SCIENTIFIC TERRESTRIAL SERVICES

BIODIVERSITY ASSESSMENT

AS PART OF THE ENVIRONMENTAL AUTHORISATION PROCESS FOR THE PROPOSED MINING RIGHTS APPLICATION FOR THE MAKGANYANE IRON ORE MINE, LOCATED IN THE NORTHERN CAPE.

EXECUTIVE SUMMARY AND BACKGROUND INFORMATION

Prepared for:	**Greenmined Environmnetal** (Pty) Ltd
Report authors:	C. Gouws (Pr. Sci. Nat) C. Lamb J. Potgieter (Pr. Sci. Nat)
Report reviewers:	S.L Daniles (Pr. Sci. Nat) C. Hooton
Reference:	STS 25 - 2015
Date:	July 2025

EXECUTIVE SUMMARY

Scientific Terrestrial Services (Pty) Ltd (STS) was appointed to conduct a Terrestrial Biodiversity Impact Assessment as part of the Environmental Authorisation (EA) process for the proposed Mining Rights Application for the Makganyane Iron Ore Mine (Assmang (Pty) Ltd), located in the Northern Cape.

The Makganyane Iron Ore Mine has been under a Prospecting Right that was due to expire on 10 April 2021 but was renewed and expired on 18 November 2024. In terms of section 18 (4) of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA), a prospecting right can only be renewed once and as such in order for Assmang to protect its security of tenure over the Prospecting Area, the Company is applying for a Mining Right over the current Prospecting Area. The proposed Minig Right Application (MRA) area will include the following farm portions: Portion 2 (A Portion of Portion 1), Remainder Portion, Remainder Portion of Portion 1 and Portion 3 of the Farm Makganyane No. 667. The MRA is located approximately 24 kilometres (km) north-west of Postmasburg on opposite sides of the R385 provincial road. Situated in the Magisterial / Administrative district of Kuruman, in the Northern Cape Province of South Africa. The total MRA comprises 1549,61 hectares (ha).

The following information was extracted from the mining work programme submitted for a MRA for Makganyane Iron Ore Mine:

- The proposed mining operations will include two open cast pits, a stockpile area and a waste rock area;
- Contractors will make use of diesel generated power supply and hence minimal electricity infrastructure will be required;
- A general water authorisation is available for 30 cubic metres (m^3) per day. Should additional water be required, it would need to be purchased from a third party; and
- Offices, parking and other supporting infrastructure will be constructed as required.

This assessment is however focused on only certain pre-selected areas, within the above-mentioned farm boundaries, associated with (i) an historical mining operational area, (ii) the proposed mining operation and (iii) a freshwater feature identified by the background databases, along with a 200 metre (m) buffer area will furthermore be referred to as "**Focus Area** "

Desktop Assessment Summary:

The following is a summary of the desktop-based results, as presented in Section 3 of the report:

- The Focus Area are situated within the **Least Concern (LC) Kuruman Mountain Bushveld** (SVk10) and the **LC Olifantshoek Plains Thornveld** (SVK 13) vegetation types;
- The National Biodiversity Assessment (NBA) database (SANBI 2018a, 2018b) classifies the Olifantshoek Plains Thornveld as poorly protected and the Kuruman Mountain Bushveld as not protected;
- The Red Listed Ecosystems (RLE) database (SANBI 2022) further indicates that the **Kuruman Mountain Bushveld** and the **Olifantshoek Plains Thornveld** ecosystems are **endemic** to South Africa;
- The entire eastern section of the Focus Area are considered to be a Critical Biodiversity Area (**CBA**) 1 (Irreplaceable Area) and the majority of the remaining Focus Area are classified as an Ecological Support Areas (**ESA**). However, only small, scattered portions of the Focus Area are located within areas classified as Other Natural Areas (ONAs);
- According to the Mining and Biodiversity Guidelines database (2012), the eastern section of the Focus Areas is located within an area identified as **Highest Biodiversity Importance**; and
- The online National Web Based Environmental Screening Tool (hereafter "screening tool") identified the Focus Area to be in a **low sensitivity** area for the Animal Species Theme and the Plant Species Theme. For the Terrestrial Biodiversity Theme, the MRA has an overall **very high sensitivity**. The triggered feature include **portions of the Focus Area being classified as a CBA 1 and an ESA, and a Freshwater Ecosystem Priority Area (FEPA) sub catchment**.

Field assessment results

A field assessment was undertaken between the 1st and the 3rd of April 2025. During the site assessment, four broad habitat units (with associated subunits for the Freshwater Habitat) were identified. The identified habitat units are as follows:

1) **Kuruman Mountain Bushveld**: The majority of the Focus Area are considered to be Kuruman Mountain Bushveld. The Kuruman Mountain Bushveld habitat is represented by a short closed thornveld. The majority of the Kuruman Mountain Bushveld habitat unit meets the definition of indigenous vegetation as per the National Environmental Management Act, 1998 [Act No. 107 of 1998] (NEMA) definition[1]. However, large portions of this habitat unit have been recently impacted by prospecting activities, which only ceased end of 2024 therefore these sections of the Kuruman Mountain Bushveld are not considered indigenous vegetation. In some of the initial prospecting site indication of secondary succession[2] is visible. The Kuruman Mountain Bushveld is associated with various terrain of the Focus Area including rocky hills and valleys;
2) **Olifantshoek Plains Thornveld**: This habitat is mostly associated with the eastern portions of the Focus Area. Overall, the vegetation structure included a tall open to semi-closed thornveld with a sparsely developed woody layer and a well-developed grass layer. The vegetation within this habitat is considered to be indigenous vegetation;
3) **Freshwater Habitat**: This habitat was associated with two watercourses[3] (SAS 25-0028, 2025), characterised as Episodic Drainage Lines (EDL) (without riparian[4] habitat), as defined in the National Water Act, 1998 (Act No. 36 of 1998) (NWA). However, various Preferential Flow Path (PFP) were also identified however these features do not meet the requirements of a watercourse. The EDL and PFP are located within the central Focus Areas. The vegetation structure of both the EDL and PFPs are identical to the surrounding Kuruman Mountain Bushveld vegetation. The EDL and PFP was identified with their distinct topography (in low laying areas and following natural channels) and often showing a lack of vegetation (with a rock base). The Freshwater Habitat also includes a Recharge area that is not considered true watercourse based on the definition provided by the NWA. The vegetation associated with the Recharge area was predominantly comprised of grasses and forbs with a scattered presence of shrubs; and
4) **Transformed Habitat**: The Transformed Habitat is mostly represented by the historic mining areas and mining infrastructure and farm houses. The floral communities associated with this habitat unit have been significantly compromised due to anthropogenic activities and comprise mostly of Alien and Invasive Plants (AIPs) and pioneer species. The Transformed Habitat is not considered to be indigenous vegetation since it has undergone significant clearance of vegetation and significant soil disturbance within the past 10 years (NEMA). The Transformed Habitat occurs mostly in the western extent of the Focus Area

Faunal observations and signs during the site visit were limited to common species expected within the region. The Kuruman Mountain Bushveld and its rocky nature provided shelter and suitable habitat for reptiles, small to medium mammals and arachnids while an increased vegetation density supported a higher avifaunal and insect species assemblage. Larger-bodied browsing species were also observed within this habitat as an increased woody vegetation density provides food resources. The varied habitat structure in the Olifantshoek Plains Thornveld Habitat, with trees and shrubs interspersed among the grass, provides suitable shelter for faunal species and is especially favoured by avifauna, which were

[1] 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.

[2] In ecology, secondary succession is the natural process of ecosystem recovery that occurs in an area where a previous biological community existed but was disturbed or destroyed. The "recovery" of habitat begins with grasses, shrubs, and other opportunistic species that lead to a more complex ecosystem over time.

[3] The National Water Act, 1998 (Act No. 36 of 1998) (NWA) define a watercourse as follows:

- 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.

[4] "Riparian habitat" (as per the 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.

notably abundant in this area, albeit only common species being observed. While the Freshwater Habitat notably the Recharge area has the potential to support several faunal SCCs, the PFPs and EDLs also serve as important movement corridors for fauna and play an important role in connectivity within the landscape. The Transformed Habitat had little importance for the faunal assemblages in the area but served as a means of movement for some fauna along the roads. Overall, faunal diversity and abundance within the Focus Area have been reduced by existing impacts and ongoing mining activities in the surrounding areas.

Species of Conservation Concern (SCC) findings

From a floral perspective, no threatened SCC (i.e., Red Data Listed (RDL) plants in terms of Section 56(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), were recorded during the site assessment. One Threatened and Protected Species (TOPS), namely *Harpagophytum procumbens* (Status = LC), does have the potential to occur within the Focus Area. Two protected tree species, as per the National Forest Act, 1998 (Act No. 84 of 1998), as amended (NFA), namely *Vachellia erioloba* and *Boscia albitrunca*, were identified during the site assessment within the study area. Furthermore, several provincially protected plant species in terms of the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA) were identified within the study area and suitable habitat to sustain additional provincially protected species is associated with the study area.

No faunal SCCs were observed during the field assessment, although several faunal SCCs (RDL and TOPS) have increased probability of occurrence (POC) within the study area. One species was confirmed within the Focus Areas by two separate landowners namely *Smutsia temminckii* (Temminck's Ground Pangolin, vulnerable (VU)). This species will mostly utilise the Kuruman Mountain Bushveld and Olifantshoek Plains Thornveld Habitats as well as some of the Freshwater Habitat within the Focus Areas. Two avifaunal SCCs have high POC within the Focus Areas, namely *Ardeotis kori* (Kori Bustard, near threatened (NT)) and *Sagittarius serpentarius* (Secretarybird, endangered (EN)). Both these species are known to occur within the region and have suitable habitat within the Focus Areas. These species will most likely be found within the Olifantshoek Plains Thornveld and Freshwater Habitat (Recharge Area) where they will likely forage and potentially nest. Additionally, there are seven avifaunal SCCs, four mammal SCCs (two threatened and two protected), one TOPS-protected amphibian species and three TOPS protected arachnid species that have medium POC for the Focus Areas.

Site Ecological Importance (SEI)

All habitats within the Focus Area were allocated an importance category, i.e., a Site Ecological Importance (SEI) category. SEI is a function of the biodiversity importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and its resilience to impacts (receptor resilience [RR]). BI in turn is a function of conservation importance (CI) and the functional integrity (FI) of the receptor.

Table 1 breaks down the SEI obtained for the floral and faunal components.

Table 1: Summary of the SEI obtained for the floral and faunal components identified within the study area.

HABITAT UNIT	FLORAL SEI	FAUNAL SEI
Kuruman Mountain Bushveld	Low	High
Olifantshoek Plains Thornveld	Low	Medium
Transformed Habitat	Very Low	Very Low
Episodic Drainage Line	Low	Medium
Preferential Flow Path	Very Low	Medium
Recharge Area	Medium	High

Proposed Impacts Discussion

The highest impacts are anticipated during the mining phase of the proposed mining activities, as this phase will result in large portions of the Focus Area (i.e., indigenous vegetation), of varying SEI, being cleared. Since the impact significance during the mining phase, after mitigation mostly varied from medium – medium high. However, based on the proposed layout the majority of the planned activities will be taking place in partially modified habitats (i.e., Kuruman Mountain Bushveld and Olifantshoek

Plains Thornveld) and sensitive habitat (i.e., EDL and Recharge area) avoided. If managed, the indirect impacts from the proposed development can remain limited in their extent and the perceived effects on floral ecology can be kept to a local scale. Mitigation of indirect impacts is more feasible and achievable than for direct impacts. See table 2 for a summary of the impact significance within each Habitat unit during the proposed project. From a faunal perspective, the highest impacts on faunal ecology can be expected during the mining phase where impacts can be expected to range from High to Medium-High (pre-mitigation). Although the anticipated post-mitigation impacts within the Focus Areas are expected to result in a Medium-High significance at a local scale, it is unlikely that faunal species will be affected at a population level if strict mitigation measures and a thorough rehabilitation plan are implemented.

Table 2: Summary of the post-mitigations impact significance within the Focus Area as a result of the proposed development.

HABITAT UNIT	FLORAL		FAUNAL
	Diversity and Habitat	Important biodiversity features (ESA)	Diversity, Habitat and SCC
Planning phase			
Kuruman Mountain Bushveld	Low-medium	Low	Low-medium
Olifantshoek Plains Thornveld	Low-medium		Low-medium
Episodic Drainage Line	Low-medium		Low-medium
Preferential Flow Path	Low		Low-medium
Mining phase			
Kuruman Mountain Bushveld	Medium - high	Medium	Medium - high
Olifantshoek Plains Thornveld	Medium		Medium - high
Episodic Drainage Line	Low - medium		Medium - high
Preferential Flow Path	Medium		Medium - high
Decommissioning and Closure phase			
Kuruman Mountain Bushveld	Low-medium	Low-medium	Low-medium
Olifantshoek Plains Thornveld	Low-medium		Low-medium
Episodic Drainage Line	Low		Low-medium
Preferential Flow Path	Low-medium		Low-medium

Of the threatened floral species assessed (i.e., VU, EN, Critically Endangered (CR), or NT species), none were recorded within the Focus Areas. Therefore, the proposed activities will not directly impact on the populations of threatened species within the Focus Areas. Several species protected under the NCNCA and the NFA were recorded within the Focus Areas. These species will require marking as part of final site walkdowns prior to vegetation clearing activities. Permit applications are required for the removal of NCNCA-protected species, and it is recommended that species be relocated out of the proposed mining footprints and not destroyed. Permits from the Northern Cape Environmental Department and from the DFFE should be obtained to remove, cut, or destroy any of the above-mentioned protected and/or threatened species before any vegetation clearing may take place.

The highest impacts on faunal SCC can be expected during the mining phase where impacts can be expected to range from High to Medium-High (pre-mitigation). Although some impact scores can be reduced through the implementation of mitigation measures, the significance will remain Medium-High (post-mitigation). The Planning and Decommissioning and Rehabilitation Phases will result in reduced impacts on faunal SCC. Subject to the strict implementation of mitigation measures, the relatively small footprint of the proposed mine, in comparison to the available habitat in the region, is unlikely to result in significant impacts on SCC populations in the region. However, it is important to acknowledge that individuals within the Focus Areas may still be impacted at a local scale.

Concluding Remarks

Based on the above, it is the specialists' opinion that the project can be considered for approval, provided that a floral and faunal walkdown (of the footprint areas) is Additionally stringent mitigation measures should be implemented including monitoring of the footprint extents (including edge effects management) together with environmental management including and a thorough rehabilitation plan, to ensure no additional loss of species and ESA or CBA integrity and functioning occur.

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

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 June 2020, and 2).

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	**Terrestrial Biodiversity Specialist Assessment**	
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.	**Part A – C:** Cover Page **Part A:** Appendix E
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	**Part A**: Section 1
2.3	**The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:**	
2.3.1	A description of the ecological drivers or processes of the system and how the proposed development will impact these;	**Part B**: Section 3 (flora) **Part C:** Section 3 (fauna)
2.3.2	Ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site;	**Part B**: Section 3 (flora) **Part C:** Section 3 (fauna)
2.3.3	The ecological corridors that the proposed development would impede including migration and movement of flora and fauna;	**Part A:** Section 3 (desktop analysis) **Part B**: Section 3 (flora) **Part C:** 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;	**Part A:** Section 3 (desktop analysis) **Part B**: Section 3 (flora) **Part C:** Section 3 (fauna) **For descriptions on the presence of FEPAs, please refer to the Freshwater Biodiversity Assessment (SAS 25-0028, 2025)*
2.3.5	A description of terrestrial biodiversity and ecosystems on the preferred site, including: a) main vegetation types; b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified; c) ecological connectivity, habitat fragmentation, ecological processes, and fine scale habitats; and d) species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified;	**Part A**: Section 3 (desktop analysis) **Part B**: Section 3 (flora) **Part C:** 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	**Part B**: Section 4 (flora) **Part C:** Section 4 (fauna)
2.3.7	**The assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:**	
2.3.7.1	Terrestrial Critical Biodiversity Areas (CBAs), including: *a) the reasons why an area has been identified as a CBA;* *b) an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;*	**Part A**: Section 3 (desktop analysis) **Part B**: Section 3 **Part C:** Section 3

	c) *the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s);* d) *the impact on ecosystem threat status;* e) *the impact on explicit subtypes in the vegetation;* f) *the impact on overall species and ecosystem diversity of the site; and* g) *the impact on any changes to threat status of populations of species of conservation concern in the CBA;*	
2.3.7.2	Terrestrial Ecological Support Areas (ESAs), including: *a) the impact on the ecological processes that operate within or across the site;* *b) the extent the proposed development will impact on the functionality of the ESA; and* c) *loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;*	
2.3.7.3	Protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including- *a) an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;*	**Part A**: Section 3 (desktop analysis). However, not applicable as no protected areas or areas of conservation concern are within 10 km of the proposed project
2.3.7.4	Priority areas for protected area expansion, including- *a) the way in which in which the proposed development will compromise or contribute to the expansion of the protected area network;*	**Part A**: Section 3 (desktop analysis). Not applicable as no protected area expansion are within 10 km of the proposed project
2.3.7.5	SWSAs including: *a) the impact(s) on the terrestrial habitat of a SWSA; and* b) *the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses);*	Not Applicable. No SWSAs within the study area.
2.3.7.6	FEPA sub catchments, including- *a) the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;*	**For descriptions on the presence of FEPAs, please refer to the Freshwater Biodiversity Assessment (SAS 25-0028, 2025)*
2.3.7.7	Indigenous forests, including: *a) impact on the ecological integrity of the forest; and* b) *percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.*	Not Applicable. No indigenous forests within the study area.
2.4	**The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report.**	
	Part B: Results of the **Floral Assessment** as well as conclusions on Terrestrial Biodiversity as it relates to vegetation communities. **Part C:** Results of the **Faunal Assessment** as well as conclusions on Terrestrial Biodiversity as it relates to faunal communities.	
3	**Terrestrial Biodiversity Specialist Assessment Report**	
3.1	**The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:**	
3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	**Part A:** Appendix E
3.1.2	A signed statement of independence by the specialist;	**Part A:** 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;	**Part B:** Section 1.2 (flora) **Part C:** Section 1.2 (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;	**Part A**: Appendix C **Part B:** Section 2 (flora) **Part B:** Appendix A (flora) **Part C:** Section 2 (fauna)

		Part C: 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;	**Part B:** Section 1.2 (flora) **Part C:** Section 1.2 (fauna)
3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	**Part B:** Section 4 (flora) **Part C:** Section 4 (fauna)
	Impact Assessment Requirements 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; 3.1.10 The degree to which the impacts and risks can be reversed; 3.1.11 The degree to which the impacts and risks can cause loss of irreplaceable resources; 3.1.12 Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	**Part B:** Section 5 (flora) – Preliminary Scoping Phase Impact Assessment **Part C:** Section 5 (fauna) – Preliminary Scoping Phase Impact Assessment
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;	**Not Applicable to this report**
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	**Part A:** Executive summary **Part B:** Section 6 (flora) **Part C:** Section 6 (fauna)
3.1.15	Any conditions to which this statement is subjected.	**Part B:** Section 5 (flora) – Preliminary Scoping Phase statements only **Part C:** Section 5 (fauna) – Preliminary Scoping Phase statements only
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 EAP and applicant and will be appended to the EIA / 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.	

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

GLOSSARY OF TERMS

Biome - (Mucina and Rutherford (2006); after Low and Rebelo (1998))	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).
Bioregion (Mucina and Rutherford (2006))	A bioregion is a composite of spatial (vegetation) units sharing similar biotic and physio-geographical features and connected by processes operating on a regional sale.
CBA (SANBI, 2020)	An area that must be maintained in a good ecological condition (natural or semi-natural state) in order to meet biodiversity targets. CBAs collectively meet biodiversity targets for all ecosystem types, as well as for species and ecological processes that depend on natural or semi-natural habitat that have not already been met in the protected area network. CBAs are identified through a systematic biodiversity planning process in a configuration that is complementary, efficient and avoids conflict with other land uses where possible.
Corridor (van Wilgen et al., 2020)	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
CR, i.e., International Union for Conservation of Nature (IUCN) Red List category (Skowno et al., 2019)	**Applied to both species/taxa and ecosystems**: A species is CR when the best available evidence indicates that it meets at least one of the five IUCN criteria for CR, indicating that the species is facing an extremely high risk of extinction. CR ecosystem types are 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. CR species are those considered to be at extremely high risk of extinction.
Ecoregion	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region."
EN (Red List category: Skowno et al. (2019))	**Applied to both species/taxa and ecosystems**: A species is EN when the best available evidence indicates that it meets at least one of the five IUCN criteria for EN, indicating that the species is facing a very high risk of extinction. EN ecosystem types are at a very high risk of collapse. EN species are those considered to be at very high risk of extinction.
Endemic species (SANBI, 2020)	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.
ESA (Skowno et al., 2019)	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
Important Bird and Biodiversity Area (IBA) (Marnewick et al, 2015a; 2015b)	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.
Indigenous vegetation (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.
Indigenous species (synonym: native species)	(SANBI, 2020 definition) Occurring naturally in a defined area (contrast with endemic) – the area must be specified and is normally taken to be the historical range of a species, notwithstanding the effects of naturally initiated range expansions/ contractions, e.g., the baobab (Adansonia digitata) is indigenous but not endemic to South Africa, but it is not indigenous to KwaZulu-Natal. (NEMBA definition) – a species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic of South Africa, but excludes a species that has been introduced in the Republic as a result of human activity, e.g. the bontebok (*Damaliscus*

	pygragus pygargus) is indigenous to only South Africa, but according to previous definition would only be indigenous to the Western Cape.
Least Threatened	Least threatened ecosystems are still largely intact.
Near Threatened (according to IUCN)	Close to being at high risk of extinction in the near future.
Protected	Species of high conservation value or national importance that require protection, according to TOPS 2007 and NEMBA.
Quarter Degree Square (QDS) (SANBI, 2020)	A way of dividing the longitude latitude degree square cells into smaller squares of 15' × 15' (roughly 24 × 27 km), forming in effect a system of geocodes.
Red Data Listed (RDL) species	According to the Red List of South African plants (http://redlist.sanbi.org/) and the IUCN, organisms that fall into the Extinct in the Wild (EW), CR, EN, Vulnerable (VU) categories of ecological status.
Species of Conservation Concern (SCC)	The term SCC in the context of this report refers to all RDL and IUCN listed threatened species as well as provincially and nationally protected species of relevance to the project.
Threatened ecosystem (Skowno et al., 2019)	An ecosystem that has been classified as CR, EN or VU, 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 NEMBA allows the Minister of Environmental Affairs or a provincial Member of the Executive Council 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.
Threatened species	A species that has been classified as CR, EN or VU, 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.
VU (Red List category: Skowno et al. (2019))	**Applied to both species/taxa and ecosystems**: A species is VU when the best available evidence indicates that it meets at least one of the five IUCN criteria for VU, indicating that the species is facing a high risk of extinction. An ecosystem type is VU 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.

LIST OF ACRONYMS

BGIS	Biodiversity Geographic Information Systems
CARA	Conservation of Agricultural Resources Act, 1983 [Act No. 43 of 1983]
CBA	Critical Biodiversity Area
CR	Critically Endangered
DFFE	Department of Forestry, Fisheries, and the Environment
E-GIS	Environmental Geographical Information Systems
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EDLs	Episodic Drainage Line
EIA	Environmental Impact Assessment
EN	Endangered
ESA	Ecological Support Area
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
ha	hectares
IBA	Important Bird and Biodiversity Area
IUCN	International Union for Conservation of Nature
km	kilometres
km2	Square kilometres
kWp	kilowatt peak
LC	Least concern
LoM	Life of Mine
m3	Cubic metres
MAP	Mean Annual Precipitation
MAPE	Mean Annual Potential for Evaporation
MASMS	Mean Annual Soil Moisture Stress
MAT	Mean Annual Temperature
MFD	Mean Frost Days
MRA	Minning Rights Application
MPRDA	Minerals and Petroleum Resources Development Act, 2002 [Act No 28 of 2002]
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]
NCNCA	The Northern Cape Nature Conservation Act, 2009 [Act No. 9 of 2009]
NCPSDF	The Northern Cape Provincial Spatial Development Framework
NFA	National Forest Act, 1998 [Act No. 84 of 1998]
NPAES	National Protected Areas Expansion Strategy
NT	Near threatened
ONA	Other Natural Areas
POC	Probability of Occurrence
POSA	Plants of southern Africa
QDS	Quarter Degree Square
RDL	Red Data List
RLE	Red List Ecosystem
SABAP2	Southern 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
SAPAD	South African Protected Areas Database
SCC	Species of Conservation Concern
STS	Scientific Terrestrial Services [Pty] Ltd
SWSA	Strategic Water Source Area

TOPS	Threatened or Protected Species (as per the 2007 List)
VEGMAP	National Vegetation Map Project
VU	Vulnerable
WSAs	Water Source Areas

1 INTRODUCTION

Scientific Terrestrial Services (Pty) Ltd (STS) was appointed by Greenmined Environmental (Pty) Ltd to conduct a Terrestrial Biodiversity Impact Assessment as part of the Environmental Authorisation (EA) application process for the proposed Mining Rights Application for the Makganyane Iron Ore Mine Assmang (Pty) Ltd, located near Beeshoek, in the Northern Cape.

The Makganyane Iron Ore Mine has been under a Prospecting Right that was due to expire on 10 April 2021 but was renewed and expired on 18 November 2024. In terms of section 18 (4) of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA), a prospecting right can only be renewed once and as such in order for the Assmang (Pty) Ltd to protect its security of tenure over the Prospecting Area, the Company is applying for a Mining Right over the current Prospecting Area.

The proposed Minig Right Application (MRA) area will include the following farm portions: Portion 2 (A Portion of Portion 1), Remainder Portion, Remainder Portion of Portion 1 and Portion 3 of the Farm Makganyane No. 667. The MRA is located approximately 24 kilometre (km) north-west of Postmasburg on opposite sides of the R385 provincial road. Situated in the Magisterial / Administrative district of Kuruman, in the Northern Cape Province of South Africa. The total MRA comprises 1549,61 hectares (ha).

This assessment is however focused on only certain pre-selected areas, within the above-mentioned farm boundaries, associated with (i) an historical mining operational area, (ii) the proposed mining operation and (iii) a freshwater feature identified by the background databases, along with a 200 metre (m) buffer area will furthermore be referred to as "**Focus Area**" (Figures 1).

The purpose of this report is to investigate and provide detail on the biodiversity associated with the MRA, while focusing on pre-selected Focus Area, from a detailed desktop-based perspective (i.e., consulting all relevant national and provincial biodiversity databases), together with preliminary high-level, field-verified results. The desktop assessment was used in the preparation of the field assessment to verify and to assist in the data interpretations that will be discussed in detail in the Environmental Impact Assessment (EIA) report. This report, however, provides a brief description of field assessment findings and the plan of study for the EIA report and methodologies to be followed.

1.1 Project Description

The proposed Makganyane mining operation is proposing the extraction of iron ore material from two open cast pits whereafter the crushed raw material will be transported by means of trucks along the R385 to the operational Beeshoek plant for processing. Once processed at the Beeshoek plant the concentrate is transported from the Postmasburg area to Arcelormittal's Vanderbijlpark and Newcastle Works through a combination of rail and road transport.

The following information was extracted from the mining work programme submitted for a mining right application for Makganyane Iron Ore Mine (Assmang (Pty) Ltd):

- The proposed mining operations will include two open cast pits, a stockpile area and a waste rock area;
- Contractors will make use of diesel generated power supply and hence minimal electricity infrastructure will be required;
- A general water authorisation is available for 30 cubic metres (m^3) per day. Should additional water be required, it would need to be purchased from a third party; and
- Offices, parking and other supporting infrastructure will be constructed as required.

No information relating to clean and dirty water separation systems (trenches, channels or a Pollution Control Dam [PCD]) or stormwater management systems were provided at the time of undertaking this assessment. Furthermore, it was assumed that the existing road network developed as part of the prospecting operation will be used for the mining operation as well. The Life of Mine (LoM) schedule is over 38 months. Figure 3 below indicates the proposed layout for the mining activities.

1.2 Scope of Work

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

- Compile a desktop assessment with all relevant information as presented by 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/). The desktop assessment aims to gain background information on the physical habitat and potential floral and faunal ecology associated with the study area;
- 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).

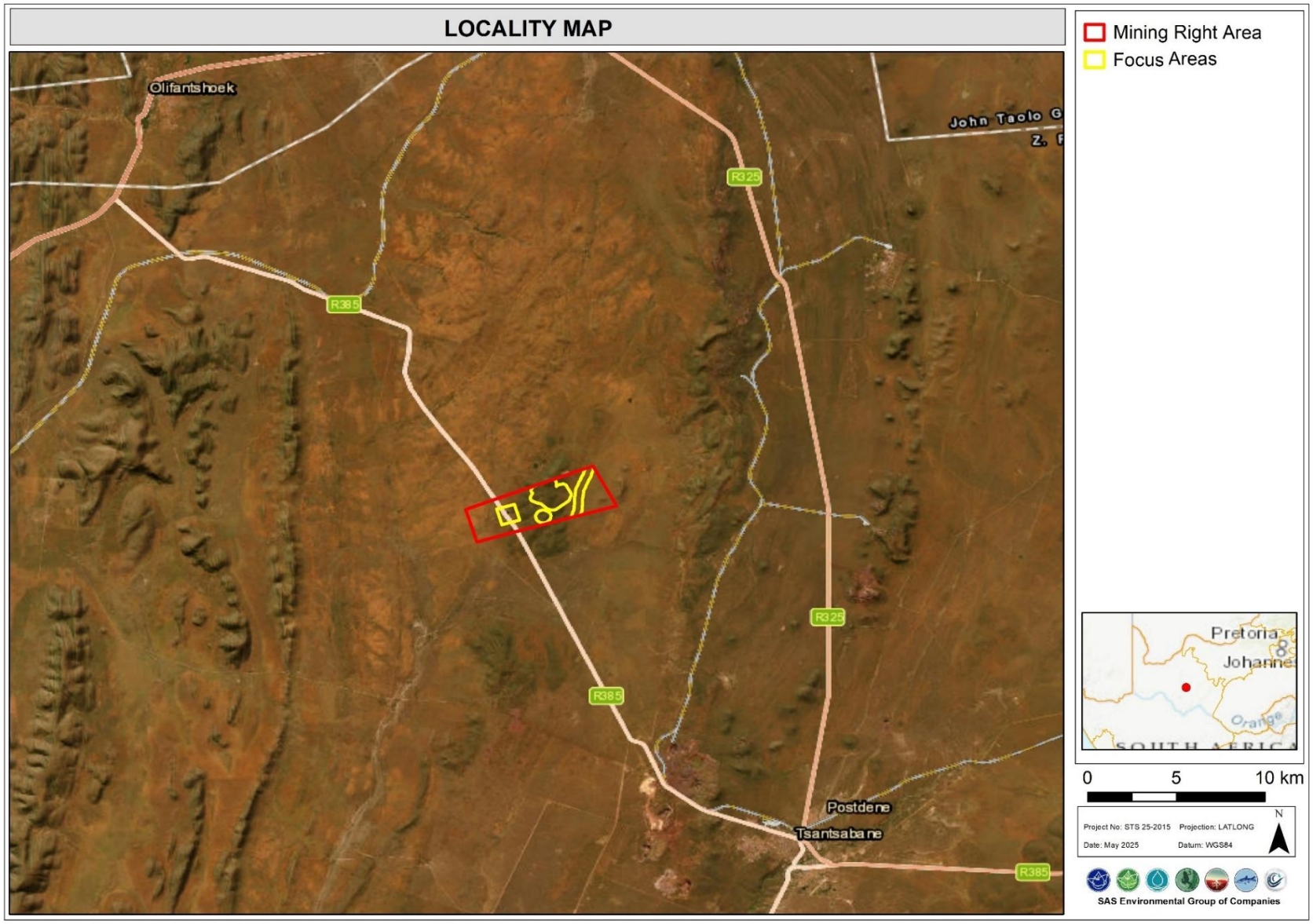


Figure 1: Digital Satellite image depicting the location of the Focus Areas in relation to the surrounding areas.

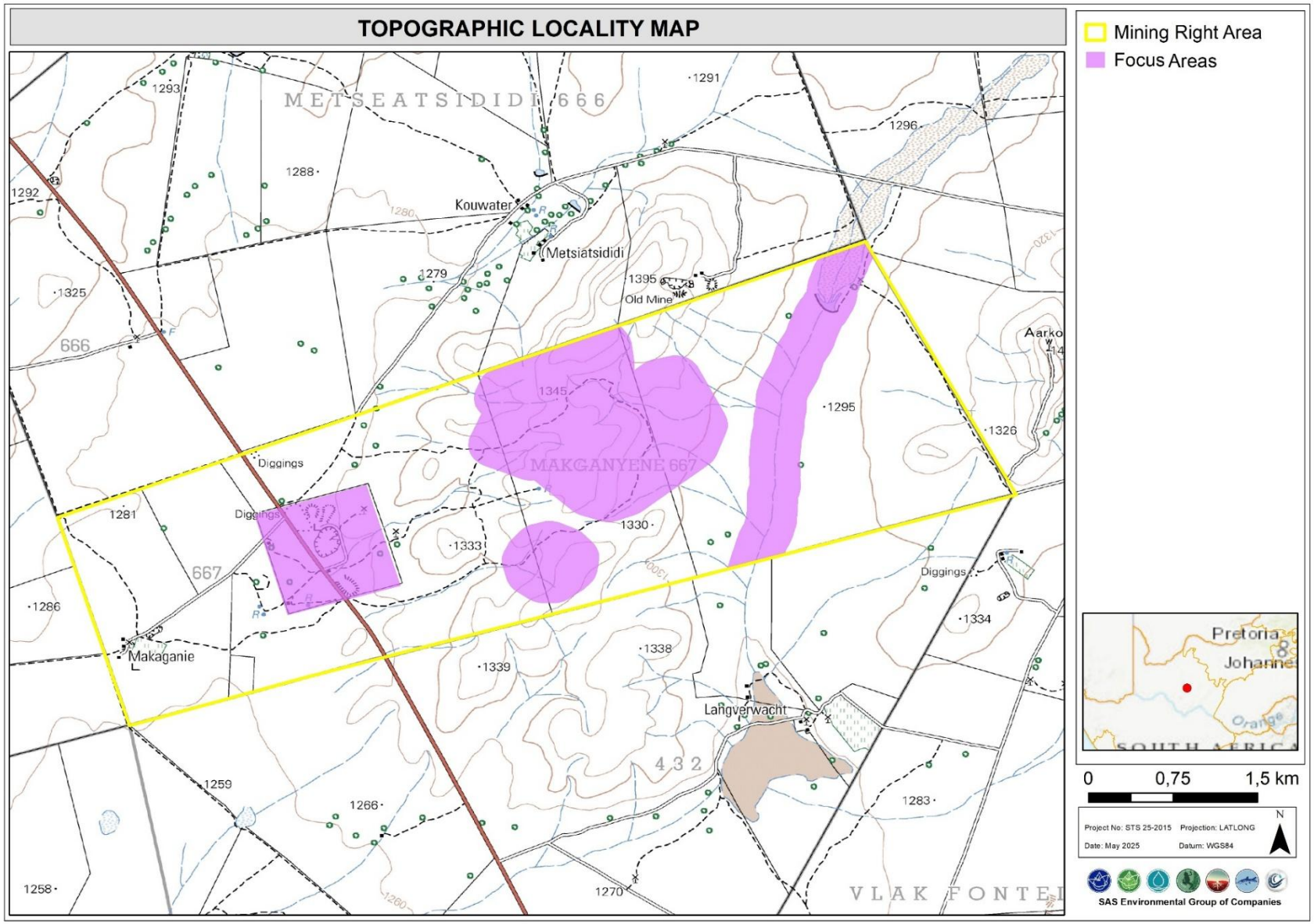


Figure 2: The Focus Areas depicted on a 1:50 000 topographical map in relation to the surrounding area.

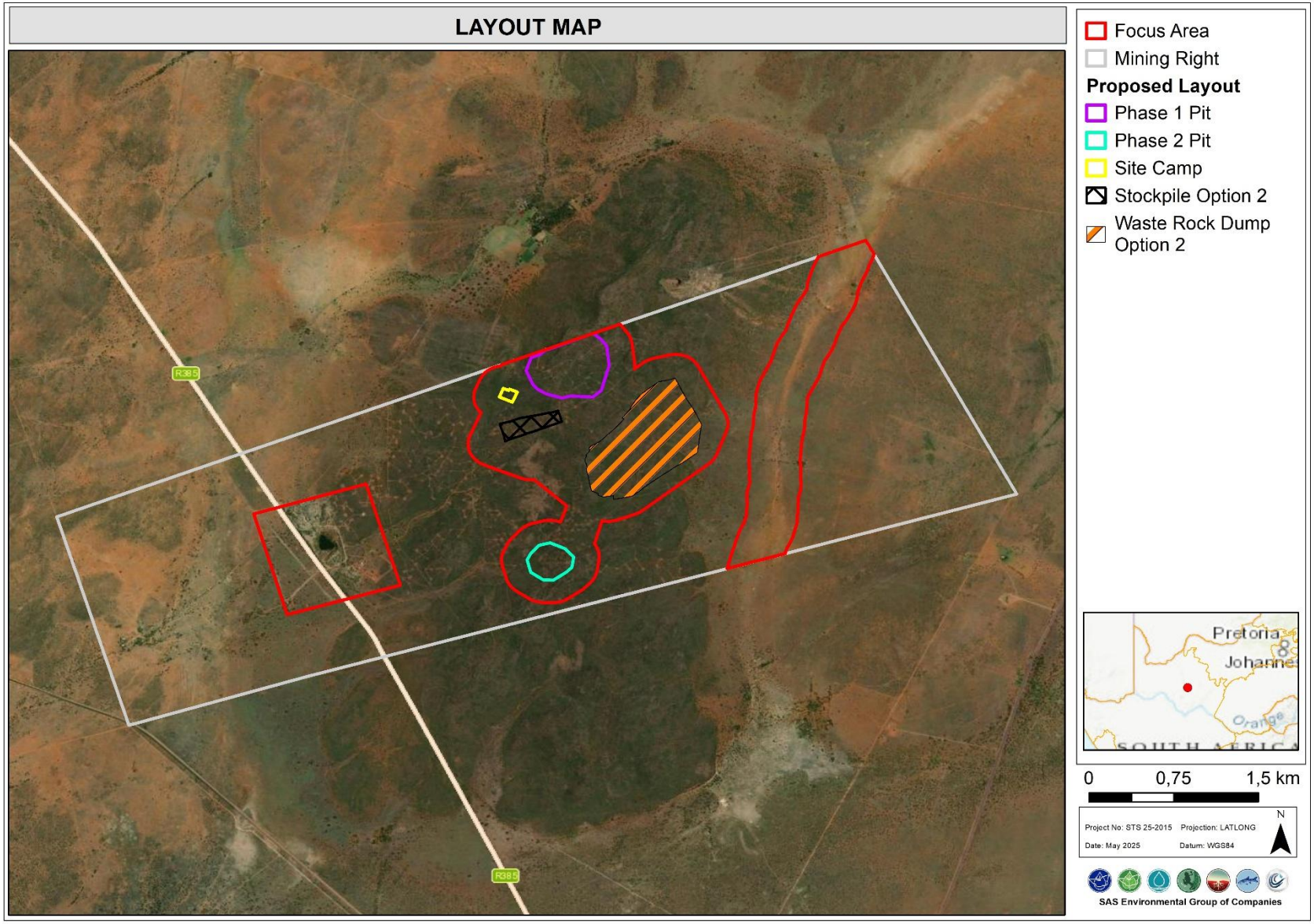


Figure 3: The proposed layout as provided by the proponent.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The biodiversity desktop assessment is confined to the Focus Area and does not include detailed results of the adjacent properties, although the sensitivity of surrounding areas has been included on the relevant maps;
- 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 assessed area's actual site characteristics at the scale required to inform more intricate planning, e.g., at the scale needed for an EA. Nevertheless, 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 biodiversity assessment (refer also to Parts B and C), 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, ground-truthed information must carry more weight in the decision-making process; and
- Not all areas of the Focus Area could be accessed during the site assessment as some areas were inaccessible due to very dense vegetation (e.g., thorns) and lack of access roads. Furthermore, time and weather constraints (i.e., excessive rain and storms) necessitated that the field assessment was focussed on areas where the development was proposed and where limited historical data were available; and
- Some Species of Conservation Concern (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 protocol and the Department of Forestry, Fisheries, and the Environment (DFFE's) National Web-based Screening Tool (hereafter "**screening tool**"), the name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain. It will be referred to as sensitive plants or animal, and its threat status included.

1.4 Legal Requirements

The following legislative requirements were considered during the assessment:

- The Constitution of the Republic of South Africa, 1996[5];
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);

[5] 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.

- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);
    - Government Notice (GN) number 2747 (Gazette Number 47526): The revised National list of Ecosystems that are Threatened and in need of Protection, dated 18 November 2022, as it relates to the NEMBA;
    - GN number R.1020: Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated 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, as it relates to the NEMBA;
    - GN number 30568: Threatened or Protected Species (TOPS) list dated 14 December 2007, as it relates to the NEMBA; and
- The National Environmental Management: Protected Areas Act, 2003 (Act. No. 57 of 2003) as amended (NEMPAA);
- The National Forest Act, 1998 (Act No. 84 of 1998) as amended (NFA);
    - GN 1935: List of Protected Tree Species as published in the Government Gazette 46094 dated 25 March 2022, as it relates to the NFA;
- Government Gazette 45421 dated 10 May 2019 as it relates to the DFFE's screening report required with an application for EA as identified in regulation 16(1)(v) of the EIA Regulations (the themes are used to provide an indication of important and/or sensitive features that have been identified within the MRA):
    - For the Terrestrial Biodiversity Theme: GN 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
    - For Animal and Plant Species Themes**:** GN 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Plant and Animal Species as published in Government Gazette 43855 dated 30 October 2020 (as amended in GN 3717 of 2023); and
- The Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA); and
- The Northern Cape Provincial Spatial Development Framework (NCPSDF) as developed in 2011 to meet the requirements of the Northern Cape Planning and Development Act, 1998 (Act 7 of 1998) and the Municipal Systems Act, 2000 (Act 32 of 2000).

Legislative requirements that are pertinent to this assessment are detailed in **Appendix B**.

1.5 Structure of the report

Part A of this report served to introduce the Project Boundary (MRA) and Focus Area, 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. A descriptive project description is also included and a Site Sensitivity Verification Report (Section 4).

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

Part C presents the results of the fauna field assessment. This section presents data analyses and a discussion of the results. Finally, this section then presents the results of the impact assessment where the impacts on vertebrate ecology and biodiversity are discussed.

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 was confined to the MRA (including Focus Area) 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 MRA (and Focus Area)[6]:

- National Protected Areas Expansion Strategy (NPAES) – 2018 database
- The South African Conservation Areas Database, Quarter 3 (SACAD, 2024);
- The South African Protected Areas Database, Quarter 3 (SAPAD, 2024);
- The National Vegetation Map Project (VEGMAP), with the below vector dataset used for information on Biomes, Bioregions and Vegetation Type(s):
    - 2024 Final Vegetation Map of South Africa, Lesotho, and Swaziland (SANBI, 2024).
- The 2022 Red List of Ecosystems (RLE) for the terrestrial realm for South Africa (SANBI 2022a; 2022b) – this database replaces the 2018 National Biodiversity

[6] Datasets obtained from:
- SANBI BGIS (2023). The South African National Biodiversity Institute - Biodiversity GIS (BGIS) [online]. URL: http://bgis.sanbi.org as retrieved in 2019; and
- Department of Environmental Affairs (DEA) Environmental Geographical Information Systems (E-GIS) website. URL: https://egis.environment.gov.za/

Assessment (NBA) Terrestrial Assessment (SANBI, 2018a; 2018b), which forms one of the base databases that the RLE database is generated upon;

- The Important Bird and Biodiversity Areas (IBA) Programme and vector dataset (BirdLife South Africa, 2015; Marnewick et al, 2015a; 2015b), in conjunction with the South African Bird Atlas Project 2 (SABAP 2);
- The International Union for Conservation of Nature (IUCN) Red List of Threatened Species;
- The screening tool (accessed 2025);
- The Northern Cape Critical Biodiversity Areas (CBAs) Map, including the following datasets and research documents:
    - 2016 Northern Cape CBAs (Northern Cape Department of Environment and Nature Conservation, 2016);
    - 2016 Northern Cape CBA Reason (Northern Cape Department of Environment and Nature Conservation. 2016); and
    - CBAs of the Northern Cape: Technical Report (Holness et al. 2016); and
- From the 2021 Strategic Water Source Areas (SWSA) project:
    - 2021 SWSA Surface water (Lötter and Le Maitre, 2021; MTPA, 2021);

3 RESULTS OF THE DESKTOP ANALYSIS

The following section contains data accessed as part of the desktop assessment and is presented as a “dashboard” report below (Table 1 and 2).

3.1 Conservation Characteristics of the MRA (and Focus Area) 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. Where required, further discussion and interpretation are provided.

Table 1: Summary of the conservation characteristics for the MRA and Focus Area (Quarter Degree Square (QDS) 2822BB). Abbreviations are represented at the bottom of the table.

DETAILS OF THE MRA AND FOCUS AREA IN TERMS OF THE 2024 FINAL VEGETATION MAP OF SOUTH AFRICA, LESOTHO, AND SWAZILAND					
Biome(s) and Bioregion(s)	The MRA and Focus Area are situated in the **Eastern-Kalahari Bushveld Bioregion** within the **Savanna Biome.**				
Vegetation Type(s) - Figure 4	The MRA is situated within the **Least Concern (LC) Kuruman Mountain Bushveld** (SVk10), the **LC Olifantshoek Plains Thornveld** (SVk 13), and the **LC Postmasburg Thornveld** (SVk14) vegetation types. The Focus Area are however situated in only the first two listed vegetation types (i.e., SVk 10 and 13).				
DESCRIPTION OF THE VEGETATION TYPES ASSOCIATED WITH THE MRA AND FOCUS AREAS ACCORDING TO MUCINA & RUTHERFORD (2006)					
KURUMAN MOUNTAIN BUSHVELD (SVK 10): CENTRAL PORTION OF THE MRA AND FOCUS AREA					
Climate	Summer and autumn rainfall with very dry winters.				
	MAP (mm)	**MAP (mm)**	**MAP (mm)**	**MAP (mm)**	**MAP (mm)**
	369	17.5	36	2786	84
Altitude (metres; m)	1 100–1 800				
Distribution	Northern Cape and North-West Provinces.				
Conservation	**LC.** Target 16%. None conserved in statutory conservation areas. Very little transformed.				
Geology & Soils	The Kuruman and Asbestos Hills consist banded iron formation, with jaspilite, chert and riebeckite-asbestos of the Asbestos Hills Subgroup of the Griqualand West Supergroup (Vaalian).				
Vegetation & landscape features (Appendix D)	Rolling hills with generally gentle to moderate slopes and hill pediment areas with an open shrubveld with *Calobota cuspidosa* formerly (*Lebeckia macrantha*) prominent in places. Grass layer is well developed.				
OLIFANTSHOEK PLAINS THORNVELD (SVK 13): MAJORITY OF THE MRA AND FOCUS AREA					
Climate	Summer and autumn rainfall with very dry winters.				
	MAP (mm)	**MAT (°C)**	**MFD (days)**	**MAPE (mm)**	**MASMS (%)**
	289	16.8	40	2728	83
Altitude	1 000–1 500 m				
Distribution	Northern Cape Province.				
Conservation	**LC.** Target 16%. Only 0.3% statutorily conserved in the Witsand Nature Reserve. Only about 1% of the area has been transformed and erosion is very low.				
Geology & Soils	Red aeolian sand of Tertiary to Recent age (Kalahari Group) with silcrete and calcrete and some andesitic and basaltic lava of the Griqualand West Supergroup.				
Vegetation & landscape features	A very wide and diverse unit on plains with usually open tree and shrub layers with, for example, *Vachellia luederitzii*, *Boscia albitrunca* and *Searsia tenuinervis* and with a usually sparse grass layer.				
POSTMASBURG THORNVELD (SVK14): SMALL SOUTHWESTERN SECTION OF THE MRA ONLY					
Climate	Summer and autumn rainfall with very dry winters.				
	MAP (mm)	**MAT (°C)**	**MFD (days)**	**MAPE (mm)**	**MASMS (%)**
	306	17.0	27	2947	84
Altitude	1 180 – 1 440 m				

Distribution	Northern Cape Province: Limited area around Postmasburg along the short valley of the Groenwaterspruit to the northeast and southwest, west to Bermolli and around Heuningkrans.
Conservation	**LC**. Target 16%. None of the unit is conserved in statutory conservation areas, but very little has been transformed. Erosion is very low
Geology & Soils	Red aeolian sand of the Kalahari Group overlying the volcanics and sediments of the Griqualand West Supergroup that outcrop in places. Deep soils are of the Hutton form.
Vegetation & landscape features	Flats surrounded by mountains supporting open, shrubby thornveld characterised by a dense shrub layer and often lacking a tree layer; the grass layer is very sparse. Shrubs are generally low and with a karroid affinity.
DETAILS OF THE FOCUS AREA IN TERMS OF THE 2018 NATIONAL BIODIVERSITY ASSESSMENT	
NBA (2018) - Figure 5	The NBA (2018) classifies the Olifantshoek Plains Thornveld as **poorly protected** and the Kuruman Mountain Bushveld and the Postmasburg Thornveld as **not protected**. **DEFINITION:** Ecosystem protection level informs whether ecosystems are either 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.
DETAILS OF THE FOCUS AREA IN TERMS OF THE 2022 RED LIST OF ECOSYSTEMS – TERRESTRIAL REALM	
RLE (2022) - Figure 5	According to the 2022 RLE dataset, the central portion of the Focus Area are located within the remaining extent of the **Kuruman Mountain Bushveld** vegetation type. The Eastern, northern and western sections of the Focus Area are located within the remaining extents of the **Olifantshoek Plains Thornveld** vegetation type. All the vegetation types have a **LC threat status**. The RLE dataset further indicates the **Kuruman Mountain Bushveld,** and the **Olfantshoek Plains Thornveld** ecosystems are **endemic** to South Africa. The purpose of listing protected ecosystems is primarily to preserve witness sites of exceptionally high conservation value. The revised list (known as the RLE 2022) is based on assessments that followed the IUCN RLE framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa (Mucina and Rutherford 2006; with updates described in Sieben et al., 2021). The revised list identifies 120 threatened terrestrial ecosystem types (55 Critically Endangered (CR), 51 Endangered (EN) and 14 Vulnerable (VU) types). Following a series of consultations with conservation authorities and the public in 2020/21, the revised list of terrestrial ecosystems that are threatened and in need of protection was the approved by the minister for implementation in august 2022. The revised list was published in the government gazette (Gazette Number 47526, Notice Number 2747) and came into effect on 18 November 2022.

NATIONAL PROTECTED AND CONSERVATION AREAS ASSOCIATED WITH THE MRA AND FOCUS AREA	
The NPAES (2018)[7], SACAD[8] (2024, Q3), SAPAD[9] (2024, Q3), and the IBA (2015) databases were checked to determine if any protected and/or conservation areas are located within 10 km of the MRA and Focus Area.	
SAPAD (2024, Q3); SACAD (2024, Q3); & NPAES (2018); & IBA (2015)	According to the NPAES 2018 database, the MRA and Focus Areas are **not located** within **Priority Focus Area, Negotiated Areas, or Protected Areas**. The SAPAD (2024; Q3) database indicates that the MRA and Focus Area are not located within 10 km of any protected areas. According to SACAD (2024; Q3) database, the MRA and Focus Area are not located within 10 km of any conservation areas. The MRA and Focus Area are not located within 10 km of an IBA.
STRATEGIC WATER SOURCE AREAS FOR SURFACE WATER (SWSAs; 2021)	
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 Eswatini. The Sub-National Water Source Areas (WSAs) are not nationally strategic as defined in the report but were included to provide a complete coverage	
SWSAs for Surface Water (2021)	The MRA and Focus Area are not within 10 km of a Surface SWSA.
NORTHERN CAPE CRITICAL BIODIVERSITY AREAS (CBA) (2016)	
Critical Biodiversity Area (CBA) – Figure 6	The entire eastern section of the MRA and Focus Area is considered a CBA 1: Irreplaceable Area. A CBA is an area that must remain in good ecological condition in order to meet biodiversity targets for ecosystem types, species of special concern or ecological processes. CBAs can meet biodiversity targets for terrestrial or aquatic features, or both. Together with protected areas, the portfolio of CBAs identified in a biodiversity plan must collectively meet biodiversity targets for representation of ecosystem types and species of special concern and may also meet biodiversity targets for some ecological processes (SANBI, 2017).
Ecological Support Areas (ESA)	Majority of the central section of the MRA and Focus Area is classified as an **ESA**. ESAs are areas which must retain their ecological processes to meet biodiversity targets for ecological processes that have not been met in CBAs or protected areas. Similarly, ESAs are required to meet biodiversity targets for representation of ecosystem types or species of special concern when it is not possible to meet them in CBAs. These areas support ecological functioning of protected areas or CBAs or a combination of these (SANBI. 2017).
Other Natural Areas (ONA)	Small, scattered portions of the Focus Area and the eastern and western portions of the MRA are located within areas classified as **ONA**s.

[7] **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 NEMPAA 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.

[8] **SACAD (2024):** 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.

[9] **SAPAD (2024):** 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 NEMPAA 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 NEMPAA); 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 NFA; and 8. Mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act No. 63 of 1970).

	According to the Technical Guidelines for CBA Maps document ONA consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs (SANBI. 2017).
CBA Reasons	The 2016 Northern Cape CBAs database also includes the "reasons" layer, which is based on the planning units used in the spatial analysis and provides a list of biodiversity and ecological features found in each planning unit, which contribute to the biodiversity target (CBA Map Reason Metadata). According to this Northern Cape CBAs Reasons layer, the triggering biodiversity, and ecological features, for the CBA's, ESAs and ONAs within the MRA and Focus Areas include the following: Olifantshoek Plains Thornveld, Kuruman Mountain Bushveld, Postmasburg Thornveld, All Rivers, FEPA 500 m, FEPA subcatchment, Southern Kalahari Salt Pans, Landscape structural elements, all natural wetlands, and Conservation Areas.
NORTHERN CAPE PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK (NCPSDF, 2012)	
The NCPSDF is to function as an innovative strategy that will apply sustainability principles to all forms of land use management throughout the northern cape as well as to facilitate practical results, as it relates to the eradication of poverty and inequality and the protection of the integrity of the environment.	
The MRA and Focus Area occurs within the **Gamagara corridor (Figure 7)**. The Gamagara corridor comprises the mining belt of the John Taolo Gaetsewe and Siyanda districts and runs from lime acres and Danielskuil to Hotazel in the north. The corridor focuses on the mining of iron and manganese.	
CENTRES OF ENDEMISM	
The MRA and Focus Area are not situated within a centre for endemism.	
DETAIL OF THE FOCUS AREA IN TERMS OF THE MINING BIODIVERSITY GUIDELINES (2012)	
Highest Biodiversity Importance - Figure 8	According to the Mining and Biodiversity Guidelines database (2012), the eastern section of the MRA and Focus Area is located within an area identified as **Highest Biodiversity Importance.** **Risk for mining:** Highest risk to mining. **Implications for mining:** 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.

NBA = National Biodiversity Assessment; SAPAD = South African Protected Areas Database; SACAD = South African Conservation Areas Database; NPAES = National Protected Areas Expansion Strategy; IBA = Important Bird Area; MAP = Mean annual precipitation; MAT = Mean annual temperature; MAPE = Mean annual potential evaporation; MFD = Mean Frost Days; MASMS = Mean annual soil moisture stress (% of days when evaporative demand was more than double the soil moisture supply); CBA = Critical Biodiversity Areas; ESA = Ecological Support Areas, ONA =Other Natural Areas, RLE = Red Listed Ecosystems, SWSA = Strategic Water Source Areas, LC =Least Concern

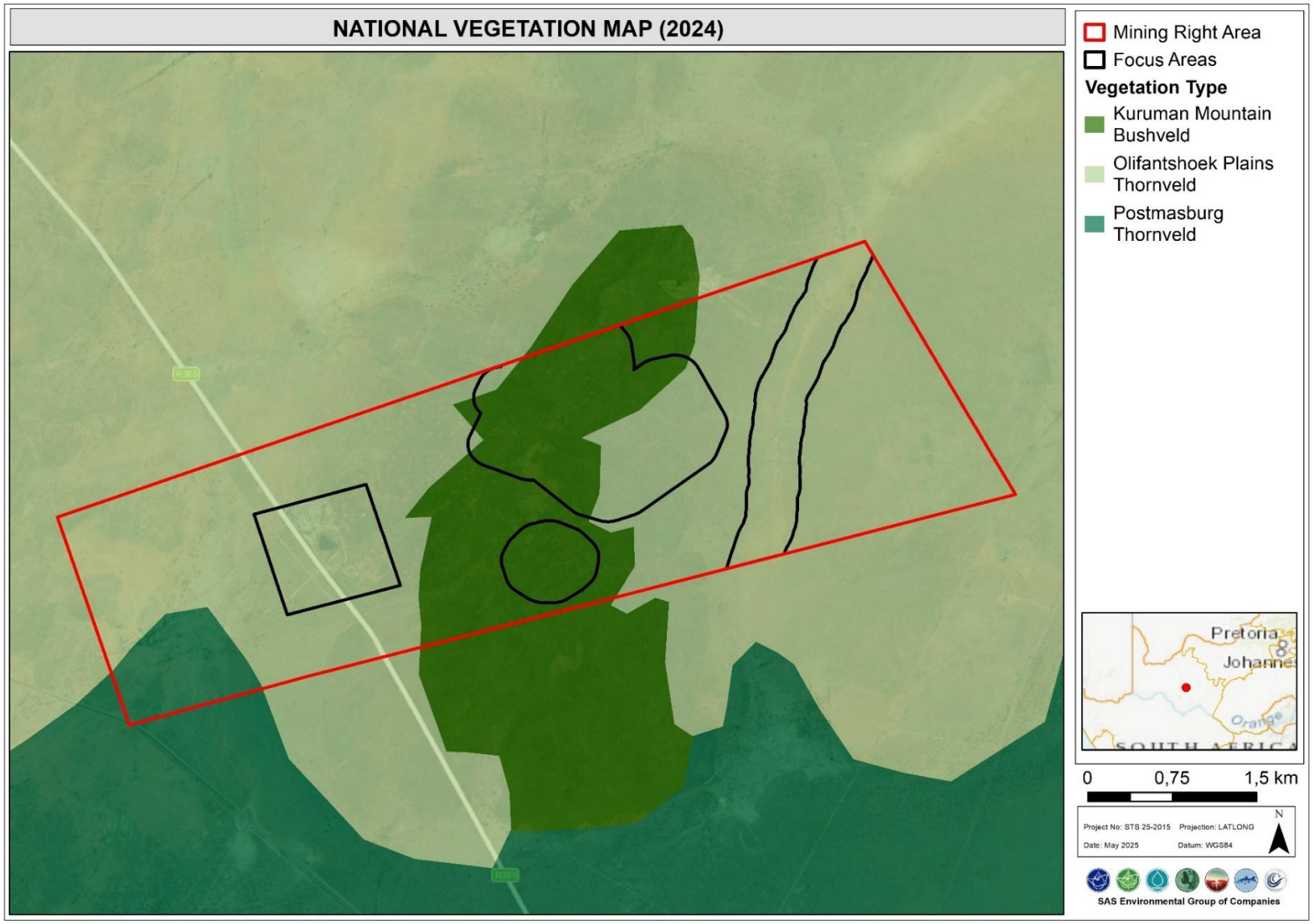


Figure 4: National VEGMAP (SANBI, 2024) of South Africa depicting the original extent of the vegetation types associated with the MRA and Focus Areas.

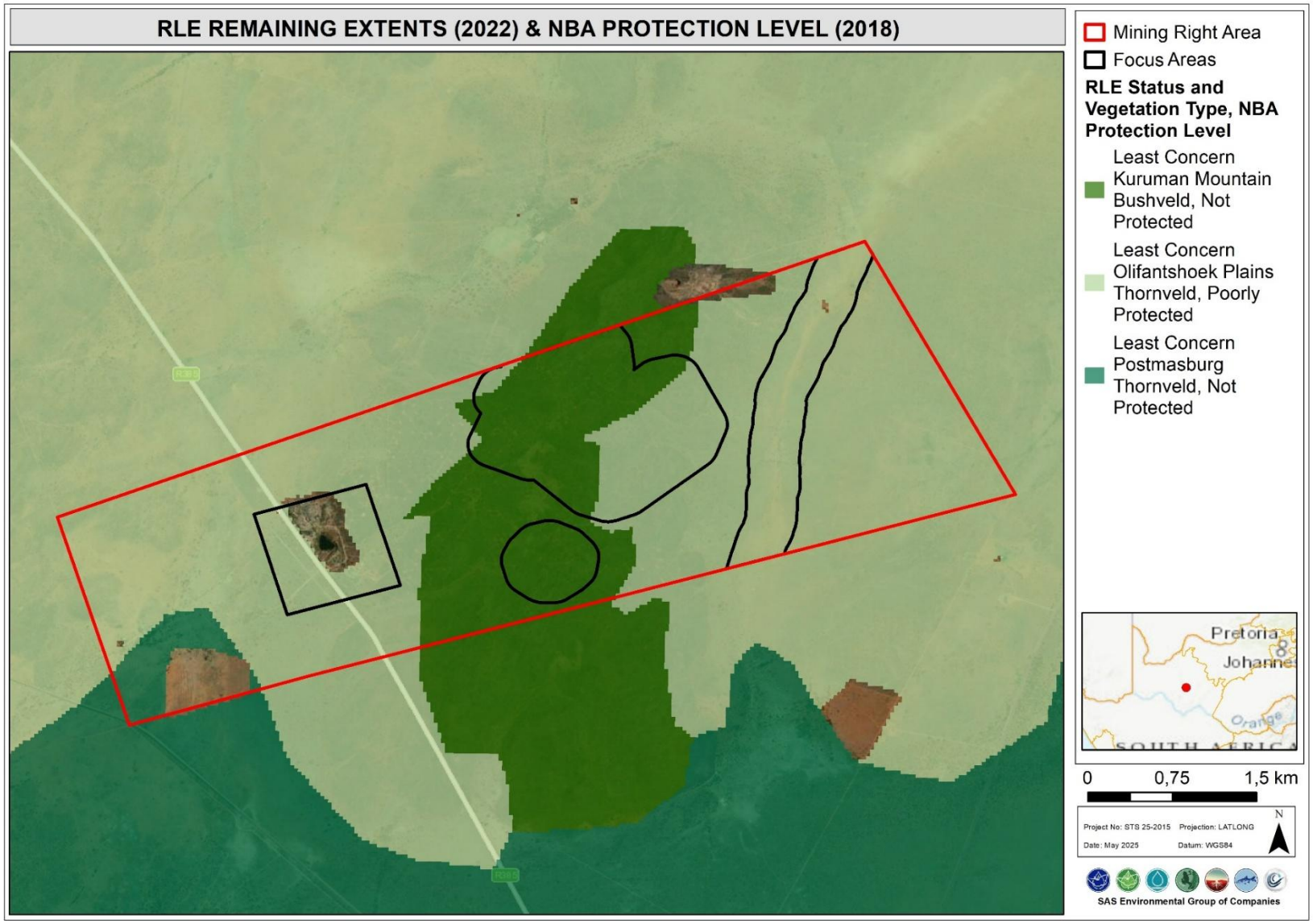


Figure 5: The remaining extent of threatened ecosystems, provided by the RLE database (SANBI 2022a & 2022b) with the protection level of the vegetation types associated with the MRA and Focus Areas as identified by the NBA 2018 database (SANBI 2018a & 2018b).

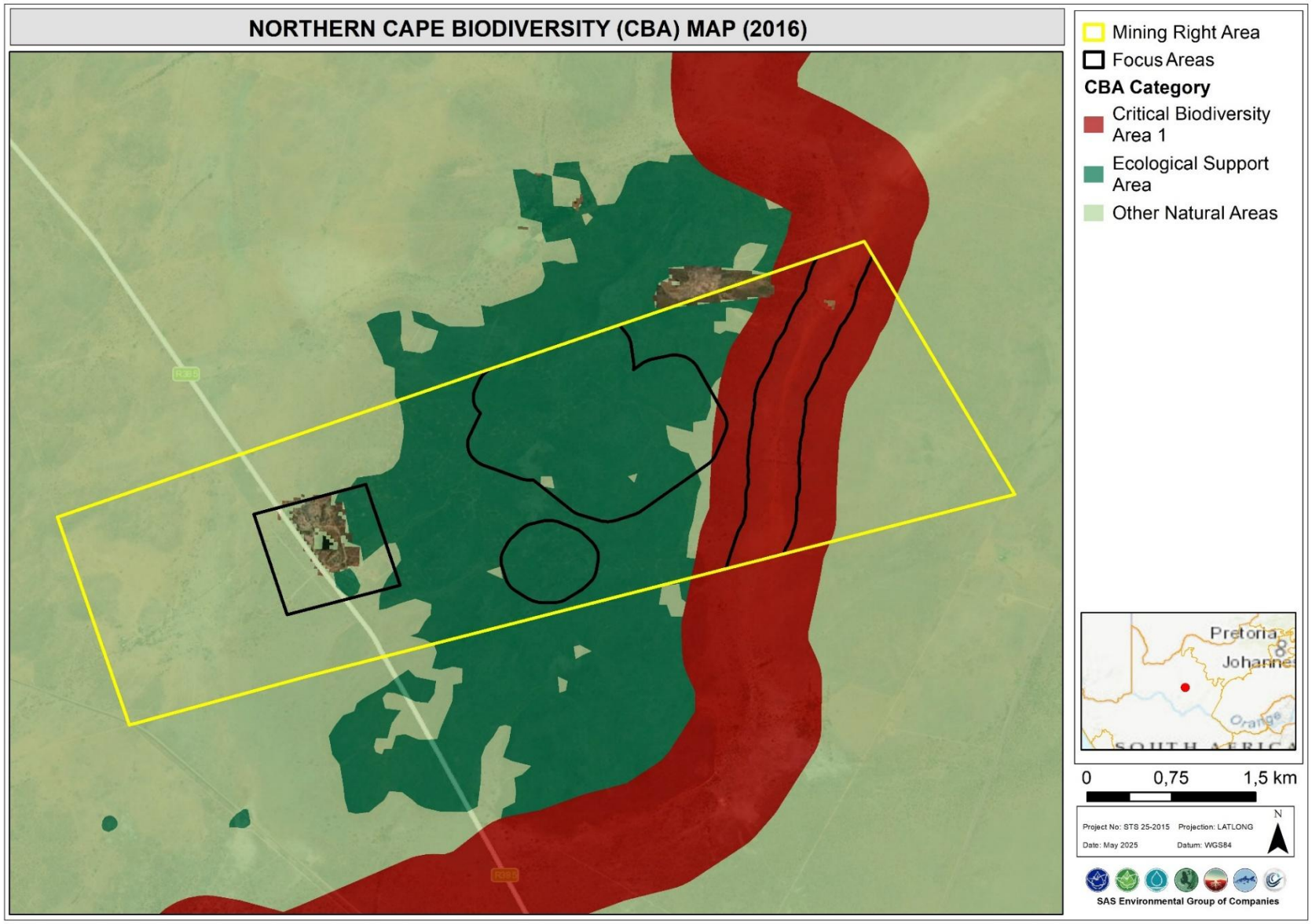


Figure 6: The CBAs and ESAs in relation to the MRA and Focus Areas, according to the NCPSDF database (2012).

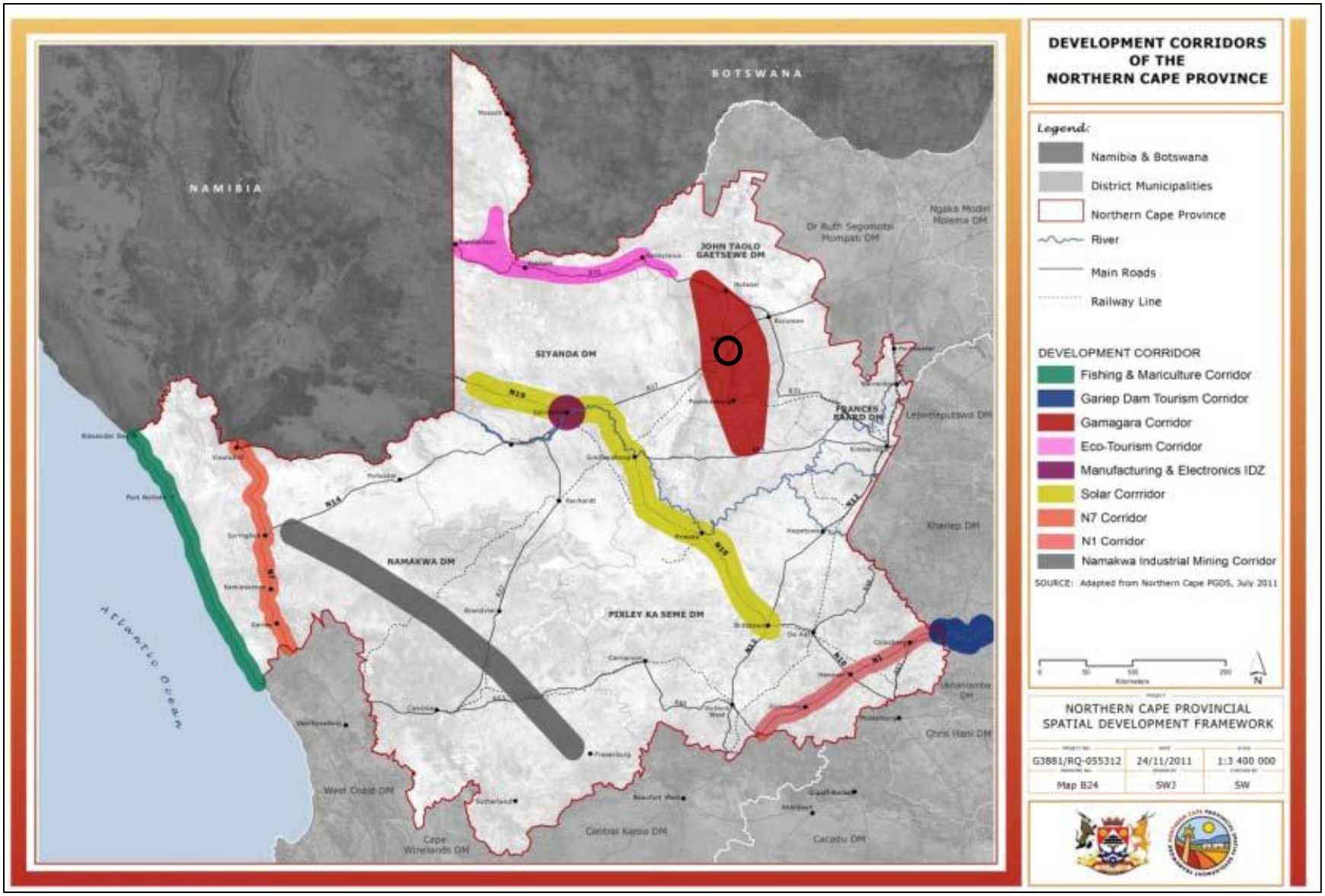


Figure 7: Development Corridors located within the Northern Cape, including the location of the MRA and Focus Areas indicated by the black circle (NCPSDF, 2012).

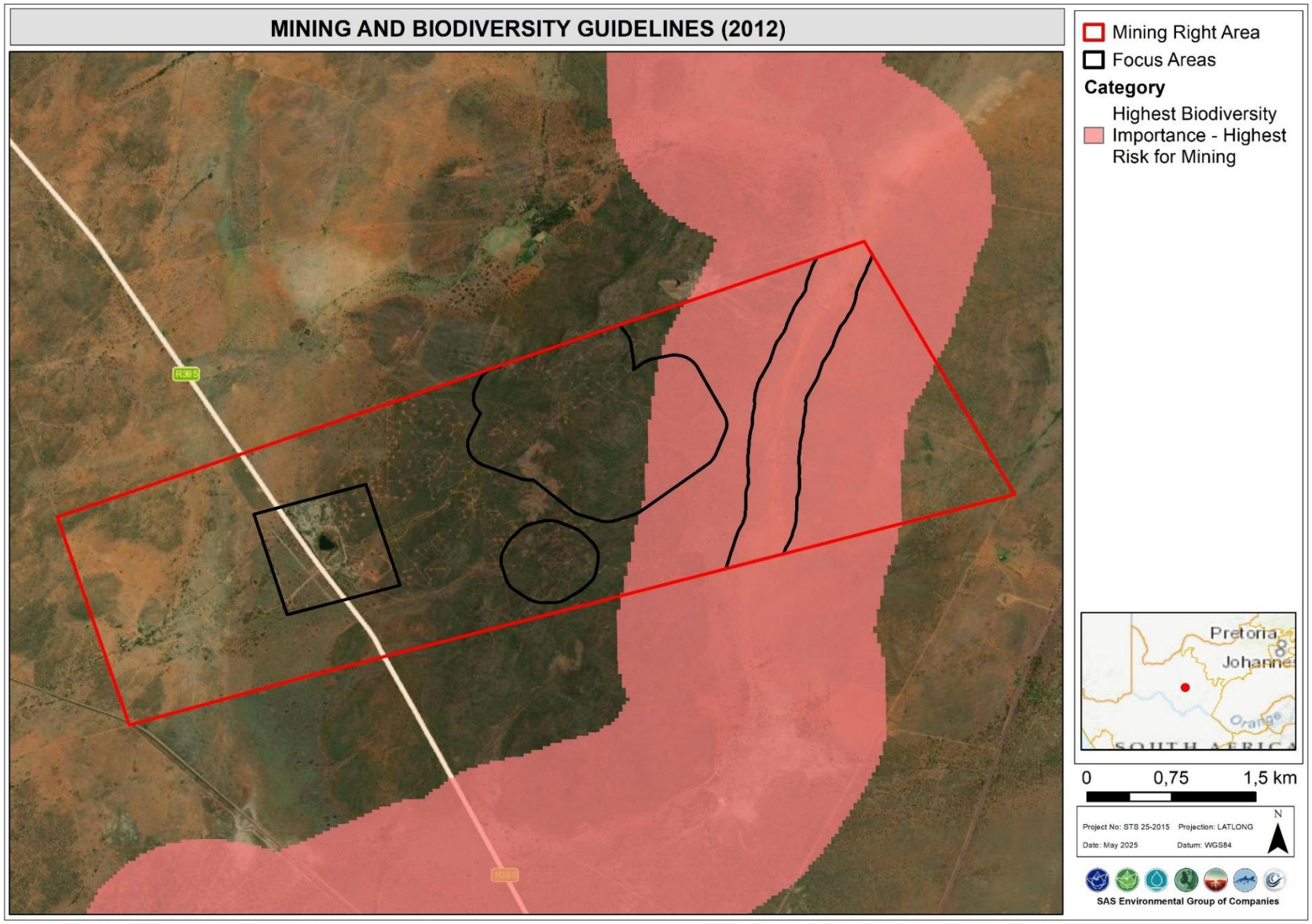


Figure 8: Sensitive areas within the MRA and Focus Areas as depicted by the Mining Guidelines Database (2012).

4 SITE VERIFICATION REPORT

According to the "Protocols for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes ("the Protocols") published in Government Gazette No. 43110 on 20 March 2020 and Government Gazette No. 43855 on 30 October 2020, the EAP must verify the current use of the site in question and its environmental sensitivity as identified by the screening tool to determine the need for specialist inputs concerning the themes included in the Protocols. The Protocols are allowed for in terms of Sections 24(5)(a) and (h) and 44 of the NEMA. The Protocols must be complied with for every new application for EA that is submitted after 9 May 2020.

The screening tool identifies species and ecosystem spatial triggers likely to indicate environmental sensitivity associated with a particular proposed development site, which in turn **determines the necessity and requirements for specialist studies**. The screening tool evaluates 'environmental sensitivity' at a **larger scale** than that of a proposed development site and frequently includes modelled data that require **field verification/ ground-truthing**. As such, the initial site sensitivity verification is required to verify the screening tool outcomes, and such verified sensitivities are used to inform the minimum reporting requirements for the Plant Species, Animal Species, and Terrestrial Biodiversity Specialist Assessment Reports. The outcome of the screening tool is presented in Table 2.

Table 2: Screening Tool Outcome for the MRA (including the Focus Area).

NATIONAL WEB-BASED ENVIRONMENTAL SCREENING TOOL[10]	
The screening tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA 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 square kilometres (km^2) are considered Critical Habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under CR, EN, or VU 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; and ➢ Low: Areas where no SCC are known or expected to occur.	
Animal Species Theme - Figure 11	The Animal Species Theme for the entire Focus Area is considered to be of **low sensitivity.**
Plant Species Theme - Figure 12	The Plant Species Theme for the entire Focus Area is considered to be of **low sensitivity**.

[10] The screening tool sensitivities are based on regional databases, whereas the background assessment is completed using provincial datasets (i.e., specific to the Focus Areas). Therefore, there can be discrepancies in the screening tool results and the background data represented in the dashboard.

Terrestrial Biodiversity Theme - Figure 13	The Terrestrial Biodiversity Sensitivity for the entire Focus Area is considered to have a **very high sensitivity**. The triggered features include **portions of the Focus Areas being classified as a CBA 1 and an ESA, and a FEPA sub catchment**.

The site sensitivity verification took place from the 1st to the 3rd of April 2025. The terrestrial biodiversity aspects were ground-truthed by two South African Council for Natural Scientific Professionals (SACNASP), one floral (registration number 169998) and one faunal ecologist (registration number 170165) and were focussed within the proposed footprint areas. The Focus Areas has been impacted by recent prospecting (which halted in November 2024), as shown in Figure 9. However, the majority of the Focus Areas still supports natural floral communities that remain in fair-good ecological condition[11] (Figure 10).

Figure 9: Example photographs of areas where transformation of the historic vegetation has occurred.

Figure 10: Example photographs of areas where natural habitats are still in fair -good condition. These areas are suitable for sensitive animals, plants, and terrestrial landscape features such as ESAs etc.

Table 3 presents the site-verified results for the study area in comparison with the screening tool outcomes - the required minimum reporting protocols are also indicated in Table 3.

[11] Areas that are moderately modified, semi-natural. An ecological condition class in which ecological function is maintained even though composition and structure have been compromised. Can apply to a site or an ecosystem.

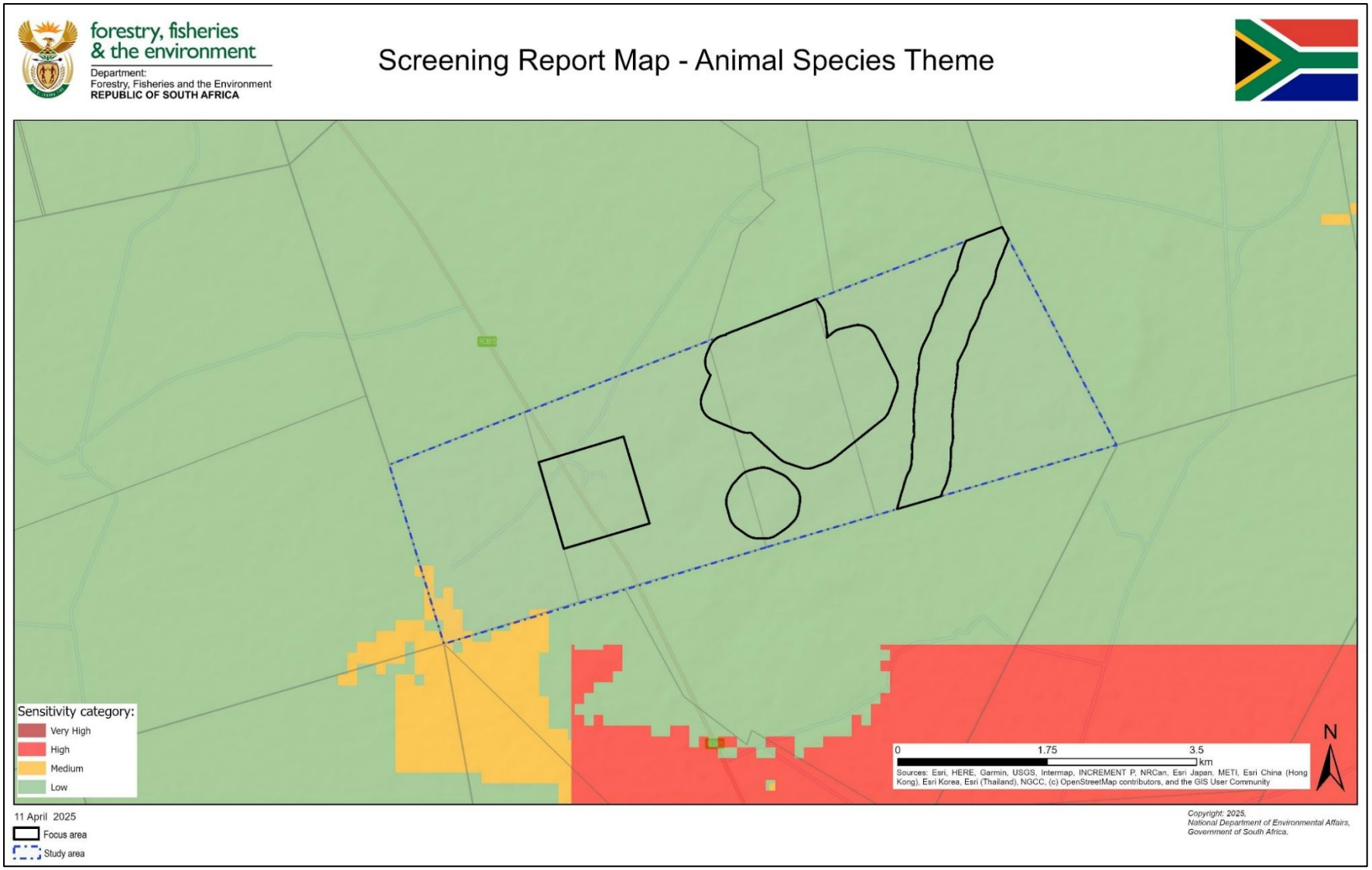


Figure 11: Animal Species Theme Sensitivity as provided by the National Screening Tool (accessed 2025). The Focus Areas indicated by the solid black line and MRA by the dotted blue line.

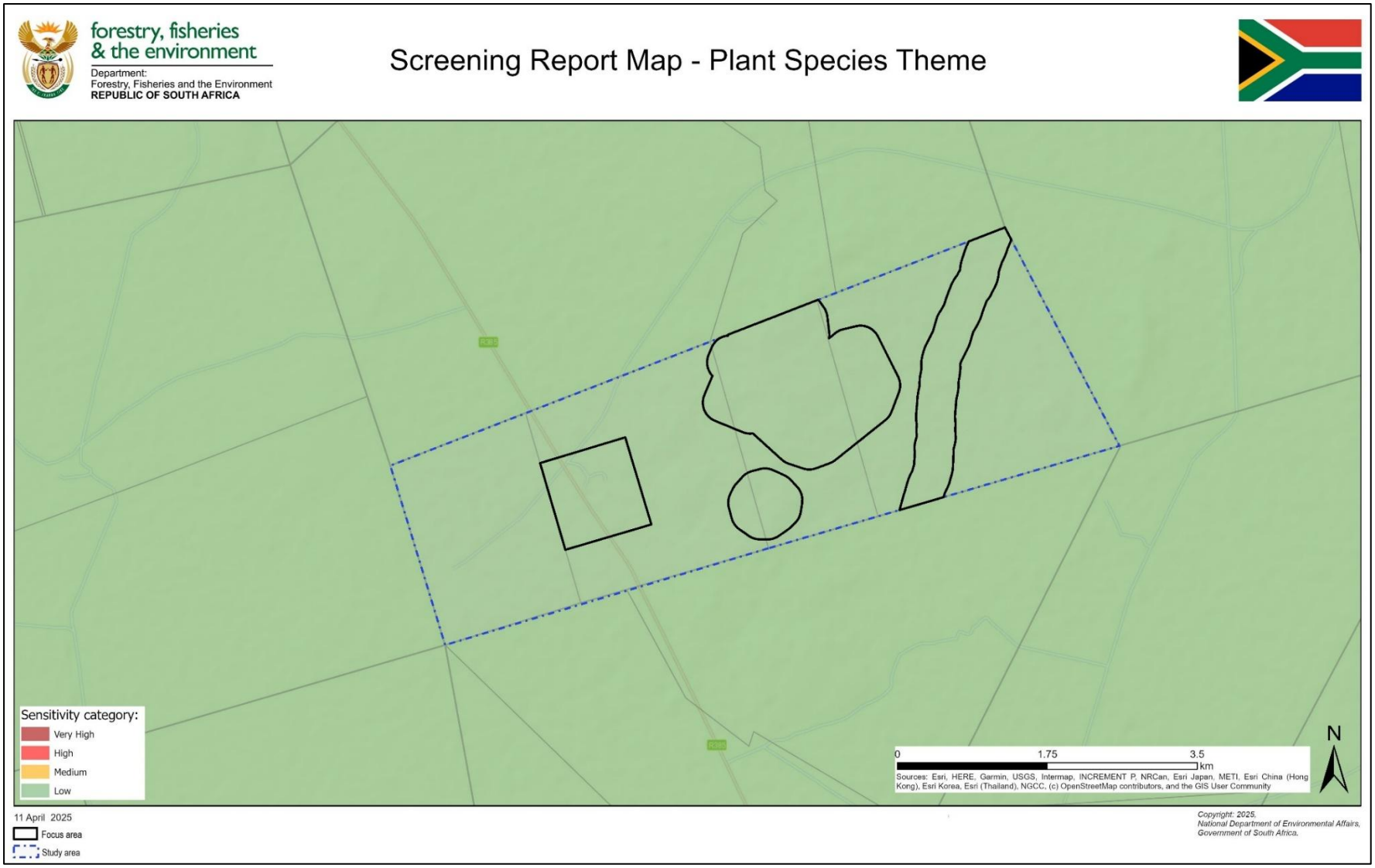


Figure 12: Plant Species Theme Sensitivity as provided by the National Screening Tool (accessed 2025). The Focus Areas indicated by the solid black line and MRA by the dotted blue line.

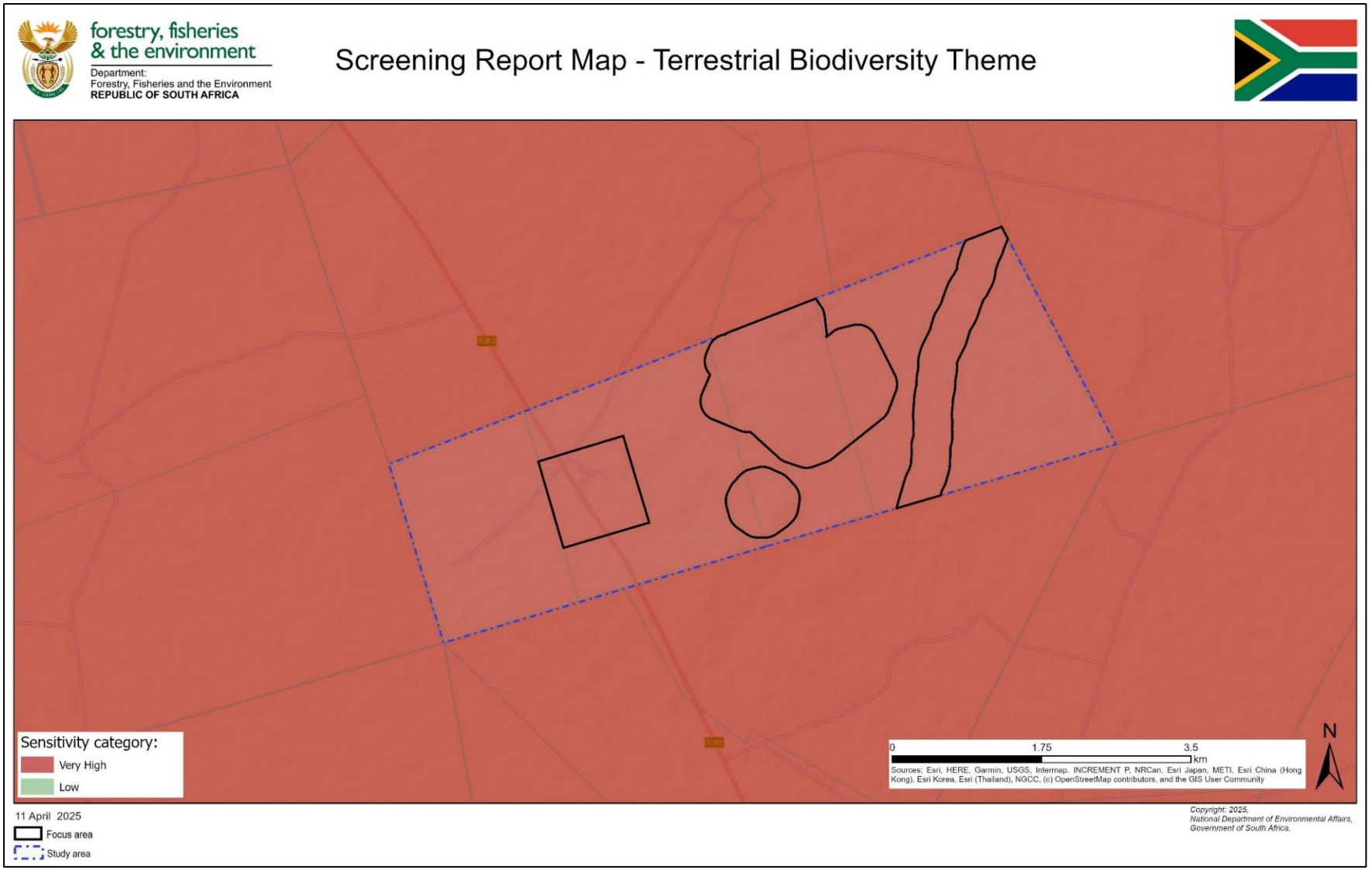


Figure 13: Terrestrial Biodiversity Theme Sensitivity as provided by the National Screening Tool (accessed 2025). The Focus Areas indicated by the solid black line and MRA by the dotted blue line.

Table 3: Specialist comparison with the screening tool sensitivity rating and professional rating. The table further provides the specialist recommendation for biodiversity reporting.

Theme	DFFE Screening Sensitivity	Comments	Specialist Proposed Sensitivity	Proposed Assessment	Applicable Legislation
Animal Species Theme	**Low** **Medium**	Although most of the MRA and Focus Areas are considered to be in an area of low sensitivity, with a small portion of medium sensitivity in the southwestern corner, these sensitivities were disputed after field verification and a high sensitivity was confirmed. The habitat within the MRA and Focus Areas supports one confirmed (*Smutsia temminckii* (Temminck's Ground Pangolin, VU) and several potential faunal SCCs with increased POC in these areas.	**High**	Animal Species Specialist Assessment	GN 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species as published in Government Gazette 43855 dated 30 October 2020 (as amended in GN 3717 of 2023).
Plant Species Theme	**Low**	No threatened species were triggered by the screening tool. Additionally, following ground-truthing, it was established that no threatened species are likely to occur within the Focus Areas.	**Low**	Terrestrial Plant Species Compliance Statement	GN 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species as published in Government Gazette 43855 dated 30 October 2020 (as amended in GN 3717 of 2023).
Terrestrial Biodiversity Theme	**Very High**	Portions of the study area, particularly the Freshwater Habitat was verified to be an CBA contributing to ecological functions and services within the Focus Areas and larger context.	**Very High**	Terrestrial Biodiversity Specialist Assessment	GN 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial

		The remainder of the Focus Areas (excluding the Freshwater Habitat, i.e., eastern portion of the Focus /study area) are not considered to be important ecological features (ESA) or representative vegetation of the Olifantshoek Plains Thornveld and Kuruman Mountain Bushveld vegetation types. Therefore, the CBA could not be confirmed for the remaining CBA area.	**Low**	Terrestrial Biodiversity Compliance Statement	Biodiversity as published in Government Gazette 43110 dated 20 March 2020

The site verification and field assessments confirmed the low plant species theme sensitivity (as identified by the Department of Forestry, Fisheries, and the Environment's (DFFE) National Web-based Screening Tool (hereafter "screening tool")) for both the MRA and the Focus Areas. However, the very high sensitivity for the terrestrial biodiversity theme was verified within the MRA and the Focus Areas and aspects thereof as they pertain to the floral report is addressed in this report. Therefore, the requirements specified for the "very high" sensitivity protocol as per the document guide in Part A was followed.

5 REFERENCES

BirdLife South Africa. 2015. Important Bird Areas 2015 [vector geospatial dataset] 2015. Available from the Biodiversity GIS website.

Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA)

Constitution of the Republic of South Africa, 1996

Department of Environmental Affairs. 2018. National Protected Areas Expansion Strategy for South Africa 2018. Department of Environmental Affairs, Pretoria, South Africa.

Frisby, A. W., Siebert, S. J., Struwig, M., & Cilliers, D. P. (2019). Plant endemism in Griqualand West, South Africa. South African journal of botany, 124, 127-137.

Government of South Africa. 2022. South African Red List of Terrestrial Ecosystems: assessment details and ecosystem descriptions. Government Notice 2747, Gazette 4526. Technical Report #7664, SANBI Pretoria, South Africa.

Government Notice number R.1020: Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated 25 September 2020 as it relates to the NEMBA.

Government Notice number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 September 2020.

Holness, S., & Oosthuysen, E. 2016. Critical biodiversity areas of the Northern Cape: technical report. Available from the Biodiversity GIS website at http://bgis. sanbi. org/project. asp.

International Union for Conservation of Nature (IUCN) 2022. The IUCN Red List of Threatened Species. Version 2021-3. https://www.iucnredlist.org/

IUCN. 2022. The IUCN Red List of South African Plants. http://redlist.sanbi.org/species.php?species=2785-1

Lead, C., Nelson, G.C. and Bennett, E., 2005. Drivers of change in ecosystem condition and services. Ecosystems and human well-being: scenarios: findings of the scenarios working group, 2, p.173.

Le Maitre DC, O'Farrell PJ and Reyers B. 2007 Ecosystems services in South Africa: a research theme that can engage environmental, economic and social scientists in the development of sustainability science? South African Journal of Science 103, September/October 2007.

Lötter, M.C. & Le Maitre, D. 2021. Fine-scale delineation of Strategic Water Source Areas for surface water in South Africa using Empirical Bayesian Kriging Regression Prediction: Technical report. Prepared for the South African National Biodiversity Institute (SANBI), Pretoria. 33 pages.

Low, A.B. and Rebelo, A.G., 1998. Vegetation of South Africa, Lesotho, and Swaziland: A companion to the vegetation map of South Africa, Lesotho, and Swaziland.

Marnewick MD, Retief EF, Theron NT, Wright DR, Anderson TA. 2015a. Important Bird and Biodiversity Areas of South Africa. Johannesburg: BirdLife South Africa.

Marnewick MD, Retief EF, Wright DR, Theron NT. 2015b. South Africa's Important Bird and Biodiversity Areas Status Report 2015. Johannesburg: BirdLife South Africa.

Mucina, L. & Rutherford, M.C. (Eds). 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria, RSA

Mpumalanga Tourism and Parks Agency (MTPA). 2021. Strategic Water Source Areas for surface water [Vector] 2021. Available from the Biodiversity GIS website.

National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)

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

National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA).

National Forests Act, 1998 (Act No. 84 of 1998) (NFA).

National Web Based Environmental Screening Tool. 2024. Accessible online: https://screening.environment.gov.za/screeningtool/#/pages/welcome

Northern Cape Department of Environment and Nature Conservation. 2016. Northern Cape Department of Environment and Nature Conservation - 2016 Northern Cape Critical Biodiversity Areas [Vector] 0. Available from the SANBI Biodiversity GIS website (http://bgis.sanbi.org/SpatialDataset/Detail/658).

SABAP2 2015. The South Africa Bird Atlas Project 2 database

SACAD: Department of Environmental Affairs. 2023. South Africa Conservation Areas Database (SACAD_OR_2024_Q3). Online available: [http://egis.environment.gov.za]

SANBI. 2016. Lexicon of Biodiversity Planning in South Africa. Beta Version, June 2016. South African National Biodiversity Institute, Pretoria. 72 pp.

SANBI. 2017. Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning. First Edition (Beta Version), June 2017. Compiled by Driver, A., Holness, S. & Daniels, F. South African National Biodiversity Institute, Pretoria.

SANBI. 2018a. Terrestrial ecosystem threat status and protection level - remaining

SANBI. 2018b. Terrestrial ecosystem threat status and protection level layer [Vector] 2018. URL: http://bgis.sanbi.org extent [Vector] 2018. URL: http://bgis.sanbi.org

SANBI. 2019. National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria. pp. 1–214.

SANBI. 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 3.1. 2022.

SANBI. 2022a. The 2022 Red List of Ecosystems (RLE) for terrestrial realm for South Africa - Original extent [Vector] 2021. Available from the Biodiversity GIS website.

SANBI. 2022b. The 2022 Red List of Ecosystems (RLE) for terrestrial realm for South Africa - remnants [Vector] 2021. Available from the Biodiversity GIS website.

SANBI. 2024. 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 2024.

SAPAD: Department of Environmental Affairs. 2023. *South Africa Protected Areas Database* (SAPAD_OR_2024_Q3). Online available: [http://egis.environment.gov.za].

Sieben, E. J. J., Glen, R. P., Van Deventer, H., & Dayaram, A. (2021). The contribution of wetland flora to regional floristic diversity across a wide range of climatic conditions in southern Africa. Biodiversity and Conservation, 30(3), 575-596.

Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (eds.). 2019. South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South African National Biodiversity Institute, Pretoria. http://hdl.handle.net/20.500.12143/6370.

van Staden, N., Siebert, S.J., Cilliers, D.P., Wilsenach, D. and Frisby, A.W., 2020. Floristic analysis of semi-arid mountain ecosystems of the Griqualand West centre of plant endemism, Northern Cape, South Africa.

Van Wilgen, B.W., Measey, J., Richardson, D.M., Wilson, J.R. and Zengeya, T.A., 2020. Biological Invasions in South Africa (p. 975). Springer Nature.

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.

Although STS (Pty) Ltd. exercises due care and diligence in rendering services and preparing documents, STS (Pty) Ltd. accepts no liability and the client, by receiving this document, indemnifies STS (Pty) Ltd. and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from, or in connection with, services rendered, directly or indirectly by STS (Pty) Ltd. and by the use of the information contained in this document.

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: Legal 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 should not carry out a restricted activity involving either:

1. A specimen of a listed threatened or protected species;
2. Specimens of an alien species; or
3. 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. This act in terms of alien and invasive species aims to:

- Prevent the unauthorised 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 June harm such ecosystems or habitats.

Alien species are defined, in terms of the NEMBA 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 June be grown in demarcated areas, if there is a permit and that steps are taken to prevent their spread; and
- **Category 3:** Ornamentally used plants that June no longer be planted.

The National Forest Act, 1998 (Act No. 10 of 1998), as amended (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 utilization."

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

Section 12:
Declaration of trees as protected

1) The Minister June 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 June 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 June 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 June 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[12] (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.

Northern Cape Provincial Spatial Development Framework (NCPSDF, 2019)

The Northern Cape Provincial Spatial Development Framework (NCPSDF) was developed in 2011 to meet the requirements of the Northern Cape Planning and Development Act, 1998 (Act 7 of 1998) and the Municipal Systems Act, 2000 (Act 32 of 2000).

The Northern Cape Nature Conservation Act (Act No. 9 of 2009) (NCNCA)

The purpose of this Act is to provide for the sustainable utilisation of wild animals, aquatic biota and plants; to provide for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; to provide for offences and penalties for contravention of the Act; to provide for the appointment of nature conservators to implement the provisions of the Act; to provide for the issuing of permits and other authorisations; and to provide for matters connected therewith.

Restricted activities involving specially protected plants:
49(1) No person June, without a permit –
(a) Pick;
(b) Import;
(c) Export;
(d) Transport;
(e) Possess;
(f) Cultivate; or
(g) Trade in,
A specimen of a specially protected plant
Restricted activities involving protected plants

[12] 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.

50 (1) Subject to the provision of section 52, no person June, without a permit –

(a) Pick;
(b) Import;
(c) Export;
(d) Transport;
(e) Cultivate; or
(f) Trade in,

A specimen of a protected plant.

APPENDIX C: Impact Assessment Methodology

The impact methodology utilised in Parts B and C was provided by the EAP.

Definitions and Concepts

Environmental Significance

The concept of significance is at the core of impact identification, evaluation and decision-making. The concept remains largely undefined and there is no international consensus on a single definition. The following common elements are recognized from the various interpretations:

- Environmental significance is a value judgment
- The degree of environmental significance depends on the nature of the impact
- The importance is rated in terms of both biophysical and socio-economic values
- Determining significance involves the amount of change to the environment perceived to be acceptable to affected communities.

Significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of acceptability) (DEAT (2002) Impact Significance, Integrated Environmental Management, Information Series 5).

The concept of risk has two dimensions, namely the consequence of an event or set of circumstances, and the likelihood of particular consequences being realised (Environment Australia (1999) Environmental Risk Management).

Table C1: Definitions provided by the proponent for the terminology included in the impact methodology.

TERM	DEFINITION
Impact	The positive or negative effects on human well-being and / or the environment.
Consequence	The intermediate or final outcome of an event or situation OR it is the result, on the environment, of an event.
Likelihood	A qualitative term covering both probability and frequency.
Frequency	The number of occurrences of a defined event in a given time or rate.
Probability	The likelihood of a specific outcome measured by the ratio of a specific outcome to the total number of possible outcomes
Environment	Surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans and their interrelation (ISO 14004, 1996).

Methodology that will be used

The environmental significance assessment methodology is based on the following determination:

Environmental Significance = Overall Consequence x Overall Likelihood

Determination of Overall Consequence

Consequence analysis is a mixture of quantitative and qualitative information, and the outcome can be positive or negative. Several factors can be used to determine consequence. For the purpose of determining the environmental significance in terms of consequence, the following factors were chosen: Severity/Intensity, Duration and Extent/Spatial Scale. Each factor is assigned a rating of 1 to 5, as described in the tables below.

Determination of Severity / Intensity

Severity relates to the nature of the event, aspect or impact to the environment and describes how severe the aspects impact on the biophysical and socio-economic environment.

Table C2: Table to be used to obtain an overall rating of severity, taking into consideration the various criteria.

TYPE OF CRITERIA	RATING				
	1	2	3	4	5
Quantitative	0-20%	21-40%	41-60%	61-80%	81-100%
Qualitative	Insignificant / non-harmful	Small / Potentially harmful	Significant/ Harmful	Great/ Very harmful	Disastrous Extremely harmful
Social/ Community response	Acceptable / I&AP satisfied	Slightly tolerable / Possible objections	Intolerable/ Sporadic complaints	Unacceptable / Widespread complaints	Totally unacceptable / Possible legal action
Irreversibility	Very low cost to mitigate/ High potential to mitigate impacts to level of insignificance/ Easily reversible	Low cost to mitigate	Substantial cost to mitigate/ Potential to mitigate impacts/ Potential to reverse impact	High cost to mitigate	Prohibitive cost to mitigate/ Little or no mechanism to mitigate impact Irreversible
Biophysical (Air quality, water quantity and quality, waste production, fauna and flora)	Insignificant change / deterioration or disturbance	Moderate change / deterioration or disturbance	Significant change / deterioration or disturbance	Very significant change / deterioration or disturbance	Disastrous change / deterioration or disturbance

Determination of Duration

Duration refers to the amount of time that the environment will be affected by the event, risk or impact, if no intervention e.g. remedial action takes place.

Table C3: Criteria for the rating of duration.

RATING	DESCRIPTION
1	Up to ONE MONTH
2	ONE MONTH to THREE MONTHS (QUARTER)
3	THREE MONTHS to ONE YEAR
4	ONE to TEN YEARS
5	Beyond TEN YEARS

Determination of Extent/Spatial Scale

Extent or spatial scale is the area affected by the event, aspect or impact.

Table C4: Criteria for the rating of extent / spatial scale

RATING	DESCRIPTION
1	Immediate, fully contained area
2	Surrounding area
3	Within Business Unit area of responsibility
4	Within the farm/neighbouring farm area
5	Regional, National, International

Determination of Overall Consequence

Overall consequence is determined by adding the factors determined above and summarized below, and then dividing the sum by 3.

Table C5: Example of calculating overall consequence.

CONSEQUENCE	RATING
Severity	Example 4
Duration	Example 2
Extent	Example 4
SUBTOTAL	**10**
TOTAL CONSEQUENCE: (Subtotal divided by 3)	**3.3**

Determination of Likelihood

The determination of likelihood is a combination of Frequency and Probability. Each factor is assigned a rating of 1 to 5, as described below.

Determination of Frequency

Frequency refers to how often the specific activity, related to the event, aspect or impact, is undertaken.

Table C6: Criteria for the rating of frequency

RATING	DESCRIPTION
1	Once a year or once/more during operation
2	Once/more in 6 Months
3	Once/more a Month
4	Once/more a Week
5	Daily

Determination of Probability

Probability refers to how often the activity or aspect has an impact on the environment.

Table C7: Criteria for the rating of probability.

RATING	DESCRIPTION
1	Almost never / almost impossible
2	Very seldom / highly unlikely
3	Infrequent / unlikely / seldom
4	Often / regularly / likely / possible
5	Daily / highly likely / definitely

Overall Likelihood

Overall likelihood is calculated by adding the factors determined above and summarized below, and then dividing the sum by 2.

Table C8: Example of calculating overall likelihood.

CONSEQUENCE	RATING
Frequency	Example 4
Probability	Example 2
SUBTOTAL	**6**
TOTAL LIKELIHOOD (Subtotal divided by 2)	**3**

Determination of Overall Environmental Significance

The multiplication of overall consequence with overall likelihood will provide the environmental significance, which is a number that will then fall into a range of LOW, LOW-MEDIUM, MEDIUM, MEDIUM-HIGH or HIGH, as shown in the table below.

Table C9: Determination of overall environmental significance.

SIGNIFICANCE OR RISK	LOW	LOW-MEDIUM	MEDIUM	MEDIUM-HIGH	HIGH
Overall Consequence X Overall Likelihood	1 - 4.9	5 - 9.9	10 - 14.9	15 – 19.9	20 - 25

Qualitative description or magnitude of Environmental Significance

This description is qualitative and is an indication of the nature or magnitude of the Environmental Significance. It also guides the prioritizations and decision making process associated with this event, aspect or impact.

Table C10: Description of environmental significance and related action required.

SIGNIFICANCE	LOW	LOW-MEDIUM	MEDIUM	MEDIUM-HIGH	HIGH
Impact Magnitude	Impact is of very low order and therefore likely to have very little real effect. Acceptable.	Impact is of low order and therefore likely to have little real effect. Acceptable.	Impact is real, and potentially substantial in relation to other impacts. Can pose a risk to company	Impact is real and substantial in relation to other impacts. Pose a risk to the company. Unacceptable	Impact is of the highest order possible. Unacceptable. Fatal flaw.
Action Required	Maintain current management measures. Where possible improve.	Maintain current management measures. Implement monitoring and evaluate to determine potential increase in risk.	Implement monitoring. Investigate mitigation measures and improve management measures to reduce risk, where possible.	Improve management measures to reduce risk.	Implement significant mitigation measures or implement alternatives.

SIGNIFICANCE	LOW	LOW-MEDIUM	MEDIUM	MEDIUM-HIGH	HIGH
		Where possible improve			

Based on the above, the significance rating scale has been determined as follows:

- **HIGH** Of the highest order possible within the bounds of impacts which could occur. In the case of negative impacts, there would be no possible mitigation and / or remedial activity to offset the impact at the spatial or time scale for which it was predicted. In the case of positive impacts, there is no real alternative to achieving the benefit.
- **MEDIUM-HIGH** Impacts of a substantial order. In the case of negative impacts, mitigation and / or remedial activity would be feasible but difficult, expensive, time-consuming or some combination of these. In the case of positive impacts, other means of achieving this benefit would be feasible, but these would be more difficult, expensive, time-consuming or some combination of these.
- **MEDIUM** Impact would be real but not substantial within the bounds of those, which could occur. In the case of negative impacts, mitigation and / or remedial activity would be both feasible and fairly easily possible, In case of positive impacts; other means of achieving these benefits would be about equal in time, cost and effort.
- **LOW-MEDIUM** Impact would be of a low order and with little real effect. In the case of negative impacts, mitigation and / or remedial activity would be either easily achieved of little would be required, or both. In case of positive impacts alternative means for achieving this benefit would likely be easier, cheaper, more effective, less time-consuming, or some combination of these.
- **LOW** Impact would be negligible. In the case of negative impacts, almost no mitigation and or remedial activity would be needed, and any minor steps, which might be needed, would be easy, cheap, and simple. In the case of positive impacts, alternative means would almost all likely be better, in one or a number of ways, than this means of achieving the benefit.
- **INSIGNIFICANT** There would be a no impact at all – not even a very low impact on the system or any of its parts.

Mitigation measure development

According to the DEA *et al.,* (2013) “Rich biodiversity underpins the diverse ecosystems that deliver ecosystem services that are of benefit to people, including the provision of basic services and goods such as clean air, water, food, medicine and fibre; as well as more complex services that regulate and mitigate our climate, protect people and other life forms from natural disaster and provide people with a rich heritage of nature-based cultural traditions. Intact ecological infrastructure contributes significant savings through, for example, the regulation of natural hazards such as storm surges and flooding which is attenuated by wetlands”.

According to the DEA *et al.* (2013) Ecosystem services can be divided into 4 main categories:

- Provisioning services are the harvestable goods or products obtained from ecosystems such as food, timber, fibre, medicine, and freshwater;
- Cultural services are the non-material benefits such as heritage landscapes and seascapes, recreation, ecotourism, spiritual values and aesthetic enjoyment;
- Regulating services are the benefits obtained from an ecosystem’s control of natural processes, such as climate, disease, erosion, water flows, and pollination, as well as protection from natural hazards; and
- Supporting services are the natural processes such as nutrient cycling, soil formation and primary production that maintain the other services.

Loss of biodiversity puts aspects of the economy, wellbeing and quality of life at risk, and reduces socio-economic options for future generations. This is of particular concern for the poor in rural areas who have limited assets and are more dependent on common property resources for their livelihoods. The importance of maintaining biodiversity and intact ecosystems for ensuring on-going provision of ecosystem services, and the consequences of ecosystem change for human well-being, were detailed in a global assessment entitled the Millennium Ecosystem Assessment (MEA, 2005), which established a scientific basis for the need for action to enhance management and conservation of biodiversity.

Sustainable development is enshrined in South Africa's Constitution and laws. The need to sustain biodiversity is directly or indirectly referred to in a number of Acts, not least the National Environmental Management: Biodiversity Act, 2004 (No. 10 of 2004) (hereafter referred to as the Biodiversity Act) and is fundamental to the notion of sustainable development. In addition, International guidelines and commitments as well as national policies and strategies are important in creating a shared vision for sustainable development in South Africa (DEA *et al.,* 2013).

The primary environmental objective of the Minerals and Petroleum Resources Development Act, 2002 (Act No 28 of 2002) (MPRDA) is to give effect to the environmental right contained in the South African Constitution. Furthermore, Section 37(2) of the MPRDA states that "any prospecting or mining operation must be conducted in accordance with generally accepted principles of sustainable development by integrating social, economic and environmental factors into the planning and implementation of prospecting and mining projects in order to ensure that exploitation of mineral resources serves present and future generations".

Pressures on biodiversity are numerous and increasing. According to the DEA *et al.,* (2013) Loss of natural habitat is the single biggest cause of biodiversity loss in South Africa and much of the world. The most severe transformation of habitat arises from the direct conversion of natural habitat for human requirements, including[13]:

- Cultivation and grazing activities;
- Rural and urban development;
- Industrial and mining activities, and
- Infrastructure development.

Impacts on biodiversity can largely take place in four ways (DEA *et al.,* 2013):

- **Direct impacts:** are impacts directly related to the project including project aspects such as site clearing, water abstraction and discharge of water from riverine resources;
- **Indirect impacts:** are impacts associated with a project that may occur within the zone of influence in a project such as surrounding terrestrial areas and downstream areas on water courses;
- **Induced impacts:** are impacts directly attributable to the project but are expected to occur due to the activities of the project. Factors included here are urban sprawl and the development of associated industries; and
- **Cumulative impacts:** can be defined as the sum of the impact of a project as well as the impacts from past, existing and reasonably foreseeable future projects that would affect the same biodiversity resources. Examples include numerous mining operations within the same drainage catchment or numerous residential developments within the same habitat for faunal or floral species.

Given the limited resources available for biodiversity management and conservation, as well as the need for development, efforts to conserve biodiversity need to be strategic, focused and supportive of sustainable development. This is a fundamental principle underpinning South Africa's approach to the management and conservation of its biodiversity and has resulted the definition of a clear mitigation strategy for biodiversity impacts.

'Mitigation' is a broad term that covers all components of the 'mitigation hierarchy' defined hereunder. It involves selecting and implementing measures – amongst others – to conserve biodiversity and to protect the users of biodiversity and other affected stakeholders from potentially adverse impacts as a result of mining or any other land use. The aim is to prevent adverse impacts from occurring or, where this is unavoidable, to limit their significance to an acceptable level. Offsetting of impacts is considered to be the last option in the mitigation hierarchy for any project.

The mitigation hierarchy in general consists of the following in order of which impacts should be mitigated (DEA *et al.,* 2013):

- **Avoid/prevent impact:** can be done through utilising alternative sites, technology and scale of projects to prevent impacts. In some cases, if impacts are expected to be too high the "no project" option should also be considered, especially where it is expected that the lower levels

[13] Limpopo Province Environment Outlook. A Report on the State of the Environment, 2002. Chapter 4.

of mitigation will not be adequate to limit environmental damage and eco-service provision to suitable levels;

- **Minimise impact:** can be done through utilisation of alternatives that will ensure that impacts on biodiversity and ecoservices provision are reduced. Impact minimisation is considered an essential part of any development project;
- **Rehabilitate impact:** is applicable to areas where impact avoidance and minimisation are unavoidable where an attempt to re-instate impacted areas and return them to conditions which are ecologically similar to the pre-project condition or an agreed post project land use, for example arable land. Rehabilitation can however not be considered as the primary mitigation tool as even with significant resources and effort rehabilitation usually does not lead to adequate replication of the diversity and complexity of the natural system. Rehabilitation often only restores ecological function to some degree to avoid ongoing negative impacts and to minimise aesthetic damage to the setting of a project. Practical rehabilitation should consist of the following phases in best practice:
  - **Structural rehabilitation** which includes physical rehabilitation of areas by means of earthworks, potential stabilisation of areas as well as any other activities required to develop a long terms sustainable ecological structure;
  - **Functional rehabilitation** which focuses on ensuring that the ecological functionality of the ecological resources on the Beeshoek Mine supports the intended post closure land use. In this regard special mention is made of the need to ensure the continued functioning and integrity of wetland and riverine areas throughout and after the rehabilitation phase;
  - **Biodiversity reinstatement** which focuses on ensuring that a reasonable level of biodiversity is re-instated to a level that supports the local post closure land uses. In this regard special mention is made of re-instating vegetation to levels which will allow the natural climax vegetation community or community suitable for supporting the intended post closure land use; and
  - **Species reinstatement** which focuses on the re-introduction of any ecologically important species which may be important for socio-cultural reasons, ecosystem functioning reasons and for conservation reasons. Species re-instatement need only occur if deemed necessary.
- **Offset impact:** refers to compensating for residual or unavoidable negative impacts on biodiversity. Offsetting should take place to address any impacts deemed to be unacceptable which cannot be mitigated through the other mechanisms in the mitigation hierarchy. The objective of biodiversity offsets should be to ensure no net loss of biodiversity. Biodiversity offsets can be considered to be a last resort to compensate for residual negative impacts on biodiversity.

The significance of residual impacts should be identified on a regional as well as national scale when considering biodiversity conservation initiatives. If the residual impacts lead to irreversible loss or irreplaceable biodiversity the residual impacts should be considered to be of *very high significance* and when residual impacts are considered to be of *very high significance*, offset initiatives are not considered an appropriate way to deal with the magnitude and/or significance of the biodiversity loss. In the case of residual impacts determined to have *medium to high significance*, an offset initiative may be investigated. If the residual biodiversity impacts are considered of low significance no biodiversity offset is required.[14]

In light of the above discussion the following points present the key concepts considered in the development of mitigation measures for the proposed project.

- Mitigation and performance improvement measures and actions that address the risks and impacts[15] 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 where possible.
- 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 wherever possible.

[14] Provincial Guideline on Biodiversity Offsets, Western Cape, 2007.

[15] Mitigation measures should address both positive and negative impacts

Recommendations

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

APPENDIX D: Vegetation Types

SVk 10 Kuruman Mountain Bushveld

Figure D1: Kuruman Mountain Bushveld: Open low bushveld with the usually leafless *Calobota cuspidosa* clearly visible at an altitude of approximately 1680 m near Bretby between Danielskuil and Kuruman. Image source: Mucina and Rutherford (2006) Figure 9.80, page 521.

Table D1: Dominant and typical floristic species of Kuruman Mountain Bushveld (Mucina & Rutherford, 2012). The table contains the important taxa associated with the vegetation type.

WOODY LAYER	
Small Trees	*Searsia lancea*
Tall Shrubs	*Diospyros austro-africana*, *Euclea crispa* subsp. *crispa*, *Euclea undulata*, *Olea europaea subsp. cuspidata*, *Searsia pyroides* var. *pyroides*, *Searsia tridactyla*, *Tarchonanthus camphoratus*, *Tephrosia longipes*
Low Shrubs	*Searsia ciliata* (d), *Amphiglossa triflora*, *Anthospermum rigidum* subsp. *pumilum*, *Gomphocarpus fruticosus* subsp. *fruticosus*, *Helichrysum zeyheri*, *Lantana rugosa*, *Wahlenbergia nodosa*
Succulent Shrubs	*Ebracteola wilmaniae*, *Hertia pallens*
Herbaceous Climber	*Rhynchosia totta*
FORB LAYER	
Herbs	*Dicoma anomala*, *Dicoma schinzii*, *Geigeria ornativa*, *Helichrysum cerastioides*, *Heliotropium strigosum*, *Hibiscus marlothianus*, *Kohautia cynanchica*, *Kyphocarpa angustifolia*.
Geophytic Herb	*Boophone disticha*, *Pellaea calomelanos*.
GRASS LAYER	
Graminoids	*Andropogon chinensis* (d), *Andropogon schirensis* (d), *Anthephora pubescens* (d), *Aristida congesta* (d), *Digitaria eriantha* subsp. *eriantha* (d), *Themeda triandra* (d), *Triraphis andropogonoides* (d), *Aristida diffusa*, *Brachiaria nigropedata*, *Bulbostylis burchellii*, *Cymbopogon caesius*, *Diheteropogon amplectens*, *Elionurus muticus*, *Eragrostis chloromelas*, *Eragrostis nindensis*, *Eustachys paspaloides*, *Heteropogon contortus*, *Melinis repens*, *Schizachyrium sanguineum*, *Trichoneura grandiglumis*.
Biogeographically important Taxon (Griqualand West endemics)	
Tall Shrub	*Calobota cuspidosa* (formerly *Lebeckia macrantha*) (d).
Low Shrubs	*Justicia puberula*, *Tarchonanthus obovatus*
Succulent Shrub	*Euphorbia wilmaniae*

Graminoid	*Digitaria polyphylla*
Herb	*Sutera griquensis*
ENDEMIC TAXA	
Succulent Shrub	*Euphorbia planiceps*

(d) = dominant species **(The genus for all *Searsia spp* was formerly *Rhus*)**

Additional Remarks: Many species in this unit are widely distributed to the northeast of the subcontinent and reach their southwestern limit in this unit (e.g., *Andropogon schirensis*). There are distinct floristic differences with the relatively nearby and parallel mountains of the SVk 15 Koranna-Langeberg Mountain Bushveld. For example, *Croton gratissimus* is common in the last-mentioned unit but rare in Kuruman Mountain Bushveld. *Calobota cuspidosa* (formerly *Lebeckia macrantha*) shows just the reverse distributional pattern between these units. A very low form (<0.5 m) of *Vachellia hebeclada* is common in the north on Makhubung hill, north of Heuningvlei.

SVk 13 Olifantshoek Plains Thornveld

Figure D2: SVk 13 Olifantshoek Plains Thornveld: Very open shrubland with *Boscia albitrunca*, *Acacia luderitzii*, *Schmidtia pappophoroides* and *S. kalahariensis* in the western part of this unit. Image source: Mucina and Rutherford (2006) Figure 9.83, page 523.

Table D2: Dominant and typical floristic species of Olifantshoek Plains Thornveld (Mucina & Rutherford, 2012). The table contains the important taxa associated with the vegetation type.

WOODY LAYER	
Tall Tree	*Senegalia burkei*
Small Trees	*Senegalia caffra (d), Burkea africana (d), Combretum apiculatum (d), C. zeyheri (d), Croton gratissimus (d), Faurea saligna (d), Heteropcyyxis natalensis (d), Ochna pulchra (d), Protea caffra (d), Pseudolachnostylis maprouneifolia (d), Terminalia sericea (d), Brachylaena rotundata, Combretum molle, Englerophytum magalismontanum, Ozoroa sphaerocarpa, Pappea capensis,Searsia leptodictya, Strychnos cocculoides, Vangueria parvifolia*
Tall Shrubs	*Diplorhynchus condylocarpon (d), Elephantorrhiza burkei (d), Combretum moggii, Grewia flava, Mundulea sericea, Pavetta zeyheri, Psydrax livida, Vitex rehmannii.*
Low Shrubs	*Searsia zeyheri (d).*
FORB LAYER	

Succulent Shrub	*Aloe castanea.*
Herb	*Xerophyta retinervis*
GRASS LAYER	
Graminoids	*Aristida transvaalensis (d), Loudetia simplex (d), Trachypogon spicatus (d), Digitaria eriantha subsp. eriantha, Enneapogon pretoriensis, Heteropogon contortus, Setaria sphacelata, Themeda triandra, Tristachya biseriata.*
ENDEMIC TAXA	
Geophytic Herb	*Gladiolus pole-evansii*
Succulent Herb	*Haworthia koelmaniorum*

Check(d) = dominant species (The genus for all *Senegalia* and *Vachellia* spp. were formerly *Acacia*)

Additional Remarks: The great variation in geology and topography in the area is associated with a wide variety of plant communities.

SVk 14 Postmasburg Thornveld

Table D3: Dominant and typical floristic species of Postmasburg Thornveld (Mucina & Rutherford, 2012). The table contains the important taxa associated with the vegetation type.

WOODY LAYER	
Tall Tree	*Vachellia erioloba* (d).
Small Trees	*Vachellia karroo (d), V. tortilis* subsp. *heteracantha (d), Searsia lancea (d), Ziziphus mucronata (d).*
Tall Shrubs	*Searsia tridactyla (d), Diospyros lycioides* subsp. *lycioides, Ehretia rigida* subsp. *rigida, Grewia flava, Tarchonanthus camphoratus.*
Low Shrubs	*Vachellia hebeclada subsp. hebeclada (d), Felicia muricata, Gomphocarpus fruticosus* subsp. *fruticosus, Lantana rugosa, Melolobium microphyllum, Sutera halimifolia*.
Succulent Shrubs	*Kalanchoe rotundifolia, Lycium cinereum*
FORB LAYER	
Herbs	*Dicoma anomala, Geigeria filifolia, G. ornativa, Hibiscus pusillus, Jamesbrittenia aurantiaca, Selago densiflora, Tripteris aghillana.*
Geophytic Herb	*Boophone disticha*
GRASS LAYER	
Graminoids	*Digitaria eriantha subsp. eriantha (d), Enneapogon scoparius (d), Eragrostis lehmanniana (d), Aristida adscensionis, A. congesta, A. diffusa, Eragrostis superba, Heteropogon contortus, Melinis repens, Schmidtia pappophoroides, Stipagrostis uniplumis.*
BIOGEOGRAPHICALLY IMPORTANT TAXON	
Succulent Shrub	*Euphorbia bergii*
Graminoid	*Digitaria polyphylla*

Check(d) = dominant species

Additional Remarks: In contrast to eastern parts of the unit, *Tarchonanthus camphoratus* is conspicuously absent in the western parts.

APPENDIX E: Details, Expertise And Curriculum Vitae of Specialists

1. Details of the specialist who prepared the report

Charne Kock	MSc Plant Science (University of Pretoria)
Candice Lamb	MSc Zoology (University of Pretoria)
Jandre Potgieter	Hons Zoology & Entomology (University of Pretoria)
Chris Hooton	BTech Nature Conservation (Tshwane University of Technology)
Samantha-Leigh Daniels	PhD (Plant Science) (University of Pretoria)

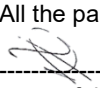
2. The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialist:	**Scientific Terrestrial Services**		
Postal address:	PO. Box 751779, Gardenview		
Postal code:	2047	Fax:	086 724 3132
Telephone:	011 616 7893		
Name / Contact person:	**Charne Kock**		
E-mail:	charne@sasenvgroup.co.za		
Qualifications	MSc (Plant Science) (University of Pretoria) BSc (Hons) Plant Science (University of Pretoria) BSc (Environmental Sciences) (University of Pretoria)		
Registration / Associations	Professional member of the South African Council for Natural Scientific Professions (SACNASP) SANAP (South African National Antarctic Programme) Golden Key Honorary Society Member of the Botanical Society of South Africa (BotSoc) Member of the Land Rehabilitation Society of Southern Africa (LARSSA) Member of the South African Association of Botanists (SAAB)		
Name / Contact person:	**Jandre Potgieter**		
E-mail:	jandre@sasenvgroup.co.za		
Qualifications	PGCE Senior and intermediate phase (UNISA) BSc (Hons) Entomology (University of Pretoria) BSc Entomology (University of Pretoria)		
Registration / Associations	Professional member of the South African Council for Natural Scientific Professions (SACNASP)		
Name / Contact person:	**Candice Lamb**		
E-mail:	candice@sasenvgroup.co.za		
Qualifications	MSc (Zoology) (University of Pretoria) BSc (Hons) Zoology (University of Pretoria) BSc (Environmental Sciences) (University of Pretoria)		
Name / Contact person:	**Chris Hooton**		
E-mail:	chris@sasenvgroup.co.za		
Qualifications	BTech Nature Conservation (Tshwane University of Technology) National Diploma Nature Conservation (Tshwane University of Technology)		
Name / Contact person:	**Samantha-Leigh Daniels**		
E-mail:	samantha@sasenvgroup.co.za		
Qualifications	PhD (Plant Science) (University of Pretoria) MSc (Plant Science) (University of Pretoria) BSc (Hons) Zoology & Entomology (University of Pretoria) BSc Zoology & Entomology (University of Pretoria)		
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 Botanical Society of South Africa (BotSoc)		

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

I, Candice Lamb, declare that -

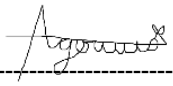
- I act as the **independent GIS specialist** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity 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, Charne Kock, declare that -

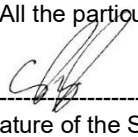
- I act as the **independent botanical specialist** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my 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, Chris Hooton, declare that -

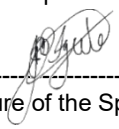
- I act as the **independent faunal specialist (reviewer)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise 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, Jandre Potgieter, declare that -

- I act as the **independent faunal 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, Samantha-Leigh Daniels, declare that -

- I act as the **independent botanical 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 CANDICE LAMB

PERSONAL DETAILS

Position in Company	Junior Consultant
Joined SAS Environmental Group of Companies	January 2024

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Awaiting registration finalisation as a candidate member of the South African Council for Natural Scientific Professions (SACNASP)

EDUCATION

Qualifications

MSc Zoology (University of Pretoria)	2022
BSc (Hons) Zoology (University of Pretoria)	2018

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, Limpopo, KwaZulu-Natal

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Faunal Assessments
- Avifaunal Assessments

Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater (wetland / riparian) Delineation and Assessment

GIS

Mapping and GIS for various sectors and various disciplines (biodiversity, freshwater, aquatic, soil, and land capability).

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHARNE KOCK

PERSONAL DETAILS

Position in Company	Floral Ecologist
Joined SAS Environmental Group of Companies	2022

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 169998)
SANAP (South African National Antarctic Programme)
Golden Key Honorary Society
Member of the Botanical Society of South Africa (BotSoc)
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)	2021
BSc (Hons) Plant Science (University of Pretoria)	2018
BSc Environmental Science (University of Pretoria)	2017

Short courses and Training

- Advanced Grass Identification Course (2019)
- CREW Tree Identification Course (2019)
- ISO 140001 Environmental Management Course (2020)
- Ecological Practices and Theory Short Course (2020)

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Limpopo, Mpumalanga, North West, Northern Cape, KwaZulu-Natal and Eastern Cape
Africa: Democratic Republic of the Congo (DRC)

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Terrestrial Ecological and Biodiversity Scoping Assessments
- Floral Assessments
- Floral walkdowns
- Alien and Invasive Plant Control Plan (AIPCP)
- Alien control monitoring
- Desktop Studies, Mapping and Background Information Research
- Protected species permits

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 JANDRE POTGIETER

PERSONAL DETAILS

Position in Company	Faunal Ecologist
Joined SAS Environmental Group of Companies	2022

EDUCATION

Qualifications

PGCE Senior and intermediate phase (UNISA)	2021
BSc (Hons) Entomology (University of Pretoria)	2013
BSc Entomology (University of Pretoria)	2012

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 170165/24)

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Eastern Cape, North West, Limpopo, Western Cape, Mpumalanga, Northern Cape and KZN

Africa – Angola and Democratic Republic of the Congo (DRC)

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Faunal Assessments
- Avifaunal Assessments

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF DR SAMANTHA-LEIGH DANIELS

PERSONAL DETAILS

Position in Company	Senior Floral Ecologist
Joined SAS Environmental Group of Companies	2020

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP)
Member of the South African Association of Botanists (SAAB)
Member of the Botanical Society of South Africa (BotSoc)

EDUCATION

Qualifications

PhD (Plant Science) (University of Pretoria	2023
MSc (Plant Science) (University of Pretoria)	2017
BSc (Hons) Zoology & Entomology (University of Pretoria)	2014
BSc Zoology & Entomology (University of Pretoria)	2013

AREAS OF WORK EXPERIENCE

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

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Terrestrial Ecological and Biodiversity Scoping Assessments
- Terrestrial Ecological and Biodiversity Screening Assessments
- Floral Assessments
- Alien and Invasive Control Plan (AICP)
- Terrestrial Monitoring
- Floral Rescue and Relocation Plans
- Rehabilitation and Management Plans
- Desktop Studies, Mapping and Background Information Research

Offsets

- Biodiversity Offsets
- Wetland Offsets

Training

- Plant species identification
- Herbarium usage and protocols