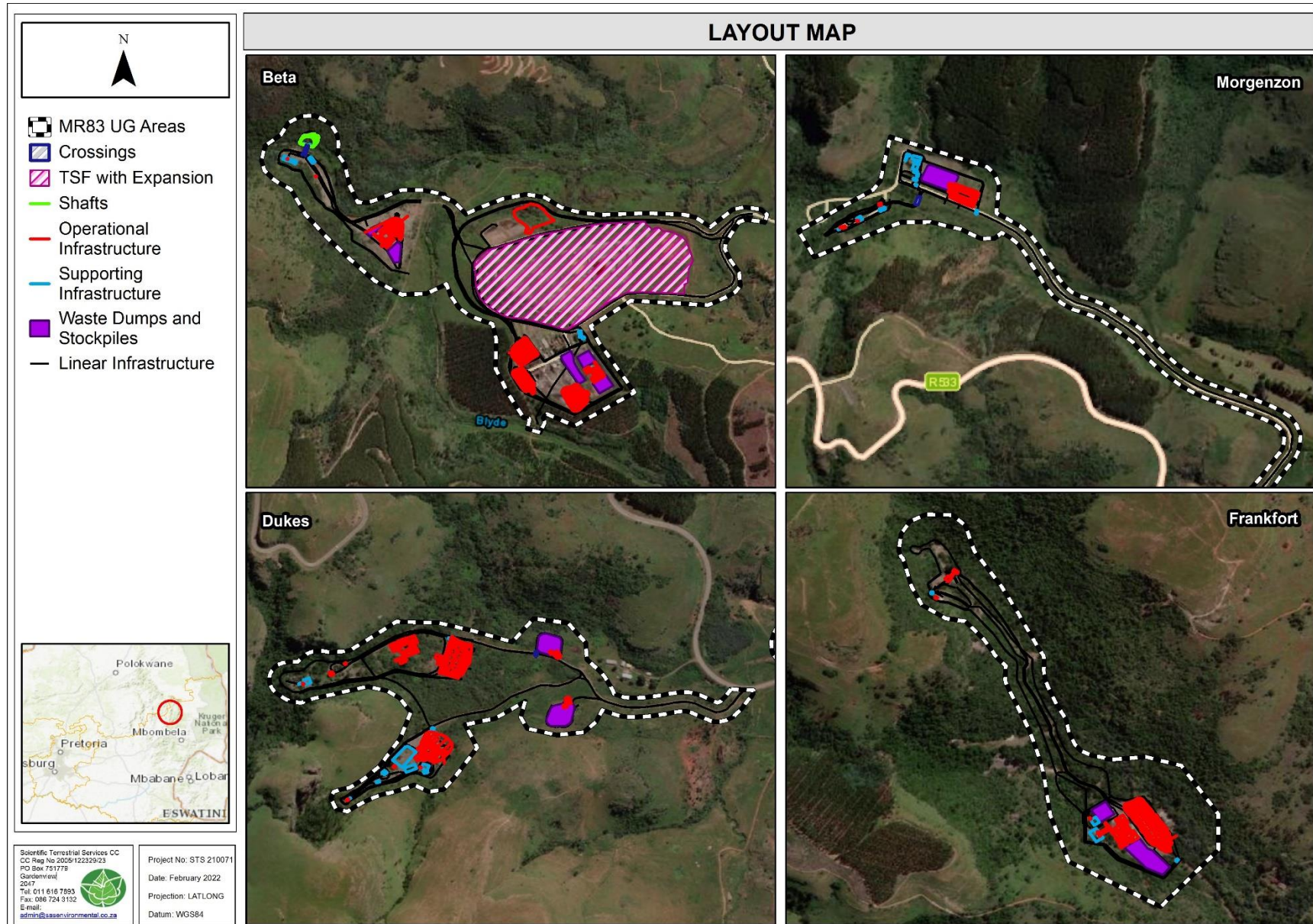


Figure 2: Proposed project layout associated with the MR83 UG Areas – simplified version.



## 1.2 Scope of Work

Specific outcomes in terms of the report are as follows:

- To confirm the descriptions of floral habitat types, communities and the ecological state of the MR83 UG Areas and to rank each habitat type based on conservation importance and ecological sensitivity;
- To update the inventories of floral species as encountered within the MR83 UG Areas;
- To confirm and/or update all sensitive landscapes associated with the MR83 UG Areas such as indigenous forests, rocky ridges, wetlands and/ or any other special features such as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs);
- To undertake an assessment of Red Data Listed (RDL) floral species as well as an assessment of other SCC (such as provincially protected species), including the potential for such species to occur within the MR83 UG Areas;
- To provide detailed information to guide the activities associated with the proposed mining activities within the MR83 UG Areas; and
- To ensure the ongoing functioning of the ecosystem in such a way as to support local and regional conservation requirements, to allow regional and national biodiversity targets to be met, and the provision of ecological services in the local area is sustained.

## 1.3 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The floral assessment is confined to the MR83 UG Areas, which includes a pre-defined 20-50 m buffer around the proposed activities. The immediate surroundings were, however, not part of the floral assessment but were included in the desktop analysis of which the results are presented in **Part A: Section 3**;
- Sampling by its nature means that not all individuals are assessed and identified. With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked.
- Several field assessments were undertaken to determine the ecological status of the MR83 UG Areas and to “ground-truth” the results of the updated desktop databases:
  - Site screening (high-level assessments of Beta North, Morgenzon and Frankfort): 19th – 22nd April 2021;
  - Site screening (high-level assessment of Dukes): 27th – 28th October 2021;and



- Comprehensive Site Assessments (all MR83 UG Areas): 17th – 19th February 2022.
- The field assessment thus spanned several seasons and mostly falls within the recommended season (November to February) for vegetation assessments as per the Mpumalanga Parks and Tourism Agency's (MTPA) recommended minimum requirements for assessing and mitigating environmental impacts. A more comprehensive assessment would require that more than one assessment take place and that these assessments occur across all seasons of the year. However, data was augmented by desktop research and project experience in the area and the findings of this report are considered an accurate depiction of the floral ecology of the MR83 UG Areas; and
- Some floral SCC identities will not be made known in this report, although their potential to occur on site will still be assessed. As per the best practice guideline that accompanies the SANBI protocol and Screening Tool, the name of the sensitive species may not appear in the final Environmental Impact Assessment (EIA) report nor any of the specialist reports released into the public domain. It will be referred to as sensitive plants, and its threat status included, e.g., critically endangered sensitive plant.

The on-site visual investigation of the MR83 UG Areas will further confirm the assumptions made during the consultation of the background maps and will determine whether the sensitivity of the terrestrial biodiversity associated with the MR83 UG Areas confirms the results of the National Web based Environmental Screening Tool ("Screening Tool" hereafter).

## 2 ASSESSMENT APPROACH

### 2.1 General Approach

The vegetation surveys are based on the subjective sampling method which is a technique where the specialist chooses specific sample sites within the area of interest, based on their professional experience in the area and background research done prior to the site visit. This allows representative recordings of floral communities and optimal detection of SCC (refer to the methodology description in **Appendix A**).

The below list includes the steps followed during the preparation for and the conduction of the field assessments:

- To guide the selection of appropriate sample sites, background data and digital satellite images were consulted before going to site, during which broad habitats, vegetation





types and potentially sensitive sites were identified. The results of these analyses were then used to focus the fieldwork on specific areas of concern and to identify areas where targeted investigations were required (e.g., for SCC detection and within the direct footprint of the proposed MR83 UG mining project);

- All relevant resources and datasets as presented by the South African National Biodiversity Institute's (SANBI's) Biodiversity Geographic Information Systems (BGIS) website (<http://bgis.sanbi.org>) and the Environmental Geographical Information Systems (E-GIS) website (<https://egis.environment.gov.za/>), including the Mpumalanga Biodiversity Sector Plan (MBSP) of 2019, POSA: Plants of southern Africa: an online checklist, and the Screening Tool, were consulted to gain background information on the physical habitat and potential floral diversity associated with the assessment areas;
- Based on the broad habitat units delineated before going to site and the pre-identified points of interest, which is updated based on on-site observations and access constraints, the selected sample areas were surveyed on foot, following subjective transects, to identify the occurrence of the dominant plant species and habitat diversities, but also to detect SCC which tend to be sparsely distributed;
- As part of the SCC assessment, the following classes were considered:
  - Threatened species. In terms of Section 56(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), threatened species are Red Data Listed (RDL) species falling into the following categories of ecological status: Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Protected in terms of the NEMBA Threatened or Protected Species (TOPS) Regulations (General Notice (GN) R152 of 2007, as amended). Removal, translocation and/or destruction of these species require authorisation from the DFFE;
  - Protected Species. Species that do not necessarily fall in the above categories of ecological status, but that are deemed important from a provincial biodiversity perspective, e.g., The Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) (MNCA) provides a list of Protected Species (Schedule 11) (Section 69(1)(a) of the MNCA) and Specially Protected Species (Schedule 12) (Section 69(1)(b) of the MNCA) for the Mpumalanga Province for which restricted activities may not occur without permits from the relevant provincial authorities. The List of Protected Tree Species (Government Gazette No. 41887, notice 536 of 2018) as it relates to the National Forests Act, 1998 (Act No. 84 of 1998) (NFA) was also considered for the SCC assessment; and





- Photographs were taken of each vegetation community that is representative of typical vegetation structure of that community, as well as photos of all detected SCC. No photographs of flagged sensitive species will be made public.

Additional information on the method of assessment is provided in **Appendix A** of this report.

## **2.2 Definitions, descriptions, and taxon nomenclature**

Scientific nomenclature for plant species in this report follows that of the SANBI's Red List of South African Plants Online, as it relates to the Botanical Database of Southern Africa (BODATSA). For alien species, the definitions of Richardson et al. (2011) are used. Vegetation structure is described as per Edwards (1983) (refer to Appendix A: Figure A1).

## **2.3 Sensitivity Mapping**

All the ecological features of the assessment areas were considered, and sensitive areas were delineated with the use of a Global Positioning System (GPS). A Geographic Information System (GIS) was used to project these features onto satellite imagery. The sensitivity map should assist the Environmental Assessment Practitioner (EAP) / proponent as to the suitability of the proposed development within the assessment areas.

# **3 RESULTS OF FLORAL ASSESSMENT**

The MR83 UG Areas are associated with three vegetation types as per Mucina and Rutherford (2006)<sup>1</sup> and SANBI (2006-2018)<sup>2</sup>, namely the GM 31 Long Tom Pass Montane Grassland, Gm 22 Northern Escarpment Dolomite Grassland, and FOz 4 Northern Mistbelt Forest.

During the field assessment, several areas with sensitive habitat were identified across the MR83 UG Areas, most notably indigenous forest patches as well as watercourses (with intact riparian vegetation). The MR83 UG Areas are also associated with various disturbances ranging from historic mining activities (i.e., old shafts, adits, waste rock dumps), current illegal mining activities, built-up areas, encroachment of alien vegetation and stretches of plantations.

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<sup>1</sup> Mucina & Rutherford (2006) provide a synthesis of all the vegetation types found within South Africa. Within each vegetation synthesis, the general characteristics of the vegetation types is described together with an indication of dominant and/or important plant taxa within the vegetation type. These vegetation types form the basis on which the habitat units, and associated discussions, for the MR83 UG Areas are based.

<sup>2</sup> South African National Biodiversity Institute (2006-2018). The Vegetation Map of South Africa, Lesotho and Swaziland, Mucina, L., Rutherford, M.C. and Powrie, L.W. (Editors), Online, <http://bgis.sanbi.org/Projects/Detail/186>, Version 2018.



Across the MR83 UG Areas, Frankfort was the least transformed and associated with the least historic and current disturbances. Beta North and Dukes are associated with the greatest extent of degraded habitat and is currently impacted significantly by illegal mining activities. Morgenzon is mostly degraded within the assessed areas; however, both Morgenzon and Dukes are surrounded by sensitive forests, watercourses, and grassland habitats that require strict control of edge effects if the underground mining project is authorised.

Across the target areas, four broad habitat units could be distinguished:

- **Degraded Habitat (section 3.1)** – encompassing Alien and Invasive Plant (AIP)-dominated Habitat and areas entirely transformed by mining (illegal and lawful) and/or forestry practices;
- **Freshwater Habitat<sup>3</sup> (section 3.2)** – encompassing Riparian<sup>4</sup> Forest, Riparian Woodland, and Watercourse Habitat;
- **Terrestrial Woody Communities (section 3.3)** – encompassing Indigenous Forests<sup>5</sup> and Woodlands (intact and degraded); and
- **Valley Habitat and Rocky Outcrops (section 3.4)** – encompassing a variety of habitat types occurring along the mountain footslopes and along rivers and streams, including stretches of grass and herb dominated veld, as well as a short stretch of Rocky Outcrops.

The above listed habitat units are not all represented in all four of the MR83 UG Areas (see Table 1 below). Where floral composition, vegetation structure and/or habitat sensitivities differ for these units within the various MR83 UG Areas, these differences were highlighted.

For a breakdown of the floral communities, habitat characteristics and conservation sensitivities associated with the above-mentioned habitat units, refer to Section 3.1 – 3.4.

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<sup>3</sup> The Freshwater Habitat meets the definition of a **watercourse** in terms of the definition contained within the National Water Act, 1998 (Act No. 36 of 1998):

- A river or spring;
- A natural channel which water flows regularly or intermittently;
- A wetland, dam or lake into which, or from which, water flows; and
- Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse;

and a reference to a watercourse includes, where relevant, its bed and banks.

<sup>4</sup> **Riparian habitat** as per the National Water Act, 1998 (Act No. 36 of 1998) (NWA): includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.

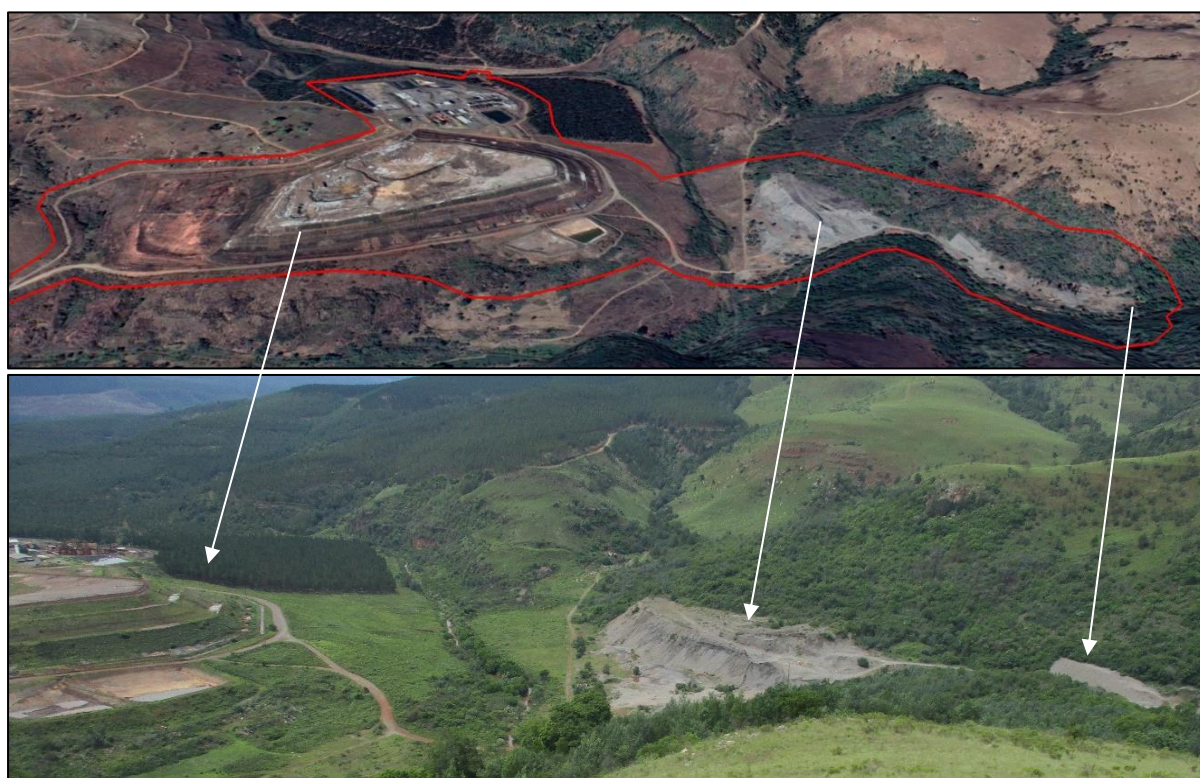
<sup>5</sup> **The definition provided by Mucina et al. (2021):** "Forest is a vegetation-physiognomic and ecosystem-functional tree-dominated formation often containing several sub-canopy shrub layers, with the tree canopy having crowns overlapping or touching, covering at least 40% of projected cover, and lacking continuous grassy undergrowth."



Figures 3 - 6 provides a photographic overview of these sites, whereas Figures 7 - 13 map the full extent of the MR83 UG Areas on google satellite imagery.

**Table 1: Quick guide to floral communities within the MR83 UG Areas.**

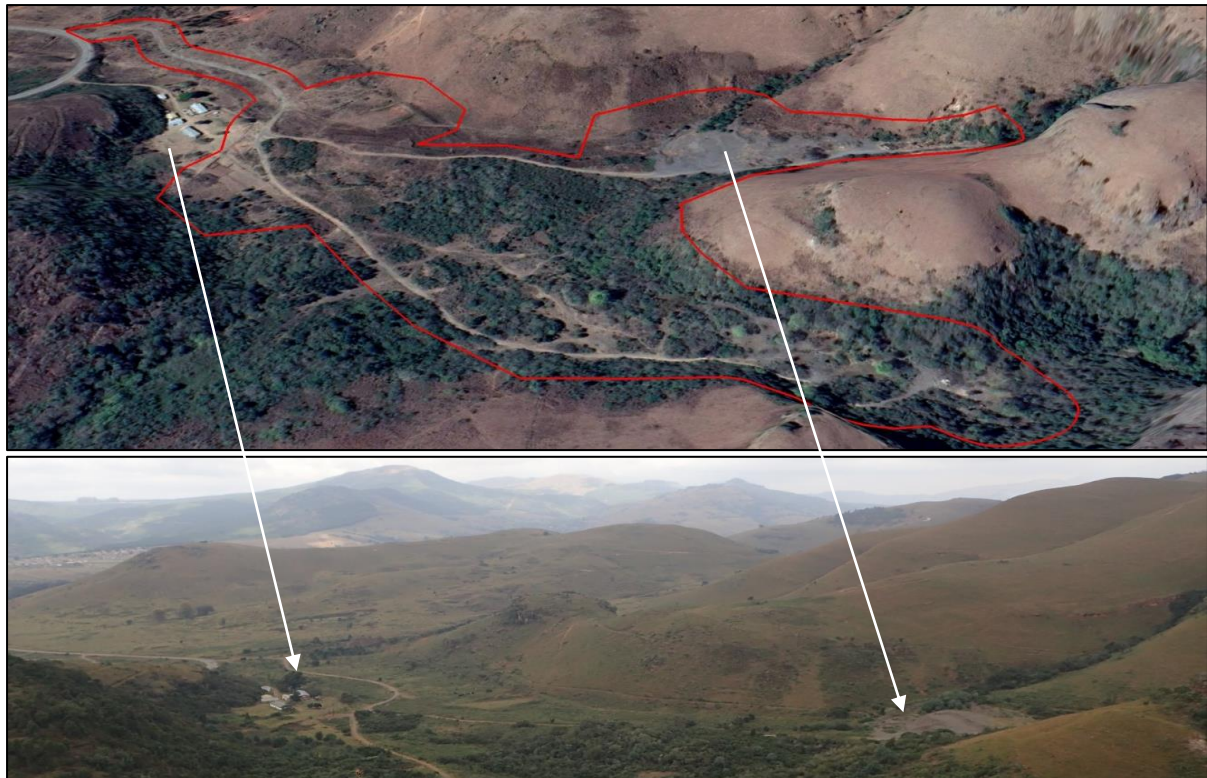
HABITAT UNIT / SUB-UNITS	BETA NORTH	DUKES	MORGENZON	FRANKFORT
<b>DEGRADED HABITAT</b>				
AIP-dominated Vegetation	x	x	x	
Transformed Habitat	x	x	x	x
<b>FRESHWATER HABITAT</b>				
Riparian Forest		x	x	x
Riparian Thicket	x	x	x	x
Woodlands	x	x	x	x
<b>TERRESTRIAL WOODY COMMUNITIES</b>				
Indigenous Forests		x	x	x
Watercourse Habitat	x	x	x	
<b>VALLEY HABITAT</b>				
Valley Habitat	x	x	x	
Rocky Habitat			x	



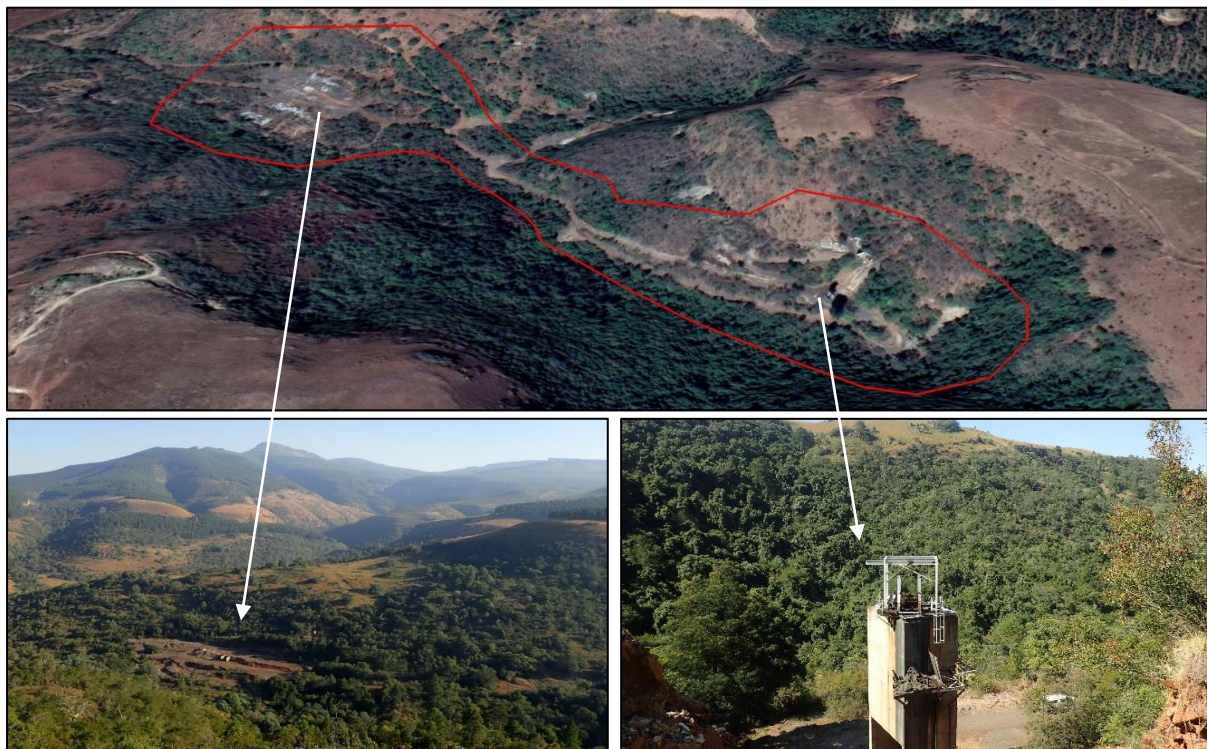
**Figure 3: Beta North habitat overview (top) as taken from Google Earth satellite imagery with a corresponding photo (bottom) that was taken of the site during the various site assessments. The red line encompasses the ground-truthed area and does not indicate the proposed footprint layout.**







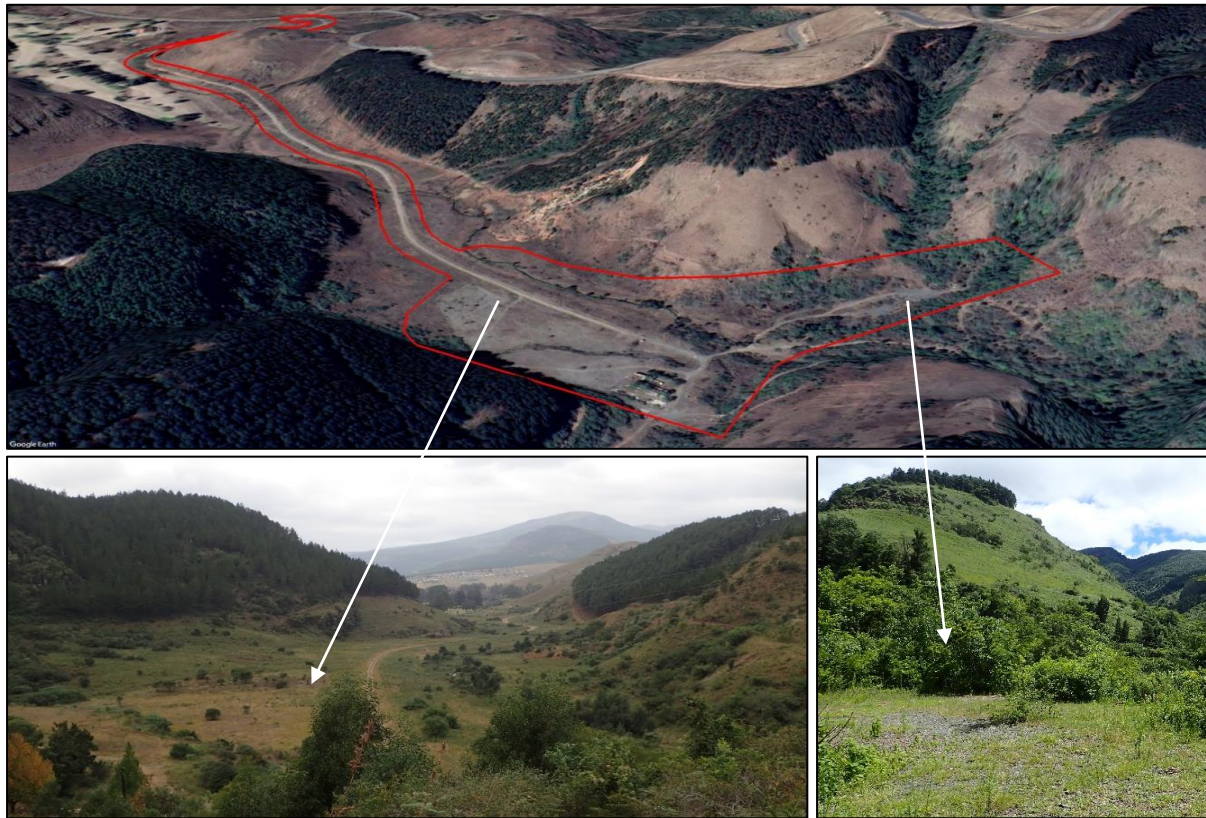
**Figure 4: Dukes habitat overview (top) as taken from Google Earth satellite imagery with a corresponding photo (bottom) that was taken of the site during the various site assessments. The red line encompasses the ground-truthed area and does not indicate the proposed footprint layout.**



**Figure 5: Frankfort habitat overview (top) as taken from Google Earth satellite imagery with a corresponding photo (bottom) that was taken of the site during the various site assessments. The red line encompasses the ground-truthed area and does not indicate the proposed footprint layout.**







**Figure 6: Morgenzon habitat overview (top) as taken from Google Earth satellite imagery with a corresponding photo (bottom) that was taken of the site during the various site assessments. The red line encompasses the ground-truthed area and does not indicate the proposed footprint layout.**





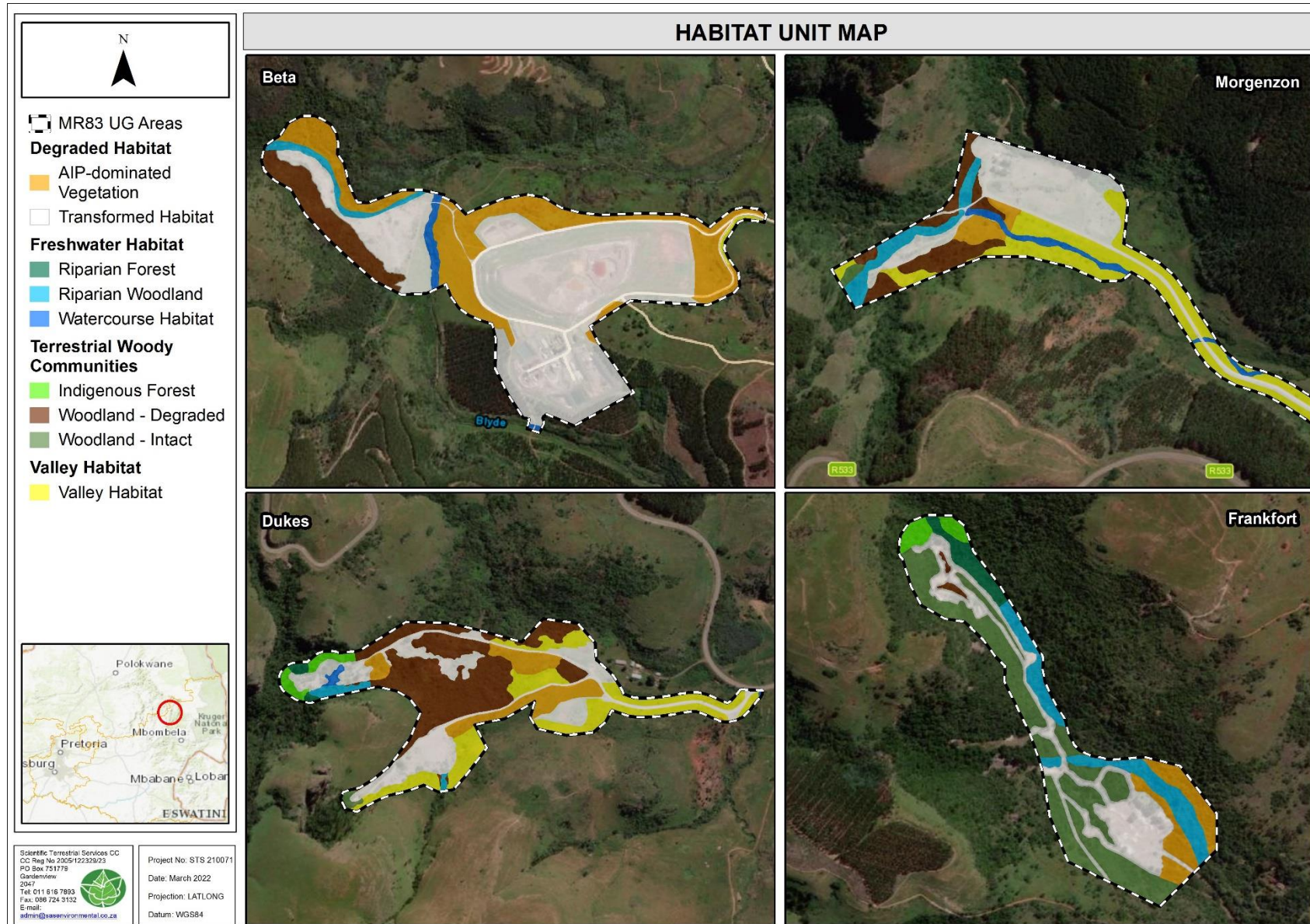


Figure 7: Habitat units associated with the MR83 UG Areas. The section of Morgenzon that is cut off in this figure only includes the haul road, which will be shown in more detail in Figure 10.





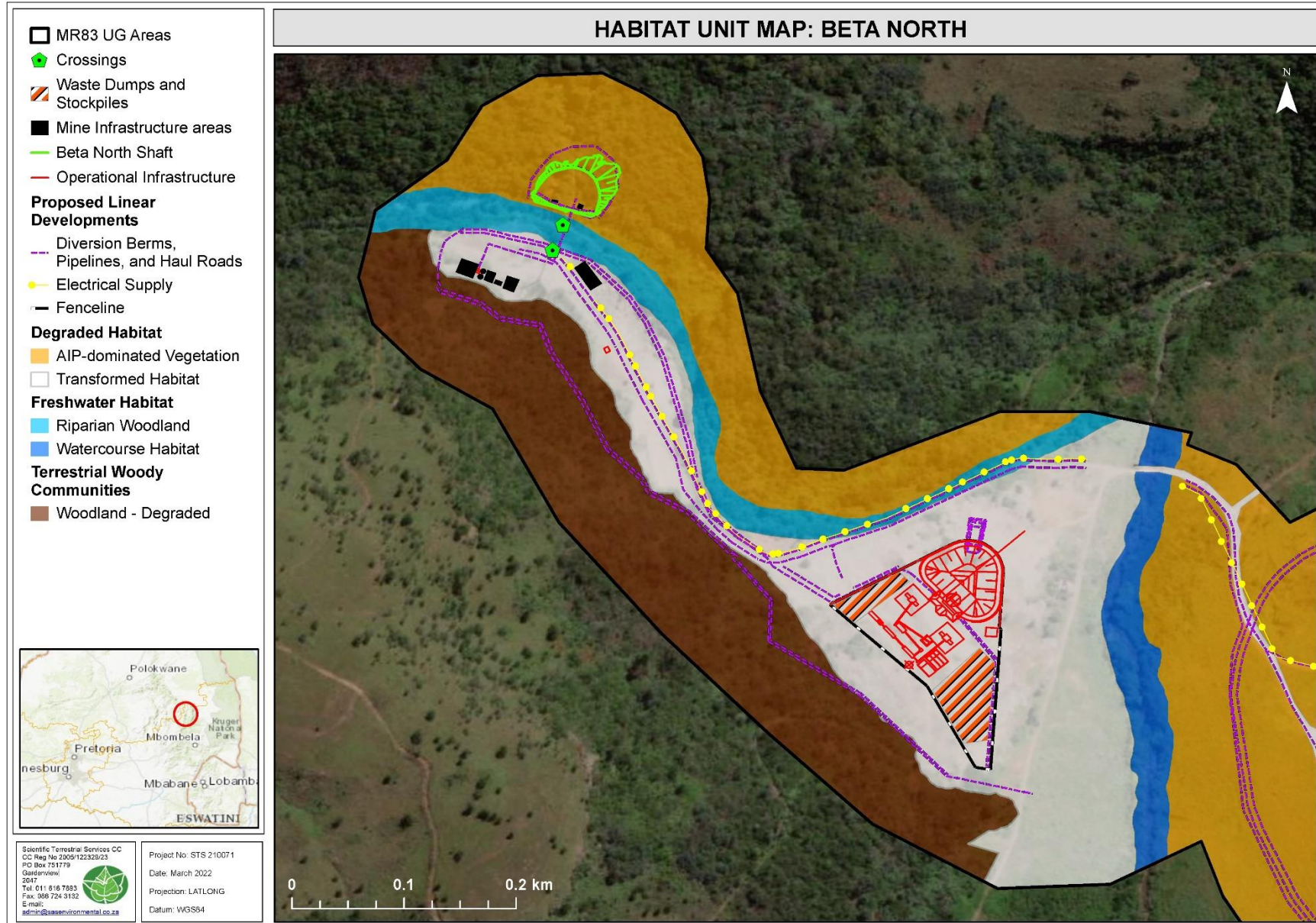


Figure 8: Habitat units associated with Beta North (western section).





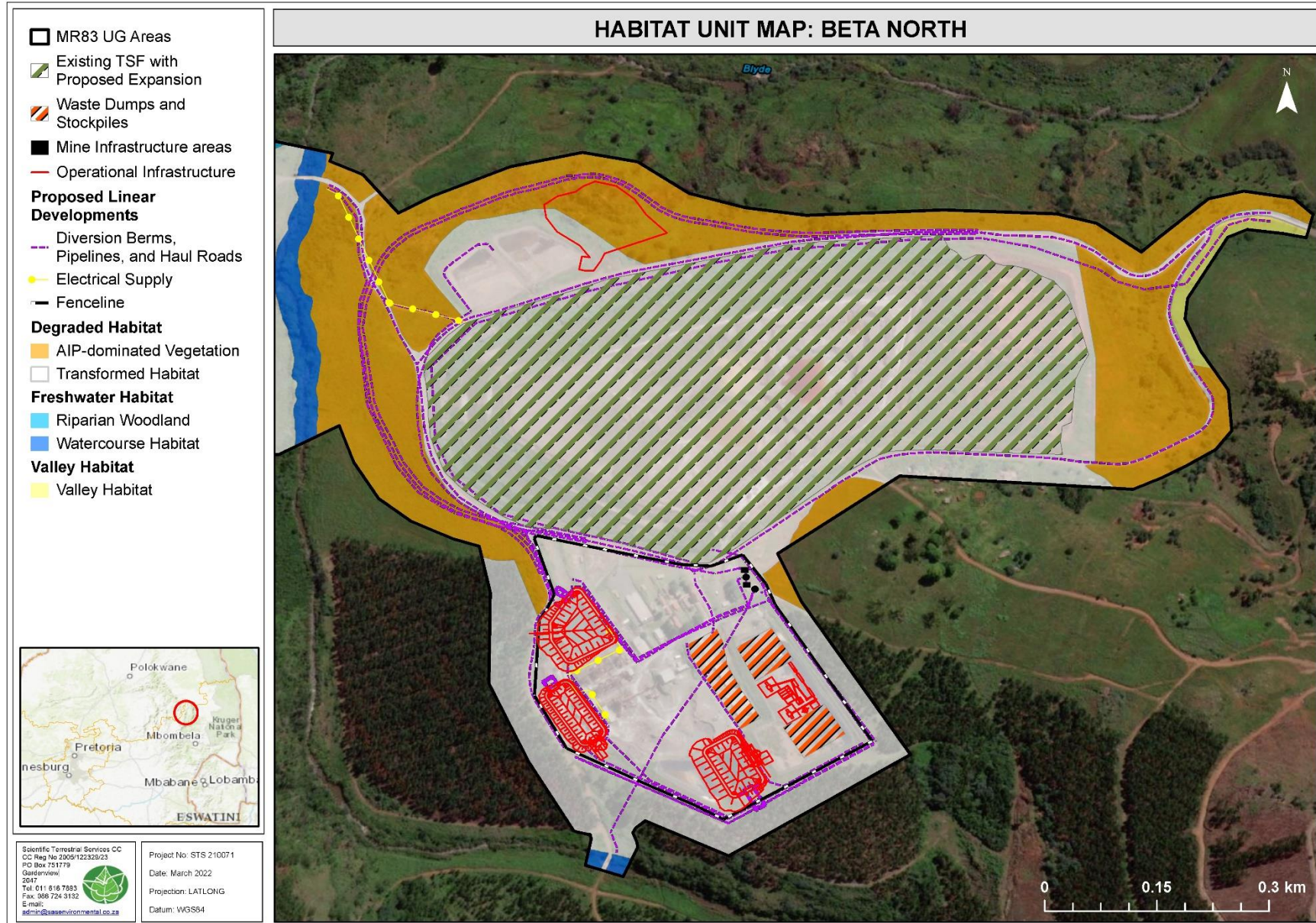


Figure 9: Habitat units associated with Beta North (eastern section, i.e., the Plant and TSF).





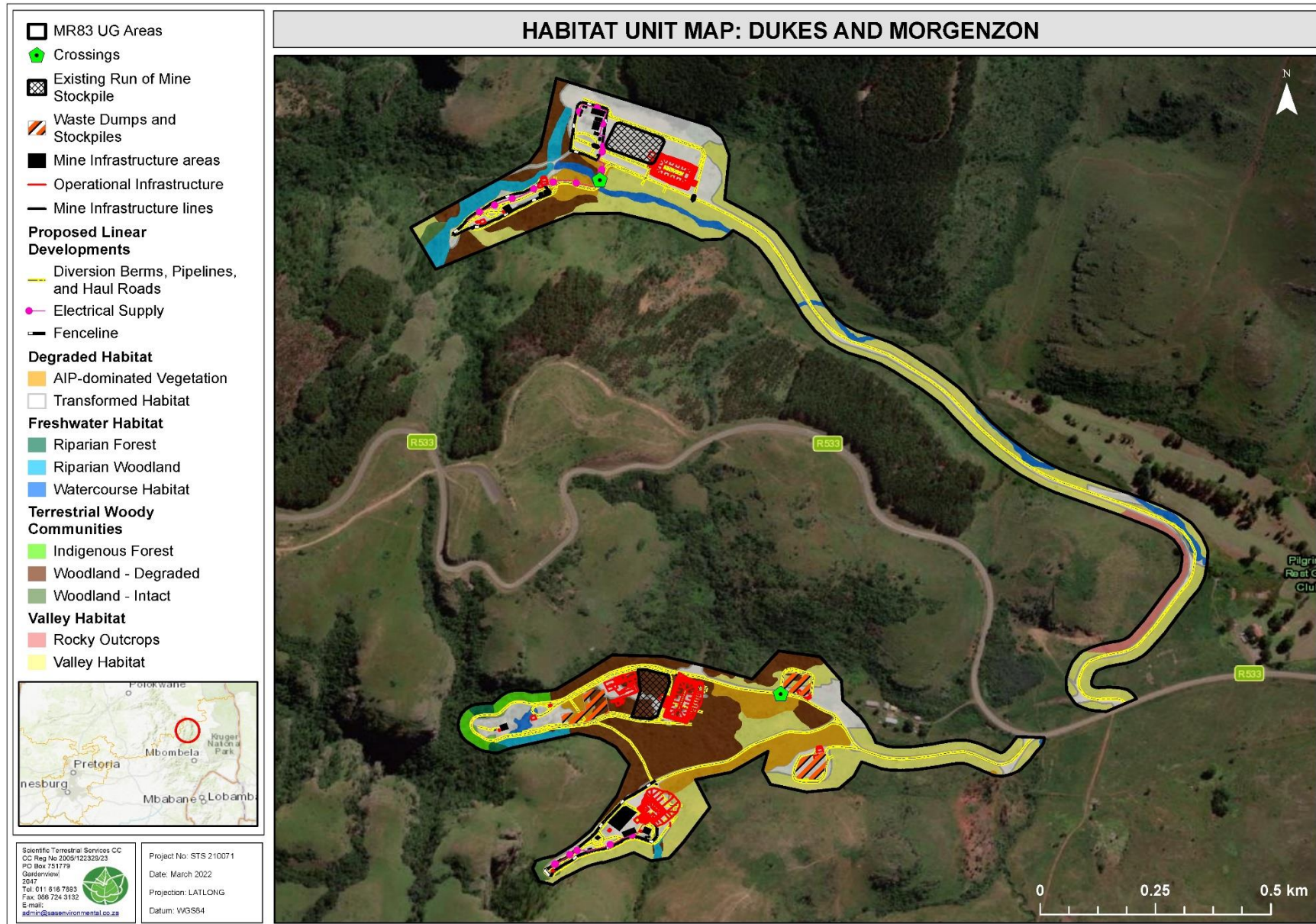


Figure 10: Zoomed-out depiction of the habitat units associated with Dukes and Morgenzon.





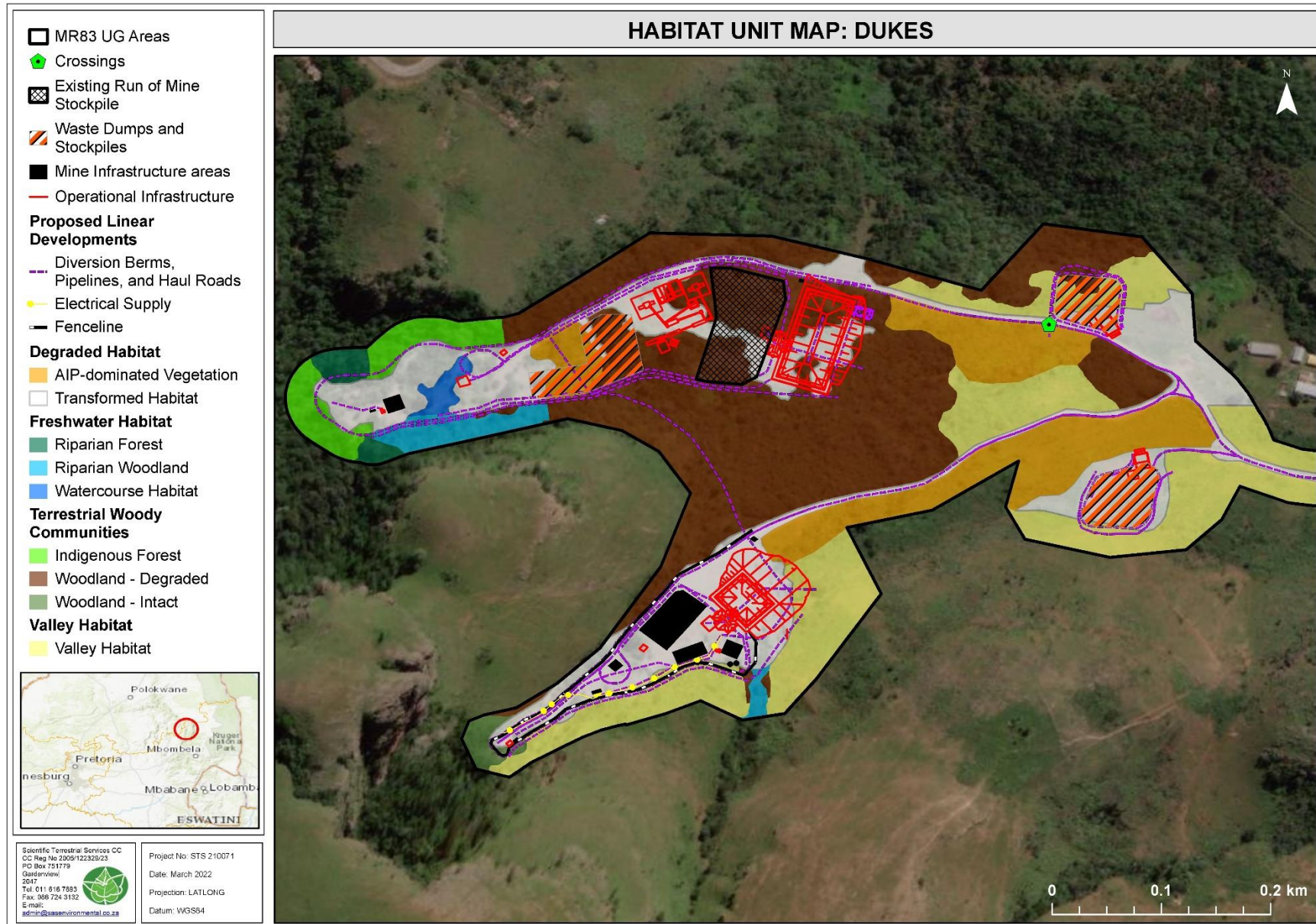


Figure 11: Habitat units associated with Dukes.





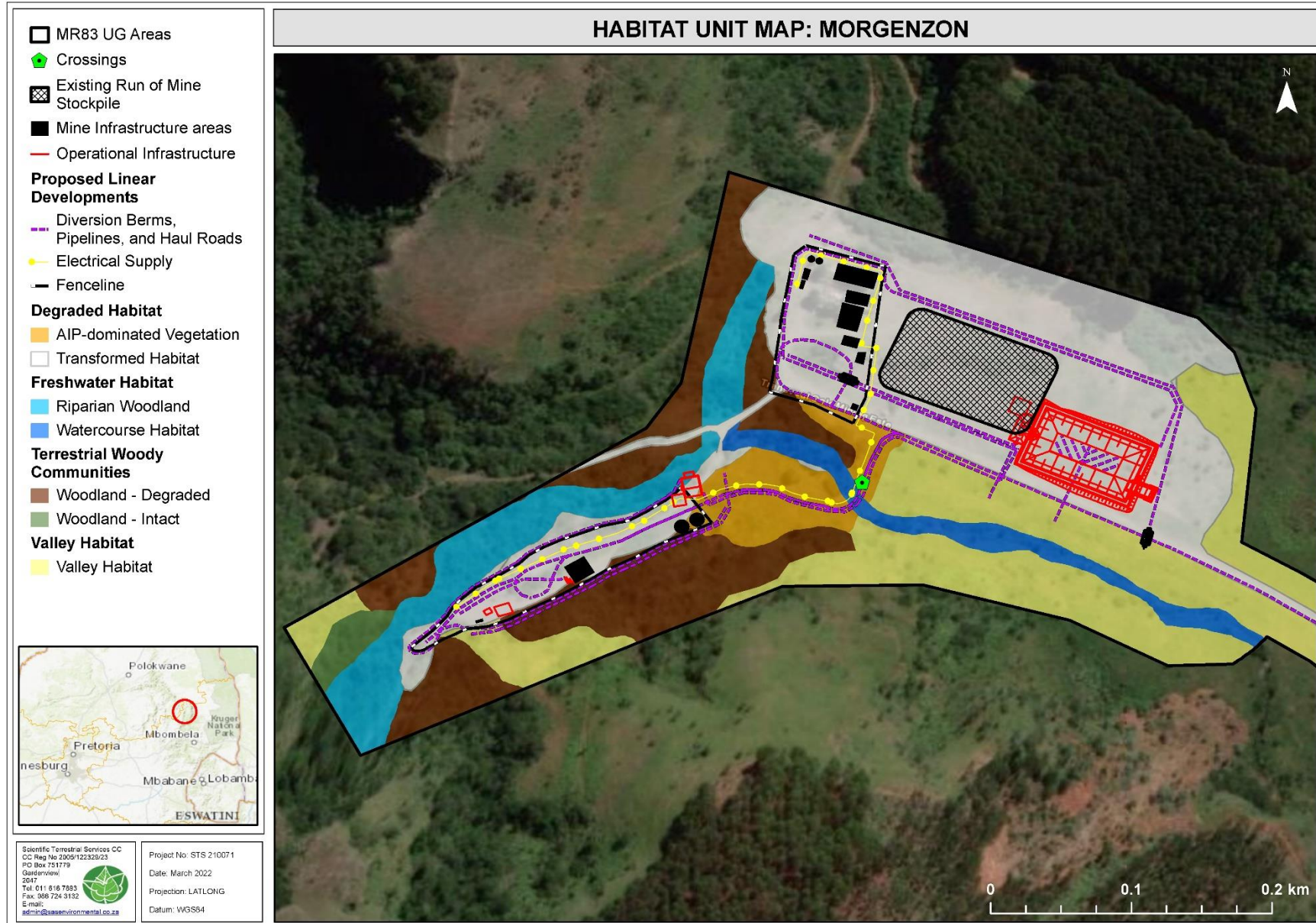


Figure 12: Habitat units associated with Morgenzon.





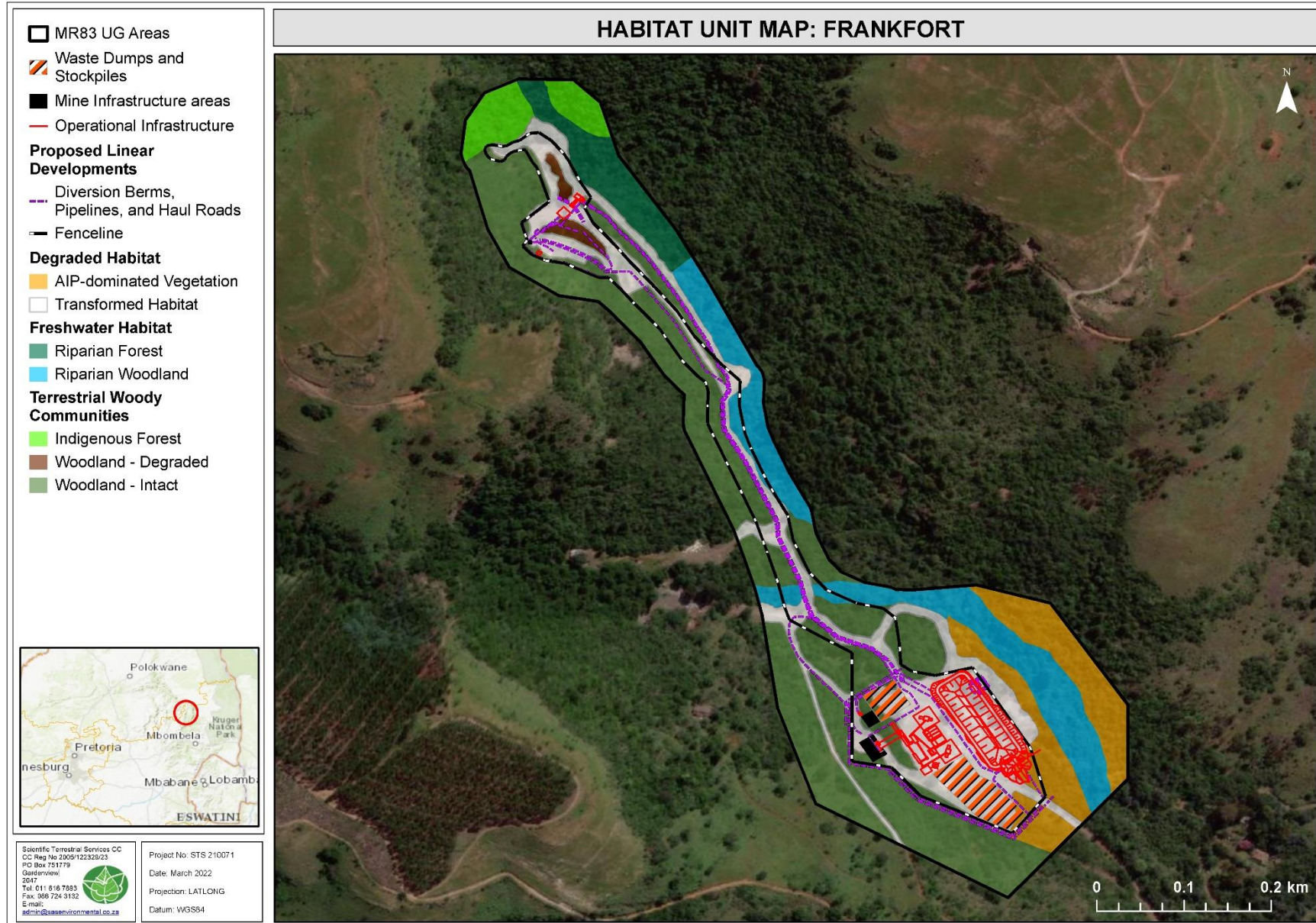

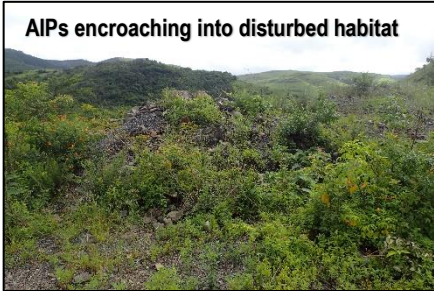












Figure 13: Habitat units associated with Frankfort.





### 3.1 Degraded Habitat

REFERENCE HABITAT PHOTOS					
AIP-dominated Vegetation			Transformed Areas		
 <p>Pine and Wattle stands</p>		 <p>AIPs encroaching into disturbed habitat</p>		 <p>Beta North</p>	 <p>Beta North TSF</p>
 <p><i>Ricinus communis</i></p>	 <p><i>Lantana camara</i></p>	 <p><i>Rubus</i> spp.</p>	 <p>Frankfort</p>	 <p>Dukes</p>	
 <p><i>Cuscuta campestris</i></p>	 <p><i>Verbena bonariensis</i></p>	 <p><i>Solanum mauritianum</i></p>			
HABITAT OVERVIEW					
<p>The Degraded Habitat is associated with all four MR83 UG Areas and represents the largest areas to be impacted by the proposed underground mining activities (with regards to surface impacts). This habitat unit is characterised by extensive sections where the natural vegetation has been heavily modified to such a degree that native vegetation is poorly represented, or where no vegetation remains at all. Within areas where historic or current anthropogenic disturbances have resulted in the proliferation of AIPs, native species have been displaced and the vegetation has largely lost its integrity.</p> <p>Two main habitat types can be distinguished, namely the AIP-dominated Habitat and the Transformed Areas. Both these habitat sub-units are not considered important for contributing towards native floral ecology in the area, nor is it anticipated to contribute favourably towards achieving conservation and provincial biodiversity targets.</p>					



**SPECIES OVERVIEW**

The Degraded Habitat unit was species poor in the Transformed Areas. The AIP-dominated Habitat was species rich due to the abundance and often high diversity of AIPs; however, the sub-unit had a low native floral representation. None of the vegetation communities associated with the Transformed Areas and the AIP-dominated Habitat are representative of the reference vegetation types, nor is indigenous vegetation associated with these sub-units. A total of 111 plant taxa were recorded within the Degraded Habitat, 37% of which were represented by woody species, 44% by forbs, and 19% by graminoid species. AIPs contributed toward 44% of all floral species recorded within this habitat unit.

Within this Degraded Habitat Unit, very little native vegetation remains. The only native species that manage to become abundant in these sub-units include pioneer grass species such as *Andropogon eucomis*, *Cynodon dactylon* and *Melinis repens*. Several AIP forb species thrive in the Degraded Habitat Unit, e.g., *Bidens pilosa*, *Conyza bonariensis*, *Tagetes minuta* and *Verbena bonariensis* (to name a few). Abundant and more frequently occurring species within this Habitat Unit included several woody species that are listed in the NEMBA Alien and Invasive Species List (2020): *Eucalyptus grandis*, *Lantana camara*, *Rubus* species (*R. cuneifolius* & *R. niveus*), *Senna septemtrionalis*, and *Solanum mauritanum*. Refer to **section 3.6** for more details on AIPs.







Due to the extent to which native floral community structure and composition have been altered by anthropogenic activities, floral SCC are highly unlikely to establish viable populations (if any), especially not within the Transformed Areas. Some *Aloe* species, *Habenaria* species, *Kniphofia* species and *Scadoxus* species have been recorded in the AIP-dominated Habitat and these are protected under Schedule 11 (Section 69(1)(a)) of the Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) (MNCA). One species protected under the National Forests Act, 1998 (Act No. 84 of 1998) (NFA) was recorded in Transformed Areas where it was likely planted as an ornamental in the past, namely *Podocarpus* (=now *Afrocarpus*) *falcatus*. Permits from the relevant authorities, i.e., MTPA and Department of Forestry, Fisheries and the Environment (DFFE), should be obtained before removal, cutting or destruction of protected species or floral SCC may take place.

Refer to **Appendix B** for a more comprehensive floral inventory for this Habitat Unit.





### 3.2 Freshwater Habitat

REPRESENTATIVE HABITAT PHOTOS		
Riparian Forest	Riparian Woodland	Watercourse Habitat
		
		
<p>The Riparian Forest sub-unit occurs within indigenous forest (refer to section 3.3) but is associated with the presence of regularly (to permanently) flowing water. Species such as a) <i>Impatiens hochstetteri</i>, b) <i>Begonia sutherlandii</i>, and c) <i>Ficus sur</i> were typically observed within this sub-unit.</p>	<p>The Riparian Woodland sub-unit was not associated with indigenous forest; however, this sub-unit was associated with a well-developed, woody riparian zone. Selected species often recorded in this sub-unit included a) <i>Peperomia retusa</i> (fern species), b) <i>Streptocarpus cf. wilmsii</i>, and c) <i>Searsia chirindensis</i>.</p>	<p>The Watercourse Habitat had a weaker association with woody species and a stronger association with graminoid species. Selected species often recorded in this sub-unit included a) <i>Salix mucronata</i>, b) <i>Persicaria</i> species (various), and c) <i>Phragmites australis</i>.</p>



### HABITAT OVERVIEW

The Freshwater Habitat encompasses true watercourses as delineated by a freshwater ecologist (refer to the SAS 202269 (2022) report), which has been arranged into three vegetation types for this report. For the hydrogeomorphic watercourse types, please refer to the freshwater report.

The Freshwater Habitat is represented in all four MR83 UG Areas and based on vegetation characteristics and position in the landscape, three sub-units were distinguished, namely the Riparian Forest (associated with Dukes, Frankfort and Morgenzon), Riparian Woodland (associated with all four MR83 UG Areas), and Watercourse Habitat (associated with Beta North, Dukes and Morgenzon). The definition of “riparian” as per the National Water Act, 1998 (Act 36 of 1998) (NWA) is applicable to this habitat unit.

The sub-units are described in more detail below.

#### Riparian Forest and Riparian Woodland

The Riparian Forest forms part of the Indigenous Forest sub-unit that is described in section 33 and, as such, this sub-unit also aligns with the NFA definition of “natural forest”. The Riparian Woodland, however, occurs outside of the Indigenous Forest sub-unit and therefore only includes riparian habitat and not forest as well.

Both these sub-units have a similar vegetation structure, i.e., **tall, closed woodland**, which typically blends in well with the surrounding forest and woodland communities.

The habitat integrity for these sub-units varied within the different MR83 UG Areas. Within Frankfort, the Riparian Forest was intact and habitat disturbances low (well sheltered from the surrounding disturbances due to its location within the dense Indigenous Forest sub-unit), whereas the habitat integrity of the Riparian Woodland within Frankfort was moderately to largely intact depending on AIP infestation. However, even when surrounded by AIP-dominated Vegetation, the Riparian Woodland in Frankfort tended to have limited disturbances – often in contrast with the surrounding habitat. The Riparian Forest in Dukes was moderately intact adjacent to the historic footprint areas and several AIPs have encroached along these systems deeper into the forested areas. Further away from the historically mined areas, habitat integrity increased. Riparian Woodlands within Dukes and Morgenzon both have lowered habitat integrity since these systems have experienced either diversions in the past or are invaded by AIPs due to their proximity to historic mined areas. No Riparian Forest is associated with Beta North, but the Riparian Woodland associated with Beta North (i.e., the Peach Tree Stream) is significantly degraded. The presence of remnant indigenous vegetation is sub-optimal, and alien species such as *Acacia dealbata*, *Eucalyptus* species and *Solanum mauritianum* (among many other AIPs) are the dominant vegetation along the stream. The Riparian Woodland (i.e., the Peach Tree Stream) has also experienced significant, direct impacts from illegal mining activities and have been diverted along several sections of its reach.

Below images are representative photos of the habitat integrity of the Riparian Forest and Riparian Woodlands within the different MR83 UG Areas.



**From left to right:** The first two images show the Riparian Woodland associated with Beta North (i.e., the Peach Tree Stream) surrounded by *Acacia dealbata* and illegal mining activities. The central photo depicts the Riparian Forest of Dukes, where the vegetation is largely intact, but invaded by AIPs such as *Rubus cuneifolius* and *Solanum mauritianum*. The fourth photo shows the Riparian Woodlands of Morgenzon, where the woody component is largely indigenous, but AIPs have encroached. The herbaceous complement was overgrown by invasive AIPs such as *Verbena bonariensis*. The last photo shows the intact habitat of the Frankfort Riparian Woodland. This section was surrounded by AIPs; however, the Riparian Woodland retained high levels of habitat integrity and very few AIPs have managed to encroach into this system. Pipes in the Frankfort Riparian Woodlands indicate water use by illegal miners have taken place historically.





### Watercourse Habitat

The Watercourse Habitat include streams and rivers (Blyde River and tributaries) where riparian habitat is present, but the woody component is not as well-developed as within the Riparian Forest and Riparian Woodland. These systems are associated with permanent waterflow and typically have a better representation of grasses and sedges; whereas the woody component is not continuous along these systems.

Vegetation structure can be described as **tall-to-high, closed grassland** along much of its extent, interspersed with stretches of **short-to-tall, open woodland**.

The integrity of these systems also varied across the different MR83 UG Areas. In Dukes only a small section of the Freshwater Habitat has been categorised as Watercourse Habitat. This is a very secluded piece that is surrounded by a historic mining footprint and consequently, the Watercourse Habitat was overrun by AIPs. Within Morgenzon, the tributary of the Blyde was moderately degraded closer to the historic mining footprint, but improved habitat becomes more evident moving eastwards towards the golf course. The Blyde River running between Beta North has been degraded in its woody compliment from a floral perspective, with the woody component characterised by several AIP trees. The graminoid and the forb component was less invaded in most sections, yet often less diverse than what was observed in sections of the Blyde River where fewer AIPs have encroached.

### SPECIES OVERVIEW

Floral diversity for the Riparian Forest and the Riparian Woodland was moderately high to intermediate, with floral diversity associated with the Watercourse Habitat intermediate. A total of 106 plant taxa were recorded within the Freshwater Habitat, 47% of which were represented by woody species, 36% by forbs, and 17% by graminoid species. AIPs contributed toward 22% of floral species richness recorded within this habitat unit.

The floral communities associated with the Riparian Forest and Riparian Woodland included several species from the surrounding Indigenous Forest and Woodland sub-units, however, species with a higher affinity for saturated soils were noticeably more abundant than in the surrounding terrestrial habitat. The Watercourse Habitat is moderately representative of what is expected for the river habitat. The presence of AIPs has replaced native species in several sections and is a contributing factor to loss of native species diversity along these systems.

Dominant and/or commonly occurring species within this unit is listed below. Please refer to **Appendix B** for a comprehensive list of species recorded on site.

- **Woody species:** *Artemisia afra*, *Buddleja auriculata*, *Buddleja salviifolia*, *Celtis africana*, *Combretum erythrophyllum*, *Euryops chrysanthemoides*, *Ficus sur*, *Ilex mitis*, *Kiggelaria africana*, *Leucosidea sericea*, *Rhamnus prinoides*, *Salix mucronata*, *Ziziphus mucronata*.
- **Herbaceous species:** *Agrimonia procera*, *Begonia sutherlandii*, *Blechnum tabulare* (fern), *Chlorophytum bowkeri*, *Crococsmia paniculata*, *Desmodium uncinatum*, *Geranium wakkerstroomianum*, *Hypoestes triflora*, *Impatiens hochstetteri*, *Persicaria attenuata*, *Pteridium aquilinum* (fern), *Senecio polyanthemoides*, *Vigna vexillata*.
- **Graminoid species:** *Carex mossii*, *Carex spicatopaniculata*, *Cyperus albostratus*, *Panicum deustum*, *Phragmites australis*, *Setaria megaphylla*.
- **AIP species:** *Acacia melanoxylon*, *Acer negundo*, *Centella aristata*, *Cirsium vulgare*, *Lantana camara*, *Oenothera rosea*, *Paspalum dilatatum*, *Paspalum urvillei*, *Rubus niveus*, *Verbena bonariensis*, *Verbena officinalis*.



**FLORAL SPECIES OF CONSERVATION CONCERN**

This habitat unit is associated with floral SCC of a varying threat status<sup>6</sup> and/or protection status. Three floral SCC groups were confirmed within this habitat unit, two of which are provincially protected under the MNCA, and one of which is nationally protected under the NFA. Two of the sensitive species triggered by the Screening Tool obtained a high Probability of Occurrence (POC) within this habitat unit and therefore the medium sensitivity for the Plant Species Theme is supported. Refer to the below table for SCC that were confirmed or obtained a High POC for this habitat unit. Refer to **Appendix C** for all the results of the POC assessment.

From a floral SCC perspective, this habitat unit (especially the Riparian Forest and Riparian Woodlands) either host or provide suitable habitat for Red Data Listed (RDL) species. However, most of the SCC likely to occur within this habitat unit are of LC in terms of their threat status but are protected nationally and/or provincially and will require permit applications from MTPA and DFFE if any form of damage to these species will occur as a result of mining activities.





Scientific Name	POC	Status	Scientific Name	POC	Status
<i>Adenia gummifera</i> var. <i>gummifera</i>	High	LC. MNCA-protected	<i>Podocarpus</i> (=Afrocarpus) <i>falcatus</i>	<b>Confirmed</b>	LC. NFA-protected. MNCA-protected
<i>Cyathea dregei</i>	<b>Confirmed</b>	LC. MNCA-protected	<i>Prunus africana</i>	High	VU. NFA-protected
<i>Hesperantha bulbifera</i>	High	LC. Rare provincially	<i>Zantedescia</i> sp.	<b>Confirmed</b>	LC. MNCA-protected
<i>Hesperantha coccinea</i>	High	LC. MNCA-protected	<i>Scabiosa transvaalensis</i>	High	VU
<i>Huperzia ophioglossoides</i>	High	LC. Rare provincially	Sensitive species 880	High	VU
Orchidaceae species	<b>Confirmed</b>	LC. MNCA-protected	Sensitive species 1252	High	VU

<sup>6</sup> LC = Least Concern; VU = Vulnerable





### 3.3 Terrestrial Woody Communities

REPRESENTATIVE HABITAT PHOTOS	
Indigenous Forest	Woodland
	
	
<p>The indigenous forest vegetation is associated with a group of trees where the canopy was largely closed. The understory vegetation included several forb, fern, and shrub species, some of the more striking being (from left to right): <i>Disperis fanniniae</i> (orchid), <i>Hylodesmum repandum</i> (typical understory forb), <i>Liparis bowkeri</i> (orchid), and <i>Sclerochiton harveyanus</i> (understory shrub).</p>	<p>The Woodland largely comprised of a tree-dominated habitat, but the tree layer was not always continuous, and the tree canopy not always closed. Graminoids were also a more important component in this sub-unit. Selected examples of tree species typically found in this habitat sub-unit included (photos left to right): <i>Bowkeria cymosa</i>, <i>Grewia occidentalis</i>, <i>Rhamnus prinoides</i>, and the indigenous <i>Rubus pinnatus</i>.</p>



**HABITAT OVERVIEW**

Much of the MR83 UG Areas are associated with floral communities dominated by a woody component. To distinguish between the various woody communities, two characteristics were used to describe key differences between the sub-units, namely physiognomy<sup>7</sup> (growth form, structure, and cover) and floristics (species composition and abundance). Based on these characteristics, the two different woody communities (Indigenous Forest and Woodland) were characterised.

**Indigenous Forest**

Two recognised definitions of “forest” are used in this report:

1. The NFA’s definition of natural forest: “...a group of indigenous trees- (a) whose crowns are largely contiguous; or (b) which have been declared by the Minister to be a natural forest under section 7(2).”
2. The definition provided by Mucina et al. (2021): “Forest is a vegetation-physiognomic and ecosystem-functional tree-dominated formation often containing several sub-canopy shrub layers, with the tree canopy having crowns overlapping or touching, covering at least 40% of projected cover, and lacking continuous grassy undergrowth.”

Taking the above definitions into account, natural forest was confirmed for this habitat sub-unit within Dukes and Frankfort – albeit only small sections within the assessment areas. The Indigenous Forest can be characterised – physiognomically – as **tall forest** (per Diagram A1, Appendix A) with a tree dominated formation where tree crowns largely overlap, and the understorey consists of both a shrub and an herbaceous understorey. The graminoid component is represented mainly by sedges, whereas the occurrence of grasses was sparse to lacking. As is typical for the Mpumalanga Mistbelt Forests (*sensu* Mucina et al. 2003), the Indigenous Forest sub-unit occurs along south-east facing slopes confined to fire refugia.

The integrity of the Indigenous Forest sections was mostly intact, especially with reference to Frankfort. Legacy impacts and the presence of illegal mining has, however, resulted in AIPs encroaching into the Dukes forest, with indigenous woody encroachers such as *Senegalia ataxacantha* and AIPs such as *Lantana camara* (amongst others) both evidently increasingly encroaching into the forest margins of Frankfort.

**Woodland**

Woodlands bare some physiognomic similarities to Forests in that the woody component is well-developed and dominated by trees in the upper stratum – as opposed to “thickets” that are better described as dense shrublands. The main difference between forests and woodlands, however, stems from the presence of a prominent grass layer in woodlands.

The Woodland sub-unit has been subjected to various direct and indirect impacts within the different MR83 UG Areas. Habitat integrity was most intact for the Woodland associated with Frankfort, i.e., mapped as “Woodland - intact”. The Frankfort Woodland is, in many aspects, represented largely by an indigenous compliment with AIP trees such as *Acacia dealbata*, *Acacia decurrens*, *Lantana camara*, *Pinus pinaster* and *Senna septemtrionalis* only prevalent along the Woodland edges and along the existing haul road.

Within Beta North, Dukes and Morgenzon, the Woodland is associated with impaired habitat integrity as the woody compliment is either moderately homogenous (dominated by species such as *Bowkeria cymosa*, *Diospyros lycioides* subsp. *lycioides*, *Leucosidea sericea*, *Rhamnus prinoides*, and *Senegalia ataxacantha*) an/or have a prominent presence of AIPs (including several serious invaders such as *Lantana camara* and various *Rubus* species). These woodlands are referred to as “Woodland - degraded” on the habitat unit maps and have formed in response to historic disturbances (i.e., most of the degraded Woodlands were historically grasslands).

From a vegetation structure perspective, the Woodland sub-unit did not fully represent any reference vegetation type. Overall structure can be described as **tall, closed woodland** (Diagram A1, Appendix A). Only the Frankfort Woodland included a decent representation of species that were representative of a transitional community between the Northern Mistbelt Forest vegetation type and the Northern Escarpment Dolomite Grassland vegetation type. The Woodland associated with Beta North, Dukes, and Morgenzon are not representative of the reference states.

<sup>7</sup> Physiognomy refers to overall structure or physical appearance-what the community and its dominant species look like, their height and spacing (height and canopy cover), and shape.





SPECIES OVERVIEW	
Indigenous Forest	Woodland
<p>The Indigenous Forest sub-unit was considered species rich and representative of the reference vegetation type. Compositional characteristics were therefore in alignment with the Mucina and Rutherford (2006) habitat description of the Northern Mistbelt Forest, but further shared several characteristics of the Mucina <i>et al.</i> (2003) classification of Mpumalanga Mistbelt Forest, and to a lesser degree the Lötter <i>et al.</i> (2014) Long Tom Mistbelt Forest sub-type.</p> <p>Species recorded within the Indigenous Forest are listed below. For a more comprehensive list of species associated with this sub-unit, please refer to <b>Appendix B</b>:</p> <ul style="list-style-type: none"> <li>➤ <b>The graminoid layer</b> was not well-represented, as is characteristic of the forest type. Species included: <i>Carex spicatopaniculata</i>, <i>Cyperus albostratus</i>, <i>Cyperus distans</i>, <i>Cyperus glaucophyllus</i>, <i>Oplismenus hirtellus</i>, <i>Setaria megaphylla</i>.</li> <li>➤ <b>Forbs and ferns</b> included: <i>Abrus laevigatus</i>, <i>Asplenium aethiopicum</i>, <i>Begonia sutherlandii</i>, <i>Cheilanthes viridis</i>, <i>Chlorophytum bowkeri</i>, <i>Crocoshia aurea</i> subsp. <i>aurea</i>, <i>Dicliptera clinopodia</i>, <i>Dietes iridioides</i>, <i>Hypoestes triflora</i>, <i>Impatiens hochstetteri</i>, <i>Peperomia retusa</i>, <i>Plectranthus cf. fruticosus</i>, <i>Pteridium aquilinum</i>, <i>Pteris catoptera</i>, <i>Streptocarpus confusus</i> subsp. <i>confusus</i>.</li> <li>➤ <b>The woody layer</b> was well developed and diverse. The canopy and emergent component included <i>Afrocarpus falcatus</i>, <i>Apodytes dimidiata</i>, <i>Brachylaena transvaalensis</i>, <i>Celtis africana</i>, <i>Combretum kraussii</i>, <i>Cussonia spicata</i>, <i>Ficus sur</i>, <i>Kiggelaria africana</i>, <i>Searsia chirindensis</i>, <i>Xymalos monospora</i>. The intermediate and shrub layer included <i>Asparagus setaceus</i>, <i>Behnia reticulata</i>, <i>Carissa bispinosa</i> subsp. <i>zambesiensis</i>, <i>Cassinopsis ilicifolia</i>, <i>Dalbergia armata</i>, <i>Diospyros whyteana</i>, <i>Myrsine africana</i>, <i>Piper capense</i>, <i>Psychotria zombamontana</i>, <i>Sclerochiton harveyanus</i>.</li> <li>➤ <b>Succulent species</b> recorded included only a <i>Cotyledon</i> sp.; however, <i>Aloe</i> species are anticipated to occur deeper into the forests; and</li> <li>➤ <b>AIPs</b> were not prominent within the habitat sub-unit. The forest fringes, however, included an intermediate representation of AIPs, e.g., <i>Lantana camara</i>. Often common in the understorey <i>Bidens pilosa</i>, <i>Conyza canadensis</i>, and <i>Galinsoga quadriradiata</i>.</li> </ul>	<p>The Frankfort Woodland was associated with a moderately high species richness, however, where AIPs started to encroach into the sub-unit, the indigenous species compliment was less species rich. The homogenous and often AIP-dominated Woodland associated with Beta North, Dukes and Morgenzon were, at best, associated with a moderate species richness.</p> <p>Species recorded within the Woodland sub-unit are listed below. For a more comprehensive list of species associated with this sub-unit, please refer to <b>Appendix B</b>:</p> <ul style="list-style-type: none"> <li>➤ <b>The graminoid layer</b> was typically well-represented, especially within the Frankfort Woodland. Species included: <i>Cynodon dactylon</i>, <i>Cyperus distans</i>, <i>Cyperus glaucophyllus</i>, <i>Digitaria eriantha</i>, <i>Melinis repens</i>, <i>Panicum deustum</i>, <i>Panicum maximum</i>, <i>Setaria megaphylla</i>, <i>Urochloa mosambicensis</i>.</li> <li>➤ <b>Forbs and ferns</b> included: <i>Clematis brachiata</i>, <i>Commelina africana</i>, <i>Conostomium natalense</i>, <i>Gerbera jamesonii</i>, <i>Ipomoea obscura</i>, <i>Maclidium zeyheri</i>, <i>Momordica foetida</i>, <i>Pearsonia sessilifolia</i>, <i>Scabiosa columbaria</i>, <i>Senecio oxyriifolius</i>, <i>Zornia capensis</i>.</li> <li>➤ <b>The woody layer</b> was well developed for Frankfort, less so in Beta North, Dukes and Morgenzon. Species included <i>Albizia versicolor</i>, <i>Athrixia elata</i>, <i>Bowkeria cymosa</i>, <i>Buddleja salviifolia</i>, <i>Cephalanthus natalensis</i>, <i>Combretum molle</i>, <i>Crotalaria doidgeae</i>, <i>Dombeya burgessiae</i>, <i>Euclea crispa</i>, <i>Faurea galpinii</i>, <i>Grewia occidentalis</i>, <i>Morella pilulifera</i>, <i>Pittosporum cf. viridiflorum</i>, <i>Rhamnus prinoides</i>, <i>Senegalia ataxacantha</i>, <i>Vachellia karoo</i>.</li> <li>➤ <b>Succulent species</b> recorded included mainly <i>Aloe</i> species; and</li> <li>➤ <b>AIPs</b> comprised of <i>Lantana camara</i>, <i>Acacia dealbata</i>, <i>Acacia decurrens</i>, and <i>Pinus pinaster</i> in the tree component, whereas the herbaceous component includes <i>Bidens pilosa</i>, <i>Conyza canadensis</i>, <i>Phytolacca octandra</i>, <i>Tagetes minuta</i>, <i>Verbena bonariensis</i>, <i>Zinnia peruviana</i>.</li> </ul>



**FLORAL SPECIES OF CONSERVATION CONCERN**

This habitat unit is associated with national and provincial SCC (refer to below section) and provides suitable habitat to support additional SCC not recorded during the field assessment. Please refer to **Appendix C** for the complete outcome of the POC assessment.

From a floral SCC perspective, the Indigenous Forest sub-unit and the intact Woodland sub-unit either host or provide suitable habitat for RDL species. The degraded Woodland has a low probability to host SCCs. The SCCs that were confirmed present within the Indigenous Forest sub-unit and the intact Woodland sub-unit are all of LC conservation status but are either nationally or provincially protected. Several of the RDL species triggered by the screening tool obtained a high to medium POC for the Indigenous Forest sub-unit and the intact Woodland sub-unit and the medium sensitivity outcome of the screening tool for the Plant Species theme is thus supported.

The Indigenous Forest sub-unit and to a lesser degree the Woodland sub-unit are important for floral SCC. It is highly recommended that where these species may be impacted by the proposed mining activities, the footprint layouts be realigned / adjusted to prevent loss of these species. If impacts to species are unavoidable, permit applications from MTPA and DFFE will be required.

Scientific Name	POC	Suitable habitat on site	Status	Scientific Name	POC	Suitable habitat on site	Status
<i>Adenia gummifera</i> var. <i>gummifera</i>	High	Indigenous Forest sub-unit, Riparian Forest sub-unit, and the Riparian Woodland sub-unit.	LC. MNCA-protected	<b>Orchidaceae species</b>	Confirmed	Indigenous Forest sub-unit	LC. MNCA-protected
<i>Adenia wilmsii</i>	Medium	Woodlands (where more grassy and along rocky slopes)	EN TOPS. MNCA-protected	<i>Pentatrichia alata</i>	Medium	Frankfort Woodlands (west of the footprint).	Data deficient
<i>Aloe nubigena</i>	Medium	Woodland associated with Frankfort.	Rare	<i>Pittosporum viridiflorum</i>	Confirmed	<b>Indigenous Forest of Frankfort and Morgenzon.</b>	LC. NFA-protected
<b>Aloe spp.</b>	<b>Confirmed</b>	<b>Woodlands</b>	<b>LC. MNCA-protected</b>	<i>Podocarpus (=Afrocarpus) falcatus</i>	Confirmed	<b>Indigenous Forest of Frankfort and Morgenzon</b>	LC. NFA-protected. MNCA-protected
<i>Callilepis leptophylla</i>	Medium	Woodland associated with Frankfort.	LC. Important provincially	<i>Podocarpus latifolius</i>	Confirmed	<b>Indigenous Woodlands Forests and</b>	LC. NFA-protected. MNCA-protected
<i>Catha edulis</i>	High	Indigenous Forests and Woodland sub-units	LC. NFA-protected	<b>Proteaceae species</b>	Confirmed	<b>Indigenous Woodlands Forests and</b>	LC. MNCA-protected
<i>Ceropegia</i> spp.	Medium	Indigenous Forests and Woodland sub-units	LC. MNCA-protected	<i>Prunus africana</i>	High	Indigenous Forest of Frankfort and Morgenzon, as well as Riparian Forest.	VU. NFA-protected
<i>Clivia caulescens</i>	High	Indigenous Forest sub-unit.	NT. MNCA-protected	<i>Scabiosa transvaalensis</i>	High	Indigenous Forest of Frankfort and Morgenzon, as well as Riparian Forest.	VU
<i>Cryptocarya transvaalensis</i>	High	Indigenous Forest sub-unit.	LC. Important provincially	<i>Scadoxys</i> spp.	High	Indigenous Forests and Woodlands	LC. MNCA-protected
<i>Curtisia dentata</i>	High	Indigenous Forest sub-unit.	NT. NFA-protected. MNCA-protected	<i>Siphonochilus aethiopicus</i>	Medium	Woodlands	CR. TOPS
<i>Faurea macnaughtonii</i>	High	Indigenous Forest associated with Frankfort and Morgenzon, but	Rare	<i>Streptocarpus actinoflorus</i>	Medium	Ecotone between the Frankfort and Morgenzon Indigenous Forests and	EN





		nowhere close to the proposed footprints.				adjacent Montane Grasslands (not within the footprint areas).	
<i>Hesperantha bulbifera</i>	High	Indigenous Forest and especially the Riparian Forest.	LC. Rare provincially	<i>Streptocarpus fenestra-dei</i>	Medium	Frankfort and Morgenzon Indigenous Forests.	VU
<i>Huperzia ophioglossoides</i>	High	Indigenous Forest and Riparian Forest.	LC. Rare provincially	<b>Zantedeschia spp</b>	<b>Confirmed</b>	<b>Indigenous Forest sub-unit of Morgenzon</b>	<b>LC. MNCA-protected</b>
<i>Merwillia plumbea</i>	High	Rock outcrops in grassy Woodland	NT. TOPS. MNCA-protected	Sensitive species 1252	High	Indigenous Forest sub-unit, Riparian Forest and Riparian Woodland sub-units.	VU
<i>Monopsis kowynensis</i>	Medium	Margins of Indigenous Forest and Woodland.	VU	Sensitive species 738	High	Indigenous Forests of Frankfort and Mprgenzon, as well as Woodland of Frankfort.	EN. TOPS. NFA-protected. MNCA-protected
<i>Ocotea bullata</i>	Medium	Indigenous Forest of Frankfort and Morgenzon, but likely deeper into the forests.	EN. NFA-protected. MNCA-protected	Sensitive species 880	High	Indigenous Forest sub-unit, Riparian Forest and Riparian Woodland sub-units.	VU
<i>Ocotea kenyensis</i>	Medium	Indigenous Forest of Frankfort and Morgenzon, but likely deeper into the forests.	VU. MNCA-protected	Sensitive species 998	Medium	Woodland associated with Frankfort – west of the proposed footprint.	EN
<i>Olinia huillensis</i> subsp. <i>burttdavii</i>	Medium	South African endemic Indigenous Forest	VU	Sensitive species 1248	Medium	Woodland associated with Frankfort.	VU. MNCA-protected



### 3.4 Valley Habitat

#### REFERENCE PHOTOS



Representative photos of the Valley Habitat that was recorded within Beta North, Dukes and Morgenzon. This habitat unit was not represented in Frankfort.

#### HABITAT OVERVIEW

The Valley Habitat occurs along the mountain footslopes of Beta North, Dukes, and Morgenzon. This habitat unit varied in habitat integrity across the different MR83 UG Areas, ranging from sections where AIP species to areas where native grasses, forbs and ferns were more prevalent (typically **short-to-tall, closed herbland**). A small stretch along the Morgenzon Haul Road includes Rocky Outcrops; however, important to note is that the Rocky Outcrops are not represented anywhere else in the MR83 UG Areas apart from this small stretch. Since there will be no changes to the existing Haul Roads (i.e., the only infrastructure associated with the Rocky Outcrops), this habitat sub-unit will not be impacted by the proposed MR83 UG project. As such, this habitat unit will not be discussed further.

The vegetation communities associated with the Valley Habitat are not representative of any of the reference vegetation types (neither corresponding to the grassland nor the forest types for the area), which can be attributed to the vegetation's response to two main landscape drivers, namely 1) position in the landscape and 2) exposure to historic (and/or current) disturbances. Since this habitat unit occurs along the mountain foothills, sediment and water often accumulate in this habitat, i.e., the habitat is exposed to increased natural disturbances that result in a landscape dominated by forbs and low shrubs (e.g., *Helichrysum mimetes*, *Helichrysum splendidum*, *Phymaspermum acerosum*) as opposed to the typical species-rich grassland communities expected from the reference Long Tom Pass Montane Grassland and Northern Escarpment Dolomite Grassland vegetation types.

Within areas where more disturbances were present, be it historic or more current, the vegetation communities were characterised by a high abundance of AIPs and the encroaching *Artemisia afra* and *Pteridium aquilinum* (common bracken fern). The lack of typical grassland communities can further be explained by the alteration of important grassland drivers such as high natural incidence of fire and grazing by wildlife within the MR83 UG Areas. This is especially relevant within Beta North, Dukes and Morgenzon where mining practices (illegal and organised) have changed natural fire regimes and have driven out larger herbivores (replacing these with domestic livestock that increase grazing pressures).

The habitat integrity of this habitat unit is of moderately low to intermediate importance for floral ecology associated with the MR83 UG Areas and surrounding landscapes.





### SPECIES OVERVIEW

A low to moderately-low native species diversity was present within the Valley Habitat of Beta North, Dukes and sections of Morgenzon. Healthier vegetation communities – that support intermediate floristic diversity with increased heterogeneity – were mostly recorded along the proposed Haul Road associated with Morgenzon A total of 58 plant taxa were recorded within the Valley Habitat, 24% of which were represented by woody species, 59% by herbaceous species, and 17% by graminoid species. AIPs contributed toward 24% of all floral species recorded within this habitat unit.

From a species composition perspective, the floral communities within this habitat unit are not representative of the reference vegetation types. Dominant and/or commonly occurring species within this unit is listed below. Please refer to **Appendix B** for a comprehensive list of species recorded on site.

- **Woody species:** *Artemisia afra* var. *afra*, *Diospyros lycioides* subsp. *lycioides*, *Eriosema psoraleoides*, *Helichrysum mimetes*, *Leucosidea sericea*, *Phymaspermum acerosum*.
- **Herbaceous species:** *Agrimonia procera*, *Crocasmia paniculata*, *Crotalaria pallida*, *Nidorella auriculata*, *Oxalis obliquifolia*, *Pelargonium luridum*, *Senecio microglossus*.
- **Graminoid species:** *Andropogon eucomus*, *Cynodon dactylon*, *Cyperus cyperoides*, *Eragrostis capensis*, *Eragrostis plana*, *Setaria sphacelata*, *Sporobolus centrifugus*.
- **AIP species:** *Lantana camara*, *Melilotus albus*, *Melilotus indicus*, *Oenothera rosea*, *Oenothera tetraptera*, *Schkuhria pinnata*, *Tagetes minuta*, *Verbena bonariensis*.

### FLORAL SPECIES OF CONSERVATION CONCERN

This habitat unit was not found to be important for RDL species and none of the triggered sensitive species from the Screening Tool outcome are likely to establish in this habitat unit. The medium sensitivity for the Plant Species Theme is thus not supported. Provincially protected species such as *Eucomis autumnalis*, *Scadoxus* species and species in the Orchidaceae family are likely to be present in this habitat unit; however, these are all LC species and not in threat of extinction at this stage. Loss of these species or their habitat would still require permit applications from the MTPA. Please refer to **Appendix C** for the outcome of the POC assessment.

The NT *Merwillia plumbea* is likely present within the rocky outcrops of this habitat unit; however, the proposed footprint will not impact on this species' habitat. Since this is a species of medicinal importance, the mine should take the necessary measures to ensure workers do not harvest the remaining sub-populations.



### 3.5 Concluding Remarks

#### PRESENCE OF UNIQUE LANDSCAPES

According to the Screening Tool, the Terrestrial Sensitivity for the MR83 UG Areas is considered to be of **Very High Sensitivity**. The triggered sensitivity features include:

- **CBA Irreplaceable** (Beta North, Dukes and Morgenzon) and **CBA Optimal** (Frankfort and Beta North): Given the largely degraded (and often historically transformed) nature of the Valley Habitat, as well as the lack of primary grasslands and floral communities that are representative of the reference states, the presence of CBA 1 and 2 was not confirmed for this habitat unit. The heavily degraded and even transformed landscapes associated with the Degraded Habitat Unit also provides no habitat suitable to meet biodiversity targets and therefore the CBA 1 and CBA 2 was not confirmed in this habitat unit. The Freshwater Habitat within Beta North, Dukes and Morgenzon occur in the **CBA Irreplaceable** and despite the degraded stretches within especially Beta North, the CBA is still confirmed due to the important ecological processes supported by the Freshwater Habitat. The Indigenous Forest and Woodland sub-units confirm the presence of CBAs.
- **ESA Local Corridor**. Associated with Frankfort and confirmed in the Woodland sub-unit (intact habitat).
- **Forest** (Beta North, Dukes, Morgenzon and Frankfort): No forests were confirmed for Beta North or Morgenzon. Small sections within Dukes and Frankfort were confirmed to be Mpumalanga Mistbelt Forest (Mucina *et al.* 2003).
- **Focus Areas for land-based protected areas expansion** (Dukes, Frankfort, Morgenzon and Beta North): The Northeast Escarpment Focus Area (South African National Parks (SanParks), 2010) is associated only with Frankfort. All four MR83 UG Areas are, however, within the Kruger to Canyons Biosphere Reserve and within the ESA Protected Areas Buffer. Dukes is in the recently promulgated (GN 1062 of October 2021) Morgenzon Forest Nature Reserve and as such, mining is legally prohibited. According to the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA), “despite other legislation, no person may conduct commercial prospecting, mining, exploration, production, or related activities (a) in a special nature reserve, national park or nature reserve;” Section 48(1)(a) of NEMPAA.
- **Endangered ecosystem** (Dukes, Frankfort, Morgenzon and Beta North): All four sites are associated with the EN Malmani Karstlands threatened ecosystem, which is associated with the Northern Escarpment Dolomite Grassland and the Long Tom Pass Montane Grassland reference states. These vegetation types were not confirmed for any of the habitat units associated with the MR83 UG Areas and thus no key biodiversity features of the Malmani Karstlands are hosted in any of the habitat units.

#### BUSINESS CASE

The MR83 UG Areas are associated with both heavily degraded habitat, but also with habitat of intermediate to high sensitivity. The habitat units that were identified over the course of several site visits, have been delineated considering 1) species composition and vegetation structure (particularly important to classify forest types and distinguish between woody communities on site), 2) ratio of AIPs vs native floral species, 3) legal reference such as definitions of “riparian habitat”, “watercourses”, and “natural forests”, and 4) the presence of floral SCC and potential for the habitat unit (or sub-unit) to support viable populations of floral SCC.

Given the above, if the proposed underground activities for MR83 is approved, the following key considerations should be taken into account:

- The reference vegetation types, as per Mucina & Rutherford (2006) and SANBI (2006-2018), included the Long Tom Pass Montane Grassland, Northern Escarpment Dolomite Grassland, and Northern Mistbelt Forest. Within the MR83 UG Areas, the presence of Long Tom Pass Montane Grassland and the Northern Escarpment Dolomite Grassland was not confirmed. These grasslands remain in the surrounding mountainous landscape, but not within the proposed footprint areas. Within Dukes and Frankfort, the Northern Mistbelt Forest was confirmed within the Indigenous Forest sub-unit and the Riparian Forest sub-unit. This forest type is listed in the Declaration of a list of “National Forest types” as **Natural Forests in terms of section 7(3)(a) of the NFA**. The effect of this declaration is that in terms of section 7(1) of the NFA, “no person may cut, disturb, damage or destroy any indigenous tree in, or remove or receive any such tree from a natural forest except in terms of: a) a license issued under subsection (4) or section 23; or b) an exemption from the provisions of subsection (4) published by the Minister in the Gazette.” The proposed footprints will encroach minimally on the Indigenous Forest sub-unit and the Riparian Forest sub-unit; however, it is strongly advised that no impact to the remaining forest section should take place. Within Frankfort in particular, edge effects would need to be managed – e.g., high potential for erosion and sedimentation of the downslope Indigenous Forest sub-unit and the Riparian Forest sub-unit. The Forests are also situated within CBAs and





therefore it is strongly advised that there be an aim for a “net gain” in biodiversity, rather than just avoiding any impacts, which can be achieved through AIP clearing and AIP management within these forest sections.

- As part of DFFE recommendations, a 30 m exclusion buffer should be incorporated around natural forests to buffer against edge effect impacts to forest dynamics. **Please refer to Figures 15 - 21** for the DFFE 30 m buffer around intact forest habitat which further illustrates the extent to which the proposed infrastructure encroaches into the buffer.
- The Very High Sensitivity of the Screening Tool Outcome for the Terrestrial Biodiversity Theme was confirmed for only the Indigenous Forest sub-unit, Woodland sub-unit (where not degraded), and the Freshwater Habitat. Of greatest concern is the presence of CBAs, ESAs, Protected Areas, and Forests. As per the MTPA land use guidelines, neither underground nor surface mining are suitable land uses to achieve biodiversity targets. However, direct loss of natural habitat associated with these significant terrestrial biodiversity features will be small and indirect impacts are far more likely. As far as is possible, clearing of natural vegetation should be minimised where these are associated with the above-mentioned sub-units. If avoidance is not possible, then offsetting and/or compensation should be investigated. Removal and management of AIPs within the MR83 UG Areas is essential and may even result in a net gain of biodiversity. Due to the sensitivity of the habitat, the end-goal of rehabilitation activities would need to aim to restore natural areas to what occurred prior to legacy mining impacts (as far as is possible and feasible).
- The Screening Tool outcome for the Plant Species theme triggered a medium sensitivity. A long list of SCCs was triggered by the Screening Tool and many of these were confirmed to have a medium to high POC for the Indigenous Forest sub-unit, Riparian Forest sub-unit and to a lesser degree the Woodland sub-unit and Riparian Woodland sub-unit. The Valley Habitat and Watercourse Habitat sub-units are not important for threatened SCC or for SCCs triggered by the Screening Tool; however, these sub-units are important for provincially protected species under the MNCA. Where SCCs were confirmed on site, these did not include threatened species but instead included NT species, nationally protected species (NFA and TOPS) and provincially protected species (MNCA). Loss of SCCs, be it threatened or protected, must be avoided at all costs. If impacts to these species are not avoidable, it is strongly advised that rescue and relocation initiatives be investigated. Alternatively, it would be necessary to harvest propagules of these species if the entire specimen cannot be relocated. Harvesting of propagules are recommended regardless, to propagate in a nursery and for use in rehabilitation activities later down the line.
- Legacy impacts associated with the MR83 UG Areas, as well as current illegal mining activities, are extensive across the four sites but more evident in Beta North, Dukes and Morgenzon. If mining is authorised, there should be a commitment (as part of mine closure) to rehabilitate the footprint areas to a state that will allow reinstatement or support CBA and ESA habitat (as far as possible) and to clear and manage AIPs within 30 m of the proposed footprint areas. Refer also to **Section 3.2** for more details on AIPs. For a depiction of the areas where indigenous vegetation was best represented, **please refer to Figure 14** below.

Please refer to **Section 4** for a description of habitat sensitivity and **Section 5** for the anticipated impacts to this habitat unit.



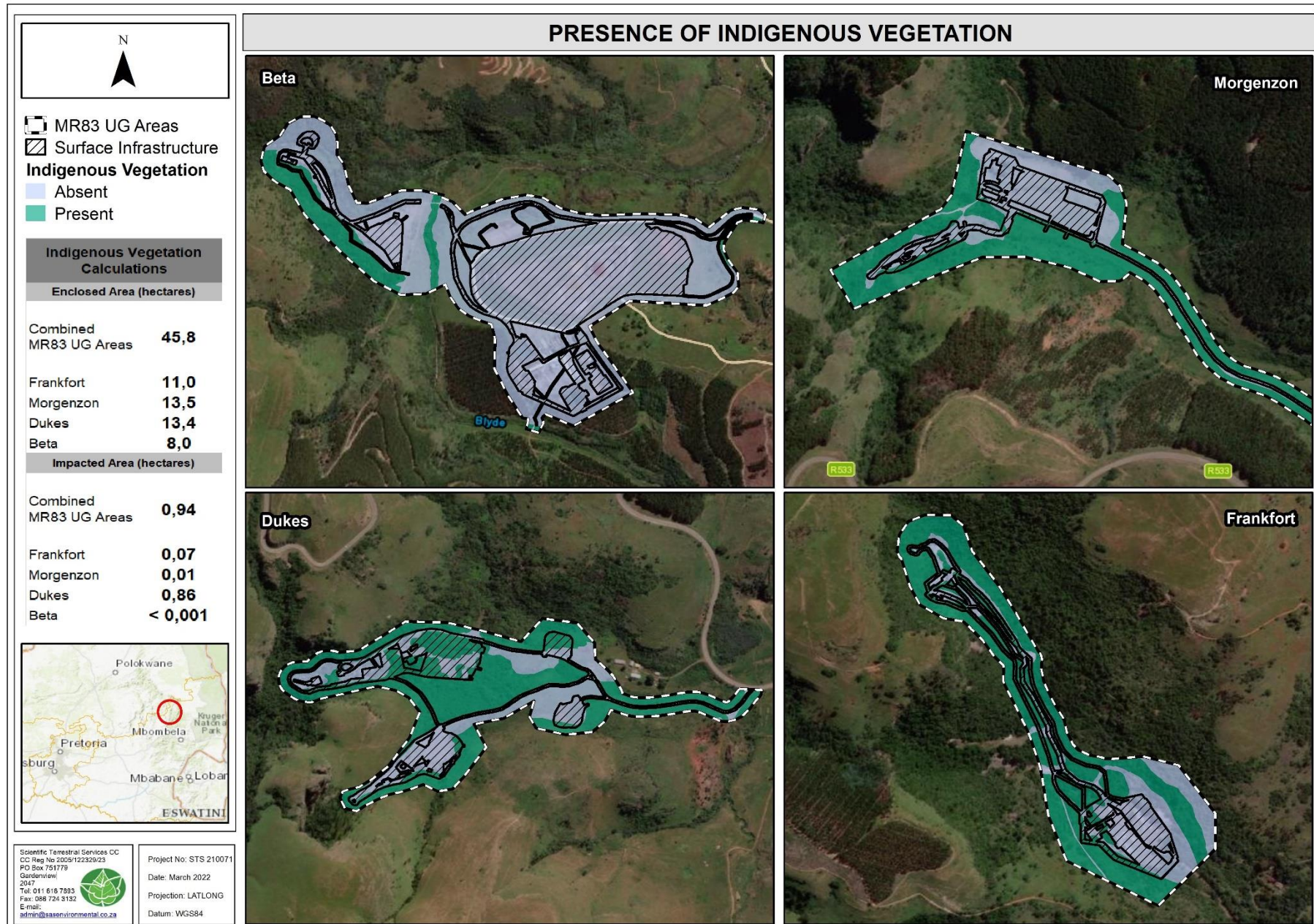


Figure 14: Areas of importance for indigenous vegetation within the MR83 UG Areas.



### 3.6 Alien and Invasive Plant (AIP) Species

South Africa is home to an estimated 759 naturalised or invasive terrestrial plant species (Richardson et al., 2020), with 327 plant species, most of which are invasive, listed in national legislation<sup>8</sup>. Many introduced species are beneficial, e.g., almost all agriculture and forestry production are based on alien species, with alien species also widely used in industries such as horticulture. However, some of these species manage to “escape” from their original locations, spread and become invasive. Although only a small proportion of introduced species become invasive (~0.1–10%), those that do proceed to impact negatively on biodiversity and the services that South Africa’s diverse natural ecosystems provide (from ecotourism to harvesting food, cut flowers, and medicinal products) (van Wilgen and Wilson, 2018).

#### 3.6.1 Legal Context

South Africa has released several Acts legislating the control of alien species. Currently, invasive species are controlled by the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) – Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated 25 September 2020. AIPs defined in terms of NEMBA are assigned a category and listed within the NEMBA List of Alien and Invasive Species (2020) in accordance with Section 70(1)(a) of the NEMBA:

- **Category 1a** species are those targeted for urgent national eradication;
- **Category 1b** species must be controlled as part of a national management programme, and cannot be traded or otherwise allowed to spread;
- **Category 2** species are the same as category 1b species, except that permits can be issued for their usage (e.g., invasive tree species can still be used in commercial forestry, providing a permit is issued that specifies where they may be grown and that permit holders “*Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to Regulation 3*”); and
- **Category 3** are listed invasive species that can be kept without permits, although they may not be traded or further propagated, and must be considered a Category 1b species if they occur in riparian zones.

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<sup>8</sup> Government Notice number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 September 2020, as it relates to the National Environmental Management Biodiversity Act, 2004 (Act No 10 of 2004).





Duty of care related to listed invasive species are referred to in NEMBA Section 73<sup>9</sup>. The motivation for this duty of care is both environmentally and economically driven. Management of alien species in South Africa is estimated to cost at least ZAR 2 billion (US\$142 million) each year - this being the amount currently spent by the national government's DFFE - i.e. the Working for Water programme (van Wilgen, 2020). Managing AIPs early on will reduce clearing costs in the long run.

### 3.6.2 Site Results

For the entire MR83 UG Areas, a total of 56 AIPs were recorded of which 24 species are classified as "Not Listed" (i.e., not currently considered invasive in the 2020 NEMBA Alien and Invasive Species Regulations), 23 species are category 1b listed invaders, five species are category 2 listed invaders, and one species a category 3 listed invader. Three species have conditional listings and thus vary in their NEMBA listing based on whether they occur in a watercourse or not. Refer to Table 2 below for more details.

AIPs were most extensive in Beta North, with Dukes and Morgenzon also associated with a high diversity and abundance of AIPs. Frankfort also hosted an abundance of AIPs, although these were less diverse than for the other MR83 UG Areas. Generally, the AIPs were best represented in the Degraded Habitat Unit; however, the Indigenous Forest sub-unit, Riparian Forest, Riparian Woodland (especially Peach Tree Stream), Watercourse Habitat, and the Valley Habitat all had an association with AIPs, albeit infested to differing degrees.

Given the sensitivity and floral importance of the Indigenous Forest sub-unit, Riparian Forest sub-unit, Riparian Woodland sub-unit, and the Watercourse Habitat sub-unit, the presence of AIPs threaten the long-term ecological integrity of these units. Ongoing degradation will result in the inevitable loss of important habitat for floral SCC as well. It is therefore of utmost importance that strict control of AIPs located on the mine's property, especially areas associated with increased disturbances, be undertaken on a regular basis as part of maintenance activities.

Many of the AIPs have likely been introduced via historic mining and current illegal mining, and as part of remediating legacy impacts, AIPs must be cleared.

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<sup>9</sup> Section 73(2): A person who is the owner of land on which a listed invasive species occurs must-

- a) notify any relevant competent authority, in writing, of the listed invasive species occurring on that land;
- b) take steps to control and eradicate the listed invasive species and to prevent it from spreading; and
- c) take all the required steps to prevent or minimise harm to biodiversity.



**Table 2: Alien and invasive alien species recorded in the MR83 UG Areas. Exemptions apply for species where an \* is given.**

Scientific name	Common Name	Native distribution	Invasive Status	Ecological Risk (where applicable)	Degraded Habitat	Freshwater Habitat	Indigenous Forest	Woodland	Valley Habitat
<b>WOODY SPECIES</b>									
<i>Acacia dealbata</i>	Silver wattle	South-eastern Australia and Tasmania	2	It results in a loss of large amounts of water run-off. Silver wattle also competes with and replaces indigenous grassland and riverine species.	x	x		x	
<i>Acacia decurrens</i>	Green wattle	South-eastern Australia	2*	Green wattle spreads and invades the grasslands, reducing the grazing area for animals. It competes with and replaces indigenous grassland and riverine animals.	x			x	
<i>Acacia elata</i>	Peppertree wattle	South-eastern Australia	1b	It competes with and has the potential to replace and reduce indigenous species.	x				
<i>Acacia melanoxylon</i>	Australian blackwood	Eastern and south-eastern Australia	2*	In South Africa it is a major invader of forests and is a particularly serious threat to 'fynbos' shrubland and grassland areas. It is known to transform these communities by replacing the native non-tree vegetation. It is considered to be difficult to control because of its fast growth rate, vigorous regrowth from root suckers, and prolific regeneration from seed.	x	x			
<i>Acer negundo</i>	Ash-leaved maple, Box elder	North America	3	It crowds and shades out native plants in sensitive bushland along watercourses, and has become a major riparian weed of some waterways.  It is also thought that dense long-term infestations of this species may cause significant damage to waterways by trapping sediment, causing erosion and depleting oxygen levels in the water as a result of shedding large quantities of autumn leaves.		x			
<i>Ailanthus altissima</i>	Tree-of-heaven	China	1b	Competes with and has the potential to replace indigenous species.	x				
<i>Eucalyptus diversicolor</i>	Karri	South-western Australia	Various <sup>10</sup>	It competes with and has the potential to replace indigenous species. Trees along watercourses are likely to reduce stream flow.	x				

<sup>10</sup> a. Category 1b within-

- (i) riparian areas;
- (ii) a Protected Area declared in terms of the Protected Areas Act; or,



Scientific name	Common Name	Native distribution	Invasive Status	Ecological Risk (where applicable)	Degraded Habitat	Freshwater Habitat	Indigenous Forest	Woodland	Valley Habitat
<i>Eucalyptus grandis</i>	Saligna gum, Rose gum	Coastal and subcoastal wet forests of eastern Australia, sporadically distributed from near Newcastle in New South Wales north to the Atherton and Windsor Tablelands in northern Queensland	Various. See conditions for <i>E. diversicolor</i>	It competes with and replaces indigenous species. Stands of trees along watercourses are likely to reduce stream flow.	x	x			
<i>Flaveria bidentis</i>	Smelter's bush	South America	1b	It invades roadsides, rail sides, cultivated lands, waste grounds and riverbanks.	x				
<i>Lantana camara</i>	Lantana	Central and South America.	1b	Competes with and replaces indigenous species. Allelopathic suppression of indigenous species interrupts regeneration processes and reduces biodiversity of natural ecosystems. Dense stands in plantations obstruct access and utilization. Poisonous to humans and animals and responsible for livestock mortalities amounting to millions of Rands every year in South Africa. Reduces the grazing potential of the land.	x	x	x	x	x
<i>Melia azedarach</i>	Seringa	Asia to Australia the form in southern Africa is an Indian cultivar	1b (within a watercourse ) 3 in urban areas	It competes with and replaces indigenous species. The abundant and prolific growth of this species at the expense of the native flora and fauna could have serious consequences for the preservation of biodiversity. Dense stands along watercourses are likely to reduce stream flow. Indigenous birds could neglect the dispersal of indigenous plants as a consequence of their preference for the fruits of this alien species.	x				

(iii) within a Listed Ecosystem or an ecosystem identified for conservation in terms of a Bioregional Plan or Biodiversity Management Plans published under the Act.

b. Not listed within Nama-Karoo, Succulent Karoo and Desert biomes, excluding within any area mentioned in (a) above.

c. Category 1b in Fynbos, Grassland, Savanna, Albany Thicket, Forest and Indian Ocean Coastal Belt biomes, but-

(i) Category 2 for plantations, woodlots, bee-forage areas, wind-rows and the lining of avenues.

(ii) Not listed within cultivated land that is at least 50 metres away from untransformed land, but excluding within any area in (a) above.

(iii) Not listed within 50 metres of the main house on a farm, but excluding in (a) above.

(iv) Not listed in urban areas for trees with a diameter of more than 400 mm at 1000 mm height at the time of publishing of this Notice, but excluding in (a) above.





Scientific name	Common Name	Native distribution	Invasive Status	Ecological Risk (where applicable)	Degraded Habitat	Freshwater Habitat	Indigenous Forest	Woodland	Valley Habitat
<i>Physalis peruviana</i>	Cape Gooseberry	South America	Not Listed	From <a href="https://www.cabi.org/isc/datasheet/40713#toimpactEnvironmental">https://www.cabi.org/isc/datasheet/40713#toimpactEnvironmental</a>  <b>Impact on Habitats:</b> It is reported as naturalised and invasive in a number of countries, especially in the Pacific, where it presumably invades and dominates natural habitats, at least on a local basis, but no detailed analysis of its impacts has been seen.  <b>Impact on Biodiversity:</b> The most serious effects of invasion by <i>P. peruviana</i> are reported from Hawaii where it threatens two endangered species, <i>Phyllostegia parviflora</i> and <i>Urera kaalae</i> (US Fish and Wildlife Service, 2008; 2011).	x				
<i>Pinus patula</i>	Patula pine	Mexico	2 Exempted from existing plantations	In South Africa invasive pines have significantly reduced water availability and have had a very negative impact on plants in the fynbos, an area of global biodiversity significance.	x			x	
<i>Ricinus communis</i>	Castor-oil plant	NE Africa	2	It naturalizes easily and grows in many areas as a common ruderal plant	x				
<i>Rubus cuneifolius</i>	American bramble	North America	1b	Competes with and replaces indigenous woody and grassland species. Dense stands are impenetrable and restrict access to forestry plantations; they also restrict access to grazing and water by domestic and wild animals.	x	x			
<i>Rubus niveus</i>	Ceylon raspberry, Mysore raspberry	Southern Asia, from Afghanistan east through India and China to Taiwan and the Philippines	1b	It forms dense, impenetrable, thorny thickets which may take over forest, scrubland, and areas of open vegetation. It also affects agricultural land, causing serious economic problems for farmers.	x	x			x
<i>Senna septemtrionalis</i>	Arsenic bush, Smooth senna	Mexico and Central America	1b	The arsenic bush invades forest margins, savannah, riverbanks, roadsides, waste ground and plantations, where it establishes itself and suppresses the regeneration of desirable species. It is also poisonous.	x	x			x



Scientific name	Common Name	Native distribution	Invasive Status	Ecological Risk (where applicable)	Degraded Habitat	Freshwater Habitat	Indigenous Forest	Woodland	Valley Habitat
<i>Solanum mauritianum</i>	Bugweed	South America	1b	Competes with and replaces indigenous riverine and forest margin species. Also competes with young trees in plantations, particularly pines and black wattle, inhibiting growth and causing stem deformation. It is a host of the KwaZulu-Natal fruit fly which is an economic pest. It has no fodder value and the plants are generally avoided by grazing animals. The unripe fruits are poisonous and the hairy leaves and stems can cause allergic dermatitis and asthma	x	x		x	
<i>Solanum nigrum</i>	Black nightshade	A predominantly Eurasian species	Not Listed	No significant impacts recorded for South Africa as yet.	x	x			
<i>Solanum sysimbriifolium</i>	Dense-thorned bitter apple	Brazil, Argentina, Uruguay and Paraguay in South America	1b	Competes with crop plants and indigenous pioneering species. Poisonous.	x	x			
<b>HERBACEOUS SPECIES</b>									
<i>Acanthospermum australe</i>	Spiny-bur	South America	Not Listed	No significant impacts recorded for South Africa as yet.	x				
<i>Achyranthes aspera</i> var. <i>aspera</i>	Burweed	Of uncertain origin. Probably indigenous to South-East Asia and Africa.	Not Listed	None recorded for South Africa yet.		x	x		
<i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>	White-flowered Mexicanu poppy	Mexico	1b	Prolific in disturbed sites and competes with agricultural crops and indigenous species. This plant contaminates crop seed and the spiny fruits and leaf tips can adhere to the wool of sheep. The seeds and parts of the plant are poisonous to humans and livestock.	x				
<i>Bidens pilosa</i>	Common blackjack	Cosmopolitan weed native to South and Central America	Not Listed	Aggressive weed in South Africa but has not yet been determined to be invasive. <i>Bidens pilosa</i> is a hardy weed capable of invading a vast range of habitats including grassland, heathland, forest clearings, wetlands, plantations, streamlines, roadsides, pasture, coastal areas and agriculture areas ( <a href="https://www.cabi.org/isc/datasheet/9148#toimpactEnvironmental">https://www.cabi.org/isc/datasheet/9148#toimpactEnvironmental</a> ).	x		x	x	



Scientific name	Common Name	Native distribution	Invasive Status	Ecological Risk (where applicable)	Degraded Habitat	Freshwater Habitat	Indigenous Forest	Woodland	Valley Habitat
				In Australia, dense thickets of <i>B. pilosa</i> outcompete native species on the exposed margins of bushland and in revegetation sites (Queensland Government, 2018).					
<i>Centella aristata</i>	Asiatic pennywort	Native across much of tropical Africa, Asia, Australia, South America and some islands in the Pacific.	Not Listed	No information could be found to suggest <i>C. asiatica</i> causes serious change to habitats.		x			
<i>Cirsium vulgare</i>	Spear thistle, Scotch thistle	Europe, Asia and North Africa	1b	It causes heavy infestations that reduce the carrying capacity of the veld and can cause injury to man and animals	x	x			
<i>Conyza bonariensis</i>	Flax-leaf fleabane	Americas	Not Listed	Major weed in South Africa but not yet deemed invasive.	x	x			
<i>Conyza canadensis</i>	Horseweed fleabane	Americas	Not Listed	Major weed in South Africa but not yet deemed invasive.	x		x	x	
<i>Cuscuta campestris</i>	Common dodder	North America	1b	Common dodder smothers and parasitises other plants of economic importance in agricultural croplands, particularly lucerne	x				x
<i>Datura stramonium</i>	Common thorn apple	Tropical America.	1b	It competes with crops and indigenous species.	x				x
<i>Galinsoga quadriradiata</i>	Shaggy soldier	Mexico	Not Listed	None recorded for South Africa yet.	x		x		
<i>Hypochaeris radicata</i>	Hairy wild lettuce	Europe	Not Listed	None recorded for South Africa yet.	x				
<i>Ipomoea purpurea</i>	Purple morning glory; Common morning glory	Tropical America	1b	Scrambles over and competes with other species. It is an annual plant and has less impact than the similar <i>Ipomoea indica</i> which is perennial.	x	x			
<i>Lilium formosanum</i>	Formosa lily	Asia (Taiwan)	1b	Competes with, and has the potential to replace, indigenous species.	x				
<i>Malvastrum coromandelianum</i>	Prickly malvastrum	Tropical America	1b	It is a frequent companion weed dominant in sugarcane. It can sometimes form small patches of a few square meters within the fields, but it occurs most often in the form of numerous but scattered individuals.	x	x			
<i>Melilotus albus</i>	Honey clover	Asia and southern Europ	Not Listed	None recorded for South Africa yet.	x				x
<i>Melilotus indicus</i>	Indian sweet clover	North America	Not Listed	None recorded for South Africa yet.	x				x
<i>Oenothera rosea</i>	Rose evening primrose	South America	Not Listed	None recorded for South Africa yet.		x			x
<i>Oenothera tetraptera</i>	White evening primrose	Texas and Mexico	Not Listed	None recorded for South Africa yet.	x				x





Scientific name	Common Name	Native distribution	Invasive Status	Ecological Risk (where applicable)	Degraded Habitat	Freshwater Habitat	Indigenous Forest	Woodland	Valley Habitat
<i>Oxalis corniculata</i>	Creeping woodsorrel	A cosmopolitan weed of tropical and temperature zones	Not Listed	None recorded for South Africa yet.	x				
<i>Phytolacca octandra</i>	Forest inkberry	Tropical America	1b	Phytolacca octandra contains phytolaccatoxin and phytolaccigenin, which are poisonous to mammals though they seldom graze it.	x			x	
<i>Plantago major</i>	Broad-leaved plantain	Eurasia	Not Listed	None recorded for South Africa yet.	x				x
<i>Richardia brasiliensis</i>	Mexican richardia	Ecuador to North Argentina	Not Listed	None recorded for South Africa yet.	x				x
<i>Schkuhria pinnata</i>	Dwarf marigold	South America	Not Listed	None recorded for South Africa yet.	x				x
<i>Solanum elaeagnifolium</i>	Silver-leaf bitter apple	North and South America	1b	Forms dense spreading infestations which compete with crop plants. It is extremely difficult to eradicate as it has deep, spreading roots and the ability to regenerate from small root fragments. The plants are poisonous and unpalatable	x				x
<i>Tagetes minuta</i>	Khaki bush, khaki weed	South and North America	Not Listed	Can be an aggressive weed of various habitats.	x			x	x
<i>Verbena bonariensis</i>	Tall verbena	South America	1b	It is poisonous to livestock and invades roadsides, disturbed places, moist areas and grasslands.	x	x			x
<i>Verbena officinalis</i>	Vervain	Cosmopolitan species	Not Listed	None recorded for South Africa yet.		x			
<i>Verbena rigida</i>	Veined verbena	Brazil and Argentina	1b	Invades grassland, roadsides, disturbed sites, wetlands and can establish in undisturbed grassland	x				x
<i>Zinnia peruviana</i>	Peruvian zinnia	Mexico to Brazil, Peru and Bolivia	Not Listed	None recorded for South Africa yet. Does not have any significant recorded impacts. However, as it is a common environmental and agricultural weed	x			x	
<b>GRAMINOID SPECIES</b>									
<i>Bromus catharticus</i>	Prairie grass	South America (i.e. Venezuela, Brazil, Bolivia, Colombia, Ecuador, Peru, Argentina, Chile, Paraguay and Uruguay)	Not Listed	None recorded for South Africa yet.		x			



Scientific name	Common Name	Native distribution	Invasive Status	Ecological Risk (where applicable)	Degraded Habitat	Freshwater Habitat	Indigenous Forest	Woodland	Valley Habitat
<i>Cortaderia jubata</i>	Purple pampas grass	West tropical South America (Ecuador and Peru to Argentina)	1b	It competes and tends to replace indigenous vegetation.	x				
<i>Cortaderia selloana</i>	Pampas grass	South America (Brazil, Uruguay, Paraguay, Argentina and Chile)	1b	It forms large clumps which displace smaller indigenous species	x				
<i>Paspalum dilatatum</i>	Dallis Grass	South America. Brazil, Argentina, Bolivia, Chile, Guyana, Paraguay and Uruguay	Not Listed	None recorded for South Africa yet.	x	x			
<i>Paspalum urvillei</i>	Vasey Grass	Argentina and Uruguay	Not Listed	None recorded for South Africa yet.		x			



## 4 SENSITIVITY MAPPING

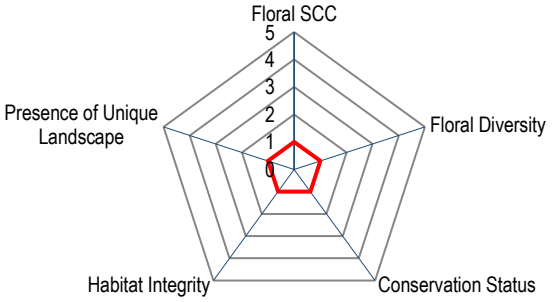
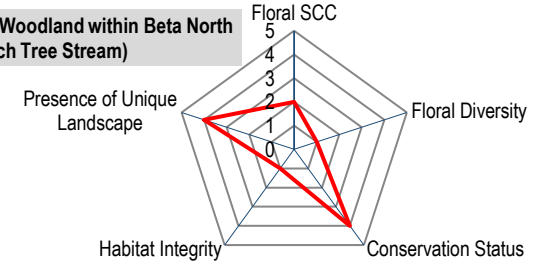
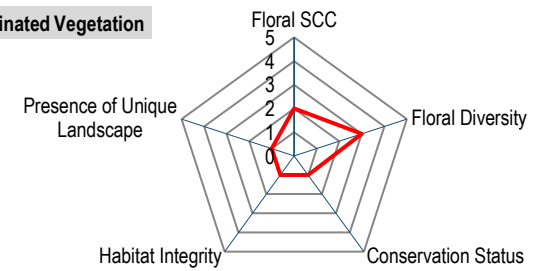
The Screening Tool identified the MR83 UG Areas to be in a **Medium Sensitivity** area for the Plant Species Theme and a **Very High Sensitivity** for the Terrestrial Biodiversity Theme. Based on the *ground-truthed results* of the site visit, Table 3 below presents the sensitivity of each identified habitat unit along with an associated conservation objective and implications for development.

Figures 15 - 20 conceptually illustrate the areas considered to be of varying ecological sensitivity and how they will be impacted by the proposed infrastructure development. The areas are depicted according to their sensitivity in terms of the presence or potential for floral SCC, habitat integrity and levels of disturbance, threat status of the habitat type, the presence of unique landscapes and overall levels of diversity (compared to a reference type).

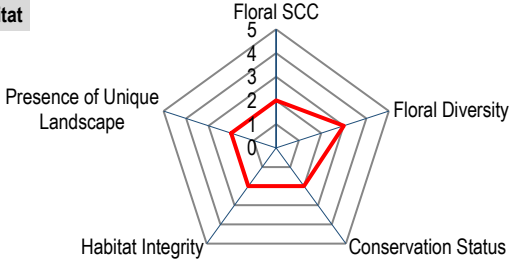
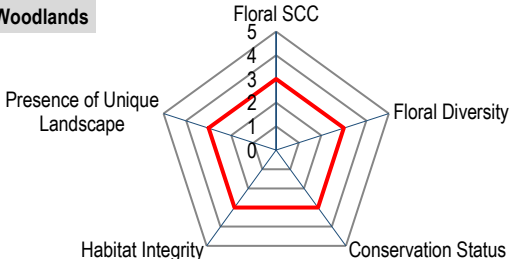
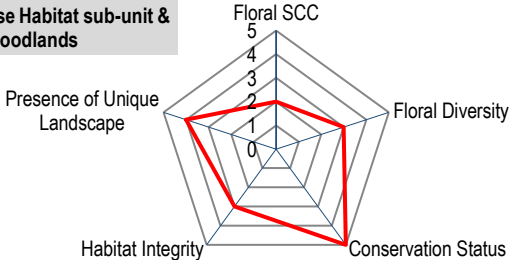




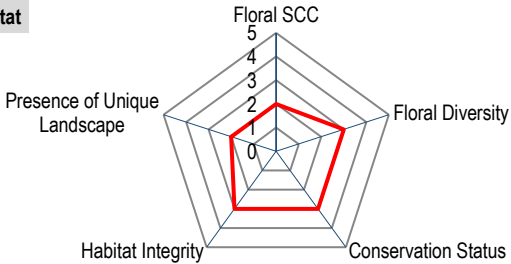
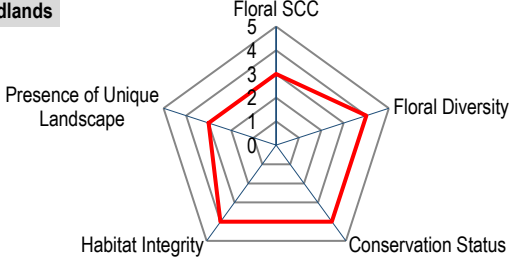
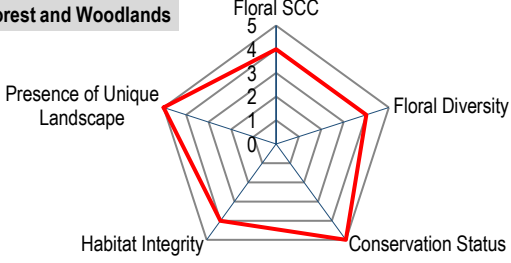
**Table 3: A summary of the sensitivity of each habitat unit and implications for development.**

Habitat Sensitivity	Conservation objective	Habitat Unit	Key habitat characteristics
<p style="text-align: center;"><b>Low</b></p> 	<p>Optimise development potential.</p>	<p><b>Degraded Habitat (Transformed Habitat sub-unit)</b></p>	<ul style="list-style-type: none"> <li>- Indigenous floral diversity was low to absent.</li> <li>- Habitat associated with a high level of disturbance.</li> <li>- Floral SCC are lacking and the potential for the habitat to support viable populations of SCC is deemed low to impossible.</li> <li>- No important biodiversity features identified in national and provincial biodiversity planning databases are confirmed in this sub-unit.</li> <li>- The floral communities do not reflect the reference vegetation type in composition nor structure.</li> </ul>
<p style="text-align: center;"><b>Moderately low</b></p> <div style="margin-bottom: 20px;"> <p><b>Riparian Woodland within Beta North (i.e., Peach Tree Stream)</b></p>  </div> <div> <p><b>AIP-dominated Vegetation</b></p>  </div>	<p>Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects.</p>	<p><b>Degraded Habitat (AIP-dominated Vegetation)</b></p> <p><b>Freshwater Habitat Unit (Riparian Woodland of Beta North)</b></p> <p><b>Valley Habitat (historically disturbed sections)</b></p>	<ul style="list-style-type: none"> <li>- Habitat has been degraded due to historic and current anthropogenic-related disturbances, namely historic mining, illegal mining, and introduction of AIPs.</li> <li>- The floral communities have significantly shifted away from the reference vegetation type and is no longer representative of important biodiversity features such as CBAs, ESAs, or threatened ecosystems.</li> <li>- No Forest remnants are associated with these habitat sub-units.</li> <li>- Floral SCC are not well-represented within these habitat sub-units and the potential for the habitat to support viable populations of such species is deemed low. Provincially protected species, however, occurred sporadically in these sub-units. Permit applications are required before these species can be cleared/ damaged / destroyed.</li> </ul>



Habitat Sensitivity	Conservation objective	Habitat Unit	Key habitat characteristics
<p><b>Valley Habitat</b></p>  <p>The radar chart for Valley Habitat shows scores of 2 for Floral SCC, 2 for Floral Diversity, 2 for Conservation Status, 2 for Habitat Integrity, and 2 for Presence of Unique Landscape.</p>			
<b>Intermediate</b>			
<p><b>Degraded Woodlands</b></p>  <p>The radar chart for Degraded Woodlands shows scores of 3 for Floral SCC, 3 for Floral Diversity, 3 for Conservation Status, 3 for Habitat Integrity, and 3 for Presence of Unique Landscape.</p> <p><b>Watercourse Habitat sub-unit &amp; Riparian Woodlands</b></p>  <p>The radar chart for Watercourse Habitat sub-unit &amp; Riparian Woodlands shows scores of 3 for Floral SCC, 3 for Floral Diversity, 3 for Conservation Status, 3 for Habitat Integrity, and 3 for Presence of Unique Landscape.</p>	<p>Preserve and enhance biodiversity of the habitat unit and surrounds while optimizing development potential.</p>	<p><b>Freshwater Habitat Unit</b> <b>(Watercourse Habitat sub-unit &amp; Riparian Woodlands of Dukes and Morgenzon)</b></p> <p><b>Valley Habitat Unit</b></p> <p><b>Woody Communities</b> <b>(Woodlands of Beta North, Dukes, Morgenzon, and fragmented section in Frankfort)</b></p>	<ul style="list-style-type: none"> <li>- It meets the definition of Indigenous Vegetation, albeit in a degraded state.</li> <li>- Habitat has been disturbed, as is evident with the presence of AIPs and the increase in woody encroachers.</li> <li>- The Freshwater Habitat sub-units are considered true watercourses and enjoy protection under the NWA.</li> <li>- No forests, CBAs, ESAs or threatened ecosystems are represented in the degraded Woodland stretches – these were often formed in response to historic disturbances.</li> <li>- No threatened species were recorded in these sub-units and nor are they anticipated to establish viable populations. The habitat supported provincially protected species such as Aloes.</li> </ul>



Habitat Sensitivity	Conservation objective	Habitat Unit	Key habitat characteristics
<p><b>Valley Habitat</b></p>  <p>The radar chart for Valley Habitat shows scores of 2 for Floral SCC, 2 for Floral Diversity, 2 for Conservation Status, 2 for Habitat Integrity, and 2 for Presence of Unique Landscape.</p>			
<b>Moderately high</b>			
<p><b>Intact Woodlands</b></p>  <p>The radar chart for Intact Woodlands shows scores of 3 for Floral SCC, 3 for Floral Diversity, 3 for Conservation Status, 3 for Habitat Integrity, and 3 for Presence of Unique Landscape.</p> <p><b>Riparian Forest and Woodlands</b></p>  <p>The radar chart for Riparian Forest and Woodlands shows scores of 4 for Floral SCC, 4 for Floral Diversity, 4 for Conservation Status, 4 for Habitat Integrity, and 4 for Presence of Unique Landscape.</p>	<p>Preserve and enhance the biodiversity of the habitat unit, limit development and disturbance.</p>	<p><b>Freshwater Habitat Unit (Riparian Forests &amp; Riparian Woodland of Dukes)</b></p> <p><b>Woody Communities (intact Woodlands associated with Dukes and Frankfort)</b></p>	<ul style="list-style-type: none"> <li>- Habitat is minimally disturbed or of increased conservation significance, i.e., presence of confirmed forest, watercourses, CBAs, and ESAs.</li> <li>- The floral communities are good representations of the reference states. Moderately high to High floristic diversity is associated with these sub-units.</li> <li>- No Forest remnants are associated with these habitat sub-units.</li> <li>- Floral SCC were recorded in these habitat sub-units, but mainly restricted to provincially protected species. The habitat is, however, suitable for several threatened species as triggered by the Screening Tool.</li> </ul>





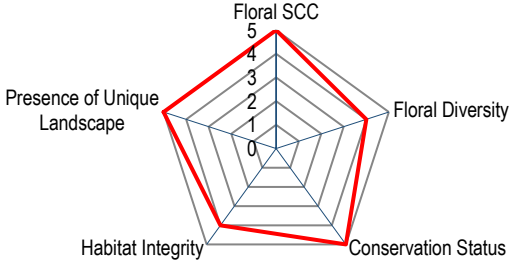
Habitat Sensitivity	Conservation objective	Habitat Unit	Key habitat characteristics
<p style="text-align: center;"><b>High</b></p> 	<p>Preserve and enhance the biodiversity of the habitat unit, no-go alternative must be considered.</p>	<p><b>Woody Communities (Indigenous Forest)</b></p>	<ul style="list-style-type: none"> <li>- Floral diversity is high and habitat integrity largely intact. Recorded vegetation communities were representative of the reference vegetation type and also of significant biodiversity features such as CBAs, nationally protected forest types, and threatened ecosystems.</li> <li>- This habitat sub-unit is of highest importance for floral SCCs (nationally and provincially protected species, as well as potential habitat for threatened species triggered by the Screening Tool).</li> </ul>





Figure 15: Sensitivity map for the MR83 UG Areas.





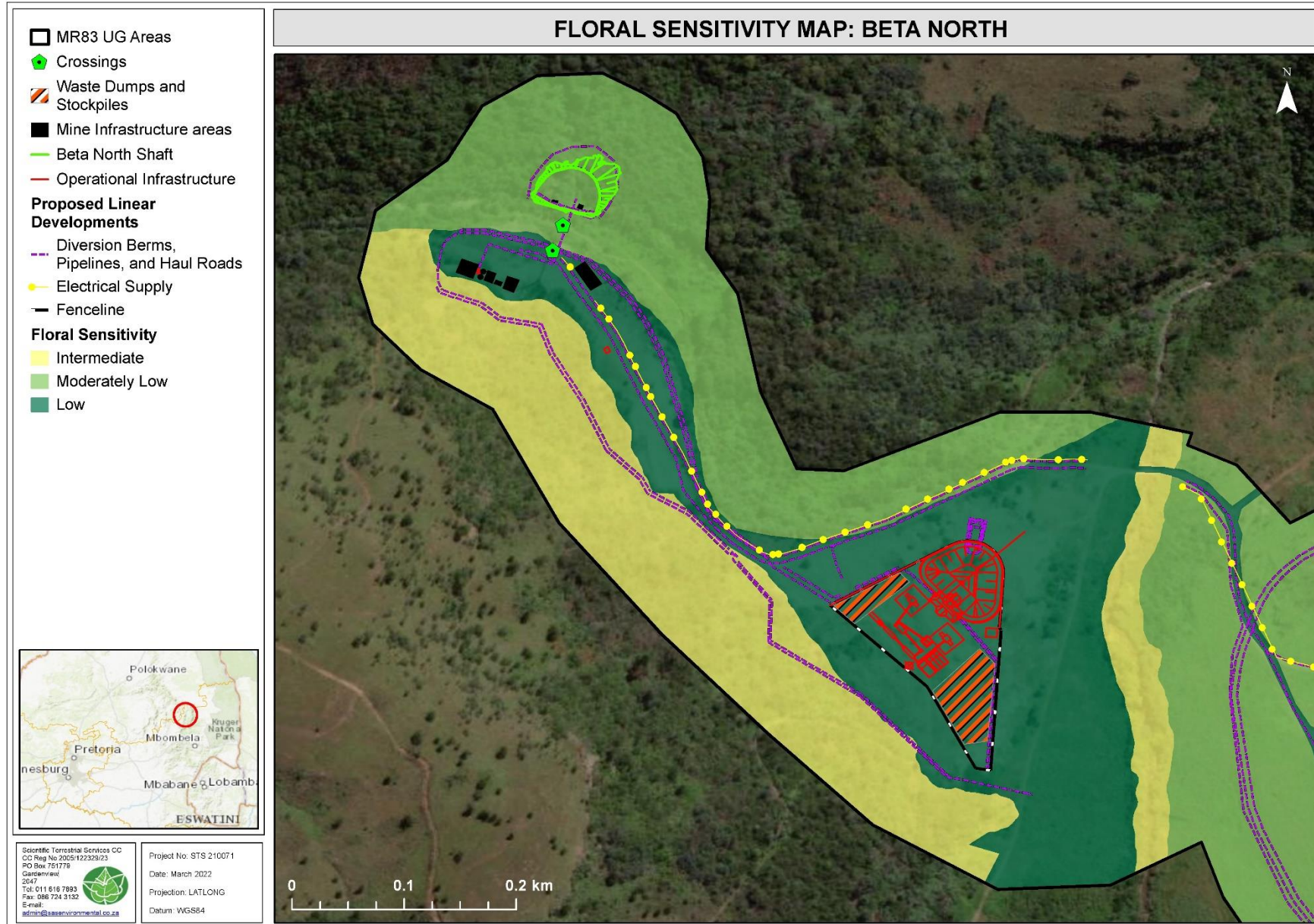


Figure 16: Sensitivity map for the MR83 UG Areas – focused on Beta North (western section).





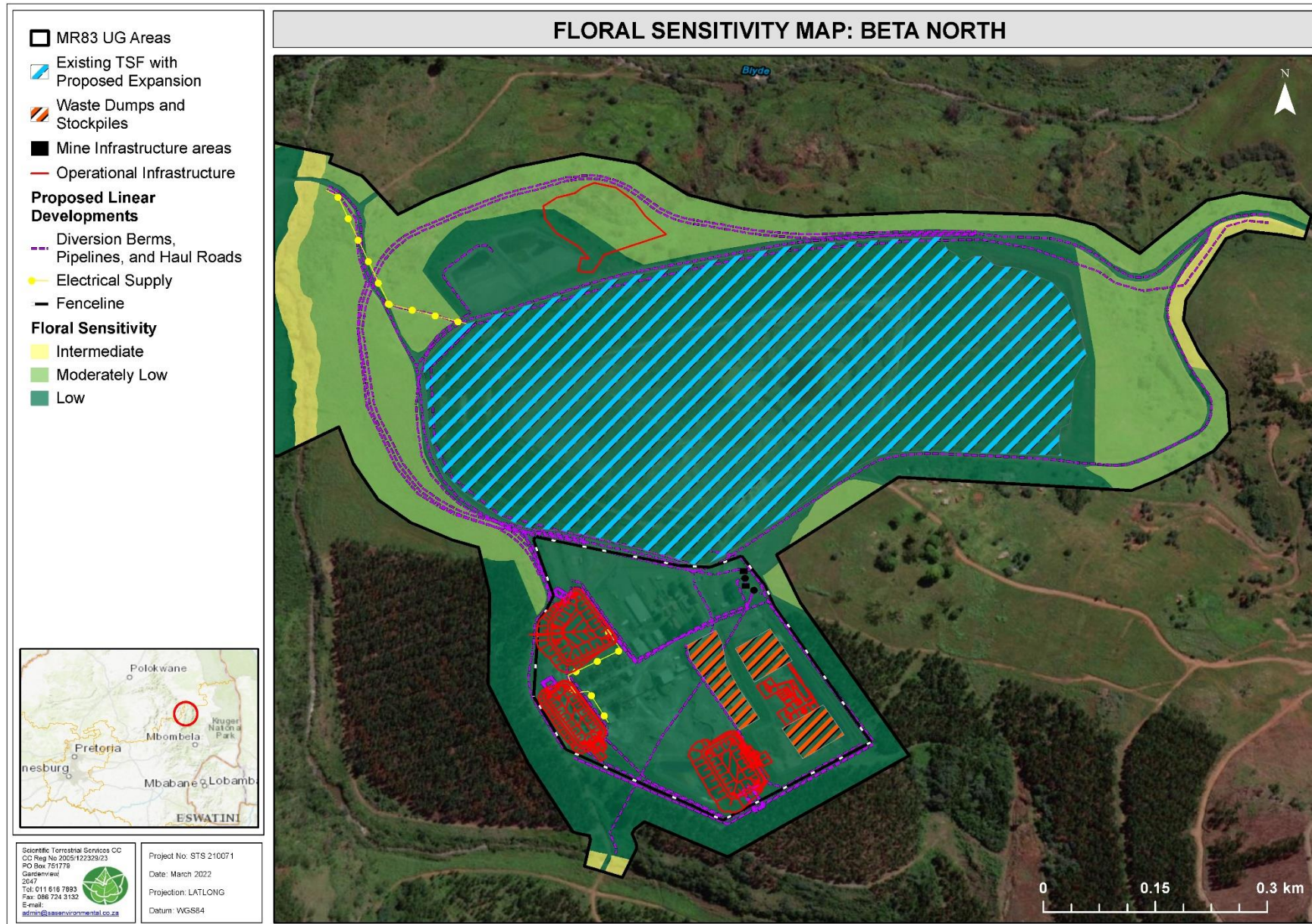


Figure 17: Sensitivity map for the MR83 UG Areas – focused on Beta North (eastern section).





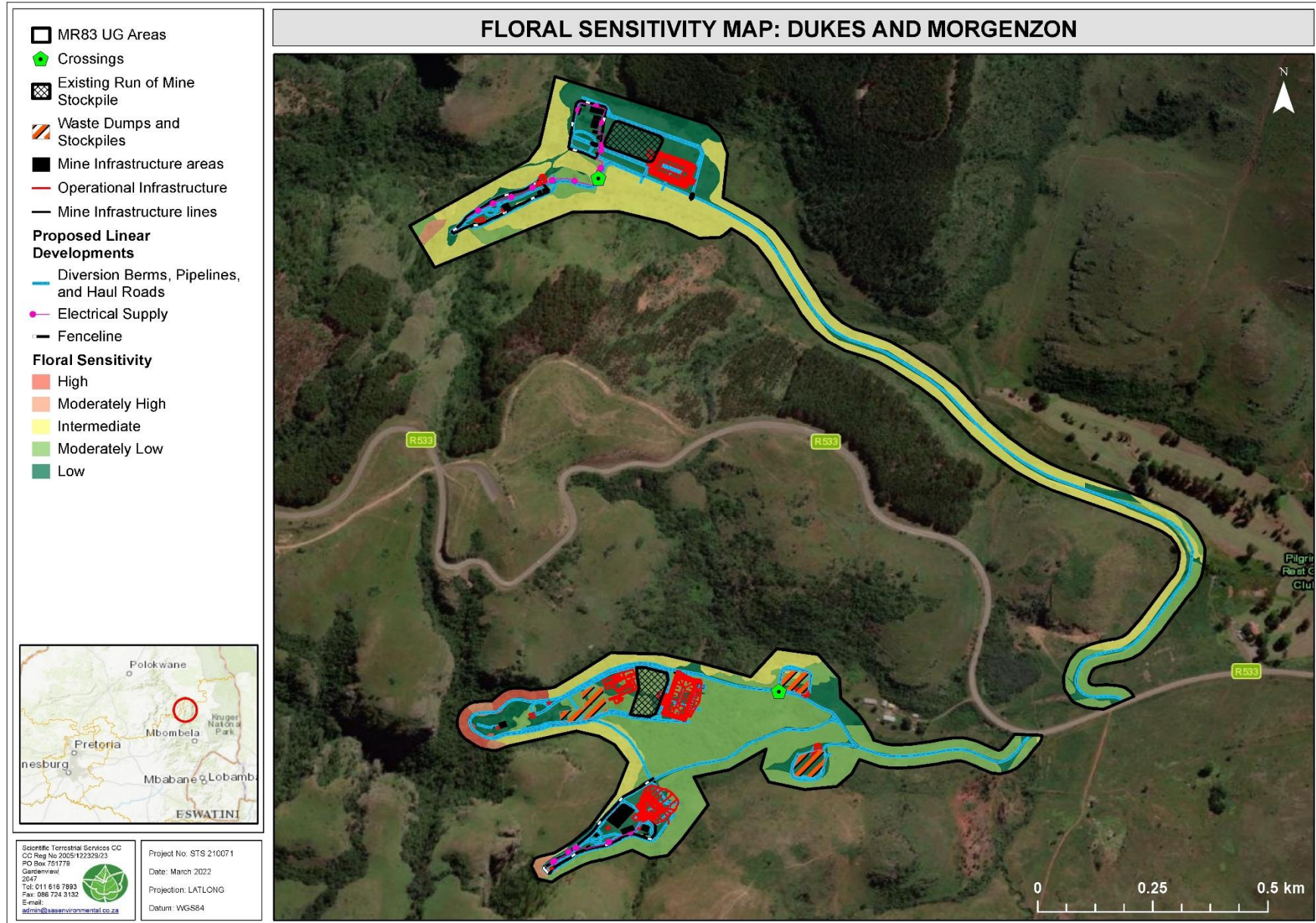


Figure 18: Sensitivity map for the MR83 UG Areas – focused on Dukes and Morgenzon.





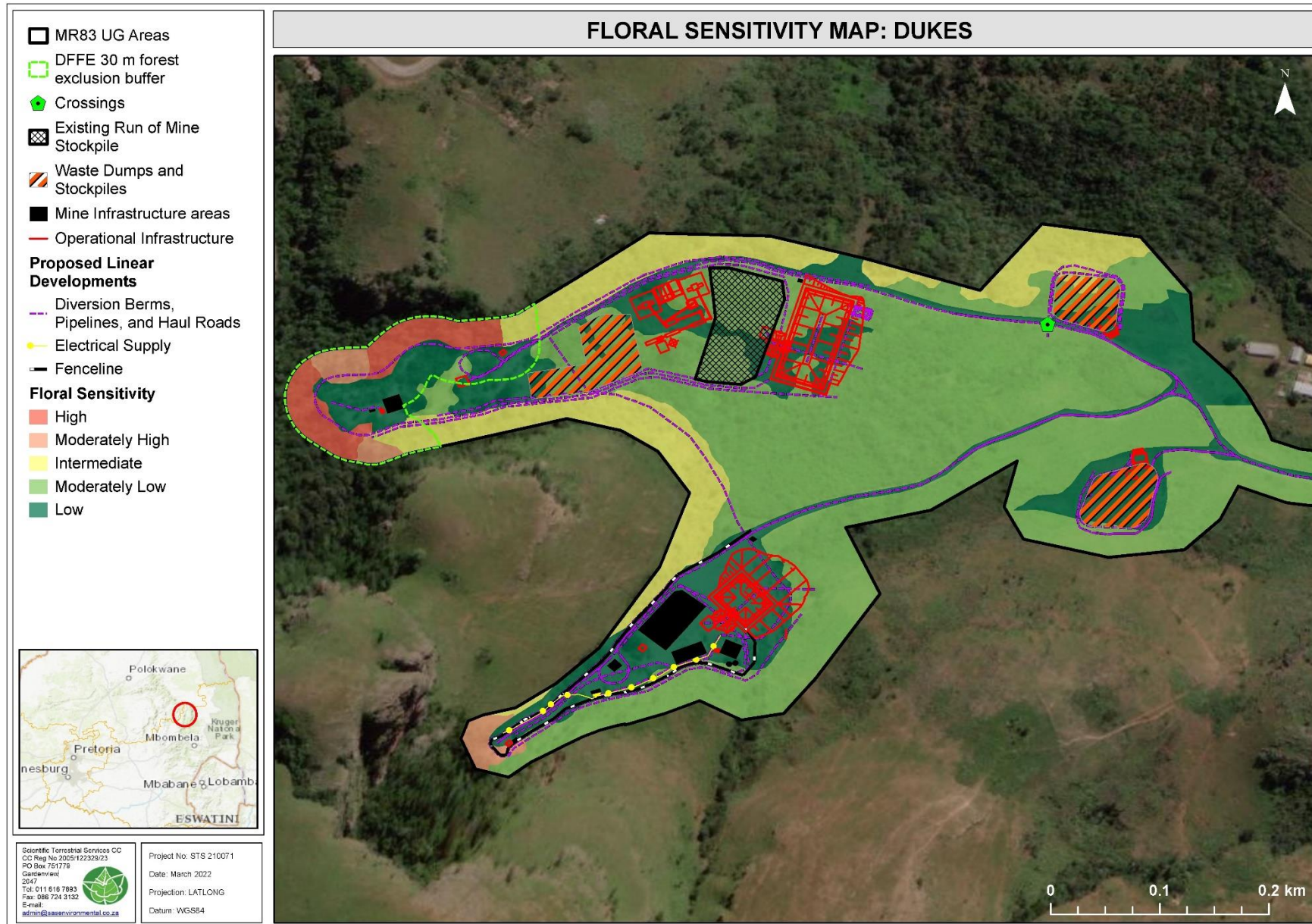


Figure 19: Sensitivity map for the MR83 UG Areas – focused on Dukes (zoomed to surface infrastructure areas).





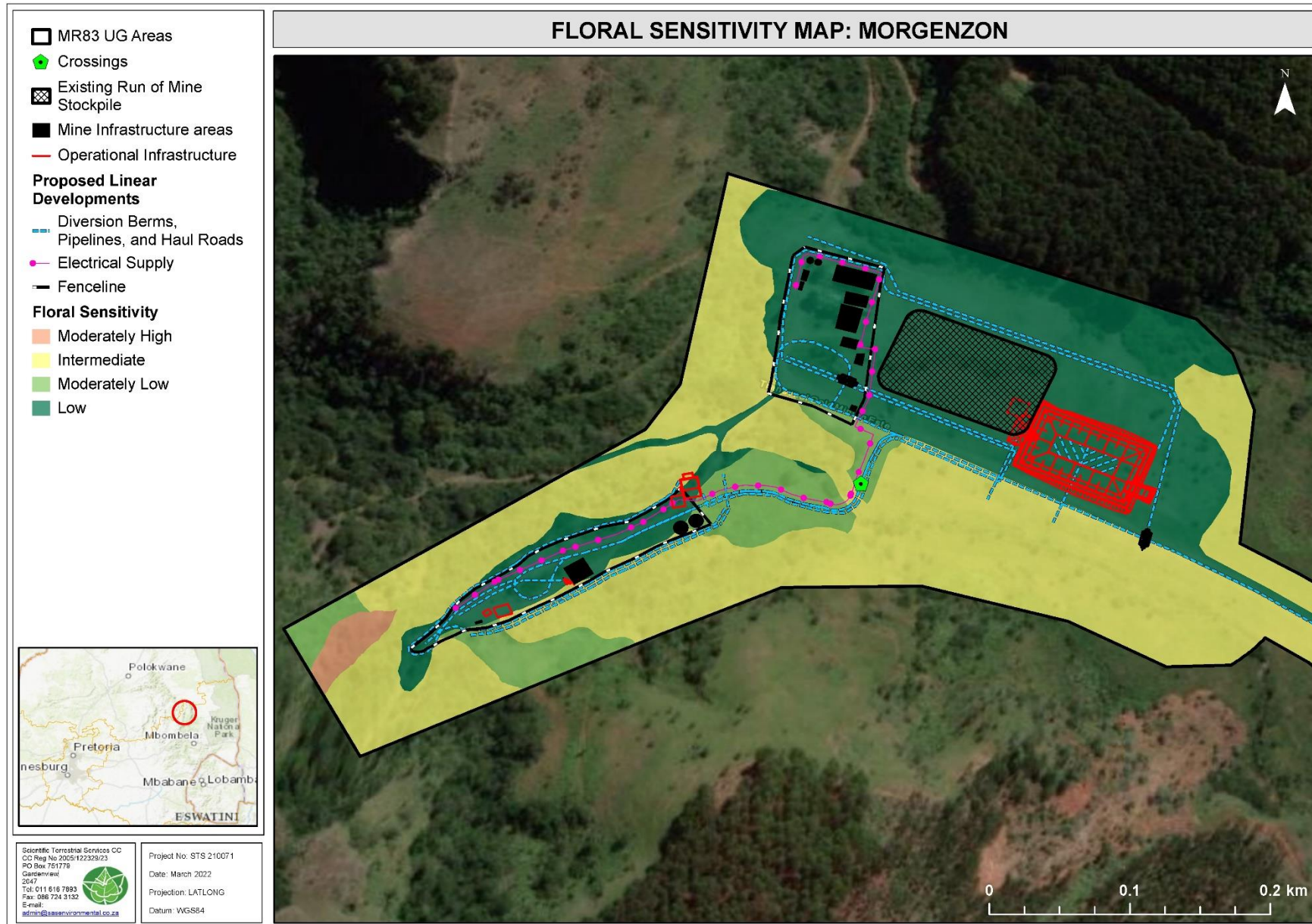


Figure 20: Sensitivity map for the MR83 UG Areas – focused on Morgenzon (zoomed to surface infrastructure areas).





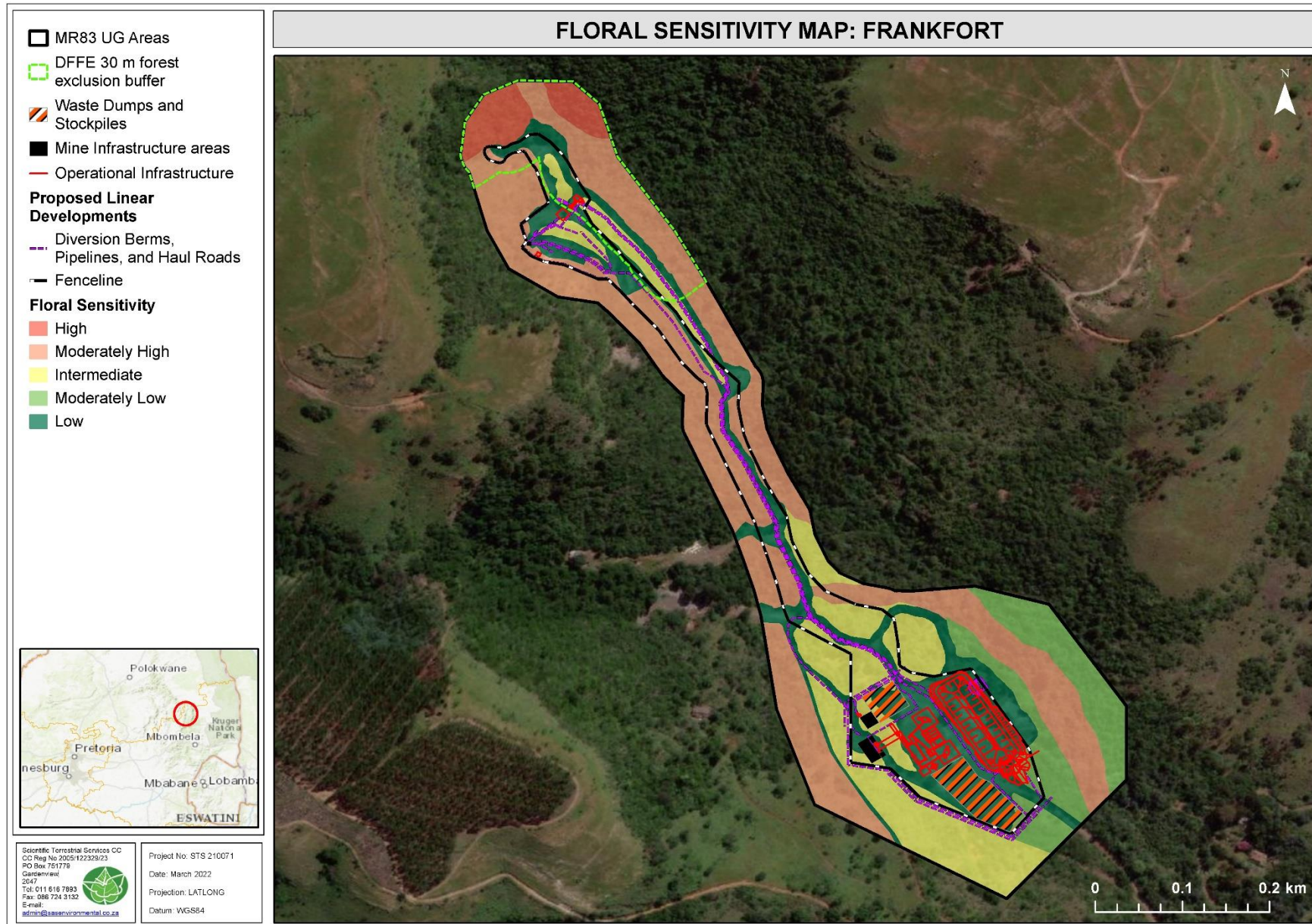


Figure 21: Sensitivity map for the MR83 UG Areas – focused on Frankfort.



## 5 IMPACT ASSESSMENT

The sections below provide the significance of perceived impacts arising from the proposed development for the MR83 UG Areas.

An impact assessment (Section 5.1) and impact discussion (Section 5.2) of all potential pre-construction, operational and decommissioning and closure phase impacts are presented in this section. All mitigatory measures required to minimise the perceived impacts are presented in Section 5.1.

### ***5.1 Floral Impact Assessment Results***

The below tables indicate the perceived risks to the floral ecology associated with all phases of the proposed project. The table also provides the findings of the impact assessment undertaken with reference to the perceived impacts prior to the implementation of mitigation measures and following the implementation of mitigation measures. Key integrated mitigation measures that are applicable to the proposed project are presented in the below tables and are required to suitably manage and mitigate the ecological impacts that are associated with all phases of the proposed activities.

The mitigated results of the impact assessment have been calculated on the premise that all mitigation measures as stipulated in this report are adhered to and implemented. Should such actions not be adhered to, it is highly likely that post-mitigation impact scores will increase.





5.1.1 Impacts associated with Beta North.

Table 4: Impacts on the floral habitat, diversity, and SCC from the proposed mining activities associated with Beta North.

\*WOM = Without Mitigation; WM = With Mitigation.

Nr	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/ Severity	Significance	Significance	Management Measures
<b>Construction Phase</b>												
1	<b>Expansion and re-working of the TSF</b>	*Site clearing and the removal of vegetation associated with the Transformed Habitat Unit; *Potential inadequate design of infrastructure leading to pollution of soils. Contaminated soils lead to a loss of viable growing conditions for plants and results in a decrease of floral habitat, diversity, and SCC – rehabilitation effort will also be increased as a result; and *Potential proliferation of AIP species that colonise areas of increased disturbances and that outcompetes native species, including the further transformation of adjacent or nearby natural, more sensitive habitat, such as downslope watercourses.	<b>Degraded Habitat Unit</b>	WOM	Negative	5	4	2	2	40	Low	*Ensure adequate design of TSF; *Prior to the commencement of construction activities, the entire construction servitude, including lay down areas and stockpile areas etc., should be fenced off and clearly demarcated; *Minimise loss of indigenous vegetation where possible; *All construction related waste and material is to be disposed of at a registered waste facility and no waste of construction rubble is to be dumped in the surrounding natural habitats; *Implement AIP control; and *Ensure AIP vegetation cuttings/propagules are disposed of adequately, i.e., it must be ensured that the spread of these species is prevented. Designated spots for cuttings are highly recommended, or potentially make use of registered waste sites.
				WM	Negative	5	4	1	2	35	Low	
			<b>Freshwater Habitat</b>	WOM	Negative	2	4	3	8	30	Low	
				WM	Negative	1	3	2	6	11	Negligible	
			<b>Woody Communities</b>	WOM	Negative	1	3	1	2	6	Negligible	
				WM	Negative	1	1	1	2	4	Negligible	
			<b>Valley Habitat</b>	WOM	Negative	1	3	1	2	6	Negligible	
				WM	Negative	1	1	1	2	4	Negligible	
2	<b>Construction of Crossing(s)</b>	*Vegetation clearing within the Riparian Woodland sub-unit (i.e., Peach Tree Stream; *Temporary alteration of stream flow; *Spread of AIPs along the Riparian Woodland sub-unit from contaminated construction material; and *Increased sediment loads and potential erosion of stream banks resulting from construction activities and increased movement of construction workers along / across the Riparian Woodland.	<b>Freshwater Habitat</b>	WOM	Negative	5	4	2	6	60	Moderate	*All crossings over watercourses must be kept to the bare minimum and are adequately designed to prevent impacts on habitat, instream flow, pattern and timing of water and water quality; *Minimise loss of indigenous vegetation where possible; *Ensure AIP vegetation cutting and propagules do not enter the watercourses where crossings will be constructed; and * As much as possible, existing access roads and river crossings must be utilised (if necessary, upgraded) to minimise further disturbances to the watercourses.
				WM	Negative	5	4	1	2	35	Low	
3	<b>Construction of surface infrastructure associated with Operational</b>	*Site preparation and clearing of small extents of indigenous vegetation for mine-related infrastructure; *Impaired water quality and reduced flow of watercourses due to the accumulation of	<b>Degraded Habitat Unit</b>	WOM	Negative	5	4	2	2	40	Low	*Prior to the commencement of construction activities, the entire construction servitude, including lay down areas and stockpile areas etc., should be fenced off and clearly demarcated;



Nr	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/ Severity	Significance	Significance	Management Measures
	<b>Infrastructure, Shafts, Supporting Infrastructure, WRDs and Stockpiles</b>	vegetation cuttings and debris resulting from vegetation clearing; *Waste from construction material leading to disturbance of natural vegetation; *Increased personnel on site leading to loss of floral habitat through the potential for increased fire frequency and intensity (further promoting wattle thicket formation), as well as indiscriminate driving through natural veld; *Potential proliferation of AIP species that colonise areas of increased disturbances arising from dumping of excavated and construction material outside of designated areas. Loss of floral habitat and species diversity as AIPs outcompete native species and transform adjacent or nearby natural, more sensitive habitat; *Dust generated during construction activities accumulating on the surrounding floral individuals, altering the photosynthetic ability of plants, and potentially further decreasing optimal growing/re-establishing conditions; *Potential failure to concurrently rehabilitate bare areas or disturbed sites as soon as they become available, potentially resulting in loss of viable soils, increasing erosion risk and/or permitting the proliferation of AIPs; and *Potential failure to implement a biodiversity action plan (BAP), including the auditing of the BAP, leading to permanent transformation of floral habitat and long-term degradation of important floral habitat within the region.	<b>Freshwater Habitat</b>	WM	Negative	5	4	1	2	35	Low	*The construction footprint and removal of vegetation must be kept as small as possible within the authorised footprints to minimise impact on the surrounding environment (edge effect management); *No vegetation cuttings may be left to accumulate in watercourses. Discard all construction related waste and material (including cleared vegetation) at a registered waste facility (or in a secluded area designated by the mine) and no waste of construction rubble is to be dumped in the surrounding natural habitats; *If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line; *Edge effects of all construction activities, which may affect floral habitat within surrounding areas, are to be strictly managed, e.g., implement an AIP control plan from the get-go, mitigate soil erosion by reducing soil compaction caused by movement of construction personnel and vehicles, suppress dust in order to mitigate the impact of dust on flora within a close proximity of construction activities; *No illicit fires must be allowed during any phases of the proposed mining development. A Fire Management Plan (FMP) should be set in place to ensure that any fires that do originate can be managed and / or stopped before significant damage to the environment occurs; *No indiscriminate driving through the veld is allowed. As far as possible vehicles are to utilise the existing roads. Where this is not feasible, new roads are to be located in areas of existing high disturbance, and not encroach upon sensitive habitats; and *Upon completion of construction activities, it must be ensured that no bare areas remain, and that indigenous species be used to revegetate the disturbed area.
				WOM	Negative	4	4	2	6	48	Moderate	
				WM	Negative	1	1	1	2	4	Negligible	
			<b>Woody Communities</b>	WOM	Negative	2	1	2	2	10	Negligible	
				WM	Negative	1	1	1	2	4	Negligible	
			<b>Valley Habitat</b>	WOM	Negative	4	4	2	6	48	Moderate	
				WM	Negative	2	1	1	2	8	Negligible	
			4	<b>Construction of Linear Developments</b>	*Site clearing and the removal of vegetation along continuous leading to fragmented habitat	<b>Woody Communities</b>	WOM	Negative	5	4	2	
WM	Negative	5					4	1	2	35	Low	



Nr	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/ Severity	Significance	Significance	Management Measures
		and a disturbance corridor along which AIPs can establish and spread to adjacent sites.	<b>Degraded Habitat Unit</b>	WOM	Negative	5	4	2	2	40	Low	footprints to minimise impact on the surrounding environment (edge effect management); *Access roads should be kept to existing roads so to reduce fragmentation of existing natural habitat; *Roadsides and linear developments serve as common corridors along which alien and invasive floral species are introduced and dispersed. Therefore, an AIP control plan should be implemented along all linear disturbances; and *All construction related waste and material is to be disposed of at a registered waste facility and no waste of construction rubble is to be dumped in the surrounding natural habitats.
				WM	Negative	5	4	1	2	35	Low	
			<b>Freshwater Habitat</b>	WOM	Negative	4	4	2	6	48	Moderate	
				WM	Negative	2	1	2	6	18	Negligible	
			<b>Valley Habitat</b>	WOM	Negative	5	4	2	2	40	Low	
				WM	Negative	4	3	1	2	24	Low	
5	<b>Removal and/or relocation of floral SCC</b>	*Failure to plan a summer floral SCC walkdown to confirm the presence/absence of such species within the direct footprint areas, including the potential untimely application for permits to relocate/ destroy any floral SCC found within the footprint areas; and * Increased human presence due to construction-related activities, potentially resulting in increased harvesting/ collection of SCC.	<b>Floral SCC</b>	WOM	Negative	4	3	1	6	40	Low	Before any construction activities can occur, a detailed walk down of the area must take place, during which all NFA-protected tree species, MNCA-protected floral species and potentially occurring RDL species are marked. If SCC are encountered and will be affected by the construction activities, these species must, as far as is possible, be avoided. If avoidance of impacts to SCC are not possible, the following is recommended:  1) For NFA-protected trees, permit applications will be required from DFFE for removal/destruction of species. For specimens too large to relocate, collection of propagules should take place and these propagated in nurseries for use in rehabilitation later down the line; 2) For MNCA-protected species, permit application from MTPA will be required to rescue and relocate such species; 3) For RDL species, an investigation must be initiated into potential relocation. If not possible, offsetting the loss of RDL species should be pursued.
				WM	Negative	2	1	1	2	8	Negligible	





Nr	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/ Severity	Significance	Significance	Management Measures
<b>Operational Phase</b>												
6	<b>All activities associated with mining and the movement of vehicles</b>	*Potential failing/collapse of TSF resulting in loss of surrounding habitat; *Further loss of floral habitat beyond the project footprint because of vegetation clearing related to operational-phase disturbances and expansion of stockpiles and waste rock dumps, on-going disturbance of soils due to operational activities, and edge effects associated with mining activities; *Ongoing disturbances from operational activities resulting in increased or continued proliferation of AIPs; *Failure to concurrently rehabilitate bare areas or disturbed sites as soon as they become available, potentially resulting in loss of viable soils, increasing erosion risk and/or permitting the proliferation of AIPs; *Erosion as a result of mining development, stormwater runoff and on-going disturbance of soils due to operational activities; *Risk of contamination from all operational facilities may pollute receiving environment; *Loss of floral SCC through ineffective monitoring of relocation success of rescued and relocated floral SCC (where applicable), and/or due to the harvesting of protected floral species by mining and operational personnel; and *Additional pressure on floral habitat by increased human populations associated with the proposed mining activities, contributing to increases in the collection of plant material for medicinal purposes and promoting the introduction and spread of AIPs that may displace habitat for SCCs.	<b>Degraded Habitat Unit</b>	WOM	Negative	5	4	1	2	35	Low	HABITAT AND DIVERSITY: *Ongoing monitoring of TSF stability; *Stockpiles, discard dumps and PCD etc. positions, and their expansion as material is deposited, should be kept as small as possible; *No additional habitat is to be disturbed during the operational phase of the development; *Manage all edge effects or indirect disturbances stemming from mining operations and infrastructure areas: a) Implement erosion control measures where necessary to ensure that further habitat loss does not occur; b) Any waste or toxic spills from vehicles or mining infrastructure must be dealt with immediately in accordance with the waste management plan /emergency incident procedure/ spill procedure ; c) No uncontrolled or unsanctioned fires are allowed. A FMP should be in place; d) Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed mining activities; and e) Implement an AIP Management / Control Plan that includes ongoing monitoring and control of the presence and/or re-emergence of such species. *Rehabilitate areas that are no longer used for mining.  FLORAL SCC: *Monitoring of relocation success of potentially rescued and relocated floral SCC should take place during the operational phase; *Manage all edge effects stemming from mining operations and infrastructure areas; and *Harvesting of protected floral species by mining and operational personnel should be strictly prohibited.
				WM	Negative	5	4	1	2	35	Low	
			<b>Freshwater Habitat</b>	WOM	Negative	4	4	2	2	32	Low	
				WM	Negative	2	4	1	2	14	Negligible	
			<b>Woody Communities</b>	WOM	Negative	4	4	2	2	32	Low	
				WM	Negative	2	1	1	2	8	Negligible	
			<b>Valley Habitat</b>	WOM	Negative	4	3	1	6	40	Low	
				WM	Negative	2	1	1	2	8	Negligible	
			<b>Floral SCC</b>	WOM	Negative	4	3	2	6	44	Moderate	
				WM	Negative	2	3	2	6	22	Low	



Nr	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/ Severity	Significance	Significance	Management Measures
7	<b>Ongoing AIP management within 30 m of proposed activities</b>	*Ongoing AIP clearing and management as part of operational activities, resulting in an increase in floral diversity and habitat integrity.	Floral Habitat and Diversity	WOM	Positive	1	1	1	6	8	Negligible	The proliferation of AIPs is expected within any disturbed areas and especially along linear developments. AIPs must be monitored and must be removed throughout the operational phase of the project to prevent their spread beyond the development footprint areas: *Removal of the AIPs, with specific emphasis on Category 1b alien species, encountered within the footprint area and immediate surrounds (approximately 30 m buffer around activities) must take place (as per NEMBA: Alien and Invasive Species Regulations of 2020); *Removal of alien invasive species should preferably commence during the construction phases and continue throughout the operational, decommissioning and post-closure phases; and *The AIP Management/Control Plan should be implemented by a qualified professional (i.e., the person must have a good record of experience in AIP management and control). No chemical control of AIPs to occur within 32 m of a watercourse.
				WM	Positive	5	3	1	8	60	Moderate	
<b>Closure and Post closure</b>												
8	<b>Seepage from TSF and WRDs</b>	*On-going risk of discharge from mining facilities beyond closure leading to a permanent impact on floral habitat and downstream impacts on Riparian Habitat and Forest Remnants	Floral Habitat and diversity	WOM	Negative	4	3	2	6	44	Moderate	*Ensure TSF is stable and monitor often to ensure rapid response in the event of discharge.
				WM	Negative	2	1	2	6	18	Negligible	
9	<b>Rehabilitation and restoration activities</b>	*Permanent loss of floral habitat, diversity and SCC, and a higher likelihood of edge effect impacts on adjacent and nearby natural vegetation of increased sensitivity due to potential failure to effectively implement and monitor rehabilitation efforts, leading to: a) Reintroduction and proliferation of alien and invasive plant species; b) Compacted soils limiting the re-establishment of natural vegetation;	Floral Habitat and diversity	WOM	Negative	5	5	2	8	75	High	*Ensure sound implementation of AIP Management / Control Plan; *Where soils have been compacted, they are to be ripped and where necessary reprofiled; *Indigenous floral species are to be used for revegetation of disturbed areas. Where possible, reinstatement of floral communities similar to the reference vegetation type for the area must form the goal of rehabilitation activities; *All surface infrastructure is to be removed and waste material disposed of at a registered dump site. Waste



Nr	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/ Severity	Significance	Significance	Management Measures
		c) Increased risk of erosion in areas left disturbed and inadequately vegetated; d) Improper rehabilitation of disturbed areas leading to permanent floral habitat loss. Ultimately leading to a permanent loss of floral habitat, diversity and SCC, and a higher likelihood of edge effect impacts on adjacent and nearby natural vegetation of increased sensitivity.		WM	Negative	2	4	2	6	24	Low	and remnant mine related material are not to be dumped or left within the focus area. *A bi-annual alien vegetation clearance programme should be implemented for up to 2 years after closure but preferably until all AIP species are under control and no risk of spread to adjacent, natural habitat remains; *Follow up with alien and invasive plant control measures for a period of 5 years post-closure; *Use of a nursery developed by the mine to cultivate indigenous/endemic floral species and floral SCCs with a focus on rehabilitation during the post-closure phase in conjunction with a suitably qualified specialist (typically a combination of Horticulturists and/or Botanists and/or Landscape Architects). This will assist in areas where regrowth is not to an acceptable standard; and *Continue monitoring of rehabilitation activities for a minimum period of 5 years following the mine closure or until an acceptable level of habitat and biodiversity re-instatement has occurred, in such a way as to ensure that natural processes and veld succession will lead to the re-establishment of the natural wilderness conditions which are analogous to the pre-mining conditions of the area.
10	<b>Rehabilitation and restoration activities</b>	*Rehabilitation of currently degraded habitat and AIP clearance of already proliferated areas. Some ecological functioning will be restored that has been lost due to AIP proliferation and habitat transformation.	<b>Floral Habitat and diversity</b>	WOM	Positive	2	3	1	6	20	Negligible	
				WM	Positive	5	4	2	6	60	Moderate	





5.1.2 Impacts associated with Dukes.

**Table 5: Impacts on the floral habitat, diversity, and SCC from the proposed mining activities associated with Dukes.**

**\*WOM = Without Mitigation; WM = With Mitigation.**

No	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/ Severity	Significance	Significance	Management Measures
<b>Construction Phase</b>												
1	<b>Construction of surface infrastructure associated with Operational Infrastructure, Supporting Infrastructure, WRDs and Stockpiles</b>	<p>*Site preparation and clearing of indigenous vegetation for mine-related infrastructure;                      *Construction related activities within the recommended 30 m forest exclusion buffer, resulting in the potential loss or degradation of the zone buffering the forest from external impacts, e.g., degradation of habitat integrity of the 30 m buffer decreasing forest resilience, increasing the risk of AIP proliferation and native woody encroachment;                      *Dumping of cut vegetation, including AIPs, outside of already disturbed areas or outside of the authorised footprints, resulting in the loss of favourable habitat for the establishment of native species;                      *Impaired water quality and reduced flow of watercourses due to the accumulation of vegetation cuttings and debris within the Freshwater Habitat resulting from vegetation clearing;                      *Waste from construction material leading to disturbance of natural vegetation;                      *Increased personnel on site leading to loss of floral habitat through the potential for increased fire frequency and intensity (further promoting wattle thicket formation), as well as indiscriminate driving through natural veld;                      *Potential proliferation of AIP species that colonise areas of increased disturbances and</p>	<b>Degraded Habitat Unit</b>	WOM	Negative	5	4	2	2	40	Low	<p>*Prior to the commencement of construction activities, the entire construction servitude, including lay down areas and stockpile areas etc., should be fenced off and clearly demarcated;                      *Restrict construction of new infrastructure that will support underground operations to outside of the 30 m forest exclusion buffer where possible and feasible;                      *The construction footprint and removal of vegetation must be kept as small as possible within the authorised footprints to minimise impact on the surrounding environment (edge effect management);                      *No vegetation cuttings may be left to accumulate in watercourses. Discard all construction related waste and material (including cleared vegetation) at a registered waste facility (or in a secluded area designated by the mine) and no waste of construction rubble is to be dumped in the surrounding natural habitats;                      *If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line;                      *Edge effects of all construction activities, which may affect floral habitat within surrounding areas, are to be strictly managed, e.g., implement an AIP control plan from the get-go, mitigate soil erosion by reducing soil compaction caused by movement of construction personnel and vehicles, suppress dust in order to mitigate the impact of dust on flora within a close proximity of construction activities;</p>
WM				Negative	5	4	1	2	35	Low		
<b>Freshwater Habitat</b>			WOM	Negative	4	4	2	6	48	Moderate		
			WM	Negative	2	4	2	6	24	Low		
<b>Woody Communities</b>			WOM	Negative	5	4	2	6	60	Moderate		



No	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/Severity	Significance	Significance	Management Measures
		that outcompetes native species, including the further transformation of adjacent or nearby natural, more sensitive habitat, such as downslope watercourses; *Dust generated during construction activities accumulating on the surrounding floral individuals, altering the photosynthetic ability of plants, and potentially further decreasing optimal growing/re-establishing conditions; *Potential failure to concurrently rehabilitate bare areas or disturbed sites as soon as they become available, potentially resulting in loss of viable soils, increasing erosion risk and/or permitting the proliferation of AIPs; and *Potential failure to implement a BAP, including the auditing of the BAP, leading to permanent transformation of floral habitat and long-term degradation of important floral habitat within the region.		WM	Negative	5	4	1	2	35	Low	*No illicit fires must be allowed during any phases of the proposed mining development. A FMP should be set in place to ensure that any fires that do originate can be managed and / or stopped before significant damage to the environment occurs; *No indiscriminate driving through the veld is allowed. As far as possible vehicles are to utilise the existing roads. Where this is not feasible, new roads are to be located in areas of existing high disturbance, and not encroach upon sensitive habitats; and *Upon completion of construction activities, it must be ensured that no bare areas remain, and that indigenous species be used to revegetate the disturbed area.
			Valley Habitat	WOM	Negative	5	4	2	2	40	Low	
				WM	Negative	5	4	1	2	35	Low	
2	Construction of Linear Developments	*Site clearing and the removal of vegetation along continuous leading to fragmented habitat and a disturbance corridor along which AIPs can establish and spread to adjacent sites; and *Construction related activities within the recommended 30 m forest exclusion buffer, resulting in the potential loss or degradation of the zone buffering the forest from external impacts, e.g., degradation of habitat integrity of the 30 m buffer decreasing forest resilience, increasing the risk of AIP proliferation and native woody encroachers.	Woody Communities	WOM	Negative	5	4	1	8	65	High	*The construction footprint and removal of vegetation must be kept as small as possible within the authorised footprints to minimise impact on the surrounding environment (edge effect management); *Limit, as far as possible, the disturbance footprint within the 30 m forest exclusion buffer; *Access roads should be kept to existing roads so to reduce fragmentation of existing natural habitat; *Roadsides and linear developments serve as common corridors along which alien and invasive floral species are introduced and dispersed. Therefore, an AIP control plan should be implemented along all linear disturbances; and *All construction related waste and material is to be disposed of at a registered waste facility and no waste of construction rubble is to be dumped in the surrounding natural habitats.
				WM	Negative	5	4	1	2	35	Low	
			Degraded Habitat Unit	WOM	Negative	5	4	2	2	40	Low	
				WM	Negative	5	4	1	2	35	Low	
			Freshwater Habitat	WOM	Negative	4	4	2	6	48	Moderate	
				WM	Negative	2	1	2	2	10	Negligible	
			Valley Habitat	WOM	Negative	5	4	1	2	35	Low	
				WM	Negative	5	4	1	2	35	Low	



No	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/Severity	Significance	Significance	Management Measures
3	<b>Removal and/or relocation of floral SCC</b>	<p>*Loss of occurring and potentially occurring floral SCC due to potential failure to conduct a walkdown of the footprint area before construction activities where floral SCC, if present, are marked and relocated to suitable habitat outside the development footprint prior to the construction phase;</p> <p>*Extensive and unnecessary loss of favourable floral habitat, leading to a decline in floral diversity, including a decline in floral SCC numbers within the site, resulting from potentially poorly planned placement of the proposed infrastructure within natural areas and areas identified as increasingly sensitive during ecological studies; and</p> <p>*Increased human presence due to construction-related activities, potentially resulting in increased harvesting/ collection of SCC.</p>	Floral SCC	WOM	Negative	4	3	1	2	24	Low	<p>Before any construction activities can occur, a detailed walk down of the area must take place, during which all NFA-protected tree species, MNCA-protected floral species and potentially occurring RDL species are marked. If SCC are encountered and will be affected by the construction activities, these species must, as far as is possible, be avoided. If avoidance of impacts to SCC are not possible, the following is recommended:</p> <ol style="list-style-type: none"> <li>1) For NFA-protected trees, permit applications will be required from DFFE for removal/destruction of species. For specimens too large to relocate, collection of propagules should take place and these propagated in nurseries for use in rehabilitation later down the line;</li> <li>2) For MNCA-protected species, permit application from MTPA will be required to rescue and relocate such species;</li> <li>3) For RDL species, an investigation must be initiated into potential relocation. If not possible, offsetting the loss of RDL species should be pursued.</li> </ol> <p>*No collection of firewood, floral SCC or medicinal floral species must be allowed by construction or mining personnel.</p>
				WM	Negative	2	1	1	2	8	Negligible	
<b>Operational Phase</b>												
4	<b>All activities associated with mining and the movement of vehicles</b>	<p>*Further loss of floral habitat beyond the project footprint because of vegetation clearing related to operational-phase disturbances and expansion of stockpiles and waste rock dumps, on-going disturbance of soils due to operational activities, and edge effects associated with mining activities;</p> <p>*Potential trimming or slashing of vegetation associated with the Forest and Woodland habitat units, or wood collection from these habitat units, creating 'gaps' in the woody layer that will impact the dynamics of these systems</p>	Degraded Habitat Unit	WOM	Negative	5	3	1	2	30	Low	<p>HABITAT AND DIVERSITY</p> <p>*Ongoing monitoring of TSF stability;</p> <p>*Stockpiles, discard dumps and PCD etc positions, and their expansion as material is deposited, should be kept as small as possible;</p> <p>*No additional habitat is to be disturbed during the operational phase of the development;</p> <p>*Manage all edge effects or indirect disturbances stemming from mining operations and infrastructure areas:</p>
				WM	Negative	5	3	1	2	30	Low	
			Freshwater Habitat	WOM	Negative	5	3	1	2	30	Low	





No	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/Severity	Significance	Significance	Management Measures
		(increased light and potential for increased fire frequency), ultimately resulting in potential alterations in species composition and ecological function; *Ongoing disturbances from operational activities resulting in increased or continued proliferation of AIPs; *Failure to concurrently rehabilitate bare areas or disturbed sites as soon as they become available, potentially resulting in loss of viable soils, increasing erosion risk and/or permitting the proliferation of AIPs; *Erosion as a result of mining development, stormwater runoff and on-going disturbance of soils due to operational activities; *Risk of contamination from all operational facilities may pollute receiving environment; *Loss of floral SCC through ineffective monitoring of relocation success of rescued and relocated floral SCC (where applicable), and/or due to the harvesting of protected floral species by mining and operational personnel; and *Additional pressure on floral habitat by increased human populations associated with the proposed mining activities, contributing to increases in the collection of plant material for medicinal purposes and promoting the introduction and spread of AIPs that may displace habitat for SCCs.	Woody Communities	WM	Negative	5	3	1	2	30	Low	a) Implement erosion control measures where necessary to ensure that further habitat loss does not occur; b) Any waste or toxic spills from vehicles or mining infrastructure must be dealt with immediately in accordance with the waste management plan /emergency incident procedure/ spill procedure; c) No uncontrolled or unsanctioned fires are allowed. A FMP should be in place; d) Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed mining activities; and e) Implement an AIP Management / Control Plan that includes ongoing monitoring and control of the presence and/or re-emergence of such species.  *No firewood collection may be permitted from the Forest Habitat, Riparian Forest or Riparian Woodlands. Ensure no disturbances to forest edges (including unauthorised activities within the 30 m forest exclusion buffer) take place that will result in the opening of forest "gaps"; and *Rehabilitate areas that are no longer used for mining
				WOM	Negative	4	4	2	6	48	Moderate	
				WM	Negative	2	3	2	6	22	Low	
			Valley Habitat	WOM	Negative	5	4	2	8	70	High	
				WM	Negative	4	4	1	6	44	Moderate	
			Floral SCC	WOM	Negative	5	4	1	2	35	Low	
			WM	Negative	2	3	1	2	12	Negligible	FLORAL SCC. *Monitoring of relocation success of potentially rescued and relocated floral SCC should take place during the operational phase; *Manage all edge effects stemming from mining operations and infrastructure areas; and *Harvesting of protected floral species by mining and operational personnel should be strictly prohibited.	
5	Ongoing AIP management within 30 m of proposed activities	-	Floral Habitat and Diversity	WOM	Positive	5	3	2	6	55	Moderate	The proliferation of AIPs is expected within any disturbed areas and especially along linear developments. AIPs must be monitored and must be removed throughout the operational phase of the project to prevent their spread beyond the development footprint areas: *Removal of the AIPs, with specific emphasis on Category 1b alien species, encountered within the footprint area and immediate surrounds (approximately



No	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/Severity	Significance	Significance	Management Measures
				WM	Positive	2	3	2	6	22	Low	30 m buffer around activities) must take place (as per NEMBA: Alien and Invasive Species Regulations of 2020); *Removal of alien invasive species should preferably commence during the construction phases and continue throughout the operational, decommissioning and post-closure phases; and *The AIP Management/Control Plan should be implemented by a qualified professional (i.e., the person must have a good record of experience in AIP management and control). No chemical control of AIPs to occur within 32 m of a watercourse.
<b>Closure and Post closure</b>												
6	<b>Rehabilitation and restoration activities</b>	*Permanent loss of floral habitat, diversity and SCC, and a higher likelihood of edge effect impacts on adjacent and nearby natural vegetation of increased sensitivity due to potential failure to effectively implement and monitor rehabilitation efforts, leading to: a) Reintroduction and proliferation of alien and invasive plant species; b) Compacted soils limiting the re-establishment of natural vegetation; c) Increased risk of erosion in areas left disturbed and inadequately vegetated; d) Improper rehabilitation of disturbed areas leading to permanent floral habitat loss. Ultimately leading to a permanent loss of floral habitat, diversity and SCC, and a higher likelihood of edge effect impacts on adjacent and nearby natural vegetation of increased sensitivity.	<b>Floral Habitat and diversity</b>	WOM	Negative	4	5	3	8	64	High	*Ensure sound implementation of AIP Management / Control Plan; *Where soils have been compacted, they are to be ripped and where necessary reprofiled; *Indigenous floral species are to be used for revegetation of disturbed areas. Where possible, reinstatement of floral communities similar to the reference vegetation type for the area must form the goal of rehabilitation activities; *All surface infrastructure is to be removed and waste material disposed of at a registered dump site. Waste and remnant mine related material are not to be dumped or left within the focus area; and *A bi-annual alien vegetation clearance programme should be implemented for up to 2 years after closure but preferably until all AIP species are under control and no risk of spread to adjacent, natural habitat remains; *Follow up with alien and invasive plant control measures for a period of 5 years post-closure.
			<b>Floral Habitat and diversity</b>	WM	Negative	2	4	2	6	24	Low	*Use of a nursery developed by the mine is recommended to cultivate indigenous/endemic floral species and floral SCCs with a focus on rehabilitation during the post-closure phase in conjunction with a suitably qualified specialist (typically a combination of Horticulturists and/or Botanists and/or Landscape Architects). This will assist in areas where regrowth is not to an acceptable standard; and
8	<b>Rehabilitation and restoration activities</b>	*Reinstatement of native floral communities due to rehabilitation of currently transformed and degraded habitat and AIP clearance within heavily infested areas. Return of ecological functioning that has been lost due to AIP proliferation and habitat transformation.	<b>Floral Habitat and diversity</b>	WOM	Positive	1	3	2	6	11	Negligible	*Use of a nursery developed by the mine is recommended to cultivate indigenous/endemic floral species and floral SCCs with a focus on rehabilitation during the post-closure phase in conjunction with a suitably qualified specialist (typically a combination of Horticulturists and/or Botanists and/or Landscape Architects). This will assist in areas where regrowth is not to an acceptable standard; and



No	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/Severity	Significance	Significance	Management Measures
				WM	Positive	5	4	2	8	70	High	*Continue monitoring of rehabilitation activities for a minimum period of 5 years following the mine closure or until an acceptable level of habitat and biodiversity re-instatement has occurred, in such a way as to ensure that natural processes and veld succession will lead to the re-establishment of the natural wilderness conditions which are analogous to the pre-mining conditions of the area.





5.1.3 Impacts associated with Frankfort.

Table 6: Impacts on the floral habitat, diversity, and SCC from the proposed mining activities associated with Frankfort.

\*WOM = Without Mitigation; WM = With Mitigation.

No.	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/ Severity	Significance	Significance	Management Measures
<b>Construction Phase</b>												
1	<b>Construction of surface infrastructure associated with Operational Infrastructure, Supporting Infrastructure, WRDs and Stockpiles</b>	*Site preparation and clearing of indigenous vegetation for mine-related infrastructure; *Construction related activities within the recommended 30 m forest exclusion buffer, resulting in the potential loss or degradation of the zone buffering the forest from external impacts, e.g., degradation of habitat integrity of the 30 m buffer decreasing forest resilience, increasing the risk of AIP proliferation and native woody encroachment; *Dumping of cut vegetation, including AIPs, outside of already disturbed areas or outside of the authorised footprints, resulting in the loss of favourable habitat for the establishment of native species; *Impaired water quality and reduced flow of watercourses due to the accumulation of vegetation cuttings and debris within the Freshwater Habitat resulting from vegetation clearing; *Potential failure to have a stormwater management plan and erosion control plan in place during construction activities. The proposed activities will occur in mountainous terrain with watercourses (i.e., Riparian Forest and Riparian Woodland) downslope of these activities; *Potential inadequate stabilisation of steep slopes in the event that vegetation will be cleared along such slopes. Consequently, increased erosion will lead to the smothering	<b>Degraded Habitat Unit</b>	WOM	Negative	5	4	2	2	40	Low	*Prior to the commencement of construction activities, the entire construction servitude, including lay down areas and stockpile areas etc., should be fenced off and clearly demarcated; *Restrict construction of new infrastructure that will support underground operations to outside of the 30 m forest exclusion buffer where possible and feasible; *The construction footprint and removal of vegetation must be kept as small as possible within the authorised footprints to minimise impact on the surrounding environment (edge effect management); *No vegetation cuttings may be left to accumulate in watercourses. Discard all construction related waste and material (including cleared vegetation) at a registered waste facility (or in a secluded area designated by the mine) and no waste of construction rubble is to be dumped in the surrounding natural habitats; *If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line; *Edge effects of all construction activities, which may affect floral habitat within surrounding areas, are to be strictly managed, e.g., implement an AIP control plan from the get-go, mitigate soil erosion by reducing soil compaction caused by movement of construction personnel and vehicles, suppress dust in order to mitigate the impact of dust on flora within a close proximity of construction activities; *No illicit fires must be allowed during any phases of the proposed mining development. A FMP should be set in place to ensure that any fires that do originate can be
WM				Negative	5	4	1	2	35	Low		
<b>Freshwater Habitat</b>			WOM	Negative	4	4	2	8	56	Moderate		



No.	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/ Severity	Significance	Significance	Management Measures
		<p>of surrounding vegetation and larger disturbance footprints as slopes continue to erode;</p> <p>*Waste from construction material leading to disturbance of natural vegetation;</p> <p>*Increased personnel on site leading to loss of floral habitat through the potential for increased fire frequency and intensity (further promoting wattle thicket formation), as well as indiscriminate driving through natural veld;</p> <p>*Potential proliferation of AIP species that colonise areas of increased disturbances and that outcompetes native species, including the further transformation of adjacent or nearby natural, more sensitive habitat, such as downslope watercourses;</p> <p>*Dust generated during construction activities accumulating on the surrounding floral individuals, altering the photosynthetic ability of plants, and potentially further decreasing optimal growing/re-establishing conditions;</p> <p>*Potential failure to concurrently rehabilitate bare areas or disturbed sites as soon as they become available, potentially resulting in loss of viable soils, increasing erosion risk and/or permitting the proliferation of AIPs; and</p> <p>*Potential failure to implement a BAP, including the auditing of the BAP, leading to permanent transformation of floral habitat and long-term degradation of important floral habitat within the region.</p>	Woody Communities	WM	Negative	2	4	2	6	24	Low	<p>managed and / or stopped before significant damage to the environment occurs;</p> <p>*No indiscriminate driving through the veld is allowed. As far as possible vehicles are to utilise the existing roads. Where this is not feasible, new roads are to be located in areas of existing high disturbance, and not encroach upon sensitive habitats; and</p> <p>*Upon completion of construction activities, it must be ensured that no bare areas remain, and that indigenous species be used to revegetate the disturbed area.</p>
			Woody Communities	WOM	Negative	5	4	2	8	70	High	
			Woody Communities	WM	Negative	5	4	1	6	55	Moderate	
2	Construction of Linear Developments	<p>*Site clearing and the removal of vegetation along continuous leading to fragmented habitat and a disturbance corridor along which AIPs can establish and spread to adjacent sites;</p> <p>*Potential failure to implement an Erosion Control Plan for construction of linear features occurring along mountain slopes, especially where areas are already disturbed</p>	Woody Communities	WOM	Negative	5	4	2	8	70	High	<p>*The construction footprint and removal of vegetation must be kept as small as possible within the authorised footprints to minimise the impact on the surrounding environment (edge effect management);</p> <p>*Limit, as far as possible, the disturbance footprint within the 30 m forest exclusion buffer;</p> <p>*Access roads should be kept to existing roads so to reduce fragmentation of existing natural habitat;</p>
			Woody Communities	WM	Negative	5	4	1	6	55	Moderate	



No.	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/ Severity	Significance	Significance	Management Measures
		and soils are less stable, leading to sedimentation of downslope watercourses and smothering of surrounding vegetation; *Construction related activities within the recommended 30 m forest exclusion buffer, resulting in the potential loss or degradation of the zone buffering the forest from external impacts, e.g., degradation of habitat integrity of the 30 m buffer decreasing forest resilience, increasing the risk of AIP proliferation and native woody encroachers; and *Potential slope failure during construction activities, directly affecting forest communities or resulting in gaps in the forest where increased light may open the potential for non-forest species to establish, thereby resulting in potential changes in forest dynamics in the long-run.	<b>Degraded Habitat Unit</b>	WOM	Negative	5	4	1	2	35	Low	*Ensure slopes are stabilised at all times and ensure measures are in place to prevent slope failure along construction activities; *Roadsides and linear developments serve as common corridors along which alien and invasive floral species are introduced and dispersed. Therefore, an AIP control plan should be implemented along all linear disturbances; and *All construction related waste and material is to be disposed of at a registered waste facility and no waste of construction rubble is to be dumped in the surrounding natural habitats.
				WM	Negative	4	3	1	2	24	Low	
			<b>Freshwater Habitat</b>	WOM	Negative	4	4	2	6	48	Moderate	
				WM	Negative	2	4	1	6	22	Low	
3	<b>Removal and/or relocation of floral SCC</b>	*Loss of occurring and potentially occurring floral SCC due to potential failure to conduct a walkdown of the footprint area before construction activities where floral SCC, if present, are marked and relocated to suitable habitat outside the development footprint prior to the construction phase; *Extensive and unnecessary loss of favourable floral habitat, leading to a decline in floral diversity, including a decline in floral SCC numbers within the site, resulting from potentially poorly planned placement of the proposed infrastructure within natural areas	<b>Floral SCC</b>	WOM	Negative	4	4	3	8	60	Moderate	Before any construction activities can occur, a detailed walk down of the area must take place, during which all NFA-protected tree species, MNCA-protected floral species and potentially occurring RDL species are marked. If SCC are encountered and will be affected by the construction activities, these species must, as far as is possible, be avoided. If avoidance of impacts to SCC are not possible, the following is recommended:  1) For NFA-protected trees, permit applications will be required from DFFE for removal/destruction of species. For specimens too large to relocate, collection





No.	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/ Severity	Significance	Significance	Management Measures
		and areas identified as increasingly sensitive during ecological studies; and * Increased human presence due to construction-related activities, potentially resulting in increased harvesting/ collection of SCC.		WM	Negative	2	4	2	6	24	Low	<p>of propagules should take place and these propagated in nurseries for use in rehabilitation later down the line;</p> <p>2) For MNCA-protected species, permit application from MTPA will be required to rescue and relocate such species;</p> <p>3) For RDL species, an investigation must be initiated into potential relocation. If not possible, offsetting the loss of RDL species should be pursued.</p> <p>*No collection of firewood, floral SCC or medicinal floral species must be allowed by construction or mining personnel.</p>
<b>Operational Phase</b>												
4	<b>All activities associated with mining and the movement of vehicles</b>	<p>*Further loss of floral habitat beyond the project footprint because of vegetation clearing related to operational-phase disturbances and expansion of stockpiles and waste rock dumps, on-going disturbance of soils due to operational activities, and edge effects associated with mining activities;</p> <p>*Potential trimming or slashing of vegetation associated with the Forest and Woodland habitat units, or wood collection from these habitat units, creating 'gaps' in the woody layer that will impact the dynamics of these systems (increased light and potential for increased fire frequency), leading to potential alterations in species composition and ecological function;</p> <p>*Ongoing disturbances from operational activities resulting in increased or continued proliferation of AIPs;</p> <p>*Failure to concurrently rehabilitate bare areas or disturbed sites as soon as they become available, potentially resulting in loss of viable soils, increasing erosion risk and/or permitting the proliferation of AIPs;</p>	<p><b>Degraded Habitat Unit</b></p> <hr/> <p><b>Freshwater Habitat</b></p> <hr/> <p><b>Woody Communities</b></p>	<p>WOM</p> <hr/> <p>WM</p> <hr/> <p>WOM</p> <hr/> <p>WM</p> <hr/> <p>WOM</p>	<p>Negative</p> <hr/> <p>Negative</p> <hr/> <p>Negative</p> <hr/> <p>Negative</p>	<p>4</p> <hr/> <p>2</p> <hr/> <p>4</p> <hr/> <p>2</p> <hr/> <p>5</p>	<p>4</p> <hr/> <p>4</p> <hr/> <p>4</p> <hr/> <p>4</p>	<p>2</p> <hr/> <p>2</p> <hr/> <p>2</p> <hr/> <p>2</p>	<p>2</p> <hr/> <p>2</p> <hr/> <p>6</p> <hr/> <p>6</p> <hr/> <p>8</p>	<p>32</p> <hr/> <p>16</p> <hr/> <p>48</p> <hr/> <p>24</p> <hr/> <p>70</p>	<p>Low</p> <hr/> <p>Negligible</p> <hr/> <p>Moderate</p> <hr/> <p>Low</p> <hr/> <p>High</p>	<p>HABITAT AND DIVERSITY</p> <p>*Ongoing monitoring of TSF stability;</p> <p>*Stockpiles, discard dumps and PCD etc positions, and their expansion as material is deposited, should be kept as small as possible;</p> <p>*No additional habitat is to be disturbed during the operational phase of the development;</p> <p>*Manage all edge effects or indirect disturbances stemming from mining operations and infrastructure areas:</p> <p>a) Implement erosion control measures where necessary to ensure that further habitat loss does not occur;</p> <p>b) Any waste or toxic spills from vehicles or mining infrastructure must be dealt with immediately in accordance with the waste management plan /emergency incident procedure/ spill procedure;</p> <p>c) No uncontrolled or unsanctioned fires are allowed. A FMP should be in place; 2</p> <p>d) Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed mining activities; and</p> <p>e) Implement an AIP Management / Control Plan that includes ongoing monitoring and control of the presence and/or re-emergence of such species.</p>



No.	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/ Severity	Significance	Significance	Management Measures
		*Erosion as a result of mining development, stormwater runoff and on-going disturbance of soils due to operational activities; *Risk of contamination from all operational facilities may pollute receiving environment; *Loss of floral SCC through ineffective monitoring of relocation success of rescued and relocated floral SCC (where applicable), and/or due to the harvesting of protected floral species by mining and operational personnel; and *Additional pressure on floral habitat by increased human populations associated with the proposed mining activities, contributing to increases in the collection of plant material for medicinal purposes and promoting the introduction and spread of AIPs that may displace habitat for SCCs.	Floral SCC	WM	Negative	4	4	1	6	44	Moderate	*No firewood collection may be permitted from the Forest Habitat, Riparian Forest or Riparian Woodlands. Ensure no disturbances to forest edges (including unauthorised activities within the 30 m forest exclusion buffer) take place that will result in the opening of forest "gaps"; and *Rehabilitate areas that are no longer used for mining.  FLORAL SCC *Monitoring of relocation success of potentially rescued and relocated floral SCC should take place during the operational phase; *Manage all edge effects stemming from mining operations and infrastructure areas; and *Harvesting of protected floral species by mining and operational personnel should be strictly prohibited.
				WOM	Negative	4	4	2	6	48	Moderate	
				WM	Negative	2	4	1	6	22	Low	
5	Ongoing AIP management within 30 m of proposed activities	*Ongoing AIP clearing and management as part of operational activities, resulting in an increase in floral diversity and habitat integrity.	Floral Habitat and Diversity	WOM	Positive	1	3	2	6	11	Negligible	The proliferation of AIPs is expected within any disturbed areas and especially along linear developments. AIPs must be monitored and must be removed throughout the operational phase of the project to prevent their spread beyond the development footprint areas: *Removal of the AIPs, with specific emphasis on Category 1b alien species, encountered within the footprint area and immediate surrounds (approximately 30 m buffer around activities) must take place (as per NEMBA: Alien and Invasive Species Regulations of 2020); *Removal of alien invasive species should preferably commence during the construction phases and continue throughout the operational, decommissioning and post-closure phases; and *The AIP Management/Control Plan should be implemented by a qualified professional (i.e., the person must have a good record of experience in AIP management and control). No chemical control of AIPs to occur within 32 m of a watercourse.
				WM	Positive	5	3	2	6	55	Moderate	



No.	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/ Severity	Significance	Significance	Management Measures
<b>Closure and Post closure</b>												
6	<b>Rehabilitation and restoration activities</b>	*Permanent loss of floral habitat, diversity and SCC, and a higher likelihood of edge effect impacts on adjacent and nearby natural vegetation of increased sensitivity due to potential failure to effectively implement and monitor rehabilitation efforts, leading to: a) Reintroduction and proliferation of alien and invasive plant species; b) Compacted soils limiting the re-establishment of natural vegetation; c) Increased risk of erosion in areas left disturbed and inadequately vegetated; d) Improper rehabilitation of disturbed areas leading to permanent floral habitat loss. Ultimately leading to a permanent loss of floral habitat, diversity and SCC, and a higher likelihood of edge effect impacts on adjacent and nearby natural vegetation of increased sensitivity.	<b>Floral Habitat and diversity</b>	WOM	Negative	5	5	2	8	75	High	*Ensure sound implementation of AIP Management / Control Plan; *Where soils have been compacted, they are to be ripped and where necessary reprofiled; *Indigenous floral species are to be used for revegetation of disturbed areas. Where possible, reinstatement of floral communities similar to the reference vegetation type for the area must form the goal of rehabilitation activities; *All surface infrastructure is to be removed and waste material disposed of at a registered dump site. Waste and remnant mine related material are not to be dumped or left within the focus area. *A bi-annual alien vegetation clearance programme should be implemented for up to 2 years after closure but preferably until all AIP species are under control and no risk of spread to adjacent, natural habitat remains; *Follow up with alien and invasive plant control measures for a period of 5 years post-closure; *Use of a nursery developed by the mine to cultivate indigenous/endemic floral species and floral SCCs with a focus on rehabilitation during the post-closure phase in conjunction with a suitably qualified specialist (typically a combination of Horticulturists and/or Botanists and/or Landscape Architects). This will assist in areas where regrowth is not to an acceptable standard; and *Continue monitoring of rehabilitation activities for a minimum period of 5 years following the mine closure or until an acceptable level of habitat and biodiversity reinstatement has occurred, in such a way as to ensure that natural processes and veld succession will lead to the re-establishment of the natural wilderness conditions which are analogous to the pre-mining conditions of the area.
				WM	Negative	2	4	2	6	24	Low	
7	<b>Rehabilitation and restoration activities</b>	*Reinstatement of native floral communities due to rehabilitation of currently transformed and degraded habitat and AIP clearance within heavily infested areas. Return of ecological functioning that has been lost due to AIP proliferation and habitat transformation.	<b>Floral Habitat and diversity</b>	WOM	Positive	2	3	2	6	22	Low	*Continue monitoring of rehabilitation activities for a minimum period of 5 years following the mine closure or until an acceptable level of habitat and biodiversity reinstatement has occurred, in such a way as to ensure that natural processes and veld succession will lead to the re-establishment of the natural wilderness conditions which are analogous to the pre-mining conditions of the area.
				WM	Positive	4	5	2	8	60	Moderate	





5.1.4 Impacts associated with Morgenzon.

Table 7: Impacts on the floral habitat, diversity, and SCC from the proposed mining activities associated with Morgenzon.

\*WOM = Without Mitigation; WM = With Mitigation.

No.	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/ Severity	Significance	Significance	Management Measures
<b>Construction Phase</b>												
1	<b>Construction of Crossing(s)</b>	*Vegetation clearing within the Riparian Woodland sub-unit (i.e., Peach Tree Stream; *Temporary alteration of stream flow; *Spread of AIPs along the Riparian Woodland sub-unit from contaminated construction material; and *Increased sediment loads and potential erosion of stream banks resulting from construction activities and increased movement of construction workers along / across the Riparian Woodland.	<b>Freshwater Habitat</b>	WOM	Negative	5	4	2	6	60	Moderate	*All crossings over watercourses must be kept to the bare minimum and are adequately designed to prevent impacts on habitat, instream flow, pattern and timing of water and water quality; *Minimise loss of indigenous vegetation where possible; *Ensure AIP vegetation cutting and propagules do not enter the watercourses where crossings will be constructed; and * As much as possible, existing access roads and river crossings must be utilised (if necessary, upgraded) to minimise further disturbances to the watercourses.
				WM	Negative	5	4	1	2	35	Low	
2	<b>Construction of surface infrastructure associated with Operational Infrastructure, Supporting Infrastructure, WRDs and Stockpiles</b>	*Site preparation and clearing of indigenous vegetation for mine-related infrastructure; *Dumping of cut vegetation, including AIPs, outside of already disturbed areas or outside of the authorised footprints, resulting in the loss of favourable habitat for the establishment of native species; *Impaired water quality and reduced flow of watercourses due to the accumulation of vegetation cuttings and debris resulting from vegetation clearing; *Potential failure to have a stormwater management plan and erosion control plan in place during construction activities; *Waste from construction material leading to disturbance of natural vegetation; *Increased personnel on site leading to loss of floral habitat through the potential for increased fire frequency and intensity (further promoting wattle thicket formation), as well as indiscriminate driving through natural veld;	<b>Degraded Habitat Unit</b>	WOM	Negative	5	4	2	2	40	Low	*Prior to the commencement of construction activities, the entire construction servitude, including lay down areas and stockpile areas etc., should be fenced off and clearly demarcated; *Restrict construction of new infrastructure that will support underground operations to outside of the 30 m forest exclusion buffer where possible and feasible; *The construction footprint and removal of vegetation must be kept as small as possible within the authorised footprints to minimise impact on the surrounding environment (edge effect management); *No vegetation cuttings may be left to accumulate in watercourses. Discard all construction related waste and material (including cleared vegetation) at a registered waste facility (or in a secluded area designated by the mine) and no waste of construction rubble is to be dumped in the surrounding natural habitats; *If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line;
				WM	Negative	5	4	1	2	35	Low	
			<b>Freshwater Habitat</b>	WOM	Negative	5	4	2	6	60	Moderate	
				WM	Negative	4	4	2	2	32	Low	



		<p>*Potential proliferation of AIP species that colonise areas of increased disturbances and that outcompetes native species, including the further transformation of adjacent or nearby natural, more sensitive habitat, such as nearby watercourses;</p> <p>*Dust generated during construction activities accumulating on the surrounding floral individuals, altering the photosynthetic ability of plants, and potentially further decreasing optimal growing/re-establishing conditions;</p> <p>*Potential failure to concurrently rehabilitate bare areas or disturbed sites as soon as they become available, potentially resulting in loss of viable soils, increasing erosion risk and/or permitting the proliferation of AIPs; and</p> <p>*Potential failure to implement a BAP, including the auditing of the BAP, leading to permanent transformation of floral habitat and long-term degradation of important floral habitat within the region.</p>	<p><b>Woody Communities</b></p>	<p>WOM</p>	<p>Negative</p>	<p>4</p>	<p>4</p>	<p>2</p>	<p>6</p>	<p>48</p>	<p>Moderate</p>	<p>*Edge effects of all construction activities, which may affect floral habitat within surrounding areas, are to be strictly managed, e.g., implement an AIP control plan from the get-go, mitigate soil erosion by reducing soil compaction caused by movement of construction personnel and vehicles, suppress dust in order to mitigate the impact of dust on flora within a close proximity of construction activities;</p> <p>*No illicit fires must be allowed during any phases of the proposed mining development. A FMP should be set in place to ensure that any fires that do originate can be managed and / or stopped before significant damage to the environment occurs;</p> <p>*No indiscriminate driving through the veld is allowed. As far as possible vehicles are to utilise the existing roads. Where this is not feasible, new roads are to be located in areas of existing high disturbance, and not encroach upon sensitive habitats; and</p> <p>*Upon completion of construction activities, it must be ensured that no bare areas remain, and that indigenous species be used to revegetate the disturbed area.</p>
			<p><b>Woody Communities</b></p>	<p>WM</p>	<p>Negative</p>	<p>2</p>	<p>4</p>	<p>2</p>	<p>2</p>	<p>16</p>	<p>Negligible</p>	
			<p><b>Valley Habitat</b></p>	<p>WOM</p>	<p>Negative</p>	<p>4</p>	<p>4</p>	<p>2</p>	<p>2</p>	<p>32</p>	<p>Low</p>	
			<p><b>Valley Habitat</b></p>	<p>WM</p>	<p>Negative</p>	<p>2</p>	<p>4</p>	<p>1</p>	<p>2</p>	<p>14</p>	<p>Negligible</p>	
3	<p><b>Construction of Linear Developments</b></p>	<p>*Site clearing and the removal of vegetation along continuous leading to fragmented habitat and a disturbance corridor along which AIPs can establish and spread to adjacent sites;</p> <p>*Potential failure to implement an Erosion Control Plan for construction of linear features, especially where areas are already disturbed and soils are less stable, leading to sedimentation of nearby watercourses and smothering of surrounding vegetation; and</p> <p>*Construction related activities within the recommended 30 m forest exclusion buffer, resulting in the potential loss or degradation of the zone buffering the forest from external impacts, e.g., degradation of habitat integrity of the 30 m buffer decreasing forest resilience, increasing the risk of AIP proliferation and native woody encroachers.</p>	<p><b>Woody Communities</b></p>	<p>WOM</p>	<p>Negative</p>	<p>4</p>	<p>4</p>	<p>1</p>	<p>6</p>	<p>44</p>	<p>Moderate</p>	<p>*The construction footprint and removal of vegetation must be kept as small as possible within the authorised footprints to minimise impact on the surrounding environment (edge effect management);</p> <p>*Limit, as far as possible, the disturbance footprint within the 30 m forest exclusion buffer;</p> <p>*Access roads should be kept to existing roads so to reduce fragmentation of existing natural habitat;</p> <p>*Roadsides and linear developments serve as common corridors along which alien and invasive floral species are introduced and dispersed. Therefore, an AIP control plan should be implemented along all linear disturbances; and</p> <p>*All construction related waste and material is to be disposed of at a registered waste facility and no waste of construction rubble is to be dumped in the surrounding natural habitats.</p>
			<p><b>Woody Communities</b></p>	<p>WM</p>	<p>Negative</p>	<p>2</p>	<p>4</p>	<p>1</p>	<p>6</p>	<p>22</p>	<p>Low</p>	
			<p><b>Degraded Habitat Unit</b></p>	<p>WOM</p>	<p>Negative</p>	<p>5</p>	<p>3</p>	<p>2</p>	<p>2</p>	<p>35</p>	<p>Low</p>	
			<p><b>Degraded Habitat Unit</b></p>	<p>WM</p>	<p>Negative</p>	<p>5</p>	<p>3</p>	<p>1</p>	<p>2</p>	<p>30</p>	<p>Low</p>	
			<p><b>Freshwater Habitat</b></p>	<p>WOM</p>	<p>Negative</p>	<p>4</p>	<p>4</p>	<p>2</p>	<p>6</p>	<p>48</p>	<p>Moderate</p>	
			<p><b>Freshwater Habitat</b></p>	<p>WM</p>	<p>Negative</p>	<p>2</p>	<p>3</p>	<p>2</p>	<p>2</p>	<p>14</p>	<p>Negligible</p>	
			<p><b>Valley Habitat</b></p>	<p>WOM</p>	<p>Negative</p>	<p>5</p>	<p>4</p>	<p>2</p>	<p>2</p>	<p>40</p>	<p>Low</p>	
			<p><b>Valley Habitat</b></p>	<p>WM</p>	<p>Negative</p>	<p>5</p>	<p>4</p>	<p>1</p>	<p>2</p>	<p>35</p>	<p>Low</p>	



4	<b>Removal and/or relocation of floral SCC</b>	*Loss of occurring and potentially occurring floral SCC due to potential failure to conduct a walkdown of the footprint area before construction activities where floral SCC, if present, are marked and relocated to suitable habitat outside the development footprint prior to the construction phase; *Extensive and unnecessary loss of favourable floral habitat, leading to a decline in floral diversity, including a decline in floral SCC numbers within the site, resulting from potentially poorly planned placement of the proposed infrastructure within natural areas and areas identified as increasingly sensitive during ecological studies; and *Increased human presence due to construction-related activities, potentially resulting in increased harvesting/ collection of SCC.	Floral SCC	WOM	Negative	5	3	1	6	50	Moderate	<p>Before any construction activities can occur, a detailed walk down of the area must take place, during which all NFA-protected tree species, MNCA-protected floral species and potentially occurring RDL species are marked. If SCC are encountered and will be affected by the construction activities, these species must, as far as is possible, be avoided. If avoidance of impacts to SCC are not possible, the following is recommended:</p> <ol style="list-style-type: none"> <li>1) For NFA-protected trees, permit applications will be required from DFFE for removal/destruction of species. For specimens too large to relocate, collection of propagules should take place and these propagated in nurseries for use in rehabilitation later down the line;</li> <li>2) For MNCA-protected species, permit application from MTPA will be required to rescue and relocate such species;</li> <li>3) For RDL species, an investigation must be initiated into potential relocation. If not possible, offsetting the loss of RDL species should be pursued.</li> </ol> <p>*No collection of firewood, floral SCC or medicinal floral species must be allowed by construction or mining personnel.</p>
			Floral SCC	WM	Negative	4	3	1	6	40	Low	
<b>Operational Phase</b>												
5	<b>All activities associated with mining and the movement of vehicles</b>	*Further loss of floral habitat beyond the project footprint because of vegetation clearing related to operational-phase disturbances and expansion of stockpiles and waste rock dumps, on-going disturbance of soils due to operational activities, and edge effects associated with mining activities; *Potential trimming or slashing of vegetation associated with the Forest and Woodland habitat units, or wood collection from these habitat units, creating 'gaps' in the woody layer that will impact the dynamics of these systems (increased light and potential for increased fire frequency), leading to potential alterations in species composition and ecological function; *Ongoing disturbances from operational activities resulting in increased or continued proliferation of AIPs;	Degraded Habitat Unit	WOM	Negative	5	4	2	2	40	Low	<p><b>HABITAT AND DIVERSITY</b> *Ongoing monitoring of TSF stability; *Stockpiles, discard dumps and PCD etc positions, and their expansion as material is deposited, should be kept as small as possible; *No additional habitat is to be disturbed during the operational phase of the development;  *Manage all edge effects or indirect disturbances stemming from mining operations and infrastructure areas: a) Implement erosion control measures where necessary to ensure that further habitat loss does not occur; b) Any waste or toxic spills from vehicles or mining infrastructure must be dealt with immediately in accordance with the waste management plan /emergency incident procedure/ spill procedure; c) No uncontrolled or unsanctioned fires are allowed. A FMP should be in place; 2</p>
			Degraded Habitat Unit	WM	Negative	4	3	1	2	24	Low	
			Freshwater Habitat	WOM	Negative	4	3	2	2	28	Low	
			Freshwater Habitat	WM	Negative	2	1	2	2	10	Negligible	
			Woody Communities	WOM	Negative	5	4	2	6	60	Moderate	





		<p>*Failure to concurrently rehabilitate bare areas or disturbed sites as soon as they become available, potentially resulting in loss of viable soils, increasing erosion risk and/or permitting the proliferation of AIPs;</p> <p>*Erosion as a result of mining development, stormwater runoff and on-going disturbance of soils due to operational activities;</p> <p>*Risk of contamination from all operational facilities may pollute receiving environment;</p> <p>*Loss of floral SCC through ineffective monitoring of relocation success of rescued and relocated floral SCC (where applicable), and/or due to the harvesting of protected floral species by mining and operational personnel; and</p> <p>*Additional pressure on floral habitat by increased human populations associated with the proposed mining activities, contributing to increases in the collection of plant material for medicinal purposes and promoting the introduction and spread of AIPs that may displace habitat for SCCs.</p>		WM	Negative	4	1	2	6	36	Low	<p>d) Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed mining activities; and</p> <p>e) Implement an AIP Management / Control Plan that includes ongoing monitoring and control of the presence and/or re-emergence of such species.</p> <p>*No firewood collection may be permitted from the Forest Habitat, Riparian Forest or Riparian Woodlands. Ensure no disturbances to forest edges (including unauthorised activities within the 30 m forest exclusion buffer) take place that will result in the opening of forest "gaps"; and</p> <p>*Rehabilitate areas that are no longer used for mining.</p> <p>FLORAL SCC</p> <p>*Monitoring of relocation success of potentially rescued and relocated floral SCC should take place during the operational phase;</p> <p>*Manage all edge effects stemming from mining operations and infrastructure areas; and</p> <p>*Harvesting of protected floral species by mining and operational personnel should be strictly prohibited.</p>
			Valley Habitat	WOM	Negative	5	3	2	6	55	Moderate	
				WM	Negative	2	1	2	2	10	Negligible	
			Floral SCC	WOM	Negative	5	3	2	6	55	Moderate	
				WM	Negative	4	3	2	2	28	Low	
6	Ongoing AIP management within 30 m of proposed activities	*Ongoing AIP clearing and management as part of operational activities, resulting in an increase in floral diversity and habitat integrity.										<p>The proliferation of AIPs is expected within any disturbed areas and especially along linear developments. AIPs must be monitored and must be removed throughout the operational phase of the project to prevent their spread beyond the development footprint areas:</p> <p>*Removal of the AIPs, with specific emphasis on Category 1b alien species, encountered within the footprint area and immediate surrounds (approximately 30 m buffer around activities) must take place (as per NEMBA: Alien and Invasive Species Regulations of 2020);</p> <p>*Removal of alien invasive species should preferably commence during the construction phases and continue throughout the operational, decommissioning and post-closure phases; and</p> <p>*The AIP Management/Control Plan should be implemented by a qualified professional (i.e., the person must have a good record of experience in AIP management and control). No chemical control of AIPs to occur within 32 m of a watercourse.</p>
			Floral Habitat and Diversity	WOM	Positive	1	3	2	6	11	Negligible	
				WM	Positive	5	4	2	6	60	Moderate	



No.	Activity	Potential Impact	Aspect affected	Mitigation	Nature	Probability	Duration	Scale	Magnitude/ Severity	Significance	Significance	Management Measures
<b>Closure and Post closure</b>												
7	<b>Rehabilitation and restoration activities</b>	<p>*Failure to monitor rehabilitation efforts, leading to:</p> <p>a) Reintroduction and proliferation of alien and invasive plant species;</p> <p>b) Compacted soils limiting the re-establishment of natural vegetation;</p> <p>c) Increased risk of erosion in areas left disturbed and inadequately vegetated;</p> <p>d) Improper rehabilitation of disturbed areas leading to permanent floral habitat loss.</p> <p>Ultimately leading to a permanent loss of floral habitat, diversity and SCC, and a higher likelihood of edge effect impacts on adjacent and nearby natural vegetation of increased sensitivity.</p>	<b>Floral Habitat and Diversity</b>	WOM	Negative	4	5	2	6	52	Moderate	<p>*Ensure sound implementation of AIP Management / Control Plan;</p> <p>*Where soils have been compacted, they are to be ripped and where necessary reprofiled;</p> <p>*Indigenous floral species are to be used for revegetation of disturbed areas. Where possible, reinstatement of floral communities similar to the reference vegetation type for the area must form the goal of rehabilitation activities;</p> <p>*All surface infrastructure is to be removed and waste material disposed of at a registered dump site. Waste and remnant mine related material are not to be dumped or left within the focus area.</p> <p>*A bi-annual alien vegetation clearance programme should be implemented for up to 2 years after closure but preferably until all AIP species are under control and no risk of spread to adjacent, natural habitat remains;</p> <p>*Follow up with alien and invasive plant control measures for a period of 5 years post-closure;</p> <p>*Use of a nursery developed by the mine to cultivate indigenous/endemic floral species and floral SCCs with a focus on rehabilitation during the post-closure phase in conjunction with a suitably qualified specialist (typically a combination of Horticulturists and/or Botanists and/or Landscape Architects). This will assist in areas where regrowth is not to an acceptable standard; and</p> <p>*Continue monitoring of rehabilitation activities for a minimum period of 5 years following the mine closure or until an acceptable level of habitat and biodiversity reinstatement has occurred, in such a way as to ensure that natural processes and veld succession will lead to the re-establishment of the natural wilderness conditions which are analogous to the pre-mining conditions of the area.</p>
				WM	Negative	2	4	2	6	24	Low	
8	<b>Rehabilitation and restoration activities</b>	<p>*Reinstatement of native floral communities due to rehabilitation of currently transformed and degraded habitat and AIP clearance within heavily infested areas. Return of ecological functioning that has been lost due to AIP proliferation and habitat transformation.</p>	<b>Floral Habitat and Diversity</b>	WOM	Positive	1	3	2	6	11	Negligible	
				WM	Positive	5	4	2	6	60	Moderate	



## 5.2 Impact Discussion

The impact assessment was undertaken on all aspects of floral ecology deemed likely to be affected by the proposed MR83 UG project activities.

### 5.2.1 Impact on Floral Habitat and Diversity

The data gathered during the site visit indicate that the Transformed Habitat sub-unit (Degraded Habitat) is of **Low** sensitivity, the AIP-dominated Vegetation (Degraded Habitat), Riparian Woodland of Beta North (Freshwater Habitat Unit), and Valley Habitat (historically impacted) of **Moderately low** sensitivity, the Watercourse Habitat sub-unit & Riparian Woodlands of Dukes and Morgenzon (Freshwater Habitat Unit), Valley Habitat Unit, and Woodlands of Beta North, Dukes and Morgenzon (Woody Communities) of **Intermediate** sensitivity, the Riparian Forests & Riparian Woodland of Dukes (Freshwater Habitat Unit) and intact Woodlands associated with Dukes and Frankfort (Woody Communities) of **Moderately high** sensitivity, and the Indigenous Forest (Woody Communities) of **High** sensitivity.

The largest of the proposed footprint will be in the Transformed Habitat and AIP-dominated Vegetation which will not result in impacts on indigenous vegetation, nor will it result in the direct loss of habitat that is considered important for sustaining floral ecology in the area. Of concern regarding activities in these sub-units are the potential for edge effects on adjacent or nearby, natural habitat. Stormwater management, erosion control, and the control of AIPs will be of the utmost importance to ensure adverse impacts stemming from activities in these habitat sub-units do not result in loss of more sensitive habitat. Smaller/ more localised footprints are associated with the Valley Habitat Unit and the degraded Woodland sub-unit. Although activities in these units will result in the loss of indigenous vegetation, the impact on floral ecology stemming from direct loss of habitat and species will be minor. This is not just due to the smaller extents of footprints in these units, but also due to the impaired or diminished habitat integrity of these units. Neither the Valley Habitat Unit nor the degraded Woodland sub-unit are representative of the reference vegetation types, e.g., the degraded Woodland sub-unit has developed in response to historic anthropogenic disturbances (previously grasslands), whereas the surrounding anthropogenic activities have resulted in altered floral communities and a high incidence of AIPs within the Valley Habitat.

Some clearance of intact Woodland habitat is proposed; however, this will be of limited extent and includes the sections of Woodland that have been fragmented from the larger Woodland communities. Where linear developments will impact on the Woodland habitat along steeper sloped sections of Frankfort, erosion control will be required. No habitat associated with





Indigenous Forests will be cleared; however, the proposed activities will occur in the 30 m DFFE forest exclusion buffer. Impacts to forest dynamics will need to be managed if the activities are authorised within the 30 m buffer zone, i.e., gaps in the forest should be avoided, no wood collection from the forests, and AIPs must be controlled.

Apart from the construction of crossings, the freshwater habitat has been excluded from the proposed activities. With no significant direct impacts anticipated, the indirect impacts from potential leaks or pollution of freshwater systems, poor stormwater and/or erosion control, and spread of AIP species poses the biggest threat to habitat integrity of the Freshwater Habitat unit. The current illegal mining activities associated with mainly Beta North, Dukes, and Morgenzon, have impacted negatively on water quality and even direct diversions of streams. The proposed MR83 UG activities must ensure their activities do not follow suit.

With the proposed activities occurring mainly within areas that are already disturbed, degraded, and/or transformed, the anticipated impacts from the proposed mining activities will not be detrimental or significant, given that mitigation measures are implemented.

Activities which are likely to negatively affect the floral habitat integrity of the MR83 UG Areas includes, but are not limited to, the following:

- Placement of infrastructure within natural habitat outside of the authorised footprint;
- Destruction of floral habitat during construction and operational activities;
- AIP proliferation and erosion in disturbed areas;
- Increased human movement, leading to greater pressure on natural floral habitat and increasing the potential for harvesting of protected floral species; and
- Alteration of hydrology and runoff patterns if storm water management is inadequate.

## 5.2.2 Impacts on Floral SCC

The potential for the proposed activities to impact directly on floral SCC is low. No SCC were recorded within the direct footprints, although MNCA-protected species such as *Aloes* and orchids may be impacted. The greatest threat to floral SCC will be the potential harvesting of species.

A walkdown of the footprint area is recommended to confirm the absence or presence of protected species for which permit applications would be required. If any SCCs are encountered within the proposed footprints and avoiding impacts to the species are deemed unlikely, it is recommended that a rescue and relocation plan be devised, or permits be



acquired to destroy such species. Authorisation to relocate such species must be obtained from the MTPA or the DFFE.

Activities which are likely to negatively affect the flora of conservation concern within and around the MR83 UG Areas include, but are not limited to, the following:

- Destruction, removal or harvesting of nationally and/or provincially protected species during construction and operational activities; and
- Potentially poorly implemented and monitored rescue and relocation of eligible SCC (only feasible for *Aloe* species) that will be affected by the proposed project, leading to unsuccessful rescue efforts and loss of SCC individuals.

### 5.2.3 Impact on CBAs, ESAs, Threatened Vegetation and Protected Areas

The proposed development will impact on the EN Malmani Karstlands threatened ecosystem, CBAs, ESAs, Forests and a protected area; however, CBAs and ESAs were only confirmed for the Indigenous Forest Habitat, intact Woodland, and Freshwater Habitat, for which little to no impacts from the proposed activities will result. The EN Malmani Karstlands are associated with the grassland vegetation types in the area which were not represented within the MR83 UG Areas. Forests will not be impacted directly, however activities will take place in the 30 m DFFE recommended exclusion buffer. Strict mitigation of edge effects in the buffers will be required to prevent adverse impacts on forests. Note that AIP clearance activities within the buffer zone may be permitted as long as the management plan be accompanied by a suitable rehabilitation and revegetation plan to prevent/manage potential erosion risks and re-establishment of AIPs.

Dukes occurs in the Morgenzon Forest NR. No mining related activities are permitted in a NR - As per Section 48(1)(a) of NEMPAA, "despite other legislation, no person may conduct commercial prospecting, mining, exploration, production, or related activities (a) in a special nature reserve, national park, or nature reserve". However, given that the proposed activities in Dukes will occur in Degraded Habitat (including areas where underground mining was previously conducted), no additional loss of habitat in the Forest NR is anticipated. It is highly recommended that rehabilitation post-closure aims to reinstate vegetation representative of the reference vegetation types of the area – as far as is feasible – and that during mining and post-closure, the presence of AIPs be controlled. A net gain in biodiversity can result post-mining, which will prove favourable for achieving biodiversity targets in the Forest NR.



#### 5.2.4 Probable Latent Impacts

Even with extensive mitigation, latent impacts on the receiving floral ecological environment are deemed likely. The following points highlight the key latent impacts that have been identified:

- Permanent loss of floral habitat;
- Permanent loss of and altered floral species diversity;
- Edge effects such as further habitat fragmentation and AIP proliferation;
- The ongoing loss of SCC/protected floral species and suitable habitat for such species; and
- Disturbed areas not rehabilitated to an ecologically functioning state resulting in the loss of floral habitat, species diversity and SCC/protected floral species.

#### 5.2.5 Cumulative Impacts

The greatest threat to the floral ecology within the survey area is likely to be the potential spread of AIPs, which may result in long-term changes to floral communities and displacement of native species. This is already a significant problem in the region, especially with wattle invasion into grasslands and along drainage lines.

### 5.3 Floral Monitoring

A floral monitoring plan must be designed and implemented throughout all phases of the proposed mining project, should it be approved. The following points aim to guide the design of the monitoring plan, and it must be noted that the monitoring plan must be continually updated and refined for site-specific requirements:

- The MR83 UG Areas should be monitored regularly by suitably trained personnel<sup>11</sup> to ensure that areas impacted by mining activities, particularly within a 30 m buffer around proposed mine footprint, do not degrade more or promote erosion or AIP spread. Factors that should be monitored include:
  - Overall species diversity and composition – records should be kept indicating any impact (negative and positive) that the mining activities have on the overall species diversity and composition of the floral communities within the 30 m buffer of the proposed mine layout;

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<sup>11</sup> Monthly monitoring can be assigned to mine personnel, e.g., the Environmental Control Officer (ECO) or Environmental Manager; however, annual external monitoring is recommended.





- The recruitment of AIP species within the surrounding areas of mining activities should be strictly monitored and where necessary AIP control measures implemented; and
  - Erosion levels and the efficacy of erosion control measures should be monitored.
- Associated monitoring of the Peach Tree Stream, the Blyde River and its tributaries should continue throughout the operational phase to ensure these systems are not adversely affected by mining activities – special attention from a floral perspective should be on the integrity of riparian vegetation;
  - As part of the monitoring program, a rehabilitation plan must be developed to ensure that areas affected by mining activities are rehabilitated back to sufficiently stable states (in line with the recommended post-closure land use for the site). The rehabilitation plan must be updated continuously (i.e., adaptive management) in accordance with the monitoring results to ensure that optimal rehabilitation measures are employed. Adaptive management is an integral part of any rehabilitation plan as it assesses monitoring results to allow rehabilitation measures to be revisited and to be adapted accordingly;
  - In the event that floral SCCs were relocated or a nursery developed for the propagation of species for rehabilitation, monitoring would need to focus on the establishment success of such species;
  - Results of the monitoring activities must be considered during all phases of the proposed project and action must be taken to mitigate impacts as soon as negative effects from mining activities become apparent; and
  - The method of monitoring must be designed to be subjective and repeatable to ensure consistent results.

## 6 CONCLUSION

STS was appointed to undertake a terrestrial biodiversity assessment as part of the proposed EIA and WUL amendment process for the MR83 UG targets near Pilgrims Rest, Mpumalanga. The assessment included four sites: Dukes, Frankfort, Morgenzon, and Beta North.

Across the target areas, four broad habitat units could be distinguished:

- **Degraded Habitat (section 3.1)** – encompassing Alien and Invasive Plant (AIP)-dominated Habitat and areas entirely transformed by mining (illegal and approved) and/or forestry practices;



- **Freshwater Habitat (section 3.2)** – encompassing Riparian Forest, Riparian Woodland, and Watercourse Habitat;
- **Terrestrial Woody Communities (section 3.3)** – encompassing Indigenous Forests and Woodlands (intact and degraded); and
- **Valley Habitat (section 3.4)** – encompassing a variety of habitat types occurring along the mountain footslopes and along rivers and streams.

Taking into consideration the presence of current and historic anthropogenic disturbances, species richness and the presence of AIPs, as well as the potential for the habitat to host significant biodiversity features and floral SCC, the following was concluded for the MR83 UG Areas: The Transformed Habitat sub-unit (Degraded Habitat) is of **Low** sensitivity, the AIP-dominated Vegetation (Degraded Habitat), Riparian Woodland of Beta North (Freshwater Habitat Unit), and Valley Habitat (historically impacted) of **Moderately low** sensitivity, the Watercourse Habitat sub-unit & Riparian Woodlands of Dukes and Morgenzon (Freshwater Habitat Unit), Valley Habitat Unit, and Woodlands of Beta North, Dukes and Morgenzon (Woody Communities) of **Intermediate** sensitivity, the Riparian Forests & Riparian Woodland of Dukes (Freshwater Habitat Unit) and intact Woodlands associated with Dukes and Frankfort (Woody Communities) of **Moderately high** sensitivity, and the Indigenous Forest (Woody Communities) of **High** sensitivity.

Due to the nature of the proposed project (underground mining) and the design of the proposed surface layouts, the activities will have restricted and mitigatable, direct impacts on indigenous vegetation and habitat of increased sensitivity. Sensitive habitat has largely been excluded from the layout designs and with edge effect control, AIP management, stormwater management, and erosion control, the impacts from the proposed mining activities will be of localised extent and will be site specific. If rehabilitation post-closure is aimed at reinstating native floral communities and removing AIPs, the proposed project may result in a net gain in biodiversity for the area. Compensation for mining in a NR should be investigated.

Given the above, if mitigation measures are adequately implemented, the proposed project as assessed in this study will not have any significant impacts on floral ecology associated with the MR83 UG Areas or the surrounding areas. It is the opinion of the ecologist that this study provides the relevant information required to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources in the MR83 UG Areas will be made in support of the principle of sustainable development.



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## APPENDIX A: Floral Method of Assessment

### Floral Species of Conservation Concern Assessment

Prior to the site visit, a record of floral SCC and their habitat requirements was developed for the MR83 UG Areas, which includes consulting the National Web-based Environmental Screening Tool. Because not all SCC have been included in the Screening Tool layers (e.g., NT and DD taxa), it remains important for the specialist to be on the lookout for additional SCC. For this study, two primary sources were consulted and are described below.

#### The National Web-Based Environmental Screening Tool

The Screening Tool was accessed to obtain a list of potentially occurring species of conservation concern for the MR83 UG Areas. Each of the themes in the Screening Tool consists of theme-specific spatial datasets which have been assigned a sensitivity level namely, “*low*”, “*medium*”, “*high*” and “*very high*” sensitivity. The four levels of sensitivity are derived and identified in different ways, e.g., for **confirmed** areas of occupied habitat for SCC a Very High and High Sensitivity is assigned and for areas of suitable habitat where SCC may occur based on spatial models only, a Medium Sensitivity is assigned. The different sensitivity ratings pertaining to the Plant [and Animal] Protocols are described below<sup>12</sup>:

- **Very High:** Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 km<sup>2</sup> are considered Critical Habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under Critically Endangered (CR), Endangered (EN), or Vulnerable (VU) D criteria of the IUCN or species listed as Critically/ Extremely Rare under South Africa’s National Red List Criteria. For each species reliant on a Critical Habitat, all remaining suitable habitat has been manually mapped at a fine scale.
- **High:** Recent occurrence records for all threatened (CR, EN, VU) and/or rare endemic species are included in the high sensitivity level. Spatial polygons of suitable habitat have been produced for each species by intersecting recently collected occurrence records (those collected since the year 2000) that have a spatial confidence level of less than 250 m with segments of remaining natural habitat.
- **Medium:** Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. Two types of spatial models have been included. The first is a simple rule-based habitat suitability model where habitat attributes such as vegetation type and altitude are selected for all areas where a species has been recorded to occur. The second is a species distribution model which uses species occurrence records combined with multiple environmental variables to quantify and predict areas of suitable habitat. The models provide a probability-based distribution indicating a continuous range of habitat suitability across areas that have not been previously surveyed. A probability threshold of 75% for suitable habitat has been used to convert the modelled probability surface and reduce it into a single spatial area which defines areas that fall within the medium sensitivity level.
- **Low:** Areas where no SCC are known or expected to occur.

#### BRAHMS Online Website

The Botanical Database of Southern Africa (BODATSA) is accessed to obtain plant names and floristic details (<http://posa.sanbi.org/>) for species of conservation concern within a selected boundary;

- This website provides access to South African plant names (taxa), specimens (herbarium sheets) and observations of plants made in the field (botanical records). Data is obtained from the Botanical Database of Southern Africa (BODATSA), which contains records from the

<sup>12</sup> More details on the use of the Screening Tool for Species of Conservation Concern can be found in the below resources:

- South African National Biodiversity Institute (SANBI). 2020. Draft Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Flora (3c) & Terrestrial Fauna (3d) Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 1.0.
- The National Web based Environmental Screening Tool website: <https://screening.environment.gov.za/screeningtool/#/pages/welcome>



- National Herbarium in Pretoria (PRE), the Compton Herbarium in Cape Town (NBG & SAM) and the KwaZulu-Natal Herbarium in Durban (NH).
- Information on habitat requirements etc. is obtained from the SANBI Red List of South African Plants website (<http://redlist.sanbi.org/>).
  - Typically, data is extracted for the Quarter Degree Square (QDS) in which the MR83 UG Areas is situated but where it is deemed appropriate, a larger area can be included.

### NEMBA TOPS Species

The National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA) Threatened or Protected Species (TOPS) list (Government Gazette [GN] 29657, as amended in GN R1187 in Government Gazette 30568 of 2007 and again in GN 627 in Government Gazette 43386 of 2020) were taken into consideration.

### List of Protected Tree Species (Government Gazette No. 41887, notice 536 of 2018) under the National Forests Act, 1998 (Act No. 84 of 1998) (NFA)

In terms of section 15(1) of the NFA, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. As these species are considered important, listed trees formed part of the SCC assessment.

### MTPA Species Status Report

A list of threatened species for the QDS 2430DC and 2430DD was obtained from the Mpumalanga Tourism and Parks Agency (MTPA) due to the MR83 UG Areas being very centrally located in these two QDS grids. This list includes true recordings of species but does not provide exact localities due to the sensitive nature of such information.

### Specially Protected and Protected Species

The Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) (MNCA) provides a list of Protected Species (Schedule 11) (Section 69(1)(a) of the MNCA) and Specially Protected Species (Schedule 12) (Section 69(1)(b) of the MNCA) for the Mpumalanga Province. These species formed part of the SCC assessment.

Throughout the floral assessment, special attention was paid to the identification of any of these SCC as well as the identification of suitable habitat that could potentially support these species.

The Probability of Occurrence (POC) for each floral SCC is described:

- **“Confirmed”**: if observed during the survey;
- **“High”**: if within the species’ known distribution range and suitable habitat is available;
- **“Medium”**: if either within the known distribution range of the species or if suitable habitat is present; or
- **“Low”**: if the habitat is not suitable and falls outside the distribution range of the species.

Low POC	Medium POC	High POC	Confirmed
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The accuracy of the POC is based on the available knowledge about the species in question, with many of the species lacking in-depth habitat research.





## 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. Whether the habitat is representative of a Critical Biodiversity Area or forms part of an Ecological Support Area is also taken into consideration;
- **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 contribute 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 A1: Floral habitat sensitivity rankings and associated land-use objectives.**

Score	Rating significance	Conservation objective
1 < 1.5	Low	Optimise development potential.
≥1.5 <2.5	Moderately low	Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects.
≥2.5 <3.5	Intermediate	Preserve and enhance biodiversity of the habitat unit and surrounds while optimizing development potential.
≥3.5 <4.5	Moderately high	Preserve and enhance the biodiversity of the habitat unit, limit development and disturbance.
≥4.5 ≤5.0	High	Preserve and enhance the biodiversity of the habitat unit, no-go alternative must be considered.



## **Vegetation Surveys**

When planning the timing of a floristic survey, it is important to remember that the primary objective is not an exhaustive species list but rather to ensure that sufficient data are collected to describe all the vegetation communities present in the area of interest, to optimise the detection of SCC and to assess habitat suitability for other potentially occurring SCC (SANBI, 2020).

The vegetation survey incorporates the subjective (or stratified) sampling method. Subjective sampling is a sampling technique in which the specialist relies on his or her own professional experience when choosing sample sites within the MR83 UG Areas. This allows representative recordings of floral communities and optimal detection of SCC. Subjective sampling is used to consider different areas (or habitat units) which are identified within the main body of a habitat/MR83 UG Areas.

One of the problems with random sampling, another popular sampling method, is that random samples may not cover all areas of a MR83 UG Areas equally and thus increase the potential to miss floral SCC. Random sampling methods also tend to require more time in the field to locate the amount of SCC that can be detected using subjective sampling methods - In the context of an EIA where time constraints are often restrictive, priority needs to be given to collecting data in the shortest time possible without compromising the efficiency of locating SCC (SANBI, 2020).

Vegetation structure has been described following the guideline in Edwards (1983). Refer to Figure A1 below:



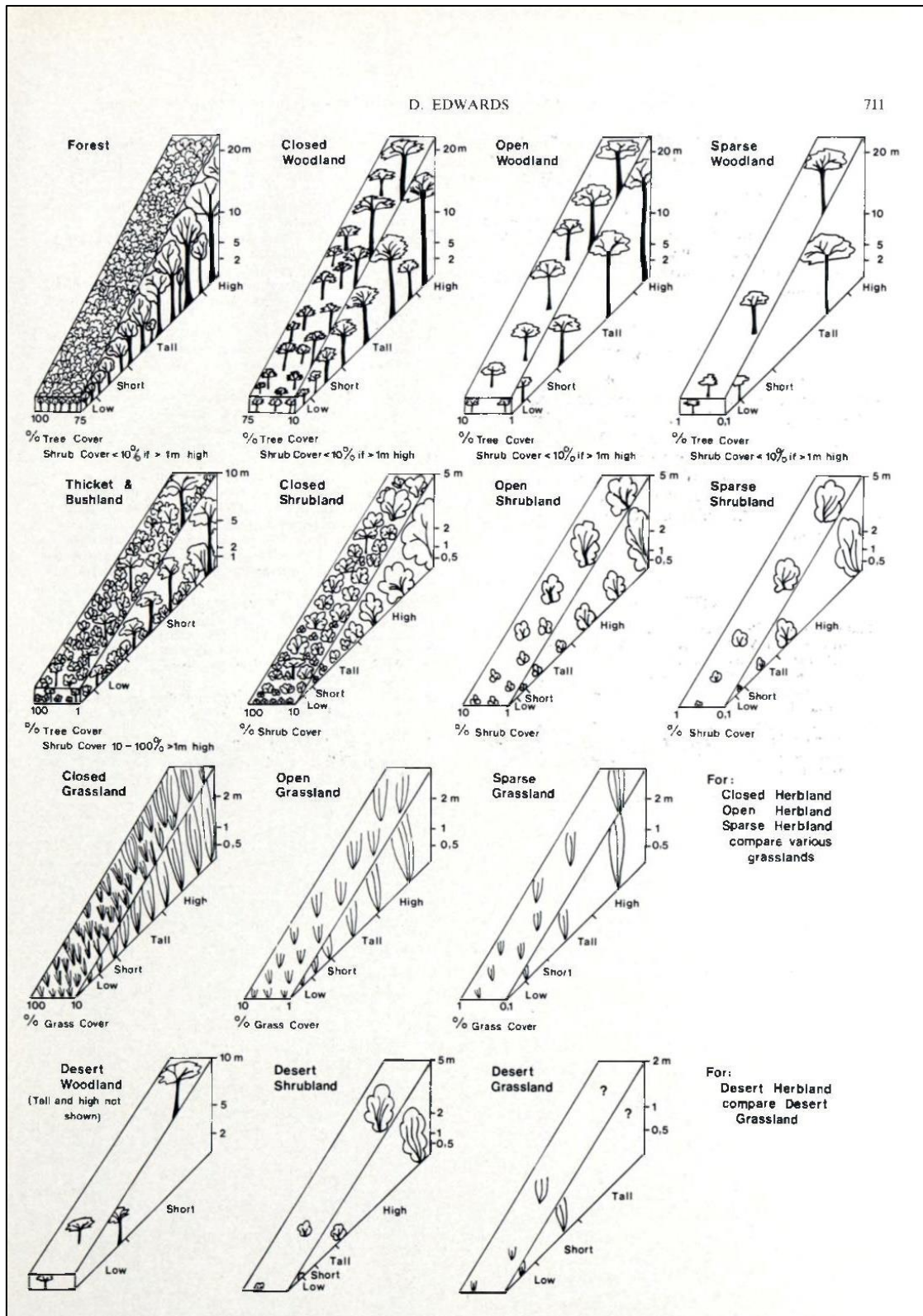


Figure A1: Diagrammatic representation of structural groups and formation classes. Only dominant growth forms are shown.



## APPENDIX B: Floral Species List

**Table B1: Floral species encountered during the field assessment. Alien species identified during the field assessment are indicated with an asterisk (\*). Species protected under the Mpumalanga Nature Conservation Act or the National Forest Act are emboldened.**

Scientific name	Degraded Habitat	Freshwater Habitat	Indigenous Forest	Woodland	Valley Habitat	Relevant Forest Notes
<b>WOODY SPECIES</b>						
* <i>Acacia dealbata</i>	x	x		x		
* <i>Acacia decurrens</i>	x			x		
* <i>Acacia elata</i>	x					
* <i>Acacia melanoxylon</i>	x	x				
* <i>Acer negundo</i>		x				
* <i>Acer</i> sp.	x					
* <i>Ailanthus altissima</i>	x					
* <i>Eucalyptus diversicolor</i>	x					
* <i>Eucalyptus grandis</i>	x	x				
* <i>Flaveria bidentis</i>	x					
* <i>Lantana camara</i>	x	x	x	x	x	
* <i>Melia azedarach</i>	x					
* <i>Physalis peruviana</i>	x					
* <i>Pinus</i> spp.	x			x		
* <i>Ricinus communis</i>	x					
* <i>Rubus cuneifolius</i>	x	x				
* <i>Rubus niveus</i>	x	x		x		
* <i>Senna septemtrionalis</i>	x	x		x		
* <i>Solanum mauritianum</i>	x	x		x		
* <i>Solanum nigrum</i>	x	x				
* <i>Solanum sysimbrifolium</i>	x					
<i>Acokanthera oppositifolia</i>		x				
<i>Albizia versicolor</i>				x		Dominant and Characteristic species (Mucina et al, 2003) - Savanna
<i>Apodytes dimidiata</i>		x	x			
<i>Artemisia afra</i> var. <i>afra</i>	x			x	x	
<i>Asparagus setaceus</i>			x			Constant taxa: Long Tom Mistbelt (Lötter et al., 2014) Dominant and Characteristic species (Mucina et al, 2003)
<i>Athrixia elata</i>		x		x		
<i>Behnia reticulata</i>			x			Montane Grassland species Dominant and Characteristic species (Mucina et al, 2003)
<i>Bowkeria cymosa</i>		x	x	x		Dominant and Characteristic species (Mucina et al, 2003)
<i>Brachylaena transvaalensis</i>			x	x		Dominant taxa: Long Tom Mistbelt (Lötter et al., 2014) Dominant and Characteristic species (Mucina et al, 2003)
<i>Buddleja auriculata</i>		x	x	x		
<i>Buddleja salviifolia</i>	x	x		x		
<i>Carissa bispinosa</i> subsp. <i>bispinosa</i>				x		
<i>Carissa bispinosa</i> subsp. <i>zambesiensis</i>			x	x		Constant taxa: Long Tom Mistbelt (Lötter et al., 2014) Dominant and Characteristic species (Mucina et al, 2003)
<i>Cassinopsis ilicifolia</i>		x	x	x		Dominant and Characteristic species (Mucina et al, 2003)
<i>Celtis africana</i>	x	x	x			Mpumalanga Mistbelt Forests - lower forests Dominant and Characteristic species (Mucina et al, 2003)
<i>Cephalanthus natalensis</i>				x		
<i>Clausena anisata</i>			x	x		Dominant and Characteristic species (Mucina et al, 2003)
<i>Cliffortia</i> sp.		x				
<i>Cnestis polyphylla</i>			x			
<i>Combretum erythrophyllum</i>		x				





Scientific name	Degraded Habitat	Freshwater Habitat	Indigenous Forest	Woodland	Valley Habitat	Relevant Forest Notes
<i>Combretum kraussii</i>			x	x		Mpumalanga Mistbelt Forests - lower forests Dominant and Characteristic species (Mucina et al, 2003)
<i>Combretum molle</i>				x		Montane Grassland species
<i>Combretum zeyheri</i>				x		
<i>Crotalaria doidgeae</i>	x			x		
<i>Cussonia spicata</i>	x		x	x		Dominant and Characteristic species (Mucina et al, 2003)
<i>Cyanthillium wollastonii</i>		x				
<b>Cyathea dregei (fern) (MNCA)</b>		x				
<i>Dalbergia armata</i>		x	x			Dominant and Characteristic species (Mucina et al, 2003)
<i>Diospyros lycioides</i> subsp. <i>lycioides</i>				x	x	Dominant and Characteristic species (Mucina et al, 2003)
<i>Diospyros whyteana</i>		x	x	x		Constant taxa: Long Tom Mistbelt (Lötter et al., 2014) Dominant and Characteristic species (Mucina et al, 2003)
<i>Dombeya burgessiae</i>			x	x		
<i>Dombeya pulchra</i>			x	x		Dominant and Characteristic species (Mucina et al, 2003)
<i>Dombeya rotundifolia</i>				x		
<i>Dovyalis rhamnoides</i>			x			Dominant and Characteristic species (Mucina et al, 2003)
<i>Ekebergia pterophylla</i>			x	x		Dominant and Characteristic species (Mucina et al, 2003)
<i>Englerophytum natalense</i>		x	x			
<i>Eriosema psoraleoides</i>	x				x	
<i>Euclea crispa</i>	x			x		
<i>Euclea natalensis</i> subsp. <i>angustifolia</i>				x		
<i>Eugenia cf woodii</i>			x			
<i>Euryops chrysanthemoides</i>		x	x			
<b>Faurea galpinii (MNCA)</b>		x	x	x		
<b>Faurea rochetiana (MNCA)</b>				x		
<i>Ficus sur</i>	x	x	x	x		Dominant and Characteristic species (Mucina et al, 2003)
<i>Grewia occidentalis</i>		x		x		
<i>Gymnosporia buxifolia</i>				x		
<i>Gymnosporia rubra</i>			x			
<i>Gymnosporia senegalensis</i>		x				
<i>Helichrysum kraussii</i>	x				x	
<i>Helichrysum mimetes</i>					x	
<i>Helichrysum splendidum</i>					x	
<i>Helinus integrifolius</i>			x			
<i>Heteropyxis canescens</i>			x	x		Dominant and Characteristic species (Mucina et al, 2003)
<i>Heteropyxis natalensis</i>	x			x		
<i>Ilex mitis</i>		x	x	x		Dominant and Characteristic species (Mucina et al, 2003)
<i>Indigofera arrecta</i>		x				
<i>Itea rhamnoides</i>		x	x			
<i>Kiggelaria africana</i>		x	x			Mpumalanga Mistbelt Forests - lower forests Dominant and Characteristic species (Mucina et al, 2003)
<i>Leonotis intermedia</i>	x				x	
<i>Leucosidea sericea</i>	x	x		x	x	
<i>Lippia</i> sp.	x				x	
<i>Morella pilulifera</i>		x	x	x		
<i>Myrsine africana</i>			x			
<i>Nuxia floribunda</i>		x				
<i>Phymaspermum acerosum</i>	x				x	
<i>Piper capense</i>			x			Dominant and Characteristic species (Mucina et al, 2003)
<b>Pittosporum cf viridiflorum (NT. NFA-Protected)</b>			x	x		<b>Dominant and Characteristic species (Mucina et al, 2003)</b>
<i>Plectranthus fruticosus</i>	x	x	x			Dominant and Characteristic species (Mucina et al, 2003)
<b>Podocarpus (=Afrocarpus) falcatus (LC. NFA-protected)</b>		x	x	x		



Scientific name	Degraded Habitat	Freshwater Habitat	Indigenous Forest	Woodland	Valley Habitat	Relevant Forest Notes
<b><i>Podocarpus latifolius</i> (LC. NFA-protected)</b>			x			Dominant and Characteristic species (Mucina et al, 2003)
<i>Pristimera longipetiolata</i>		x	x			
<i>Pseudarthria hookeri</i>	x			x	x	
<i>Psychotria zombamontana</i>			x			Diagnostic taxa: Long Tom Mistnelt (Lötter et al., 2014) Dominant and Characteristic species (Mucina et al, 2003)
<i>Rhamnus prinoides</i>	x	x	x	x		
<i>Rhoicissus rhomboidea</i>			x			
<i>Rhoicissus tridentata</i>				x		Dominant and Characteristic species (Mucina et al, 2003)
<i>Rothmannia capensis</i>						Dominant and Characteristic species (Mucina et al, 2003)
<i>Rubus cf apetalus</i>			x	x		
<i>Rubus pinnatus</i>			x	x		
<i>Rubus rigidus</i>	x					
<i>Salix mucronata</i>		x				
<i>Schrebera alata</i>		x	x			
<i>Sclerochiton harveyanus</i>		x	x	x		Dominant taxa: Long Tom Mistbelt (Lötter et al., 2014) Dominant and Characteristic species (Mucina et al, 2003)
<i>Scolopia zeyheri</i>			x			
<i>Searsia chirindensis</i>		x	x	x		
<i>Searsia dentata</i>					x	
<i>Searsia lucida f. lucida</i>			x	x		
<i>Searsia pentheri</i>	x		x	x		
<i>Secamone alpini</i>			x	x		Constant taxa: Long Tom Mistbelt (Lötter et al., 2014) Dominant and Characteristic species (Mucina et al, 2003)
<i>Senegalia ataxacantha</i>		x	x	x		Dominant and Characteristic species (Mucina et al, 2003)
<i>Solanum panduriforme</i>	x					
<i>Tarchonanthus trilobus</i>				x		
<i>Tenryhnea phyllicifolia</i>		x			x	
<i>Tetradenia riparia</i>		x	x			
<i>Trema orientalis</i>			x	x		Dominant and Characteristic species (Mucina et al, 2003)
<i>Vachellia karoo</i>	x			x		
<i>Vangueria infausta</i>				x		
<i>Xymalos monospora</i>			x	x		Diagnostic taxa: Long Tom Mistnelt (Lötter et al., 2014) Dominant and Characteristic species (Mucina et al, 2003)
<i>Zanthoxylum capense</i>			x			
<i>Ziziphus mucronata</i>		x	x	x		
<b>HERBACEOUS SPECIES</b>						
* <i>Acanthospermum australe</i>	x					
* <i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>	x					
* <i>Bidens pilosa</i>	x		x	x		
* <i>Centella aristata</i>		x				
* <i>Cirsium vulgare</i>	x	x				
* <i>Conyza bonariensis</i>	x	x				
* <i>Conyza canadensis</i>	x		x	x		
* <i>Cuscuta campestris</i>	x				x	
* <i>Datura stramonium</i>	x				x	
* <i>Galinsoga quadriradiata</i>	x		x			
* <i>Hypochoeris radicata</i>	x					
* <i>Ipomoea purpurea</i>	x	x				
* <i>Lilium formosanum</i>	x					
* <i>Malvastrum coromandelianum</i>	x	x				
* <i>Melilotus albus</i>	x				x	



Scientific name	Degraded Habitat	Freshwater Habitat	Indigenous Forest	Woodland	Valley Habitat	Relevant Forest Notes
* <i>Mellilotus indicus</i>	x				x	
* <i>Oenothera rosea</i>		x			x	
* <i>Oenothera tetraptera</i>	x				x	
* <i>Oxalis corniculata</i>	x					
* <i>Phytolacca octandra</i>	x			x		
* <i>Plantago major</i>	x				x	
* <i>Richardia brasiliensis</i>	x				x	
* <i>Schkuhria pinnata</i>	x				x	
* <i>Solanum elaeagnifolium</i>	x				x	
* <i>Tagetes minuta</i>	x			x	x	
* <i>Verbena bonariensis</i>	x	x			x	
* <i>Verbena officinalis</i>		x				
* <i>Verbena rigida</i>	x				x	
* <i>Zinnia peruviana</i>	x			x		
<i>Abrus laevigatus</i>		x	x			
* <i>Achyranthes aspera</i> var. <i>aspera</i>		x	x			
<i>Agrimonia procera</i>	x	x			x	
<i>Alectra sessiliflora</i>	x					
<b><i>Aloe affinis</i> (succulent species) (MNCA)</b>				x		
<b><i>Aloe arborescens</i> (succulent species) (MNCA)</b>				x		
<i>Asplenium aethiopicum</i> (fern)		x	x			Dominant and Characteristic species (Mucina et al, 2003)
<i>Begonia sonderiana</i>	x			x		
<i>Begonia sutherlandii</i>		x	x			
<i>Blechnum tabulare</i> (fern)		x	x			
<i>Chamaecrista mimosoides</i>					x	
<i>Cheilanthes viridis</i> (fern)		x	x			Mpumalanga Mistbelt Forest. Dominant and Characteristic species (Mucina et al, 2003)
<i>Chlorophytum bowkeri</i>		x	x			
<i>Cissampelos torulosa</i>			x			
<i>Clematis brachiata</i>	x			x		
<i>Commelina africana</i>		x	x	x	x	
<i>Commelina eckloniana</i>				x		
<i>Conostomium natalense</i>				x		
<i>Cotyledon</i> sp. (succulent species)			x			
<i>Crocoshia aurea</i> subsp. <i>aurea</i>		x	x			Dominant and Characteristic species (Mucina et al, 2003)
<i>Crocoshia paniculata</i>	x	x			x	
<i>Crotalaria pallida</i>					x	
<i>Cucumis zeyheri</i>	x					
<i>Cynoglossum lanceolatum</i>	x				x	
<i>Desmodium uncinatum</i>		x	x			
<i>Dicliptera clinopodia</i>		x	x	x		Dominant and Characteristic species (Mucina et al, 2003)
<i>Dietes iridioides</i>		x	x			Dominant and Characteristic species (Mucina et al, 2003)
<b><i>Disperis fanniniae</i> (MTPA)</b>			x			
<i>Elaphoglossum acrostichoides</i> (fern)		x				



Scientific name	Degraded Habitat	Freshwater Habitat	Indigenous Forest	Woodland	Valley Habitat	Relevant Forest Notes
<i>Freezia laxa</i>		x	x	x		
<i>Geranium wakkerstroomianum</i>		x	x			
<i>Gerbera jamesonii</i>				x		
<i>Gloriosa modesta</i>		x	x	x		
<i>Gymnanthemum coloratum</i>	x				x	
<b>Habenaria sp. (MNCA)</b>	x					
<i>Helichrysum athrixiifolium</i>					x	
<i>Helichrysum nudifolium</i>					x	
<i>Holothrix orthoceras</i>			x			
<i>Hylodesmum repandum</i>		x	x			
<i>Hypoestes triflora</i>		x	x			Mpumalanga Mistbelt Forests.
<i>Impatiens hochstetteri</i>		x	x			Dominant and Characteristic species (Mucina et al, 2003)
<i>Ipomoea obscura</i>				x		
<b>Kniphofia sp. (MNCA)</b>	x				x	
<i>Kohautia amatymbica</i>	x			x	x	
<i>Kohautia amatymbica</i>	x					
<i>Lactuca inermis</i>	x					
<b>Liparis bowkeri (MNCA)</b>			x			
<i>Macledium zeyheri</i>				x		
<i>Momordica foetida</i>	x			x		
<i>Moraea spathulata</i>		x			x	
<i>Nidorella auriculata</i>	x				x	
<i>Nidorella sp.</i>					x	
<i>Ocimum filamentosum</i>			x			
<i>Oxalis obliquifolia</i>				x	x	
<i>Pearsonia sessilifolia</i>				x		
<i>Pelargonium luridum</i>					x	
<i>Peperomia retusa</i> (fern)		x	x			Dominant and Characteristic species (Mucina et al, 2003)
<i>Persicaria attenuata</i>		x				
<i>Plantago lanceolata</i>	x				x	
<i>Plectranthus grallatus</i>		x				
<i>Plectranthus verticillatus</i>			x			
<i>Pleopeltis ecklonii</i> (fern)		x	x			
<i>Polygala albida</i> subsp. <i>albida</i>	x			x		
<i>Pteridium aquilinum</i> (fern)	x	x	x	x		Dominant and Characteristic species (Mucina et al, 2003)
<i>Pteris catoptera</i> (fern)			x			Mpumalanga Mistbelt Forests
<i>Scabiosa columbaria</i>	x			x		
<i>Scadoxus puniceus</i>					x	
<i>Senecio inornatus</i>					x	
<i>Senecio microglossus</i>	x				x	
<i>Senecio oxyriifolius</i>				x		
<i>Senecio polyanthemoides</i>	x	x				
<i>Sida rhombifolia</i>	x			x		
<i>Streptocarpus cf wilmsii</i>		x				Dominant and Characteristic species (Mucina et al, 2003)
<i>Streptocarpus confusus</i> subsp. <i>confusus</i>			x			
<i>Vigna vexillata</i>		x	x			





Scientific name	Degraded Habitat	Freshwater Habitat	Indigenous Forest	Woodland	Valley Habitat	Relevant Forest Notes
<i>Wahlenbergia undulata</i>	x				x	
<i>Waltheria indica</i>				x		
<b>Zantedeschia albomaculata (MNCA)</b>				x		
<i>Zornia capensis</i>				x		
<b>GRAMINOID SPECIES</b>						
* <i>Bromus catharticus</i>		x				
* <i>Cortaderia jubata</i>	x					
* <i>Cortaderia selloana</i>	x					
* <i>Paspalum dilatatum</i>	x	x				
* <i>Paspalum urvillei</i>		x				
<i>Andropogon eucomus</i>	x	x			x	
<i>Carex mossii</i>		x				
<i>Carex spicatopaniculata</i>		x	x			Dominant and Characteristic species (Mucina et al, 2003)
<i>Chloris gayana</i>	x					
<i>Cymbopogon caesius</i>	x	x		x		
<i>Cymbopogon pospischilii</i>					x	
<i>Cynodon dactylon</i>	x			x	x	
<i>Cyperus albostratus</i>		x	x			Mpumalanga Mistbelt Forests. Dominant and Characteristic species (Mucina et al, 2003)
<i>Cyperus cyperoides</i>	x	x			x	
<i>Cyperus distans</i>			x	x		
<i>Cyperus esculentus</i> (thought to be exotic)	x	x		x		
<i>Cyperus glaucophyllus</i>		x	x	x		
<i>Cyperus keniensis</i>		x				
<i>Digitaria eriantha</i>	x			x		
<i>Eragrostis capensis</i>	x			x	x	
<i>Eragrostis gummiflua</i>		x				
<i>Eragrostis lehmanniana</i>				x		
<i>Eragrostis plana</i>	x				x	
<i>Eragrostis racemosa</i>				x		
<i>Heteropogon contortus</i>				x		
<i>Hyparrhenia filipendula</i>	x			x	x	
<i>Imperata cylindrica</i>	x				x	
<i>Loudetia simplex</i>				x		
<i>Melinis repens</i>	x			x		
<i>Oplismenus hirtellus</i>		x	x			Mpumalanga Mistbelt Forests. Dominant and Characteristic species (Mucina et al, 2003)
<i>Panicum deustum</i>	x	x		x		
<i>Panicum maximum</i>				x		
<i>Phragmites australis</i>		x				
<i>Setaria megaphylla</i>	x	x	x	x		Dominant and Characteristic species (Mucina et al, 2003)
<i>Setaria sphacelata</i>		x			x	
<i>Sporobolus africanus</i>	x					
<i>Sporobolus centrifugus</i>					x	
<i>Themeda triandra</i>	x			x		
<i>Tristachya leucothrix</i>	x			x		
<i>Urochloa mosambicensis</i>	x			x		



## APPENDIX C: Floral SCC

South Africa uses the internationally endorsed [IUCN Red List Categories and Criteria](#) in the Red List of South African plants. This scientific system is designed to measure species' risk of extinction. The purpose of this system is to highlight those species that are most urgently in need of conservation action. Due to its strong focus on determining risk of extinction, the IUCN system does not highlight species that are at low risk of extinction but may nonetheless be of high conservation importance. Because the Red List of South African plants is used widely in South African conservation practices such as systematic conservation planning or protected area expansion, we use an amended system of categories designed to highlight those species that are at low risk of extinction but of conservation concern.

### Definitions of the national Red List categories

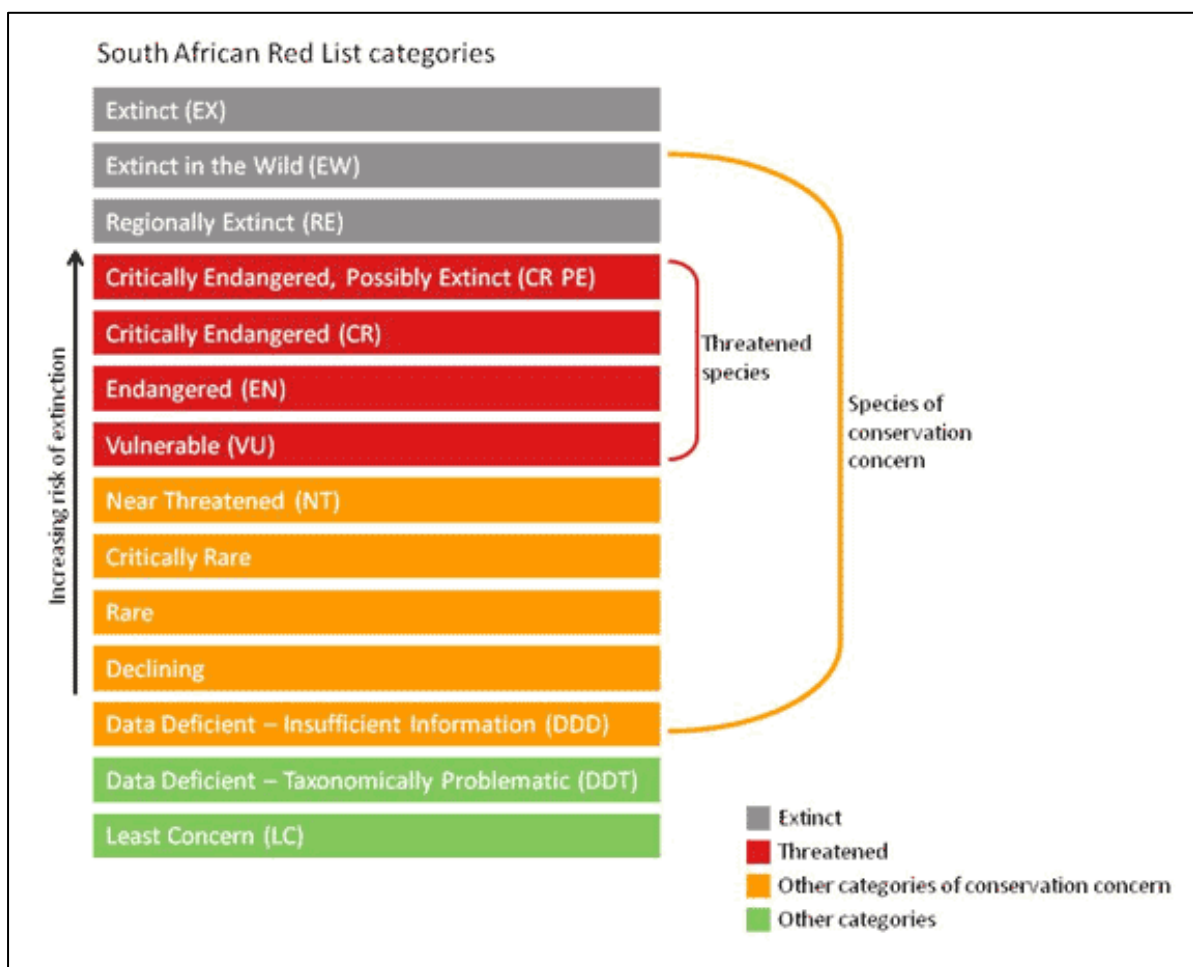
Categories marked with <sup>N</sup> are non-IUCN, national Red List categories for species not in danger of extinction but considered of conservation concern. The IUCN equivalent of these categories is Least Concern (LC).

- **Extinct (EX)** A species is Extinct when there is no reasonable doubt that the last individual has died. Species should be classified as Extinct only once exhaustive surveys throughout the species' known range have failed to record an individual.
- **Extinct in the Wild (EW)** A species is Extinct in the Wild when it is known to survive only in cultivation or as a naturalized population (or populations) well outside the past range.
- **Regionally Extinct (RE)** A species is Regionally Extinct when it is extinct within the region assessed (in this case South Africa), but wild populations can still be found in areas outside the region.
- **Critically Endangered, Possibly Extinct (CR PE)** Possibly Extinct is a special tag associated with the category Critically Endangered, indicating species that are highly likely to be extinct, but the exhaustive surveys required for classifying the species as Extinct has not yet been completed. A small chance remains that such species may still be rediscovered.
- **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.
- **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.
- **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.
- **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.
- <sup>N</sup>**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.
- <sup>N</sup>**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. The four criteria are as follows:
  - Restricted range: Extent of Occurrence (EOO) <500 km<sup>2</sup>, OR
  - Habitat specialist: Species is restricted to a specialized microhabitat so that it has a very small Area of Occupancy (AOO), typically smaller than 20 km<sup>2</sup>, OR
  - Low densities of individuals: Species always occurs as single individuals or very small subpopulations (typically fewer than 50 mature individuals) scattered over a wide area, OR
  - Small global population: Less than 10 000 mature individuals.
- **Least Concern (LC)** 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.



- **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.
- **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.
- **Not Evaluated (NE)** A species is Not Evaluated when it has not been evaluated against the criteria. The national Red List of South African plants is a comprehensive assessment of all South African indigenous plants, and therefore all species are assessed and given a national Red List status. However, some species included in [Plants of southern Africa: an online checklist](#) are species that do not qualify for national listing because they are naturalized exotics, hybrids (natural or cultivated), or synonyms. These species are given the status Not Evaluated and the reasons why they have not been assessed are included in the assessment justification.

### Threatened Species and Species of Conservation Concern



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

**Species of conservation concern** are species that have a 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, Declining and Data Deficient - Insufficient Information (DDD).



## POC for RDL Floral SCC obtained from BODATSA, the Online National Environmental Screening Tool as well as from the MTPA Species Status Report

**Table C1: Red Data Listed plant species historically recorded in the QDS 2430DC & 2430DD. Species list obtained from the new Plants of southern Africa (new POSA) online catalogue. Additional species were obtained from the Screening Tool as well as the MTPA Species Status<sup>13</sup> report. Information on species distributions and conservation status were derived from the Red List of South African Plants website (<http://redlist.sanbi.org/index.php>). POC Abbreviations: C = Confirmed, H = High, M = Medium, L = Low.**

Scientific Name	POC	Species Details	RSA	MTPA	Scientific Name	POC	Species Details	RSA	MTPA
<i>Adenia gummifera</i> var. <i>gummifera</i>	H	Not endemic to South Africa  <b>Provincial distribution:</b> Eastern Cape, KwaZulu-Natal, Limpopo, Mpumalanga. <b>Range:</b> Widespread in eastern Africa, from Somalia to Kei River mouth in the Eastern Cape, South Africa. <b>Major habitats:</b> Forest, Savanna. <b>Description:</b> Forested ravines, forest patches and forest margins, forest scrub, miombo woodland, savanna, dune forest, on stony slopes, termitaria and littoral bush, 0-1 800 m.  <b>Suitable habitat on site:</b> Indigenous Forest sub-unit, Riparian Forest sub-unit, and the Riparian Woodland sub-unit.	LC	D	<i>Helichrysum homilochrysum</i>	L	South African endemic  <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Mpumalanga Escarpment around Lydenburg, recorded from Mariepskop to Mac Mac between Graskop and Sabie. <b>Major habitats:</b> Grassland. <b>Description:</b> Cliff faces and ledges, 1350-1990 m.	Rare	-
<i>Alepidea amatymbica</i>	L	Not endemic to South Africa  <b>Range:</b> In its natural state <i>Alepidea amatymbica</i> is distributed along the Amathole Mountains in the Eastern Cape, extending north-eastwards to southern KwaZulu-Natal and along the eastern border of Lesotho, and northwards to the Free State, Swaziland, Mpumalanga, Limpopo and eastern Zimbabwe. <b>Description:</b> It is usually found in damp grassland near streams from 1 520 to 2 590 m altitude. It is common in the summer rainfall grasslands of southern Africa.	EN	VU	<i>Hesperantha brevicaulis</i>	L	South African endemic  <b>Provincial distribution:</b> Limpopo, Mpumalanga. <b>Range:</b> Eastern Mpumalanga Escarpment and the Wolkberg Mountains. <b>Major habitats:</b> Grassland.	Rare	Rare

<sup>13</sup> Information provided by the Mpumalanga Tourism and Parks Agency on Monday, 19 April 2021.





Scientific Name	POC	Species Details	RSA	MPA	Scientific Name	POC	Species Details	RSA	MPA
<b>Sensitive species 998</b>	M	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> Free State, KwaZulu-Natal, Limpopo, Mpumalanga.</p> <p><b>Range:</b> Widespread across the eastern highveld of Mpumalanga, the eastern Free State, and north-western KwaZulu-Natal. It occurs along the north and north-eastern borders of Lesotho and is also found in Swaziland, on the Eastern Highlands of Zimbabwe and the Chimanimani Mountains of Mozambique (Hutchinson, 2016).</p> <p><b>Major habitats:</b> Grassland.</p> <p><b>Description:</b> Forest margins, west and south facing mountain slopes and near drainage lines or islands within wetlands (Hutchinson 2016).</p> <p><b>Suitable habitat on site:</b> Woodland associated with Frankfort – west of the proposed footprint.</p>	EN	-	<i>Hesperantha bulbifera</i>	H	<p>South African endemic</p> <p><b>Provincial distribution:</b> Eastern Cape, KwaZulu-Natal, Limpopo, Mpumalanga.</p> <p><b>Range:</b> This species has a wide, but scattered distribution across the eastern summer rainfall areas, from the Soutpansberg in Limpopo to the Boschberg near Somerset East, Eastern Cape. It has not been recorded in KwaZulu-Natal but is likely to occur there.</p> <p><b>Description:</b> It is localized to ledges on wet cliffs and damp places in the spray of waterfalls.</p> <p><b>Suitable habitat on site:</b> Indigenous Forest and especially the Riparian Forest.</p>	LC	Rare
<i>Aloe albida</i>	L	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> Mpumalanga.</p> <p><b>Range:</b> <i>Aloe albida</i> has a restricted range in the mountains south of Barberton, Mpumalanga, extending to Malolotja in north-western Swaziland.</p> <p><b>Major habitats:</b> Barberton Montane Grassland, KaNgwane Montane Grassland.</p> <p><b>Description:</b> Montane mistbelt grassland, 1500-1800 m.</p>	NT	NT	<i>Hesperantha rupestris</i>	L	<p>South African endemic</p> <p><b>Provincial distribution:</b> Mpumalanga.</p> <p><b>Range:</b> Waterval Boven.</p> <p><b>Major habitats:</b> Grassland.</p>	DDD	DD



Scientific Name	POC	Species Details	RSA	MPA	Scientific Name	POC	Species Details	RSA	MPA
<i>Aloe fouriei</i>	L	<p>South African endemic</p> <p><b>Provincial distribution:</b> Limpopo, Mpumalanga.</p> <p><b>Range:</b> The distribution of <i>Aloe fouriei</i> is uncertain. According to Hardy and Glen (1985) and Glen and Hardy (2000), it is localized to the Abel Erasmus Pass near the southern border of Limpopo Province. Craib (2005) reports this species from dolomite bushveld in the Strydpoort Mountains south of Polokwane, as well as the Steelpoort area in Sekhukhune. Field observations collected by die Mpumalanga Parks and Tourism Agency records it from dolomite grassland in the Pilgrim's Rest district south of the Abel Erasmus Pass.</p> <p><b>Major habitats:</b> Pong Dolomite Mountain Bushveld, Northern Escarpment Dolomite Grassland, Sekhukhune Mountain Bushveld.</p> <p><b>Description:</b> It occurs in rocky areas in grasslands, either at the edges of large sheets of exposed dolomite, on cliff faces, or among large, tumbled rocks on the summits of hills, generally on south to east facing slopes.</p>	NT	NT	<i>Huperzia ophioglossoides</i>	H	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> Limpopo, Mpumalanga.</p> <p><b>Range:</b> Limpopo and Mpumalanga Drakensberg Escarpment, extending to central and tropical Africa, the Mascarene islands and Madagascar.</p> <p><b>Major habitats:</b> Forest.</p> <p><b>Description:</b> Epiphyte in mid- to high altitude mistbelt forests.</p> <p><b>Suitable habitat on site:</b> Indigenous Forest and Riparian Forest.</p>	LC	Rare
<b>Sensitive species 285</b>	L	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> Mpumalanga.</p> <p><b>Range:</b> This species has a restricted distribution along the eastern escarpment of Mpumalanga Province between the Blyde River Canyon and Piet Retief. It also occurs around Mankayane in western Swaziland.</p> <p><b>Major habitats:</b> Barberton Montane Grassland, KaNgwane Montane Grassland, Long Tom Pass Montane Grassland, Lydenburg Thornveld, Northern Escarpment Dolomite Grassland.</p> <p><b>Description:</b> It occurs in exposed, rocky sites with short grass on north- and northwest-facing slopes in dry highveld grassland.</p>	VU	VU	<i>Hypodematium crenatum</i>	L	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> Limpopo, Mpumalanga.</p> <p><b>Range:</b> Wolkberg, and Bourke's Luck Potholes to Sodwala in South Africa. Widespread but very rare in Africa, Madagascar and Asia.</p> <p><b>Major habitats:</b> Wolkberg Dolomite Grassland, Northern Escarpment Dolomite Grassland.</p> <p><b>Description:</b> Crevices on dolomite cliffs or in soil at the base of dolomite outcrops, from 1260-1600 m.</p>	VU	VU



Scientific Name	POC	Species Details	RSA	MPA	Scientific Name	POC	Species Details	RSA	MPA
<b>Sensitive species 1219</b>	L	<p>South African endemic</p> <p><b>Provincial distribution:</b> KwaZulu-Natal, Mpumalanga.</p> <p><b>Range:</b> This species occurs in scattered, isolated subpopulations across the Mpumalanga Highveld, from Dullstroom to Graskop, and southwards to Barberton and Wakkerstroom.</p> <p><b>Major habitats:</b> Steenkampsberg Montane Grassland, Wakkerstroom Montane Grassland, Long Tom Pass Montane Grassland, Paulpietersburg Moist Grassland.</p> <p><b>Description:</b> It occurs in seasonally moist, high altitude montane grasslands, 1800-2300 m.</p>	VU	-	<i>Hypoxis hemerocallidea</i>	M	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, North West.</p> <p><b>Range:</b> This species is widespread across northern and eastern South Africa, extending to Botswana, eSwatini (Swaziland) and Mozambique.</p> <p><b>Description:</b> It occurs in a wide range of habitats, including sandy hills on the margins of dune forests, open, rocky grassland, dry, stony, grassy slopes, mountain slopes and plateaus. It appears to be drought and fire tolerant.</p> <p><b>Suitable habitat on site:</b> Valley Habitat.</p>	LC	LC
<i>Aloe nubigena</i>	M	<p>South African endemic</p> <p><b>Provincial distribution:</b> Mpumalanga.</p> <p><b>Range:</b> This species is endemic to the edge of the Mpumalanga Drakensberg Escarpment between Mariepskop and Graskop.</p> <p><b>Major habitats:</b> Northern Escarpment Quartzite Sourveld.</p> <p><b>Description:</b> It is localized to the upper parts of steep south- to east-facing cliffs above forested gorges at the edge of the escarpment.</p> <p><b>Suitable habitat on site:</b> Woodland associated with Frankfort.</p>	Rare	NT	<i>Jamesbrittenia macrantha</i>	L	<p>South African endemic</p> <p><b>Provincial distribution:</b> Limpopo, Mpumalanga.</p> <p><b>Range:</b> Sekhukhuneland.</p>	NT	NT
<i>Argyrobium megarrhizum</i>	L	<p>South African endemic</p> <p><b>Provincial distribution:</b> Gauteng, Limpopo, Mpumalanga.</p> <p><b>Range:</b> Pretoria to Bronkhorstspuit.</p>	NT	NT	<i>Kalanchoe alticola</i>	L	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> Mpumalanga.</p> <p><b>Range:</b> Barberton to north-eastern Swaziland.</p>	DDD	DD
<i>Argyrobium muddii</i>	L	<p>South African endemic</p> <p><b>Provincial distribution:</b> Limpopo, Mpumalanga.</p> <p><b>Range:</b> Haenertsburg and Graskop.</p> <p><b>Major habitats:</b> Woodbush Granite Grassland, Northern Escarpment Quartzite Sourveld, Northern Escarpment Dolomite Grassland.</p> <p><b>Description:</b> Mistbelt Grassland.</p>	EN	EN	<i>Kniphofia rigidifolia</i>	L	<p>South African endemic</p> <p><b>Provincial distribution:</b> Mpumalanga.</p> <p><b>Description:</b> Grows in dense grass among dolerite rocks and on fertile soil beside streams in Mpumalanga at altitudes of 1 500-2 100 m.</p>	LC	Rare



Scientific Name	POC	Species Details	RSA	MPA	Scientific Name	POC	Species Details	RSA	MPA
<i>Aspidonepsis shebae</i>	L	South African endemic <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Mpumalanga Drakensberg upper escarpment between Mount Sheba and Mauchsberg, with a disjunct record from the mountains between Barberton and Swaziland. <b>Major habitats:</b> Long Tom Pass Montane Grassland, Barberton Montane Grassland, Rand Highveld Grassland. <b>Description:</b> High altitude montane grassland, 1400-2100 m.	VU	-	Sensitive species 311	L	South African endemic <b>Provincial distribution:</b> KwaZulu-Natal, Mpumalanga. <b>Range:</b> Mpumalanga Drakensberg Mountains and Ngome in KwaZulu-Natal. <b>Major habitats:</b> Grassland. <b>Description:</b> Quartzitic rocky outcrops in montane grasslands, 1200-2200 m.	Rare	Rare
<i>Boophone disticha</i>	L	Not endemic to South Africa <b>Provincial distribution:</b> Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West, Western Cape. <b>Range:</b> Throughout South Africa and up to Uganda. <b>Major habitats:</b> Albany Thicket, Fynbos, Grassland, Indian Ocean Coastal Belt, Nama Karoo, Savanna, Succulent Karoo. <b>Description:</b> Dry grassland and rocky areas.	LC	LC	<i>Kniphofia typhoides</i>	L	South African endemic <b>Provincial distribution:</b> Gauteng, Limpopo, Mpumalanga, North West. <b>Range:</b> Parys to Lydenburg to Paulpietersburg to Newcastle. <b>Major habitats:</b> Grassland. <b>Description:</b> Low lying wetlands and seasonally wet areas in climax Themeda triandra grasslands on heavy black clay soils, tends to disappear from degraded grasslands.	NT	NT
Sensitive species 1248	M	Not endemic to South Africa <b>Provincial distribution:</b> Eastern Cape, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga. <b>Range:</b> Eastern Cape to Limpopo Province. Widespread elsewhere in southern and eastern Africa. <b>Description:</b> Low and medium altitudes, usually along mountain ranges and in thickly vegetated river valleys, often under bush clumps and in boulder screes, sometimes found scrambling at the margins of karroid, succulent bush in the Eastern Cape. Occurs in bushy kloofs at the coast and inland in KwaZulu-Natal. In Gauteng, Mpumalanga and North West Province it is often found in open woodland or on steep rocky hills usually in well-shaded situations. Tolerates wet and dry conditions, growing predominantly in summer rainfall areas with an annual rainfall of 200-800 mm. <b>Suitable habitat on site:</b> Woodland associated with Frankfort.	VU	-	<i>Ledebouria parvifolia</i>	L	South African endemic <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Graskop district. <b>Major system:</b> Terrestrial <b>Major habitats:</b> Grassland. <b>Description:</b> Dolomite of the Malmani Formation in the Chuniespoort Group.	DDD	DD





Scientific Name	POC	Species Details	RSA	MPA	Scientific Name	POC	Species Details	RSA	MPA
<b>Sensitive species 644</b>	L	South African endemic <b>Provincial distribution:</b> Limpopo, Mpumalanga. <b>Range:</b> Wolkberg to Graskop. <b>Major habitats:</b> Wolkberg Dolomite Grassland, Northern Escarpment Dolomite Grassland. <b>Description:</b> Shallow pockets of dolomite, tolerating both open and shady conditions.	VU	VU	<b>Sensitive species 411</b>	L	South African endemic <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Mpumalanga Escarpment, Blyde River Canyon to Kaapsehoop. <b>Major habitats:</b> Long Tom Pass Montane Grassland, Northern Escarpment Quartzite Sourveld <b>Description:</b> Shallow, grey sandy soils in Black Reef Quartzite grasslands.	VU	VU
<b>Sensitive species 1054</b>	L	South African endemic <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Steenkampsberg, Ohrigstad Dam Nature Reserve and Long Tom Pass.	Rare	Rare	<i>Lobelia trullifolia subsp. delicatula</i>	L	Not endemic to South Africa <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Swaziland and Graskop. <b>Major habitats:</b> Grassland. <b>Description:</b> Damp, sheltered areas among rocks.	Rare	Rare
<i>Callilepis leptophylla</i>	M	Not endemic to South Africa <b>Provincial distribution:</b> Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga. <b>Range:</b> Widespread in eastern half of South Africa. Also in Swaziland. <b>Major habitats:</b> Grassland, Savanna. <b>Suitable habitat on site:</b> Woodland associated with Frankfort.	LC	D	<b>Sensitive species 104</b>	L	Not endemic to South Africa <b>Provincial distribution:</b> KwaZulu-Natal, Limpopo. <b>Range:</b> From Guinea-Bissau through tropical Africa to KwaZulu-Natal.	EN	-
<i>Clivia caulescens</i>	H	Not endemic to South Africa <b>Provincial distribution:</b> Limpopo, Mpumalanga. <b>Range:</b> Limpopo Province to Swaziland. <b>Major habitats:</b> Forest. <b>Description:</b> Forest patches and forest margins. <b>Suitable habitat on site:</b> Indigenous Forest sub-unit.	NT	NT	<i>Melinis drakensbergensis</i>	Uncertain	South African endemic <b>Provincial distribution:</b> Mpumalanga. <b>Major system:</b> Terrestrial.	DDT	DD



Scientific Name	POC	Species Details	RSA	MTPA	Scientific Name	POC	Species Details	RSA	MTPA
<b>Sensitive species 880</b>	H	<p>South African endemic</p> <p><b>Provincial distribution:</b> Mpumalanga.  <b>Range:</b> Mpumalanga Drakensberg Escarpment, Mariepskop to Mac Mac.  <b>Major habitats:</b> Northern Escarpment Quartzite Sourveld, Scarp Forest, Northern Mistbelt Forest.  <b>Description:</b> Damp, shady places along streams and forest margins.</p> <p><b>Suitable habitat on site:</b>                      Indigenous Forest sub-unit, Riparian Forest and Riparian Woodland sub-units.</p>	VU	VU	<b><i>Merwillia plumbea</i></b> (= <i>Scilla natalensis</i> )	H	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> KwaZulu-Natal, Mpumalanga.  <b>Range:</b> Widespread in eastern half of South Africa. Also in Swaziland and Lesotho.  <b>Major habitats:</b> Grassland.  <b>Description:</b> Montane mistbelt and Ngongoni grassland, rocky areas on steep, well drained slopes. 300-2500 m.</p> <p><b>Suitable habitat on site:</b>                      Valley Habitat within the rocky outcrops along the Morgenzon proposed Haul Road.</p>	NT	NT
<b><i>Cryptocarya transvaalensis</i></b>	H	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> Limpopo, Mpumalanga.  <b>Range:</b> Occurs along the eastern Escarpment, from Swaziland to the Wolkberg Mountains and also the Soutpansberg Mountains, and northwards to tropical Africa.  <b>Major habitats:</b> Forest.  <b>Description:</b> Limited to Afromontane forests up to 1700 m.</p> <p><b>Suitable habitat on site:</b>                      Indigenous Forest sub-unit.</p>	LC	D	<b><i>Monopsis kowynensis</i></b>	M	<p>South African endemic</p> <p><b>Provincial distribution:</b> Mpumalanga.  <b>Range:</b> Mariepskop to Graskop and the Long Tom Pass.  <b>Major habitats:</b> Long Tom Pass Montane Grassland, Northern Escarpment Afromontane Fynbos.  <b>Description:</b> Along forest margins in mistbelt grassland.</p> <p><b>Suitable habitat on site:</b>                      Margins of Indigenous Forest and Woodland.</p>	VU	VU
<b><i>Curtisia dentata</i></b>	H	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga.  <b>Range:</b> Cape Peninsula to the Zimbabwe-Mozambique highlands.  <b>Major habitats:</b> Forest.  <b>Description:</b> Evergreen forest from coast to 1800 m.</p> <p><b>Suitable habitat on site:</b>                      Indigenous Forest sub-unit.</p>	NT	NT	<b><i>Ocotea bullata</i></b>	M	<p>South African endemic</p> <p><b>Provincial distribution:</b> Eastern Cape, KwaZulu-Natal, Limpopo, Mpumalanga, Western Cape.  <b>Range:</b> Widespread in South Africa from the Cape Peninsula to the Wolkberg Mountains in Limpopo.  <b>Major habitats:</b> Northern Coastal Forest, Southern Coastal Forest, Scarp Forest, Northern Mistbelt Forest, Southern Mistbelt Forest, Northern Afrotropical Forest, Southern Afrotropical Forest.  <b>Description:</b> High, cool, evergreen Afromontane forests.</p> <p><b>Suitable habitat on site:</b>                      Indigenous Forest of Frankfort and Morgenzon, but likely deeper into the forests.</p>	EN	EN



Scientific Name	POC	Species Details	RSA	MPA	Scientific Name	POC	Species Details	RSA	MPA
<i>Cymbopappus piliferus</i>	L	<p>South African endemic</p> <p><b>Provincial distribution:</b> Mpumalanga.</p> <p><b>Range:</b> Ohrigstad to Belfast.</p> <p><b>Major habitats:</b> Long Tom Pass Montane Grassland, Steenkampsberg Montane Grassland.</p> <p><b>Description:</b> Rocky quartzitic ridges in montane grassland.</p>	VU	VU	<i>Ocotea kenyensis</i>	M	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> Eastern Cape, KwaZulu-Natal, Limpopo, Mpumalanga.</p> <p><b>Range:</b> Eastern Cape through KwaZulu-Natal, Mpumalanga and Limpopo Provinces and into Swaziland, Zimbabwe, Mozambique, Tanzania and Kenya.</p> <p><b>Major habitats:</b> Scarp Forest, Northern Mistbelt Forest, Northern Afrotropical Forest.</p> <p><b>Description:</b> Scarp and Mistbelt Forest.</p> <p><b>Suitable habitat on site:</b> Indigenous Forest of Frankfort and Morgenzon, but likely deeper into the forests.</p>	VU	VU
<i>Cyrtanthus huttonii</i>	L	<p>South African endemic</p> <p><b>Provincial distribution:</b> Eastern Cape, Mpumalanga.</p>	LC	Rare	<i>Olinia huillensis</i> subsp. <i>burttdavii</i>	M	<p>South African endemic</p> <p><b>Provincial distribution:</b> Limpopo, Mpumalanga.</p> <p><b>Range:</b> Eastern escarpment of South Africa from Tzaneen to Lydenburg.</p> <p><b>Major habitats:</b> Scarp Forest, Northern Mistbelt Forest, Northern Afrotropical Forest.</p> <p><b>Description:</b> Windswept rocky outcrops in the high-altitude mistbelt.</p> <p><b>Suitable habitat on site:</b> Indigenous Forest</p>	VU	-
<b>Sensitive species 1252</b>	H	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Western Cape.</p> <p><b>Range:</b> Western Cape, Eastern Cape, KwaZulu-Natal, Free State, Gauteng, Mpumalanga, Limpopo Province, Swaziland, Zimbabwe and Zambia.</p> <p><b>Description:</b> Wooded and relatively mesic places, such as the moister bushveld areas, coastal bush and wooded mountain kloofs.</p> <p><b>Suitable habitat on site:</b> Indigenous Forest sub-unit, Riparian Forest and Riparian Woodland sub-units.</p>	VU	VU	<b>Sensitive species 541</b>	L	<p>South African endemic</p> <p><b>Provincial distribution:</b> Limpopo.</p> <p><b>Range:</b> Bewaarkloof to Abel Erasmus Pass to Blyde River Canyon.</p> <p><b>Major habitats:</b> Forest.</p> <p><b>Description:</b> In accumulated litter on the floor of dry forest on south-facing slopes, also on cliffs and rocky outcrops, wedged in crevices.</p>	Rare	-



Scientific Name	POC	Species Details	RSA	MPA	Scientific Name	POC	Species Details	RSA	MPA
<i>Disa rungweensis</i> (now <i>D. zimbabwensis</i> )	L	Not endemic to South Africa <b>Provincial distribution:</b> Mpumalanga. <b>Description:</b> Montane grassland	LC	Rare	<b>Sensitive species 1026</b>	L	South African endemic <b>Provincial distribution:</b> Limpopo, Mpumalanga. <b>Range:</b> Olifants River Valley around Penge to the Blyde River Canyon and Graskop. <b>Major habitats:</b> Ohrigstad Mountain Bushveld, Pong Dolomite Mountain Bushveld, Northern Escarpment Dolomite Grassland <b>Description:</b> Shaded rock crevices in dolomite grassland and bushveld	Rare	Rare
<i>Disa extinctoria</i>	L	Not endemic to South Africa <b>Provincial distribution:</b> Limpopo, Mpumalanga. <b>Range:</b> Swaziland to Tzaneen. <b>Major habitats:</b> Grassland. <b>Description:</b> Crest of the escarpment in damp grassland and swamps, 1000-1300 m.	NT	NT	<i>Pentatrichia alata</i>	M	South African endemic <b>Provincial distribution:</b> Limpopo, Mpumalanga. <b>Range:</b> Pilgrim's Rest, Abel Erasmus Pass and Wolkberg Mountains. <b>Major habitats:</b> Grassland, Savanna. <b>Description:</b> Grassland or savanna, on rocky slopes and sandy ground.  <b>Suitable habitat on site:</b> Frankfort Woodlands (west of the footprint).	DDD	DD
<i>Disa maculomarronina</i>	L	South African endemic <b>Provincial distribution:</b> KwaZulu-Natal, Mpumalanga. <b>Range:</b> Wakkerstroom and the Mpumalanga Escarpment around Graskop. <b>Major habitats:</b> Grassland. <b>Description:</b> Swamps, montane grassland on the edges of Black Reef Quartzite, 1500-1700 m.	NT	NT	<i>Protea parvula</i>	L	Not endemic to South Africa <b>Provincial distribution:</b> KwaZulu-Natal, Mpumalanga. <b>Range:</b> Drakensberg Escarpment in Swaziland, Mpumalanga and KwaZulu-Natal from Mariepskop to Vryheid. <b>Major habitats:</b> Grassland.	NT	NT





Scientific Name	POC	Species Details	RSA	MTPA	Scientific Name	POC	Species Details	RSA	MTPA
<i>Drimia robusta</i> (NOW <i>Drimia elata</i> )	L	Not endemic to South Africa <b>Provincial distribution:</b> Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West. <b>Description:</b> In grassland, often among rocks.	DDT	Muthi	<i>Prunus africana</i>	H	Not endemic to South Africa <b>Provincial distribution:</b> Eastern Cape, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, North West. <b>Range:</b> Widespread in Africa from the southern Cape, through KwaZulu-Natal, Swaziland and northwards into Zimbabwe and central Africa and the islands of Madagascar and Comoros. <b>Major habitats:</b> Eastern Valley Bushveld, Gold Reef Mountain Bushveld, Ohrigstad Mountain Bushveld, Pong Dolomite Mountain Bushveld, Mamabolo Mountain Bushveld, Soutpansberg Mountain Bushveld, Northern Coastal Forest, Scarp Forest, Northern Mistbelt Forest, Southern Mistbelt Forest, Northern Afrotemperate Forest <b>Description:</b> Evergreen forests near the coast, inland mistbelt forests and afrotemperate forests up to 2100 m. <b>Suitable habitat on site:</b> Indigenous Forest of Frankfort and Morgenzon, as well as Riparian Forest.	VU	VU
<i>Drimiopsis davidsoniae</i> (now = <i>Ledebouria davidsoniae</i> )	L	South African endemic <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Blyde River Canyon Nature Reserve. <b>Major habitats:</b> Northern Escarpment Quartzite Sourveld, Lydenburg Thornveld. <b>Description:</b> Rocky slopes.	VU	VU	<i>Scabiosa transvaalensis</i>	H	South African endemic <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Pilgrim's Rest to the Blyde River Canyon. <b>Major habitats:</b> Scarp Forest, Northern Mistbelt Forest. <b>Description:</b> Riverine forest, scarp forest or grassy slopes near forest margins. <b>Suitable habitat on site:</b> Indigenous Forest of Frankfort and Morgenzon, as well as Riparian Forest.	VU	-
<i>Erica atherstonei</i>	L	South African endemic <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Pilgrim's Rest to Buffelskloof. <b>Major habitats:</b> Grassland. <b>Description:</b> Rocky areas (quartzite) in montane grassland at edge of escarpment or on steep slopes, occasionally in moist areas, 1500-2500 m.	NT	NT	<i>Schizochilus cecilii</i> subsp. <i>culveri</i>	L	Not endemic to South Africa <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Barberton to Mbabane. <b>Major habitats:</b> Grassland. <b>Description:</b> Damp rock ledges on steep slopes, grassland.	Rare	-



Scientific Name	POC	Species Details	RSA	MPA	Scientific Name	POC	Species Details	RSA	MPA
<i>Erica holtii</i>	L	South African endemic <b>Provincial distribution:</b> KwaZulu-Natal, Limpopo, Mpumalanga.	LC	Rare	<i>Schizochilus crenulatus</i>	L	South African endemic <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Mariepskop to Graskop. <b>Major habitats:</b> Northern Escarpment Quartzite Sourveld. <b>Description:</b> Edges of flat Black Reef Quartzite rock flushes, in damp to wet conditions, and often in moss, substrate rarely deeper than 10 mm.	VU	VU
<i>Erica rivularis</i>	L	South African endemic <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Blyde River Canyon and Graskop. <b>Major habitats:</b> Northern Escarpment Quartzite Sourveld. <b>Description:</b> Margins of clear, high altitude perennial streams over quartzitic rocks.	EN	EN	<i>Schizochilus lilacinus</i>	L	South African endemic <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Between Lydenburg and Graskop. <b>Major habitats:</b> Grassland. <b>Description:</b> Occurs among rocks or on narrow ledges on steep rocky slopes in damp areas. 1600-2300 m.	Rare	Rare
<i>Erica subverticillaris</i>	L	South African endemic <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Long Tom Pass. <b>Major habitats:</b> Long Tom Pass Montane Grassland, Northern Escarpment Quartzite Sourveld, Lydenburg Thornveld. <b>Description:</b> High altitude, short grassland, among rocky outcrops on mountain summits, 1900-2200 m.	VU	VU	<i>Senecio hederiformis (was Cineraria)</i>	L	South African endemic <b>Provincial distribution:</b> Limpopo, Mpumalanga. <b>Range:</b> Blouberg and Graskop. <b>Major habitats:</b> Grassland. <b>Description:</b> Cracks of quartzite rock faces in mistbelt.	Rare	Rare
<i>Eucomis autumnalis</i>	M	Not endemic to South Africa <b>Provincial distribution:</b> Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West. <b>Range:</b> South Africa, Swaziland, Lesotho, Botswana, Zimbabwe and Malawi. <b>Major habitats:</b> Grassland. <b>Description:</b> Damp, open grassland and sheltered places from the coast to 2450 m. <b>Suitable habitat on site:</b> Valley Habitat.	LC	D	<i>Senecio latissimifolius</i>	Unlikely	South African endemic <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Pilgrim's Rest. <b>Major habitats:</b> Grassland. <b>Description:</b> Unknown.	DDD	DD



Scientific Name	POC	Species Details	RSA	MPA	Scientific Name	POC	Species Details	RSA	MPA
<i>Eucomis autumnalis</i> sp nova - dwarf	L	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West.</p> <p><b>Range:</b> South Africa, Swaziland, Lesotho, Botswana, Zimbabwe and Malawi.</p> <p><b>Major habitats:</b> Grassland.</p> <p><b>Description:</b> Damp, open grassland and sheltered places from the coast to 2450 m.</p> <p><b>Suitable habitat on site:</b> Valley Habitat.</p>	D	D	<i>Streptocarpus actinoflorus</i>	M	<p>South African endemic</p> <p><b>Provincial distribution:</b> Limpopo, Mpumalanga.</p> <p><b>Range:</b> Mariepskop to Blyde.</p> <p><b>Major habitats:</b> Northern Escarpment Quartzite Sourveld, Northern Escarpment Dolomite Grassland, Scarp Forest, Northern Mistbelt Forest.</p> <p><b>Description:</b> Ecotone between grassland and dry mistbelt forest and in south-facing grassland areas.</p> <p><b>Suitable habitat on site:</b> Ecotone between the Franfort and Morgenzon Indigenous Forests and adjacent Montane Grasslands (not within the footprint areas).</p>	EN	EN
<i>Eucomis montana</i>	L	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> Mpumalanga</p> <p><b>Range:</b> Mpumalanga and Swaziland.</p> <p><b>Major habitats:</b> Grassland.</p> <p><b>Description:</b> Rocky montane grassland.</p>	LC	D	<i>Streptocarpus decipiens</i>	L	<p>South African endemic</p> <p><b>Provincial distribution:</b> Mpumalanga.</p> <p><b>Range:</b> Mariepskop to Graskop.</p> <p><b>Major habitats:</b> Grassland.</p> <p><b>Description:</b> Grows under shallow overhangs of sandstone outcrops on grass slopes, more rarely it grows in horizontal cracks towards the base of larger cliffs.</p>	Rare	Rare
<i>Eucomis pallidiflora</i> (= <i>E. pole-evansii</i> )	L	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> Mpumalanga.</p> <p><b>Range:</b> Pilgrim's Rest and Lydenburg to Swaziland to southern Mpumalanga.</p> <p><b>Major habitats:</b> Grassland.</p> <p><b>Description:</b> Wetlands in grassland, often in standing water up to 300 mm deep.</p>	NT	NT	<i>Streptocarpus fenestralis</i>	M	<p>South African endemic</p> <p><b>Provincial distribution:</b> Mpumalanga.</p> <p><b>Range:</b> God's Window to Bourke's Luck mine.</p> <p><b>Major habitats:</b> Northern Escarpment Quartzite Sourveld, Scarp Forest, Northern Mistbelt Forest.</p> <p><b>Description:</b> Shallow soils in rocky areas in forested gullies.</p> <p><b>Suitable habitat on site:</b> Franfort and Morgenzon Indigenous Forests.</p>	VU	VU
<i>Eulophia zeyheriana</i>	L	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> Eastern Cape, KwaZulu-Natal, Mpumalanga.</p> <p><b>Description:</b> Found in Cape Province, Swaziland, Natal and Transvaal South Africa in high altitude sour grasslands at elevations of 1000 to 2200 meters.</p>	LC	Rare	<i>Thesium inversum</i>	Uncertain	<p>South African endemic</p> <p><b>Provincial distribution:</b> Mpumalanga.</p> <p><b>Major system:</b> Terrestrial.</p>	DDT	DD



Scientific Name	POC	Species Details	RSA	MPA	Scientific Name	POC	Species Details	RSA	MPA
<i>Faurea macnaughtonii</i>	M - H	<p>Not endemic to South Africa</p> <p><b>Provincial distribution:</b> Eastern Cape, KwaZulu-Natal, Mpumalanga, Western Cape</p> <p><b>Range:</b> This species is widespread across eastern South Africa, from the Wolkberg in Limpopo Province southwards to the Amathole Mountains in the Eastern Cape. An isolated subpopulation occurs in the southern Cape forests around Knysna. It also occurs in eSwatini (Swaziland).</p> <p><b>Major habitats:</b> Scarp Forest, Northern Mistbelt Forest, Northern Afrotropical Forest, Southern Afrotropical Forest.</p> <p><b>Description:</b> This species occurs deep inside mature forest, from near sea level up to 2000 m. Dispersal is limited, with seeds typically falling from the canopy to the forest floor, and therefore this species is prone to fragmentation. It is pollinated by bees.</p> <p><b>Suitable habitat on site:</b> Indigenous Forest associated with Frankfort and Morgenzenon, but nowhere close to the proposed footprints.</p>	Rare	Rare	<i>Thesium subsimile</i>	L	<p>South African endemic</p> <p><b>Provincial distribution:</b> Mpumalanga.</p> <p><b>Range:</b> Dullstroom.</p> <p><b>Major habitats:</b> Grassland.</p> <p><b>Description:</b> Inundated grassland, 1600-200 m.</p>	DDD	DD
<i>Gladiolus calcaratus</i>	L	<p>South African endemic</p> <p><b>Provincial distribution:</b> Mpumalanga.</p> <p><b>Range:</b> Mpumalanga Highveld, between Dullstroom, Pilgrim's Rest and Lydenburg.</p> <p><b>Description:</b> Grassy mountain slopes, in deeper soils in wet sites or around the edges of damp depressions. 2100-2400 m.</p>	LC	VU	<b>Sensitive species 86</b>	L	<p>South African endemic</p> <p><b>Provincial distribution:</b> Mpumalanga.</p> <p><b>Range:</b> Mariepskop to Mount Sheba and Graskop.</p> <p><b>Major habitats:</b> Long Tom Pass Montane Grassland, Northern Escarpment Quartzite Sourveld.</p> <p><b>Description:</b> Montane grassland, on damp, shallow soils over sheet rocks or in open grassland.</p>	Rare	Rare
<i>Gladiolus rufomarginatus</i>	L	<p>South African endemic</p> <p><b>Provincial distribution:</b> Mpumalanga.</p> <p><b>Range:</b> Lydenburg to Ohrigstad.</p> <p><b>Major habitats:</b> Grassland.</p>	Rare	Rare	<i>Wahlenbergia serpentina</i>	L	<p>South African endemic</p> <p><b>Provincial distribution:</b> Western Cape.</p> <p><b>Major system:</b> Terrestrial.</p>	DDT	DD





Scientific Name	POC	Species Details	RSA	MTPA	Scientific Name	POC	Species Details	RSA	MTPA
<i>Gladiolus saxatilis</i>	L	South African endemic <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Mariepskop to Graskop. <b>Major habitats:</b> Grassland.	Rare	Rare	<b>Sensitive species 738</b>	H	Not endemic to South Africa <b>Provincial distribution:</b> KwaZulu-Natal, Limpopo, Mpumalanga. <b>Range:</b> North-eastern KwaZulu-Natal, Mpumalanga and Limpopo Province. Also occurs in Swaziland, Mozambique and Zimbabwe and Malawi. <b>Major habitats:</b> Maputaland Pallid Sandy Bushveld, Zululand Lowveld, Kaalrug Mountain Bushveld, Ohrigstad Mountain Bushveld, Pong Dolomite Mountain Bushveld, Soutpansberg Mountain Bushveld, Ironwood Dry Forest, Sand Forest, Northern Coastal Forest, Scarp Forest, Northern Mistbelt Forest, Northern Afrotropical Forest, Lowveld Riverine Forest <b>Description:</b> Variable, including coastal, riverine, dune and montane forest as well as open woodland and thickets. <b>Suitable habitat on site:</b> Indigenous Forests of Frankfort and Mprgenzon, as well as Woodland of Frankfort.	EN	EN
<i>Gnidia variabilis</i>	L	South African endemic <b>Provincial distribution:</b> Mpumalanga. <b>Range:</b> Lydenburg. <b>Major habitats:</b> Steenkampsberg Montane Grassland, Northern Escarpment Dolomite Grassland. <b>Description:</b> Well-drained grassland, 900-1800 m.	VU	VU	<i>Watsonia strubeniae</i>	L	South African endemic <b>Provincial distribution:</b> Limpopo, Mpumalanga.	LC	LC
<i>Gunnera perpensa</i>	L	Not endemic to South Africa <b>Provincial distribution:</b> Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West, Western Cape. <b>Range:</b> Western Cape to Ethiopia. <b>Major habitats:</b> Albany Thicket, Fynbos, Grassland, Indian Ocean Coastal Belt, Nama Karoo, Savanna. <b>Description:</b> Damp marshy area and vleis from coast to 2400 m.	LC	D	<i>Zantedeschia pentlandii</i>	L	South African endemic <b>Provincial distribution:</b> Limpopo, Mpumalanga. <b>Range:</b> Roossenekal to Dullstroom. <b>Major habitats:</b> Sekhukhune Mountain Bushveld, Steenkampsberg Montane Grassland, Sekhukhune Montane Grassland <b>Description:</b> Rocky hillsides.	VU	VU



Scientific Name	POC	Species Details	RSA	MTPA	Scientific Name	POC	Species Details	RSA	MTPA
<i>Habenaria mossii</i> sp. nov. aff. <i>mossii</i>	L	South African endemic  <b>Provincial distribution:</b> Gauteng, North West. <b>Range:</b> Johannesburg, Pretoria and Krugersdorp. <b>Major habitats:</b> Andesite Mountain Bushveld, Carletonville Dolomite Grassland <b>Description:</b> Open grassland on dolomite or in black, sandy soil.	EN	-					

\*DDD = Data Deficient - Insufficient Information; DDT = Data Deficient - Taxonomically Problematic; EN = Endangered; LC = Least Concern; VU = Vulnerable.



## NEMBA TOPS List for South Africa<sup>14</sup>

**Table C2: TOPS list for South Africa – plant species.**

NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	Common Name	POC	Provincial Distribution	Status
<i>Adenia wilmsii</i>	No common name	Medium	<b>Provincial distribution:</b> Mpumalanga <b>Range:</b> Lydenburg to Waterval Boven <b>Description:</b> Dolerite outcrops or red loam soil, in open woodland, 1300-1500 m.  <b>Suitable habitat on site:</b> Woodlands (where more grassy and along rocky slopes)	EN; P
<i>Adenium swazicum</i>	Swaziland Impala Lily	Low	<b>Provincial distribution:</b> Mpumalanga <b>Range:</b> Kruger National Park to Swaziland along the Lebombo Mountains and adjacent areas in south-western Mozambique.	VU
<i>Aloe albida</i>	Grass Aloe	Low	<b>Provincial distribution:</b> Mpumalanga <b>Range:</b> <i>Aloe albida</i> has a restricted range in the mountains south of Barberton, Mpumalanga, extending to Malolotja in north-western Swaziland.	NT
<i>Aloe pillansii</i> (now <i>Aloidendron pillansii</i> )	False Quiver Tree	Low	<b>Provincial distribution:</b> Northern Cape <b>Range:</b> Richtersveld and southern Namibia.	EN
<i>Aloe simii</i>	No common name	Low	<b>Provincial distribution:</b> Mpumalanga <b>Range:</b> This species is endemic to a small area in the transition area between the Mpumalanga Lowveld and Escarpment, where it occurs from Sabie southwards to White River and around Nelspruit. <b>Description:</b> It occurs along drainage lines and in wetlands in open woodland and grassland, 600-1100 m.	EN; P
<i>Clivia mirabilis</i>	"Oorlogskloof" Bush Lily	Low	<b>Provincial distribution:</b> Northern Cape, Western Cape	VU; P
<i>Diaphanante millarii</i>	Tree Orchid	Low	<b>Provincial distribution:</b> Eastern Cape, KwaZulu-Natal <b>Range:</b> East London and Durban.	VU
<i>Disa macrostachya</i>	No common name	Low	<b>Provincial distribution:</b> Northern Cape	EN; P
<i>Disa nubigena</i>	No common name	Low	<b>Provincial distribution:</b> Western Cape	Rare; P
<i>Disa physodes</i>	No common name	Low	<b>Provincial distribution:</b> Western Cape	CR; P
<i>Disa procera</i>	No common name	Low	<b>Provincial distribution:</b> Western Cape	EN; P
<i>Disa sabulosa</i>	No common name	Low	<b>Provincial distribution:</b> Western Cape	EN; P
<i>Encephalartos aemulans</i>	Ngotshe Cycad	Low	<b>Provincial distribution:</b> KwaZulu-Natal	CR
<i>Encephalartos altensteinii</i>	Bread Palm	Low	<b>Provincial distribution:</b> Eastern Cape, KwaZulu-Natal	VU; P
<i>Encephalartos arenarius</i>	Dune Cycad	Low	<b>Provincial distribution:</b> Eastern Cape	EN
<i>Encephalartos brevifoliolatus</i>	Escarpment Cycad	Low	<b>Provincial distribution:</b> Limpopo	EW
<i>Encephalartos caffer</i>	Breadfruit Tree	Low	<b>Provincial distribution:</b> Eastern Cape, KwaZulu-Natal	NT; P

<sup>14</sup> National Environmental Management: Biodiversity Act 10 of 2004 - Threatened or Protected Species Regulations, 2007. Government Notice R152 in Government Gazette 29657 dated 23 February 2007. Commencement date: 1 June 2007 [GN R150, Gazette no. 29657], as amended.



NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	Common Name	POC	Provincial Distribution	Status
<i>Encephalartos cerinus</i>	Waxen Cycad	Low	Provincial distribution: KwaZulu-Natal	CR
<i>Encephalartos cupidus</i>	Blyde River Cycad	Low	Provincial distribution: Limpopo, Mpumalanga Description: Grassland, on steep, rocky slopes or cliffs and sometimes near seepage areas bordering gallery forests.	CR
<i>Encephalartos dolomiticus</i>	Wolkberg Cycad	Low	Provincial distribution: Limpopo	CR
<i>Encephalartos dyerianus</i>	Lowveld Cycad	Low	Provincial distribution: Limpopo	CR; P
<i>Encephalartos eugene-maraisii</i>	Waterberg Cycad	Low	Provincial distribution: Limpopo	EN
<i>Encephalartos friderici-guilielmi</i>	No common name	Low	Provincial distribution: Eastern Cape, KwaZulu-Natal	NT; P
<i>Encephalartos ghellinckii</i>	No common name	Low	Provincial distribution: Eastern Cape, KwaZulu-Natal	VU; P
<i>Encephalartos heenanii</i>	Woolly Cycad	Low	Provincial distribution: Mpumalanga Description: Open areas of montane grasslands amidst scarp forest in deep valleys and ravines.	CR
<i>Encephalartos hirsutus</i>	Venda Cycad	Low	Provincial distribution: Limpopo	CR
<i>Encephalartos horridus</i>	Eastern Cape Blue Cycad	Low	Provincial distribution: Eastern Cape	EN
<i>Encephalartos humilis</i>	No common name	Low	Provincial distribution: Mpumalanga Description: Montane and mistbelt grassland, rocky sandstone slopes.	VU; P
<i>Encephalartos inopinus</i>	Lydenburg Cycad	Low	Provincial distribution: Limpopo	CR
<i>Encephalartos laevifolius</i>	Kaapsehoop Cycad	Low	Provincial distribution: Eastern Cape, KwaZulu-Natal, Limpopo, Mpumalanga Description: Steep, rocky slopes in mistbelt grassland, 1300-1500 m.	CR
<i>Encephalartos lanatus</i>	No common name	Low	Provincial distribution: Gauteng and western Mpumalanga Description: Sheltered, wooded ravines in sandstone ridges, 1200-1500 m.	NT; P
<i>Encephalartos latifrons</i>	Albany Cycad	Low	Provincial distribution: Eastern Cape	CR
<i>Encephalartos lebomboensis</i>	Lebombo Cycad	Low	Provincial distribution: KwaZulu-Natal, Mpumalanga Description: Cliffs and rocky ravines in savanna and grassland.	EN
<i>Encephalartos lehmannii</i>	No common name	Low	Provincial distribution: Eastern Cape	NT; P
<i>Encephalartos longifolius</i>	No common name	Low	Provincial distribution: Eastern Cape	NT; P
<i>Encephalartos middelburgensis</i>	Middelburg Cycad	Low	Provincial distribution: Gauteng, Mpumalanga Description: Open grasslands and in sheltered valleys.	CR
<i>Encephalartos msinganus</i>	Msinga, Cycad	Low	Provincial distribution: KwaZulu-Natal	CR
<i>Encephalartos natalensis</i>	Natal Giant Cycad	Low	Provincial distribution: Eastern Cape, KwaZulu-Natal	NT; P
<i>Encephalartos ngoyanus</i>	Ngoye Dwarf Cycad	Low	Provincial distribution: KwaZulu-Natal	VU
<i>Encephalartos nubimontanus</i>	Blue Cycad	Low	Provincial distribution: Limpopo	EW
<i>Encephalartos paucidentatus</i>	No common name	Low	Provincial distribution: Mpumalanga Description: Forest, occurs on steep rocky slopes and alongside streams in deep gorges.	VU; P
<i>Encephalartos princeps</i>	No common name	Low	Provincial distribution: Eastern Cape	VU; P
<i>Encephalartos senticosus</i>	No common name	Low	Provincial distribution: KwaZulu-Natal	VU; P
<i>Encephalartos transvenosus</i>	Modjadje Cycad	Low	Provincial distribution: Limpopo	LC; P
<i>Encephalartos trispinosus</i>	No common name	Low	Provincial distribution: Eastern Cape	VU; P





NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	Common Name	POC	Provincial Distribution	Status
<i>Encephalartos woodii</i>	Wood's Cycad	Low	Provincial distribution: KwaZulu-Natal	EW
<i>Euphorbia clivicola</i>	No common name	Low	Provincial distribution: Limpopo	CR; P
<i>Euphorbia meloformis</i>	No common name	Low	Provincial distribution: Eastern Cape	NT; P
<i>Euphorbia obesa</i>	No common name	Low	Provincial distribution: Eastern Cape	EN; P
<i>Harpagophytum procumbens</i>	Devil's Claw	Low	Provincial distribution: Free State, Limpopo, Northern Cape, North West	LC; P
<i>Harpagophytum zeyherii</i>	Devil's Claw	Low	Provincial distribution: Gauteng, Limpopo, Mpumalanga, North West	LC; P
<i>Hoodia currorii</i>	Ghaap	Low	Provincial distribution: Limpopo	P
<i>Hoodia gordonii</i>	Ghaap	Low	Provincial distribution: Free State, Northern Cape, Western Cape	DDD; P
<i>Jubaeopsis caffra</i>	Pondoland Coconut	Low	Provincial distribution: Eastern Cape	EN
<i>Merwillia plumbea</i>	Blue Squill	High	Provincial distribution: KwaZulu-Natal, Mpumalanga Major habitats: Grassland Description: Montane mistbelt and Ngongoni grassland, rocky areas on steep, well drained slopes. 300-2500 m. Suitable habitat on site: Rock outcrops in grassy Woodland and Valley Habitat.	NT
<i>Newtonia hildebrandtii</i> var. <i>hildebrandtii</i>	Lebombo Wattle	Low	Provincial distribution: KwaZulu-Natal	Now LC
<i>Protea odorata</i>	Swartland Sugarbush	Low	Provincial distribution: Western Cape	CR; P
<i>Siphonochilus aethiopicus</i>	Wild Ginger	Medium	Provincial distribution: KwaZulu-Natal, Limpopo, Mpumalanga Range: Sporadically from the Letaba catchment in the Limpopo Lowveld to Swaziland. Extinct in KwaZulu-Natal. Widespread elsewhere in Africa. Description: Tall open or closed woodland, wooded grassland or bushveld. Suitable habitat on site: Woodlands	CR
<i>Stangeria eriopus</i>	No common name	Low	Provincial distribution: Eastern Cape, KwaZulu-Natal	VU; P
<i>Zantedeschia jucunda</i>	Yellow Arum Lilly	Low	Provincial distribution: Limpopo	VU
Sensitive species 738		High	Provincial distribution: KwaZulu-Natal, Limpopo, Mpumalanga Description: Variable, including coastal, riverine, dune and montane forest as well as open woodland and thickets. Suitable habitat on site: Indigenous Forests of Frankfort and Mprgenzon, as well as Woodland of Frankfort.	EN

CR = Critically Endangered, EN = Endangered, EW = Extinct in the Wild, NT = Near Threatened, VU = Vulnerable, P = Protected, POC = Probability of Occurrence.



## Protected Species (Schedule 11: Section 69(1)(a)) and Specially Protected Species (Schedule 12: Section 69(1)(b)) of the Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) (MNCA)

**Table C3: Schedule 11 - Protected Plants (Section 69 (1) (a)) of the Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) (MNCA).**

SCHEDULE 11 - PROTECTED PLANTS		
Common Name	Scientific Name	POC
<b>All species of trees ferns, excluding the bracken fern</b>	<b>All species of the Genus: <i>Cyathea capensis</i> and <i>Cyathea dregei</i></b>	<b>High</b>
All species of Cycads in Republic of South Africa and the seedling of the species of Cycads referred to in schedule 12	All species of the family Zamiaceae occurring in the Republic of South Africa and the seedlings of the species of <i>Encephalartos</i> referred to in Schedule 12	<b>Low</b>
<b>All species of yellow wood</b>	<b><i>Podocarpus</i> spp.</b>	<b>Confirmed</b>
<b>All species of arum lilies</b>	<b><i>Zantedeschia</i> spp.</b>	<b>Confirmed</b>
	<i>Schizobasis intricata</i> (now <i>Drimia intricata</i> )	<b>Low</b>
<b>“Knolklimop”</b>	<b>Sensitive species 1248</b>	<b>Medium</b>
<b>All species of red-hot pokers</b>	<b><i>Kniphofia</i> spp.</b>	<b>Confirmed</b>
<b>All species of Aloes, excluding:</b> (a) All species not occurring in Mpumalanga and (b) The following species: all species of haworthias all species of <i>Agapanthus</i> all species of squill	<b><i>Aloe</i> spp., excluding:</b> (a) All species not occurring in Mpumalanga (b) The following species: <i>Haworthia</i> spp. <i>Agapanthus</i> spp. <i>Scilla</i> spp.	<b>Confirmed</b>
<b>All species of pineapple flower</b>	<b><i>Eucomis</i> spp.</b>	<b>Medium</b>
All species of <i>dracaena</i>	<i>Dracaena</i> spp.	<b>Low</b>
All species of paint brush	<i>Haemanthus</i> spp. and <i>Scadoxis</i> spp.	<b>Medium</b>
	<i>Boophane disticha</i>	
Cape poison bulb	Recorded just outside of the MR83 UG Areas within the Eastern Highveld Grassland Habitat Unit	<b>Low</b>
All species of <i>Clivia</i>	<i>Clivia</i> spp.	<b>High</b>
All species of <i>Brunsvigia</i>	<i>Brunsvigia</i> spp.	<b>Low</b>
All species of <i>Crinum</i>	<i>Crinum</i> spp.	<b>Medium</b>
Ground lily	<i>Ammocharis coranica</i>	<b>Low</b>
All species of fire lily	<i>Cyrtanthus</i> spp.	<b>Low</b>
River lily	<i>Hesperantha coccinea</i>	<b>High</b>
All species of <i>Watsonia</i>	<i>Watsonia</i> spp.	<b>Medium</b>
all species of gladioli	<i>Gladiolus</i> spp.	<b>Medium</b>
Wild ginger	<i>Siphonochilus aethiopicus</i>	<b>Low</b>
<b>All species of orchids</b>	<b>All species of the family Orchidaceae</b>	<b>Confirmed</b>
All species of the family Proteaceae	All species of the family Proteaceae	<b>Confirmed</b>
All species of black stinkwood	<i>Ocotea</i> spp.	<b>Medium</b>
Kiaat	<i>Pterocarpus angolensis</i>	<b>Low</b>
Tamboti	<i>Spirostachys africana</i>	<b>Low</b>
The following species of <i>Euphorbias</i> : <i>Euphorbia bernardii</i> and <i>Euphorbia grandialata</i>	The following species of euphorbias: <i>Euphorbia bernardii</i> and <i>Euphorbia grandialata</i>	<b>Low</b>
Common bersama	<i>Bersama tysoniana</i>	<b>Low</b>
Red ivory	<i>Berchemia zeyheri</i>	<b>Low</b>
	<b>Sensitive species 738</b>	<b>High</b>
All species of <i>Adenia</i>	<i>Adenia</i> spp.	<b>Medium - High</b>
Bastard onion wood	<i>Cassipourea gerrardii</i>	<b>Low</b>



SCHEDULE 11 - PROTECTED PLANTS		
Common Name	Scientific Name	POC
Assegai tree	<i>Curtisia dentata</i>	High
All species of olive trees	All species of the Genus <i>Olea</i>	High
All species of impala lilies	All species of the Genus <i>Adenium</i>	Low
Kudu lily	<i>Pachypodium saundersii</i>	Low
All species of <i>Brachystelma</i>	<i>Brachystelma</i> spp.	Medium
All species of <i>Ceropegia</i>	<i>Ceropegia</i> spp.	Medium
All species of <i>Huerniopsis</i> and <i>Huernia</i>	<i>Huerniopsis</i> and <i>Huernia</i> spp.	Low
All species of <i>Duvalia</i>	<i>Duvalia</i> spp.	Low
All species of <i>Stapeliads</i>	<i>Stapelia</i> spp.	Low
All species of <i>Orbeanthus</i>	<i>Orbeanthus</i> spp.	Low
All species of <i>Orbeas</i>	<i>Orbea</i> spp.	Low
All species of <i>Orbeopsis</i>	<i>Orbeopsis</i> spp..	Low

**Table C4: Schedule 12 - Specially Protected Plants (Section 69 (1) (b)) of the Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) (MNCA).**

SCHEDULE 12 - SPECIALLY PROTECTED PLANTS		
Common Name	Scientific Name	POC
<p>(a) All plants, excluding seedlings, of the following species of cycads within the genus <i>Encephalartos</i>: <i>dolomiticus</i>, <i>dyer</i>, <i>middleburg</i>, <i>eugene marais</i>, <i>heenan</i>, <i>inopinus</i>, <i>laevifolius</i>, <i>lanatus</i>, <i>lebombo</i>, <i>ngoyanus</i>, <i>paucidentatus</i>, <i>modjadje</i> and <i>villosus</i></p> <p>(b) All plants of the following species of cycad within the <i>Encephalartos</i> genus: <i>cupidus</i> and <i>humilus</i></p> <p>(c) all species of cycads in their natural habitat</p>	<p>(a) All plants, excluding seedlings, of the following species of the Genus <i>Encephalartos</i>: <i>E. dolomiticus</i>, <i>E. dyerianus</i>, <i>E. middleburgensis</i>, <i>E. eugene maraissii</i>, <i>E. heenanii</i>, <i>E. inopinus</i>, <i>E. laevifolius</i>, <i>E. lanatus</i>, <i>E. transvenosus</i> and <i>E. villosus</i> and many species derived from the above species</p> <p>(b) All plants of the following species of the Genus <i>Encephalartos</i>: <i>E. cupidus</i> and <i>E. humilus</i></p> <p>(c) All plants of the Genus <i>Encephalartos</i> in their natural habitat</p>	Low



## Protected Tree Species (Government Gazette No. 41887, notice 536 of 2018) under the National Forests Act, 1998 (Act No. 84 of 1998) (NFA)

**Table C5: NFA plant list for species with a known distribution range falling within the MR83 UG Areas<sup>15</sup>.**

SCIENTIFIC NAME	Habitat & Distribution <sup>16</sup> & <sup>17</sup>	National Red List Status	POC
<i>Afzelia quanzensis</i>	Afzelia quanzensis is widespread. It grows in low altitude woodland and dry forests, usually in deep sand. Its distribution stretches from northern KwaZulu-Natal, through to Limpopo, Zimbabwe and other neighbouring countries. It is also found in Somalia.	LC P	Low
<i>Balanites maughamii</i>	The plants can be found in small colonies in the bushveld, sand forest, on sandstone outcrops, along river banks, near springs and around pans.	LC P	Low
<i>Boscia albitrunca</i>	Habitat mainly includes dry, open woodland and bushveld, mostly in hot, arid, semi-desert areas, often on termitaria. The vast distribution range covers Botswana, Limpopo, Gauteng, North-West, Swaziland, the Free State, Northern Cape and KwaZulu-Natal. It also extends into Zambia, Zimbabwe, and Mozambique.	LC P	Low
<i>Catha edulis</i>	Khat is found in woodlands and on rocky outcrops. It is scattered in KwaZulu-Natal and Eastern Cape, mostly from the mistbelt, moving inland. It is also found in the Western Cape, Mpumalanga, Swaziland, Mozambique and through to tropical Africa and the Arab countries.  <b>Suitable habitat on site:</b> Woodland and Forests	LC P	High
<i>Curtisia dentata</i>	The assegai grows in most of the forests in southern Africa and Swaziland, from sea level to 1 800 m. It ranges from the Cape Peninsula through the forest patches of the eastern Western Cape to the forests of the Knysna region, the Eastern Cape, KwaZulu-Natal, Mpumalanga, Limpopo and Swaziland. In the forest it is usually found in climax forest and grows into a tall tree with a clean, unbuttressed bole. It also grows on grassy mountain slopes and in coastal scrub forest where it is a small bushy tree.  <b>Suitable habitat on site:</b> Indigenous Forest sub-unit.	NT P	High
<i>Elaeodendron transvaalense</i>	Savanna or bushveld, from open woodland to thickets, often on termite mounds.	NT P	Low
<i>Encephalartos</i> spp.			Low
<i>Ocotea bullata</i>	Occurs naturally in most of the high forests of South Africa, from the kloofs of Table Mountain to the mountain forests of Limpopo, and it is at its best in the Knysna forests.  <b>Suitable habitat on site:</b> Indigenous Forest of Frankfort and Morgenzon, but likely deeper into the forests.	EN P	Medium
<i>Pittosporum viridiflorum</i>	Widely distributed in the eastern half of South Africa, occurring from the Western Cape up into tropical Africa and beyond to Arabia and India. It grows over a wide range of altitudes and varies in form from one location to another. Pittosporum viridiflorum grows in tall forest and in scrub on the forest margin, kloofs and on stream banks.	LC P	Confirmed

<sup>15</sup> <https://www.thetreeapp.co.za/team/>

<sup>16</sup> <http://pza.sanbi.org/>

<sup>17</sup> <http://redlist.sanbi.org/index.php>





SCIENTIFIC NAME	Habitat & Distribution <sup>16</sup> & <sup>17</sup>	National Red List Status	POC
	<b>Suitable habitat on site:</b> Indigenous Forest of Frankfort and Morgenzen.		
<i>Podocarpus (=Afrocarpus) falcatus</i>	These Trees are found in the southern Cape (e.g. the Big Tree at Knysna), through KwaZulu-Natal, Western Soutpansberg (far northern RSA) and Blouberg, Mpumalanga and Limpopo. They occur from the coast up to an altitude of about 2 000m. Trees are also found in Swaziland, Mozambique, Kenya, Tanzania and Malawi and northwards to Ethiopia. The trees grow in mountain and coastal forests and are shade tolerant. They grow best in deep, slightly acidic well-drained soils.  <b>Suitable habitat on site:</b> Indigenous Forest of Frankfort and Morgenzen.	LC P	Confirmed
<i>Podocarpus latifolius</i>	The real yellowwood grows naturally in mountainous areas and forests in the southern, eastern and northern parts of South Africa, extending into Zimbabwe and further north. It is also found on rocky hillsides and mountain slopes but does not get as tall where it is exposed as it does in the forests.  <b>Suitable habitat on site:</b> Indigenous Forest of Frankfort and Morgenzen.	LC P	Confirmed
<i>Prunus africana</i>	<i>Prunus africana</i> is confined to evergreen forests from near the coast to the mist belt and montane forests in KwaZulu-Natal, Eastern Cape, Swaziland, Mpumalanga, Zimbabwe, and tropical Africa. This It is a moderately fast-growing tree which is sensitive to heavy frost, preferring areas where there is regular rain; it will tolerate moderate frosts.  <b>Suitable habitat on site:</b> Indigenous Forest of Frankfort and Morgenzen, as well as Riparian Forest.	VU P	High
<i>Pterocarpus angolensis</i>	Grows in the warm, frost-free areas in the northeast of the country, extending into Zimbabwe, northern Botswana, Mozambique and Namibia and northwards into other parts of Africa. It grows in bushveld and woodland where the rainfall is above 500 mm per year, and it favours rocky slopes or well-drained, deep, sandy soil.	LC P	Low
<i>Sclerocarya birrea</i> subsp. <i>caffra</i>	The Marula is widespread in Africa from Ethiopia in the north to KwaZulu-Natal in the south. In South Africa it is more dominant in the Baphalaborwa area in Limpopo. It occurs naturally in various types of woodland, on sandy soil or occasionally sandy loam.	LC P	Low
<i>Sideroxylon inerme</i>	This species is commonly found in dune forests, almost always in coastal woodlands and also in littoral forests (forests along the seashore). It also occurs further inland in Zimbabwe and Gauteng.	LC P	Low
<b>Sensitive species 738</b>	<b>Suitable habitat on site:</b> Indigenous Forests of Frankfort and Mprgenzen, as well as Woodland of Frankfort.	EN P	High

EN = Endangered, LC = Least Concern; NT = Near Threatened, P= Protected, POC = Probability of Occurrence; VU = Vulnerable.





SCIENTIFIC TERRESTRIAL SERVICES

## BIODIVERSITY ASSESSMENT

AS PART OF THE PROPOSED EIA AND WUL  
AMENDMENT PROCESS FOR THE MR83 UG  
TARGETS NEAR PILGRIMS REST,  
MPUMALANGA

### Part C: Faunal Assessment

Prepared for: Transvaal Gold Mining Estates  
(Limited)  
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Report Reference: STS 210071  
Date: March 2022



Part of the SAS Environmental Group of Companies

Website: <http://www.sasenvironmental.co.za>

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## ACRONYMS

ADU	The Animal Demography Unit online database: <a href="http://vmus.adu.org.za/">http://vmus.adu.org.za/</a> .
AIP/AIPs	Alien Invasive Plant/Alien Invasive Plants
BGIS	Biodiversity Geographic Information Systems
CR	Critically Endangered
DFFE	Department of Forestry, Fisheries and the Environment
DHSWS	Department of Human Settlements, Water and Sanitation
e-WULAAS	Electronic Water Use Licence (WUL) Application and Authorisation System
EAP	Environmental Assessment Practitioner
EIS	Ecological Importance and Sensitivity
EN	Endangered
GIS	Geographic Information System
GPS	Global Positioning System
Ha	Hectares
IBA	Important Bird Area
IEM	Integrated Environmental Management
IIE	Independent Institute of Education (Pty) Ltd
IUCN	International Union for Conservation of Nature and Natural Resources
LC	Least Concern
NA	Not Applicable
NBA	National Biodiversity Assessment
NT	Near Threatened
NEMBA	National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)
NYBA	Not yet been assessed
MNCA	Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998)
MP 2003	Mpumalanga State of the Environment Report (2003).
MRA	Mining Rights Area
MTPA	Mpumalanga Tourism and Parks Agency
P	Protected, according to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004): Amendment of Critically Endangered, Endangered, Vulnerable and Protected Species List. December 2007
PES	Present Ecological State
POC	Probability of Occurrence
PRECIS	Pretoria Computerised Information System
QDS	Quarter Degree Square
RDL	Red Data Listed
R	Rare
RE	Regionally Extinct
RSA	Republic of South Africa
SABAP	Southern African Bird Atlas Project
SANBI	South Africa National Biodiversity Institute
SP	Specially Protected
STS	Scientific Terrestrial Services
SCC	Species of Conservation Concern
sp and spp	The "sp." is an abbreviation for species. It is used when the actual species name cannot or need not or is not specified. The plural form of this abbreviation is "spp." and indicates "several species. Example: <i>Chrysoperla sp.</i> (when referring to a single species) and <i>Chrysoperla spp.</i>
TOPS	Threatened Or Protected Species (list of 2007) according to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004):
VU	Vulnerable
WUL	Water Use Licence



## GLOSSARY OF TERMS

<b>Alien and Invasive species</b>	A species that is not an indigenous species; or an indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.
<b>Carrying Capacity</b>	The maximum population size of a biological species that can be sustained by that specific environment, given the food, habitat, water, and other resources available.
<b>CBA (Critical Biodiversity Area)</b>	A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation and ridges.
<b>Diversity</b>	Abundance and species richness of faunal classes
<b>Endangered (according to IUCN)</b>	Organisms at very high risk of extinction in the wild
<b>Endemic species</b>	Species that are only found within a pre-defined area. There can therefore be sub-continental (e.g., southern Africa), national (South Africa), provincial, regional or even within a particular mountain range.
<b>ESA (Ecological Support Area)</b>	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
<b>Class (faunal)</b>	In biological classification, class (Latin: classis) is a taxonomic rank, as well as a taxonomic unit. Class specifically refers to major groups, namely: mammals, avifauna (birds), reptiles and invertebrates.
<b>Habitat Integrity (ecological)</b>	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.
<b>Least Concern</b>	Unlikely to become extinct in the near future. A least-concern species is a species that has been categorized by the International Union for Conservation of Nature (IUCN) as evaluated as not being a focus of species conservation. They do not qualify as threatened, near threatened, or (before 2001) conservation dependent.
<b>Least Threatened</b>	Least threatened ecosystems are still largely intact.
<b>Near Threatened (according to IUCN)</b>	Close to being at high risk of extinction in the near future.
<b>Niche (ecological)</b>	The role and position a species has in its environment; how it meets its needs for food and shelter, how it survives, and how it reproduces. A species' niche includes all of its interactions with the biotic and abiotic factors of its environment.
<b>Protected</b>	Species of high conservation value or national importance that require protection, according to NEMBA:TOPS List of 2007.
<b>Resource (ecological)</b>	A resource is a substance or object in the environment required by an organism for normal growth, maintenance, and reproduction. Resources can be consumed by one organism and, as a result, become unavailable to another organism.
<b>Rupicolous</b>	Living or growing on or among rocks.
<b>RDL (Red Data listed) species</b>	Organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.
<b>SCC (Species of Conservation Concern)</b>	The term SCC in the context of this report refers to all RDL (Red Data) and IUCN (International Union for the Conservation of Nature) listed threatened species as well as protected species of relevance to the project.
<b>Trophic (ecological)</b>	Refers to feeding and nutrition.
<b>Rank Grassland Vegetation</b>	Grassland or marsh vegetation that has grown abundantly without being cut or grazed for some time, and as a result has become tall, tussocky, and dominated by coarse species of grass.
<b>Vulnerable (according to IUCN)</b>	Species meets one of the 5 red list criteria and thus considered to be at high risk of unnatural (human-caused) extinction without further human intervention.



# 1 INTRODUCTION

## 1.1 Background Information and Project Description

Scientific Terrestrial Services CC (STS) was appointed to undertake a terrestrial biodiversity assessment as part of the proposed Environmental Impact Assessment (EIA) and Water Use Licence (WUL) amendment processes for the MR83 Underground (UG) targets (considered as the proposed mining activities) near Pilgrims Rest, Mpumalanga Province.

The assessment included four sites which will henceforth collectively be referred to as the “**MR83 UG Areas**”; individually referred to as Dukes, Frankfort, Morgenzon, and Beta North (Figure 1). The MR83 UG Areas are located within the Mpumalanga Province, with Dukes, Morgenzon, and Beta located to the west and north-west of Pilgrim’s Rest and Frankfort approximately nine (9) km north of Pilgrim’s Rest (localities depicted in Part A: Figures 1 and 2). As part of the field assessments, an approximate 20 m (linear infrastructure) – approximate 50 m (non-linear infrastructure) buffer area around the proposed mining activities was ground-truthed.

A detailed depiction of the proposed activities to accompany the proposed underground mining activities are presented in Part A: Figures 3 – 7. Figure 2 presents a simplified version of the proposed infrastructure.

The purpose of this report is to define the faunal ecology of the MR83 UG Areas as well as mapping and defining areas of increased Ecological Importance and Sensitivity (EIS) and to define the Present Ecological State (PES) of the MR83 UG Areas.

## 1.2. Scope of Work

The objectives of this study are:

- To provide inventories of faunal species encountered within the survey area and assess the potential impacts that the proposed survey will have on these species and the habitat;
- To determine and describe habitat types, communities and the ecological state of the survey area and to rank each habitat type based on conservation importance and ecological sensitivity;
- To identify and consider all sensitive landscapes including rocky ridges, wetlands and/ or any other special features;



- To reconduct a Red Data Listed (RDL) species assessment as well as an assessment of other Species of Conservation Concern (SCC), including potential for such species to occur within the MR83 UG Areas;
- To provide detailed information to guide the final layout of the proposed mining development and activities infrastructure and activities to be associated with the MR83 UG Areas; and
- To, where possible, ensure the ongoing functioning of the ecosystem in such a way as to support local and regional conservation requirements and the provision of ecological services in the local area.

### **1.3. Assumptions and Limitations**

The following assumptions and limitations are applicable to this report:

- This faunal assessment is confined to the MR83 UG Areas and allocated buffers (20 m for linear and 50 m for non-linear infrastructure) as guided by the layouts provided by the mine;
- With ecology being dynamic and complex and the habits of many faunal species, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most faunal communities have been accurately assessed and considered and the information provided is considered sufficient to allow informed decision making to take place and facilitate integrated environmental management.
- Due to the nature and habits of many faunal taxa, the high level of surrounding anthropogenic activities, it is unlikely that all species or classes would have been observed during a field assessment of limited duration. Furthermore, time constraints and security risks prevented employment of sherman and camera traps. Therefore, site observations were compared with literature studies where necessary; and
- Several field assessments were undertaken to determine the ecological status of the MR83 UG Areas and to “ground-truth” the results of the updated desktop databases. These included 1) site screening as part of the pre-feasibility assessment (high level assessments of Beta, Morgenzon and Frankfort) from the 19<sup>th</sup> – 22<sup>nd</sup> April 2021, 2) site screening as part of the pre-feasibility assessment (high level assessment of Dukes) from the 27<sup>th</sup> – 28<sup>th</sup> October 2021, and 3) a comprehensive site assessment as part of the EIA phase studies (all MR83 UG Areas): 17<sup>th</sup> – 19<sup>th</sup> January 2022. A more comprehensive assessment would require that assessments take place in all seasons of the year, notably during the rainy season when insect abundances drastically increase, and a better understanding of forage potential can be determined. However, on-site data was significantly augmented with all available desktop data and specialist experience in the area.





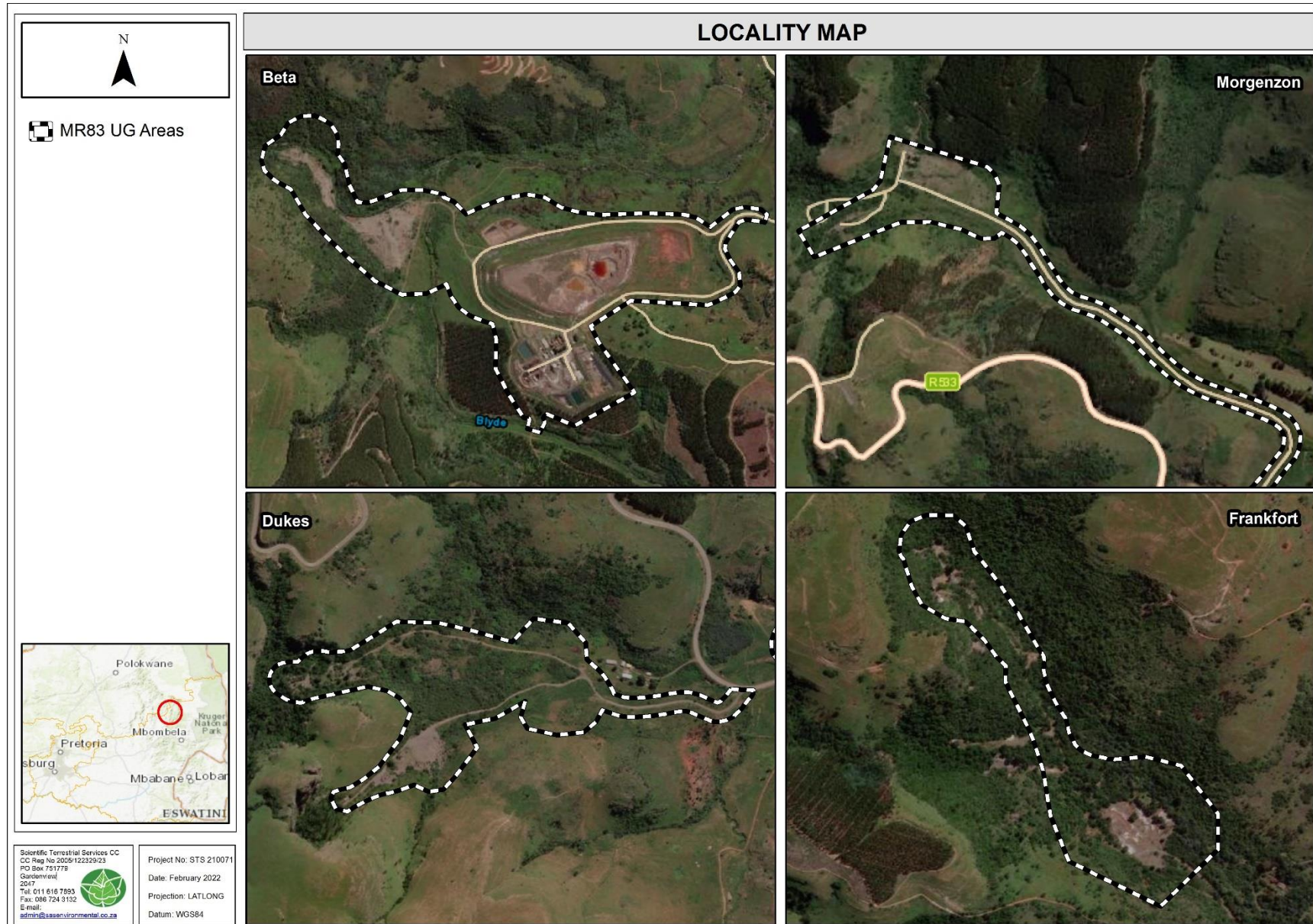


Figure 1: Conceptual illustration of the MR 83 UG Areas in relation to surrounding areas.





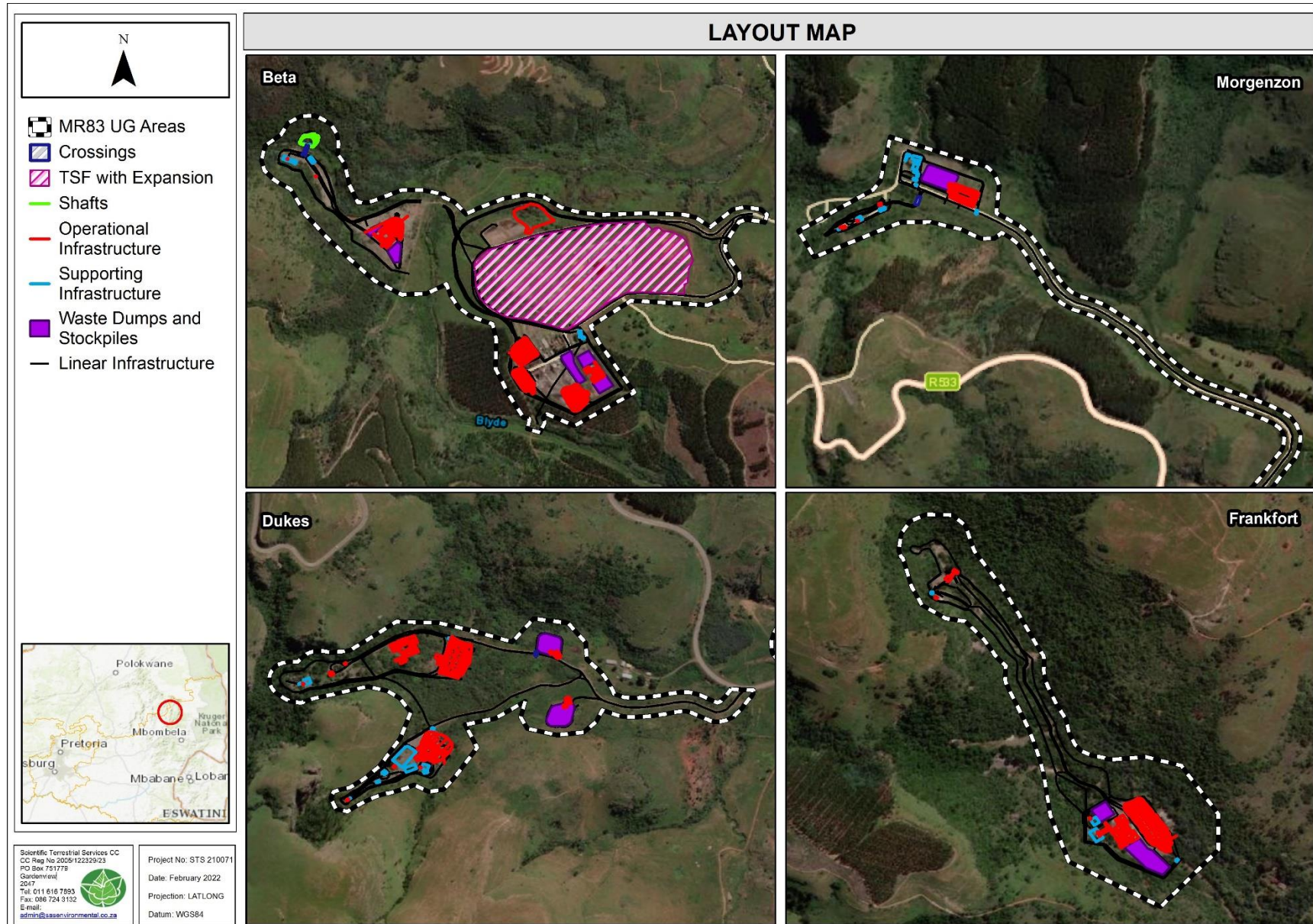


Figure 2: Proposed project layout associated with the MR83 UG Areas.



## 2 ASSESSMENT APPROACH

STS conducted the follow-up field assessment focused solely on the MR 83 UG Areas from the 17<sup>th</sup> to the 19<sup>th</sup> of January 2022 to determine the faunal ecological status of the MR83 UG Areas. A reconnaissance 'walkabout' was initially undertaken to determine the general habitat types found throughout the MR83 UG Areas, following this, specific study sites were selected that were considered to be representative of the habitats found within the MR83 UG Areas, with special emphasis being placed on areas that may potentially support faunal SCC. Sites were investigated on foot to identify the occurrence of fauna within the MR83 UG Areas. Faunal data collected during the site assessment was further significantly augmented by literature and online databases.

A detailed explanation of the method of assessment is provided in Appendix A of this report. The faunal categories covered in this assessment are mammals, avifauna, reptiles, amphibians, general invertebrates, and arachnids. For the methodologies relating to the impact assessment and development of the mitigation measures, please refer to Appendix C of Part A.

### 2.1 General approach

To accurately determine the PES of the MR83 UG Areas and capture comprehensive data with respect to faunal taxa, the following methodology were applied:

- Maps and digital satellite images were consulted prior to the field assessment to determine broad habitats, vegetation types and potentially sensitive sites. An initial visual on-site assessment of the MR83 UG Areas was made in order to confirm the assumptions made during consultation of the digital satellite imagery;
- A literature review with respect to habitats, vegetation types and species distribution was conducted, with reference to the relevant past study of de Wet *et al* (2012);
- Relevant databases considered during the assessment of the MR83 UG Areas included the Important Bird and Biodiversity Areas (IBA, 2015), South African Bird Atlas Project 2 (SABAP2), Animal Demography Units (ADU) Virtual Museum, International Union for Conservation of Nature (IUCN), the Mpumalanga Critical Biodiversity Area (CBA) Map (2016) and the National Biodiversity Assessment (NBA, 2018);
- Specific methodologies for the assessment, in terms of field work and data analysis of faunal ecological assemblages are presented in Appendix A of this report; and
- For the methodologies relating to the impact assessment and development of the mitigatory measures, please refer to Appendix C of Part A.



## 2.2 Sensitivity Mapping

All the ecological features associated with the MR83 UG Areas were considered, and sensitive areas were assessed. A Geographic Information System (GIS) was used to project these features onto satellite imagery and/or topographic maps. The sensitivity map should guide the final design and layout of the MR 83 UG Areas and associated activities. Please refer to Section 4 of this report for further details.

## 2.3 Faunal Species of Conservational Concern Assessment

During field assessments, it is not always feasible to identify or observe all species within an area, largely due to the secretive nature of many faunal species, possible low population numbers or varying habits of species. As such, and to specifically assess an area for faunal SCC, a Probability of Occurrence (POC) estimation is used, considering several factors to determine the probability of faunal SCC occurrence within the MR83 UG Areas. Species listed in Appendix B whose known distribution ranges and habitat preferences include the proposed infrastructure development sites were taken into consideration. Faunal species likely to occur within the MR83 UG Areas are indicated and briefly discussed within each of the relevant dashboards, along with their POC.

# 3 FAUNAL ASSESSMENT RESULTS

The results of the field assessment agrees with the Mpumalanga Biodiversity Sector Plan (2019) that indicates that most ( $\pm$  408 of 528 Ha or 77 %) of the MR 83 UG Areas occurs within “Heavily Modified” areas. The MR 83 UG Areas has been historically transformed by subsistence farming and heavy livestock grazing, and as such, no longer contains high conservation value.

## 3.1 Faunal Habitat

The MR 83 UG Areas comprises four broad habitat units across the various mining areas. These broad habitat units have further been broken down into smaller sub-units. These habitat units are discussed briefly in terms of faunal utilisation and importance and are visually depicted in Figures 3 – 9 below. For a more detailed description and discussion of these habitat units please refer to the Part B: Floral Report.

- **Degraded Habitat** – encompassing Alien and Invasive Plant (AIP)-dominated habitat and areas entirely transformed by mining (illegal and approved) and/or forestry practices. As





a result of this degradation, faunal species occupancy and utilisation of this habitat is notably low. Some of the AIP do produce flowers which will attract some faunal species, however this is seasonal and notably a problem as it allows for the further spread of AIPs. This degraded habitat is largely utilised by common insects and avifauna and is not considered important or of value from a faunal perspective;

- **Freshwater Habitat** – encompassing Riparian Forest, Riparian Woodland, and Watercourse Habitat. These habitats are considered important for a diversity of fauna as well as potential SCC. Not only do these habitats provide areas of important niche habitat, but the watercourses also serve as an important source of surface water for terrestrial species and breeding habitat for aquatic species. It must be noted, however that in the Beta and Dukes areas, the presence of illegal miners has radically reduced the quality of habitat associated with the watercourses as well as the water quality itself, where surface water is present. The freshwater habitat is considered important and of ecological value from a faunal perspective;
- **Terrestrial Woody Communities** – encompassing Indigenous Forests and Woodlands (intact and degraded). The forests and intact woodlands are considered important habitats for invertebrates, avifauna and other arboreal species. The degraded woodlands are impacted by the proliferation of AIPs, though they do still provide a supportive role to intact adjacent habitats and as an area of shelter for fauna where located adjacent to more degraded areas; and
- **Valley Habitat** – encompassing a variety of habitat types occurring along the mountain footslopes and along rivers and streams. This valley habitat varied between areas of more open grasslands with few shrubs to areas where shrub density increased. The increased prevalence of AIPs in this habitat does detract from the potential habitat provisioning for fauna, though, as noted previously, these AIPs do provide seasonal food resources to insects and avifauna. Rocky Outcrops are only present along a small stretch of the Morgenzon haul road, however as there will be no changes to the haul roads, this habitat sub-unit will not be directly impacted upon.

Figures 3 and 9 depict the location of the abovementioned habitat units in the MR 83 UG Areas. Sections 3.2- 3.5 that follow discuss the results of the field assessment in a dashboard format for each of the faunal classes where applicable.



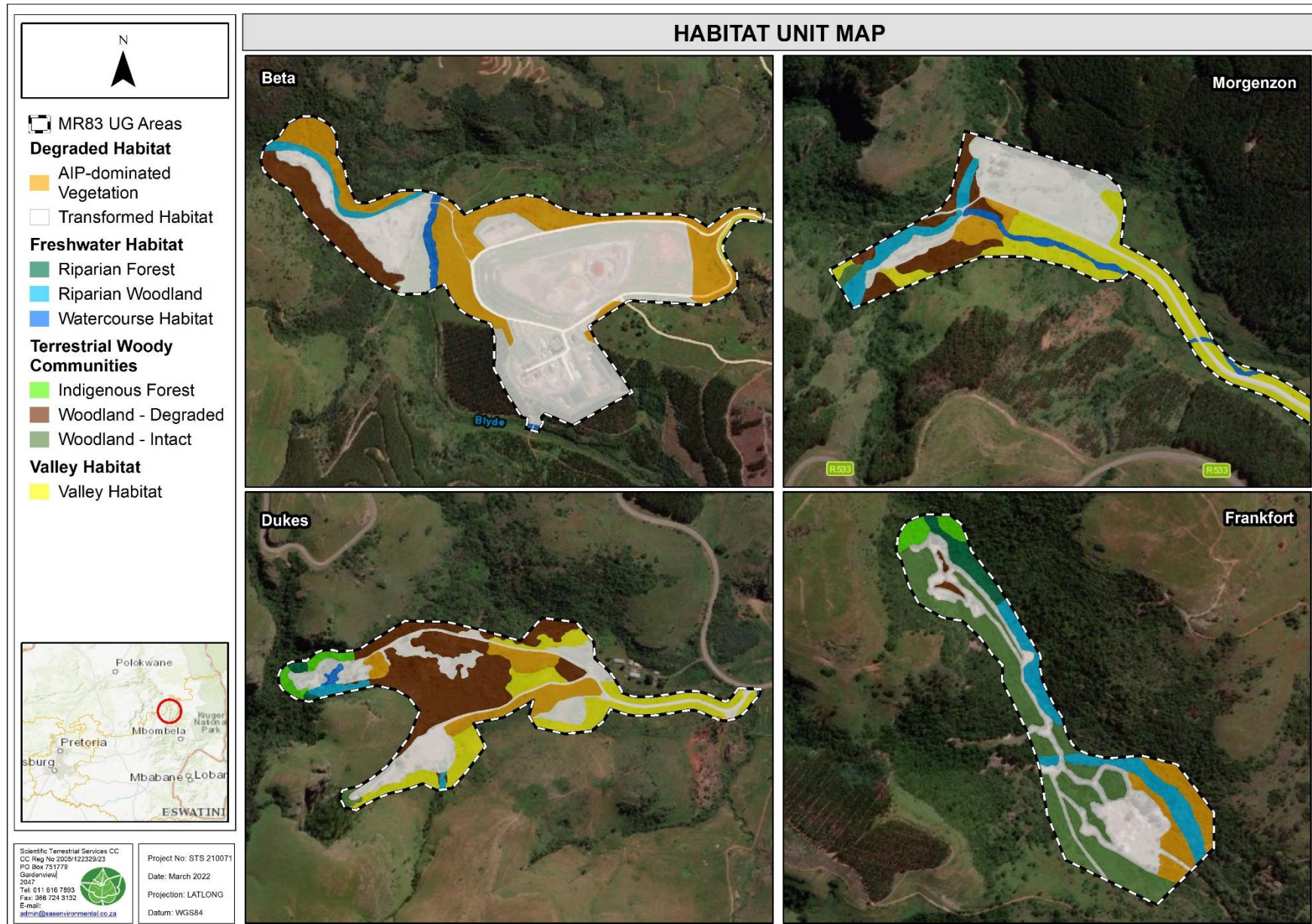


Figure 3: Habitat unit map.





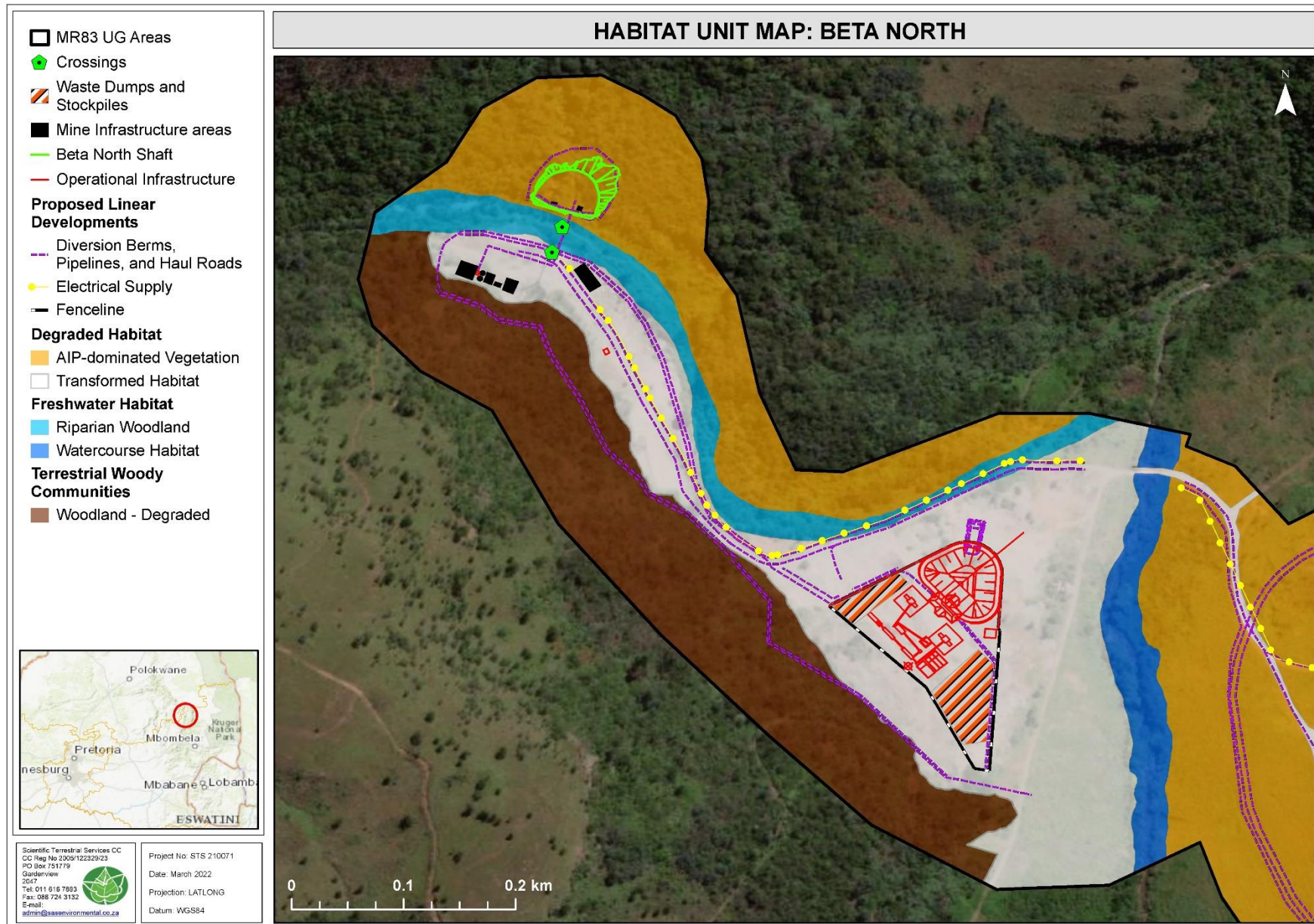


Figure 4: Habitat unit map with proposed mining activities – Beta western portion.





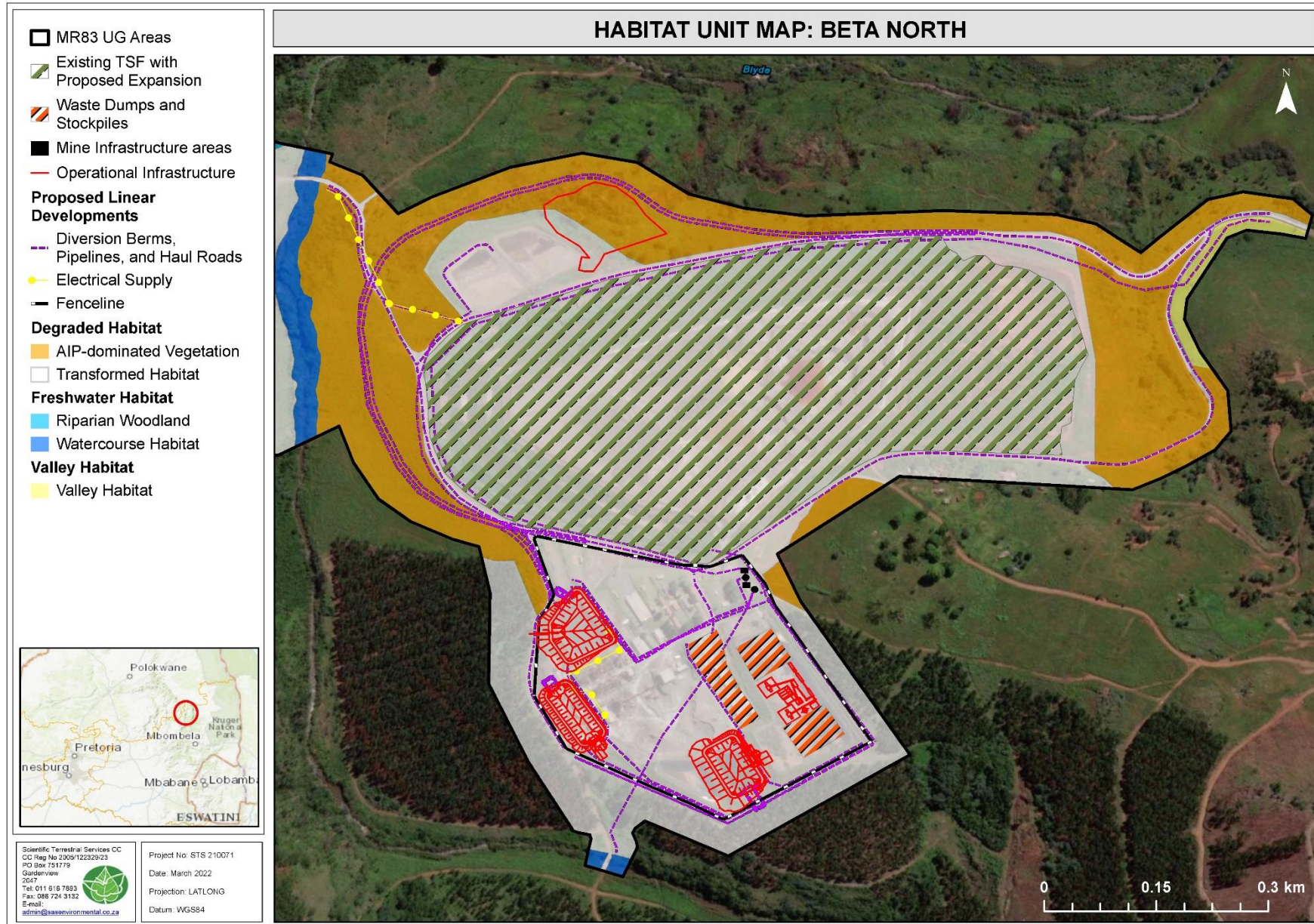


Figure 5: Habitat unit map with proposed mining activities – Beta eastern portion.





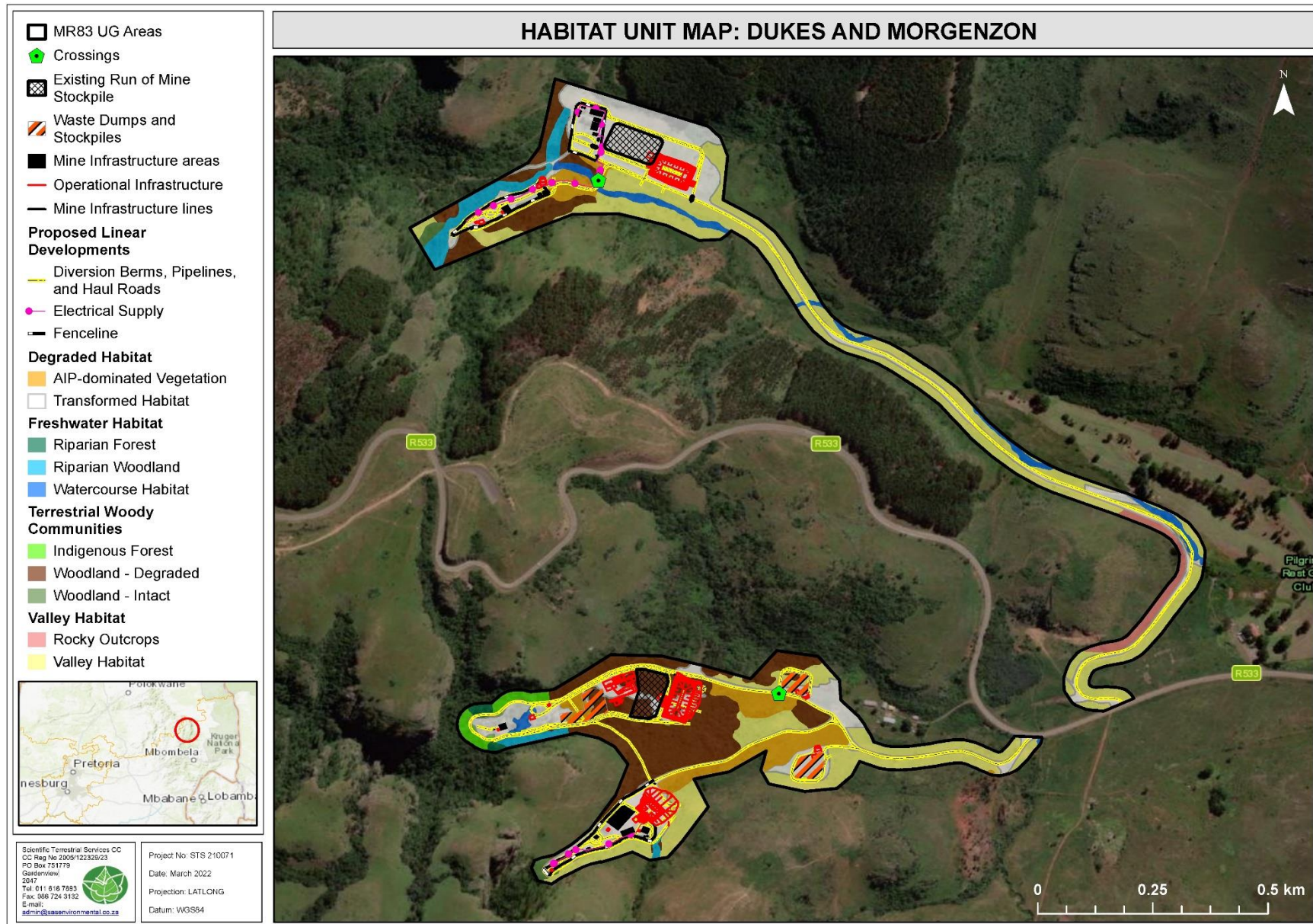


Figure 6: Habitat unit map with proposed mining activities – Dukes and Morgenzon.





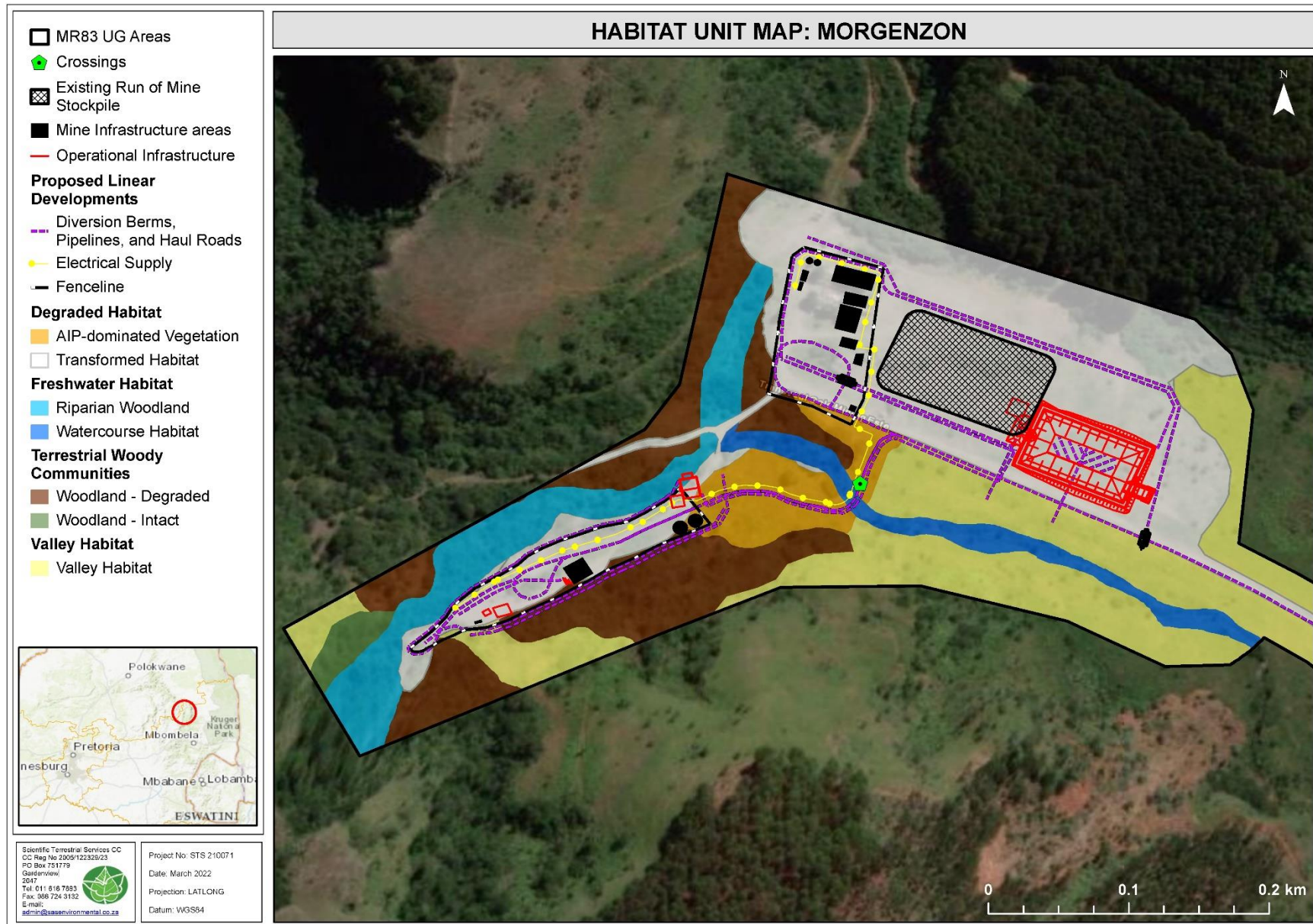


Figure 7: Habitat unit map with proposed mining activities – Morgenzon.





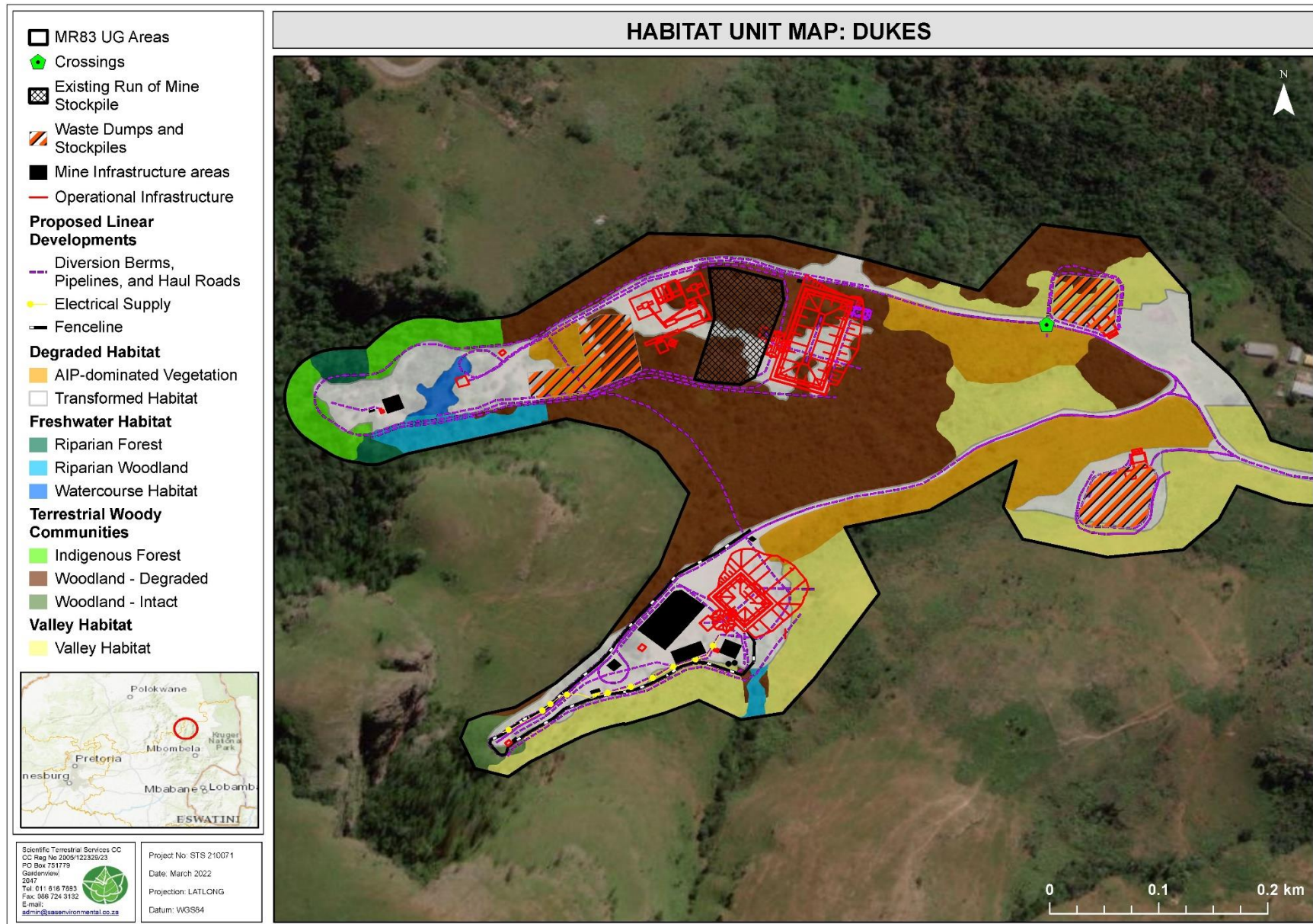


Figure 8: Habitat unit map with proposed mining activities – Dukes.





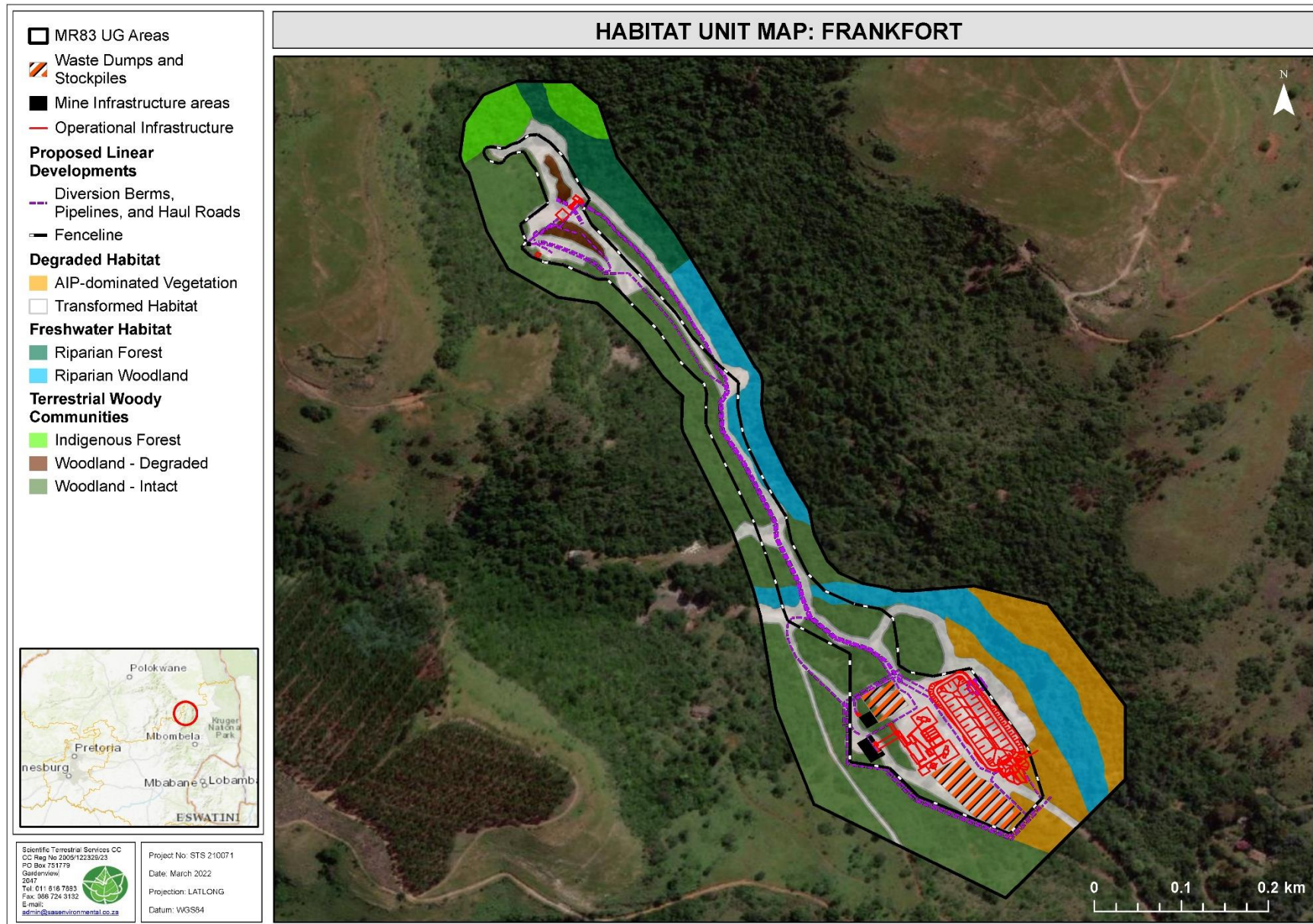





Figure 9: Habitat unit map with proposed mining activities – Frankfort.





### 3.2 Mammals

Table 1: Field assessment results pertaining to mammal species within the MR83 UG Areas.

REPRESENTATIVE PHOTOGRAPHS OF SPECIES RECORDED		
		
<p>a) <i>Rhinolophus blasii</i> (Blasius's Horseshoe Bat), b) <i>Atilax paludinosus</i> (Water Mongoose), c) <i>Chlorocebus pygerythrus</i> (Vervet Monkey) spoor.</p>		
MAMMAL HABITAT AND DIVERSITY OVERVIEW		
<p>The site assessment focused on the areas that will be disturbed by the proposed mining activities at each MR 83 UG Areas, as well as the surrounding habitat and the impact the activities may have on faunal species and habitat connectivity. Mammal diversity and abundance at all the sites was considered low, most notably at Beta and Dukes where anthropogenic activities (illegal miners) are very high. The habitat within Beta and Dukes has further been notably impacted upon as a result of AIP proliferation, historic mining disturbances, earth moving activities and stream diversions by the illegal miners. Though the habitats within the Dukes and Beta footprints could potentially host several common species and possibly SCC, the current state of these sites and the continued expansion of illegal mining activities precludes this from happening. As such, mammal species for the most part appear to avoid these areas due to these impacts, the lack of useable habitat and the increased presence of people.</p> <p>At Morgenzon, mammal activity was marginally higher although historic and current disturbances and the presence of illegal miners is impacting on the overall diversity, notably as the illegal miners are utilising the old buildings on site as a base of operations. Habitat and habitat connectivity at Morgenzon is, however higher allowing for mammal species to move more freely through the mining area, though such movement is likely to be sporadic and comprising only a small number of mammal species. The more open valley bushveld and vegetation along the freshwater system provides suitable food resources to the small number of common mammal species herein. The presence of surface water will further likely act as an attractant to mammal species. An individual <i>Redunca fulvorufula</i> (Mountain Reedbuck) was observed coming down to the stream along the haul road at Morgenzon to drink following which it then moved off back into the mountainous terrain to the south of the road.</p> <p>Illegal mining at Frankfort in the past and now low intensity sampling activities, has resulted in increased anthropogenic disturbances in the mining site as well as the surroundings, however, these levels are notably lower than that of the other three sites. Although these disturbances are lower, mammal diversity and abundance was still noted to be low, which is likely attributed to the locality of the mine in the valley and the mountainous terrain which limits faunal species movement. The steeper slopes and denser woody component associated with Frankfort makes this site more suitable to arboreal mammals as well as small mammals who require less space and can more easily manoeuvre in the steeper terrain. The presence of the freshwater system does, however provide an invaluable source of surface water for any mammals in the footprint and surrounding areas.</p>		






<b>MAMMAL SCC</b>			
<p>The databases for the region indicates that several mammal SCC are associated with the various mining sites from a desktop perspective. Taking into consideration that the majority of the proposed mining infrastructure within the MR 83 UG Areas are located within existing transformed habitat, the possible impact to mammal SCC is notable reduced. There are, however a few stand out examples where SCC may make use of the habitats within or immediately adjacent the mining sites, either permanently or temporarily. These species have been listed and briefly discussed below.</p>			
Species	Discussion	Status	POC
<i>Rhinolophus cohenae</i> (Cohen's Horseshoe Bat)	<p>All three of these species are known from the region and have previously been recorded according to the MTPA database. These bat species may occupy the old, abandoned, non-active mine shafts within and surrounding the proposed mining areas. These bats, however are unlikely to occur in shafts that are more regularly utilised by illegal miners. Bats in general are tolerant to anthropogenic influence and are known to also make use of buildings to roost. During the assessment of the sites, a single individual <i>Rhinolophus blasii</i> was observed in an old shaft near the Morgenzon footprint area, though, it must be noted that this shaft is located outside of the proposed mining footprint and will not be impacted upon by the proposed mining activities. At Frankfort, two other <i>Rhinolophus</i> sp individuals were observed in an old shaft located outside of the proposed footprint, unfortunately they flew deeper into the mine shaft before detailed photographs could be taken. This shaft does, however not form part of the proposed Frankfort mining activities.</p>	VU	High
<i>Rhinolophus blasii</i> (Blasius's Horseshoe Bat)		NT	Confirmed
<i>Rhinolophus swinnyi</i> (Swinny's Horseshoe Bat)		VU	High
<i>Panthera pardus</i> (Leopard)	<p>This species is adept at surviving within a variety of habitats. The mining areas and surrounding habitat are likely inhabited by this species, albeit at a low density. Individuals have been seen in the past near the Beta mine and it is likely that Morgenzon and Frankfort would fall within a leopards home range. It is, however considered unlikely that an individual would be wholly reliant on the mining areas for survival, nor would they breed in these specific areas due to the increased presence of people herein. Mining activities are unlikely to have any negative impact on this species and may actually have a positive one. Formal mining will lead to a controlled and reduced presence of illegal miners. This may possibly result in an increase of larger mammals (prey items) due to a decrease in snaring activities, resulting in a possible increase in leopard abundance in the region, although likely marginal.</p>	VU	Medium
<i>Cercopithecus albogularis schwarzi</i> (Samango Monkey)	<p>Restricted to forest habitats, this species may inhabit the forested areas surrounding Frankfort. This species is unlikely to occur at any of the other sites due to the increased presence of illegal miners and habitat disturbances. Mining activities at Frankfort are, however unlikely to impact on this species, as the proposed infrastructure is not expected to impact upon the Forest habitat.</p>	EN	Medium
<b>CONCLUDING REMARKS</b>			
<p>The proposed mining sites are located predominantly within existing disturbance and / or transformed areas. The mammal assemblages within these disturbed areas are not well represented, with the majority of the species observed being located in the adjacent habitats, outside of the proposed disturbance footprint. The additional pressure of the illegal mining activities and human movement in the areas further reduces mammal abundances, notably larger mammals. The only significant concern pertaining to mammals in the region with regards to the current proposed mining activities would be the potential impacts on bats, notably the three species listed above. This concern, however is largely mitigated as the proposed adit access points will be the same adits currently utilised by the illegal miners and as such, it is unlikely that the bats will be present therein.</p>			



### 3.4 Avifauna

Table 2: Field assessment results pertaining to avifaunal species within the MR83 UG Areas.

REPRESENTATIVE PHOTOGRAPHS OF SPECIES RECORDED		
		
a) <i>Estrilda astrild</i> (Common Waxbill), b) <i>Apalis thoracica</i> (Bar-throated Apalis) and c) <i>Zosterops virens</i> (Cape White-eye).		
AVIFAUNAL HABITAT AND DIVERSITY OVERVIEW		
<p>Due to their increased mobility (flight), avifaunal species are far less location restricted than other species, easily able to overcome structures and elevated terrain. Avifauna are better able to make use of all habitats associated with the various mining areas, predominantly driven by food availability and suitable nesting habitat during breeding seasons. The Transformed habitat in which the majority of the mining infrastructure is proposed is largely considered unsuitable even for avifauna, providing limited foraging grounds and no suitable areas for refuge or nesting.</p> <p>The Woodlands, Forests and Freshwater habitats provide the highest degree of suitable habitat for avifauna, notable insectivores who will actively search out insects within these habitats as a readily available food resource. These habitats also provide suitable areas of refuge and nesting owing to the increase abundance of woody species. Larger avifauna, notably raptors and owls will likely favour the Forest habitat owing to the larger trees growing herein. Forage availability for granivores is relatively abundant within all the mining areas, whilst fruiting and flowering plants provide additional seasonal food resources. Limited evidence and no direct observations of ground dwelling birds such as <i>Numida meleagris</i> (Helmeted Guineafowl) and <i>Pternistis natalensis</i> (Natal Spurrow) were made. It is likely that snaring activities by the illegal miners in the mining sites has resulted in a decrease in abundance, as well as possible area avoidance by the remaining species.</p> <p>Very few avifauna were observed at Dukes, though this is likely attributed to the short duration of the assessment due to safety concerns. Given the habitat component associated with Dukes, it is unlikely that a high diversity of avifauna will occur therein, with many species being common and widespread species readily observed in other areas. The habitats within the Morgenzon assessment were more intact than that of Dukes and consequently, a greater abundance of avifauna were observed. These species were, however still considered to be common and widespread species, many of which also appeared at Dukes. Beta was very similar in terms of avifaunal diversity in the footprint areas as Morgenzon and Dukes. The proliferation of AIPs and the disturbances as a result of illegal mining has led to a decrease in suitable avifaunal habitat. Common species were observed although in a low abundance, however low observation rates can also be attributed to the limited time available on site due to safety concerns. Frankfort is considered to be the most intact area in terms of avifaunal habitat provisioning, predominantly due to the Woodlands, Freshwater systems and Forests associated with Frankfort. The dense vegetation made direct observations more difficult but it was evident from vocalisations that Frankfort has a higher diversity of avifauna in comparison to the other site.</p>		









AVIFAUNAL SCC			
The databases for the region indicates that several avifaunal SCC are associated with the various mining sites from a desktop perspective. Taking into consideration that the majority of the proposed mining infrastructure areas are located within existing transformed habitat, the likelihood that avifaunal SCC will occur in these direct footprint areas is considered small. There are, however a few SCC that may make use of the habitats adjacent the mining sites, either permanently or temporarily. These species have been listed and briefly discussed below.			
Species	Discussion	Status	POC
<i>Eupodotis senegalensis</i> (White-bellied Korhaan)	Known from several records in the region, this species is likely to make use of the open woodland areas and valley habitat where it can easily move about on the ground foraging for prey items. Such foraging activity is likely to be undertaken at a lower frequency in the areas where there is an increased presence of illegal miners. Due to its ground foraging habits, this species is also at increased risk of being caught in wire snares set between shrubs and taller stands of grass. The proposed areas of development associated with the various mining activities are unlikely to pose any significant risk to this species, whilst the formal and controlled activities in the mining sites will likely lead to a decrease in snaring activities which may be potentially beneficial to the species over the long term.	VU	Medium
<i>Geronticus calvus</i> (Southern Bald Ibis)	Much like the above korhaan species, this species opts to forage in open grasslands, particularly those that have been grazed where a short grass layer is present. Although informal grazing does occur within the various mining sites, the grazing intensity does not create short grassland areas and as such, decreases the favourability of these areas for <i>G. calvus</i> . Mining activities should they be authorised are unlikely to impact upon this species in terms of loss of foraging or breeding habitat.	VU	Medium
<i>Hirundo atrocaerulea</i> (Blue Swallow)	A small swallow whose breeding habitat is under threat from agriculture and continued human developments in suitable areas of habitat. This species is a specialist in terms of nest construction, opting to nest in underground sinkholes, old adits and aardvark burrows. The proposed mining activities are not located in any such localities that may be considered important breeding areas of this species. The proposed mining localities are further unlikely to impact on the preferred foraging ground of <i>H. atrocaerulea</i> , which is often seen foraging over wetlands and streams, catching insects mid-flight.	CR	Medium
<i>Stephanoaetus coronatus</i> (African Crowned Eagle)	This species has been previously recorded in the areas surrounding the proposed mining areas. Owing to the large home range of this species, it will likely forage over extensive distances in search of prey and will not be reliant upon, nor likely hunt within, the proposed areas earmarked for mining development. This species is, however reliant on large trees in the Forest habitat for nesting and as such, it is important that minimal disturbances to this habitat occur. During the site assessments no nests in the forest habitat were observed nor were any individuals seen flying over or in close proximity to the sites.	VU	High
CONCLUDING REMARKS			
The proposed mining footprints are all located in areas that have already been transformed / notably disturbed. These areas are noted to provide limited habitat and resource provisioning to avifauna and as such are not considered important from an avifaunal importance perspective. Following the site assessment, it is considered unlikely that the proposed mining footprints and activities will have a notable impact on common species and avifaunal SCC in the immediate and surrounding areas.			





### 3.5 Herpetofauna

**Table 3: Field assessment results pertaining to herpetofaunal species within the MR83 UG Areas.**

REPRESENTATIVE PHOTOGRAPHS OF SPECIES RECORDED			
			
a) <i>Sclerophrys gutturalis</i> (Guttural Toad), b) <i>Amietia delalandii</i> (Common River Frog), c) <i>Lycodonomorphus rufulus</i> (Common Brown Water Snake) and d) <i>Lygodactylus capensis</i> (Common Dwarf Gecko)			
HERPETOFAUNA HABITAT AND DIVERSITY OVERVIEW			
<p>Amphibians and reptiles are notoriously difficult to sample due to their secretive natures, habitual avoidance of predators and in the case of amphibians, various stages of metamorphosis. This is further compounded when undertaking surveys of short duration. However, given that the planned mining areas are predominantly located in already transformed and disturbed areas and that there is significant background info for the region, these limitations are not considered detrimental to this study.</p> <p>Only two amphibian species were observed (as photographed above), both of which are considered to be common and widespread species. Both these species were readily observed at Morgenzon and Frankfort along the freshwater systems and in the adjacent vegetation where soil moisture was higher. No amphibians were observed at Dukes, though there was surface water in areas. Both of the observed amphibian species have previously been observed at Beta, notably along the peach tree stream, however, following the significant impacts that the illegal miners have had on this system, abundances of these species appear to have been reduced, with no individuals being observed during the assessment. Food resources for amphibians in the form of insects is not considered a limiting factor in the sites, nor is habitat quality where no illegal mining activities are taking place. With the exception of stream crossings to access the adits, impacts to the freshwater systems and as such amphibian species is unlikely to be significant, and will likely be less than the current level of impacts resulting from illegal mining activities.</p> <p>Reptiles species were not readily observed within the proposed mining sites, with only the two species listed observed (as photographed above). Previous site visit observations for the local area have included species such as <i>Chamaeleo dilepis</i> (Common Flap-necked Chameleon), <i>Agama aculeata distanti</i> (Eastern Ground Agama), <i>Pseudocordylus melanotus</i> (Drakensburg Crag Lizard), <i>Trachylepis varia</i> (Variable Skink) <i>Panaspis wahlbergi</i> (Wahlberg's Snake-eyed Skink) and <i>Philothamnus natalensis occidentalis</i> (Western Natal Green Snake). Reptiles are inherently adept at inhabiting a range of habitats, including disturbed and transformed sites. Skinks and geckos were readily observed in the transformed areas whilst it is considered likely that reptiles such as those previously recorded will inhabit the areas surrounding the proposed mining sites. Insects, small mammals, amphibians and even small reptiles will form the primary prey base of many reptile species, with some of the skinks and agamas also ingesting suitable plant material. Given the adaptability of reptiles, it is unlikely that any reptiles species associated with the sites will be significantly impacted upon. In contrast, some of the species may thrive, given that the buildings will provide suitable areas of refuge as well as new potential foraging grounds. Insects will likely be attracted to the mining sites at night due to lights, resulting in an increase in prey abundance for small reptiles.</p>			















HERPETOFAUNA SCC			
The databases for the region indicate that several herpetofaunal SCC are associated with the various mining sites from a desktop perspective. Taking into consideration that the majority of the proposed mining infrastructure areas are located within existing transformed habitat, the likelihood that herpetofaunal SCC will occur in these direct footprint areas is considered limited. There are, however a few SCC that may make use of the habitats adjacent the mining sites, either permanently or temporarily. These species have been listed and briefly discussed below.			
Species	Discussion	Status	POC
<i>Hadromophryne natalensis</i> (Natal ghost frog)	<i>H. natalensis</i> inhabits clear, swift-flowing streams located in mountainous terrain where these waters flow through forests and wooded areas. These rather niche habitat requirement precludes the Dukes and Morgenzon mining areas. The Peach Tree stream that flows through Beta may have once provided habitat for this species, however stream diversions by illegal miners as well as significant sediment deposition and water pollution from these mining activities has likely rendered the Peach Tree stream redundant in terms of habitat provisioning for this species. The freshwater system flowing through the Frankfort site is, however considered suitable for this species, being largely unimpacted, clear and fast flowing through a well wooded area. Though sections of the stream were searched for this species, no individuals were observed, however this could be as a result of the limited sampling time as well as the varying metamorphic phases of the frogs. Any disturbance to this stream system may place individuals at increased risk.	VU	Medium
<i>Bradypodion transvaalensis</i> (Transvaal Dwarf Chameleon)	This species is generally associated with dense moist forest and thick vegetation associated with heavy mist but has also been recorded in the grassland areas adjacent to plantations. This species may occur in the Forest and Wooded habitats associated with Frankfort, and to a lesser extent this species may occur at Morgenzon. This species is unlikely to be associated with the footprint areas at Dukes or Beta due to habitat disturbance.	VU	Medium
<i>Chamaesaura anguina anguina</i> (Cape Grass Lizard)	This species inhabits grassland areas and as such may be inhabit the more open areas of the Valley Habitat. Since the proposed mine development areas are predominantly located outside of potentially suitable habitat areas for this species, mining activities are unlikely to pose any significant threat to any individuals should they occur at the various sites.	NT	Medium
<i>Homoroselaps lacteus</i> (Spotted Harlequin Snake)	This species shows preference for fynbos, lowland forests, moist savannas and grasslands, preying upon small lizards and other small snakes, notably legless skinks and blind snakes. Habitat disturbances around Beta and Dukes have likely resulted in the creation of unsuitable habitat for not only this species but its prey items. Morgenzon and Frankfort may, however support a local population of this snake species.	NT	Medium
CONCLUDING REMARKS			
A low diversity of herpetofauna were observed, although the species that were observed appeared to be fairly abundant. The low observed diversity is not considered representative of the true diversity of the areas as food resources and habitat availability will likely support a far higher diversity of reptiles and amphibians. Much of the mining infrastructure is planned to be developed in already disturbed areas and as such, natural habitat for amphibians and reptiles is unlikely to be disturbed, ensuring that the proposed mining activities are unlikely to impact on herpetofauna abundance and diversity in the region.			





### 3.6 Invertebrates (Insects and Arachnids)

Table 4: Field assessment results pertaining to insect species within the MR83 UG Areas.

REPRESENTATIVE PHOTOGRAPHS OF SPECIES RECORDED			
			
a) <i>Acraea nohara nohara</i> (Light Red Acraea), b) <i>Trithemis furva</i> (Navy Dropwing), c) <i>Precis archesia</i> (Garden Commodore) and d) <i>Platycleis</i> sp (Cicada).			
			
e) <i>Brakefieldia perspicua perspicua</i> (Marsh Patroller), f) <i>Cassionympha cassius</i> (Rainforest Brown), g) <i>Gastrimargus</i> sp (Grasshopper) and h) <i>Chlorolestes fasciatus</i> (Mountain Malachite).			
			
i) <i>Trichonephila fenestrata</i> (Hairy Golden Orb-weaving Spider), j) <i>Cheloctonus intermedius</i> (Intermediate Creeper Scorpion), k) Genus <i>Leucauge</i> (Orchid Spiders) and l) <i>Caerostris</i> sp (Bark Spider).			



**INVERTEBRATE HABITAT AND DIVERSITY OVERVIEW**

Invertebrate species were the most common faunal class encountered within the various mining sites and were readily observed in the Morgenzon and Frankfort sites whilst a lower abundance and diversity of invertebrates was observed in the Dukes and Beta sites. Morgenzon and Frankfort provide better habitat opportunities for invertebrates in comparison to Dukes and Beta, with Dukes and Beta being more impacted upon and more active in terms of illegal mining activities.

Insect species are considered a vital and important link in the ecosystem, fulfilling many ecological roles, including pollination, removal of dead animal and plant material, pest predation and parasitism and clearing of dung and scat from larger mammals. The Transformed habitat provided limited habitat for insects, though, individuals belonging to the Orthoptera Family (Crickets and Grasshoppers) were observed herein. Lepidopterans (Butterflies) were prevalent throughout all the sites, with the highest abundances and diversity being observed in Frankfort and Morgenzon in the Woodland and Valley Habitats. Flowering plants, including AIPs provide an important and seasonal food resource for many insects, whilst these insects also serve an important function as pollinators of these species. Herbivorous insect species are not limited in terms of food resources given the diversity of herbaceous and woody species present within the various mining sites. Insect species provide a vital food resource for many of the other faunal species in the region. As such impacts that lead to the loss of insect abundance and diversity will have a negative cascading effect on other faunal species in the MR 83 UG Areas.

Arachnid species were readily observed within Frankfort and Morgenzon, and to a lesser extent in Beta and Dukes. Arachnid abundances appeared to be comparative with insect abundances, as to be expected, as insects serve as a primary food resource for arachnid species. Web building and plant dwelling spiders were abundant, whilst a lower abundance of ground dwelling and active hunting spiders such as those of the family Lycosidae (Wolf Spiders) were also observed. As many arachnids are crepuscular or nocturnal, it is likely that many arachnid species were not observed during the site assessment. Though this is a limitation to the study, the presence of suitable habitat and food resources in the non-transformed habitats allows for the inference that the mining site likely comprise of a diversity of arachnids, notably given the variations in vegetation structure which provides unique habitat and hunting opportunities to arachnids. The majority of the proposed mining infrastructure is located in the Transformed habitat and as such, little impact and or disturbances to arachnids are expected.

**INVERTEBRATE SCC**

The databases for the region indicates that several invertebrate SCC are associated with the various mining sites from a desktop perspective. Taking into consideration that the majority of the proposed mining infrastructure areas are located within existing transformed habitat, the likelihood that invertebrate SCC will occur in these direct footprint areas is small. There is, however one SCC that may make use of the habitats adjacent the mining sites, either permanently or temporarily. This species has been listed and briefly discussed below.

Species	Discussion	Status	POC
<i>Pseudagrion newtoni</i> (Harlequin Sprite)	This species is known from the region where it favours grass-lined or sedge-lined streams in hilly or mountainous country. Many such streams in the region have been subjected to trampling by livestock and the proliferation of woody species along the banks, creating unfavourable habitat for this species. The freshwater system associated with the Morgenzon haul road may provide suitable habitat for this species (grass lined stream banks), though, even here the impacts of trampling by cattle and increased woody cover along the banks is evident, leaving only small areas that may be considered suitable for this species. The proposed mining footprint are unlikely to impact on the integrity of the stream, though, continued cattle grazing and woody encroachment will likely do so.	VU	Medium

**CONCLUDING REMARKS**

Mining processes have the potential to impact on invertebrate species in the mining site, however, since much of the operations are located within the existing transformed footprints, direct impacts from habitat loss are likely to be limited. Of concern will be the introduction of artificial lighting to these areas for the purpose of operations and health and safety. This lighting will likely lead to the attraction of insects to these areas, disrupting their natural cycles / movement patterns. It is imperative that all external lighting be downward facing and that yellow/warm lighting is used instead of LED white lights in order to decrease insect attraction.





## 4 SENSITIVITY MAPPING

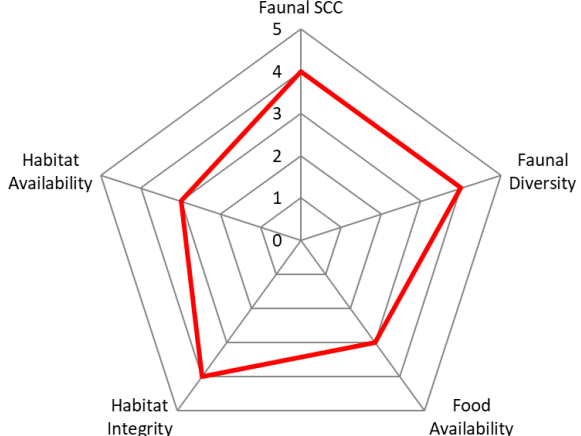
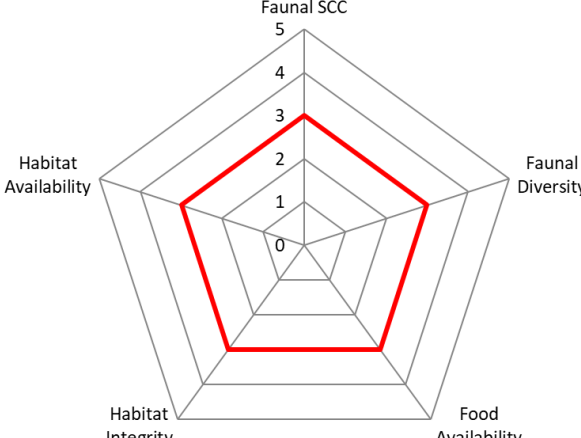
The Screening Tool identified the MR83 UG Areas to be in a **Medium and High Sensitivity** area for the Animal Species Theme. Based on the *ground-truthed results* of the site visit, Table 5 below presents the sensitivity of each identified habitat unit along with an associated conservation objective and implications for development.

Figures 10 - 15 below conceptually illustrates the faunal ecological sensitivity for the various areas. The areas are depicted according to their sensitivity in terms of the presence or potential for faunal SCC, habitat integrity, levels of disturbance and overall levels of diversity.

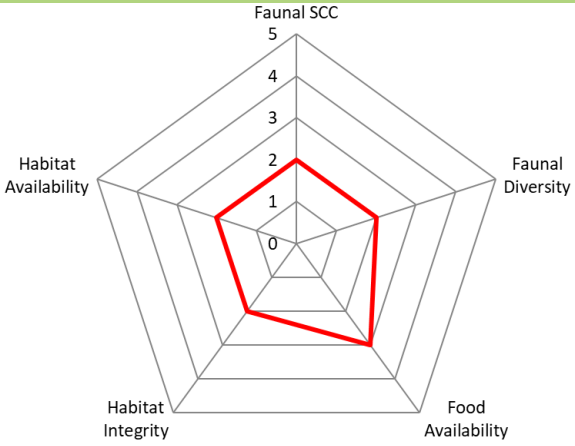
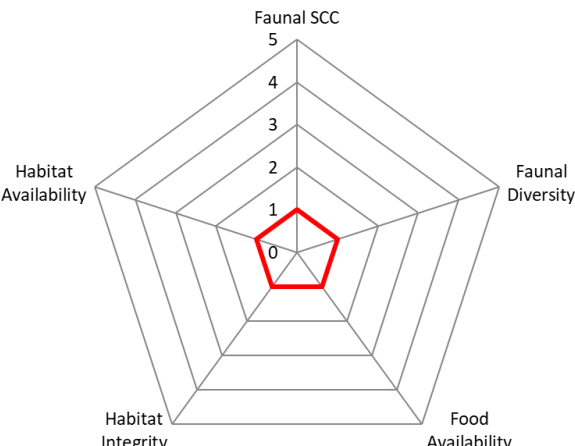
DRAFT FOR COMMENT



**Table 5: A summary of the sensitivity of each habitat unit and implications for the proposed activities.**

Habitat Sensitivity	Habitat Units	Conservation Objective	Key Habitat Characteristics
<p style="text-align: center;"><b>Moderately High</b></p> 	<p><b>Frankfort:</b></p> <ul style="list-style-type: none"> <li>- Indigenous Forest.</li> <li>- Intact Woodland portions.</li> <li>- Freshwater Habitat.</li> </ul> <p><b>Dukes:</b></p> <ul style="list-style-type: none"> <li>- Indigenous Forest.</li> <li>- Riparian Forest.</li> </ul> <p><b>Beta:</b></p> <ul style="list-style-type: none"> <li>- Watercourse Habitat.</li> </ul>	<p>Preserve and enhance the biodiversity of the habitat unit, limit development and disturbance.</p>	<ul style="list-style-type: none"> <li>- Suitable habitat to support an increased diversity of faunal species.</li> <li>- SCC may potentially occur within and / or make use of these habitats.</li> <li>- Habitats are largely intact and / or provide important ecological functions and support to faunal species.</li> </ul>
<p style="text-align: center;"><b>Intermediate</b></p> 	<p><b>Frankfort:</b></p> <ul style="list-style-type: none"> <li>- Intact Woodland portions.</li> </ul> <p><b>Morgenzon:</b></p> <ul style="list-style-type: none"> <li>- Woody communities.</li> <li>- Freshwater Habitat.</li> <li>- Valley Habitat.</li> <li>- AIP Dominated Vegetation.</li> </ul> <p><b>Dukes:</b></p> <ul style="list-style-type: none"> <li>- Riparian Woodland.</li> <li>- Portions Degraded Woodland.</li> </ul> <p><b>Beta:</b></p> <ul style="list-style-type: none"> <li>- Degraded Woodland.</li> <li>- Valley Habitat.</li> </ul>	<p>Preserve and enhance biodiversity of the habitat unit and surroundings while optimising development potential.</p>	<ul style="list-style-type: none"> <li>- Moderate diversity of common faunal species observed and supported in these habitats.</li> <li>- SCC may potentially make use of these habitats periodically e.g. foraging.</li> <li>- Habitats have been subjected to a degree of disturbance, however they still support fauna in terms of habitat provisioning and food resources.</li> <li>- Common faunal species likely to breed within these habitats and utilise them in the long term.</li> </ul>



Habitat Sensitivity	Habitat Units	Conservation Objective	Key Habitat Characteristics
<p style="text-align: center;"><b>Moderately Low</b></p> 	<p><b>Frankfort:</b> - AIP Dominated Vegetation.</p> <p><b>Dukes:</b> - Valley Habitat. - Portions Degraded Woodland. - AIP Dominated Vegetation. - Watercourse Habitat. - Riparian Woodland.</p> <p><b>Beta:</b> - Riparian Woodland. - AIP Dominated Vegetation.</p>	<p style="text-align: center;">Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects.</p>	<ul style="list-style-type: none"> <li>- Habitat integrity has been notably impacted upon.</li> <li>- Moderately low diversity of faunal species observed in these habitats.</li> <li>- Due to disturbances, illegal mining activities and AIP proliferation habitat provisioning has been compromised, limiting faunal abundances.</li> <li>- Only species better adapted to impacted / disturbed areas will make use of these habitats.</li> <li>- Does, however provide linkages between more suitable habitats.</li> </ul>
<p style="text-align: center;"><b>Low</b></p> 	<p><b>Transformed Habitat</b> - All sites.</p>	<p style="text-align: center;">Optimise development potential.</p>	<ul style="list-style-type: none"> <li>- Comprises all areas that have been significantly impacted upon and / or developed.</li> <li>- Limited habitat provisioning for fauna.</li> <li>- Not readily utilised by or of importance to faunal species.</li> </ul>



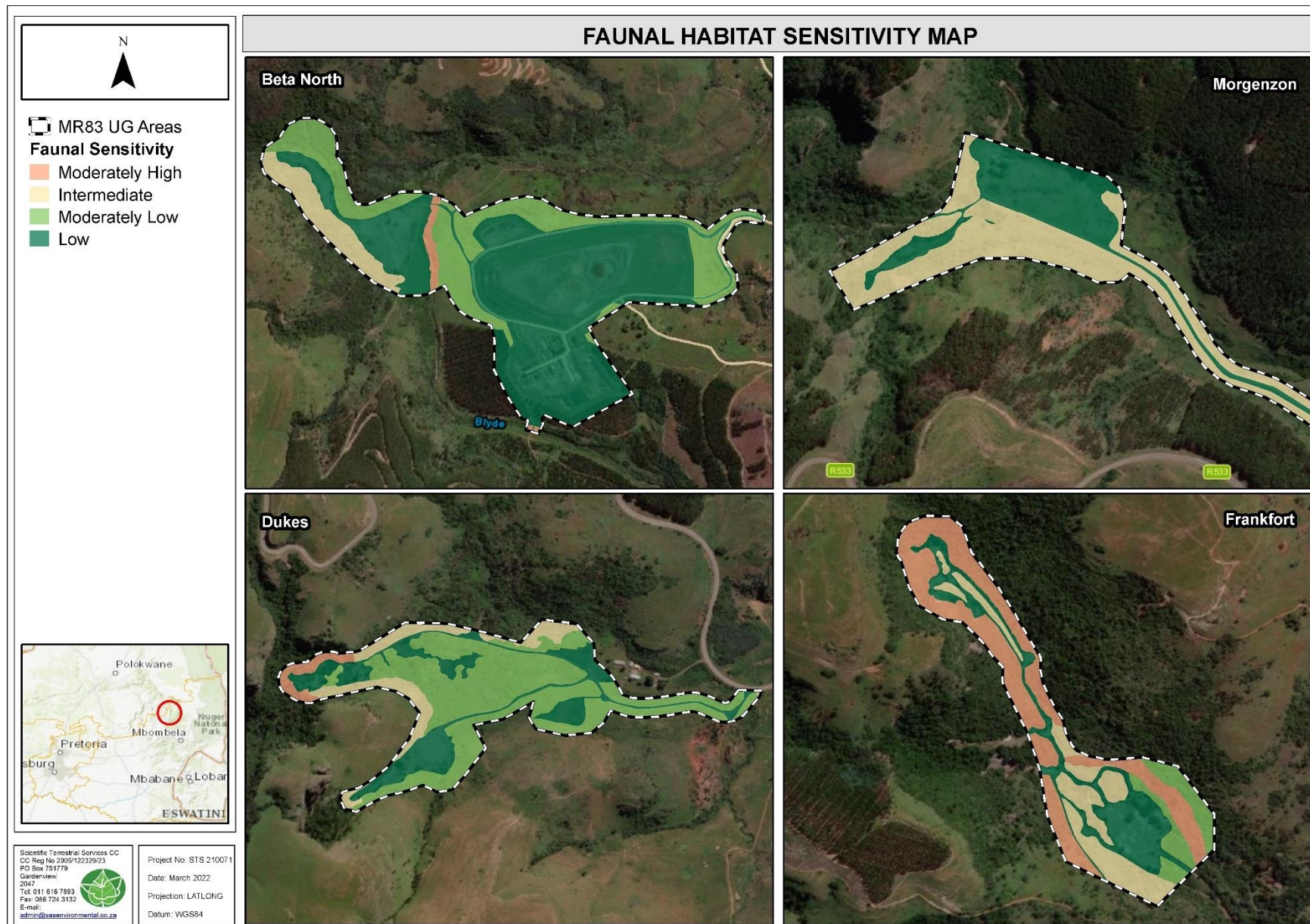


Figure 10. Combined faunal habitat sensitivity map for the MR83 UG Areas.





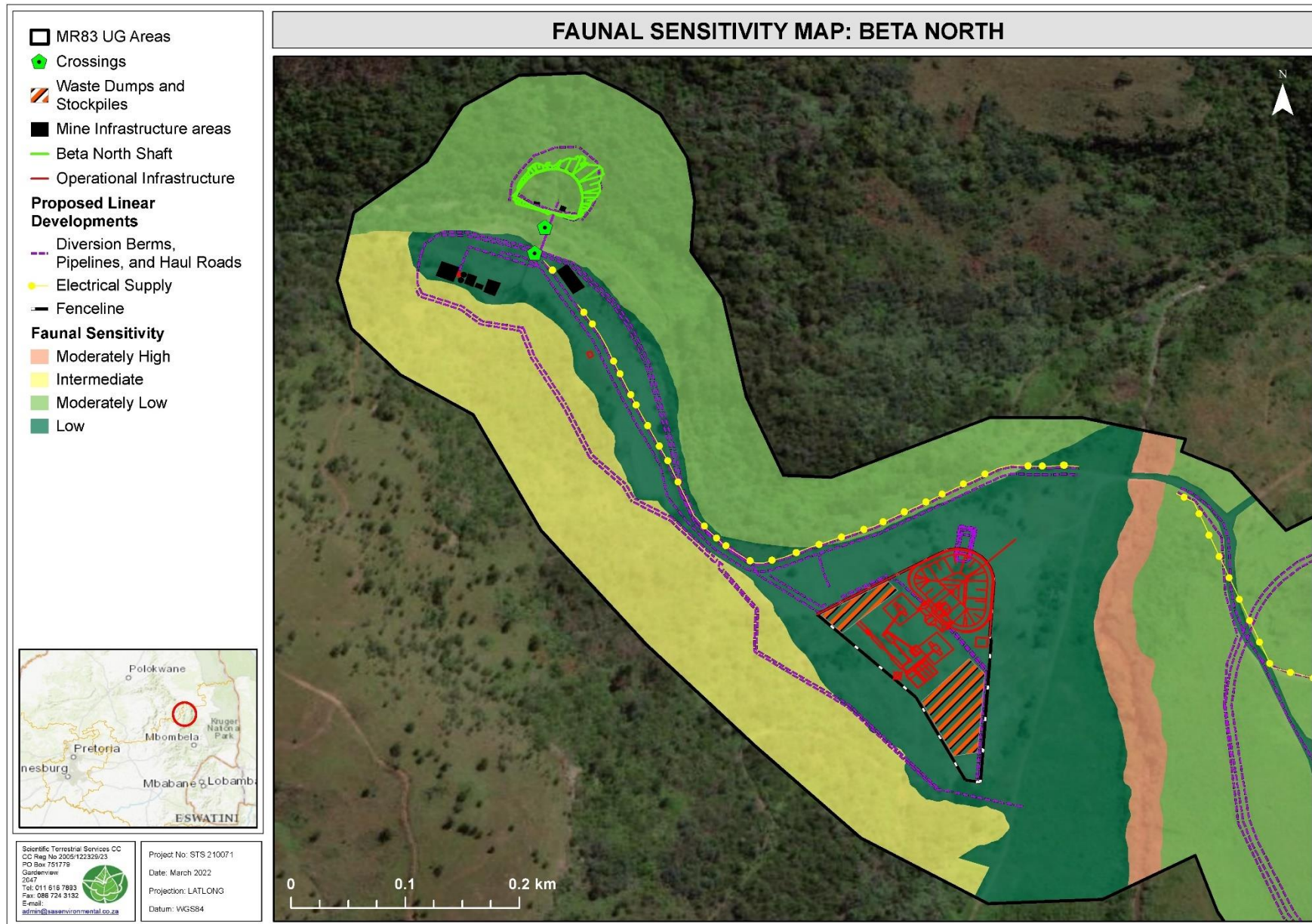


Figure 11. Faunal habitat sensitivity map for the eastern half of Beta.





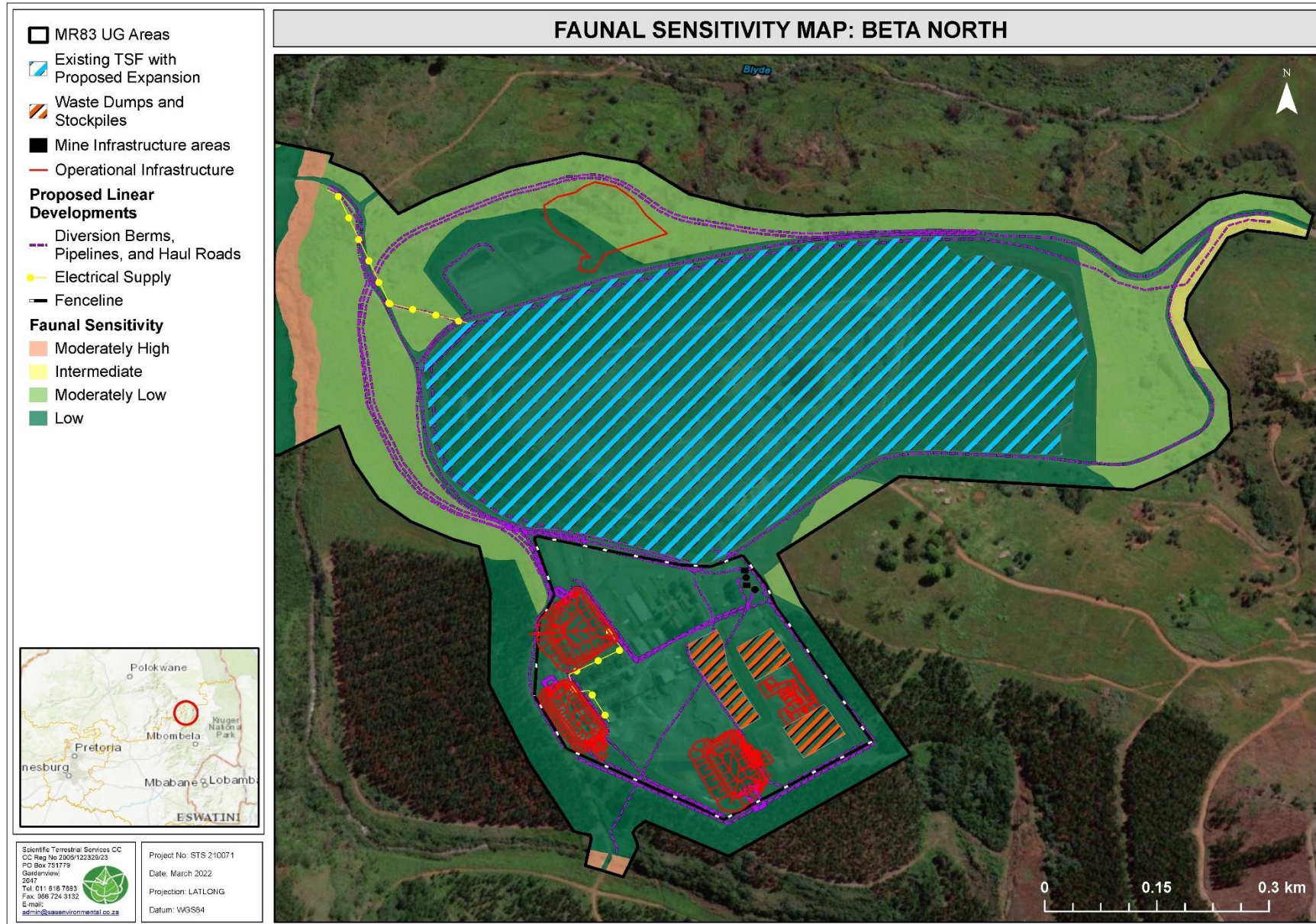


Figure 12. Faunal habitat sensitivity map for the western half of Beta.





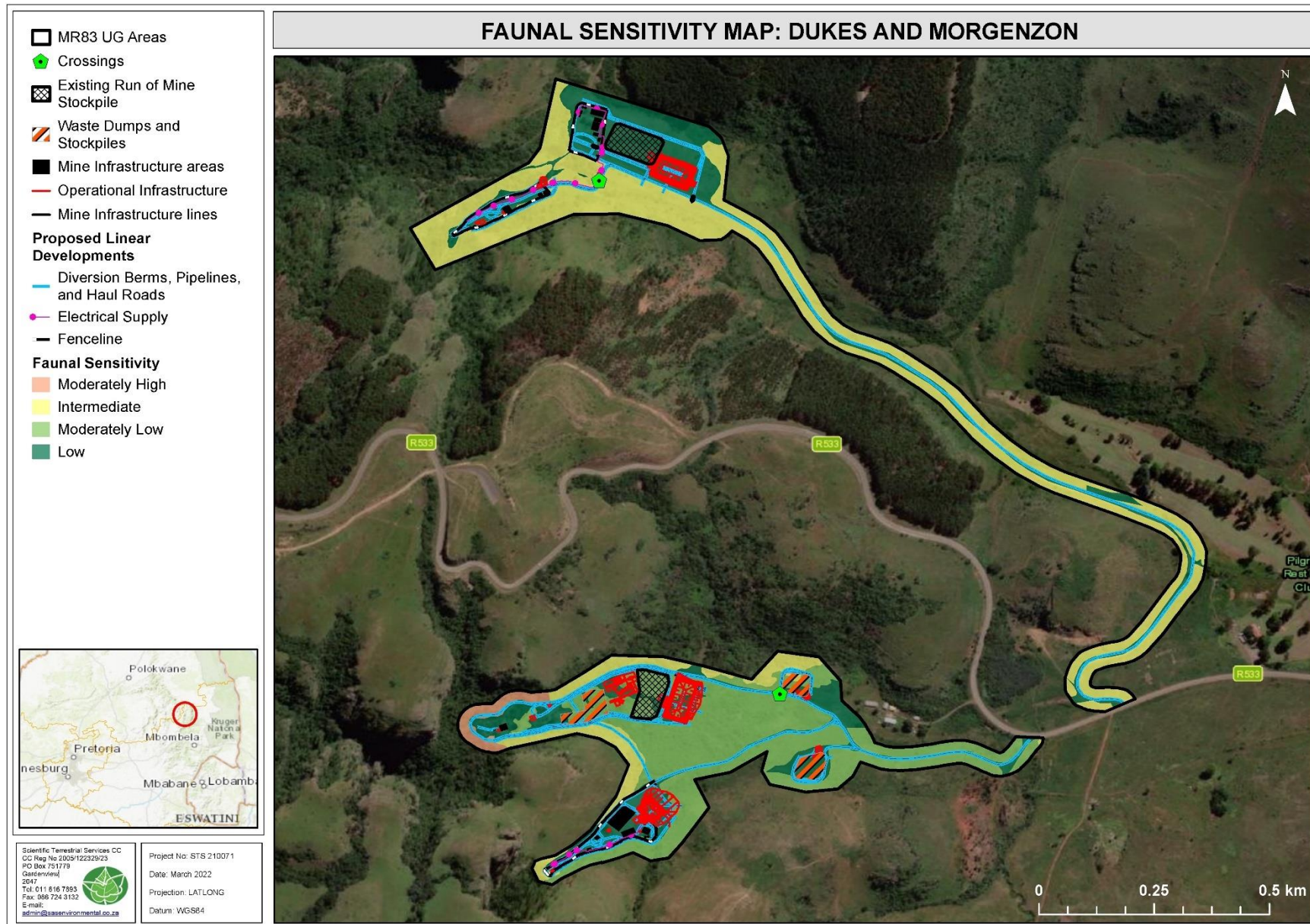


Figure 13. Combined faunal habitat sensitivity map for Dukes and Morgenzon.





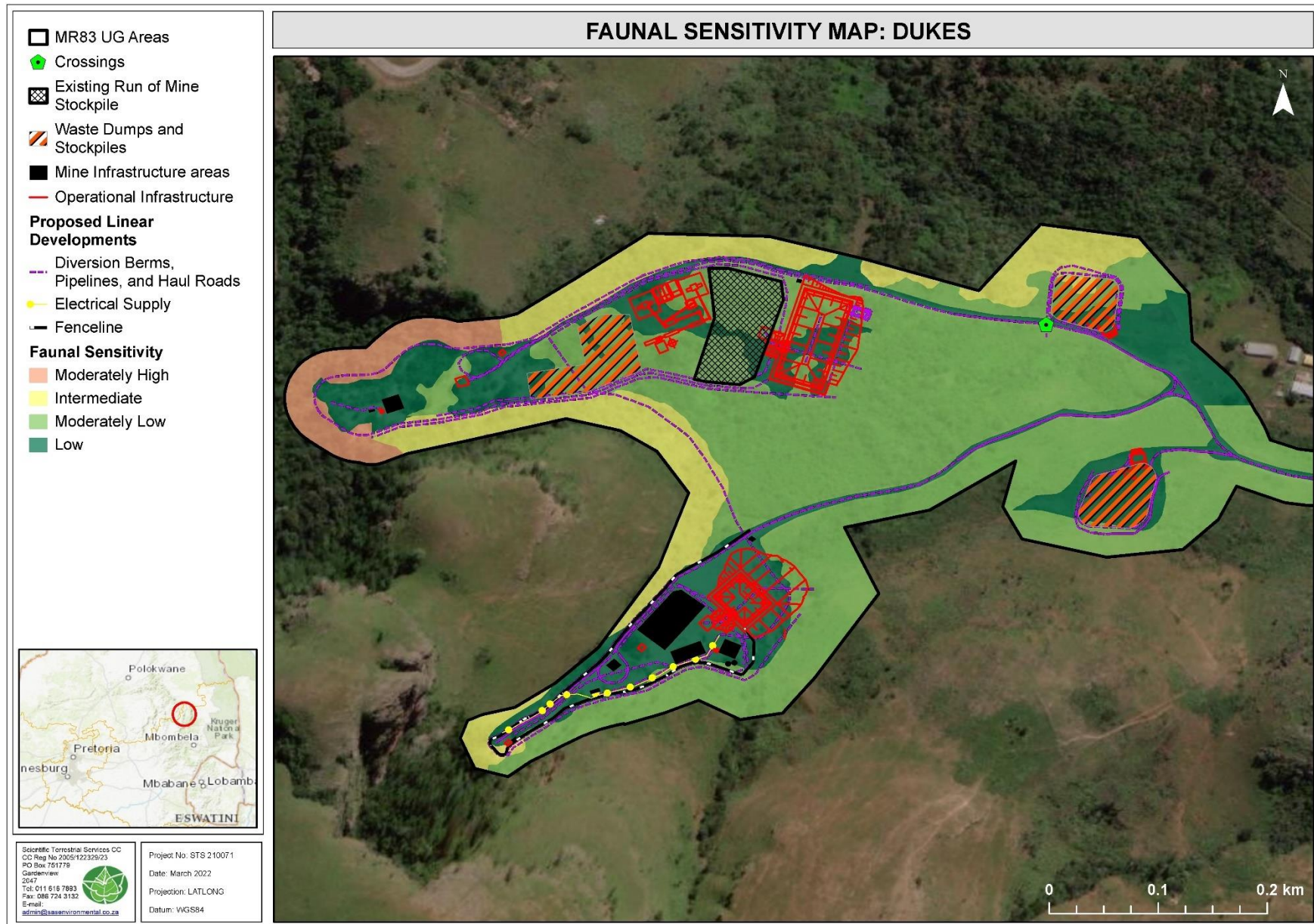


Figure 14. Faunal habitat sensitivity map for Dukus.





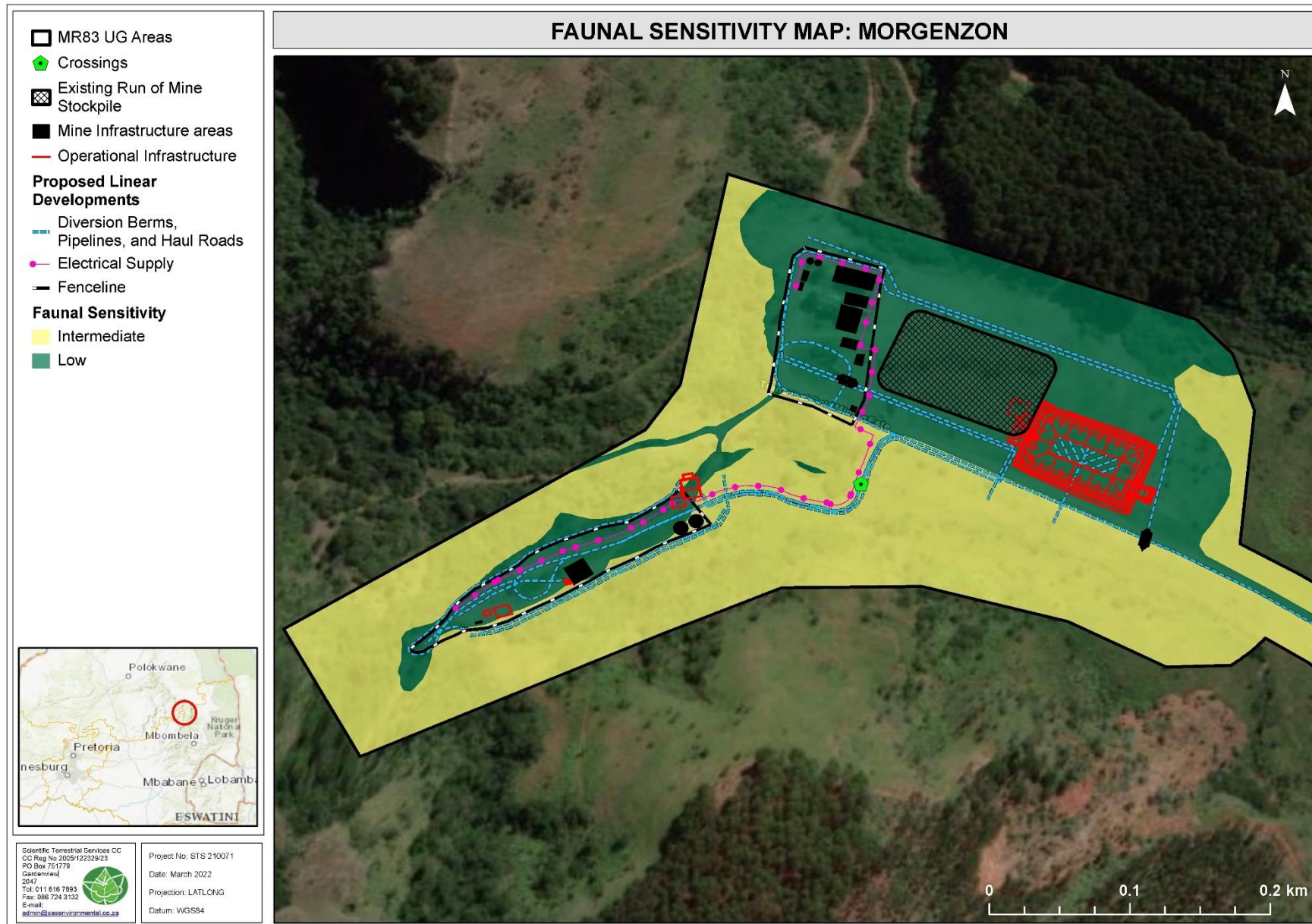


Figure 15. Faunal habitat sensitivity map for the Morgenzon.





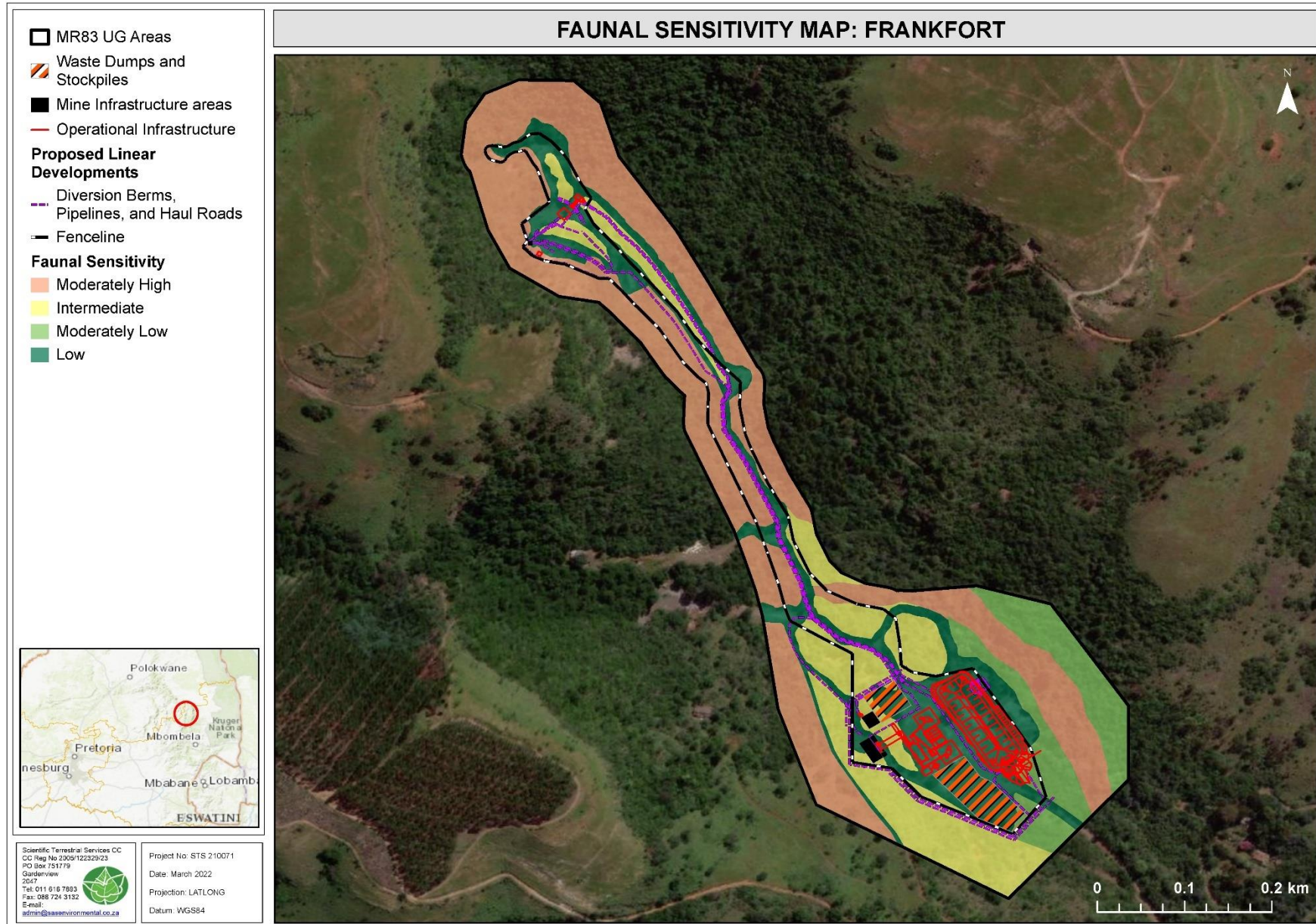


Figure 16. Faunal habitat sensitivity map for the Frankfort.



## 5 IMPACT ASSESSMENT

The sections below provide the significance of perceived impacts arising from the proposed development for the MR83 UG Areas.

An impact assessment (Section 5.1) and impact discussion (Section 5.2) of all potential pre-construction, operational and decommissioning and closure phase impacts are presented in this section. All mitigatory measures required to minimise the perceived impacts are presented in Section 5.1 along with the potential impacts.

### 5.1 Impact Assessment Results

The below table indicates the perceived risks to the faunal ecology associated with all phases of the proposed project. The table also provides the findings of the impact assessment undertaken with reference to the perceived impacts prior to the implementation of mitigation measures and following the implementation of mitigation measures. Key integrated mitigation measures that are applicable to the proposed project are presented in the below table and are required to suitably manage and mitigate the ecological impacts that are associated with all phases of the proposed activities.

The mitigated results of the impact assessment have been calculated on the premise that all mitigation measures as stipulated in this report are adhered to and implemented. Should such actions not be adhered to, it is highly likely that post-mitigation impact scores will increase.



**Table 6: Impacts on the faunal component resulting from the proposed mining activities. (\*WOM = Without Mitigation; WM = With Mitigation).**

Activity	Aspect affected	Potential Impact	Without or With Mitigation	Nature (Negative or Positive Impact)	Probability	Duration	Scale	Magnitude/ Severity	Significance	Management Measures	
<b>Construction Phase</b>											
Clearance of vegetation in the AIP-Dominated Habitat	Faunal habitat and species	*Loss of marginal faunal habitat where footprint areas extend into habitat unit. *Decrease in seasonal food resources provided by flowering and fruiting plants (AIPs). *Potential marginal decrease in faunal species abundances. *Alien plant proliferation likely to occur in disturbed areas.	WOM	Negative	5	4	2	6	60	Moderate	*At all times, ensure that sound environmental management is in place during the construction phase. *An AIP Management/Control Plan should be compiled for implementation prior to vegetation clearance and construction starting. *A Biodiversity Action Plan must be developed and implemented prior to the construction phase and carried through into the operational phase, and updated accordingly. *Should any SCC need to be removed (unlikely) the removal and/or rescue and relocation should be overseen by a MTPA-suitably qualified ecologist with all permits/authorisations in place. *Clearly demarcate the project footprints and ensure that no vegetation clearance or vehicle movement occurs beyond these demarcated areas. *Ensure that existing roads are used as far as possible and that limited development of new roads occurs. *Where linear infrastructure, notably fences etc encroaches into sensitive habitat, it is recommended that these structures be shifted so as to avoid the sensitive habitat. *All Freshwater crossing points are to be designed in such a way that they do no impact on the geomorphological or hydrological functioning of the systems.
			WM	Negative	5	3	1	6	50	Moderate	
Clearance of vegetation in the Riparian Forest	Faunal habitat and species	*Loss of faunal habitat where fence structure extends through a section of this habitat unit at Frankfort. *Possible proliferation and erosion from fence installation leading habitat degradation and sedimentation of the downslope habitat. *Potential loss of faunal SCC.	WOM	Negative	4	1	1	6	32	Low	
			WM	Negative	2	1	1	2	8	Negligible	
Clearance of vegetation in the Riparian Woodland	Faunal habitat and species	*Loss of faunal habitat where footprint areas extend into habitat unit, notably linear structures. *Potential marginal decrease in faunal species abundances due to fences limiting faunal species movement. *Alien plant proliferation likely to occur in disturbed areas. *Potential loss of faunal SCC.	WOM	Negative	5	4	1	6	55	Moderate	
			WM	Negative	5	3	2	2	35	Low	
Linear crossings of the Watercourse Habitat	Faunal habitat and species	*Increased sedimentation due to runoff from haul roads and pipeline footprints altering bankside vegetation and instream faunal habitat. *Increased risk of hydrocarbons entering the watercourses as a result of leaks and spills from construction vehicles when crossing the watercourse habitat potentially impacting on the bankside and instream faunal species (amphibians). *Altered flow patterns and hydrological cycles impacting on water dependant faunal species both down and upstream of the crossing. *Potential loss of faunal SCC.	WOM	Negative	5	3	2	6	55	Moderate	
			WM	Negative	5	3	1	2	30	Low	





Clearance of vegetation in the Indigenous Forest	Faunal habitat and species	<p>*Loss of faunal habitat where linear infrastructure is located within the Forest habitat.</p> <p>*Decreased faunal diversity due to disturbances to Forest habitat.</p> <p>*Increased risk of AIPs proliferating in the disturbed areas changing the vegetative composition of the forest.</p> <p>*Potential loss of faunal SCC.</p>	WOM	Negative	4	4	2	6	48	Moderate	<p>*No hunting/catching of faunal species or SCC by mine employees is allowed.</p> <p>*No informal fires by construction personnel are allowed.</p> <p>*Construction footprints must be regularly monitored for edge effects.</p> <p>*Smaller species such as scorpions and reptiles are likely to be less mobile during the colder period, as such should any be observed in the site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Construction personnel are to be educated about these species and the need for their conservation. Smaller scorpion species and harmless reptiles should be carefully relocated by a suitably nominated construction person or nominated mine official. For larger venomous snakes, a suitably trained mine official or specialist should be contacted to effect the relocation of the species, should it not move off on its own.</p> <p>*Areas of increased ecological sensitivity falling outside of the direct mine footprint should be designated as No-Go areas.</p> <p>*It is recommended that the entrances of the old adits should not be closed / sealed so as to ensure their continued use for bat species. However, as these old adits pose a safety risk due to use by illegal miners, it is recommended that the old adits are sealed at the back where they intercept with the MR83 proposed mining adits. Old adits that do not intercept the MR83 underground workings, but require closing due to safety, should be sealed / closed at the back of the shaft, allowing for at least 20-30m of shaft being left open from the adit entrance. This will ensure that the roosting sights for bats are not closed off and they can continue to utilise these areas.</p> <p>*All external lights must be downward facing and with warm/yellow light emitting globes to minimise insect attraction. The bare minimum amount of external lighting in order to ensure personnel safety must be used.</p>
			WM	Negative	2	3	1	2	12	Negligible	
Clearance of vegetation in the Degraded Woodland	Faunal habitat and species	<p>*Loss of faunal habitat within the proposed footprint areas.</p> <p>*Displacement and potential loss of faunal species within the proposed footprint areas.</p> <p>*Edge effects as a result of poor management of construction activities leading to further habitat and faunal species loss.</p>	WOM	Negative	5	4	2	6	60	Moderate	
			WM	Negative	5	4	1	6	55	Moderate	
Clearance of vegetation in the Intact Woodland	Faunal habitat and species	<p>*Loss of faunal habitat where linear infrastructure is located within the woodland habitat.</p> <p>*Decreased faunal diversity due to disturbances to woodland habitat.</p> <p>*Increased risk of AIPs proliferating in the disturbed areas changing the vegetative composition of the woodlands.</p> <p>*Potential loss of faunal SCC.</p>	WOM	Negative	5	4	2	6	60	Moderate	
			WM	Negative	5	3	1	6	50	Moderate	
Clearance of vegetation in the Valley Habitat	Faunal habitat and species	<p>*Loss of faunal habitat within the proposed footprint areas.</p> <p>*Displacement and potential loss of faunal species within the proposed footprint areas.</p> <p>*Edge effects as a result of poor management of construction activities leading to further habitat and faunal species loss.</p>	WOM	Negative	5	4	2	6	60	Moderate	
			WM	Negative	5	3	1	6	50	Moderate	
All construction related activities	Faunal habitat and species	<p>*Edge effects impacting adjacent habitat e.g., the of alien vegetation and the loss of viable soils for re-establishment of indigenous species if soils are allowed to become compacted and / or eroded.</p> <p>*Snaring, poaching / hunting of faunal species by construction personnel.</p> <p>*Fauna mortalities from vehicle strikes.</p> <p>*Runaway fires may lead to habitat and species loss.</p> <p>*Too frequent / uncontrolled fires may lead to structural and plant species composition of habitats.</p> <p>*Potential loss of faunal SCC.</p> <p>*Movement of personnel into old adits disturbing roosting bats, notably SCC.</p>	WOM	Negative	4	3	1	6	40	Low	
			WM	Negative	2	3	1	6	20	Negligible	



Operational Phase											
Movement of in vehicles	Faunal species	*Collisions with mine vehicles and fauna. *Spillage/leakage of chemicals, fuel and oils from equipment leading to hydrocarbon ingress into the soils affecting plant growth (faunal habitat and food resources) and soil organisms. *Hydrocarbons may impact surrounding habitat as a result of water runoff or leaching into subterranean water sources during rainfall events	WOM	Negative	5	4	2	2	40	Low	*At all times, ensure that sound environmental management is in place during the operation phase. *An AIP Management/Control Plan should be in place and AIP control should be carried out as required. *A Biodiversity Action Plan must be implemented. *Should any SCC need to be removed (unlikely) the removal and/or rescue and relocation should be overseen by a MTPA-suitably qualified ecologist with all permits/authorisations in place. *No vegetation clearance or vehicle movement should occur outside of the operational footprint area unless authorised. *Ensure that existing roads are used as far as possible and that limited development of new roads occurs. *All infrastructure is to be regularly inspected for erosion or environmental risks, notably the fence lines (erosion) and the freshwater crossings. *All pipelines are to be inspected on a bi-monthly basis to ensure no leaks are present and that no contamination of the receiving environment has occurred. *Freshwater crossing points are to be checked and if need be debris cleared to main the hydrological functioning of the system. *No hunting/catching of faunal species or SCC by mining personnel is to be allowed, unless specific authorisation has been acquired from the provincial department. *No informal fires by construction personnel are allowed. *Construction footprints must be regularly monitored for edge effects. *Smaller species such as scorpions and reptiles are likely to be less mobile during the colder period, as such should any be observed in the site during operational activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Personnel are to be educated about these species and the need for their conservation. Smaller scorpion species and harmless reptiles should be carefully relocated by a suitably
			WM	Negative	4	4	1	2	28	Low	
Mine operation - lighting	Faunal species	*Artificial lighting in dark landscapes impacts on natural behavioural patterns of nocturnal species, notably insects. Such impacts include alteration of breeding and foraging patterns which in the long term can affect population numbers. *Attraction to light sources also creates an unnaturally high abundance of insects in a single spot, with insectivores such as bats and reptiles capitalising on this. This may lead to increased predation on insects.	WOM	Negative	5	4	2	2	40	Low	
			WM	Negative	5	4	1	2	35	Low	
Mining operations - edge effects	Faunal habitat and species	*Further loss of habitat and faunal species therein in the areas adjacent the mining activities. *Increased vehicle and personnel movement assists in the further spread of AIPs within the footprint areas as well as the surrounding habitats *Increased AIP proliferation in these disturbed footprints. *Unauthorised and/or planned clearance of vegetation outside of the footprint leading to further habitat disturbance.	WOM	Negative	5	4	2	6	60	Moderate	
			WM	Negative	4	4	1	2	28	Low	
Poor erosion control	Faunal habitat and species	*Increase erosion and sediment runoff impacting on habitat in the surrounding areas. *Degradation of Freshwater systems. *Sedimentation of Freshwater systems will impact upon amphibians and other aquatic species, potentially SCC.	WOM	Negative	4	3	1	8	48	Moderate	
			WM	Negative	2	3	1	6	20	Negligible	
	Faunal habitat	*Increased risk of snaring / poaching of animals and possibly SCC. *Runaway fires causing damage to the surrounding vegetation types,	WOM	Negative	4	3	1	6	40	Low	



Mine operation - personnel	and species	leading to potential change in vegetation structure and faunal species diversity.	WM	Negative	2	3	1	6	20	Negligible	nominated construction person or nominated mine official. For larger venomous snakes, a suitably trained mine official or specialist should be contacted to effect the relocation of the species, should it not move off on its own.
Mine operation - noise	Faunal species	*Increased ambient noise from operational activities and facilities may drown out calls / communication of faunal species nearby. Increased ambient noise may lead to decreased breeding success or failure to hear nearby predator.	WOM	Negative	2	4	2	6	24	Low	*Areas of increased ecological sensitivity falling outside of the direct mine footprint should be designated as No-Go areas. *It is recommended that the entrances of the old adits should not be closed / sealed so as to ensure their continued use for bat species. However, as these old adits pose a safety risk due to use by illegal miners, it is recommended that the old adits are sealed at the back where they intercept with the MR83 proposed mining adits. Old adits that do not intercept the MR83 underground workings, but require closing due to safety, should be sealed / closed at the back of the shaft, allowing for at least 20-30m of shaft being left open from the adit entrance. This will ensure that the roosting sights for bats are not closed off and they can continue to utilise these areas.
			WM	Negative	2	4	1	6	22	Low	*All external lights must be downward facing and with warm/yellow light emitting globes to minimise insect attraction. The bare minimum amount of external lighting in order to ensure personnel safety must be used. *it is recommended that a faunal monitoring program, to be defined within the BAP, be put in place to monitor species diversity and the potential changes thereof during the life of mine.
<b>Closure and Post closure</b>											
Rehabilitation	Faunal habitat and species	*Failure to reinstate degraded and impacted faunal habitat through rehabilitation activities. *Proliferation of AIPs in the disturbed areas post mining, replacing indigenous (and endemic) vegetation leading to long term loss of faunal habitat and species diversity. *Failure to remove and remedy all TSF and PCD structures so that no contamination of the surrounding habitat occurs.	WOM	Negative	5	4	2	6	60	Moderate	*Implement all recommendations as per the mine closure plan. *All surface infrastructure should be removed, and waste material disposed of at a registered dump site. Waste and remnant mine related material should not be dumped or left on site.
			WM	Negative	2	4	1	6	22	Low	*Where soils have been compacted, they are to be ripped and where necessary reprofiled in accordance with the rehabilitation plan. *Indigenous floral species are to be used for revegetation of disturbed areas with the end goal to



Closure operations	Faunal habitat and species	<p>*Failure to break down and remove all mining structures and rehabilitating the footprints to a pre-mining state leading to long term and potentially permanent habitat degradation and species diversity loss.</p> <p>*Poaching of faunal species by closure staff and contract workers leading to further loss of species diversity.</p>	WOM	Negative	2	4	2	6	24	Low	<p>achieve the same vegetation composition and similar structure as pre-mining conditions.</p> <p>*Continue with AIP control as per the AIP control and mine closure plan.</p> <p>*Continue monitoring of rehabilitation activities for a minimum period of 5 years following the mine closure or until an acceptable level of habitat and biodiversity reinstatement has occurred, in such a way as to ensure that natural processes and veld succession will lead to the re-establishment of the natural wilderness conditions which are analogous to the pre-mining conditions of the area.</p>
			WOM	Negative	2	4	1	6	22	Low	

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## 5.2 Impact Discussion

The perceived impact significance of the proposed mining development and activities on faunal habitat, diversity, and SCC ranges from **moderate to low** significance without mitigation. Should mitigatory measures not be implemented, impacts can be reduced to **low and negligible** levels, considering that much of the proposed infrastructure is located in already transformed areas. Increased impact significance prior to mitigation is largely based on the assumption that mitigation measures will not be implemented, that areas outside of the proposed development footprint will also be cleared and that no rescue and relocation, rehabilitation or alien plant control plans will be implemented. When factoring in the mitigation measures stipulated within this report the overall anticipated impacts decrease to low/acceptable levels, especially considering that the majority of the mining infrastructure will be located in old mining footprint and areas that have already been compromised and contain little value from a faunal perspective.

### 5.2.1 Impact on Faunal Habitat and Diversity

Much of the proposed mining infrastructure will be located in the Transformed habitat, a habitat that is of very little value to faunal species. Portions of the proposed infrastructure areas will however extend into the surrounding habitats, though, the footprints of these is notably small and not expected to have a significant impact on faunal species diversity. It is noted that portions of the linear structures, roads, pipelines, fences etc. do intersect areas of increased sensitivity. Habitat clearance in these areas of increased sensitivity is concerning, however, given the small extents of the proposed clearing and with mitigation measures implemented, it is unlikely that there will be a significant impact to faunal species.

### 5.2.2 Impacts on Faunal SCC

One faunal SCC, namely *Rhinolophus blasii* (Blasius's Horseshoe Bat, NT), was observed in an old adit located to the north of the proposed Morgenzon mine, outside of any potential disturbance footprint. Though, it is noted that this species may be present and make use of various other old adits. As such, it is recommended that the entrances to these adits should remain open, with the shaft / tunnel being sealed approximately 20-30m inwardly. Such measures will endeavour to meet both the safety needs of the mine as well as the needs to keep the adits open for roosting of bats. Several other faunal SCC (see Sections 3.2 – 3.6) may also occur either within or adjacent to the proposed mining footprints. It is however important to note that none of the SCC are likely reliant on the proposed footprint areas, likely only foraging in the areas or moving through the proposed mining areas as they form part of



a larger home range of a species. Impacts to faunal SCC from the proposed mining activities is expected to be limited given the mine locations, small overall footprints and already impacted areas. Provided all mitigation measures are implemented, impacts to faunal SCC are likely to be manageable and not detrimental to SCC.

### 5.2.3 Probable Residual Impacts

Even with extensive mitigation, residual impacts on the receiving faunal ecological environment are likely. The following points highlight the key residual impacts that have been identified. It should be noted, however, that these impacts are also a result of the already degraded state of the environment due to the historic mining activities in the areas as well as the current illegal mining activities.

- Continued degradation of natural habitat adjacent to the proposed mining footprint as a result of edge effects;
- Altered faunal species diversity;
- Potential loss of faunal abundance in the local area;
- Edge effects such as further habitat fragmentation and AIP proliferation; and
- Disturbed areas are highly unlikely to be rehabilitated to baseline levels of ecological functioning and loss of faunal habitat and species diversity may be long term.

### 5.2.4 Cumulative Impacts

The Pilgrims Rest area is well known from a historical mining perspective, and more recently from an illegal mining one. Much of the landscape has seen significant habitat and biodiversity loss due to extensive vegetation clearance for plantations, mostly comprising of pine trees. In addition to this, historic mining activities has resulted in disturbance footprints scattered throughout the local area, some more noticeable than others. As a result, the remaining intact habitat areas are considered to be of increased importance for faunal species. These remaining areas however are now being heavily impacted upon as a result of illegal mining activities and AIP proliferation. The proposed MR83 mining activities are predominantly located in old mining areas, many of which are currently occupied by illegal miners. As such, the cumulative impacts are expected to be minimal as the majority of impacts will be located within already impacted sites. It is however possible that legal mining activities may in turn have a positive cumulative impact to the region through the controlling of AIPs and through controlled mining activities that do not lead to the pollution of the freshwater systems and surrounding areas as is currently seen with the illegal miners.



## 6 CONCLUSION

STS was appointed to undertake a terrestrial biodiversity assessment as part of the proposed EIA and WUL amendment processes for the MR83 UG targets areas, namely Dukes, Beta, Morgenzon and Frankfort.

The field results indicated that overall, the majority of the proposed mining infrastructures are located within areas that have been historically disturbed from previous mining and other land uses. Intact and sensitive habitats were however noted adjacent to some of the proposed mining sites, though, limited infrastructure is proposed in these areas (mostly relating to fences and pipelines). Provided all mitigation measures are implemented and the construction and operational activities well managed, significant impacts to faunal habitat and species is unlikely.

One faunal SCC, namely *Rhinolophus blasii* (Blasius's Horseshoe Bat, NT), was observed in an old adit located to the north of the proposed Morgenzon mine, outside of any potential disturbance footprint. Several other faunal SCC may occur in the adjacent habitats, though mining related activities are not expected to have a significant impact to these species.

Overall, the perceived impact significance of the proposed mining development and activities on faunal habitat, diversity and SCC ranges from **moderate to low** significance without mitigation, reducing to **low and negligible** levels with mitigation measures and sound environmental management being implemented.

The objective of this study was to provide sufficient information on the faunal ecology of the area, together with other studies on the physical and socio-cultural environment, in order for the Environmental Assessment Practitioner (EAP) and the relevant authorities to apply the principles of Integrated Environmental Management (IEM) and the concept of sustainable development.



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## APPENDIX A: Faunal Method of Assessment

It is important to note that due to the nature and habits of fauna, varied stages of life cycles, seasonal and temporal fluctuations along with other external factors, it is unlikely that all faunal species will have been recorded during the site assessment. The presence of anthropogenic activities near the MR83 UG Areas may have an impact on faunal behaviour and in turn the rate of observations. In order to increase overall observation time within the MR83 UG Areas, as well as increasing the likelihood of observing shy and hesitant species, Sherman and camera traps are usually placed within the MR83 UG Areas. Sherman traps are often used to increase the likelihood of capturing and observing small mammal species, notably small nocturnal mammals.

### ***Mammals***

Mammal species were recorded during the field assessment with the use of visual identification, spoor, calls, dung, and other notable field signs. Due to the short duration, limited size and disturbed nature of the environment, camera and Sherman traps were not employed. Specific attention was paid to mammal SCC as listed by the International Union for the Conservation of Nature (IUCN), the Mpumalanga province and NEMBA.

### ***Avifauna***

The Southern African Bird Atlas Project 2 database (<http://sabap2.adu.org.za/>) was compared with the recent field survey of avifaunal species identified in the MR83 UG Areas. Field surveys were undertaken utilising direct observation and bird call identification techniques to accurately identify avifaunal species. Specific attention was given to avifaunal SCC listed on a regional and national level, as well as those identified by the International Union for the Conservation of Nature (IUCN).

### ***Reptiles***

Reptiles were identified during the field survey. Suitable applicable habitat areas (rocky outcrops and fallen dead trees) were inspected, and all reptiles encountered were identified. The data gathered during the assessment along with the habitat analysis provided an accurate indication of which reptile species are likely to occur on the MR83 UG Areas. Specific attention was given to reptile SCC listed on a regional and national level, as well as those identified by the International Union for the Conservation of Nature (IUCN).

### ***Amphibians***

Identifying amphibian species is done using direct visual identification along with call identification technique. Amphibian species flourish in and around wetland, riparian and moist grassland areas. It is unlikely that all amphibian species will have been recorded during the site assessment, due to their cryptic nature and habits, varied stages of life cycles and seasonal and temporal fluctuations within the environment. The data gathered during the assessment along with the habitat analysis provided an accurate indication of which amphibian species are likely to occur within the MR83 UG Areas as well as the surrounding area. Specific attention was given to amphibian SCC listed on a regional and national level, as well as those identified by the International Union for the Conservation of Nature (IUCN).

### ***Invertebrates***

Whilst conducting transects through the MR83 UG Areas, all insect species visually observed were identified, and where possible photographs taken. Unfortunately as a result of limited access and security reasons, pitfall traps could not be installed. A large net was instead used to capture insects, by moving it through the grass.



It must be noted however that due to the cryptic nature and habits of insects, varied stages of life cycles and seasonal and temporal fluctuations within the environment, it is unlikely that all insect species will have been recorded during the site assessment period. Nevertheless, the data gathered during the assessment along with the habitat analysis provided an accurate indication of which species are likely to occur in the MR83 UG Areas at the time of the survey. Specific attention was given to insect SCC listed on a regional and national level, as well as those identified by the International Union for the Conservation of Nature (IUCN).

## Arachnids

Suitable applicable habitat areas (rocky outcrops, sandy areas and fallen dead trees) where spiders and scorpions are likely to reside were searched. Rocks were overturned and inspected for signs of these species. Specific attention was paid to searching for Mygalomorphae arachnids (Trapdoor and Baboon spiders) as well as potential SCC scorpions within the MR83 UG Areas.

## Faunal Species of Conservation Concern Assessment

Prior to the site visit, a record of faunal SCC and their habitat requirements was developed for the MR83 UG Areas, which includes consulting the National Web-based Environmental Screening Tool. Because not all SCC have been included in the Screening Tool layers (e.g. NT and DD taxa), it remains important for the specialist to be on the lookout for additional SCC. For this study, known distribution ranges and literature regarding SCC was used in conjunction with primary sources described below.

### The National Web-Based Environmental Screening Tool

The Screening Tool was accessed to obtain a list of potentially occurring species of conservation concern for the MR83 UG Areas. Each of the themes in the Screening Tool consists of theme-specific spatial datasets which have been assigned a sensitivity level namely, “low”, “medium”, “high” and “very high” sensitivity. The four levels of sensitivity are derived and identified in different ways, e.g. for **confirmed** areas of occupied habitat for SCC a Very High and High Sensitivity is assigned and for areas of suitable habitat where SCC may occur based on spatial models only, a Medium Sensitivity is assigned. The different sensitivity ratings pertaining to the Animal [and Plant] Protocols are described below<sup>1</sup>:

- **Very High:** Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 km<sup>2</sup> are considered Critical Habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under Critically Endangered (CR), Endangered (EN), or Vulnerable (VU) D criteria of the IUCN or species listed as Critically/Extremely Rare under South Africa’s National Red List Criteria. For each species reliant on a Critical Habitat, all remaining suitable habitat has been manually mapped at a fine scale.
- **High:** Recent occurrence records for all threatened (CR, EN, VU) and/or rare endemic species are included in the high sensitivity level. Spatial polygons of suitable habitat have been produced for each species by intersecting recently collected occurrence records (those collected since the year 2000) that have a spatial confidence level of less than 250 m with segments of remaining natural habitat.
- **Medium:** Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. Two types of spatial models have been included. The first is a simple rule-based habitat suitability model where habitat attributes such as vegetation type and altitude are selected for all areas where a species has been recorded to occur. The second is a species distribution model which uses species occurrence records combined with multiple environmental variables to quantify and predict areas of suitable habitat. The models provide a probability-based

<sup>1</sup> More details on the use of the Screening Tool for Species of Conservation Concern can be found in the below resources:

- South African National Biodiversity Institute (SANBI). 2020. Draft Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Flora (3c) & Terrestrial Fauna (3d) Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 1.0.
- The National Web based Environmental Screening Tool website:  
<https://screening.environment.gov.za/screeningtool/#/pages/welcome>



distribution indicating a continuous range of habitat suitability across areas that have not been previously surveyed. A probability threshold of 75% for suitable habitat has been used to convert the modelled probability surface and reduce it into a single spatial area which defines areas that fall within the medium sensitivity level.

- **Low**: Areas where no SCC are known or expected to occur.

## NEMBA TOPS SPECIES AND NATIONALLY AND PROVINCIALY LISTED SCC

The Threatened or Protected Species (TOPS) Regulations (GN 255 of 2015) under Section 56(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), were taken into consideration as well as all species listed by the IUCN, the National Biodiversity Assessment 2019 and the relevant provincial conservation databases.

Throughout the fauna assessment, special attention was paid to the identification of any of these SCC as well as the identification of suitable habitat that could potentially support these species. The **Probability of Occurrence (POC)** for each faunal SCC is described as:

- **“Confirmed”**: if observed during the survey;
- **“High”**: if within the species’ known distribution range and suitable habitat is available;
- **“Medium”**: if either within the known distribution range of the species or if suitable habitat is present; or
- **“Low”**: if the habitat is not suitable and falls outside the distribution range of the species.

The accuracy of the POC is based on the available knowledge about the species in question, with many of the species lacking in-depth habitat research.

## Faunal Habitat Sensitivity

The sensitivity of the MR83 UG Areas for each faunal class (i.e. mammals, birds, reptiles, amphibians and invertebrates) was determined by calculating the mean of five different parameters which influence each faunal class and provide an indication of the overall faunal ecological integrity, importance and sensitivity of the MR83 UG Areas for each class. Each of the following parameters are subjectively rated on a scale of 1 to 5 (1 = lowest and 5 = highest):

- **Faunal SCC**: The confirmed presence or potential for faunal SCC or any other significant species, such as endemics, to occur within the habitat unit;
- **Habitat Availability**: The presence of suitable habitat for each class;
- **Food Availability**: The availability of food within the MR83 UG Areas for each faunal class;
- **Faunal Diversity**: The recorded faunal diversity compared to a suitable reference condition such as surrounding natural areas or available faunal databases; and
- **Habitat Integrity**: The degree to which the habitat is transformed based on observed disturbances which may affect habitat integrity.

Each of these values contribute equally to the mean score, which determines the suitability and sensitivity of the MR83 UG Areas for each faunal class. A conservation and land-use objective is also assigned to each sensitivity class which aims to guide the responsible and sustainable utilization of the MR83 UG Areas in relation to each faunal class. The different classes and land-use objectives are presented in the table below:

**Table A1: Faunal habitat sensitivity rankings and associated land-use objectives.**

Score	Rating significance	Conservation objective
1.0 < 1.5	Low	Optimise development potential.
≥1.5 <2.5	Moderately low	Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects.
≥2.5 <3.5	Intermediate	Preserve and enhance biodiversity of the habitat unit and surrounds while optimising development potential.
≥3.5 <4.5	Moderately high	Preserve and enhance the biodiversity of the habitat unit, limit development and disturbance.





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≥4.5 ≤ 5.0	High	Preserve and enhance the biodiversity of the habitat unit, no-go alternative must be considered.
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## APPENDIX B: Faunal SCC

The tables below list the faunal Species of Conservation Concern for Mpumalanga:

**Table B1: List of mammal species (Cohen & Camacho, 2002a) as listed in the Mpumalanga State of the Environment Report (2003).**

English Name	Species	MP 2003 Status
Cape Mole Rat	<i>Georychus capensis</i>	EN
Sclater's Golden Mole	<i>Chlorotalpa sclateri montana</i>	CR
Highveld Golden Mole	<i>Amblysomus septentrionalis</i>	VU
Rough-Haired Golden Mole	<i>Chrysoxalax villosus rufopallidus</i>	CR
Rough-Haired Golden Mole	<i>Chrysoxalax villosus rufus</i>	EN
Juliana's Golden Mole	<i>Neamblysomus julianae</i>	EN
Robust Golden Mole	<i>Amblysomus robustus</i>	VU
Meester's Golden Mole	<i>Amblysomus hottentotus meesteri</i>	VU
Laminate Vlei Rat	<i>Otomys laminatus</i>	VU
Peak-Saddle Horseshoe Bat	<i>Rhinolophus blasii empusa</i>	EN
Lesser Long-Fingered Bat	<i>Miniopterus fraterculus</i>	VU
Welwitsch's Hairy Bat	<i>Myotis welwitschii</i>	EN
Short-Eared Trident Bat	<i>Cloeotis percivali australis</i>	EN
Antbear	<i>Orycteropus afer</i>	NE
Oribi	<i>Ourebia ourebi</i>	VU
African Striped Weasel	<i>Poecilogale albinucha</i>	NE
Wild Dog	<i>Lycaon pictus</i>	EN
Pangolin	<i>Manis temminckii</i>	VU
Aardwolf	<i>Proteles cristatus</i>	LC
African Leopard	<i>Panthera pardus</i>	VU
Natal Red Rock Rabbit	<i>Pronolagus crassicaudatus ruddi</i>	NE
Serval	<i>Leptailurus serval</i>	NT

EN= Endangered; CR= Critically Endangered; VU= Vulnerable; NE=Not Evaluated

**Table B2: List of bird species (Cohen & Camacho,2002b) as listed in the Mpumalanga State of the Environment Report (2003).**

English Name	Species	MP 2003 Status
Blue Crane	<i>Anthropoides paradiseus</i>	VU
Grey Crowned Crane	<i>Balearica reguloru,</i>	VU
Southern Ground Hornbill	<i>Bucorvus leadbeateri</i>	VU
Wattled Crane	<i>Bugeranus carunculatus</i>	CR
Chestnut banded Plover	<i>Charadrius pallidus</i>	NT
African Marsh Harrier	<i>Circus ranivorus</i>	VU
Saddle-billed Stork	<i>Ephippiorhynchus senegalensis</i>	CR
Blue Korhaan	<i>Eupodotis caerulescens</i>	VU
White-bellied Korhaan	<i>Eupodotis senegalensis</i>	VU
Lanner Falcon	<i>Falco biarmicus</i>	VU
Taita Falcon	<i>Falco fasciinucha</i>	NT
Peregrine Falcon	<i>Falco peregrinus minor</i>	VU
Southern Bald Ibis	<i>Geronticus calvus</i>	VU
Cape Vulture	<i>Gyps coprotheres</i>	VU
Yellow breasted Pipit	<i>Hemimacronyx chloris</i>	VU
Rudd's Lark	<i>Heteromira fra ruddi</i>	CR
Blue Swallow	<i>Hirundo atrocaerulea</i>	CR
Pink throated Twinspot	<i>Hypargos margaritatus</i>	NT



Stanley's Bustard	<i>Neotis denhami</i>	VU
Martial Eagle	<i>Polemaetus bellicosus</i>	VU
Striped Flufftail	<i>Sarothrura affinis</i>	VU
White-winged Flufftail	<i>Sarothrura ayresi</i>	CR
Botha's Lark	<i>Spizocorys fringillaris</i>	EN
Bateleur	<i>Terathopius ecaudatus</i>	VU
Lappet-faced Vulture	<i>Torgos tracheliotos</i>	EN
White-headed Vulture	<i>Trigonoceps occipitalis</i>	EN
Black-rumped Buttonquail	<i>Turnix nanus</i>	EN
African Grass Owl	<i>Tyto capensis</i>	VU

EN= Endangered; CR= Critically Endangered; VU= Vulnerable; NT= Near Threatened

**Table B3: List of reptile species (Williamson & Theron, 2002) as listed in the Mpumalanga State of the Environment Report (2003).**

English Name	Species	MP 2003 Status
Haacke's Flat Gecko	<i>Afroedura haackei</i>	EN
Abel Erasmus Pass Flat Gecko	<i>Afroedura rupestris</i>	EN
Mariepskop Flat Gecko	<i>Afroedura indet</i>	EN
Rondavels Flat Gecko	<i>Afroedura rondavelica</i>	EN
Forest/Natal Purpleglossed Snake	<i>Amblyodipsas concolor</i>	VU
Lowveld Shield-nosed Snake	<i>Aspidelaps scutatus intermedius</i>	VU
Dwarf Chameleon	<i>Bradypodion transvaalense complex</i>	VU
Giant Girdled Lizard	<i>Cordylus giganteus</i>	VU
Barberton Girdled Lizard	<i>Cordylus warreni barbertonensis</i>	NT
Lebombo Girdled Lizard	<i>Cordylus warreni</i>	VU
Swazi Rock Snake	<i>Inyoka swazicus</i>	VU
Transvaal Flat Lizard	<i>Platysaurus orientalis</i>	NT
Wilhelm's Flat Lizard	<i>Platysaurus wilhelmi</i>	VU
Montane Burrowing Skink	<i>Scelotes mirus</i>	NT
Breyer's Longtailed Seps	<i>Tetradactylus breyeri</i>	VU
Harlequin Striped Snake	<i>Homoroselaps dorsalis</i>	NT
Transvaal/Coppery Grass Lizard	<i>Chamaesaura aenea</i>	NT

EN= Endangered; VU= Vulnerable; NT= Near Threatened; LC= Least Concern; DD = Data Deficient

**Table B4: List of amphibian species (Williamson & Theron, 2002) as listed in the Mpumalanga State of the Environment Report (2003).**

English Name	Species	MP 2003 Status
Karoo Toad	<i>Bufo garipeensis nubicolus</i>	VU
Natal Ghost Frog	<i>Heleophryne natalensis</i>	VU
Spotted Shovel-Nosed Frog	<i>Hemisis guttatus</i>	VU
Yellow Striped Reed Frog	<i>Hyperolius semidiscus</i>	VU
Plain Stream Frog	<i>Strongylopus wageri</i>	VU
Giant Bullfrog	<i>Pyxicephalus adspersus</i>	VU
Greater Leaf-Folding Frog	<i>Afrixalus fornasini</i>	VU
Whistling Rain Frog	<i>Breviceps sopranus</i>	VU

VU= Vulnerable, MP 2003 = Mpumalanga State of the Environment Report (2003)

**Table B5: List of invertebrate species (De Wet, 2002) as listed in the Mpumalanga State of the Environment Report (2003).**

English Name	Species	MP 2003 Status
<i>Aloeides rossouwi</i>	Rossouw's Copper	EN
<i>Aloeides barbarae</i>	Barbara's Copper	EN
<i>Lepidochrysops swanepoeli</i>	Swanepoel's Blue	EN
<i>Lepidochrysops jefferyi</i>	Jeffery's Blue	EN
<i>Dingana fraterna</i>	Stoffberg Widow	EN



<i>Metisella meninx</i>	Marsh Sylph	VU
<i>Aloeides nubilis</i>	Cloud Copper	VU
<i>Pseudagrion coeleste</i>	Catshead Sprite - Coenagrionidae	CR
<i>Pseudagrion inopinatum</i>	Balinsky's Sprite - Coenagrionidae	VU
<i>Pseudagrion newtoni</i>	Newton's Sprite - Coenagrionidae	VU
<i>Pseudagrion sjoestedti pseudojoestedti</i>	Sjostedt's Sprite - Coenagrionidae	CR
<i>Aeshna ellioti usambarica</i>	Elliot's Hawker-Aeshnidae	VU
<i>Phyllomacromia monoceros</i>	Unicorn Cruiser - Corduliidae	CR

EN= Endangered; CR= Critically Endangered; VU= Vulnerable

**Table B6: NEMBA: TOPS list (2007) of all faunal SCC that require a permit should they need to be relocated as a result of the proposed mining development and activities and its activities.**

Scientific Name	Common Name
<b>CRITICALLY ENDANGERED SPECIES</b>	
<b>REPTILIA</b>	
<i>Caretta caretta</i>	Loggerhead Sea Turtle
<i>Dermochelys coriacea</i>	Leatherback Sea Turtle
<i>Eretmochelys imbricate</i>	Hawksbill Sea Turtle
<b>AVES</b>	
<i>Grus carunculatus</i>	Wattled Crane
<i>Hirundo atrocaerulea</i>	Blue Swallow
<i>Neophron percnopterus</i>	Egyptian Vulture
<i>Poicephalus robustus</i>	Cape Parrot
<b>MAMMALIA</b>	
<i>Bunolagus monticularis</i>	Riverine Rabbit
<i>Chrysospalax</i>	Rough-haired Golden Mole
<b>ENDANGERED SPECIES</b>	
<b>REPTILIA</b>	
<i>Chelonia mydas</i>	Green Turtle
<i>Cordylus giganteus</i>	Giant Girdled Lizard
<i>Lepidochelys olivacea</i>	Olive Ridley Turtle
<i>Psammobates geometricus</i>	Geometric Tortoise
<b>AVIFAUNA</b>	
<i>Anthropoides paradiseus</i>	Blue Crane
<i>Balearica regulorum</i>	Grey Crowned Crane
<i>Ephippiorhynchus senegalensis</i>	Saddle-billed Stork
<i>Gypaetus barbatus</i>	Bearded Vulture
<i>Gyps africanus</i>	White-backed Vulture
<i>Gyps coprotheres</i>	Cape Vulture
<i>Necrosyrtes</i>	Hooded Vulture
<i>Pelecanus rufescens</i>	Pink-backed Pelican
<i>Scotopelia peli</i>	Pel's Fishing Owl
<i>Torgos tracheliotus</i>	Lappet-faced Vulture
<b>MAMMALIA</b>	
<i>Amblysomus robustus</i>	Robust Golden Mole
<i>Damaliscus tunatus</i>	Tsessebe
<i>Diceros bicornis</i>	Black Rhinoceros
<i>Equus zebra</i>	Mountain Zebra
<i>Lycaon pictus</i>	African Wild Dog
<i>Neamblysomus gunningi</i>	Gunning's Golden Mole
<i>Ourebia ourebi</i>	Oribi
<i>Paraxerus palliatus</i>	Red Squirrel
<i>Petrodromus tetradactylus</i>	Four-toed Elephant-shrew
<b>INVERTEBRATA</b>	
<i>Colophon spp - species</i>	Stag Beetles





Scientific Name	Common Name
<b>VULNERABLE SPECIES</b>	
<b>AVES</b>	
<i>Trigonoceps occipitalis</i>	White-headed Vulture
<i>Aquila rapax</i>	Tawny Eagle
<i>Ardeotis kori</i>	Kori Bustard
<i>Ciconia nigra</i>	Black Stork
<i>Circaetus fasciolatus</i>	Southern Banded Snake Eagle
<i>Eupodotis caerulescens</i>	Blue Korhaan
<i>Falco fasciinucha</i>	Falcon
<i>Falco naumanni</i>	Lesser Kestrel
<i>Falco peregrinus</i>	Peregrine Falcon
<i>Geronticus calvus</i>	Bald Ibis
<i>Neotis ludwidgei</i>	Ludwig's Bustard
<i>Polemaetus bellicosus</i>	Martial Eagle
<i>Terathopus ecaudatus</i>	Bateleur
<i>Tyto capensis</i>	Grass Owl
<b>MAMMALIA</b>	
<i>Acinonyx jubatus</i>	Cheetah
<i>Chrysospalax trevelyani</i>	Giant Golden Mole
<i>Cricetomys gambianus</i>	Giant Rat
<i>Damaliscus pyrgorgus pygargus</i>	Bontebok
<i>Dendrohyrax arboreus</i>	Tree Hyrax
<i>Hippotragus equinus</i>	Roan Antelope
<i>Pholidota temminckii</i>	Pangolin
<i>Neamblysomus julianae</i>	Juliana's Golden Mole
<i>Neotragus moschatus</i>	Suni
<i>Panthera leo</i>	Lion
<i>Panthera pardus</i>	Leopard
<i>Philantomba monticola</i>	Blue Duiker
<b>INVERTEBRATA</b>	
<i>Peripatopsis alba</i>	White Cave Velvet Worm
<b>PROTECTED SPECIES</b>	
<b>AMPHIBIA</b>	
<i>Pyxicephalus adspersus</i>	Giant Bullfrog
<i>Pyxicephalus edulis</i>	African Bullfrog
<b>REPTILIA</b>	
<i>Bitis gabonica</i>	Gaboon Adder
<i>Bitis schneideri</i>	Namaqua Dwarf Adder
<i>Bradypodion taeniabronchum</i>	Smith's Dwarf Chameleon
<i>Cordylus cataphractus</i>	Girdled Lizard
<i>Crocodylus niloticus</i>	Nile crocodile
<i>Python natalensis</i>	African Rock Python
<b>AVES</b>	
<i>Bucowus leadeateri</i>	Southern Ground-Hornbill
<i>Circus ranivorus</i>	African Marsh Harrier
<i>Neotis denhami</i>	Denham's Bustard
<i>Spheniscus</i>	Jackass Penguin
<b>MAMMALIA</b>	
<i>Atelerix frontalis</i>	South African Hedgehog
<i>Ceratotherium simum</i>	White Rhinoceros
<i>Connochaetes</i>	Black Wildebeest
<i>Crocuta crocuta</i>	Spotted Hyaena
<i>Felis nigripes</i>	Black-footed Cat
<i>Parahyaena brunnea</i>	Brown Hyaena



Scientific Name	Common Name
<i>Leptailurus serval</i>	Serval
<i>Loxodonta africana</i>	African elephant
<i>Lutra maculicollis</i>	Spotted-necked Otter
<i>Millivora capensis</i>	Honey Badger
<i>Raphicerus sharpei</i>	Sharpe's Grysbok
<i>Redunca</i>	Reedbuck
<i>Vulpes chama</i>	Cape Fox

INVERTEBRATA	
<i>Aloeides clarki</i>	Coega Copper Butterfly
<i>Ceratogyrus spp - All species</i>	Horned Baboon Spiders
<i>Echinodiscus bisperforatus</i>	Pansy Shell
<i>Dromica spp - All species</i>	Tiger Beetles
<i>Graphipterus assimilis</i>	Velvet Ground Beetle
<i>Hadogenes spp -species</i>	Flat Rock Scorpions
<i>Haliotis midae</i>	South African Abalone
<i>Harpactira spp - All species</i>	Common Baboon Spiders
<i>Ichneustoma - Aspecies</i>	Fruit Chafer Beetles
<i>Manticora spp - Aspecies</i>	Monster Tiger Beetles
<i>Megacephala asperata</i>	Tiger Beetle
<i>Megacephala regalis</i>	Tiger Beetle
<i>Nigidius auriculatus</i>	Stag beetle
<i>Oonotus adpersus</i>	Stag Beetle
<i>Oonotus interioris</i>	Stag Beetle
<i>Oonotus rex</i>	Stag Beetle
<i>Oonotus sericeus</i>	Stag Beetle
<i>Opisthacanthus spp - All species</i>	Creeping Scorpions
<i>Opisththalmus spp - All species</i>	Burrowing Scorpions
<i>Platychile pallida</i>	Tiger Beetle
<i>Prosopocoilus petitclerci</i>	Stag Beetle
<i>Prothyma guttipennis</i>	Tiger Beetle
<i>Pterinochilus spp - All species</i>	Golden Baboon Spiders

NL= Not Listed; EN= Endangered; CR= Critically Endangered; VU= Vulnerable; P = Protected (TOPS 2007); NT = Near Threatened

**Table B7: List of threatened fauna that have been previously recorded in the MR83 UG Areas QDS: 2430DC (according to MPTA databases)**

Scientific Name	Common Name	National Red List Status	MTPA status	POC in MR83 UG Areas
<b>MAMMALS</b>				
<i>Rhinolophus cohenae</i>	Cohen's horseshoe bat	VU	VU	High
<i>Rhinolophus blasii</i>	Blasius's horseshoe bat	NT	NT	Confirmed
<i>Rhinolophus swinnyi</i>	Swinny's horseshoe bat	VU	VU	High
<i>Ourebia ourebi ourebi</i>	Oribi	EN	EN	Low
<i>Pelea capreolus</i>	Grey rhebok	NT	NT	Low
<i>Redunca fulvorufula</i>	Mountain reedbuck	EN	EN	Low
<i>Cercopithecus albogularis schwarzi</i>	Samango Monkey	EN	EN	Medium
<i>Parahyaena brunnea</i>	Brown hyaena	NT	NT	Low
<i>Panthera pardus</i>	Leopard	VU	VU	Medium
<b>AVIFAUNA</b>				
<i>Stephanoaetus coronatus</i>	African Crowned Eagle	VU	VU	High



<i>Gyps coprotheres</i>	Cape Vulture	EN	EN	Low
<i>Sarothrura affinis</i>	Striped Flufftail	VU	VU	Low
<i>Neotis denhami</i>	Denhams Bustard	VU	VU	Low
<i>Falco peregrinus</i>	Peregrine Falcon	-	VU	Low
<i>Hirundo atrocaerulea</i>	Blue Swallow	CR	CR	Medium
<i>Geronticus calvus</i>	Southern Bald Ibis	VU	VU	Medium
<i>Eupodotis senegalensis</i>	White-bellied Korhaan	VU	VU	Medium
<b>INVERTEBRATES</b>				
<i>Aloeides nubilus</i>	-	EN	EN	Low
<i>Pseudagrion newtoni</i>	Harlequin Sprite	VU	VU	Medium
<b>REPTILES</b>				
<i>Lamprophis fuscus</i>	Yellow-bellied house snake	NT	NT	Low
<i>Bradypodion transvaalensis</i>	Transvaal Dwarf Chameleon	LC	VU	Medium
<i>Homoroselaps lacteus</i>	Spotted Harlequin Snake	LC	NT	Medium
<i>Chamaesaura anguina anguina</i>	Cape grass lizard	NT	NT	Medium
<b>AMPHIBIANS</b>				
<i>Hadromophryne natalensis</i>	Natal Ghost Frog	LC	VU	Medium

NT = Near Threatened; VU = Vulnerable; DD = Data Deficient; LC = Least Concern; EN = Endangered

**Table B8: Faunal SCC that may occur in the MR83 UG Areas according to the DFFE screening tool.**

Scientific Name	National Red List Status	POC in MR83 UG Areas
<b>Dukes</b>		
<i>Amblysomus robustus</i>	VU	Low
<i>Geronticus calvus</i>	VU	Medium
<i>Chrysospalax villosus</i>	VU	Low
<i>Cercopithecus albogularis schwarzi</i>	VU	Low
<i>Hydricteis maculicollis</i>	VU	Low
<i>Ourebia ourebi ourebi</i>	EN	Low
<i>Lepidochrysops irvingi</i>	VU	Low
<i>Aroegas fuscus</i>	EN	Low
<i>Thoracistus jambila</i>	EN	Low
<i>Lioptilus nigricapillus</i>	VU	Low
<i>Ciconia nigra</i>	VU	Low
<b>FRANKFORT</b>		
<i>Amblysomus robustus</i>	VU	Low
<i>Chrysospalax villosus</i>	VU	Low
<i>Cercopithecus albogularis schwarzi</i>	VU	Low
<i>Hydricteis maculicollis</i>	VU	Low
<i>Ourebia ourebi ourebi</i>	EN	Low
<i>Lepidochrysops irvingi</i>	VU	Low
<i>Aroegas fuscus</i>	EN	Low
<i>Thoracistus jambila</i>	EN	Low
<i>Lioptilus nigricapillus</i>	VU	Low
<i>Ciconia nigra</i>	VU	Low
<b>MORGENZON</b>		
<i>Amblysomus robustus</i>	VU	Low
<i>Chrysospalax villosus</i>	VU	Low
<i>Dasymys robertsii</i>	VU	Low
<i>Crocidura maquassiensis</i>	VU	Low
<i>Cercopithecus albogularis schwarzi</i>	VU	Low
<i>Hydricteis maculicollis</i>	VU	Low
<i>Ourebia ourebi ourebi</i>	EN	Low
<i>Lepidochrysops irvingi</i>	VU	Low



<i>Aroegas fuscus</i>	EN	Low
<i>Thoracistus jambila</i>	EN	Low
<i>Ciconia nigra</i>	VU	Low
<b>BETA</b>		
<i>Amblysomus robustus</i>	VU	Low
<i>Chrysospalax villosus</i>	VU	Low
<i>Cercopithecus albogularis schwarzi</i>	VU	Low
<i>Hydrictis maculicollis</i>	VU	Low
<i>Ourebia ourebi ourebi</i>	EN	Low
<i>Geronticus calvus</i>	VU	Medium
<i>Lepidochrysops irvingi</i>	VU	Low
<i>Aroegas fuscus</i>	EN	Low
<i>Thoracistus jambila</i>	EN	Low
<i>Ciconia nigra</i>	VU	Low
<i>Lioptilus nigricapillus</i>	VU	Low

R = Rare. DD = Data Deficient. VU = Vulnerable

**Table B7: Avifaunal Species for the pentads including and directly adjoining the study are.**

Pentads	Link to pentad summary on the South African Bird Atlas Project 2 web page
2445_3040	<a href="http://sabap2.birdmap.africa/coverage/pentad/2445_3040">http://sabap2.birdmap.africa/coverage/pentad/2445_3040</a>
2450_3040	<a href="http://sabap2.birdmap.africa/coverage/pentad/2450_3040">http://sabap2.birdmap.africa/coverage/pentad/2450_3040</a>
2455_3040	<a href="http://sabap2.birdmap.africa/coverage/pentad/2455_3040">http://sabap2.birdmap.africa/coverage/pentad/2455_3040</a>

### Species listed as protected under the Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) (MNCA)

**Table B8: Schedule 1 - SPECIALLY PROTECTED GAME (SECTION 4 (1) (a))**

Common name	Scientific name
Elephant	<i>Loxodonta africana</i>
All species of rhinoceros	all species of the Family Rhinocerotidae

**Table B9: Schedule 2 - PROTECTED GAME (SECTION 4 (1) (b))**

Common name	Scientific name
<b>AMPHIBIANS, REPTILES AND MAMMALS</b>	
Bullfrog	<i>Pyxicephalus adspersus</i>
All species of reptiles excluding the water leguaan, rock leguaan and all species of snakes	All species of the Class Reptilia excluding <i>Varanus niloticus</i> , <i>Varanus exanthematicus</i> and all species of the Sub Order Serpentes
Riverine Rabbit	<i>Bungolagus monticularis</i>
Hedgehog	<i>Atelerix frontalis</i>
Samango Monkey	<i>Cercopithecus mitis</i>
Bushbaby	<i>Otolemur crassicaudatus</i>
Lesser Bushbaby	<i>Galago moholi</i>
Honey-Badger	<i>Mellivora capensis</i>
Pangolin	<i>Manis temminckii</i>
Aardwolf	<i>Proteles cristatus</i>
Cape Hunting Dog	<i>Lycaon pictus</i>
Brown Hyaena	<i>Hyaena brunnea</i>
Antbear	<i>Orycteropus afer</i>
Mountain Zebra	<i>Equus zebra</i>
Hartmann's Zebra	<i>Equus zebra hartmannae</i>





Common name	Scientific name
Hippopotamus	<i>Hippopotamus amphibius</i>
Giraffe	<i>Giraffa camelopardalis</i>
Nyala	<i>Tragelaphus angasi</i>
Red Duiker	<i>Cephalophus natalensis</i>
Blue Duiker	<i>Philantomba monticola</i>
Reedbuck	<i>Redunca arundinum</i>
Mountain Reedbuck	<i>Redunca fulvorufula</i>
Sable Antelope	<i>Hippotragus niger</i>
Roan Antelope	<i>Hippotragus equinus</i>
Black Wildebeest	<i>Connochaetes gnou</i>
Tsessebe	<i>Damaliscus lunatus</i>
Lichtenstein's Hartebeest	<i>Alcelaphus lichtensteinii</i>
Klipspringer	<i>Oreotragus oreotragus</i>
Oribi	<i>Ourebia ourebi</i>
Steenbok	<i>Raphicerus campestris</i>
Sharpe's Grysbok	<i>Raphicerus sharper</i>
Suni	<i>Neotragus moschatus</i>
Grey Rhebok	<i>Pelea capreolus</i>
Eland	<i>Taurotragus oryx</i>
Waterbuck	<i>Kobus ellipsiprymnus</i>
Cape Clawless Otter	<i>Aonyx capensis</i>
Spotted Necked Otter	<i>Lutra maculicollis</i>
<b>BIRDS</b>	
Any bird which is a wild animal, excluding a bird referred to in Schedule 3, and the -	
White Breasted Cormorant	<i>Phalacrocorax lucidus</i>
Reed Cormorant	<i>Phalacrocorax africanus</i>
Red-Eyed Turtle Dove	<i>Streptopelia semitorquata</i>
Cape Turtle Dove	<i>Streptopelia capicola</i>
Laughing Dove	<i>Streptopelia senegalensis</i>
all species of mousebirds	all species of the Family Colidae
Pied Crow	<i>Corvus albus</i>
Black Crow	<i>Corvus capensis</i>
Red-Eyed Bulbul	<i>Pycnonotus nigricans</i>
Black-Eyed Bulbul	<i>Pycnonotus barbatus</i>
Red-Winged Starling	<i>Onychognathus morio</i>
Cape Sparrow	<i>Passer melanurus</i>
Spotted-Backed Weaver	<i>Ploceus cucullatus</i>
Cape Weaver	<i>Ploceus capensis</i>
Masked Weaver	<i>Ploceus velatus</i>
Red-Billed Quelea	<i>Quelea quelea</i>
Red Bishop	<i>Euplectes orix</i>

Table B10: Schedule 4 - PROTECTED WILD ANIMALS (SECTION 4 (1) (d)).

Common name	Scientific name
Spotted hyaena	<i>Crocuta crocuta</i>
Cheetah	<i>Acinonyx jubatus</i>
Leopard	<i>Panthera pardus</i>
Lion	<i>Panthera Leo</i>
African buffalo	<i>Syncerus caffer</i>

Table B11: Schedule 5 - WILD ANIMALS TO WHICH THE PROVISIONS OF SECTION 33 APPLY

Common name	Scientific name
Water Monitor Lizard	<i>Varanus niloticus</i>



White throated rock monitor lizard	<i>Varanus exanthematicus</i>
All species of snakes	all species of the Sub Order Serpentes
Any bird which is a wild animal, but which is not game, excluding the ostrich	<i>Struthio camelus</i>
Chacma Baboon	<i>Papio ursinus</i>
Vervet Monkey	<i>Cercopithecus mitis</i>
All Dassies	Family: Procaviidae
All Mongooses	Family: Viverridae
Tree Squirrel	<i>Paraxerus cepapi</i>
Warthog	<i>Phacochoerus aethiopicus</i>
Serval	<i>Felis serval</i>
Civet	<i>Civettictis civetta</i>
Cape Fox	<i>Vulpes chama</i>
Side Striped Jackal	<i>Canis adustus</i>
All Genets	<i>Genetia</i> spp.
Springhare	<i>Pedetes capensis</i>
African Wild Cat	<i>Felis lybica</i>

**Table B12: Schedule 7 - INVERTEBRATES (SECTION 35 (1)).**

Common name	Scientific name
All species of baboon spiders belonging to the genera as referred	<i>Ceratogyrus</i> spp., <i>Harpactira</i> spp. and <i>Pterinochilus</i> spp.



## APPENDIX C: Faunal Species List

**Table C1: Mammal species recorded for the mining areas.**

Scientific Name	Common Name	Conservation Status
<i>Canis mesomelas</i>	Black-backed Jackal	LC
<i>Rhinolophus blasii</i>	Blasius's Horseshoe Bat	NT
<i>Elephantulus myurus</i>	Eastern Rock Sengi	LC
<i>Tragelaphus strepsiceros</i>	Greater Kudu	LC
<i>Aethomys namaquensis</i>	Namaqua Rock Mouse	LC
<i>Cryptomys hottentotus</i>	Southern African Mole-rat	LC
<i>Papio ursinus</i>	Chacma Baboon	LC
<i>Chlorocebus pygerythrus</i>	Vervet Monkey	LC
<i>Hystrix africaeaustralis</i>	Porcupine	LC
<i>Lepus saxatilis</i>	Scrub Hare	LC
<i>Atilax paludinosus</i>	Water Mongoose	LC
<i>Rattus norvegicus</i>	Brown Rat	LC
<i>Redunca fulvorufula</i>	Mountain Reedbuck	LC
<i>Sylvicapra grimmia</i>	Common Duiker	LC

NT = Near Threatened, LC = Least Concern

**Table C2: Bat species recorded and identified using a SM4BAT Detector and the Kaleidoscope Pro Software.**

Scientific Name	Common Name	Conservation Status
<i>Pipistrellus hesperidus</i>	Dusky Pipistrelle Bat	LC
<i>Neoromicia capensis</i>	Cape Serotine Bat	LC
<i>Pipistrellus hesperidus</i>	Dusky Pipistrelle Bat	LC
<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat	LC
<i>Chaerephon pumilus</i>	Little Free-tailed Bat	LC
<i>Miniopterus natalensis</i>	Natal Long-fingered Bat	LC
<i>Rhinolophus hildebrandtii</i>	Hildebrandt's Horseshoe Bat	LC
<i>Sauromys petrophilus</i>	Robert's Flat-headed Bat	LC
<i>Eptesicus hottentotus</i>	Long-tailed House Bat	LC
<i>Rhinolophus blasii</i>	Blasius's Horseshoe Bat	NT
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe Bat	LC
<i>Scotophilus dinganii</i>	African Yellow Bat	LC

**Table C3: Avifaunal species recorded for the mining areas.**

Scientific name	English name	Conservation Status
<i>Threskiornis aethiopicus</i>	African Sacred Ibis	LC
<i>Cossypha dichroa</i>	Chorister Robin-chat	LC
<i>Cossypha caffra</i>	Cape Robin-chat	LC
<i>Merops apiaster</i>	European Bee-eater	LC
<i>Merops bullockoides</i>	White-fronted Bee-eater	LC
<i>Monticola rupestris</i>	Cape Rock Thrush	LC
<i>Buteo rufofuscus</i>	Jackal Buzzard	LC
<i>Falco rupicolus</i>	Rock Kestrel	LC



Scientific name	English name	Conservation Status
<i>Onychognathus morio</i>	Red-winged Starling	LC
<i>Halcyon albiventris</i>	Brown-hooded Kingfisher	LC
<i>Plocepasser mahali</i>	White-browed Sparrow Weaver	LC
<i>Saxicola torquatus</i>	African Stonechat	LC
<i>Elanus caeruleus</i>	Black-shouldered Kite	LC
<i>Vanellus armatus</i>	Blacksmith Lapwing	LC
<i>Passer melanurus</i>	Cape Sparrow	LC
<i>Streptopelia capicola</i>	Cape Turtle Dove	LC
<i>Motacilla capensis</i>	Cape Wagtail	LC
<i>Cisticola fulvicapilla</i>	Neddicky	LC
<i>Lanius collaris</i>	Common Fiscal	LC
<i>Pycnonotus tricolor</i>	Dark-capped Bulbul	LC
<i>Crithagra mozambicus</i>	Yellow-fronted Canary	LC
<i>Terpsiphone viridis</i>	Paradise-flycatcher	LC
<i>Upupa africana</i>	African Hoopoe	LC
<i>Anthus cinnamomeus</i>	African Pipit	LC
<i>Anthus similis</i>	Long-billed Pipit	LC
<i>Oenanthe bifasciata</i>	Buff-streaked Chat	LC
<i>Apalis thoracica</i>	Bar-throated Apalis	LC
<i>Tchagra senegalus</i>	Black-crowned Tchagra	LC
<i>Uraeginthus angolensis</i>	Blue Waxbill	LC
<i>Estrilda melanotis</i>	Swee Waxbill	LC
<i>Estrilda astrild</i>	Common Waxbill	LC
<i>Telophorus zeylonus</i>	Bokmakierie	LC
<i>Serinus gularis</i>	Streaky-headed Canary	LC
<i>Hirundo fuligula</i>	Rock Martin	LC
<i>Ardea cinerea</i>	Grey Heron	LC
<i>Numida meleagris</i>	Helmeted Guinea fowl	LC
<i>Trachyphonus vaillantii</i>	Crested Barbet	LC
<i>Vanellus coronatus</i>	Crowned Lapwing	LC
<i>Dicrurus adsimilis</i>	Fork-tailed Drongo	LC
<i>Malaconotus blanchoti</i>	Grey-headed Bush-Shrike	LC
<i>Colius striatus</i>	Speckled Mousebird	LC
<i>Corvus albus</i>	Pied crow	LC
<i>Streptopelia semitorquata</i>	Red-eyed Dove	LC
<i>Pternistis swainsonii</i>	Swainson's Spurfowl	LC
<i>Nectarinia famosa</i>	Malachite sunbird	LC
<i>Cinnyris afra</i>	Greater Double-collared Sunbird	LC
<i>Batis capensis</i>	Cape Batis	LC
<i>Lagonosticta rubricate</i>	African Firefinch	LC
<i>Passer domesticus</i>	House Sparrow	LC
<i>Streptopelia senegalensis</i>	Laughing Dove	LC
<i>Apus affinis</i>	Little Swift	LC
<i>Prinia subflava</i>	Tawny-flanked Prinia	LC
<i>Corvus capensis</i>	Cape Crow	LC





Scientific name	English name	Conservation Status
<i>Streptopelia semitorquata</i>	Red-eyed Dove	LC
<i>Zosterops virens</i>	Cape White-eye	LC
<i>Urocolius indicus</i>	Red-faced Mousebird	LC
<i>Ploceus velatus</i>	Southern Masked Weaver	LC
<i>Euplectes orix</i>	Southern Red Bishop	LC
<i>Cisticola juncidis</i>	Zitting Cisticola	LC

LC = Least Concern, N-End Near-endemic

**Table C4: Reptile species recorded for the mining areas.**

Scientific name	Common Name	Conservation Status
<i>Chamaeleo dilepis</i>	Common Flap-necked Chameleon	LC
<i>Psammophylax tritaeniatus</i>	Striped Grass Snake	LC
<i>Lycodonomorphus rufulus</i>	Common Brown Water Snake	LC
<i>Philothamnus natalensis occidentalis</i>	Western Natal Green Snake	LC
<i>Agama aculeata distantii</i>	Eastern Ground Agama	LC
<i>Lygodactylus capensis capensis</i>	Common House Gecko	LC
<i>Trachylepis varia</i>	Variable Skink	LC
<i>Panaspis wahlbergi</i>	Wahlberg's Snake-eyed Skink	LC
<i>Pseudocordylus melanotus</i>	Drakensburg Crag Lizard	LC

LC = Least Concern, NYBA = Not Yet Been Assessed

**Table C5: General invertebrates recorded for the mining areas.**

Scientific Name	Common Name	Conservation Status
<i>Belenois aurota</i>	Brown-veined White	NYBA
<i>Junonia hierta</i>	Yellow Pansy	LC
<i>Acraea nohara nohara</i>	Light Red Acraea	LC
<i>Musca domestica</i>	House Fly	NYBA
<i>Acanthacris ruficornis</i>	Garden Locust	NYBA
<i>Dysdercus nigrofasciatus</i>	Cotton Stainer	NYBA
<i>Byblia ilythia</i>	Spotted Joker	LC
<i>Trichostetha fascicularis</i>	Green Protea Beetle	NYBA
<i>Sphodromantis gastrica</i>	Giant Mantid	LC
<i>Apis mellifera scutellata</i>	African Honeybee	NYBA
<i>Catopsilia florella</i>	African migrant	LC
<i>Phalanta phalantha aethiopia</i>	African leopard	LC
<i>Platypleura hirta</i>	Cicada	NYBA
<i>Platypleura sp</i>	Cicada	NYBA
<i>Catacroptera cloanthe cloanthe</i>	Pirate	LC
Family Bacillidae	Stick Insect	NYBA
<i>Maransis rufolineatus</i>	Grass Stick Insect	
<i>Dischista rufa</i>	Fruit Chafer	NYBA
<i>Anisorrhina umbonata</i>	Saddle Fruit Chafer	NYBA
<i>Brakefieldia perspicua perspicua</i>	Marsh Patroller	LC
<i>Papilio nireus lyaeus</i>	Green-banded Swallowtail	LC
<i>Papilio euphranor</i>	Forest Swallowtail	LC
<i>Papilio demodocus demodocus</i>	Citrus Swallowtail	LC
<i>Phymateus viridipes</i>	Green Milkweed/ Stinkweed Locust	NYBA
<i>Decapotoma lunata</i>	Lunate Blister Beetle	NYBA
<i>Belenois creona severina</i>	African Common White	LC



Scientific Name	Common Name	Conservation Status
<i>Leptotes babaulti</i>	Babault's Blue	LC
<i>Platylesches neba</i>	Flower-girl hopper	NYBA
<i>Colotis euipe Omphale</i>	Smokey Orange Tip	LC
<i>Cyligramma latona</i>	Cream-striped Owl	NYBA
<i>Dictyophorus spumans</i>	Koppie Foam Grasshopper	NYBA
<i>Anax imperator</i>	Blue Emperor	LC
<i>Orthetrum Julia</i>	Julia Skimmer	LC
<i>Eyprepocnemis sp/</i>	N/A	NYBA
<i>Grammodes stolida</i>	Stolid Lines	NYBA
<i>Acrida acuminata</i>	Common Stick Grasshopper	NYBA
<i>Azanus moriqua</i>	Thorn-tree Blue	LC
<i>Solenopsis punctaticeps</i>	Fire Ant	NYBA
<i>Azanus ubaldus</i>	Velvet-spotted Blue	LC
<i>Anthene definita definita</i>	Common Hairtail	LC
<i>Onosandrus sp</i>	N/A	N/A
<i>Pachycondyla tarsata</i>	African Stink Ant	NYBA
<i>Afreumenes sp</i>	Potter Wasps	NYBA
<i>Camponotus maculatus</i>	Spotted Sugar Ant	NYBA
<i>Byblia ilithyia</i>	Spotted Joker	LC
<i>Macronemurus tinctus</i>	White-tip Grassland Antlion	NYBA
<i>Hagenomyia tristis</i>	Gregarious Antlion	NYBA
<i>Anoplolepis custodiens</i>	Pugnacious Ant	NYBA
<i>Tmetanota sp</i>	Grasshoppers	NYBA
<i>Rhinocoris sp</i>	Flower Assassin	NYBA
<i>Acanthogryllus fortipes</i>	Brown Cricket	NYBA
<i>Kedestes barberae</i>	Barber's Ranger	NYBA
<i>Veterna sp</i>	Grass Stink Bugs	NYBA
<i>Anubis scalaris</i>	Skunk Longhorn	NYBA
<i>Orthoctha dasyncnemis</i>	N/A	NYBA
<i>Bactrododema reyi</i>	Walking Stick Insect	NYBA
<i>Popa undata</i>	Stick Mantid	NYBA
<i>Trithemis furva</i>	Navy Dropwing	LC
<i>Precis archesia pelasgis</i>	Garden Inspector	LC
<i>Precis archesia</i>	Garden Commodore	LC
<i>Epioscopomantis chalybea</i>	Mantis	NYBA
<i>Locris sp</i>	Spittle Bug	NYBA
<i>Dichtha sp</i>	Toktokkie	NYBA
<i>Garret asp</i>	Dung Beetle	NYBA
<i>Proagoderus aciculatis</i>	Dung Beetle	NYBA
<i>Deropeltis erythrocephala</i>	Cockroach	NYBA
<i>Acraea nohara nohara</i>	Light Red Acraea	NYBA
<i>Anthia sp</i>	Tyrant Ground Beetle	NYBA
<i>Notogomphus praetorius</i>	Yellow jack Dragonfly	LC
<i>Spialia spio</i>	Mountain Sandman	NYBA
<i>Catantops humeralis</i>	Grasshopper	NYBA
<i>Rhachitops sp</i>	Grasshopper	NYBA
<i>Truxalis sp</i>	Grasshopper	NYBA
<i>Plagioderia caffra</i>	Beetle	NYBA



Scientific Name	Common Name	Conservation Status
Family Psychidae	Bagworms	NYBA
<i>Phaneroptera</i> sp	Leaf Katydid	NYBA
<i>Evides pubiventris</i>	Emerald Jewel Bug	NYBA
<i>Precis octavia sesamus</i>	Gaudy Commodore	LC
<i>Hodotermes mossambicus</i>	Northern Harvester Termite	NYBA
<i>Chlorolestes fasciatus</i>	Mountain Malachite	LC
<i>Scutigera coleoptrata</i>	House centipede	NYBA
<i>Gastrimargus</i> sp	N/A	NYBA
<i>Bicyclus anynana anynana</i>	Squinting Bush Brown	LC
<i>Cassionympha cassius</i>	Rainforest Brown	LC
<i>Platycypha caligata</i>	Dancing Jewel	LC
<i>Anterhynchium natalense</i>	N/A	NYBA
<i>Pseudagrion spermatum</i>	Upland Sprite	NYBA
<i>Xeloma tomentosa</i>	Gold-haired Fruit Chafer	NYBA
<i>Cyrtothyrea marginalis</i>	Common Dotted Fruit Chafer	NYBA
<i>Acraea natalica</i>	Natal Acraea	LC
<i>Danaus chrysippus</i>	African Monarch	LC
<i>Papilio demodocus</i>	Citrus Swallowtail	LC
<i>Mylothris agathina</i>	Common Dotted Border	LC

LC = Least Concern, NYBA = Not yet been assessed by the IUCN

**Table C6: Arachnid species recorded for the mining areas.**

Common Name	Scientific Name	Conservation Status
<i>Harpactira hamiltoni</i>	Highveld Baboon Spider	NYBA
<i>Argiope trifasciata</i>	Banded Argiope	NYBA
<i>Perenethis simoni</i>	Nursery-web spider	NYBA
<i>Hyllus argyrotoxis</i>	Jumping Spider	NYBA
<i>Leucauge festiva</i>	Masked Vlei Spider	NYBA
<i>Peucetia viridis</i>	Green Lynx Spiders	NYBA
<i>Caerostris</i> sp	Bark Spider	NYBA
<i>Monaeses</i> sp	N/A	NYBA
<i>Tibellus</i> sp	N/A	NYBA
<i>Runcinia flavida</i>	N/A	NYBA
<i>Thomisus stenningi</i>	N/A	NYBA
Genus <i>Leucauge</i>	Orchid Spiders	NYBA
<i>Oxyopes bothai</i>	Grass Lynx Spiders	NYBA
<i>Oxyopes angulitarsus</i>	Grass Lynx Spiders	NYBA
<i>Oxyopes</i> sp	Grass Lynx Spiders	NYBA
<i>Trichonephila fenestrata</i>	Hairy Golden Orb-weaving Spider	NYBA
<i>Solifugae</i> sp.	Sun Spider	NYBA
Family Thomisidae	Crab Spiders	NYBA
<i>Argiope australis</i>	Common garden orb-web spiders	NYBA
<i>Gasteracantha versicolor</i>	Medium-wing Kite Spider	NYBA
<i>Cheloctonus intermedius</i>	Intermediate Creeper	NYBA
<i>Cheloctonus jonesii</i>	Jone's Creeper	NYBA

LC = Least Concern, NYBA = Not Yet Been Assessed



**Table C7: Amphibian species recorded for the mining areas.**

Scientific name	Common Name	Conservation Status
<i>Afrana angolensis</i>	Angola River Frog	LC
<i>Amietia delalandii</i>	Common River Frog	LC
<i>Amietophrynus gutturalis</i>	Guttural Toad	NYBA
<i>Amietophrynus rangeri</i>	Raucous Toad	NYBA

LC = Least Concern, NYBA = Not Yet Been Assessed

**Table C8: Amphibian species previously recorded for the QDS according to SAFAP.**

Scientific name	Common Name	Conservation Status
<i>Breviceps adspersus</i>	Bushveld Rain Frog	LC
<i>Breviceps mossambicus</i>	Mozambique Rain Frog	LC
<i>Breviceps verrucosus</i>	Plaintive Rain Frog	LC
<i>Afrana angolensis</i>	Angola River Frog	LC
<i>Cacosternum boettgeri</i>	Common Caco	LC
<i>Cacosternum parvum</i>	Mountain Caco	LC
<i>Heleophryne natalensis</i>	Natal Ghost Frog	NT
<i>Kassina senegalensis</i>	Senegal Kassina	LC
<i>Phrynobatrachus natalensis</i>	Natal Dwarf Puddle Frog	LC
<i>Schismaderma carens</i>	African Red Toad	LC
<i>Strongylopus grayii</i>	Gray's Stream Frog	LC
<i>Tomopterna natalensis</i>	Natal Sand Frog	LC
<i>Amietophrynus garmani</i>	Eastern Olive Toad	LC
<i>Cacosternum nanum</i>	Bronze Caco	LC
<i>Hyperolius marmoratus</i>	Marbled Reed Frog	LC

LC = Least Concern, NYBA = Not Yet Been Assessed, NT= Near Threatened







**SCIENTIFIC TERRESTRIAL SERVICES**

**BIODIVERSITY ASSESSMENT**

**AS PART OF THE PROPOSED EIA AND WUL  
AMENDMENT PROCESS FOR THE MR83 UG  
TARGETS NEAR PILGRIMS REST,  
MPUMALANGA**

**Prepared for:** Transvaal Gold Mining Estates  
Limited (TGME)  
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**Report reference:** STS 210071  
**Date:** March 2022



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## EXECUTIVE SUMMARY

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Scientific Terrestrial Services CC (STS) was appointed to undertake a terrestrial biodiversity assessment as part of the proposed Environmental Impact Assessment (EIA) and Water Use Licence (WUL) amendment process for the MR83 UG targets near Pilgrims Rest, Mpumalanga.

The assessment included four sites which will henceforth collectively be referred to as the “MR83 UG Areas”; individually referred to as Dukes, Frankfort, Morgenzon, and Beta North. The MR83 UG Areas are located within the Mpumalanga Province, with Dukes and Morgenzon roughly 2 km north-west, Beta North approximately 2 km south-west, and Frankfort approximately 9 km north of Pilgrim’s Rest. As part of the field assessments, a 20 m to 50 m buffer area around the proposed mining activities was ground-truthed (based on site accessibility and safety constraints).

Several field assessments were undertaken to determine the ecological status of the MR83 UG Areas and to “ground-truth” the results of the updated desktop databases:

- Site screening (high level assessments of Beta, Morgenzon and Frankfort): 19<sup>th</sup> – 22<sup>nd</sup> April 2021;
- Site screening (high level assessment of Dukes): 27<sup>th</sup> – 28<sup>th</sup> October 2021; and
- Complete Site Assessments (all MR83 UG Areas): 17<sup>th</sup> – 19<sup>th</sup> January 2022.

### Desktop Database Results for the MR83 UG Areas

The entire extent of Beta North, Dukes and Frankfort, with much of Morgenzon’s extent occur in an area considered to be of **Highest Biodiversity Importance** from a mine planning perspective (Mining and Biodiversity Guidelines of 2012). The western extent of Morgenzon is in an area considered to be of **High Biodiversity Importance** from a mine planning perspective. The most important biodiversity features highlighted by the desktop databases included:

- The MR83 UG Areas are associated with three vegetation types as per Mucina and Rutherford (2006) and SANBI (2006-2018), namely the GM 31 Long Tom Pass Montane Grassland (Near Threatened (NT), Gm 22 Northern Escarpment Dolomite Grassland (Vulnerable (VU); poorly protected), and FOz 4 Northern Mistbelt Forest (Least Concern (LC); well protected). As such, the project area occurs in both the Grassland Biome (corresponding with the Mesic Highveld Grassland Bioregion) and the Forest Biome (corresponding to the Zonal and Interzonal Forests Bioregion).
- All four MR83 UG Areas partially (or fully) occur within the Endangered (EN) Malmani Karstlands threatened ecosystem. The Malmani Karstlands endangered ecosystem (Government Notice 1002 of the 9th of December 2011) is gazetted based on Criterion F, which identifies priority areas for meeting explicit biodiversity targets as defined by a systematic biodiversity plan. This ecosystem is associated with mountainous karstlands of the Malmani subgroup, together with the presence of karstland endemic taxa and threatened species.
- The MR83 UG Areas are surrounded by numerous protected and conservation areas. Most notably the following: Frankfort is within the Northeast Escarpment Focus Area (National Protected Areas Expansion Strategy (NPAES), 2010), Dukes is partially within the Morgenzon Forest Nature Reserve (NR), and the entire extent of all four MR83 UG Areas occurs in the Kruger to Canyons Biosphere Reserve and the Mpumalanga Drakensberg Strategic Water Source Areas (SWSA).
- From a provincial perspective, the Mpumalanga Biodiversity Sector Plan (2019 Terrestrial Database) indicated that: Dukes and Morgenzon are largely located in an **Irreplaceable Critical Biodiversity Area (CBA)**, with the western section of Beta North also within an Irreplaceable CBA. The north-western section of Frankfort is within an Optimal CBA and the eastern and southern sections of Beta North in this **Optimal CBA**. Frankfort partially occurs within an **ESA Local Corridor**. A small section within Dukes is mapped as **moderately modified areas** considered old lands. All MR83 UG Areas have small sections of **Heavily Modified Areas**. Sections of Morgenzon and Frankfort are mapped as **Other Natural Areas**, and all four MR83 UG Areas are located within an **ESA: Protected Area Buffer**.



## Ground-truthed results

During the field assessment, several areas with sensitive habitat were identified across the MR83 UG Areas, most notably indigenous forest patches as well as watercourses (with intact riparian vegetation). The MR83 UG Areas are also associated with various disturbances ranging from historic mining activities (i.e., old shafts, adits, waste rock dumps etc.), current illegal mining activities, built-up areas, encroachment of alien vegetation and stretches of plantations.

Across the MR83 UG Areas, Frankfort was the least transformed and associated with the least historic and current disturbances. Beta North and Dukes are associated with the greatest extent of degraded habitat and is currently impacted significantly by illegal mining activities. Morgenzon is mostly degraded within the assessed areas; however, both Morgenzon and Dukes are surrounded by sensitive forests, watercourses, and grassland habitats that require strict control of edge effects if the underground mining project is authorised.

Across the target areas, four broad habitat units could be distinguished:

- **Degraded Habitat** – encompassing Alien and Invasive Plant (AIP)-dominated Habitat and areas entirely transformed by mining (illegal and lawful) and/or forestry practices;
- **Freshwater Habitat**<sup>1</sup> – encompassing Riparian<sup>2</sup> Forest, Riparian Woodland, and Watercourse Habitat;
- **Terrestrial Woody Communities** – encompassing Indigenous Forests<sup>3</sup> and Woodlands (intact and degraded); and
- **Valley Habitat and Rocky Outcrops** – encompassing a variety of habitat types occurring along the mountain footslopes and along rivers and streams, including stretches of grass and herb dominated veld, as well as a short stretch of Rocky Outcrops along the Morgenzon Haul Road. important to note is that the Rocky Outcrops are not represented anywhere else in the MR83 UG Areas apart from this small stretch. Since there will be no changes to the existing Haul Roads (i.e., the only infrastructure associated with the Rocky Outcrops), this habitat sub-unit will not be impacted by the proposed MR83 UG project. As such, this habitat unit is not discussed further.

From a floral perspective, taking into consideration the presence of current and historic anthropogenic disturbances, species richness and the presence of AIPs, as well as the potential for the habitat to host significant biodiversity features and floral SCC, the following was concluded for the MR83 UG Areas:

- The Transformed Habitat sub-unit (Degraded Habitat) is of **Low** sensitivity, the AIP-dominated Vegetation (Degraded Habitat), Riparian Woodland of Beta North (Freshwater Habitat Unit), and Valley Habitat (historically impacted) of **Moderately low** sensitivity, the Watercourse Habitat sub-unit & Riparian Woodlands of Dukes and Morgenzon (Freshwater Habitat Unit), Valley Habitat Unit, and Woodlands of Beta North, Dukes and Morgenzon (Woody Communities) of **Intermediate** sensitivity, the Riparian Forests & Riparian Woodland of Dukes (Freshwater Habitat Unit) and intact Woodlands associated with Dukes and Frankfort (Woody Communities) of **Moderately high** sensitivity, and the Indigenous Forest (Woody Communities) of **High** sensitivity.

<sup>1</sup> The Freshwater Habitat meets the definition of a **watercourse** in terms of the definition contained within the National Water Act, 1998 (Act No. 36 of 1998):

- A river or spring;
- A natural channel which water flows regularly or intermittently;
- A wetland, dam or lake into which, or from which, water flows; and
- Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse;

and a reference to a watercourse includes, where relevant, its bed and banks.

<sup>2</sup> **Riparian habitat** as per the National Water Act, 1998 (Act No. 36 of 1998) (NWA): includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.

<sup>3</sup> **The definition provided by Mucina et al. (2021):** "Forest is a vegetation-physiognomic and ecosystem-functional tree-dominated formation often containing several sub-canopy shrub layers, with the tree canopy having crowns overlapping or touching, covering at least 40% of projected cover, and lacking continuous grassy undergrowth."





From a faunal perspective, when considering the current and historic anthropogenic disturbances, available habitat, faunal species diversity, as well as the potential for the habitats to host faunal SCC, the following was concluded for the MR83 UG Areas:

- The Indigenous Forest, portions of the Intact Woodlands and Freshwater Habitat at Dukes are considered to be of **moderately high sensitivity**. Likewise, the Indigenous Forest and Riparian Forest at Dukes and the Watercourse Habitat (Blyde River) at Beta are also considered to be of **moderately high sensitivity**; and
- The remaining habitats vary from **moderately low to intermediate sensitivities** for faunal species, with the Transformed habitat being of **low sensitivity**.

From a conservation perspective, the **Very High Sensitivity** of the Screening Tool Outcome for the Terrestrial Biodiversity Theme was only confirmed for the Indigenous Forest sub-unit, Woodland sub-unit (where not degraded), and the Freshwater Habitat. Of greatest concern is the presence of CBAs, ESAs, Protected Areas, and Forests. As per the Mpumalanga Tourism and Parks Agency (MTPA, 2014) land use guidelines, neither underground nor surface mining are suitable land uses to achieve biodiversity targets. Dukes occurs in the Morgenzon Forest NR. No mining related activities are permitted in a NR - As per Section 48(1)(a) of NEMPAA<sup>4</sup>, “despite other legislation, no person may conduct commercial prospecting, mining, exploration, production, or related activities (a) in a special nature reserve, national park, or nature reserve”. However, given that the proposed activities in Dukes will occur in Degraded Habitat, no additional loss of habitat in the Forest NR is anticipated. It is highly recommended that rehabilitation post-closure aims to reinstate vegetation representative of the reference vegetation types of the area – as far as is feasible – and that during mining and post-closure, the presence of AIPs be controlled. A net gain in biodiversity can result post-mining, which will prove favourable for achieving biodiversity targets in the Forest NR.

*\*Important to note:* “TGME is a pre-existing mining operation. Operations may continue, subject to conditions that may be imposed by the Minister of the Department of Forestry, Fisheries and the Environment. TGME is actively engaging with the Minister on the conditions for the continuation of the mining activities in the newly expanded Morgenzon Forest Nature Reserve.” – personal communications with TGME.

### Species of Conservation Concern (SCC)

The Screening Tool outcome for the Plant Species theme triggered low and a medium sensitivities. An extensive list of SCCs was triggered by the Screening Tool and many of these were confirmed to have a medium to high Probability of Occurrence (POC) for the Indigenous Forest sub-unit, Riparian Forest sub-unit and to a lesser degree the Woodland sub-unit and Riparian Woodland sub-unit. The Valley Habitat and Watercourse Habitat sub-units are not important for threatened SCC or for SCCs triggered by the Screening Tool (at least not in the extents associated with the MR83 UG Areas due to degradation of the vegetation from surrounding anthropogenic disturbances); however, these sub-units are important for provincially protected species under the Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) (MNCA). Where SCCs were confirmed on site, these did not include threatened species but instead included NT species, nationally protected species (National Forest Act, 1998 (Act No 84 of 1998, as amended in September 2011) (NFA) and Threatened or Protected Species (TOPS)<sup>5</sup>) and provincially protected species (MNCA). Loss of SCCs, be it threatened or protected, must be avoided at all costs. If impacts to these species are not avoidable, it is strongly advised that rescue and relocation initiatives be investigated. Alternatively, it would be necessary to harvest propagules of these species if the entire specimen cannot be relocated. Harvesting of propagules are recommended regardless, to propagate in a nursery and for use in rehabilitation activities later down the line.

The Screening Tool outcome for the Animal Species theme triggered high and medium sensitivities. The screening tool as well as data obtained from Mpumalanga Parks indicated that a number of faunal SCC are associated with the various mining footprint. However, following the site assessment the number of SCC that may occur within or adjacent to the mining areas is considered to be notably less than indicated by the databases. This largely as a result of the Degraded Habitat in which much of the mining infrastructure is proposed. Some of the more intact adjacent habitats can support SCC, however

<sup>4</sup> National Environmental Management: Protected Areas Act, 2003 (Act. No. 57 of 2003) (NEMPAA)

<sup>5</sup> National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) (Gazette No. 26436, Notice No. 700, commencement date: 1 September 2004); Threatened or Protected Species Regulations, 2007.





given the small extent of these areas and current anthropogenic activities in the areas, the likelihood of SCC occurring permanently is reduced. One faunal SCC, namely *Rhinolophus blasii* (Blasius's Horseshoe Bat, NT), was observed in an old adit located to the north of the proposed Morgenzon mine, outside of any potential disturbance footprint. Provided that all mitigation measures are implemented, impacts to faunal SCC are considered manageable and of decreased significance.

### Concluding Remarks

Due to the nature of the proposed project (underground mining) and the design of the proposed surface layouts, the activities will have restricted and mitigatable, direct impacts on indigenous vegetation and habitat of increased sensitivity. Sensitive habitat has largely been excluded from the layout designs and with edge effect control, AIP management, stormwater management, and erosion control, the impacts from the proposed mining activities will be of localised extent and will be site specific.

If the MR83 UG project will be authorised, as far as is possible, clearing of natural vegetation should be minimised where these are associated with the Indigenous Forest sub-unit, Woodland sub-unit (where not degraded), and the Freshwater Habitat. If avoidance is not possible, then offsetting and/or compensation should be investigated. If rehabilitation post-closure is aimed at clearing and controlling AIPs, as well as reinstating native floral communities, the proposed project may result in a net gain in biodiversity for the area. Conditions for mining in a NR should be investigated.

It is the opinion of the ecologists that this study provides the relevant information required to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources in the MR83 UG Areas will be made in support of the principle of sustainable development.

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**SCIENTIFIC TERRESTRIAL SERVICES**

**BIODIVERSITY ASSESSMENT**

**AS PART OF THE PROPOSED EIA AND WUL  
AMENDMENT PROCESS FOR THE MR83 UG  
TARGETS NEAR PILGRIMS REST,  
MPUMALANGA**

**Part A: Background Information**

**Prepared for:** Transvaal Gold Mining Estate  
Limited (TGME)  
**Prepared by:** Scientific Terrestrial Services CC  
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**Report reviewers:** N. Cloete (Pr. Sci. Nat)  
**Report reference:** STS 210071  
**Date:** March 2022



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## DOCUMENT GUIDE

The table below provides a guide to the reporting of biodiversity impacts as they relate to 1) Government Notice No. 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on **Terrestrial Biodiversity** as published in Government Gazette 43110 dated 20 March 2020, and 2) Government Notice No. 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on **Terrestrial Plant and Animal Species** as published in Government Gazette 43855 dated 30 October 2020.

Theme-Specific Requirements as per Government Notice No. 320 Terrestrial Biodiversity Theme – Very High Sensitivity Rating as per Screening Tool Output		
No.	SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS	Section in report/Notes
2	<b>Terrestrial Biodiversity Specialist Assessment</b>	
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.	<b>Part A – C:</b> Cover Page <b>Part A:</b> Appendix E
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	<b>Part A:</b> Section 1
2.3	<b>The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:</b>	
2.3.1	A description of the ecological drivers or processes of the system and how the proposed development will impact these;	<b>Part B:</b> Section 3 (flora) <b>Part C:</b> Section 3 (fauna)
2.3.2	Ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site;	<b>Part B:</b> Section 3 (flora) <b>Part C:</b> Section 3 (fauna)
2.3.3	The ecological corridors that the proposed development would impede including migration and movement of flora and fauna;	<b>Part A:</b> Section 3 (desktop analysis) <b>Part B:</b> Section 3 (flora) <b>Part C:</b> Section 3 (fauna)
2.3.4	The description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of Strategic Water Source Areas (SWSAs) or Freshwater Ecosystem Priority Area (FEPA) sub catchments;	<b>Part A:</b> Section 3 (desktop analysis) <b>Part B:</b> Section 3 (flora) <b>Part C:</b> Section 3 (fauna)
2.3.5	A description of terrestrial biodiversity and ecosystems on the preferred site, including: <ul style="list-style-type: none"> <li>a) main vegetation types;</li> <li>b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified;</li> <li>c) ecological connectivity, habitat fragmentation, ecological processes, and fine scale habitats; and</li> <li>d) species, distribution, important habitats (e.g., feeding grounds, nesting sites, etc.) and movement patterns identified;</li> </ul>	<b>Part A:</b> Section 3 (desktop analysis) <b>Part B:</b> Section 3 (flora) <b>Part C:</b> Section 3 (fauna)
2.3.6	The assessment must identify any alternative development footprints within the preferred site which would be of a “low” sensitivity as identified by the screening tool and verified through the site sensitivity verification; and	Section 5.3.6
2.3.7	<b>The assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:</b>	
2.3.7.1	Terrestrial Critical Biodiversity Areas (CBAs), including: <ul style="list-style-type: none"> <li>a) <i>the reasons why an area has been identified as a CBA;</i></li> <li>b) <i>an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;</i></li> <li>c) <i>the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s);</i></li> <li>d) <i>the impact on ecosystem threat status;</i></li> <li>e) <i>the impact on explicit subtypes in the vegetation;</i></li> <li>f) <i>the impact on overall species and ecosystem diversity of the site; and</i></li> </ul>	<b>Part A:</b> Section 3 (desktop analysis) <b>Part B:</b> Section 3 <b>Part C:</b> Section 3



	g) <i>the impact on any changes to threat status of populations of species of conservation concern in the CBA;</i>	
2.3.7.2	Terrestrial Ecological Support Areas (ESAs), including: a) <i>the impact on the ecological processes that operate within or across the site;</i> b) <i>the extent the proposed development will impact on the functionality of the ESA; and</i> c) <i>loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;</i>	
2.3.7.3	Protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including- a) <i>an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;</i>	<b>Part A:</b> Section 3 (desktop analysis)
2.3.7.4	Priority areas for protected area expansion, including- a) <i>the way in which in which the proposed development will compromise or contribute to the expansion of the protected area network;</i>	<b>Part A:</b> Section 3 (desktop analysis)
2.3.7.5	SWSAs including: a) <i>the impact(s) on the terrestrial habitat of a SWSA; and</i> b) <i>the impacts of the proposed development on the SWSA water quality and quantity (e.g., describing potential increased runoff leading to increased sediment load in water courses);</i>	Not Applicable
2.3.7.6	FEPA sub catchments, including- a) <i>the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;</i>	Not applicable
2.3.7.7	Indigenous forests, including: a) <i>impact on the ecological integrity of the forest; and</i> b) <i>percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.</i>	<b>Part A:</b> Section 3 (desktop analysis) <b>Part B:</b> Section 3 <b>Part C:</b> Section 3
<b>2.4</b>	<b>The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report.</b>	
	<b>Part B:</b> Results of the <b>Floral Assessment</b> as well as conclusions on Terrestrial Biodiversity as it relates to vegetation communities. <b>Part C:</b> Results of the <b>Faunal Assessment</b> as well as conclusions on Terrestrial Biodiversity as it relates to faunal communities.	
<b>3</b>	<b>Terrestrial Biodiversity Specialist Assessment Report</b>	
<b>3.1</b>	<b>The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:</b>	
3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	<b>Part A:</b> Appendix E
3.1.2	A signed statement of independence by the specialist;	<b>Part A:</b> Appendix E
3.1.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	<b>Part B:</b> Section 1.3 (flora) <b>Part C:</b> Section 1.3 (fauna)
3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	<b>Part A:</b> Appendix C <b>Part B:</b> Section 2 (flora) <b>Part B:</b> Appendix A (flora) <b>Part C:</b> Section 2 (fauna) <b>Part C:</b> Appendix A (fauna)
3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	<b>Part B:</b> Section 1.3 (flora) <b>Part C:</b> Section 1.3 (fauna)
3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	<b>Part B:</b> Section 4 (flora) <b>Part C:</b> Section 4 (fauna)
	<b>Impact Assessment Requirements</b> 3.1.7 Additional environmental impacts expected from the proposed development; 3.1.8 Any direct, indirect and cumulative impacts of the proposed development; 3.1.9 The degree to which impacts and risks can be mitigated;	<b>Part B:</b> Section 5 (flora) <b>Part C:</b> Section 5 (fauna)





	<p>3.1.10 The degree to which the impacts and risks can be reversed;</p> <p>3.1.11 The degree to which the impacts and risks can cause loss of irreplaceable resources;</p> <p>3.1.12 Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);</p>	
3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a “low” terrestrial biodiversity sensitivity and that were not considered appropriate;	<b>Not Applicable to this report</b>
3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	<b>Part A:</b> Executive summary <b>Part B:</b> Section 6 (flora) <b>Part C:</b> Section 6 (fauna)
3.1.15	Any conditions to which this statement is subjected.	<b>Part B:</b> Section 5 (flora) <b>Part C:</b> Section 5 (fauna)
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.	This report is submitted to the Environmental Assessment Practitioner (EAP) and applicant and will be appended to the Environmental Impact Assessment (EIA) / Environmental Management Plan (EMP) by the EAP in due course as part of the application process
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	



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## GLOSSARY OF TERMS

Most definitions are based on terms and concepts elaborated by Richardson *et al.* (2011), Hui and Richardson (2017) and Wilson *et al.* (2017), with consideration to their applicability in the South African context, especially South African legislation [notably the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), and the associated Alien and Invasive Species Regulations, 2020].

<b>Alien species</b> (syn. exotic species; non-native species)	A species that is present in a region outside its natural range due to human actions (intentional or accidental) that have enabled it to overcome biogeographic barriers.
<b>Biological diversity or Biodiversity</b> (as per the definition in NEMBA)	The variability among living organisms from all sources including, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.
<b>Biome - as per Mucina and Rutherford (2006); after Low and Rebelo (1998).</b>	A broad ecological spatial unit representing major life zones of large natural areas – defined mainly by vegetation structure, climate, and major large-scale disturbance factors (such as fires).
<b>Bioregion (as per the definition in NEMBA)</b>	A geographic region which has in terms of section 40(1) been determined as a bioregion for the purposes of this Act;
<b>Critical Biodiversity Area (CBA)</b>	A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation, and ridges.
<b>Corridor</b>	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
<b>Disturbance</b>	A temporal change, either regular or irregular (uncertain), in the environmental conditions that can trigger population fluctuations and secondary succession. Disturbance is an important driver of biological invasions.
<b>Ecoregion</b>	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region".
<b>Endangered</b>	Organisms in danger of extinction if causal factors continue to operate.
<b>Endemic species</b>	Species that are only found within a pre-defined area. There can therefore be sub-continental (e.g., southern Africa), national (South Africa), provincial, regional, or even within a particular mountain range.
<b>Ecological Support Area (ESA)</b>	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
<b>Ground-truth</b>	Ground truth is a term used in various fields to refer to information provided by direct observation (i.e., empirical evidence) as opposed to information provided by inference.
<b>Habitat</b> (As per the definition in NEMBA)	A place where a species or ecological community naturally occurs.
<b>Important Bird and Biodiversity Area (IBA)</b>	The IBA Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that: are globally threatened, have a restricted range, are restricted to specific biomes/vegetation types or sites that have significant populations.
<b>Indigenous vegetation</b> (As per the definition in NEMA)	Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
<b>Integrity (ecological)</b>	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.
<b>Invasive species</b>	Alien species that sustain self-replacing populations over several life cycles, produce reproductive offspring, often in very large numbers at considerable distances from the parent and/or site of introduction, and have the potential to spread over long distances.
<b>Listed alien species</b>	All alien species that are regulated in South Africa under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004), Alien and Invasive Species Regulations, 2020.
<b>Least Threatened</b>	Least threatened ecosystems are still largely intact.
<b>Native species</b> (syn. indigenous species)	Species that are found within their natural range where they have evolved without human intervention (intentional or accidental). Also includes species that





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	have expanded their range as a result of human modification of the environment that does not directly impact dispersal (e.g., species are still native if they increase their range as a result of watered gardens but are alien if they increase their range as a result of spread along human-created corridors linking previously separate biogeographic regions).
<b>Red Data listed (RDL) species</b>	According to the Red List of South African plants ( <a href="http://redlist.sanbi.org/">http://redlist.sanbi.org/</a> ) and the International Union for Conservation of Nature (IUCN), organisms that fall into the Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.
<b>Species of Conservation Concern (SCC)</b>	The term SCC in the context of this report refers to all RDL and IUCN listed threatened species as well as protected species of relevance to the project.



## LIST OF ACRONYMS

AIP	Alien and Invasive Plant
BGIS	Biodiversity Geographic Information Systems
CARA	Conservation of Agricultural Resources Act, 1983 [Act No. 43 of 1983]
CBA	Critical Biodiversity Area
CR	Critically Endangered
DMS	Dense Medium Separation
DFFE	Department of Forestry, Fisheries and the Environment
DMRE	Department of Mineral Resources and Energy
ESA	Ecological Support Area
EN	Endangered
E-GIS	Environmental Geographical Information Systems
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EW	Extinct in the Wild
GN	Government Notice
Ha	Hectares
IBA	Important Bird and Biodiversity Area
IEM	Integrated Environmental Management
I&APs	Interested and Affected Parties
IUCN	International Union for Conservation of Nature
LC	Least Concern
MAPE	Mean Annual Potential Evaporation
MAP	Mean annual precipitation
MASMS	Mean Annual Soil Moisture Stress
MAT	Mean Annual Temperature
MFD	Mean Frost Days
masl	Meters Above Mean Sea Level
MBSP	Mpumalanga Biodiversity Sector Plan
MNCA	Mpumalanga Nature Conservation Act, 1998 [Act No. 10 of 1998]
MTPA	Mpumalanga Tourism and Parks Agency
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act, 1998 [Act No. 107 of 1998]
NEMBA	National Environmental Management: Biodiversity Act, 2004 [Act No. 10 of 2004]
NEMPAA	National Environmental Management: Protected Areas Act, 2003 [Act. No. 57 of 2003]
NFA	National Forest Act, 1998 [Act No. 84 of 1998]
NPAES	National Protected Area Expansion Strategy
NWA	National Water Act, 1998 [Act No. 36 of 1998]
NR	Nature Reserve
POC	Probability of Occurrence
QDS	Quarter Degree Squares
RDL	Red Data listed
RoM	Run of Mine
STS	Scientific Terrestrial Services
SABAP 2	South African Bird Atlas Project 2
SACAD	South African Conservation Areas Database
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SanParks	South African National Parks



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<b>SAPAD</b>	South African Protected Areas Database
<b>SCC</b>	Species of Conservation Concern
<b>SWSA</b>	Strategic Water Source Areas
<b>TSF</b>	Tailings Storage Facility
<b>TOPS</b>	Threatened or Protected Species
<b>TMM</b>	Trackless mobile machinery
<b>TGME</b>	Transvaal Gold Mining Estates Limited
<b>VEGMAP</b>	Vegetation Map Project
<b>VU</b>	Vulnerable
<b>WSA</b>	Water Source Area
<b>WUL</b>	Water Use Licence



# 1 INTRODUCTION

## 1.1 Background Information and Project Description

Scientific Terrestrial Services CC (STS) was appointed to undertake a terrestrial biodiversity assessment as part of the proposed Environmental Impact Assessment (EIA) and Water Use Licence (WUL) amendment process for the MR83 UG targets near Pilgrims Rest, Mpumalanga.

The assessment included four sites which will henceforth collectively be referred to as the “**MR83 UG Areas**”; individually referred to as Dukes, Frankfort, Morgenzon, and Beta North (Figure 1). The MR83 UG Areas are located within the Mpumalanga Province, with Dukes and Morgenzon roughly 2 km north-west, Beta North approximately 2 km south-west, and Frankfort approximately 9 km north of Pilgrim’s Rest (localities depicted in Figures 1 and 2). As part of the field assessments, a 20 m to 50 m buffer area around the proposed mining activities was ground-truthed (based on site accessibility and safety constraints).

The purpose of this report (Part A) is to update, where necessary, information pertaining to the biodiversity of the MR83 UG Areas from a desktop conservation database perspective. It is the objective of this desktop assessment to provide detailed information to guide the fieldwork components (discussed in Parts B and C) to ensure that all relevant ecological aspects are considered prior to performing the field assessments. This report is not a standalone report and should be considered together with the outcome of the biodiversity assessments (floral assessment in Part B and the faunal assessment in Part C).





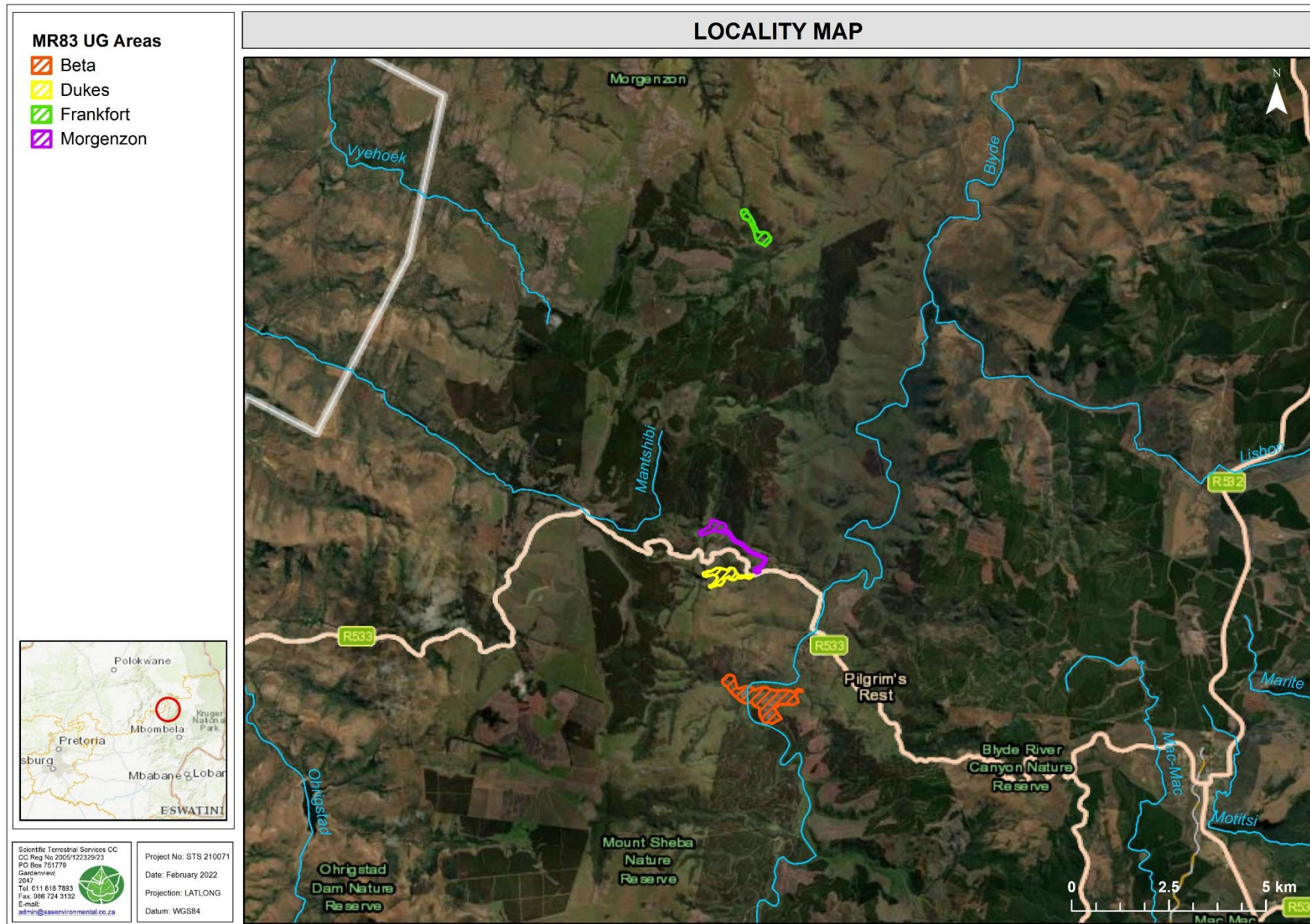


Figure 1. Digital satellite image depicting the MR83 UG Areas in relation to surrounding area.





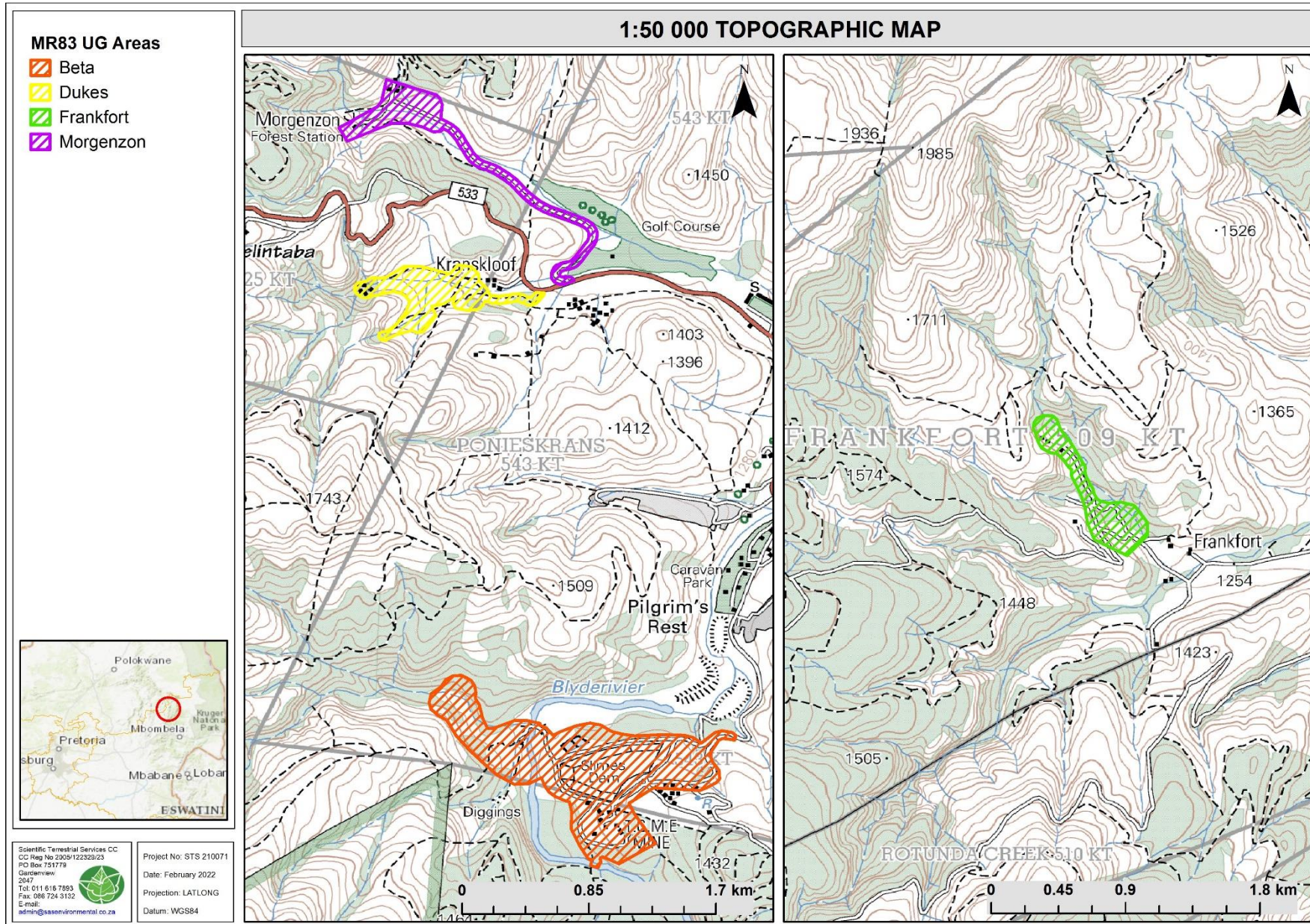


Figure 2. The MR83 UG Areas depicted on a 1:50 000 topographical map in relation to the surrounding area.



## 1.2 Project Description<sup>6</sup>

Transvaal Gold Mining Estates Limited (TGME), a subsidiary of Theta Gold Mines Limited, is the holder of an existing mining right with Department of Mineral Resources and Energy (DMRE) Reference Number: MP 30/5/1/2/2/83 MR (83 MR) with effective date 16 October 2013.

TGME is proposing to undertake a redevelopment of its historical underground mines within the 83 MR mining area, i.e., the MR83 UG Areas (as introduced previously). The MR83 UG Areas include historical underground mining sections as well as an old TGME process and beneficiation plant. For the proposed underground mining project, additional surface infrastructure is required to augment the existing surface infrastructure – as is required to support the underground workings, the expansion of the current Tailings Storage Facility (TSF) and an upgrade of the old TGME process plant.

The planned infrastructure at each shaft includes (but is not limited to):

- Trackless mobile machinery (TMM) workshops;
- Fuel storage facilities;
- Oil storage facilities;
- Mining and engineering stores;
- First aid station;
- Mining waste sorting /management and salvage yard;
- Sewage handling facilities;
- Diesel generator sets;
- Power distribution transformers;
- Water supply and distribution infrastructure;
- Reservoir and water tanks;
- Surface water management infrastructure;
- Upgrading of river crossings and rehabilitation of Peach Tree stream;
- Site security and access control;
- Mining settling and collection dam (stormwater and pollution control);
- Emulsion storage tanks;

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<sup>6</sup> TGME Existing Underground Mine Redevelopment Project: Final Scoping Report. OMI0005-2021-22-200184-SR





- Underground infrastructure;
  - Power supply by Generator at the shaft;
  - Water supply from the Blyde (Current Approved Permit);
  - Ore handling infrastructure (Ore passes, conveyors, incline winder with required shaft equipment); and
  - Dewatering system.
- Offices – mobile/prefabricated offices;
- Surface ore handling and load-out facilities;
- Dense Medium Separation (DMS) plant;
- Mine residue facility (waste rock)
- Run of Mine (RoM) stockpile area
- Conveyor from Beta North to the plant
- Single drum winder
- Steel rope haulage system.

A detailed depiction of the proposed activities to accompany the proposed underground mining activities are presented in Figures 3 – 7.

The Life of Project is currently estimated at 10 years (i.e., requested validity of the EIA) in which the construction phase is estimated at three years and the mining at seven years. Various alternatives have been assessed for the project at scoping level, and workshopped during specialist, applicant, and engineering team interactions. The alternatives were also influenced by the existing baseline environmental data and specialist inputs, and by discussions with authorities and with Interested and Affected Parties (I&APs).





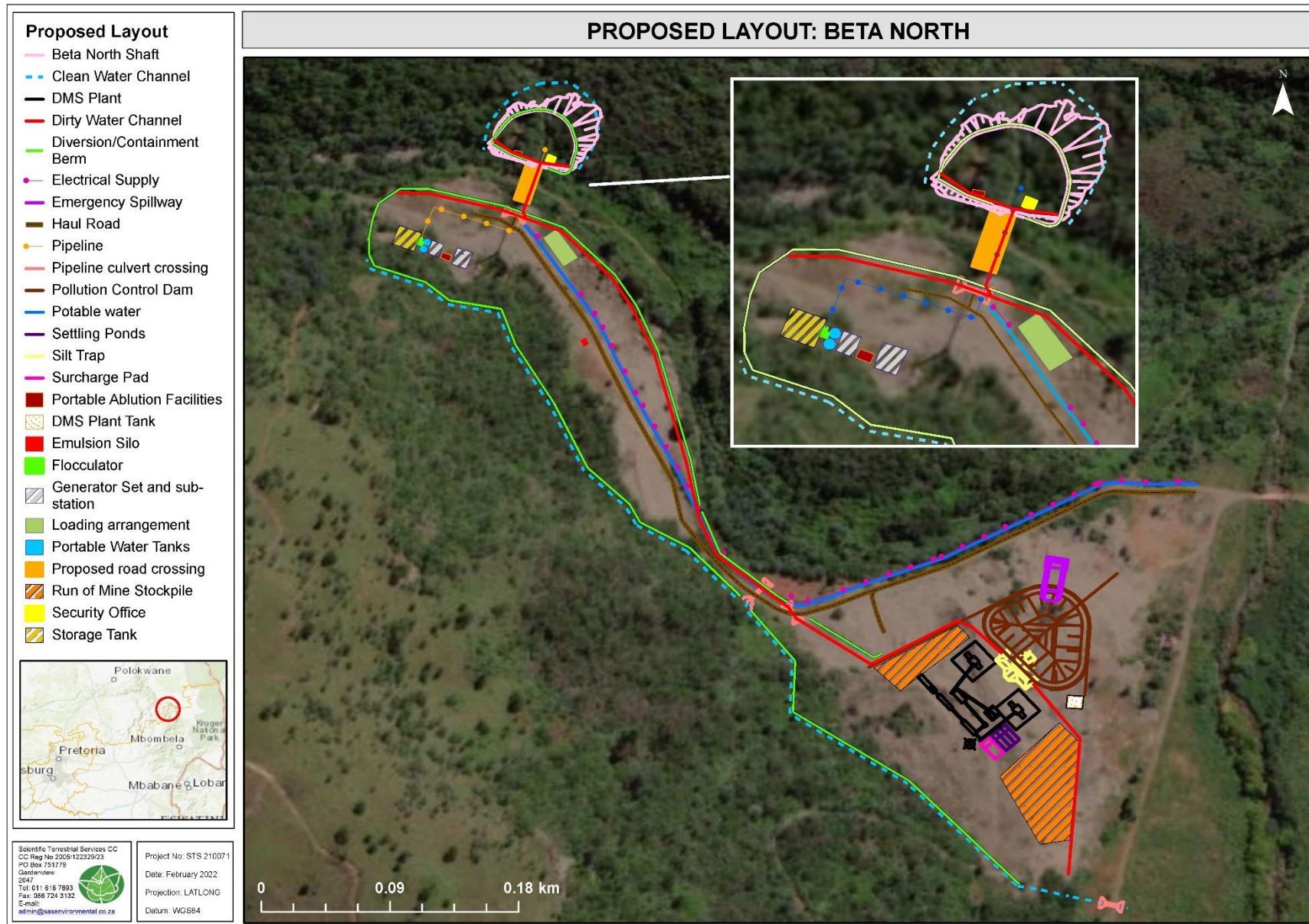


Figure 3: Proposed layout map for Beta North (part 1) provided by the Environmental Assessment Practitioner (EAP) during the time of assessment.





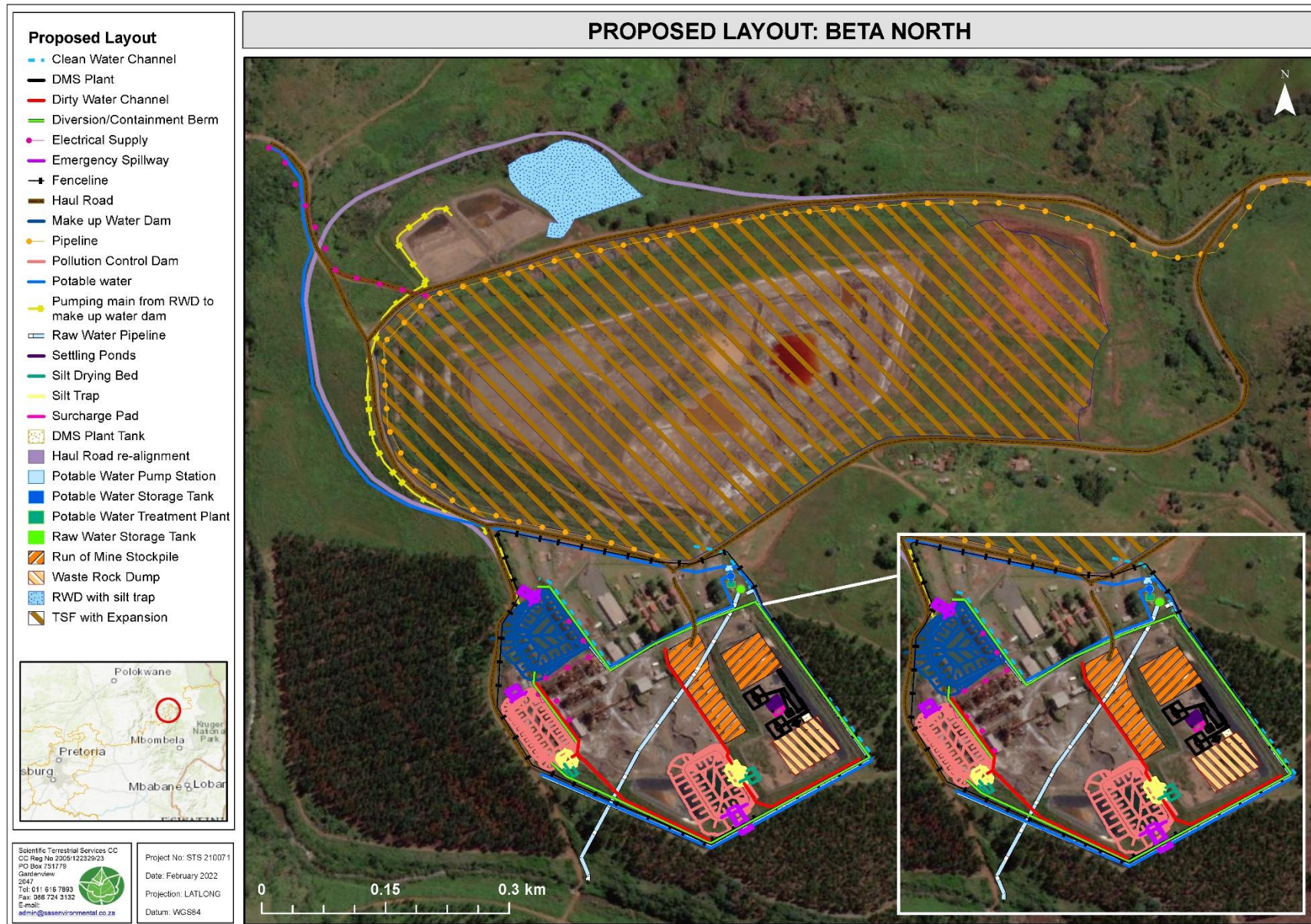


Figure 4: Proposed layout map for Beta North (part 2) provided by the EAP during the time of assessment.





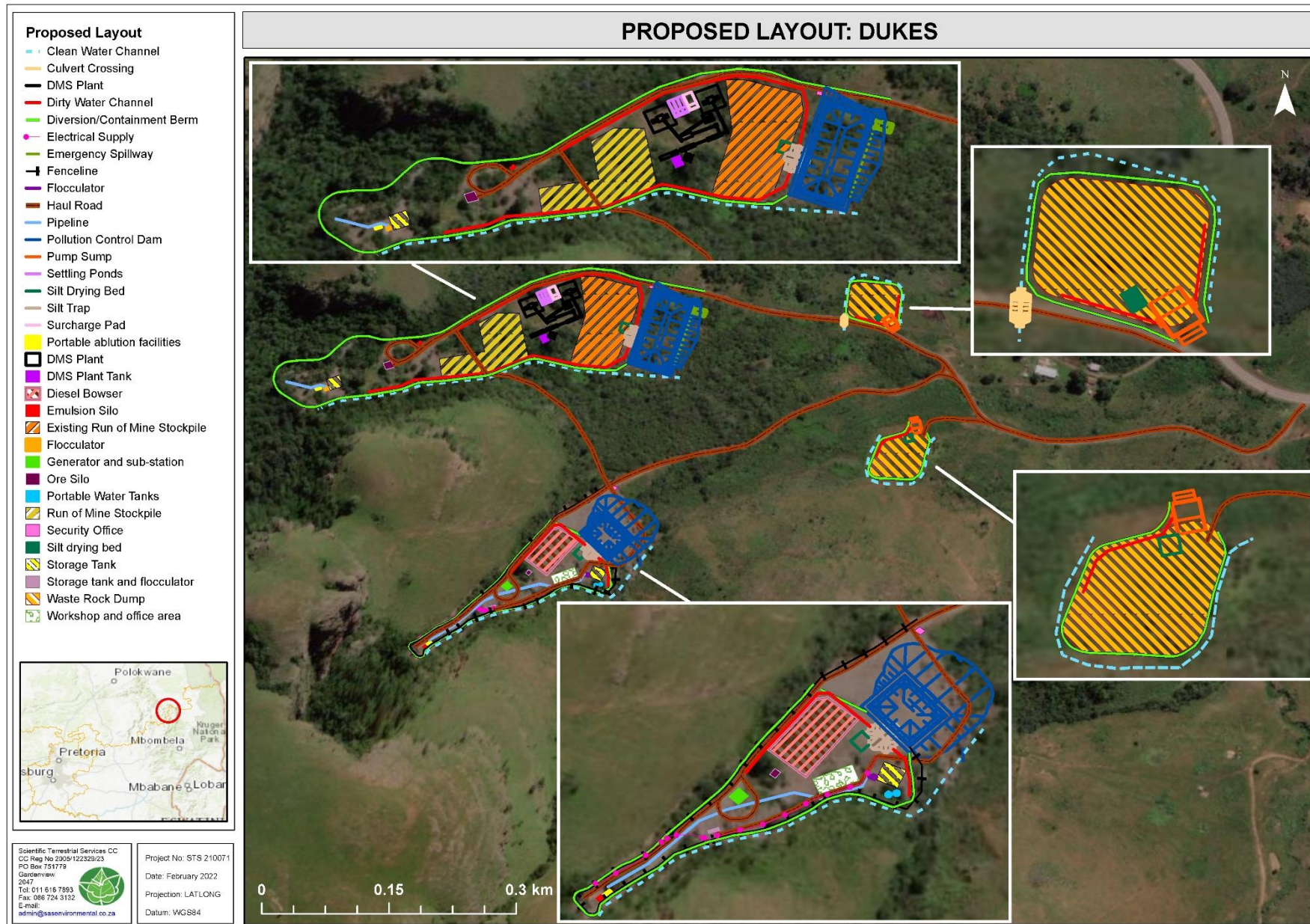


Figure 5: Proposed layout map for Dukes provided by the EAP during the time of assessment.





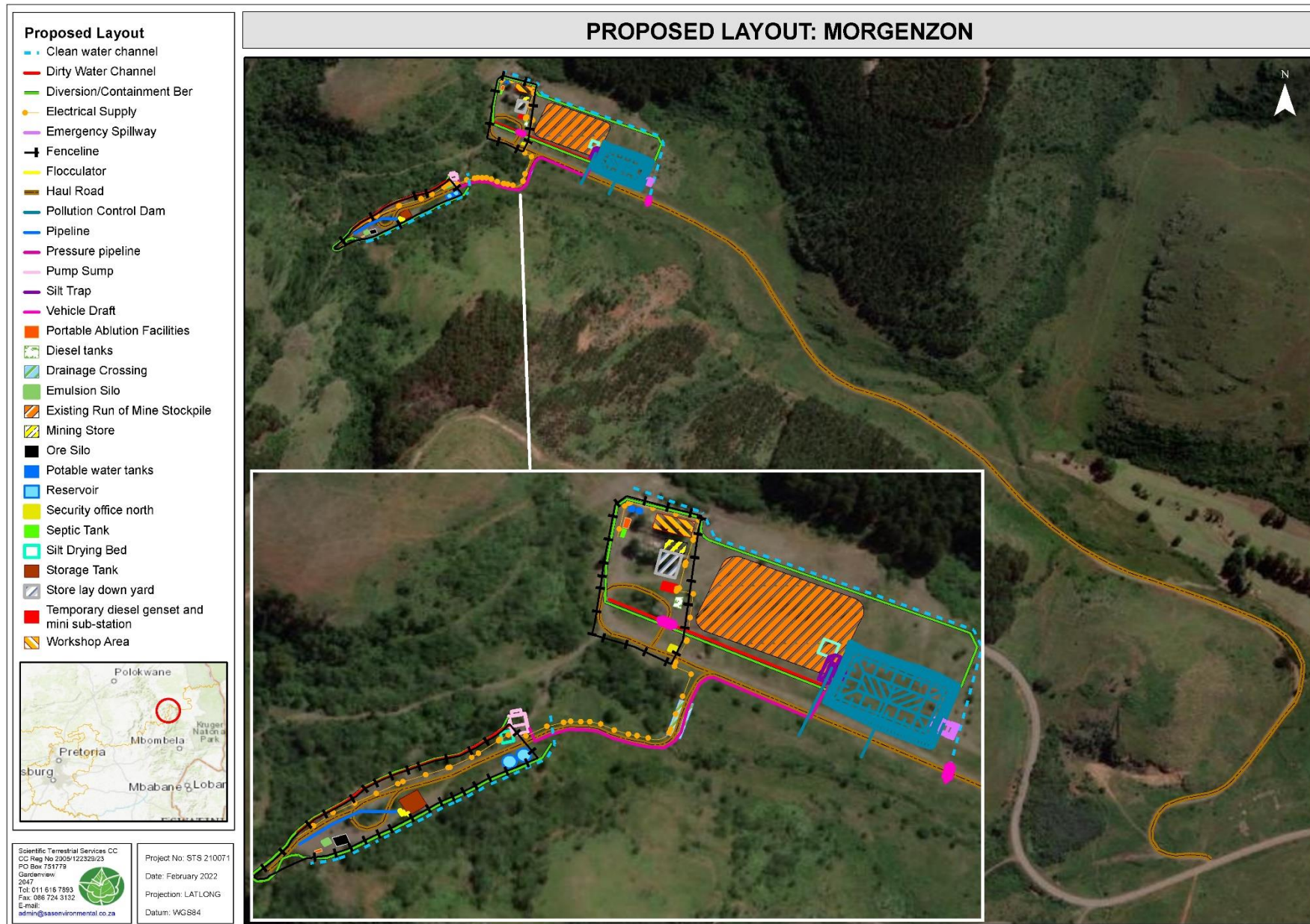


Figure 6: Proposed layout map for Morgenzon provided by the EAP during the time of assessment.







Figure 7: Proposed layout map for Frankfort provided by the EAP during the time of assessment.



### **1.3 Scope of Work**

Specific outcomes in terms of Part A of the report are as follows:

- To update the desktop assessment using all relevant information as presented by the South African National Biodiversity Institute's (SANBI) Biodiversity Geographic Information Systems (BGIS) website (<http://bgis.sanbi.org>) and the Department of Forestry, Fisheries and the Environment (DFFE) Environmental Geographical Information Systems (E-GIS) website (<https://egis.environment.gov.za/>). The desktop assessment aims to gain background information on the physical habitat and potential floral and faunal ecology associated with the MR83 UG Areas;
- To state the indemnity and terms of use of this report (Appendix A) as well as to provide the details of the specialists who prepared the reports (Appendix E);
- To outline the legislative requirements that were considered for the assessment (Appendix B of this report); and
- To provide the methodologies followed relating to the impact assessment and development of the mitigation measures (Appendix C) that were applied in the floral and faunal assessments (Part B and Part C).

### **1.4 Assumptions and Limitations**

The following assumptions and limitations are applicable to this report:

- The biodiversity desktop assessment is confined to the MR83 UG Areas and does not include detailed results of the adjacent properties, although ecological important or sensitive areas according to the desktop databases of surrounding areas and the greater project area have been included on the relevant maps; and
- It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the actual site characteristics within the MR83 UG Areas at the scale required to inform an environmental process. However, this information is useful as background information to the study and is important in legislative contextualisation of risk and impact and was used as a guideline to inform the assessment and to focus on areas and aspects of increased conservation importance. It must, however, be noted that site assessment of key areas may potentially contradict the information contained in the relevant databases, in which case the site verified information must carry more weight in the decision-making process.



## 1.5 Legislative Requirements

The following legislative requirements were considered during the assessment:

- The Constitution of the Republic of South Africa, 1996<sup>7</sup>;
- The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA);
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);
  - Government Notice (GN) number R.1020: Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated 25 September 2020 as it relates to the NEMBA;
  - GN number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 September 2020;
- The National Environmental Management: Protected Areas Act, 2003 (Act. No. 57 of 2003) (NEMPAA);
- Government Gazette 45421 dated 10 May 2019 as it relates to the Department of Forestry, Fisheries and the Environment (DFFE)'s national environmental screening report required with an application for environmental authorisation as identified in regulation 16(1)(v) of EIA Regulations:
  - GN No. 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity as published in Government Gazette 43110 dated 20 March 2020; and
  - GN No. 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant and Terrestrial Animal Species as published in Government Gazette 43855 dated 30 October 2020.
- The Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) (MNCA).

The details of each of the above, as they pertain to this study, are provided in Appendix B of this report.

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<sup>7</sup> Since 1996, the Constitution has been amended by seventeen amendments acts. The Constitution is formally entitled the 'Constitution of the Republic of South Africa, 1996'. It was previously also numbered as if it were an Act of Parliament – Act No. 108 of 1996 – but since the passage of the Citation of Constitutional Laws Act, neither it nor the acts amending it are allocated act numbers.





## 2 ASSESSMENT APPROACH

Maps and digital satellite images were generated prior to the field assessment to determine broad habitats, vegetation types and potentially sensitive sites. The biodiversity desktop assessment is confined to the MR83 UG Areas and does not include the neighbouring and adjacent properties, although the sensitivity of surrounding areas is included on the respective maps. Relevant databases and documentation that were considered during the assessment of the MR83 UG Areas include<sup>8</sup>:

- 2010 National Protected Area Expansion Strategy (NPAES) (Government of South Africa, 2010; DEA & SANBI, 2009), including the below-listed vector datasets:
  - NPAES Focus Areas 2010: National Protected Areas Expansion Strategy: Focus areas for protected area expansion (South African National Parks (SanParks), 2010);
  - NPAES Formal: Polygons of formal protected national parks areas in South Africa (SANParks/SANBI, 2013); and
  - NPAES Protected Areas – Informal: Informal conservation areas in South Africa (SANParks/SANBI, 2012).
- The South African Conservation Areas Database, Quarter 3 (SACAD, 2021);
- The South African Protected Areas Database, Quarter 3 (SAPAD, 2021);
- The Mpumalanga Biodiversity Sector Plan (MBSP) – 2019 data set;
- The National Vegetation Map Project (VEGMAP), with the below vector dataset used for information on Biomes, Bioregions and Vegetation Type(s):
  - 2018 Final Vegetation Map of South Africa, Lesotho, and Swaziland (SANBI, 2018a).
- The National List of Threatened Ecosystems 2011 (SANBI 2011; South Africa, 2011);
- From the National Biodiversity Assessment (NBA, 2018) Terrestrial Assessment project (Skowno *et al.*, 2019):
  - 2018 Terrestrial ecosystem threat status and protection level - remaining extent (SANBI, 2018b); and
  - 2018 Terrestrial ecosystem threat status and protection level layer (SANBI, 2018c).

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<sup>8</sup> Datasets obtained from:

- SANBI BGIS (2020). The South African National Biodiversity Institute - Biodiversity GIS (BGIS) [online]. URL: <http://bgis.sanbi.org>; and
- Environmental Geographical Information Systems (E-GIS) website. URL: <https://egis.environment.gov.za/>





- The Important Bird and Biodiversity Areas (IBA) Programme and vector dataset (BirdLife South Africa, 2015; Marnewick et al., 2015a and 2015b), in conjunction with the South African Bird Atlas Project 2 (SABAP 2);
- From the 2017 Strategic Water Source Areas (SWSA) project:
  - 2017 SWSA **Surface water** (Water Research Commission, 2017).
- The Mining and Biodiversity Guidelines 2012 database (SANBI, 2012) – part of the 2013 Mining and Biodiversity Guidelines Project (Department of Environmental Affairs et al, 2013);
- The International Union for Conservation of Nature (IUCN); and
- The National Web-Based Environmental Screening Tool (accessed 2021).

Several field assessments were undertaken to determine the ecological status of the MR83 UG Areas and to “ground-truth” the results of the updated desktop databases:

- Site screening (high level assessments of Beta North, Morgenzon and Frankfort): 19<sup>th</sup> – 22<sup>nd</sup> April 2021;
- Site screening (high level assessment of Dukes): 27<sup>th</sup> – 28<sup>th</sup> October 2021; and
- Complete Site Assessments (all MR83 UG Areas): 17<sup>th</sup> – 19<sup>th</sup> January 2022.

### **3 RESULTS OF THE DESKTOP ANALYSIS**

#### ***3.1 Conservation Characteristics of the MR83 UG Areas based on National and Provincial Datasets***

The following section contains data accessed as part of the desktop assessment and are presented as a “dashboard” report below (Table 1). The dashboard report aims to present concise summaries of the data on as few pages as possible to allow for improved assimilation of results by the reader to take place. Where required, further discussion and interpretation are provided.



**Table 1: Summary of the vegetation characteristics associated with the MR83 UG Areas [Quarter Degree Squares (QDS) 2430DC].**

DESCRIPTION OF THE VEGETATION TYPE(S) RELEVANT TO THE MR83 UG AREAS BASED ON THE 2018 FINAL VEGETATION MAP OF SOUTH AFRICA, LESOTHO AND SWAZILAND (SANBI 2006–2018 & SANBI, 2018A)						
<b>Biome(s) and Bioregion(s) (Figure 8)</b>	The biome associated with the MR83 UG Areas is the <b>Grassland Biome (corresponding with the Mesic Highveld Grassland Bioregion)</b> , with small sections of Dukes, Frankfort and Morgenzon traversed by the <b>Forest Biome (corresponding to the Zonal and Interzonal Forests Bioregion)</b> .					
<b>Vegetation Type(s)</b>	<p>Three vegetation types (<b>Figure 9</b>) are associated with the MR83 UG Areas; however, the <b>Northern Escarpment Dolomite Grassland</b> and the <b>Long Tom Pass Montane Grassland</b> make up the largest of the vegetation types associated with the project (Figure 9). Smaller sections of Dukes, Frankfort and Morgenzon are traversed by the <b>Northern Mistbelt Forest</b> (Figure 9). More specifically, the following vegetation types are associated with each of the MR83 UG Areas:</p> <ul style="list-style-type: none"> <li>- <b>Dukes</b>: The western section of Dukes occurs within both the Long Tom Pass Montane Grassland and the Northern Mistbelt Forest vegetation types, with the eastern section occurring within the Northern Escarpment Dolomite Grassland.</li> <li>- <b>Frankfort</b>: A small section in the northern extent of Frankfort occurs in the Long Tom Pass Montane Grassland, with a moderate stretch of the Northern Mistbelt Forest within the north-eastern extent of Frankfort. The central and southern sections occur in the Northern Escarpment Dolomite Grassland.</li> <li>- <b>Morgenzon</b>: A small section in the western extent of Morgenzon is mapped as Long Tom Pass Montane Grassland, with the central and eastern sections in the Northern Escarpment Dolomite Grassland.</li> <li>- <b>Beta North</b>: Most of the extent occurs within the Northern Escarpment Dolomite Grassland. A small section in its northern extent is in the <b>Northern Mistbelt Forest</b>.</li> </ul> <p>The <b>Northern Escarpment Dolomite Grassland</b> and the <b>Long Tom Pass Montane Grassland</b> are endemic to South Africa, with the <b>Northern Mistbelt Forest</b> =likely endemic to South Africa, Lesotho and Eswatini (<b>Figure 10</b>).</p>					
VEGETATION TYPE DESCRIPTIONS ACCORDING TO MUCINA & RUTHERFORD (2006) - ORIGINAL EXTENT OF VEGETATION TYPES						
Vegetation Type	GM 31 Long Tom Pass Montane Grassland		Gm 22 Northern Escarpment Dolomite Grassland		FOz 4 Northern Mistbelt Forest	
<b>Climate Information</b>	Climate is a seasonally arid temperate region with hot summers reaching 22°C and cool and dry winters with average July temperatures as low as 4°C.		Summer rainfall. Most of this unit occurs in the mistbelt, with increased precipitation. Warm-temperate climate, with low frequency of frost.		No available information in Mucina and Rutherford	
	<b>MAP* (mm)</b>	1067	<b>MAP* (mm)</b>	1034	<b>MAP* (mm)</b>	1084
	<b>MAT* (°C)</b>	14.3	<b>MAT* (°C)</b>	16.5	<b>MAT* (°C)</b>	16.7
	<b>MFD* (Days)</b>	14	<b>MFD* (Days)</b>	5	<b>MFD* (Days)</b>	-
	<b>MAPE* (mm)</b>	1864	<b>MAPE* (mm)</b>	1905	<b>MAPE* (mm)</b>	1946
	<b>MASMS* (%)</b>	14	<b>MASMS* (%)</b>	67	<b>MASMS* (%)</b>	-
<b>Altitude (m)</b>	1500 m - 1650 m		1 000–1 620 m		1 050 to1 650 m	
<b>Distribution</b>	Occurring along the escarpment east of Lydenburg, from Morgenzon Reserve just north of Crystal Springs Mountain Lodge, Pilgrim's Rest, southwards to the Schoemanskloof.		Mpumalanga Province: From the high-lying dolomite grasslands of the Abel Erasmus Pass and Motlatse (Blyde) River (Vaalhoek) areas in the north, it extends southwards in a broad dolomite band along the Northern Escarpment, to as far south as the vicinity of Kaapsehoop.		Limpopo and Mpumalanga as well as in Swaziland: Occurring along the Soutpansberg from Blouberg in the northwest to the Samandou Plateau in the northeast and further southwards (along the Northern Escarpment) from Abel Erasmus Pass (Olifants River) to the surroundings of Badplaas and Barberton.	



<p><b>Geology<sup>9</sup>, Soils &amp; Hydrology</b></p>	<p>The geology forms part of the Pretoria Group, which predominantly consists of shale and quartzite in the Rooihogte, Timeball Hill and Boshhoek Formations, and the distinctive volcanic elements of the Hekpoort Andesite Formations which are on the summits of the highest lying areas.</p>	<p>Malmani dolomites of the Chuniespoort Group (Transvaal Supergroup) which overlies the Black Reef Quartzite Formation. Soils usually have a high pH, are rich in calcium and magnesium, and with low phosphorus status. Deep Hutton and Griffin soil forms are common. Land types Fa, Ab and Ac.</p>	<p>Highly weathered, clayey soils mainly of Avalon and Hutton soil forms, derived from shales (Pretoria Group), quartzite (Black Reef Formation), dolomite (Chuniespoort Group), granite (Nelspruit Basement) and diabase (Mokolian intrusives).</p>
<p><b>Conservation</b></p>	<p>Listed as <b>Vulnerable (VU)</b> in Mucina and Rutherford (2006) but listed as <b>Near Threatened (NT)</b> in the updated 2018 Final Vegetation Map of South Africa, Lesotho and Swaziland.</p> <p>As much as 60.1% of this unit is still natural where a large proportion of this unit has been afforested (39%) or cultivated (0.6%).</p> <p>This unit is well protected where its target of 27% has been met in the current reserve network. However gold mining is still a threat as this unit contains a few current gold mines and many abandoned shafts and mine dumps.</p>	<p>Listed as <b>Endangered (EN)</b> in Mucina and Rutherford (2006) but listed as <b>Vulnerable (VU)</b> in the updated 2018 Final Vegetation Map of South Africa, Lesotho and Swaziland.</p> <p>Conservation target 27%. Only 2% protected within the Blyde River Canyon National Park, but larger portion protected in private Driekop Caves and London heritage sites in the north and in the Mooifontein and Mondi Cycad Reserve heritage sites in the south. More than half of this unit has been transformed (52%), mainly by plantations (47%) and cultivated lands (5%). Erosion potential very low (17%), low (51%) and moderate (28%).</p>	<p><b>Least threatened (LC)</b>. Conservation target 30%. About 10% statutorily conserved in Blyde River Canyon, Lekgalameetse, Songimvelo, Makobulaan, Malalotja, Nelshoogte, Barberton, and Starvation Creek Nature Reserves. More than 25% enjoys protection in privately owned nature reserves, including for instance Wolkberg Wilderness Area, In-De-Diepte, Sudwala, Mac, Buffelskloof, Mount Sheba etc. Below the escarpment between Mariepskop and Graskop, the natural forest has expanded into former grassland areas due to the protection of the timber plantations against fire.</p>
<p><b>Vegetation &amp; landscape features</b></p>	<p>The landscape has a diverse physiography, which includes subalpine peaks, level terraces and rolling plains in the higher lying areas with steeply sloping mountain slopes. The highest point is Mount Anderson (2280 m), occurring just north of Long Tom Pass.</p>	<p>Very species-rich grasslands that occur along the Escarpment dolomite belt. The grasslands are characterised by a very diverse shrub layer which varies in height and density. The herbaceous component becomes more dense northwards as the climate becomes drier.</p>	<p>Tall, evergreen afrotemperate mistbelt forests occurring primarily in east-facing fire refugia such as subridge scarps and moist sheltered kloofs where they form small, fragmented patches.</p>

<sup>9</sup> **Land types** refer to a class of land with specified characteristics. In South Africa it has been used as a unit denoting land at 1:250 000 scale, over which there is a marked uniformity of climate, terrain form and soil pattern. Land type Bd refers to non-red soils (Hu, Bv <33%) that are usually more dystrophic/mesotrophic than they are eutrophic, Land type Bc refers to upland duplex and marginalitic soils that have a Plinthic catena less than 10%, Land type Ae refers to Red (yellow soils <10%) that are more eutrophic than dystrophic/mesotrophic, and Land type Ia refers to a miscellaneous soil class.



DESCRIPTION OF THE VEGETATION TYPES IN TERMS OF THE NBA 2018 TERRESTRIAL DATASET - REMAINING EXTENT OF VEGETATION TYPES	
<p><b>National Biodiversity Assessment (NBA, 2018)</b> <b>(Figure 11)</b></p>	<p>The NBA is the primary tool for monitoring and reporting on the state of biodiversity in South Africa. Two headline indicators that are applied to both ecosystems and species are used in the NBA: <b>threat status</b> and <b>protection level</b>:</p> <ul style="list-style-type: none"> <li>i. Ecosystem threat status tells us about the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function, and composition, on which their ability to provide ecosystem services ultimately depends. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or LC, based on the proportion of each ecosystem type that remains in good ecological condition relative to a series of thresholds.</li> <li>ii. Ecosystem protection level tells us whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Not Protected, Poorly Protected, Moderately Protected or Well Protected, based on the proportion of each ecosystem type that occurs within a protected area recognised in the NEMPAA.</li> </ul> <p>Three Vegetation type remnants are associated with the MR83 UG Areas: the Long Tom Pass Montane Grassland (Near Threatened (NT); well protected), Northern Escarpment Dolomite Grassland (VU; poorly protected), and the Northern Mistbelt Forest (LC; well protected).</p>





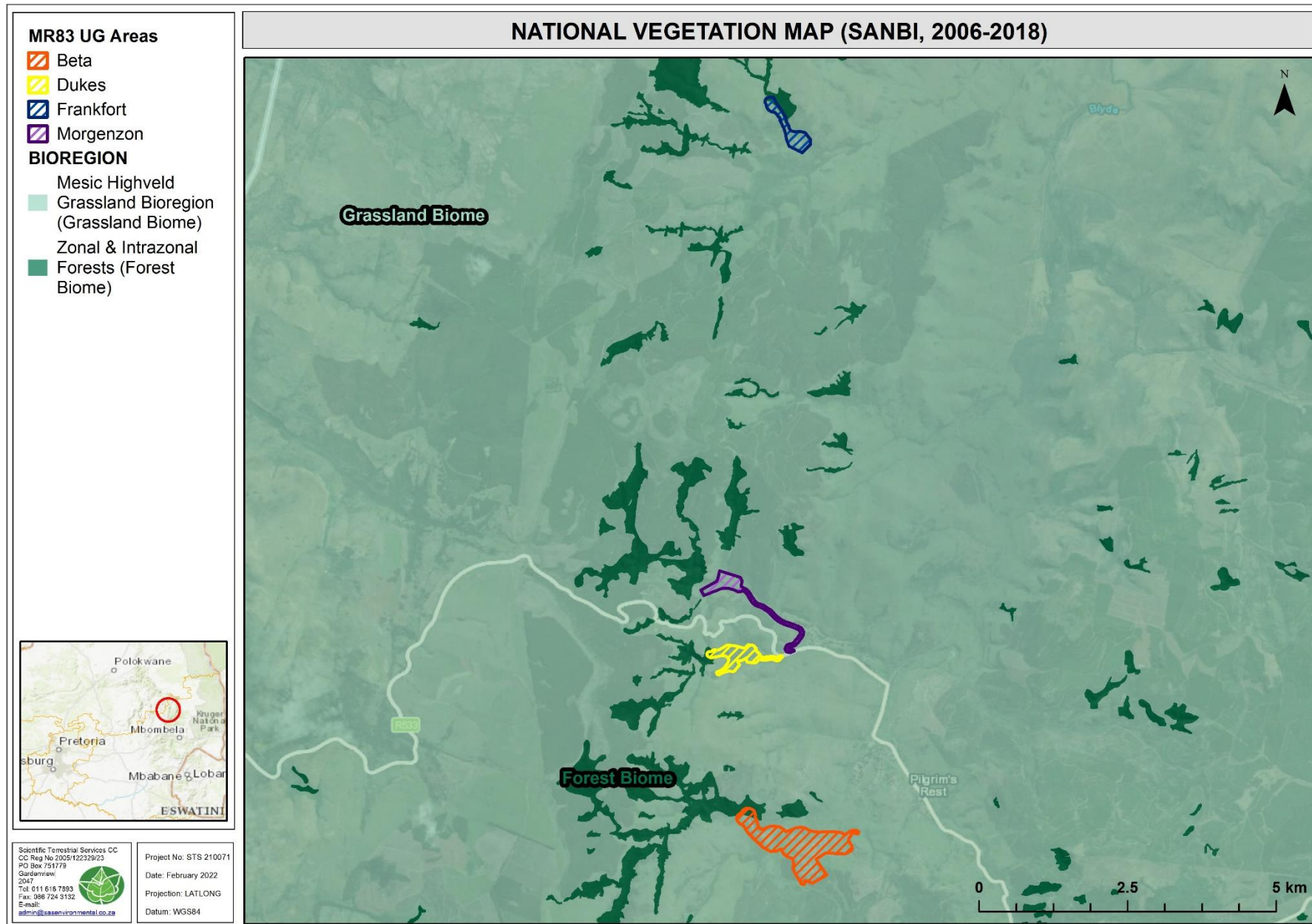


Figure 8: Biomes and bioregions associated with the MR83 UG Areas (Mucina and Rutherford, 2018 database).



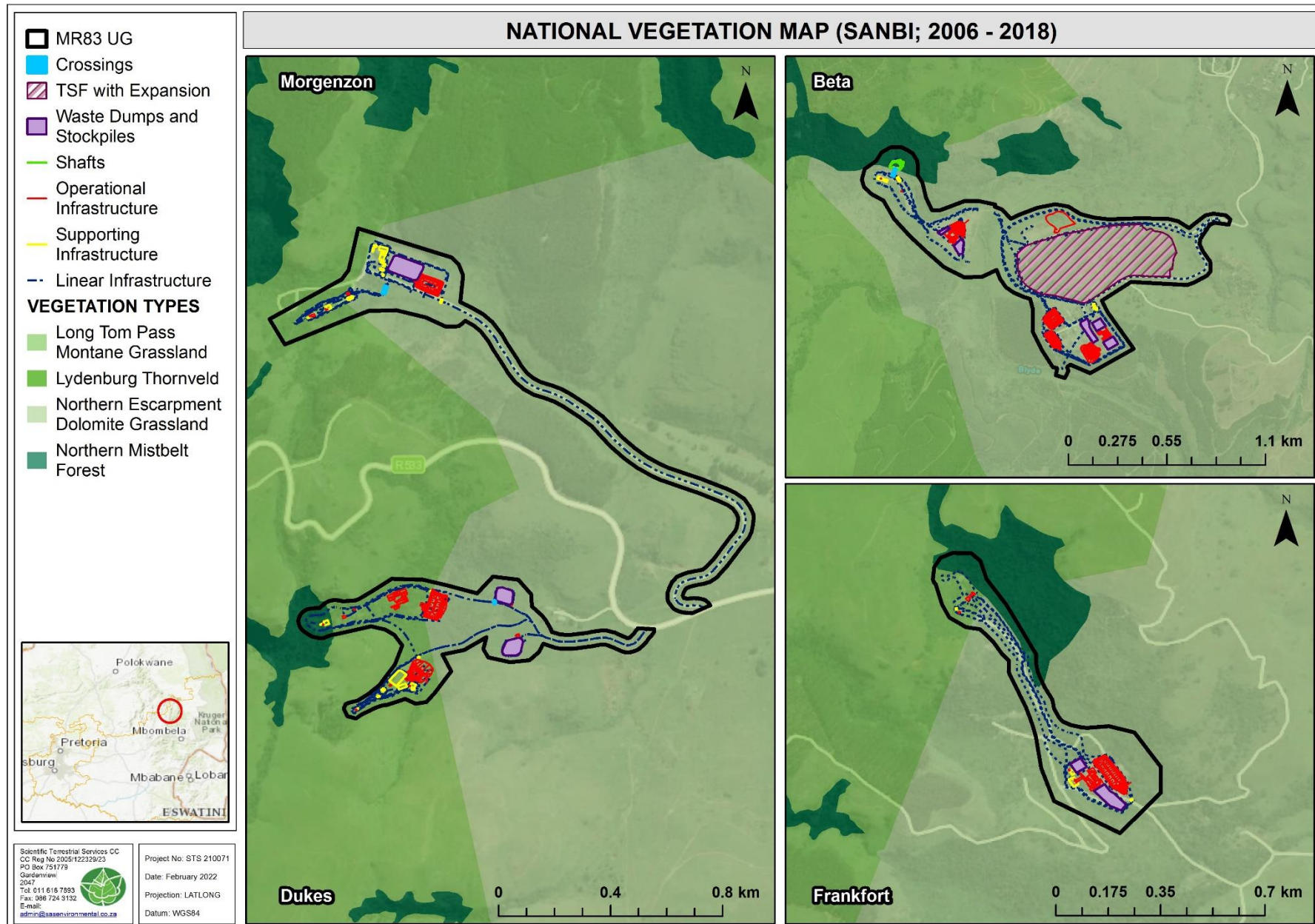


Figure 9: Vegetation types associated with the MR83 UG Areas (SANBI, 2018a database).





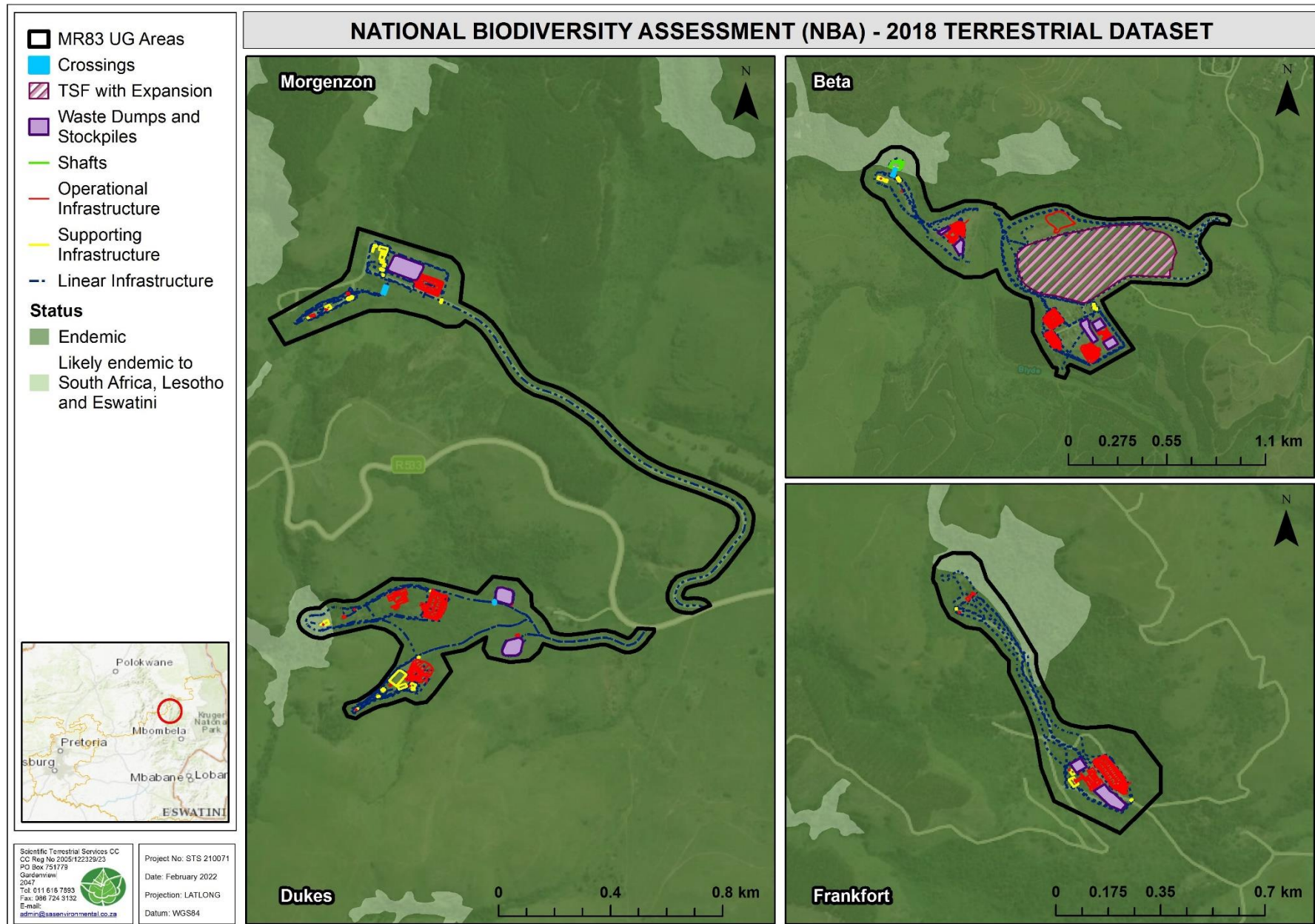


Figure 10: Endemic status of vegetation types associated with the MR83 UG Areas (SANBI, 2018c).





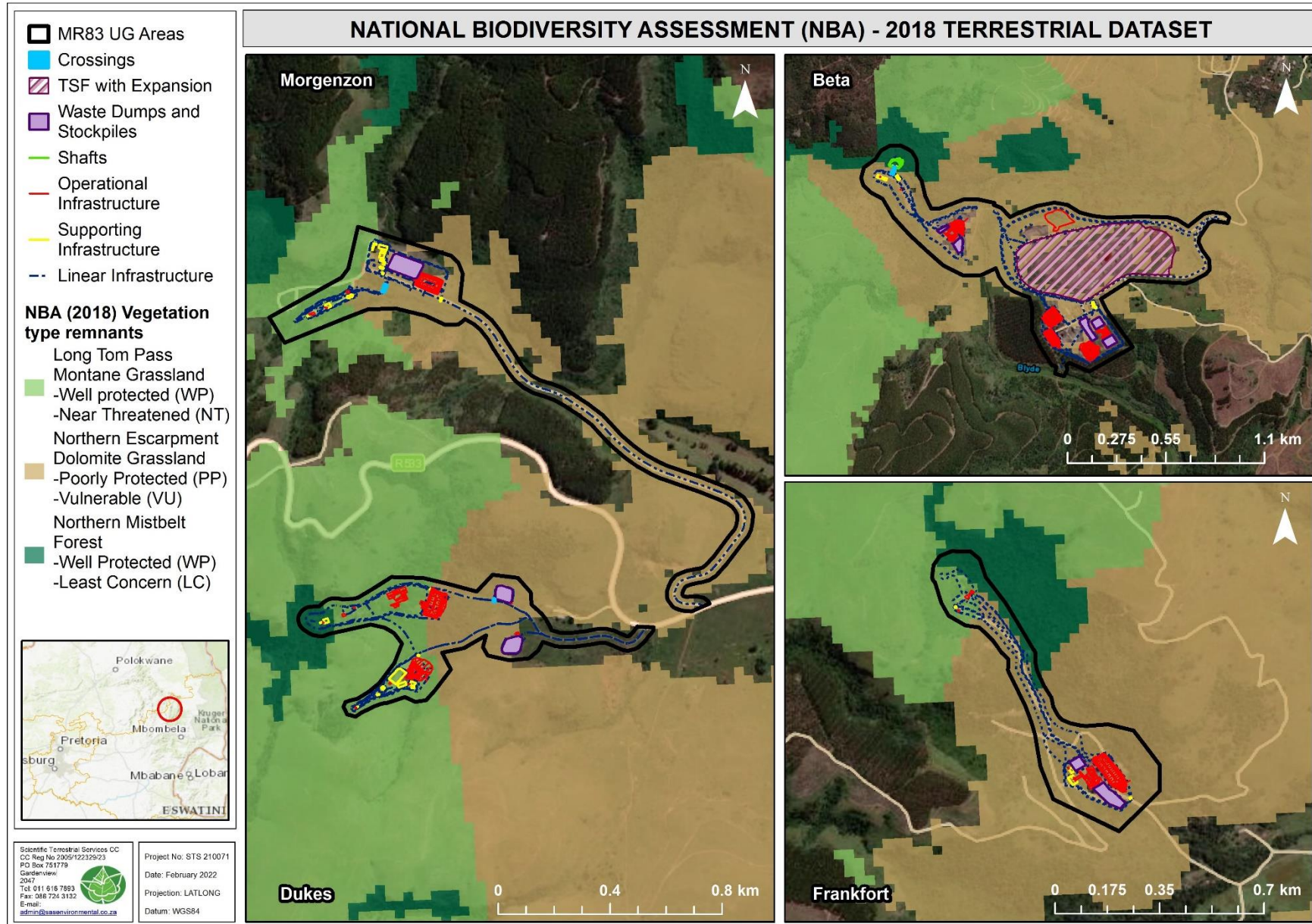


Figure 11: The remaining extent of the ecosystems associated with the MR83 UG Areas according to the 2018 National Biodiversity Assessment (SANBI, 2018b).





**Table 2: Summary of the terrestrial conservation characteristics for the MR83 UG Areas (QDS 2430DC).**

CONSERVATION DETAILS PERTAINING TO THE MR83 UG AREAS (VARIOUS DATABASES)	
<p><b>National Threatened Ecosystems (2011) (Figure 12)</b></p>	<p>All four MR83 UG Areas partially occur within the <b>Endangered Malmani Karstlands</b> threatened ecosystem. The Malmani Karstlands endangered ecosystem (GN 1002 of the 9th of December 2011)<sup>10</sup> is gazetted based on <b>Criterion F</b>, which identifies priority areas for meeting explicit biodiversity targets as defined by a systematic biodiversity plan. This ecosystem is associated with mountainous karstlands of the Malmani subgroup, together with the presence of karstland endemic taxa and threatened species.</p> <p><u>Key biodiversity features</u> associated with this ecosystem include:</p> <ul style="list-style-type: none"> <li>- <b>Five mammal species</b>, namely the Rough-haired Golden Mole, Meester's Golden Mole, Short-eared Trident Bat, Natal Long-fingered Bat and Oriibi;</li> <li>- <b>Six bird species</b> including Blue Crane, Blue Swallow, Grey Crowned Crane, Striped Flufftail, Southern Ground Hornbill and Wattled Crane;</li> <li>- <b>Three reptile species</b> for example <i>Bradypodion transvaalense</i> and <i>Lamprophis swazicus</i>;</li> <li>- <b>Seven vegetation types</b>, namely the Northern Escarpment Dolomite Grassland, Pong Dolomite Mountain Bushveld, Ohrigstad Mountain Bushveld, Long Tom Pass Montane Grassland, Lydenburg Thornveld, Mpumalanga Afromontane Forest and Northern Escarpment Quartzite Sourveld; and</li> <li>- <b>Five plant species</b>, namely <i>Aloe fouriei</i>, <i>Gladiolus vernus</i>, <i>Gladiolus macneillii</i>, <i>Ocotea kenyensis</i>, Sensitive species 738.</li> </ul>
<p><b>SAPAD (2021, Q3); SACAD (2021, Q3); NPAES (2010); IBA (2015); and SWSA (2017).</b></p>	<p>The NPAES (2010)<sup>11</sup>, SACAD<sup>12</sup> (2021, Q3), SAPAD<sup>13</sup> (2021, Q3), Important Bird and Biodiversity Areas (IBA, 2015) and the Surface Water Strategic Water Source Areas (SWSAs, 2017) databases indicate several protected and conservation areas within 10 km of the MR83 UG Areas. In terms of protected areas, Listing Notice 3 (GNR 324) is triggered in Mpumalanga for activities in “<i>Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas, where such areas comprise indigenous vegetation</i>”.</p> <p>NPAES (2010) Formal Protected Areas (Figure 13):</p> <ul style="list-style-type: none"> <li>• Morgenzon Reserve; Motlatse Canyon Provincial Nature Reserve (NR), Ohrigstad Dam NR, and Tweefontein Reserve.</li> </ul> <p>NPAES (2010) Informal Protected Areas (Figure 14):</p> <ul style="list-style-type: none"> <li>• Mount Anderson Catchment NR</li> </ul>

<sup>10</sup> South Africa. 2011. National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection. Government Gazette, 558(34809): 1 – 544, December 9.

<sup>11</sup> Protected areas are areas of land or sea that are **formally** protected by law and managed mainly for biodiversity conservation. Protected areas recognised in the National Environmental Management: Protected Areas Act (Act 57 of 2003) are considered **formal protected areas** in the NPAES. It is important to differentiate protected areas from conservation areas. Conservation areas are areas of land not formally protected by law but informally protected by the current owners and users and managed at least partly for biodiversity conservation. Because there is no long-term security associated with conservation areas, they are not considered a strong form of protection. Conservation areas are not a major focus of the NPAES.

<sup>12</sup> **SACAD (2021)**: The types of conservation areas that are currently included in the database are the following: 1. Biosphere reserves, 2. Ramsar sites, 3. Stewardship agreements (other than nature reserves and protected environments), 4. Botanical gardens, 5. Transfrontier conservation areas, 6. Transfrontier parks, 7. Military conservation areas and 8. Conservancies.

<sup>13</sup> **SAPAD (2021)**: The definition of protected areas follows the definition of a protected area as defined in the National Environmental Management: Protected Areas Act, (Act 57 of 2003). Chapter 2 of the National Environmental Management: Protected Areas Act, 2003 sets out the “System of Protected Areas”, which consists of the following kinds of protected areas - 1. Special nature reserves; 2. National parks; 3. Nature reserves; 4. Protected environments (1-4 declared in terms of the National Environmental Management: Protected Areas Act, 2003); 5. World heritage sites declared in terms of the World Heritage Convention Act; 6. Marine protected areas declared in terms of the Marine Living Resources Act; 7. Specially protected forest areas, forest nature reserves, and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act No. 84 of 1998); and 8. Mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act No. 63 of 1970).



## NPAES (2010) Focus Areas (Figure 15):

- Frankfort is within the Northeast Escarpment Focus Area, with Morgenzon within 5 km of this focus area and Dukes and Beta North within 10 km of this focus area. The Northeast Escarpment focus area is an extremely diverse area important for ecological processes and resilience to climate change. It is an important Grassland centre of endemism and includes opportunities for protecting intact river reaches with threatened river types. There are excellent opportunities for expanding the Legalametse, Wolkberg and Blyde Canyon Reserves (National Protected Area Expansion Strategy document for South Africa 2008).

## SAPAD (2021, Q3) Protected Areas (Figure 13):

- Blyderivierspoort NR; Henra Private NR; Mac Mac Reserve; Mount Anderson Catchment NR; Mount Sheba Private NR; Morgenzon Reserve; Ohrigstad Dam NR, and Tweefontein Reserve.
- Newly promulgated Morgenzon Forest Nature Reserve – GN 1062, Gazette number 45345, dated 19 October 2021 as it pertains to the National Forests Act (84/1998): Declaration of certain State Forests Properties in Mpumalanga Province as Forest Nature Reserves under Sec 8(1) and 9.

## SACAD (2021, Q3) Conservation Areas (Figure 15):

- The entire extent of the MR83 UG Areas is in the Kruger to Canyons Biosphere Reserve.

## SWSA (2017) (Figure 14):

- The entire extent of the MR83 UG Areas is in the Mpumalanga Drakensberg SWSA. Surface water SWSAs are defined as areas of land that supply a disproportionate (i.e., relatively large) quantity of mean annual surface water runoff in relation to their size. They include transboundary areas that extend into Lesotho and Swaziland. The sub-national Water Source Areas (WSAs) are not nationally strategic as defined in the report but were included to provide a complete coverage.

## IBA (2015) (Figure 14):

- The MR83 UG Areas are within 5 km of the Blyde River Canyon IBA. This is the only site in South Africa that supports breeding *Falco fasciinucha*. At least one pair inhabits the gorges and there is potential habitat for several more birds. The cliffs at Manoutsa hold over 660 pairs of *Gyps coprotheres*, making it the world's fourth-largest colony. The gorges also hold breeding *Ciconia nigra*, *Falco peregrinus* and *Bubo capensis*. The surrounding grassland supports *Turnix hottentotta*, *Sarothrura affinis*, *Saxicola bifasciata*, *Neotis denhami*, *Grus paradisea*, *Bucorvus cafer*, *Tyto capensis* and *Geronticus calvus*, which breed within the reserve along the cliff gorges. The proteoid hillslopes hold *Promerops gurneyi*. The forest and forest edge support *Stephanoaetus coronatus*, *Buteo oreophilus*, *Lioptilus nigricapillus*, *Tauraco corythaix*, *Bradypterus barratti*, *Telophorus olivaceus*, *Cossypha dichroa*, *Cercotrichas signata*, *Estrilda melanotis* and *Serinus scotops*.

Additionally, the Mpumalanga Tourism and Parks Agency (MTPA) provides a database with provincially protected areas, much of which overlap with areas identified in the SAPAD and NPAES databases. The list includes the following provincially protected areas (Figure 16):

- Blyde River Canyon NR
- Graskop Grasslands Unique Community
- Hartebeesvlakte Reserve
- Henra Private NR
- Mac Mac Reserve
- Mariepskop Conservation Area
- Morgenzon Reserve
- Mount Anderson Catchment NR



	<ul style="list-style-type: none"> <li>• Mount Sheba Private NR</li> <li>• Ohrigstad Dam NR</li> <li>• Tweefontein Reserve</li> </ul>		
MPUMALANGA BIODIVERSITY SECTOR PLAN (2019) TERRESTRIAL DATABASE			
<b>CBA Irreplaceable (Figure 17)</b>	<p>Dukes and Morgenzon are largely located in an <b>Irreplaceable CBA</b>, with the western section of Beta North also within an Irreplaceable CBA. These are areas required to meet targets and with irreplaceability values of more than 80%; Critical linkages or pinch-points in the landscape that <b>must remain natural</b>; and often include Critically Endangered Ecosystems, or hosts species of conservation concern.</p> <p><u>Primary Objective:</u> Maintain in a natural state with no loss of ecosystems, functionality, or species; no flexibility in land-use options.</p>	<b>CBA Optimal (Figure 17)</b>	<p>The north-western section of Frankfort is within an <b>Optimal CBA</b> and the eastern and southern sections of Beta North in this Optimal CBA. Dukes and Morgenzon do not occur in an Optimal CBA.</p> <p>The CBA Optimal Areas (previously called ‘important and necessary’ in the Mpumalanga Biodiversity Conservation Plan - MBCP) are the areas optimally located to meet both the various biodiversity targets and other criteria defined in the analysis. Although these areas are not ‘irreplaceable’ they are the most efficient land configuration to meet all biodiversity targets and design criteria.</p> <p><u>Primary Objective:</u> Maintain in a natural state with no loss of ecosystems, functionality or species; some flexibility in land-use options.</p>
<b>ESA Local Corridor (Figure 17)</b>	<p>Frankfort partially occurs within an <b>ESA Local Corridor</b>. ESA Local Corridors are finer scale alternative pathways that build resilience into the corridor network by ensuring connectivity between climate change focal areas, reducing reliance on single landscape scale corridors.</p> <p><u>Primary Objective:</u> Maintain in a natural, or near-natural, state with limited loss of ecosystems or functionality.</p>	<b>Moderately Modified Old Lands (Figure 17)</b>	<p>A small section within Dukes is mapped as moderately modified areas considered old lands. These are old, cultivated lands that have been allowed to recover (within the last 80 years) and support some natural vegetation. Although biodiversity pattern and ecological functioning may have been compromised the areas may still play a role in supporting biodiversity and providing ecosystem services.</p> <p><u>Primary Objective:</u> Stabilise and manage to restore ecological functionality, particularly soil carbon and water-related functionality.</p>
<b>Heavily Modified (Figure 17)</b>	<p>All MR83 UG Areas have small sections of <b>Heavily Modified Areas</b>. These are areas currently modified to such an extent that any valuable biodiversity and ecological functions have been lost.</p> <p><u>Primary Objective:</u> Manage the land-use in a biodiversity-friendly manner aiming to maximise ecological functionality.</p>	<b>Other Natural Areas (Figure 17)</b>	<p>Sections of Morgenzon and Frankfort are mapped as <b>Other Natural Areas</b>. These are Natural areas which are not identified as CBAs or ESAs, but which provide a range of ecosystem services from their ecological infrastructure.</p> <p><u>Primary Objective:</u> Minimise habitat and species loss through strategic landscape planning and ensure basic ecosystem functionality.</p>
<b>PA: National Parks &amp; Nature Reserves (Figure 17 &amp; 18)</b>	<p>None of the MR83 UG Areas are within Protected Areas; however, the Beta North area is immediately north-east of a protected area. These areas include gazetted National Parks, Nature Reserves, Special Nature Reserves, and Forest Nature Reserves.</p>	<b>ESA Protected Area Buffer (Figure 18)</b>	<p>All four MR83 UG Areas are located within an <b>ESA: Protected Area Buffer</b>. This area constitutes a buffer distance of either 10 km for National Parks; 5 km for all other PAs; and 1 km for Protected Environments.</p>



	<p>**It should be noted that this 2019 dataset does not include the newly promulgated Morgenzon Forest Nature Reserve, which intersects most of Dukes (refer to Figures 13 &amp; 16).</p> <p><u>Primary Objective:</u> Already meeting biodiversity targets, therefore must be kept in a natural state and with a management plan focused on maintaining or improving the state of biodiversity.</p>		<p><u>Primary Objective:</u> Maintain or improve ecological and tourism functionality of a PA, ensuring none of the PA objectives are compromised by activities or land-use changes in the buffer zone.</p>
<b>MINING AND BIODIVERSITY GUIDELINES (2013) – FIGURE 19</b>			
<b>Highest Biodiversity Importance</b>	<p>The entire extent of Beta North, Dukes and Frankfort, with much of Morgenzon's extent occur in an area considered to be of <b>Highest Biodiversity Importance</b> from a mine planning perspective.</p> <p><b>Risk for mining:</b> Highest risk for mining. <b>Implications for mining:</b> Environmental screening, EIAs and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features, and to provide a site-specific basis on which to apply the mitigation hierarchy to inform regulatory decision making for mining, water use licences, and environmental authorisations. If they are confirmed, the likelihood of a fatal flaw for new mining projects is very high because of the significance of the biodiversity features in these areas and the associated ecosystem services.</p>	<b>High Biodiversity Importance</b>	<p>The western extent of Morgenzon is in an area considered to be of <b>High Biodiversity Importance</b> from a mine planning perspective.</p> <p><b>Risk for mining:</b> High risk to mining. <b>Implications for mining:</b> An EIA should include an assessment of optimum, sustainable land use for a particular area and will determine the significance of the impact on biodiversity. Mining options may be limited in these areas, and red flags for mining projects are possible. Authorisations may set limits and specify biodiversity offsets that would be written into licence agreements and/or authorisations.</p>
<b>MPUMALANGA BIOBASE (2002) – FIGURES 20 &amp; 21</b>			
<b>Centres and Regions of Plant Endemism (Figure 20)</b>	<p>Frankfort and Morgenzozn occur partially within the <b>Lydenburg Centre of Endemism (CE)</b>, whereas Beta North partially occurs in the <b>Wolkberg CE</b>.</p> <p>All four MR83 UG Areas partially occur within the <b>Drakensberg Fromontane Region of Endemism (RE)</b>.</p>	<b>Important Cave Areas (Figure 21)</b>	<p>The Mpumalanga Biobase indicates that Dukes, Morgenzon and Frankfort partially occur in areas considered important for bat caves. Beta North is entirely located in such an area.</p>
	<p>The demarcation of floristic regions is based on groups of taxa with similar geographical distributions. Floristic regions can be classified hierarchically to reflect similarities and differences between regions. A phytochorion is a floristic (phytogeographical) region of any rank. At a particular scale, a phytochorion may also be called a 'centre of endemism' when distinguished by a high concentration of endemic plant taxa (Van Wyk &amp; Smith 2001). Phytochoria usually incorporate different vegetation types, so they may include forest, grassland, and bushveld, but these will have common recurring floristic elements.</p>	<b>Indigenous Forest (Figure 21)</b>	<p>According to the Mpumalanga Biobase, patches of Indigenous Forest are present within Dukes.</p>





**NATIONAL WEB-BASED ENVIRONMENTAL SCREENING TOOL**

The Screening Tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the Environmental Authorisation process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas. The different sensitivity ratings pertaining to the Plant [and Animal] Protocols are described below:

- **Very High:** Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 km<sup>2</sup> are considered Critical Habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under Critically Endangered (CR), Endangered (EN), or Vulnerable (VU) D criteria of the IUCN or species listed as Critically/ Extremely Rare under South Africa’s National Red List Criteria. For each species reliant on a Critical Habitat, all remaining suitable habitat has been manually mapped at a fine scale.
- **High:** Recent occurrence records for all threatened (CR, EN, VU) and/or rare endemic species are included in the high sensitivity level.
- **Medium:** Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level.
- **Low:** Areas where no SCC are known or expected to occur.

	Animal Species Theme (Triggered Species per sensitivity class)	Plant Species Theme (Triggered Species per sensitivity class)	Terrestrial Biodiversity Theme (Triggered biodiversity features)
<b>Dukes</b>	MEDIUM AND HIGH SENSITIVITY  <b>High Sensitivity Areas:</b> <ul style="list-style-type: none"> <li>• <u>Aves:</u> <i>Geronticus calvus</i> (VU)</li> </ul> <b>Medium Sensitivity Areas:</b> <ul style="list-style-type: none"> <li>• <u>Mammalia:</u> <i>Amblysomus robustus</i> (VU), <i>Chrysospalax villosus</i> (VU), <i>Cercopithecus albogularis schwarzi</i> (VU), <i>Hydrictis maculicollis</i> (VU), <i>Ourebia ourebi ourebi</i> (EN).</li> <li>• <u>Insecta:</u> <i>Lepidochrysops irvingi</i> (VU).</li> <li>• <u>Invertebrate:</u> <i>Aroegas fuscus</i> (EN), <i>Thoracistus jambila</i> (EN), Forest invertebrate.</li> <li>• <u>Aves:</u> <i>Lioptilus nigricapillus</i> (VU), <i>Ciconia nigra</i> (VU).</li> </ul>	MEDIUM SENSITIVITY  <b>Medium Sensitivity Areas:</b> <ul style="list-style-type: none"> <li>• <i>Faurea macnaughtonii</i> (Rare), <i>Ocotea bullata</i> (EN), Sensitive species 1252 (VU), <i>Argyrolobium muddii</i> (EN), Sensitive species 86 (Rare), <i>Ocotea kenyensis</i> (VU), <i>Hesperanthera brevicaulis</i> (Rare), Sensitive species 880 (VU), <i>Monopsis kowynensis</i> (VU), <i>Erica subverticillaris</i> (VU), Sensitive species 1026 (Rare), Sensitive species 285 (VU), Sensitive species 644 (VU), Sensitive species 1054 (Rare), <i>Aspidonepsis shebae</i> (VU), <i>Scabiosa transvaalensis</i> (VU), <i>Schizochilus cecilii</i> subsp. <i>culveri</i> (Rare), <i>Schizochilus lilacinus</i> (Rare), <i>Gnidia variabilis</i> (VU), <i>Olinia huillensis</i> subsp. <i>burttdavii</i> (VU), <i>Helichrysum homilochrysum</i> (Rare), <i>Streptocarpus decipiens</i> (Rare), <i>Hypodematium crenatum</i> (VU), Sensitive species 411 (VU), Sensitive species 738 (EN), Sensitive species 998 (EN), Sensitive species 1219 (VU), Sensitive species 311 (Rare), Sensitive species 104 (EN), Sensitive species 1248 (VU), <i>Hesperanthera bulbifera</i> (Rare), <i>Prunus africana</i> (VU).</li> </ul>	VERY HIGH SENSITIVITY  <b>Very High Sensitivity:</b> <ul style="list-style-type: none"> <li>• Critical Biodiversity Area 1</li> <li>• Forest</li> <li>• Very High Freshwater ecosystem priority area quinary catchments</li> <li>• Focus Areas for land-based protected areas expansion</li> <li>• Endangered ecosystem</li> </ul>
<b>Frankfort</b>	MEDIUM SENSITIVITY  <b>Medium Sensitivity Areas:</b> <ul style="list-style-type: none"> <li>• <u>Mammalia:</u> <i>Amblysomus robustus</i> (VU), <i>Chrysospalax villosus</i> (VU), <i>Cercopithecus albogularis schwarzi</i> (VU), <i>Hydrictis maculicollis</i> (VU), <i>Ourebia ourebi ourebi</i> (EN).</li> <li>• <u>Insecta:</u> <i>Lepidochrysops irvingi</i> (VU).</li> <li>• <u>Invertebrate:</u> <i>Aroegas fuscus</i> (EN), <i>Thoracistus jambila</i> (EN), Forest invertebrate.</li> <li>• <u>Aves:</u> <i>Ciconia nigra</i> (VU).</li> </ul>	MEDIUM SENSITIVITY  <b>Medium Sensitivity Areas:</b> <ul style="list-style-type: none"> <li>• <i>Faurea macnaughtonii</i> (Rare), <i>Ocotea bullata</i> (EN), Sensitive species 1252 (VU), <i>Argyrolobium muddii</i> (EN), Sensitive species 86 (Rare), <i>Ocotea kenyensis</i> (VU), <i>Hesperanthera brevicaulis</i> (Rare), Sensitive species 880 (VU), <i>Monopsis kowynensis</i> (VU), <i>Erica subverticillaris</i> (VU), Sensitive species 1026 (Rare), Sensitive species 285 (VU), Sensitive species 644 (VU), Sensitive species 541 (Rare), <i>Scabiosa transvaalensis</i> (VU), <i>Gnidia variabilis</i> (VU), <i>Olinia huillensis</i> subsp. <i>burttdavii</i> (VU), <i>Helichrysum homilochrysum</i> (Rare), <i>Streptocarpus decipiens</i> (Rare), <i>Streptocarpus actinoflorus</i> (EN), <i>Hypodematium crenatum</i> (VU), Sensitive species 411 (VU), Sensitive species 738 (EN), Sensitive species 998 (EN), Sensitive species 311 (Rare), Sensitive species 104 (EN), Sensitive species 1248 (VU), <i>Hesperanthera bulbifera</i> (Rare), <i>Prunus africana</i> (VU).</li> </ul>	VERY HIGH SENSITIVITY  <b>Very High Sensitivity:</b> <ul style="list-style-type: none"> <li>• Critical Biodiversity Area 2</li> <li>• Ecological Support Area</li> <li>• Freshwater ecosystem priority area quinary catchments</li> <li>• Focus Areas for land-based protected areas expansion</li> <li>• Endangered ecosystem</li> </ul>



	Animal Species Theme (Triggered Species per sensitivity class)	Plant Species Theme (Triggered Species per sensitivity class)	Terrestrial Biodiversity Theme (Triggered biodiversity features)
<b>Morgenzon</b>	<p>MEDIUM AND HIGH SENSITIVITY</p> <p><b>High Sensitivity Areas:</b></p> <ul style="list-style-type: none"> <li><u>Aves</u>: <i>Geronticus calvus</i> (VU)</li> </ul> <p><b>Medium Sensitivity Areas:</b></p> <ul style="list-style-type: none"> <li><u>Mammalia</u>: <i>Amblysomus robustus</i> (VU), <i>Chrysospalax villosus</i> (VU), <i>Dasymys robertsii</i> (VU), <i>Crocidura maquassiensis</i> (VU), <i>Cercopithecus albogularis schwarzi</i> (VU), <i>Hydricteis maculicollis</i> (VU), <i>Ourebia ourebi ourebi</i> (EN).</li> <li><u>Insecta</u>: <i>Lepidochrysops irvingi</i> (VU).</li> <li><u>Invertebrate</u>: <i>Aroegas fuscus</i> (EN), <i>Thoracistus jambila</i> (EN), Forest invertebrate.</li> <li><u>Aves</u>: <i>Ciconia nigra</i> (VU).</li> </ul>	<p>LOW AND MEDIUM SENSITIVITY</p> <p><b>Medium Sensitivity Areas:</b></p> <ul style="list-style-type: none"> <li><i>Faurea macnaughtonii</i> (Rare), <i>Ocotea bullata</i> (EN), Sensitive species 1252 (VU), <i>Argyrolobium muddii</i> (EN), Sensitive species 86 (Rare), <i>Ocotea kenyensis</i> (VU), <i>Hesperantha brevicaulis</i> (Rare), Sensitive species 880 (VU), <i>Monopsis kowynensis</i> (VU), <i>Erica subverticillaris</i> (VU), Sensitive species 1026 (Rare), Sensitive species 285 (VU), Sensitive species 644 (VU), <i>Aspidonepsis shebae</i> (VU), <i>Scabiosa transvaalensis</i> (VU), <i>Schizochilus lilacinus</i> (Rare), <i>Gnidia variabilis</i> (VU), <i>Olinia huillensis</i> subsp. <i>burttdavii</i> (VU), <i>Helichrysum homilochrysum</i> (Rare), <i>Streptocarpus decipiens</i> (Rare), <i>Hypodematium crenatum</i> (VU), Sensitive species 411 (VU), Sensitive species 738 (EN), Sensitive species 998 (EN), Sensitive species 1219 (VU), Sensitive species 311 (Rare), Sensitive species 104 (EN), Sensitive species 1248 (VU), <i>Hesperantha bulbifera</i> (Rare), <i>Prunus africana</i> (VU).</li> </ul>	<p>VERY HIGH SENSITIVITY</p> <p><b>Very High Sensitivity:</b></p> <ul style="list-style-type: none"> <li>Critical Biodiversity Area 1</li> <li>Forest</li> <li>Freshwater ecosystem priority area quinary catchments</li> <li>Focus Areas for land-based protected areas expansion</li> <li>Endangered ecosystem</li> </ul>
<b>Beta North</b>	<p>MEDIUM AND HIGH SENSITIVITY</p> <p><b>High Sensitivity Areas:</b></p> <ul style="list-style-type: none"> <li><u>Aves</u>: <i>Geronticus calvus</i> (VU)</li> </ul> <p><b>Medium Sensitivity Areas:</b></p> <ul style="list-style-type: none"> <li><u>Mammalia</u>: <i>Amblysomus robustus</i> (VU), <i>Chrysospalax villosus</i> (VU), <i>Cercopithecus albogularis schwarzi</i> (VU), <i>Hydricteis maculicollis</i> (VU), <i>Ourebia ourebi ourebi</i> (EN).</li> <li><u>Insecta</u>: <i>Lepidochrysops irvingi</i> (VU).</li> <li><u>Invertebrate</u>: <i>Aroegas fuscus</i> (EN), <i>Thoracistus jambila</i> (EN), Forest invertebrate.</li> <li><u>Aves</u>: <i>Ciconia nigra</i> (VU), <i>Lioptilus nigricapillus</i> (VU).</li> </ul>	<p>LOW AND MEDIUM SENSITIVITY</p> <p><b>Medium Sensitivity Areas:</b></p> <ul style="list-style-type: none"> <li><i>Faurea macnaughtonii</i> (Rare), <i>Ocotea bullata</i> (EN), Sensitive species 1252 (VU), <i>Argyrolobium muddii</i> (EN), Sensitive species 86 (Rare), <i>Ocotea kenyensis</i> (VU), <i>Hesperantha brevicaulis</i> (Rare), Sensitive species 880 (VU), <i>Monopsis kowynensis</i> (VU), <i>Erica subverticillaris</i> (VU), Sensitive species 1026 (Rare), Sensitive species 285 (VU), Sensitive species 644 (VU), <i>Aspidonepsis shebae</i> (VU), <i>Scabiosa transvaalensis</i> (VU), <i>Schizochilus cecillii</i> subsp. <i>culveri</i> (Rare), <i>Schizochilus lilacinus</i> (Rare), <i>Gnidia variabilis</i> (VU), <i>Olinia huillensis</i> subsp. <i>burttdavii</i> (VU), <i>Helichrysum homilochrysum</i> (Rare), <i>Streptocarpus decipiens</i> (Rare), <i>Hypodematium crenatum</i> (VU), Sensitive species 411 (VU), Sensitive species 738 (EN), Sensitive species 998 (EN), Sensitive species 1219 (VU), Sensitive species 311 (Rare), Sensitive species 104 (EN), Sensitive species 1248 (VU), <i>Hesperantha bulbifera</i> (Rare), <i>Prunus africana</i> (VU).</li> </ul>	<p>VERY HIGH SENSITIVITY</p> <p><b>Very High Sensitivity:</b></p> <ul style="list-style-type: none"> <li>Critical Biodiversity Area 2</li> <li>Critical Biodiversity Area 1</li> <li>Forest</li> <li>Freshwater ecosystem priority area quinary catchments</li> <li>Focus Areas for land-based protected areas expansion</li> <li>Endangered ecosystem</li> </ul>

CBA = Critical Biodiversity Area, ESA = Ecological Support Area, IBA = Important Bird and Biodiversity Area, MAP = Mean Annual Precipitation, MAT = Mean Annual Temperature, MFD = Mean Frost Days, MAPE = Mean Annual Potential for Evaporation, MASMS = Mean Annual Soil Moisture Stress, NBA = National Biodiversity Assessment, NPAES = National Protected Areas Expansion Strategy, SACAD = South African Conservation Areas Database, SAPAD = South African Protected Areas Database.



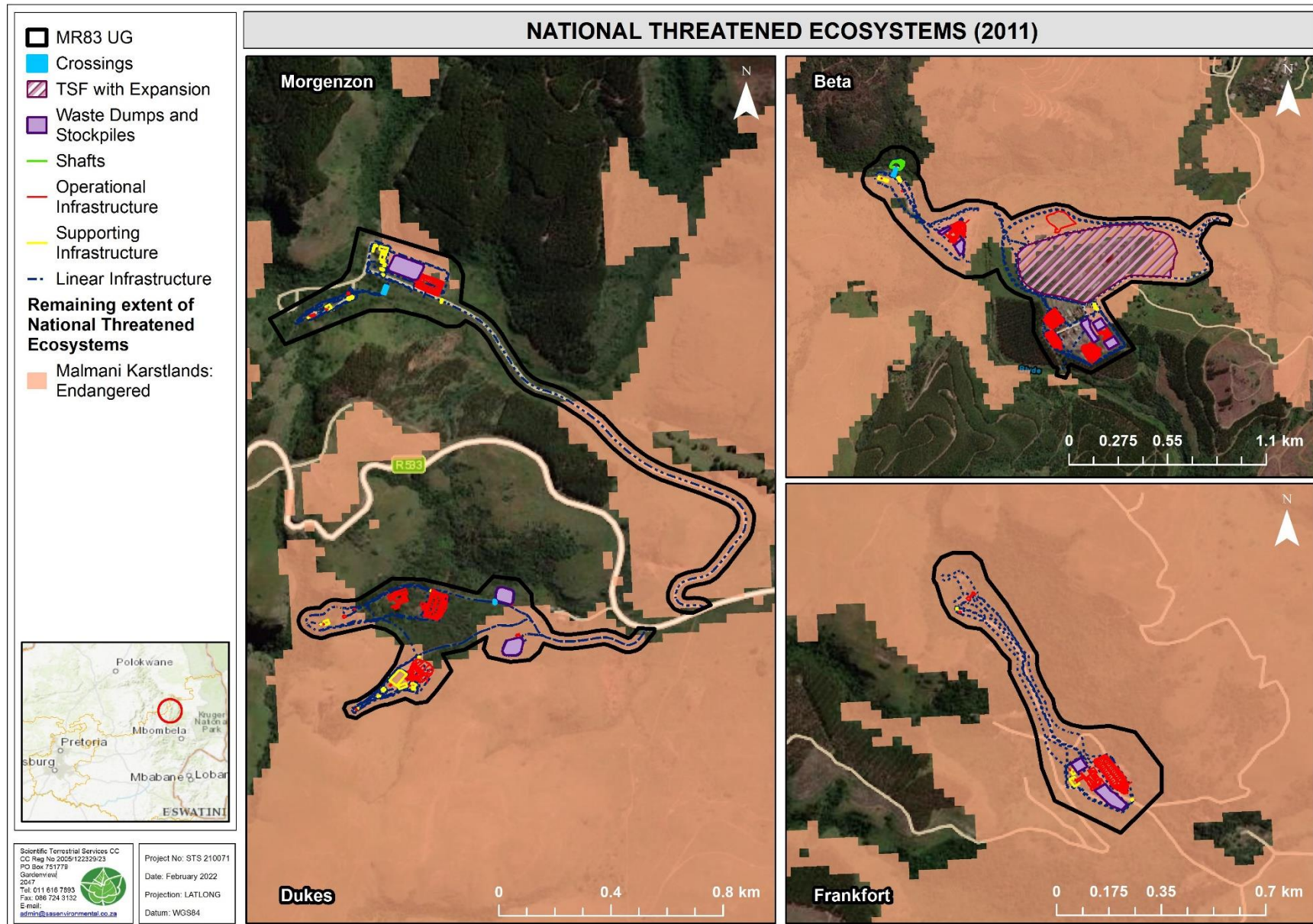


Figure 12: The remaining extent of Threatened Ecosystems associated with the MR83 UG Areas according to the National Threatened Ecosystems database (2011).





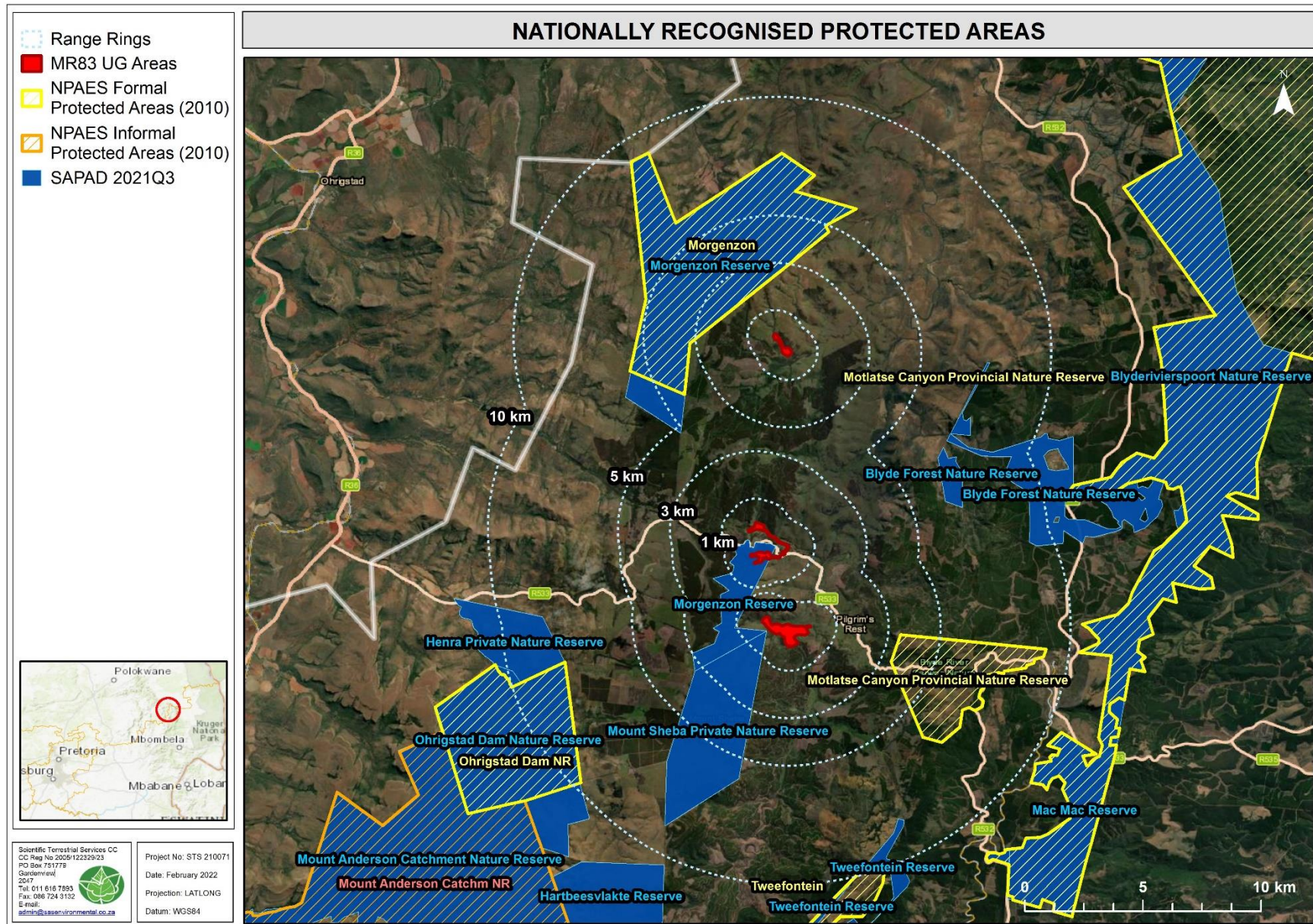


Figure 13: National Protected Areas in proximity (within 10 km) of the MR83 UG Areas (SAPAD, 2021; and NPAES, 2010).





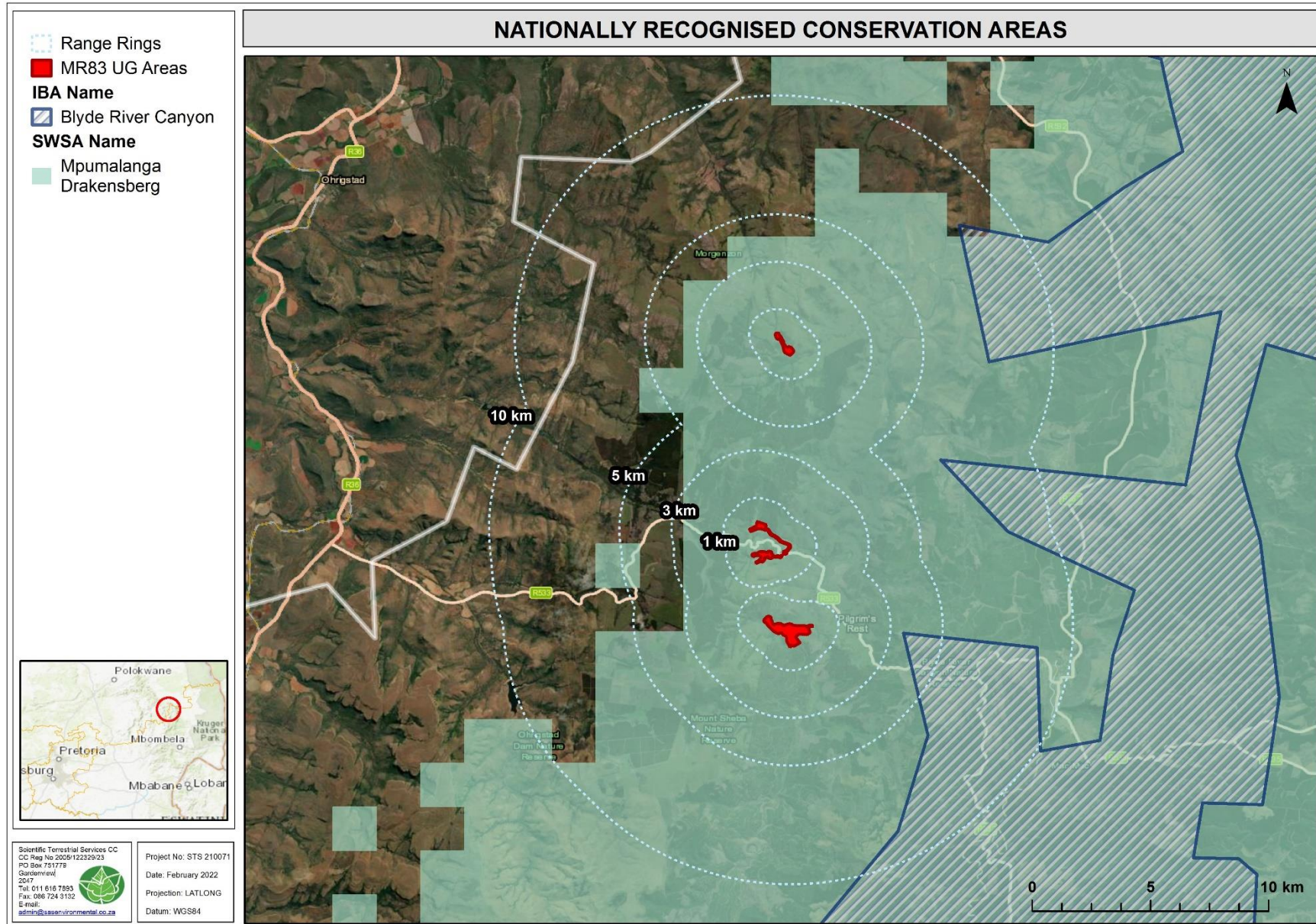


Figure 14: National Conservation Areas in close proximity (within 10 km) of the MR83 UG Areas (IBA, 2015; and SWSA, 2017).





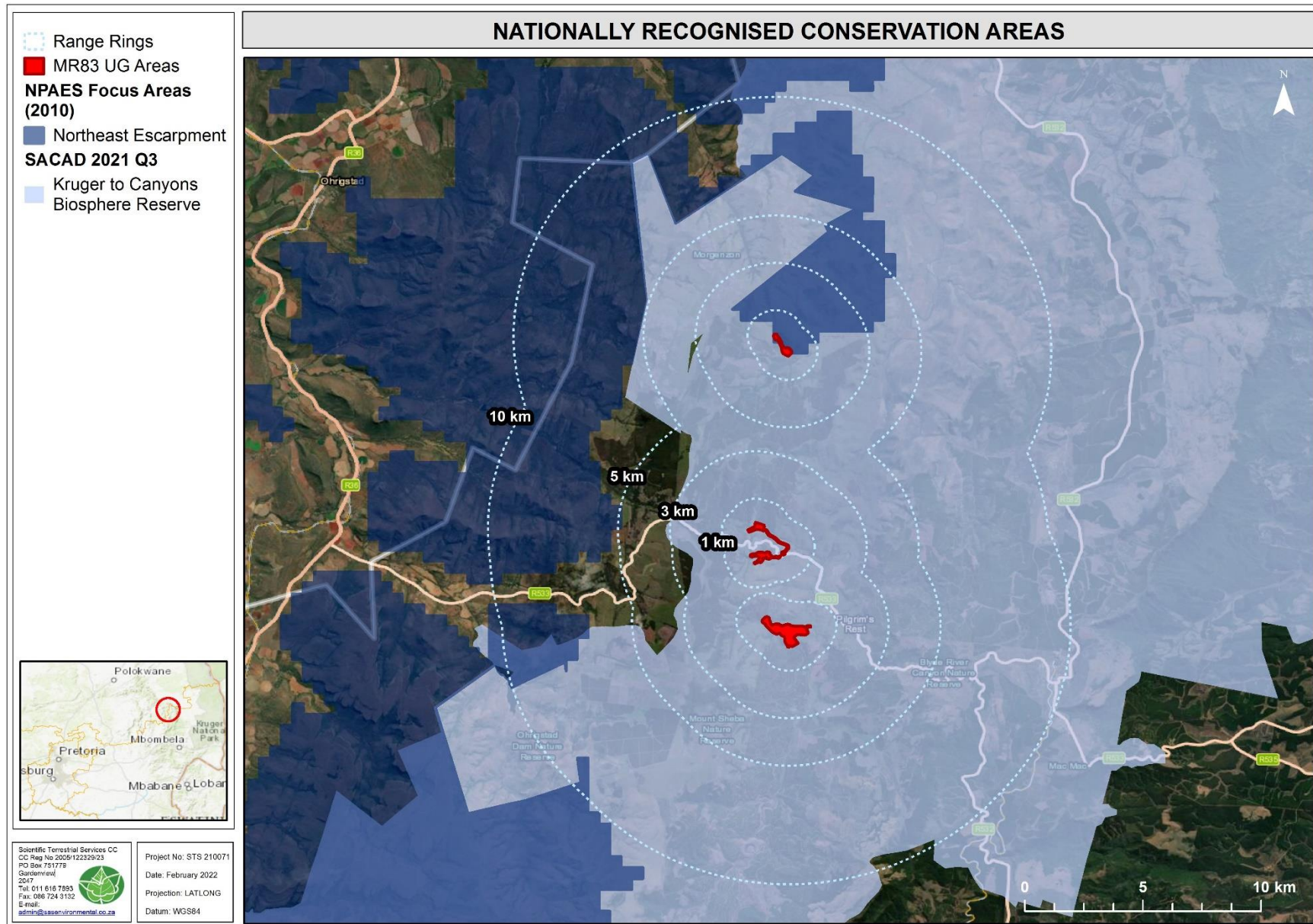


Figure 15: National Conservation Areas in close proximity (within 10 km) of the MR83 UG Areas (NPAES, 2010; SACAD, 2021).





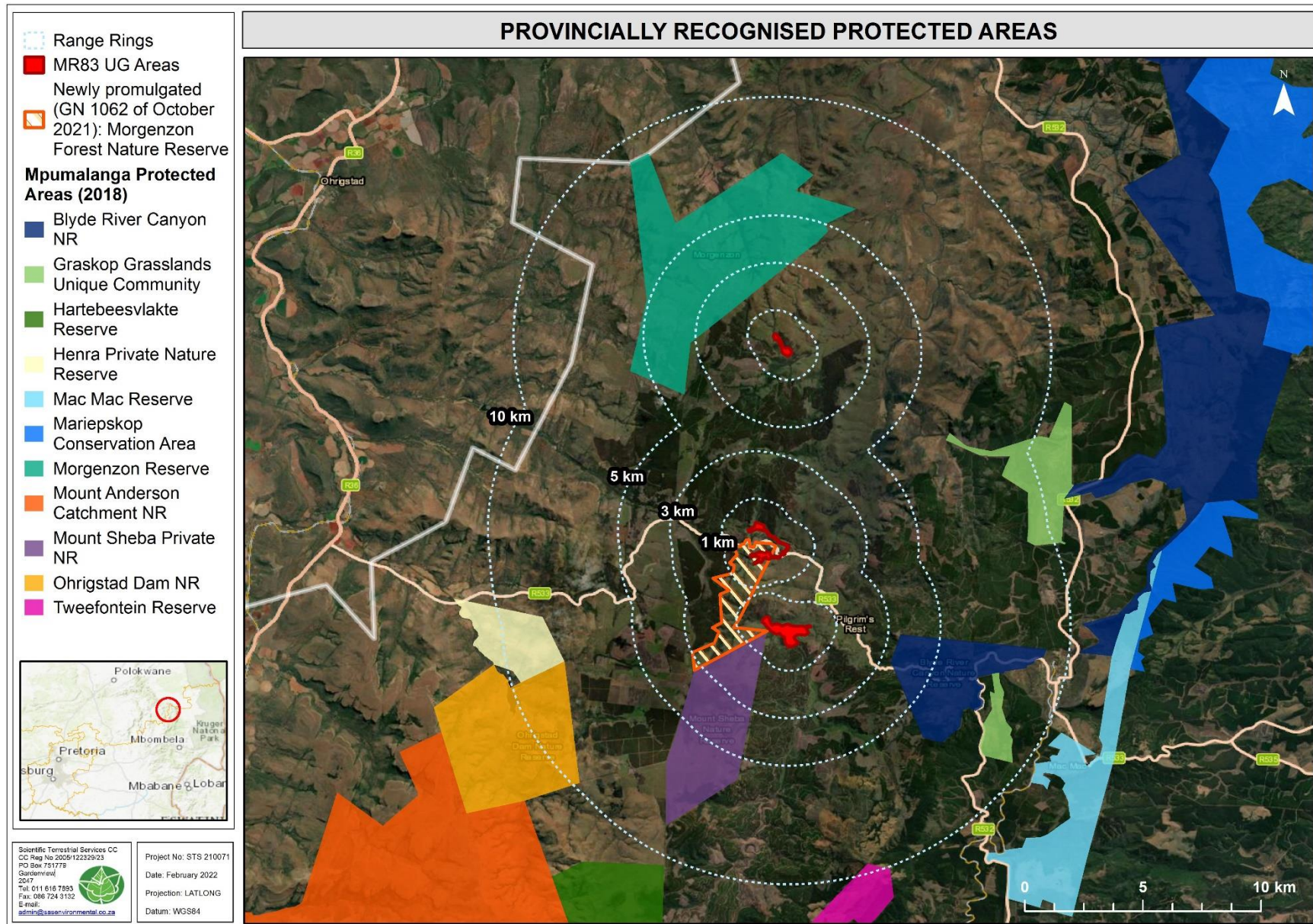


Figure 16: Provincial Protected Areas in relation to the MR83 UG Areas (MTPA, 2018).





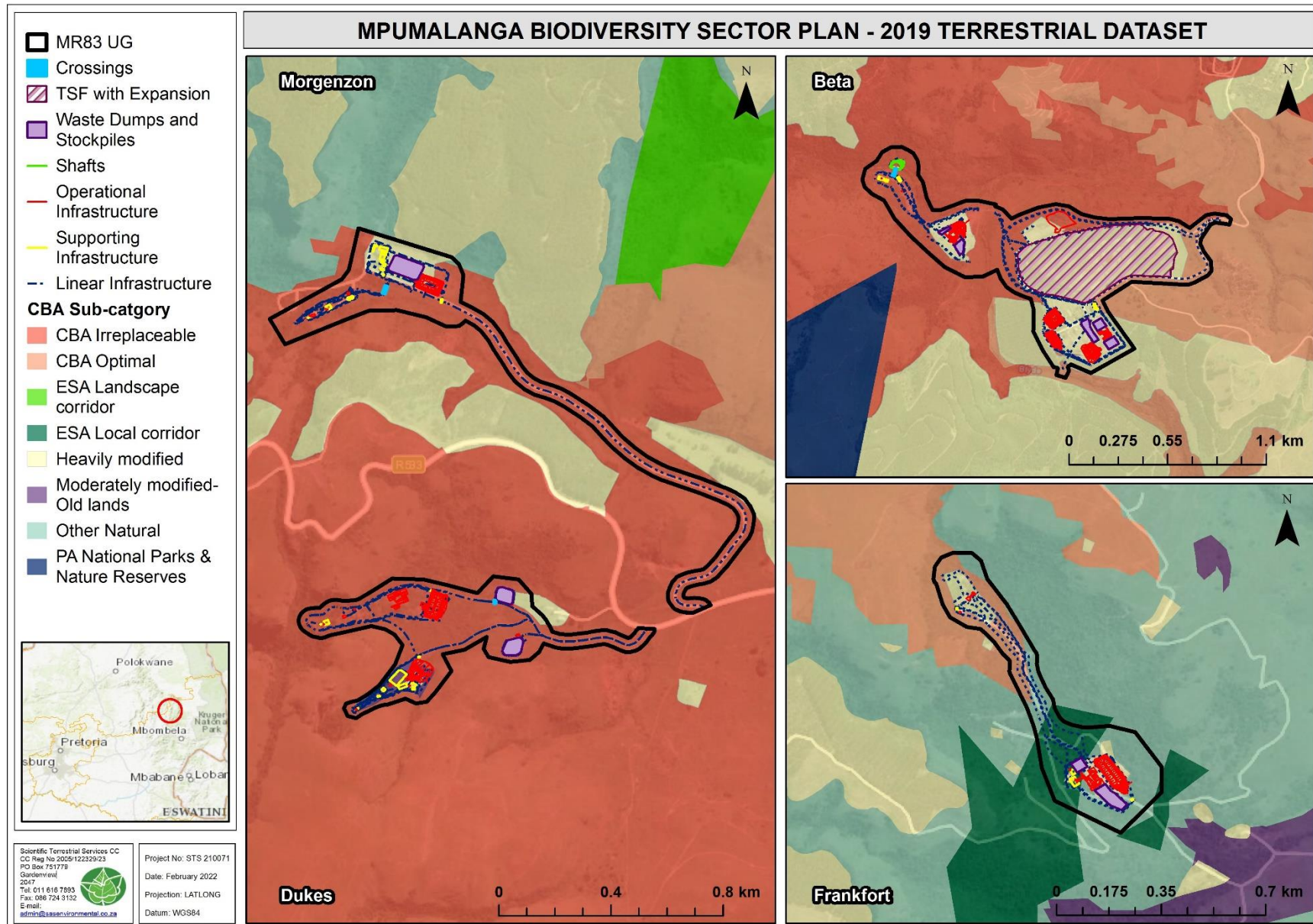


Figure 17: The MR83 UG Areas in relation to Critical Biodiversity Areas (CBA Irreplaceable and Optimal) (Mpumalanga Biodiversity Sector Plan, 2019).





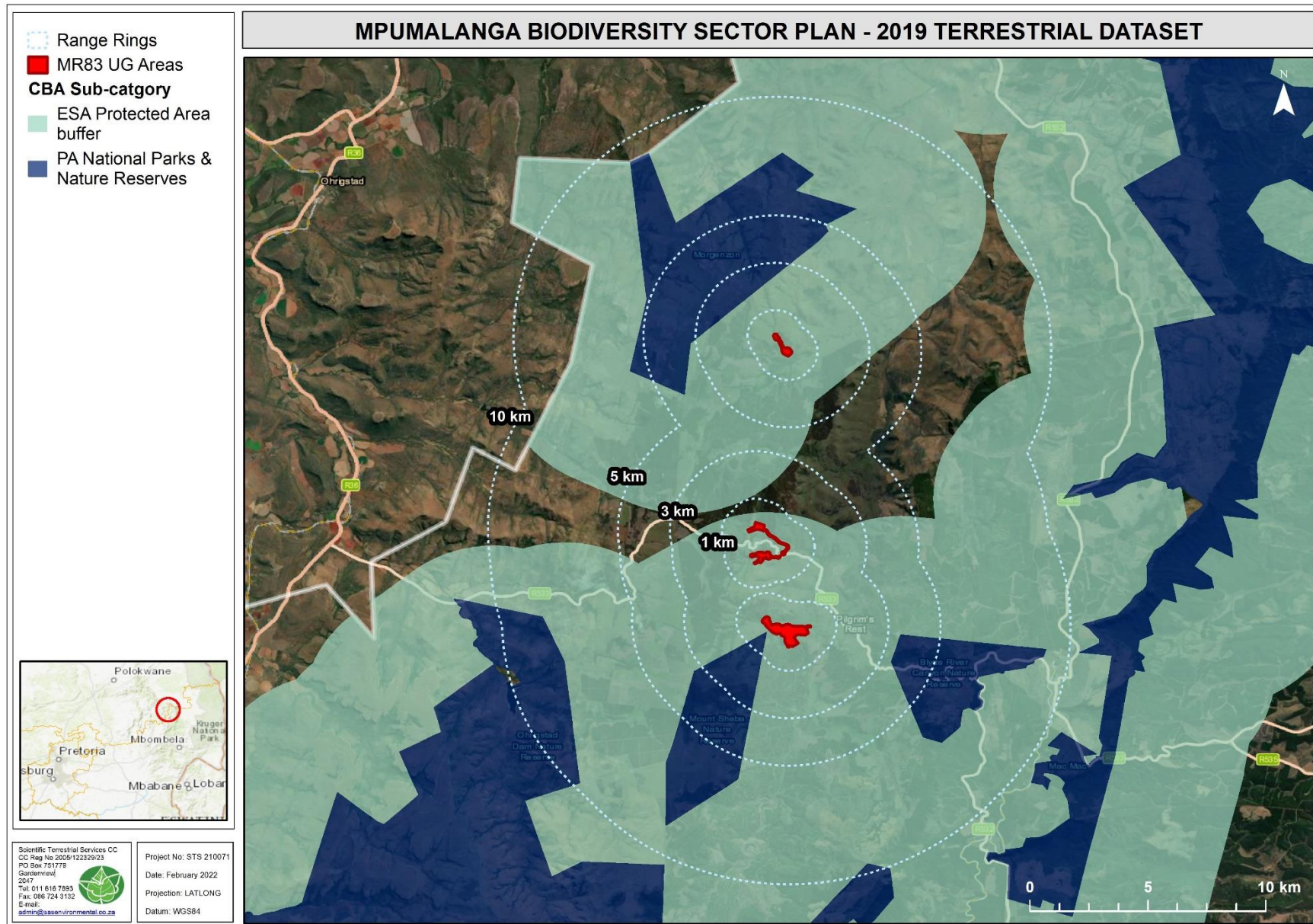


Figure 18: The MR83 UG Areas in relation to the protected areas and its associated 5km ESA buffers (Mpumalanga Biodiversity Sector Plan, 2019).





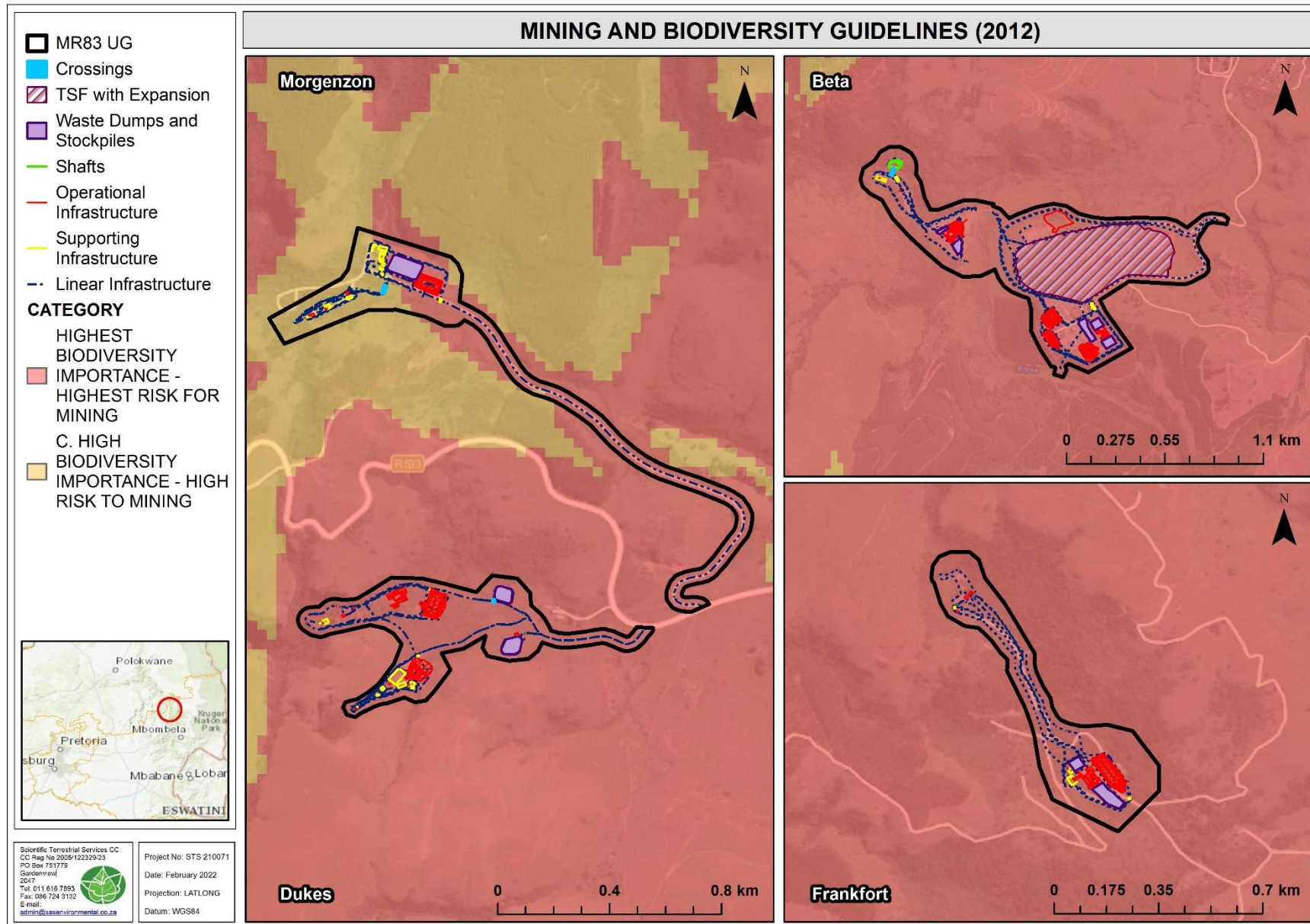


Figure 19: Importance of the MR83 UG Areas according to the Mining and Biodiversity Guidelines (2012).



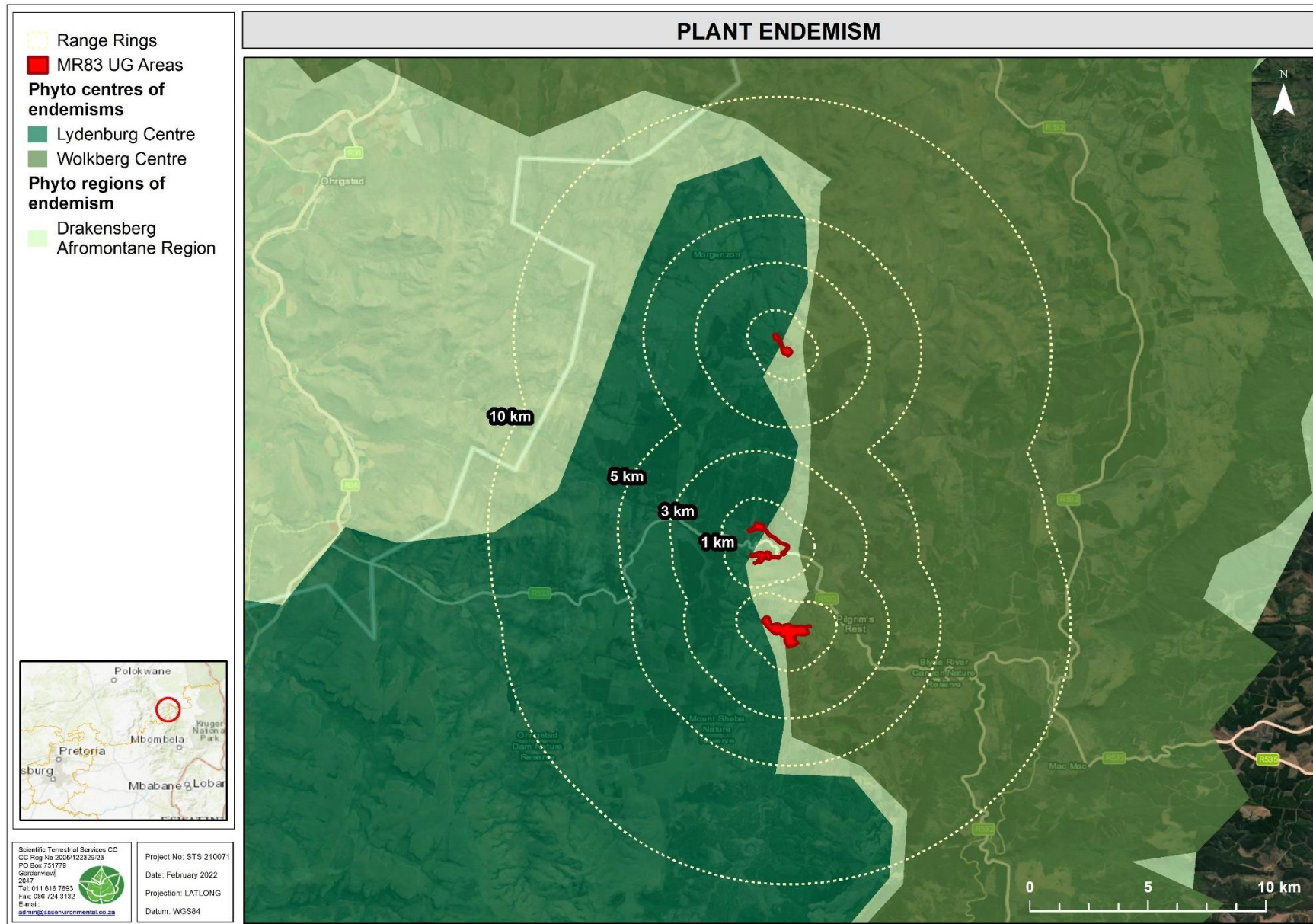


Figure 20: Centres and Regions of Phyto Endemism associated with the MR83 UG Areas (Mpumalanga BioBase Report, 2002).





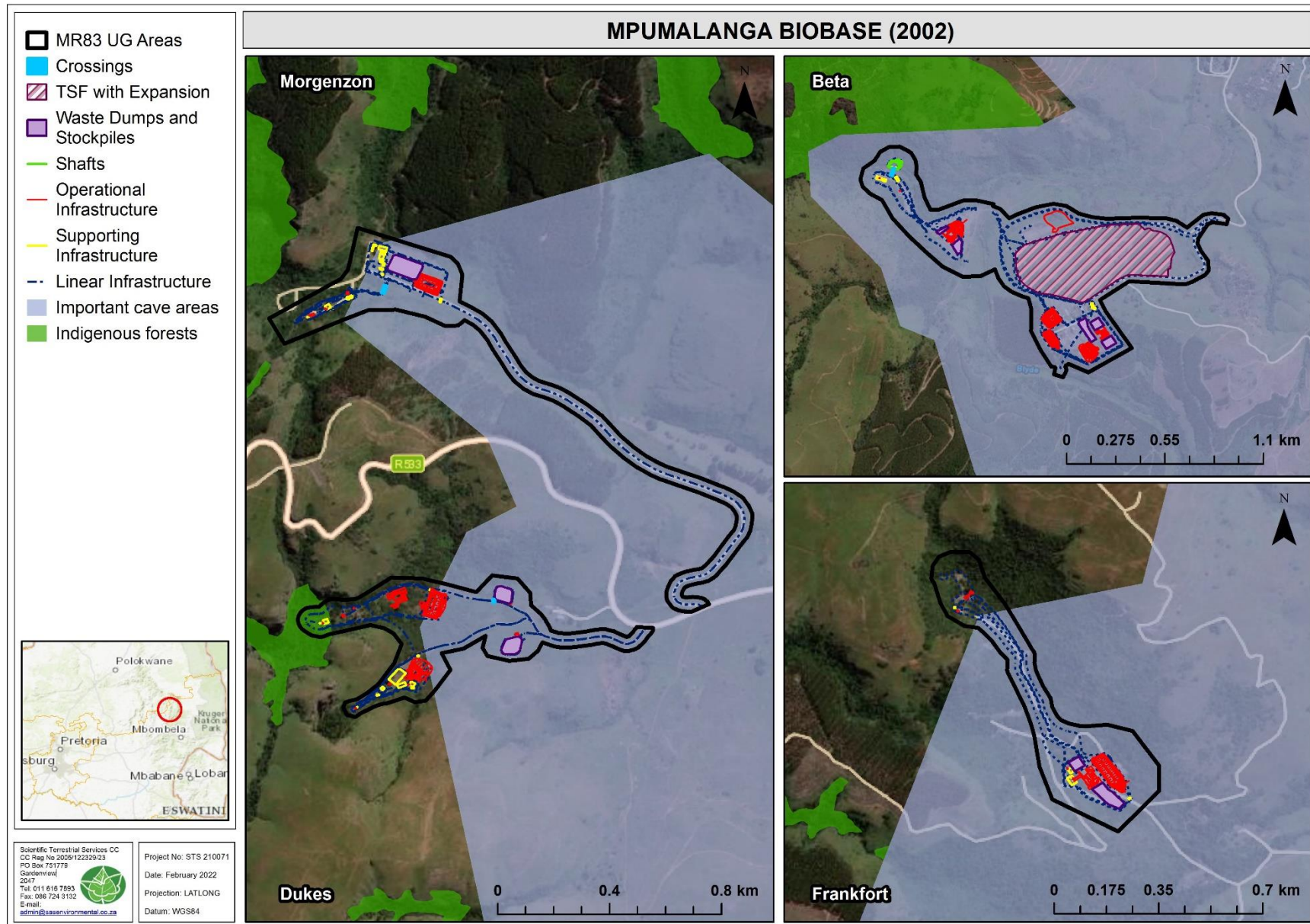


Figure 21: Important Bat Cave areas and Indigenous Forest patches associated with the MR83 UG Areas (Mpumalanga BioBase Report, 2002).





## 4 STRUCTURE OF THE BIODIVERSITY REPORT

**Part A** of this report served to introduce the MR83 UG Areas, as well as the general approach to the study. Part A also presents the results of general desktop information reviewed as part of the study including the information generated by the relevant authorities as well as the context of the site in relation to the surrounding anthropogenic activities and ecological character.

**Part B** presents the results of the floral field assessment, data analyses and discussion of the results. Part B also presents the results of the impact assessment where the impacts on floral ecology and biodiversity are discussed.

**Part C** presents the results of the faunal field assessment, data analyses and discussion of the results. Part C also presents the results of the impact assessment where the impacts on faunal ecology and biodiversity are discussed.



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## **APPENDIX A: Indemnity and Terms of Use of this Report**

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 and STS and its staff reserve the right to, at their sole discretion, modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

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This report must not be altered or added to or used for any other purpose other than that for which it was produced without the prior written consent of the author(s). This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.





## APPENDIX B: Legislative Requirements

### THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA, 1996

The environment and the health and well-being of people are safeguarded under the Constitution of the Republic of South Africa, 1996 by way of Section 24. Section 24(a) guarantees a right to an environment that is not harmful to human health or well-being and to environmental protection for the benefit of present and future generations. Section 24(b) directs the state to take reasonable legislative and other measures to prevent pollution, promote conservation, and secure the ecologically sustainable development and use of natural resources (including water and mineral resources) while promoting justifiable economic and social development. Section 27 guarantees every person the right of access to sufficient water, and the state is obliged to take reasonable legislative and other measures within its available resources to achieve the progressive realisation of this right. Section 27 is defined as a socio-economic right and not an environmental right. However, read with Section 24 it requires of the state to ensure that water is conserved and protected and that sufficient access to the resource is provided. Water regulation in South Africa places a great emphasis on protecting the resource and on providing access to water for everyone.

### THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) (NEMA)

The National Environmental Management Act, 1998 (Act No.107 of 1998) (NEMA) and the associated Environmental Impact Assessment (EIA) Regulations (GN R326 as amended in 2017 and well as listing notices 1, 2 and 3 (GN R327, R325 and R324 of 2017), state that prior to any development taking place which triggers any activity as listed within the abovementioned regulations, an environmental authorisation process needs to be followed and environmental authorisation obtained. This could follow either the Basic Assessment process or the Environmental Impact Assessment process depending on the nature of the activity and scale of the anticipated impacts.

### THE NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004) (NEMBA)

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 bio prospecting 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 are not negatively impacted upon, by any activity being undertaken, in order 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) A specimen of a listed threatened or protected species;
- b) Specimens of an alien species; or
- c) A specimen of a listed invasive species without a permit.



## **GOVERNMENT NOTICE NUMBER R.1020: ALIEN AND INVASIVE SPECIES REGULATIONS, 2020 (IN GOVERNMENT GAZETTE 43735), INCLUDING GOVERNMENT NOTICE NUMBER 1003: ALIEN AND INVASIVE SPECIES LISTS, 2020 (IN GOVERNMENT GAZETTE 43726) AS IT RELATES TO THE NEMBA**

NEMBA is administered by the Department of Environmental Affairs and aims to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA. In terms of alien and invasive species. This act in terms of alien and invasive species aims to:

- Prevent the unauthorized introduction and spread of alien and invasive species to ecosystems and habitats where they do not naturally occur,
- Manage and control alien and invasive species, to prevent or minimize harm to the environment and biodiversity; and
- Eradicate alien species and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats.

Alien species are defined, in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004) as:

- (a) A species that is not an indigenous species; or
- (b) An indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.

Categories according to NEMBA (Alien and Invasive Species Regulations, 2020):

- **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; and
- **Category 3:** Ornamentally used plants that may no longer be planted.

## **THE NATIONAL FOREST ACT, 1998 (ACT NO. 10 OF 1998), AS AMENDED IN SEPTEMBER 2011 (NFA)**

According to the department of Department of Forestry, Fisheries and the Environment (DFFE) (previously the Department of Agriculture, Forestry and Fisheries (DAFF)) ©2019 website (<https://www.daff.gov.za/daffweb3/>):

“In terms of the National Forests Act of 1998 certain tree species (types of trees) can be identified and declared as protected. The Department of Water Affairs and Forestry followed an objective, scientific and participative process to arrive at the new list of protected tree species, enacted in 2004. All trees occurring in natural forests are also protected in terms of the Act. Protective actions take place within the framework of the Act as well as national policy and guidelines. Trees are protected for a variety of reasons, and some species require strict protection while others require control over harvesting and utilisation.”

Applicable sections of the NFA pertaining to the proposed project include the below:

### **Section 12:**

Declaration of trees as protected

- 1) The Minister may declare-
  - a. particular tree,
  - b. a particular group of trees,
  - c. a particular woodland; or
  - d. trees belonging to a particular species,
 to be a protected tree, group of trees, woodland or species.
- 2) The Minister may make such a declaration only if he or she is of the opinion that the tree, group of trees, woodland or species is not already adequately protected in terms of other legislation.
- 3) In exercising a discretion in terms of this section, the Minister must consider the principles set out in section 3(3) of the NFA.



**Section 15(1):**

No person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence granted by the Minister or in terms of an exemption from the provisions of this subsection published by the Minister in the Gazette.

Contravention of this declaration is regarded as a first category offence that may result in a person who is found guilty of being sentenced to a fine or imprisonment for a period up to three years, or both a fine and imprisonment.

**NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT, 2003 (ACT NO. 57 OF 2003) AS AMENDED<sup>14</sup> (NEMPAA)**

The objective of this act is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological biodiversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas; for the continued existence, governance and functions of South African National Parks; and for matters in connection thereof.

**THE CONSERVATION OF AGRICULTURAL RESOURCES ACT, 1983 (ACT NO. 43 OF 1983) (CARA)**

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

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<sup>14</sup> Amendments to the NEMPAA:

- National Environmental Management: Protected Areas Amendment Act 31 of 2004 – Gazette No. 27274, No. 131. Commencement date: 1 November 2005 [Proc. No. R. 58, Gazette No. 28123]
- National Environment Laws Amendment Act 14 of 2009 – Gazette No.32267, No. 617. Commencement date: 18 September 2009 [Proc. 65, Gazette No. 32580]
- National Environmental Management: Protected Areas Amendment Act 15 of 2009 – Gazette No. 32660, No. 748. Commencement date: 23 October 2009 – except for sections 1 and 8 [Proc. No. 69, Gazette No. 32660]
- Schedule 2 amended by Government Notice R236 in Government Gazette 36295 dated 27 March 2013. Commencement date: 1 April 2013 of sections 1 and 8 (relating to Schedule 2) of the National Environmental Management Protected Areas Amendment Act, 15 of 2009 [Proc. No. 7, Gazette No. 36296]
- National Environmental Management: Protected Areas Amendment Act 21 of 2014 - Government Notice 445 in Government Gazette 37710 dated 2 June 2014. Commencement date: 2 June 2014.
- Schedule 2 amendment by General Notice 2 of 2016 in Government Gazette 39728 dated 25 February 2016. Commencement date: 25 February 2016.





## **THE MPUMALANGA NATURE CONSERVATION ACT, 1998 (ACT NO. 10 OF 1998) (MNCA)**

The Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) (MNCA) provides for the protection of indigenous plants. Subject to the provisions of this Act, no person shall:

- Pick, be in possession of, sell, purchase, donate, receive as a gift, import into, export, or remove from the Province, or convey:
  - A specially protected plant; or
  - A protected plant.
- Pick any indigenous plant:
  - On a public road;
  - On land next to a public road within 100 m measured from the centre of the road;
  - Within an area bordering any natural watercourse, whether wet or dry, up to and within 50 m from the high watermark on either side of the natural watercourse; or
  - In a Provincial Park, a site of Ecological Importance or a Protected Natural Environment.

The below schedules were applicable for the floral and faunal assessments (Part B and C):

- Schedule 1: Specifically Protected Game (Section 4 (1) (a));
- Schedule 2: Protected Game (Section 4 (1) (b));
- Schedule 4: Protected Wild Animals (Section 4 (1) (d));
- Schedule 7: Invertebrates (Section 35 (1));
- Schedule 11: Protected Plants (Section 69 (1) (a)); and
- Schedule 12: Specifically Protected Plants (Section 69 (1) (b)).



## APPENDIX C: Impact Assessment Methodology (OMI Methodology)

The Impact Assessment Methodology is as per the OMI Solutions methodology.

<b>Probability: This describes the likelihood of the impact actually occurring.</b>	
Improbable	The possibility of the impact occurring is very low, due to the circumstances, design or experience.
Probable	There is a probability that the impact will occur to the extent that provision must be made therefore.
Highly Probable	It is most likely that the impact will occur at some stage of the development.
Definite	The impact will take place regardless of any prevention plans, and there can only be relied on mitigatory actions or contingency plans to contain the effect.
<b>Duration: The lifetime of the impact.</b>	
Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.
Medium term	The impact will last up to the end of the phases, where after it will be negated.
Long term	The impact will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter.
Permanent	Impact that will be non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.
<b>Scale: The physical and spatial size of the impact.</b>	
Local	The impacted area extends only as far as the activity, e.g., footprint
Site	The impact could affect the whole, or a measurable portion of the above-mentioned properties.
Regional	The impact could affect the area including the neighbouring residential areas.
<b>Magnitude/ Severity: Does the impact destroy the environment or alter its function.</b>	
Low	The impact alters the affected environment in such a way that natural processes are not affected.
Medium	The affected environment is altered, but functions and processes continue in a modified way.
High	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.
<b>Significance: This 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.</b>	
Negligible	The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.
Low	The impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.
Moderate	The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.
High	The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.
<b>Mitigation Effect: Degree to which the impact can be managed following mitigation</b>	
Can be reversed	Can be avoided, managed or mitigated in such a way that natural processes are not affected and returned to natural state
Can be avoided, managed or mitigated	Can be avoided, managed or mitigated to the degree that functions and processes continue in a modified way)
May cause irreplaceable loss of resources	Irreversible impact (may cause irreplaceable loss of resources). Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.



Aspect	Description	Weight
Probability	Improbable	1
	Probable	2
	Highly Probable	4
	Definite	5
Duration	Short term	1
	Medium term	3
	Long term	4
	Permanent	5
Scale	Local	1
	Site	2
	Regional	3
Magnitude	Low	2
	Medium	6
	High	8
Significance	Negligible	<=20
	Low	<=40
	Moderate	<=60
	High	>60

## Mitigation measure development

The following points present the key concepts considered in the development of mitigation measures for the proposed development.

- *Mitigation and performance improvement measures* and actions that address the risks and impacts<sup>15</sup> are identified and described in as much detail as possible.
- Measures and actions to address negative impacts will favour avoidance and prevention over minimisation, mitigation, or compensation.
- Desired outcomes are defined and have been developed in such a way as to be *measurable events with performance indicators, targets and acceptable criteria* that can be tracked over *defined periods*, with estimates of the *resources* (including human resource and training requirements) *and responsibilities for implementation*.

## Recommendations

Recommendations were developed to address and mitigate impacts associated with the proposed development. These recommendations also include general management measures which apply to the proposed development as a whole. Mitigation measures have been developed to address issues in all phases throughout the life of the operation from planning, through to construction and operational and decommissioning phases.

<sup>15</sup> Mitigation measures should address both positive and negative impacts





## APPENDIX D: Vegetation Types

### GM 31 Long Tom Pass Montane Grassland

The Long Tom Pass Montane Grasslands have links to Zimbabwean flora (e.g., *Disa zimbabweensis*, *Morella microbracteata*, *Helichrysum swynnertonii*) as well as the southern Drakenberg (e.g. *Polypodium vulgare*, *Helichrysum melanacme*). It is also sharing a few endemics with the adjacent Steenkampsberg Montane Grasslands to the west (*Indigofera hedyantha* subsp. *steenkampsborgensis*).

**Remarks:** A floristic analysis of the vegetation supports the recognition of a new centre of plant endemism (Lydenburg Centre) with the proposal of two subcentres of plant endemism, namely the Long Tom Pass Subcentre and the Steenkampsberg subcentre. Total species richness for the Lydenburg centre is around 2266 species and 51 endemic plant species. The Long Tom Pass subcentre has at least 19 plant taxa endemic to this unit.

**Table D1: Important taxa associated with the Long Tom Pass Montane Grassland (Mucina & Rutherford, 2006).**

Woody Layer	
Small Trees	<i>Apodytes dimidiata</i> , <i>Protea roupelliae</i> subsp. <i>roupelliae</i> (d), <i>Protea caffra</i> subsp. <i>caffra</i> , <i>Faurea galpinii</i> , <i>Hypericum revolutum</i> , <i>Myrsine africana</i> , <i>Buddleja auriculata</i> , <i>Buddleja salviifolia</i> , <i>Searsia tumulicola</i> var. <i>tumulicola</i> , <i>Searsia pyroides</i> , <i>Syncolostemon eriocephalus</i> , <i>Passerina montana</i> .
Low Shrubs	<i>Protea parvula</i> (d), <i>Phymaspermum atherosum</i> (d), <i>Psoralea latifolia</i> (d), <i>Erica drakensbergensis</i> , <i>Cliffortia repens</i> , <i>Cliffortia nitidula</i> subsp. <i>pilosa</i> (d), <i>Erica woodii</i> (d), <i>Rothea hirsuta</i> , <i>Lasiosiphon caffer</i> , <i>Berkheya echinacea</i> , <i>Pelargonium dispar</i> , <i>Aeschynomene rehmannii</i> var. <i>leptobotrya</i> , <i>Erica cerinthoides</i> var. <i>cerinthoides</i> , <i>Hebenstretia comosa</i> , <i>Anisopappus smutsii</i> , <i>Euryops pedunculatus</i> , <i>Clutia abyssinica</i> .
Succulent Shrubs	<i>Aloe arborescens</i> , <i>Crassula sarcocaulis</i> subsp. <i>sarcocaulis</i> , <i>Lopholaena disticha</i> .
Forb layer	
Herbs	<i>Helichrysum wilmsii</i> (d), <i>Helichrysum acutatum</i> , <i>Helichrysum glomeratum</i> (d), <i>Helichrysum spiralepis</i> (d), <i>Helichrysum subluteum</i> (d), <i>Helichrysum polycladum</i> , <i>Helichrysum pilosellum</i> , <i>Sopubia cana</i> (d), <i>Eriosema kraussianum</i> (d), <i>Drosera burkeana</i> , <i>Selago atherstonei</i> (d), <i>Gladiolus longicollis</i> var. <i>platypetalus</i> (d), <i>Gerbera ambigua</i> , <i>Monsonia transvaalensis</i> , <i>Oxalis obliquifolia</i> , <i>Pseudopegolettia thodei</i> , <i>Psammotropha myriantha</i> (d), <i>Xysmalobium aceratooides</i> (d), <i>Pearsonia obovata</i> , <i>Pearsonia sessilifolia</i> subsp. <i>sessilifolia</i> , <i>Cycnium racemosum</i> , <i>Berkheya radula</i> , <i>Helichrysum coriaceum</i> , <i>Helichrysum nudifolium</i> var. <i>pilosellum</i> , <i>Syncolostemon albiflorus</i> , <i>Syncolostemon subvelutina</i> (d), <i>Diclis reptans</i> , <i>Hypoxis filiformis</i> , <i>Inezia integrifolia</i> , <i>Kohautia amatymbica</i> , <i>Senecio coronatus</i> , <i>Senecio glaberrimus</i> , <i>Senecio scitus</i> , <i>Pentanisia prunelloides</i> subsp. <i>latifolia</i> , <i>Nidorella auriculata</i> , <i>Pteridium aquilinum</i> , <i>Sebaea bojeri</i> , <i>Hilliardiella hirsuta</i> , <i>Alepidea peduncularis</i> , <i>Alepidea setifera</i> , <i>Rhynchosia monophylla</i> , <i>Craterocapsa tarsodes</i> , <i>Geranium wakkerstroomianum</i> , <i>Cyphia elata</i> var. <i>elata</i> , <i>Wahlenbergia lycopodioides</i> . <i>Trachyandra saltii</i> , <i>Chlorophytum cooperi</i> .
Succulent Herbs	<i>Anthospermum herbaceum</i> .
Grass layer	
Graminoids	<i>Andropogon schirensis</i> (d), <i>Festuca costata</i> var. <i>costata</i> (d), <i>Themeda triandra</i> , <i>Alloteropsis semialata</i> subsp. <i>eckloniana</i> (d), <i>Ctenium concinnum</i> (d), <i>Loudetia densispica</i> (d), <i>Microchloa altera</i> (d), <i>Microchloa caffra</i> (d), <i>Monocymbium ceresiiforme</i> , <i>Sporobolus centrifugus</i> , <i>Bromus firmior</i> , <i>Andropogon appendiculatus</i> , <i>Diheteropogon filifolius</i> (d), <i>Harpochloa falx</i> (d), <i>Koeleria capensis</i> (d), <i>Panicum ecklonii</i> , <i>Panicum natalense</i> , <i>Sporobolus centrifugus</i> , <i>Tristachya leucothrix</i> , <i>Agrostis lachnantha</i> var. <i>lachnantha</i> , <i>Eragrostis racemosa</i> , <i>Trachypogon spicatus</i> , <i>Scleria dieterlenii</i> (d), <i>Cyperus semitrifidus</i> , <i>Cyperus obtusiflorus</i> var. <i>flavissimus</i> , <i>Restio schoenoides</i> . <i>Xyris capensis</i>

(d) = dominant species

(The genus for all *Searsia* spp. was formerly *Rhus*)



**Table D2: Biogeographically important taxa associated with the Long Tom Pass Montane Grassland (Mucina & Rutherford, 2006).**

BIOGEOGRAPHICALLY IMPORTANT TAXA (REGIONAL ENDEMIC)	
<b>Woody Layer</b>	
Shrubs	<i>Morella microbracteata</i> .
<b>Forb layer</b>	
Herbs	<i>Helichrysum swynnertonii</i>
Geophytic herbs	<i>Brachystelma stellatum</i>
Succulent Herbs	<i>Aloe affinis</i> , <i>Khadia alticola</i>

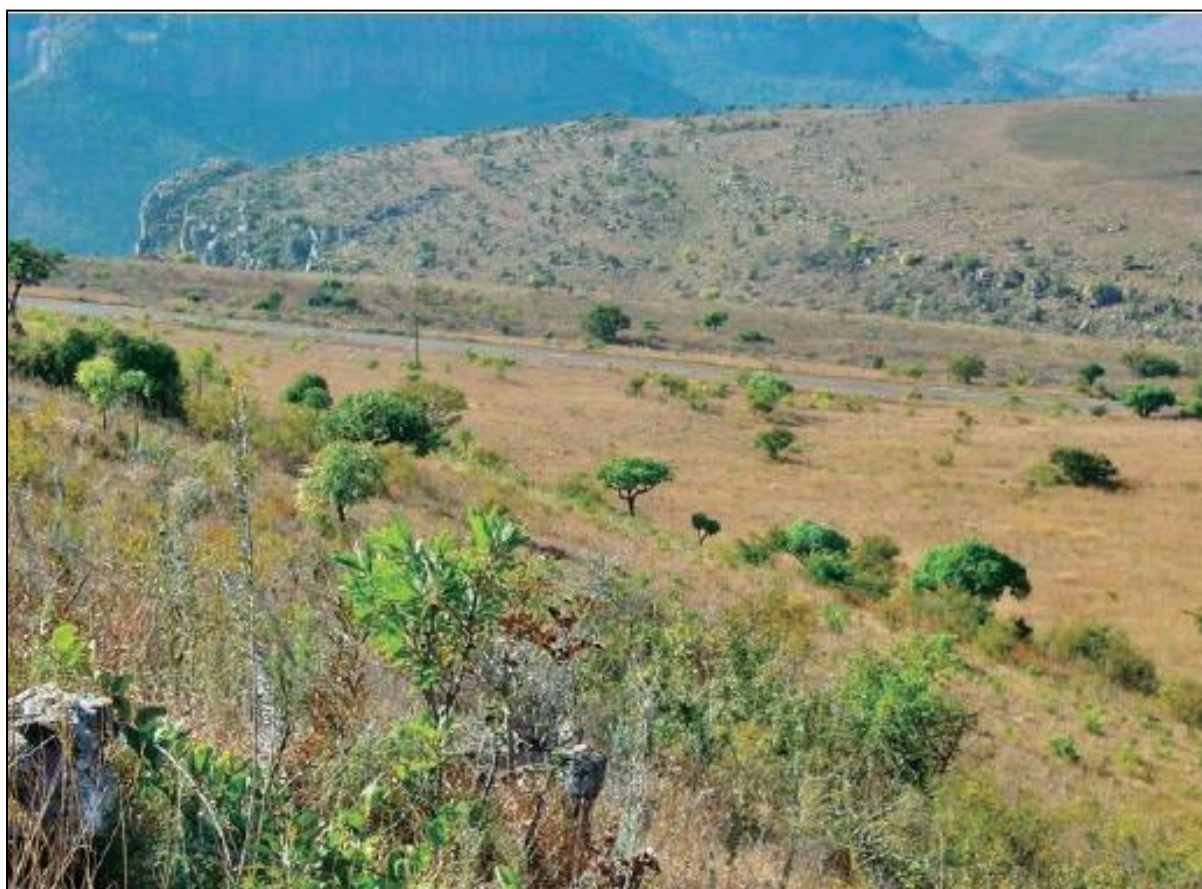
(d) = dominant species

**Table D3: Endemic taxa associated with the Long Tom Pass Montane Grassland (Mucina & Rutherford, 2006).**

ENDEMIC TAXA	
<b>Woody Layer</b>	
Low Shrubs	<i>Callilepis normae</i> , <i>Erica atherstonei</i> , <i>Erica revoluta</i> , <i>Erica subverticillaris</i> , <i>Helichrysum summo-montanum</i> .
<b>Forb layer</b>	
Herbs	<i>Helichrysum-aureum</i> sp nov., <i>Streptocarpus cyaneus</i> subsp. <i>long-tommi</i> , <i>Streptocarpus hilburtii</i> .
Geophytic Herbs	<i>Disa amoena</i> , <i>Disa clavicornis</i> , <i>Disa vigilans</i> , <i>Hesperantha saxicola</i> , <i>Gladiolus calcaratus</i> , <i>Gladiolus exiguus</i> , <i>Ledebouria mokobulanensis</i> , <i>Watsonia wilmsii</i>

(d) = dominant species

### Gm 22 Northern Escarpment Dolomite Grassland

**Figure D1:** Gm 22 Northern Escarpment Dolomite Grassland: Rocky dolomite grassland on the Farm Dientjie (Blyde River Canyon National Park, Mpumalanaga) with the grass *Loudetia simplex* and scattered woody species such as *Cussonia paniculata*, *Protea caffra*, *Ziziphus mucronata* and *Smilax kraussiana*. Mucina and Rutherford (2006) page 409.

**Remarks:** Large variation in altitude and rainfall results in differences in species composition. These dolomites support species usually associated with the Wolkberg Centre of Plant Endemism, although some species are also shared with the Sekhukhune Centre of Plant Endemism (e.g. *Dombeya autumnalis*).

**Table D4: Important taxa associated with the Northern Escarpment Dolomite Grassland (Mucina & Rutherford, 2006).**

Woody Layer	
Small Trees	<i>Seemannaralia gerrardii</i> (d), <i>Cussonia natalensis</i> , <i>Faurea rochetiana</i> , <i>Faurea saligna</i> , <i>Hippobromus pauciflorus</i> , <i>Ozoroa albicans</i> , <i>Protea caffra</i> subsp. <i>caffra</i> , <i>Protea roupelliae</i> subsp. <i>roupelliae</i> .
Tall Shrubs	<i>Pavetta lanceolata</i> (d), <i>Diospyros lycioides</i> subsp. <i>sericea</i> , <i>Protea gaguedi</i> , <i>Searsia rehmanniana</i> , <i>Tarchonanthus parvicapitulatus</i> .
Low Shrubs	<i>Argyrobolium transvaalense</i> , <i>Athrixia arachnoidea</i> , <i>Chaetacanthus burchellii</i> , <i>Erica drakensbergensis</i> , <i>Helichrysum splendidum</i> , <i>Pelargonium dolomiticum</i> , <i>Phymaspermum acerosum</i> , <i>Searsia tumulicola</i> var. <i>meeuseana</i> , <i>Schistostephium rotundifolium</i> , <i>Stoebe plumosa</i> , <i>Tenrhynea phyllicifolia</i> .
Forb layer	
Herbs	<i>Hypodematium crenatum</i> (d), <i>Barleria ovata</i> , <i>Conostomium natalense</i> , <i>Dicoma anomala</i> , <i>Helichrysum miconiifolium</i> , <i>Helichrysum thapsus</i> , <i>Pearsonia sessilifolia</i> subsp. <i>marginata</i> , <i>P. sessilifolia</i> subsp. <i>sessilifolia</i> , <i>Rhynchosia monophylla</i> , <i>Senecio panduriformis</i> , <i>Hilliardiella aristata</i> , <i>Xerophyta retinervis</i> .
Geophytic Herbs	<i>Cheilanthes pentagona</i> (d), <i>Pteris vittata</i> (d).
Succulent Herbs	<i>Aloe fouriei</i> , <i>Crassula sarcocaulis</i>
Grass layer	
Graminoids	<i>Cymbopogon caesius</i> (d), <i>Cymbopogon nardus</i> (d), <i>Elionurus muticus</i> (d), <i>Eragrostis capensis</i> (d), <i>Hyparrhenia filipendula</i> (d), <i>Loudetia simplex</i> (d), <i>Monocymbium ceresiiforme</i> (d), <i>Schizachyrium sanguineum</i> (d), <i>Trichopteryx dregeana</i> (d), <i>Tristachya leucothrix</i> (d), <i>Alloteropsis semialata</i> subsp. <i>eckloniana</i> , <i>Andropogon schirensis</i> , <i>Digitaria maitlandii</i> , <i>Diheteropogon filifolius</i> , <i>Eragrostis plana</i> , <i>Eragrostis racemosa</i> , <i>Festuca costata</i> , <i>Melinis nerviglumis</i> , <i>Melinis repens</i> subsp. <i>repens</i> , <i>Microchloa altera</i> , <i>Sporobolus africanus</i> , <i>Sporobolus pectinatus</i> , <i>Stiburus alopecuroides</i> , <i>Themeda triandra</i> .

(d) = dominant species

(The genus for all *Searsia* spp. was formerly *Rhus*)

**Table D5: Biogeographically important taxa associated with the Northern Escarpment Dolomite Grassland (Mucina & Rutherford, 2006).**

BIOGEOGRAPHICALLY IMPORTANT TAXA ( <sup>N</sup> Northern sourveld endemic, <sup>W</sup> Wolkberg endemic)	
Woody Layer	
Low Shrubs	<i>Berkheya pauciflora</i> <sup>W</sup> , <i>Heteromorpha pubescens</i> <sup>N</sup> .
Forb layer	
Herbs	<i>Syncolostemon transvaalensis</i> <sup>N</sup> (d), <i>Phymaspermum argenteum</i> <sup>N</sup> , <i>Scabiosa transvaalensis</i> <sup>W</sup> .

(d) = dominant species

**Table D6: Endemic taxa associated with the Northern Escarpment Dolomite Grassland (Mucina & Rutherford, 2006).**

ENDEMIC TAXA	
Woody Layer	
Small Trees	<i>Ozoroa</i> sp. nov. (' <i>laetans</i> ').
Low Shrubs	<i>Salvia dolomitica</i> (d), <i>Pelargonium album</i> .
Succulent Shrubs	<i>Aloe alooides</i> .
Semiparasitic Shrub	<i>Thesium davidsonae</i> .
Forb layer	
Geophytic Herbs	<i>Gladiolus macneilii</i> , <i>G. pavonia</i> , <i>Ledebouria parvifolia</i> .

(d) = dominant species





## FOz 4 Northern Mistbelt Forest



**Figure D2:** FOz 4 Northern Mistbelt Forest: Strand of tree fern *Cyathea capensis* on the edge of mistbelt forest in a shady gully below the escarpment near Graskop (Mpumalanga). Mucina and Rutherford (2006) page 601.

**Remarks:** These forests border on sourveld grasslands on their upper boundary, whereas they often border on bushveld on their lower boundary. The Northern Mistbelt Forests are typically species rich, containing a mixture of afrotemperate elements and species of subtropical provenience, indicating a floristic (and possibly also biogeographic-evolutionary) link of these forests to the Scarp Forests. This phenomenon is clearly observed along the Northern Escarpment below God's Window and Marieskop, and in the Barberton region (Morgenthal & Cilliers 1999).

**Table D7: Important taxa associated with the Northern Mistbelt Forest (Mucina & Rutherford, 2006).**

Woody Layer	
<b>Tall Trees</b>	<i>Brachylaena transvaalensis</i> (d), <i>Combretum kraussii</i> (d), <i>Curtisia dentata</i> (d), <i>Drypetes gerrardii</i> (d), <i>Kiggelaria africana</i> (d), <i>Ocotea kenyensis</i> (d), <i>Olea capensis</i> subsp. <i>macrocarpa</i> (d), <i>Podocarpus latifolius</i> (d), <i>Psyrax obovata</i> subsp. <i>elliptica</i> (d), <i>Searsia chirindensis</i> (d), <i>Schefflera umbellifera</i> (d), <i>Syzygium gerrardii</i> (d), <i>Xymalos monospora</i> (d), <i>Aphloia theiformis</i> , <i>Chionanthus battiscombei</i> , <i>Chionanthus foveolatus</i> subsp. <i>major</i> , <i>Maytenus acuminata</i> , <i>Pterocelastrus galpinii</i> , <i>Rapanea melanophloeos</i> , <i>Rothmannia capensis</i> , <i>Trichilia dregeana</i> .
<b>Small Trees</b>	<i>Cassipourea malosana</i> (d), <i>Oxyanthus speciosus</i> subsp. <i>gerrardii</i> (d), <i>Englerophytum magalismsontanum</i> , <i>Gymnosporia harveyana</i> , <i>Mackaya bella</i> , <i>Ochna arborea</i> var. <i>oconnorii</i> , <i>Peddiea africana</i> , <i>Rinorea angustifolia</i> .
<b>Woody Climber</b>	<i>Senegalia ataxacantha</i> (d), <i>Keetia gueinzii</i> (d), <i>Rhoicissus rhomboidea</i> (d), <i>Bauhinia galpinii</i> , <i>Dalbergia armata</i> .
<b>Tall Shrubs</b>	<i>Psychotria capensis</i> (d), <i>Canthium kuntzeanum</i> , <i>Carissa bispinosa</i> subsp. <i>zambesiensis</i> , <i>Pavetta kotzei</i> , <i>Sclerochiton harveyanus</i> .
<b>Soft Shrubs</b>	<i>Galopina circaeoides</i> , <i>Hypoestes triflora</i> .





Forb layer	
Herbs	<i>Begonia sonderiana</i> , <i>Plectranthus rubropunctatus</i> , <i>Plectranthus tetragonus</i> , <i>Streptocarpus meyeri</i> , <i>Streptocarpus pentherianus</i> .
Geophytic Herbs	<i>Dietes iridioides</i> (d), <i>Asplenium aethiopicum</i> , <i>Asplenium boltonii</i> , <i>Asplenium splendens</i> , <i>Crocasmia aurea</i> , <i>Dryopteris inaequalis</i> , <i>Elaphoglossum acrostichoides</i> , <i>Polypodium polypodioides</i> subsp. <i>ecklonii</i> (now = <i>Pleopeltis ecklonii</i> ), <i>Polystichum macleanae</i> , <i>Pteris catoptera</i> .
Grass layer	
Climbing Graminoids	<i>Prosphytochloa prehensilis</i> (d).
Graminoids	<i>Carex spicato-paniculata</i> (d), <i>Cyperus albostrigatus</i> (d), <i>Oplismenus hirtellus</i> (d).

(d) = dominant species

(The genus for all *Searsia* spp. was formerly *Rhus*)

(The genus for all *Senegalia* was formerly *Acacia*)

**Table D8: Biogeographically important taxa associated with the Northern Mistbelt Forest (Mucina & Rutherford, 2006).**

BIOGEOGRAPHICALLY IMPORTANT TAXA ( <sup>S</sup> Southern distribution limit, <sup>B</sup> Endemic of Barberton Centre)	
Woody Layer	
Tall Trees	<i>Anthocleista grandiflora</i> <sup>S</sup> , <i>Faurea galpinii</i> .
Tall Shrubs	<i>Psychotria zombamontana</i> <sup>S</sup> (d), <i>Coptosperma rhodesiacum</i> <sup>S</sup> .
Soft Shrubs	<i>Duvernoia adhatodoides</i> <sup>B</sup> .
Forb layer	
Herbs	<i>Plectranthus swynnertonii</i> <sup>S</sup> , <i>Sphaerocionium capillare</i> <sup>S</sup> . <b>Megaherbs:</b> <i>Ensete ventricosum</i> <sup>S</sup> , <i>Strelitzia caudata</i> <sup>S</sup> .

(d) = dominant species

**Table D9: Endemic taxa associated with the Northern Mistbelt Forest (Mucina & Rutherford, 2006).**

ENDEMIC TAXA	
Woody Layer	
Tall Trees	<i>Cryptocarya transvaalensis</i> (d), <i>Ochna gamostigmata</i> .
Small Trees	<i>Dombeya pulchra</i> , <i>Heteropyxis canescens</i> .
Tall Shrubs	<i>Pavetta barbertonensis</i> (d).
Forb layer	
Herbs	<i>Streptocarpus davyi</i> , <i>Streptocarpus fenestra-dei</i> , <i>Streptocarpus micranthus</i> , <i>Streptocarpus parviflorus</i> , <i>Streptocarpus roseo-albus</i> , <i>Streptocarpus wilmsii</i> .
Epiphytic Herbs	<i>Mystacidium brayboniae</i> .
Geophytic Herbs	<i>Clivia caulescens</i> (d).

(d) = dominant species



## APPENDIX E: Details, Expertise And Curriculum Vitae of Specialists

### 1. (a) (i) Details of the specialist who prepared the report:

Christien Steyn	MSc Plant Science (University of Pretoria)
Christopher Hooton	B.Tech Nature Conservation (Tshwane University of Technology)
Kim Marais	BSc (Hons) Zoology (Herpetology) (University of the Witwatersrand)
Nelanie Cloete	MSc Botany and Environmental Management (University of Johannesburg)

### 1. (A). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae

<b>Company of Specialist:</b>	<b>Scientific Terrestrial Services CC</b>		
Name / Contact person:	Nelanie Cloete		
Postal address:	PO. Box 751779, Gardenview		
Postal code:	2047	Fax:	086 724 3132
Telephone:	011 616 7893		
E-mail:	<a href="mailto:Nelanie@sasenvgroup.co.za">Nelanie@sasenvgroup.co.za</a>		
Qualifications	MSc Environmental Management (University of Johannesburg) MSc Botany (University of Johannesburg) BSc (Hons) Botany (University of Johannesburg) BSc (Botany and Zoology) (Rand Afrikaans University)		
Registration / Associations	Professional member of the South African Council for Natural Scientific Professions (SACNASP) Member of the South African Association of Botanists (SAAB) Member of the International Affiliation for Impact Assessments (IAIAsa) South Africa group Member of the Grassland Society of South Africa (GSSA)		
<b>Company of Specialist:</b>	<b>Scientific Terrestrial ServicesCC</b>		
Name / Contact person:	Kim Marais		
Postal address:	221 Riverside Lofts, Tygerfalls Boulevard, Bellville		
Postal code:	7539	Fax:	086 724 3132
Telephone:	011 616 7893		
E-mail:	<a href="mailto:kim@sasenvgroup.co.za">kim@sasenvgroup.co.za</a>		
Qualifications	BSc (Hons) Zoology (University of the Witwatersrand) BSc (Zoology and Conservation) (University of the Witwatersrand)		
Registration / Associations	Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP) Member of South African Wetland Forum		
<b>Company of Specialist:</b>	<b>Scientific Terrestrial Services</b>		
Name / Contact person:	Christien Steyn		
Postal address:	PO. Box 751779, Gardenview		
Postal code:	2047	Fax:	086 724 3132
Telephone:	011 616 7893		
E-mail:	<a href="mailto:christien@sasenvgroup.co.za">christien@sasenvgroup.co.za</a>		
Qualifications	MSc (Plant Science) (University of Pretoria) BSc (Hons) Plant Science (Invasion Biology) (University of Pretoria) BSc Environmental Science (University of Pretoria)		
Registration / Associations	Member of the South African Association of Botanists (SAAB) Member of the Botanical Society of South Africa (BotSoc) Professional member of the South African Council for Natural Scientific Professions (SACNASP) Member of the Grassland Society of South Africa (GSSA) Member of the Land Rehabilitation Society of Southern Africa (LARSSA)		



**1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority**


I, Christopher Hooton, declare that -

- I act as the **independent specialist** 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 relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, 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

  
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Signature of the Specialist

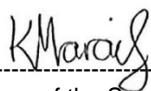
I, Christien Steyn, declare that -

- I act as the **independent specialist** 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 relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, 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

  
-----  
Signature of the Specialist

I, Kim Marais, declare that -

- I act as the **independent specialist (reviewer)** 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 relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, 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

  
-----  
Signature of the Specialist



I, Nelanie Cloete, declare that -

- I act as the **independent specialist (reviewer)** 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 relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, 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



-----  
Signature of the Specialist







## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

### CURRICULUM VITAE OF CHRISTOPHER HOOTON

#### PERSONAL DETAILS

Position in Company	Senior Scientist, Member Biodiversity Specialist
Joined SAS Environmental Group of Companies	2013

#### EDUCATION

##### Qualifications

BTech Nature Conservation (Tshwane University of Technology)	2013
National Diploma Nature Conservation (Tshwane University of Technology)	2008

#### AREAS OF WORK EXPERIENCE

**South Africa** – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Eastern Cape, Western Cape, Northern Cape, Free State

**Africa** - Zimbabwe, Sierra Leone, Zambia

#### KEY SPECIALIST DISCIPLINES

##### Biodiversity Assessments

- Floral Assessments
- Faunal Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Protected Tree and Floral Marking and Reporting
- Biodiversity Offset Plan

##### Freshwater Assessments

- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning





## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

### CURRICULUM VITAE OF CHRISTIEN STEYN

#### PERSONAL DETAILS

Position in Company	Floral Ecologist
Joined SAS Environmental Group of Companies	2018

#### MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 127823/21)  
 Member of the Botanical Society of South Africa (BotSoc)  
 Member of the Grassland Society of South Africa (GSSA)  
 Member of the Land Rehabilitation Society of Southern Africa (LARSSA)  
 Member of the South African Association of Botanists (SAAB)

#### EDUCATION

##### Qualifications

MSc Plant Science (University of Pretoria)	2017
BSc (Hons) Plant Science (Invasion Biology) (University of Pretoria)	2014
BSc Environmental Science (University of Pretoria)	2013

##### Short courses and Training

- Advanced Grass Identification Course
- Practical Plant Identification, including Herbarium Usage and Protocols
- Vegetation Classification and Mapping: Use of Geographic Information System for understanding vegetation pattern and biodiversity conservation.
- Introduction to Statistics for Biologists: Applications of plant ecology principles in plant conservation, i.e., species distribution modelling, alien plant invasions, conservation planning
- International Plant Functional Trait Course: Hands-on, field-based exploration of plant functional traits, along with experience in the usage of plant traits data in climate-change research and ecosystem ecology.  
<https://www.uib.no/en/rg/EECRG/97477/plant-functional-traits-course-2>

#### AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Northern Cape, Free State

#### KEY SPECIALIST DISCIPLINES

##### Biodiversity Assessments

- Terrestrial Ecological and Biodiversity Scoping Assessments
- Terrestrial Ecological and Biodiversity Screening Assessments
- Floral Assessments
- Input into Terrestrial Rehabilitation Plan design with the focus on the re-establishment of vegetation
- Floral Rescue and Relocation Plans
- Alien and Invasive Plant Control and Management Plans (AIPCPs)
- Alien and Invasive Plant Identification and awareness training
- Terrestrial Monitoring
- Protected Tree and Floral Marking and Reporting
- Desktop Studies, Mapping and Background Information Research





## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

### CURRICULUM VITAE OF NELANIE CLOETE

#### PERSONAL DETAILS

Position in Company	Senior Scientist, Member Botanical Science and Terrestrial Ecology
Joined SAS Environmental Group of Companies	2011

#### MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 400503/14)  
 Member of the South African Association of Botanists (SAAB)  
 Member of the International Affiliation for Impact Assessments (IAIAsa) South Africa group  
 Member of the Grassland Society of South Africa (GSSA)  
 Member of the Botanical Society of South Africa (BotSoc)  
 Member of the Gauteng Wetland Forum (GWF)  
 Member of the South African Wetland Society (SAWS)

#### EDUCATION

##### Qualifications

MSc Environmental Management (University of Johannesburg)	2013
MSc Botany (University of Johannesburg)	2007
BSc (Hons) Botany (University of Johannesburg)	2005
BSc (Botany and Zoology) (Rand Afrikaans University)	2004

##### Short Courses

Certificate – Department of Environmental Science in Legal context of Environmental Management, Compliance and Enforcement (UNISA)	2009
Introduction to Project Management - Online course by the University of Adelaide	2016
Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs	2017
Environmental legal compliance, Monitoring and Auditing	2021

#### AREAS OF WORK EXPERIENCE

**South Africa** – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Northern Cape, Eastern Cape, Free State

**Africa** - Democratic Republic of the Congo (DRC)

#### KEY SPECIALIST DISCIPLINES

##### Biodiversity Assessments

- Floral Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Terrestrial Monitoring
- Protected Tree and Floral Marking and Reporting
- Biodiversity Offset Plan

##### Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Plant species and Landscape Plan

##### Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Environmental and Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions





## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

### CURRICULUM VITAE OF **KIM MARAIS**

#### PERSONAL DETAILS

Position in Company	Senior Scientist Water Resource Manager
Joined SAS Environmental Group of Companies	2015

#### MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 117137/17)  
Member of the Western Cape Wetland Forum (WCWF)

#### EDUCATION

##### Qualifications

BSc (Hons) Zoology (University of the Witwatersrand)	2012
BSc (Zoology and Conservation) (University of the Witwatersrand)	2011

##### Short Courses

Aquatic and Wetland Plant Identification (Cripsis Environment)	2019
Tools for Wetland Assessment (Rhodes University)	2018
Certificate in Environmental Law for Environmental Managers (CEM)	2014
Certificate for Introduction to Environmental Management (CEM)	2013

#### KEY SPECIALIST DISCIPLINES

##### Biodiversity Assessments

- Biodiversity Action Plans (BAP)
- Alien and Invasive Control Plans (AICP)
- Faunal Eco Scans
- Faunal Impact Assessments

##### Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Watercourse Maintenance and Management Plans
- Freshwater Offset Plan

##### Aquatic Ecological Assessment and Water Quality Studies

- Riparian Vegetation Integrity (VEGRAI)
- Water quality Monitoring
- Riverine Rehabilitation Plans

##### Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions
- Public Participation processes

