SCIENTIFIC TERRESTRIAL SERVICES

Terrestrial Biodiversity Assessment

AS PART OF THE ENVIRONMENTAL AUTHORISATION PROCESS FOR THE PROPOSED TOWNSHIP DEVELOPMENT ON PT 72 OF THE FARM BULTFONTEIN, NEAR LANSERIA, GAUTENG PROVINCE.

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Reference: STS 23-2057
Date: February 2024

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EXECUTIVE SUMMARY

Scientific Terrestrial Services (Pty) Ltd. (hereafter "STS") was appointed to conduct a terrestrial biodiversity assessment as part of the Environmental Authorisation (EA) application process for the proposed mixed-use development, located near the Lanseria airport within the Gauteng Province (hereafter referred to as the "**study area**".

A field assessment was undertaken during spring (24th of October 2023). The field assessment aimed to determine the ecological status of the study area and to "ground-truth" the results of the desktop databases.

CONSERVATION SIGNIFICANCE OF THE STUDY AREA (DESK-BASED ASSESSMENT)

According to the 2022 Red List Ecosystems (RLE) database (which replaces the National Biodiversity Assessment (NBA) (2018) which forms one of the basis databases that the RLE database is generated upon), the study area is located within the remaining extent of the **Critically Endangered (CR) Egoli Granite Grassland**. The ecosystem is listed under the criteria B1(i) which indicates that the ecosystem has a restricted distribution and has undergone a high rate of loss (Government of South Africa, 2022). This endemic ecosystem was poorly protected according to the 2018 protection level status (as defined by the 2018 NBA). This vegetation type was used as the reference state against which the ground-truthed vegetation communities were compared (descriptions as per Mucina and Rutherford (2006) are provided in Section 3 of this report).

From a provincial biodiversity management perspective, the Gauteng Conservation Plan (C-Plan) V 3.3 indicates that majority of the study area is located within an area considered to be of biodiversity importance, most notably an **Important Critical Biodiversity Area (CBA) (also referred to as CBA 2).** Triggering features of the Important CBA include the presence of Red and Orange Listed[1] (OL) plant species and primary vegetation. CBAs are areas of high biodiversity value and need to be maintained in a natural state. CBA Important Areas are areas considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation, and ridges. A small section in the north of the study area is also located within an Ecological Support Area (ESA).

GROUND TRUTHED RESULTS (SPECIES DIVERSITY AND HABITAT INTEGRITY)

Based on the results of the field investigations conducted between the 24th of October 2023, three (3) broad habitat units (and associated submits) were identified within the study area, namely:

- **Degraded Grassland Habitat** – this habitat comprised the largest extent of the study area. The habitat was dominated by grass species in which a moderately low to intermediately developed herbaceous layer was supported. Faunal species observed within this habitat were limited to common species to the region known to thrive in degraded environments;
- **Moist Grassland –** the floral communities associated with this habitat shared a subset of species with the Degraded Grassland; however, this habitat was unique in that it supported additional species that have an affinity for hydromorphic[2] soils. Two subunits were identified within this habitat; habitats shared the same floral communities but were distinguished on the basis that a section of the Moist Grassland is considered a **Seep Wetland**[3]. The Seep Wetland is considered a watercourse[4] as per the National Water Act, 1998 (Act No. 36 of 1998) as

[1] The concept of an Orange List (OL) was introduced as a way of assessing and recording the conservation importance of taxa that are rare and of special concern but are not on a Red List (Victor and Keith, 2004). For Gauteng, this includes species that are endemic to either South Africa or the province, species that have a limited distribution in the country, species that are overharvested for the medicinal plant trade or species that are losing habitat due to urban expansion, to name a few (GDARD, 2014).

[2] Hydromorphic is defined as follows: "*of or pertaining to soil having characteristics that are developed when there is excess water all or part of the time which leads to the development of anaerobic conditions in the soil*".

[3] Seep wetlands are located on gently to steeply sloping land and dominated by the colluvial (gravity-driven), unidirectional movement of water and material down-slope. Seep wetlands are often located on the side-slopes of a valley, but they do not typically extend onto a valley floor. Water inputs are primarily via subsurface flows from an up-slope direction. Seep wetlands are often associated with diffuse overland flow during and after rainfall events.

[4] The National Water Act, 1998 (Act No. 36 of 1998) as amended (NWA) define a watercourse as follows: (1) a river or spring, (2) a natural channel which water flows regularly or intermittently, (3) a wetland, dam, or lake into which, or from which, water flows; and (4) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse. A reference to a watercourse includes, where relevant, its bed and banks (Ollis et al. 2016).

amended (NWA) (refer to the Freshwater Assessment STS 23-2057, 2024). The remainder of the Moist Grassland (i.e., the second subunit) will be referred to as **Perched Moist Grassland**. The seasonal increase in moisture levels within these habitats may provide temporary suitable habitat conditions for some faunal species, notably amphibians, but due to the lack of permanent water surface water is unlikely to serve as an important breeding habitat for such species.

- **Transformed Habitat** – this habitat comprised the second largest extent of the study area. This habitat was associated with the complete transformation of areas (e.g., buildings or areas of excavation and dumping). Little habitat was available for native plant species and thus a lack of suitable habitat for SCC (both threatened and protected) was also evident within this habitat. Generally, vegetation communities were largely absent or represented mainly by AIP species (in which the abundance thereof was often high). The Transformed Habitat within the study area does not offer any unique habitat for fauna or areas of significant conservation value.

Refer to Table A1 for an indication of the vegetation characteristics associated with each of the habitats observed within the study area.

Table A1: Vegetation classification of the habitat units and associated floral communities within the study area.

Aspect	Transformed Habitat	Degraded Grassland Habitat	Moist Grassland	
			Perched Moist Grassland	Seep Wetland
Ecological Condition (refer to glossary of terms)	Poor ecological condition	Fair ecological condition	Fair ecological condition	Fair ecological condition
Indigenous vegetation[5]	✗	✓	✓	✓
Presence of watercourse[6]	Not applicable	Not applicable	Not applicable	✓
Ecological corridors[7]	✗	Stepping stone corridor	Stepping stone corridor	Stepping stone corridor
Representative of reference vegetation type(s)[8]	✗	✗		Not applicable

SPECIES OF CONSERVATION CONCERN (SCC)

The Department of Forestry, Fisheries, and the Environment's (DFFE) National Web-based Environmental Screening Tool ("screening tool' hereafter) was applied to the study area and indicated that for the Plant Species Theme was of medium sensitivity, whereas the Animal Species Theme was of medium and high sensitivity.

None of the triggered floral species (as identified by the screening tool) were identified within the study area, nor was any suitable habitat for such species identified.

For provincially protected species, the Gauteng Department of Agriculture and Rural Development (GDARD) provided STS with a list of potential Red and/or OL species for the Quarter Degree Square (QDS) grid 2527DD (in which the study area is located). These species were considered as part of the

[5] Indigenous vegetation (As per the definition in NEMA): Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.

[6] The Freshwater Habitat meets the definition of a watercourse in terms of the definition contained within the National Water Act, 1998 (Act No. 36 of 1998) as amended (NWA): (1) a river or spring, (2) a natural channel which water flows regularly or intermittently, (3) a wetland, dam or lake into which, or from which, water flows; and (4) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse. A reference to a watercourse includes, where relevant, its bed and banks.

[7] **In morphological terms, Ćurčić and Đurđić (2013) refer to three types of ecological corridors:**

- Linear corridors - long, uninterrupted strips of vegetation, such as hedges, strips of forest, and the vegetation growing on banks of rivers and streams;
- Steppingstone corridors - series of small, non-connected habitats which are used to find shelter, food, or to rest; and
- Landscape corridors - consist of diverse, uninterrupted landscape elements which offer sufficient cover for a safe journey from one habitat patch to another.

[8] In terms of species composition and vegetation structure.

SCC assessment for the study area because they are considered important provincially. Two (2) OL species were identified within the study area, namely *Boophone disticha* (least concern (LC)) and *Hypoxis hemerocallidea* (LC). Refer to the Impact Assessment Discussion for SCC below for further information.

The online screening tool considered the study area to have both a high faunal sensitivity and a medium faunal sensitivity. The sensitivities were triggered by the potential occurrence of the following species: High -*Tyto capensis* (African Grass Owl, VU), *Eupodotis senegalensis* (White-bellied Korhaan, VU) and Medium - *Crocidura maquassiensis* (Makwassie Musk Shrew, VU), *Dasymys robertsii* (Robert's Shaggy Rat, VU), *Hydrictis maculicollis* (Spotted-necked Otter, VU), and *Clonia uvarovi* (Uvarov's Clonia Bush cricket, VU). After field verification, it was determined that the following species, *Tyto capensis* (African Grass Owl, VU) and *Eupodotis senegalensis* (White-bellied Korhaan, VU), have a medium POC with the potential to forage within the study area but will not likely be found permanently. The verified site sensitivity for *Crocidura maquassiensis* (Makwassie Musk Shrew, VU), *Hydrictis maculicollis* (Spotted-necked Otter, VU), *Clonia uvarovi* (Uvarov's Clonia Bush cricket, VU) and *Dasymys robertsii* (Robert's Shaggy Rat, VU) were however low as suitable habitat within the study area was limited.

SITE ECOLOGICAL IMPORTANCE (SEI)

All habitats within the study 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 A2 breaks down the SEI obtained for the floral and faunal components.

Table A2: Summary of the SEI obtained for the floral and faunal components identified within the study area.

HABITAT UNIT	FLORAL SEI	FAUNAL SEI
Degraded Grassland Habitat	Low	Low
Perched Moist Grassland	Medium	Low
Seep Wetland	Medium	Low
Transformed Habitat	Very Low	Very Low

IMPACT DISCUSSION

The proponent has advised STS that all development layouts will remain outside of the Seep Wetland (and associated buffers/setbacks). As such, the impact assessment has been undertaken under the assumption that the study area (barring the Seep Wetland and associated buffers) will be transomed for development purposes.

Floral Habitat and Diversity:

The proposed development within this study area will result in the direct loss of indigenous vegetation on the habitat units associated with the study area. Furthermore, indirect impacts (i.e., edge effects such as AIP proliferation) are anticipated for habitat within the study area. However, the impacts can remain localised if strict mitigation measures are implemented and development and associated activities remain within the approved footprint area.

As per the Gauteng C-Plan, CBA 2 areas overlapped with the Degraded Grassland, the Transformed Habitat, and the Moist Grassland. The triggering features for the CBA 2 included the presence of primary vegetation and habitat for Red Listed bird species. Red listed bird habitat was identified by the Gauteng conservation plan as being located within the south-western corner of the study area (i.e., the area in which the Transformed Habitat is located). Given the modified nature thereof, no habitat for red-listed birds is available within the study area. Furthermore, as the vegetation communities have been subject to considerable anthropogenic activities (both historically and currently), the subsequent degraded floral communities are not considered primary vegetation; instead, the floral communities are secondary in nature. Given the above, it is concluded that no intact, functioning CBA (Important) habitat is present within the study area.

A small section in the east of the study area overlaps with an ESA. The overlapping habitat includes the Seep Wetland. Although degraded in nature, the Seep Wetland is considered to provide functioning ESA habitat (albeit modified); the wetland contributes to ecological function and connectivity within the greater landscape.

According to the RLE (2022) database, the study area is located within the CR Egoli Granite Grassland. Sections of the Degraded Grassland, Transformed Habitat, and Moist Grassland all overlap with the remaining extent of the RLE. However, given the altered species communities and structure within these habitats, and the associated shift from the typical floral communities that are associated with the reference vegetation type (i.e., Egoli Granite Grassland vegetation), no representative RLE habitat was identified within the study area.

The greatest impact on floral habitat and diversity is anticipated to be the result of vegetation clearing activities, specifically impacting on habitat and diversity within the Degraded Grassland, Moist Grassland (specifically the Perched Moist Grassland) and the Transformed Habitat. However, given the lowered sensitivity of these habitats, the overall impact significance is anticipated to be low, resulting in a limited loss of a diversity of floral species. In contrast, direct impacts on the Seep Wetland are not anticipated as construction is assumed to occur outside of the Wetland and associated buffers. However, secondary impacts are possible, and if no mitigated, impacts to the Seep Wetland are anticipated. It must be ensured that development is excluded from the Seep Wetland (identified as a watercourse by the NWA), and that the associated regulated buffer zones are implemented – refer to recommendation in the Freshwater assessment (STS 22-2057, 2024). A vegetated corridor around the Seep Wetland should be considered as this will be very beneficial in ensuring connectivity across the landscape (especially for neighbouring CBA or ESA habitat).

Faunal Habitat and Diversity:

Overall, the impact significance of the proposed mixed-use development (prior to mitigation) on faunal habitat and diversity ranges from **low** to **very low** within the study area. After mitigation measures are implemented, the impact scores will reduce, resulting in predominantly **very low** impacts and a few **low** impact scores. The potential for large-scale impacts is unlikely if recommended mitigatory measures as stipulated in Part C: Section 5.2 are adhered to.

The historical, ongoing, and surrounding anthropogenic impacts, including cultivation, grazing, and development, have undermined the long-term potential to maintain a diverse faunal assemblage within the study area due to its existing diminished, degraded, and fragmented condition. Presently, the habitats within the study area can only support a moderate to low diversity of faunal classes, predominantly favouring common, small-sized animals while large mammals or predators are mostly excluded. As such vegetation clearing and operational activities are not expected to have significant impacts on the overall faunal populations within the region.

Floral SCC

As no threatened species were recorded within the study area and as no habitat to support such species is deemed present within the study area, a Plant Species Compliance Statement is required. Thus, to meet the requirements of the Terrestrial Plant Species Compliance Statement, a statement and impact statement have been provided in this section of the report.

Plant Species Compliance Statement: The findings of the site assessment disputed the screening tool outcome of medium sensitivity for the Plant Species Theme and instead verifies a low sensitivity.

Two (2) OL species were recorded within the study area, namely *Boophone disticha* and *Hypoxis hemerocallidea*. These species are species with large bulbs that require larger areas to be dug up. As such, the relocation activities must be undertaken by a suitably trained individual to minimise impacts to the species and associated habitat to which they are relocated. Permits for the relocation of OL species within the development footprint area is not required. However, if these species need to be relocated to surrounding habitat outside of the development footprint area. Although these OL species were recorded within the Degraded Grassland Habitat, the abundance thereof was low, and it is unlikely that other species will be recorded; these species are widespread occurring species (i.e., not restricted to Gauteng) that can tolerate various habitat types and conditions. As such the study area is not regarded as important to support populations of these OL species.

Faunal SCC

From a faunal perspective, the Degraded Grassland Habitat, Perched Moist Grassland and Seep Wetland have the potential to possibly support four faunal SCC, albeit not permanently and probably only for foraging purposes. Habitat integrity and sensitivity in all habitat units, are limited by anthropogenic developments surrounding the study area, that have reduced its size and fragmented it from surrounding natural areas. The study area has also been impacted by historical cultivation and current grazing activities which has reduced the long-term sustainability of the study area to support SCC. The impact on SCC within the study area is not anticipated to be significant, given the limited POC of such SCC.

Impacts, without mitigation, to faunal SCC range from **low** to **very low** through all phases of the development. Mitigation, if implemented correctly, will reduce the impact significance to SCC in most phases to **very low**. Should any faunal SCC be encountered (albeit considered unlikely given the current ecological condition of the study area) a suitably qualified specialist should be consulted as to help ascertain the best way forward.

CONCLUDING REMARKS:

The proposed activities will impact on the habitat units within the study area to varying degrees. The greatest (direct) impact associated with the proposed development activities will be within floral and faunal habitat of **low** and **very low SEI**, whereas only a small aspect of the proposed activities has the potential to (indirectly) impact on floral habitat with **medium SEI**. However, given the mitigation measures as provided in this report series (and any additional mitigation measures provided in the freshwater report) are implemented, the anticipated impact from the proposed development is considered to vary between **low** and **very low** impact significance.

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.

SCIENTIFIC TERRESTRIAL SERVICES

Terrestrial Biodiversity Assessment

AS PART OF THE ENVIRONMENTAL AUTHORISATION PROCESS FOR THE PROPOSED TOWNSHIP DEVELOPMENT ON PT 72 OF THE FARM BULTFONTEIN NEAR LANSERIA, GAUTENG PROVINCE.

Part A: Background Information

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DOCUMENT GUIDE

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

Theme-Specific Requirements as per Government Notice No. 320 Terrestrial Plant Species 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)
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	**Areas of low sensitivity was prioritised.**
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;* *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*	**Part A**: Section 3 (desktop analysis) **Part B**: Section 3 and 5 **Part C:** Section 3

	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)
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)
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);*	**Part A**: Section 3 (desktop analysis) This section is covered in the Freshwater Ecological Assessment (STS 23- 2057, 2024)
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;*	This section is covered in the Freshwater Ecological Assessment (STS 23- 2057, 2024)
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.*	No Forests were identified 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 (flora) **Part C:** Section 1 (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 (flora) **Part C:** Section 1 (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	**Part B:** Section 6 (flora)

	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 C:** Section 6 (fauna)
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. Low sensitivity areas were verified as such and the proposed layout optimised within these areas.**
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 7 (flora) **Part C:** Section 7 (fauna)
3.1.15	Any conditions to which this statement is subjected.	**Part B:** Section 6 (flora) **Part C:** Section 6 (fauna)
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.	This report is submitted to the 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.	

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GLOSSARY OF TERMS

Biodiversity priority areas (Skowno et al., 2019)	Features in the landscape or seascape that are important for conserving a representative sample of ecosystems and species, for maintaining ecological processes, or for the provision of ecosystem services. They include the following categories, most of which are identified based on systematic biodiversity planning principles and methods: protected areas, Critically Endangered (CR) and Endangered (En) ecosystems, Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA), Freshwater Ecosystem Priority Areas (FEPA), high water yield areas, flagship free-flowing rivers, priority estuaries, study areas for land-based protected area expansion, and study areas for offshore protection. Marine ecosystem priority areas and coastal ecosystem priority areas have yet to be identified but will be included in future. The different categories are not mutually exclusive and, in some cases, overlap, often because a particular area or site is important for more than one reason. They should be complementary, with overlaps reinforcing the importance of an area.
Biological diversity or Biodiversity (National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA))	The variability among living organisms from all sources including, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.
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.
Degradation (Skowno et al., 2019)	The many human-caused processes that drive the decline or loss in biodiversity, ecosystem functions or ecosystem services in any terrestrial and associated aquatic ecosystems.
ESA (Skowno et al., 2019)	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
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)	A species that is naturally restricted to a particular, well-defined region, i.e., 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.
Ground·Truth	To check the accuracy of (remotely sensed data) by means of in-situ observations.
Habitat (NEMBA)	A place where a species or ecological community naturally occurs.
Listed alien species	All alien species that are regulated in South Africa under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004), Alien and Invasive Species Regulations, 2020.
Least Threatened	Least threatened ecosystems are still largely intact.
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 protected species of relevance to the project.
Terrestrial Species (SANBI, 2020)	For the purposes of the species environmental guidelines (SANBI, 2020), terrestrial species are considered to represent species that are not exclusively marine and occur on land (at least for a portion of their life cycle). This includes amphibians (frogs and toads) but excludes other freshwater aquatic species which are considered to be aquatic (e.g., fish, diatoms and aquatic macroinvertebrates). This definition is not an accurate biological definition but rather applied in this manner to align with the Protocol on Terrestrial Biodiversity.
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 Biodiversity Act allows the Minister of Environmental Affairs or a provincial Member of the Executive Council (MEC) for Environmental Affairs to publish a list of threatened ecosystems. To date, threatened ecosystems have been listed only in the terrestrial environment. In cases where no list has yet been published by the Minister, such as for all aquatic ecosystems, the ecosystem threat status assessment in the National Biodiversity Assessment (NBA) can be used as an interim list in planning and decision making.
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)	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 Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for VU and is then considered to be at a high risk of collapse.

LIST OF ACRONYMS

AIP	Alien and Invasive Plant
BESS	Battery Energy Storage System
BGIS	Biodiversity Geographic Information Systems
CARA	Conservation of Agricultural Resource Act
CBA	Critical Biodiversity Area
C-Plan	Conservation Plan
CR	Critically Endangered
CVB	Channel Valley Bottom
DC	Direct Current
DFFE	Department of Forestry, Fisheries, and the Environment
EGI	Electricity Grid Infrastructure
E-GIS	Environmental Geographical Information Systems
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EN	Endangered
ESA	Ecological Support Area
EW	Extinct in the Wild
FEPA	Freshwater Ecosystem Priority Areas
GDARD	Gauteng Department of Agriculture and Rural Development
GIS	Geographic Information System
GN	Government Notice
Ha	Hectares
IBA	Important Bird Area
IEM	Integrated Environmental Management
IUCN	International Union for the Conservation of Nature
km	Kilometres
km²	Square kilometres
MAP	Mean Annual Precipitation
MAPE	Mean Annual Potential for Evaporation
MASMS	Mean Annual Soil Moisture Stress
MAT	Mean Annual Temperature
MEC	Member of the Executive Council
MFD	Mean Frost Days
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEMPAA	National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)
NFA	National Forest Act, 1998 (Act No. 84 of 1998)
NPAES	National Protected Areas Expansion Strategy
NT	Near threatened
NWA	National Water Act, 1998 [Act No. 36 of 1998]
QDS	Quarter Degree Square (1:50,000 topographical mapping references)
RDL	Red Data List
RLE	Red List of Ecosystems
SABAP 2	Southern African Bird Atlas 2
SACAD	South Africa Conservation Areas Database
SACNASP	South African Council for Natural Scientific Professions

SANBI	South African National Biodiversity Institute
SAPAD	South Africa Protected Area Database
SCC	Species of Conservation Concern
STS	Scientific Terrestrial Services (Pty) Ltd
SWSA	Strategic Water Source Area
TOPS	Threatened Or Protected Species
VEGMAP	National Vegetation Map Project
VU	Vulnerable
WSAs	Water Source Areas

1 INTRODUCTION

Scientific Terrestrial Services (Pty) Ltd. (hereafter “STS”) was appointed to conduct a terrestrial biodiversity assessment as part of the Environmental Authorisation (EA) application process for the proposed mixed-use development, located near the Lanseria airport within the Gauteng Province (hereafter referred to as the “study area”; Figure 1 and Figure 2).

The study area, which is approximately 33 hectares (ha) in size and is located 1 kilometre (km) south of the Lanseria airport. The N14 is located approximately 2.3 km southeast of the study area and the R512 is located immediately west of the study area. The surrounding landscape consists of industrial development, agricultural practices, and some suburban housing areas.

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

1.1 Structure of the Biodiversity Report

Part A of this report served to introduce the study 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.

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

1.2 Scope of Work

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

- To complete a desktop assessment using all relevant information as presented by the South African National Biodiversity Institute's (SANBI) Biodiversity Geographic Information Systems (BGIS) website (http://bgis.sanbi.org) and the Department of Forestry, Fisheries and the Environment's (DFFE) Environmental Geographical Information Systems (E-GIS) website (https://egis.environment.gov.za/). The desktop assessment aims to provide 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); 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).

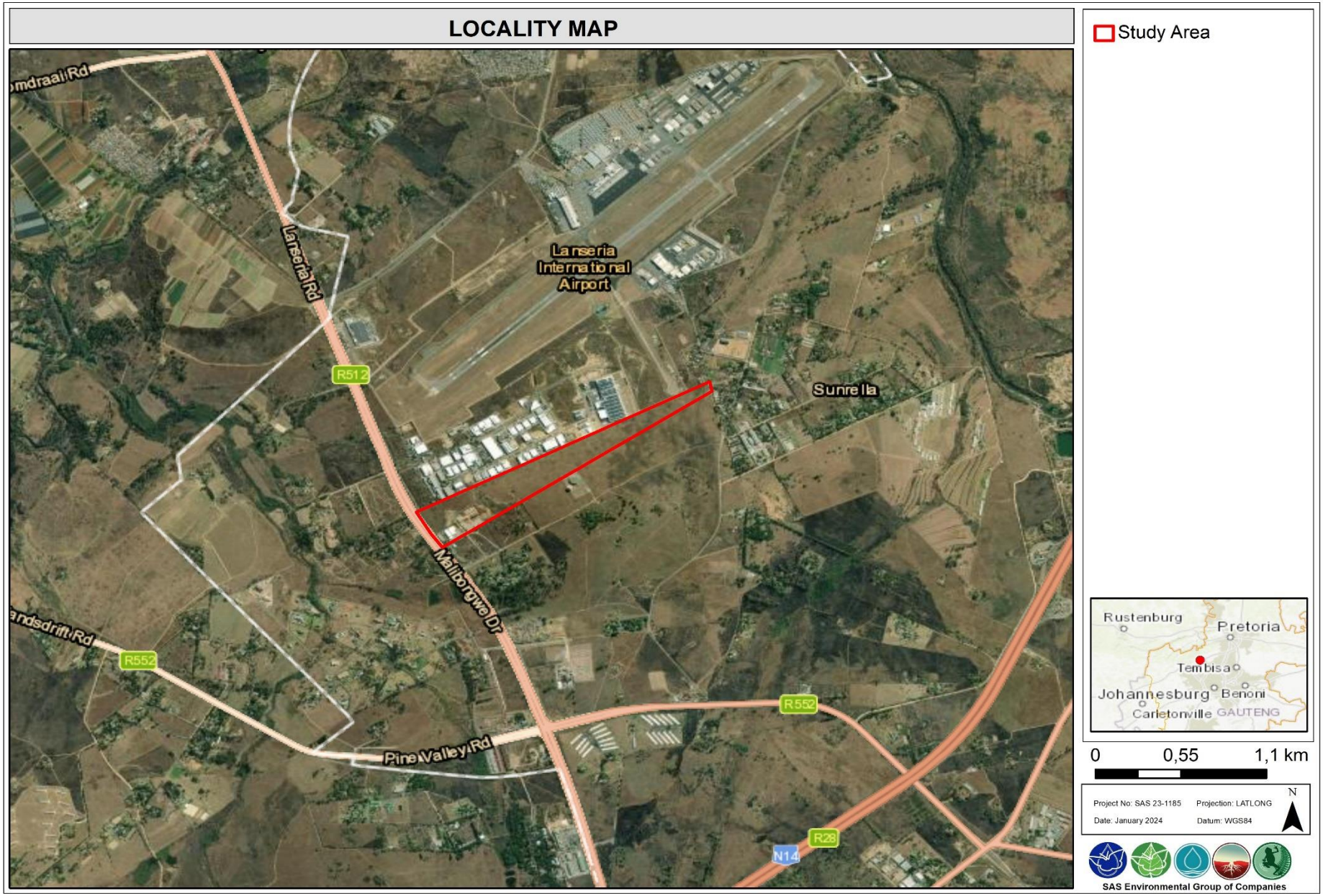

Figure 1. Digital satellite image depicting the study area in relation to surrounding area.

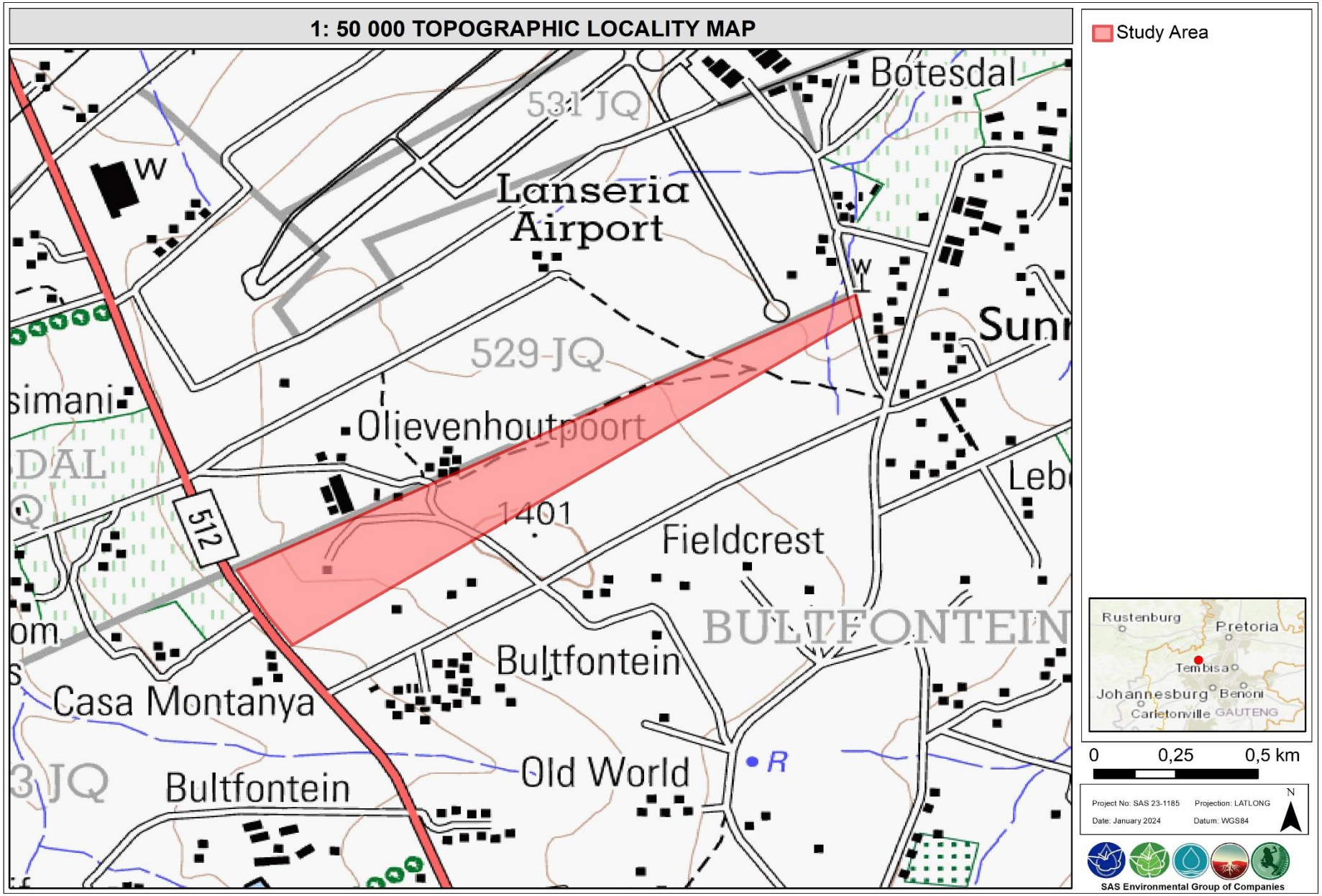

Figure 2. The study area depicted on a 1:50 000 topographical map in relation to the surrounding area.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The biodiversity desktop assessment is confined to the study area and does not include detailed results of the adjacent properties, although ecological important or sensitive areas according to the desktop databases of surrounding areas and the greater project area have been included on the relevant maps;
- The DFFE Screening Tool (hereafter "Screening Tool") provides names of Sensitive Species likely to be present within study area and its surrounds. Within the Screening Tool outcome, the names of some species are not provided. These species are rather assigned a number keeping them unidentifiable (e.g., Sensitive Species 1). This procedure is followed because of the vulnerability of the species to threats such as illegal harvesting and overexploitation. According to the best practice guidelines provided by the SANBI, the identity of Sensitive Species may not appear in the final Environmental Impact Assessment (EIA) report nor any of the specialist reports released into the public domain. However, the conservation threat status of such species has been provided; and
- It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the 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.

1.4 Legislative Requirements

The following legislative requirements were considered during the assessment:

- The Constitution of the Republic of South Africa, 1996[9];
- The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA);
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);

[9] 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: The Revised National List of Ecosystems that are Threatened and in need of Protection, published in Gazette No. 47526, 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 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; and
    - GN number 30568: Threatened or Protected Species (TOPS) list dated 14 December 2007, as it relates to the NEMBA.
- The National Forest Act, 1998 (Act No. 84 of 1998, 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;
- The National Environmental Management: Protected Areas Act, 2003 (Act. No. 57 of 2003) (NEMPAA); and
- Government Gazette 45421 dated 10 May 2019 as it relates to the DFFE national environmental screening report required with an application for environmental authorisation as identified in regulation 16(1)(v) of EIA Regulations:
    - 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 Terrestrial Plant and Animal Species as published in Government Gazette 43855 dated 30 October 2020 (as amended in GN 3717 of 2023).

The following documentation was also considered:

- Gauteng Department of Agriculture and Rural Development (GDARD) Requirements for Biodiversity Assessments Version 3 (GDARD, 2014b).

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

2 ASSESSMENT APPROACH

Maps and digital satellite images were generated prior to the field assessment to determine broad habitats, vegetation types and potentially sensitive sites. The biodiversity desktop assessment is confined to the study 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 study area include[10]:

- National Protected Areas Expansion Strategy (NPAES) – 2018 database;
- The South African Conservation Areas Database, Quarter 3 (SACAD, 2023);
- The South African Protected Areas Database, Quarter 3 (SAPAD, 2023);
- The Gauteng Conservation Plan (C-Plan V3.3, 2011);
- The National Vegetation Map Project (VEGMAP), with the below vector dataset used for information on Biomes, Bioregions and Vegetation Type(s):
    - 2018 Final Vegetation Map of South Africa, Lesotho, and Swaziland (SANBI, 2018a).
- The 2022 Red List of Ecosystems (RLE) for the terrestrial realm for South Africa (SANBI 2022a and 2022b). This database replaces the 2018 National Biodiversity Assessment (NBA) (SANBI, 2018b & 2018c) Terrestrial Assessment, 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 and 2015b), in conjunction with the South African Bird Atlas Project 2 (SABAP 2);
- From the 2021 Strategic Water Source Areas (SWSA) project:
    - 2021 SWSA **Surface water** (Lötter & Le Maitre (2021) and Mpumalanga Tourism and Parks Agency (2021)).
- The International Union for Conservation of Nature (IUCN) list of threatened species (IUCN, 2022b); and
- The Screening Tool (accessed 2023).

The field assessment was undertaken during spring (24th of October 2023). The field assessment aimed to determine if any changes have taken place pertaining to the ecological status of the study area and to “ground-truth” the results of the desktop databases.

[10] Datasets obtained from:

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

3 RESULTS OF THE DESKTOP ANALYSIS

The below section provides the outcome of the desktop research for the study area.

3.1 Conservation Characteristics of the study 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 (Tables 1 and 2). The dashboard report aims to present concise summaries of the data on as few pages as possible to allow for improved assimilation of results by the reader to take place. Where required, further discussion and interpretation are provided.

Table 1: Summary of the biodiversity characteristics associated with the study area [Quarter Degree Squares (QDS) 2527DD].

DETAILS OF THE STUDY AREA IN TERMS OF VEGMAP (SANBI 2006-2018)					
Biome	The study area is situated within the **Grassland Biome.**				
Bioregion	The study area is located within the **Mesic Highveld Grassland Bioregion.**				
Vegetation Type	The study area is situated within the critically endangered (CR) **Egoli Granite Grassland** vegetation type.				
DESCRIPTION OF THE EGOLI GRANITE GRASSLAND VEGETATION TYPE RELEVANT TO THE STUDY AREA (MUCINA & RUTHERFORD, 2006)					
Distribution	Located within the Gauteng Province.				
Climate	Strongly seasonal summer-rainfall region, with very dry winters.				
	MAP (mm)	**MAT (°C)**	**MFD (days)**	**MAPE (mm)**	**MASMS (%)**
	682	16	29	2194	75
Altitude (m)	1 280 – 1 660				
Conservation	**EN** as per Mucina and Rutherford (2006); however, the 2018 VEGMAP dataset as well as the 2022 RLE dataset indicate the vegetation type to now be Critically Endangered (CR). Target 24%. Only about 3% of this unit is conserved in statutory reserves and several private conservation areas. More than two thirds of the unit have already undergone transformation mostly by urbanisation, cultivation or by building of roads. Current rates of transformation threaten most of the remaining unconserved areas. There is no serious alien infestation in this unit. Erosion is moderate and very low.				
Geology & Soils	Archaean granite and gneiss of the Halfway House Granite at the core of the Johannesburg Dome supporting leached, shallow, coarsely grained, sandy soil poor in nutrients of Glenrosa form. Small area is built by ultramafics. Dominant land types associated with the vegetation type are Bb and Ba.				
Vegetation & landscape features (Appendix D)	Moderately undulating plains and low hills supporting tall, usually *Hyparrhenia hirta*-dominated grassland, with some woody species on rocky outcrops or rock sheets. The rocky habitats show a high diversity of woody species, which occur in the form of scattered shrub groups or solitary small trees.				
CONSERVATION DETAILS PERTAINING TO THE STUDY AREA (VARIOUS DATABASES)					
RLE (2022; Figure 3) & NBA (SANBI; 2018b)	This database replaces the NBA (2018), which forms one of the basis databases that the RLE database is generated upon. According to the RLE dataset (2022), most of the study area is located within the remaining extent of the **CR Egoli Granite Grassland**. The ecosystem is listed under the criteria B1(i) which indicates that the ecosystem has a restricted distribution ad has undergone a high rate of loss (Government of South Africa, 2022). This endemic ecosystem was poorly protected according to the 2018 protection level status (as defined by the 2018 NBA). 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 Dayaram et al., 2019). The revised list identifies 120 threatened terrestrial ecosystem types (55 CR, 51 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).				
SAPAD (2023, Q3); SACAD (2023, Q3); NPAES (2018)	According to the NPAES 2018 database, most of the study area is located within a **Priority Focus Area** (Figure 4). The SAPAD (2023) indicates that the study area is located within 10 km of five (5) protected areas, namely the **Crocodile River Reserve Central Nature Reserve Cluster** (approx. > 6 km north of the study area), the **Crocodile River Reserve Protected Environment** (approx. > 7,5 km north of the study area), the **Crocodile River Doornrandje Nature Reserve Cluster** (approx. > 7,5 km northeast of the study area), the **Diepsloot Nature Reserve** (approx. > 1,8 km east of the study area), and the **Fossil Hominid Sites of South Africa** (approx. > 4,5 km west of the study area) (Figure 5).				

	According to SACAD (2023), the study area is located within the **Magaliesberg Biosphere Reserve** (Figure 5). The Magaliesberg Biosphere Management Plan (Figure 6) indicates that the study area is in the **transitional area** of the biosphere reserve. "Biosphere zones are an attempt to reduce conflicts arising between conservation and development. There are opportunities for conservation and sustainable development that may help mitigate the vulnerability of the biodiversity and marginalised communities within the biosphere.
IBA (2015) (Figure 7)	The study area is located within an IBA, namely the **Magaliesberg IBA**. The most important trigger species in the IBA is the globally threatened *Gyps coprotheres* (Cape Vulture, VU). The number of breeding pairs in the Skeerpoort colony seems to be stable at 200–250. *Sagittarius serpentarius* (Secretarybird, EN) is the other globally threatened species in the IBA.
DETAIL OF THE STUDY AREA IN TERMS OF THE GAUTENG CONSERVATION PLAN (C-PLAN V3.3, 2011)	
Critical Biodiversity Area (CBA) (Figure 8)	Most of the study area is located within an area considered to be of biodiversity importance, most notably an **Important CBA (also referred to as CBA 2).** Triggering features of the Important CBA include the presence of Red and Orange Listed plant species and primary vegetation. CBAs are areas of high biodiversity value and need to be maintained in a natural state. CBA Important Areas are areas considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation, and ridges.
Ecological Support Area (ESA)	According to the Gauteng C-Plan, a small northern portion of the study area and portions within the investigation area are classified as an ESA. Ecological Support Areas (ESAs) are natural, near natural, degraded or heavily modified areas required to be maintained in an ecologically functional state to support CBAs and/or Protected Areas.
Wetland and River Buffers	According to the Gauteng C-Plan, there are no river or wetland buffers intersecting the study area.
River Dataset (2021)	
Ridges	The study area is not located within any ridges.
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 Swaziland. The Sub-National Water Source Areas (WSAs) are not nationally strategic as defined in the report but were included to provide a complete coverage.	
Name & Criteria	The study area is not within 10 km of a SWSA.

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.

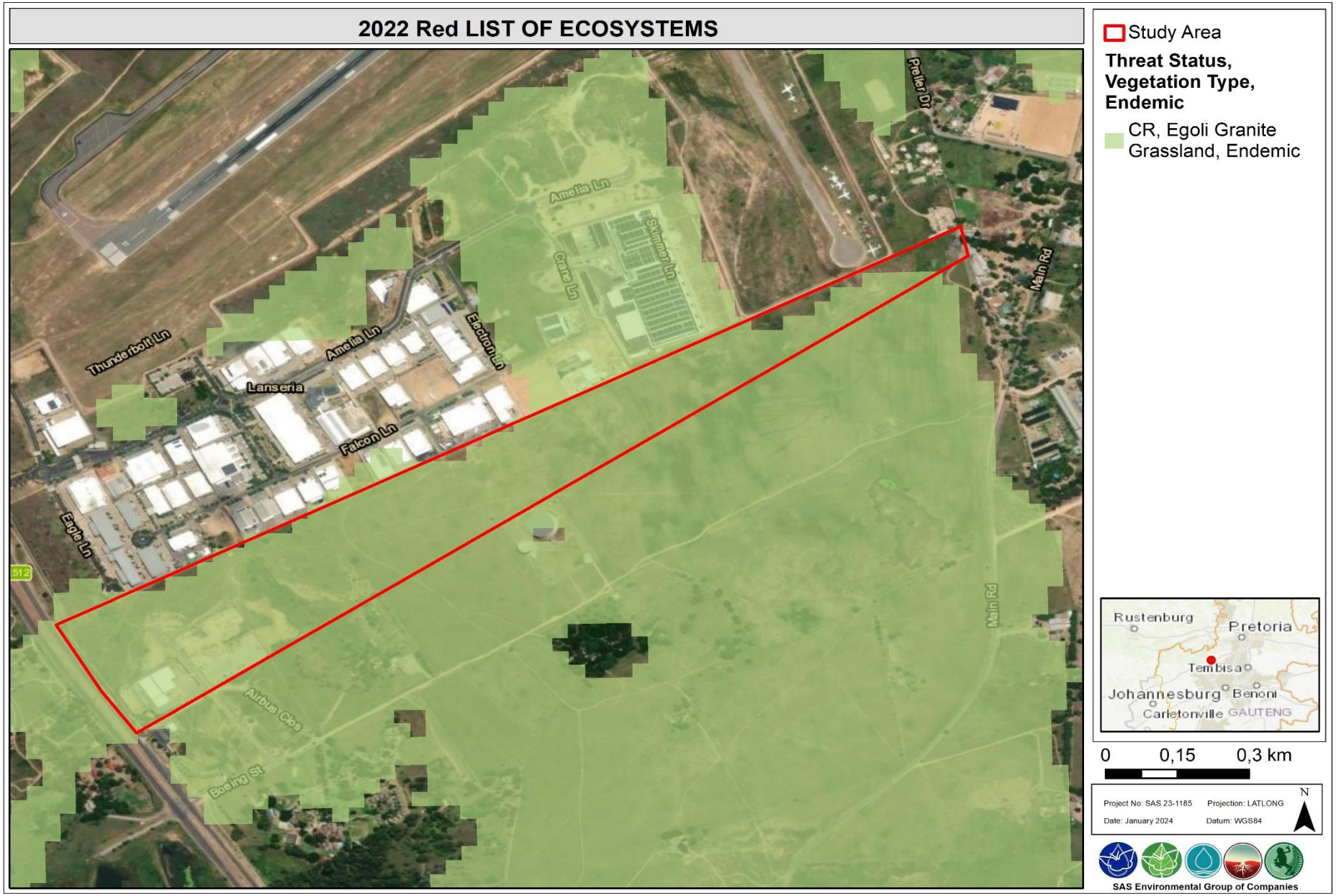

Figure 3: The study area in relation to the remaining extent of threatened ecosystems as per the RLE (SANBI; 2022a, 2022b).

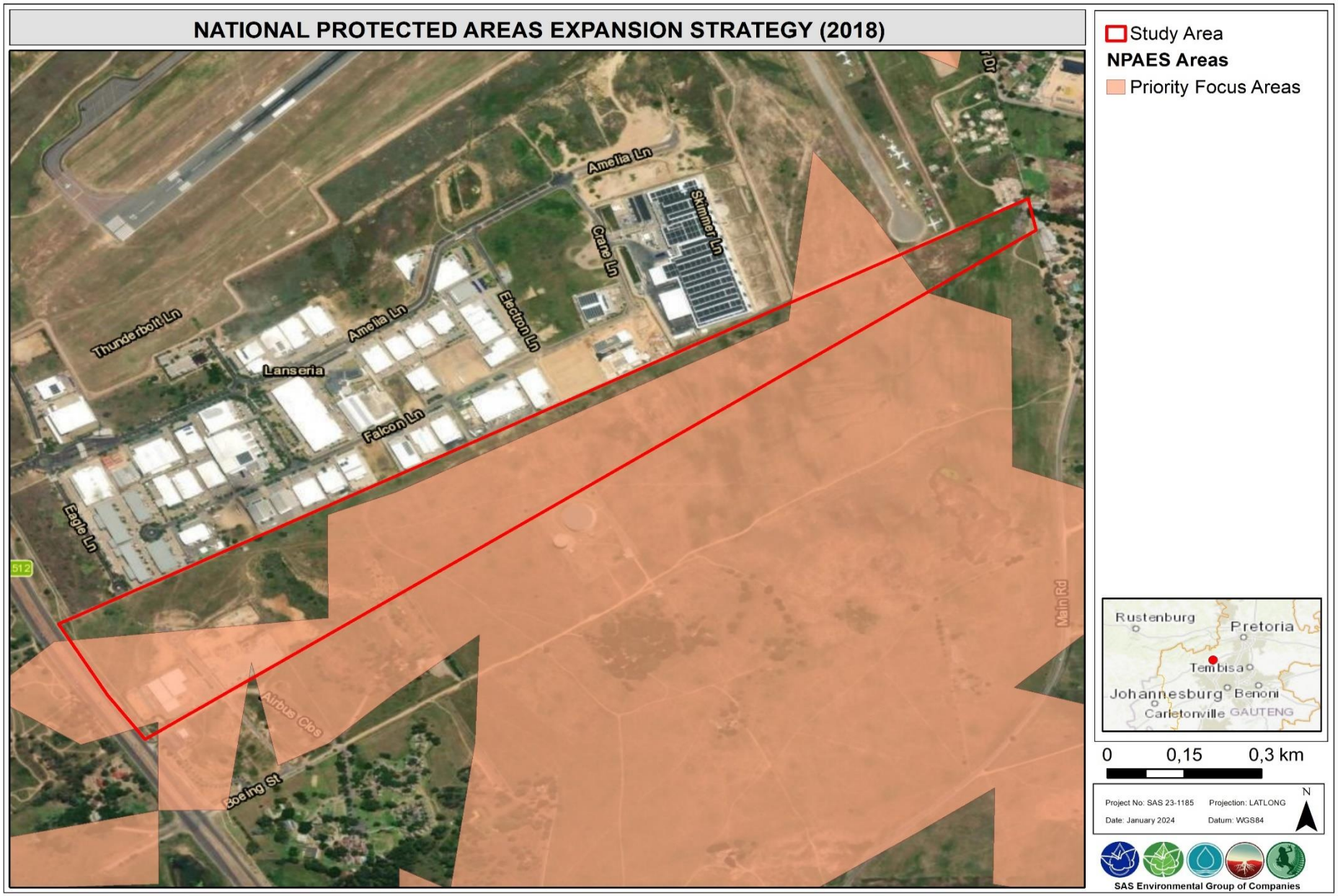

Figure 4: Priority Focus Areas (as per the NPAES 2018 database) that are associated with the study area.

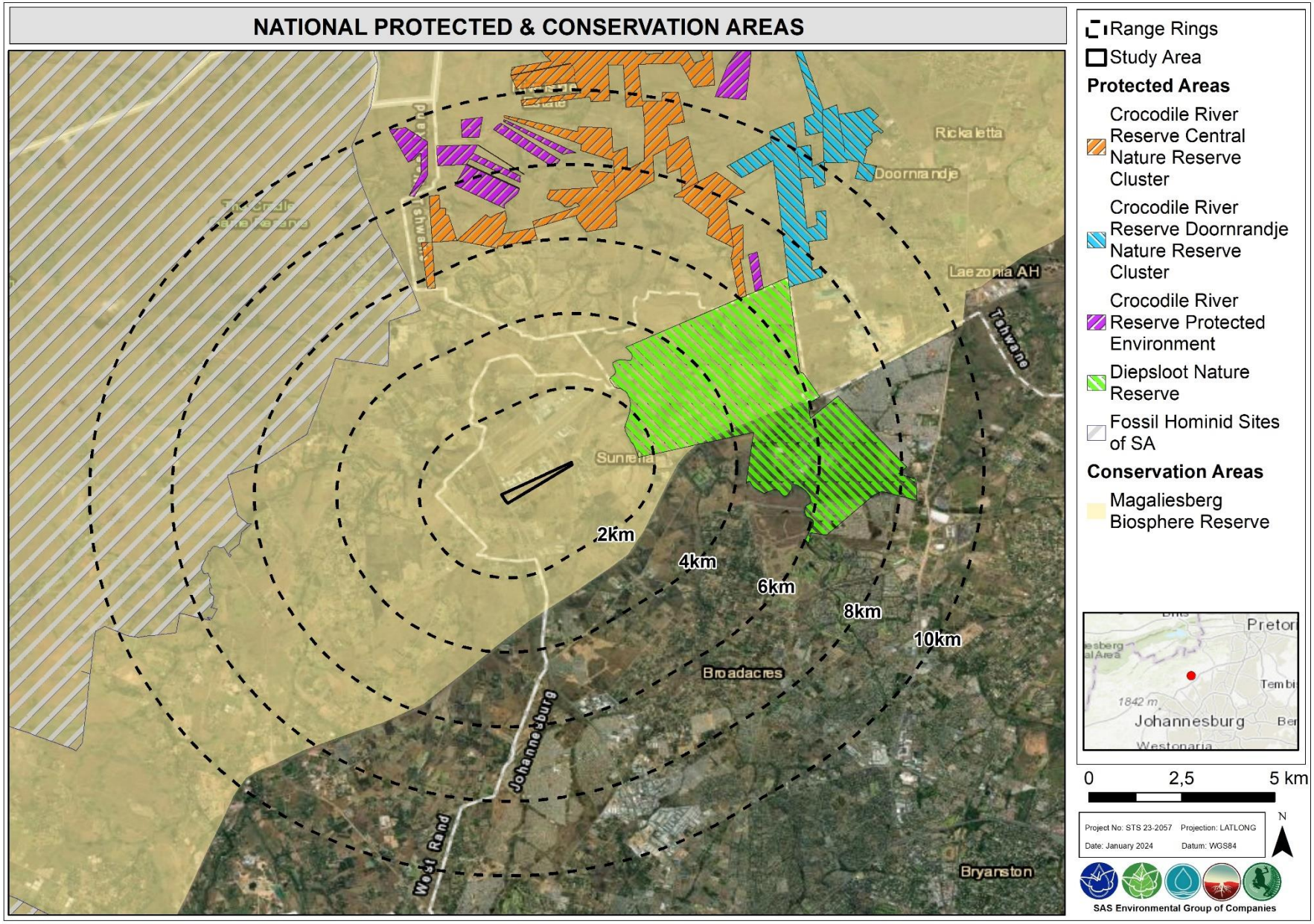

Figure 5: National Protected & Conservation Areas that are associated with the study area (as per the SACAD (2023, Q3) & SAPAD (2023, Q3)).

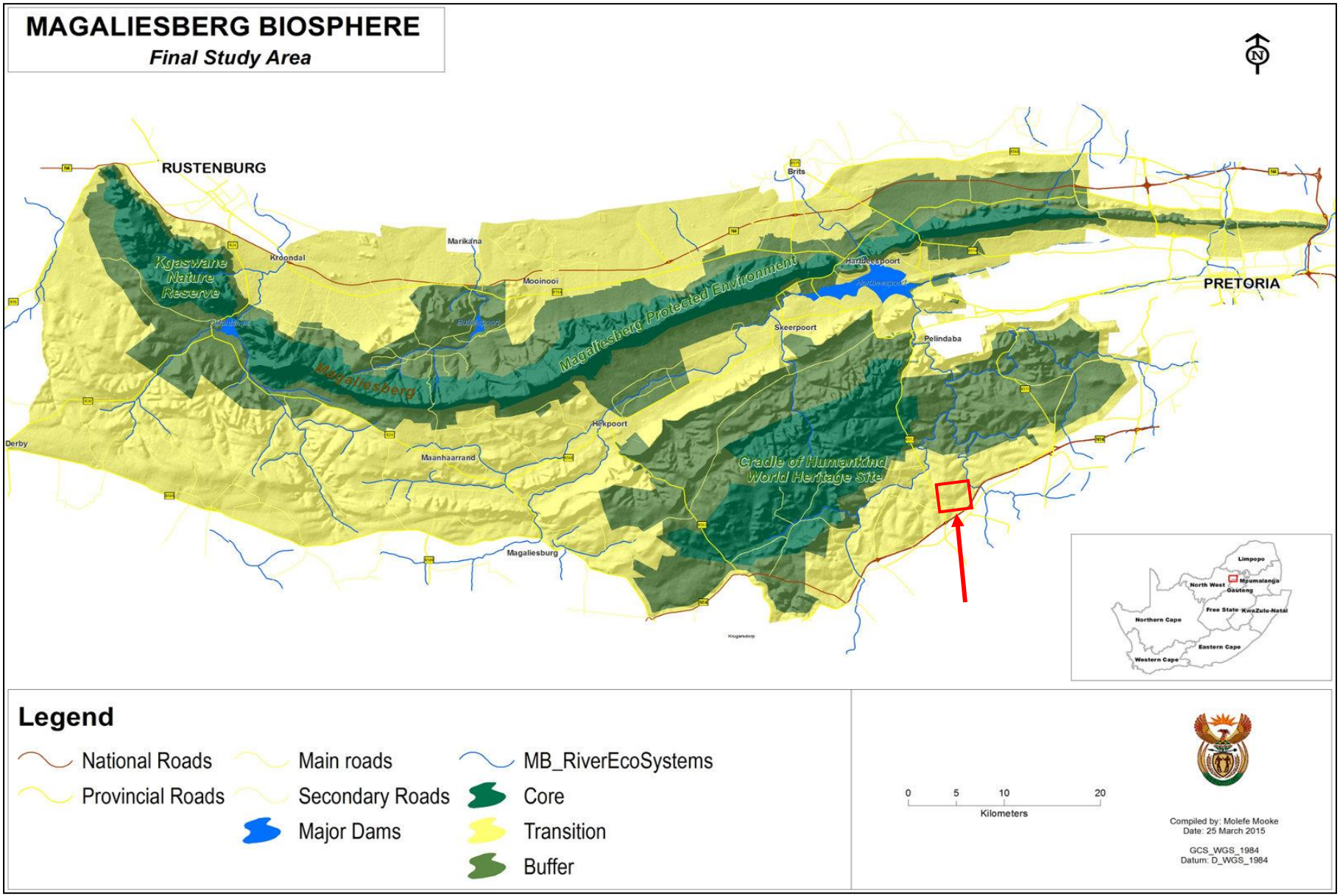

Figure 6: Core and transitional areas of the Magaliesberg Biosphere Reserve. The approximate locality of the study area is indicated by the red block.

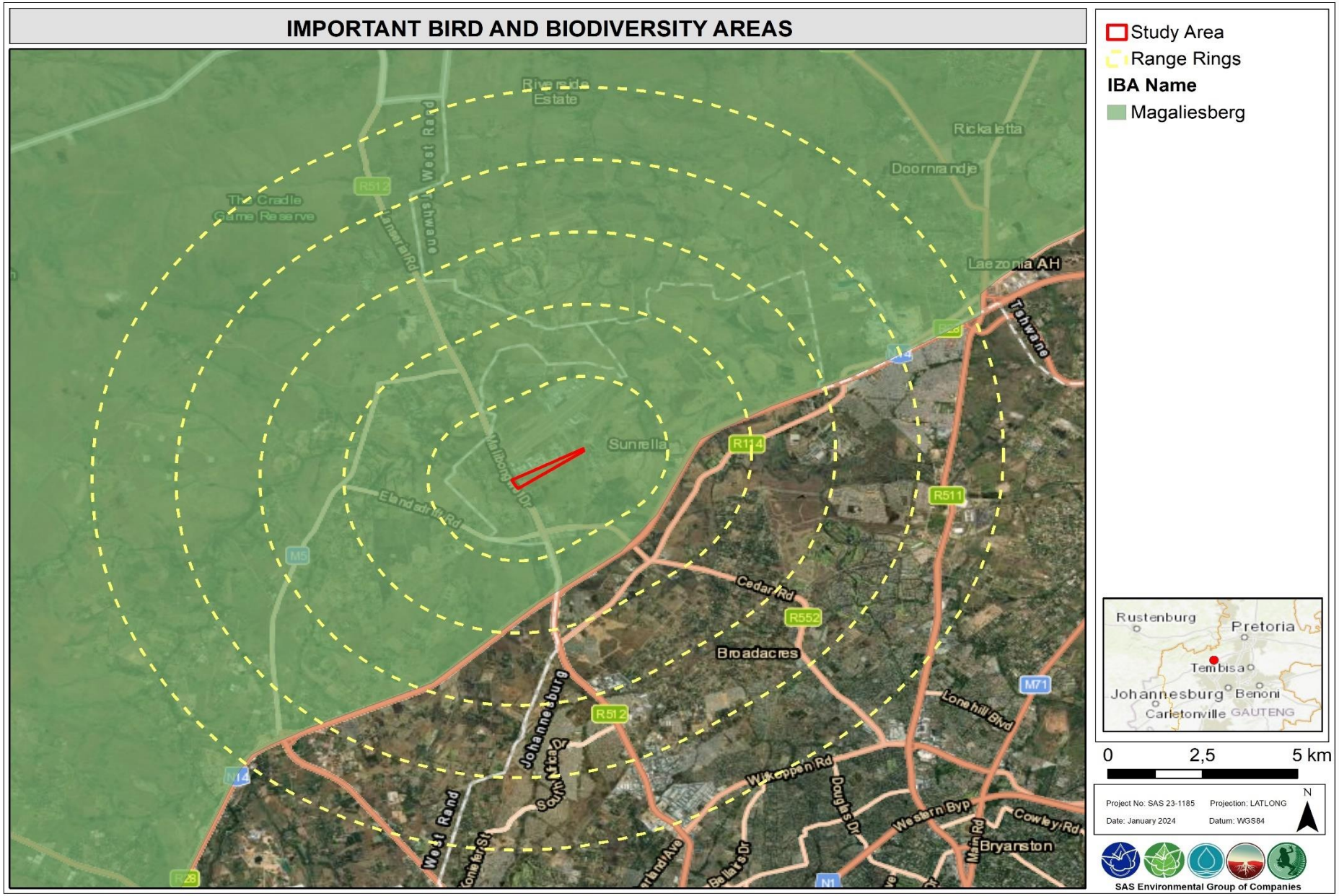

Figure 7: The Magaliesberg IBA in relation to the study area.

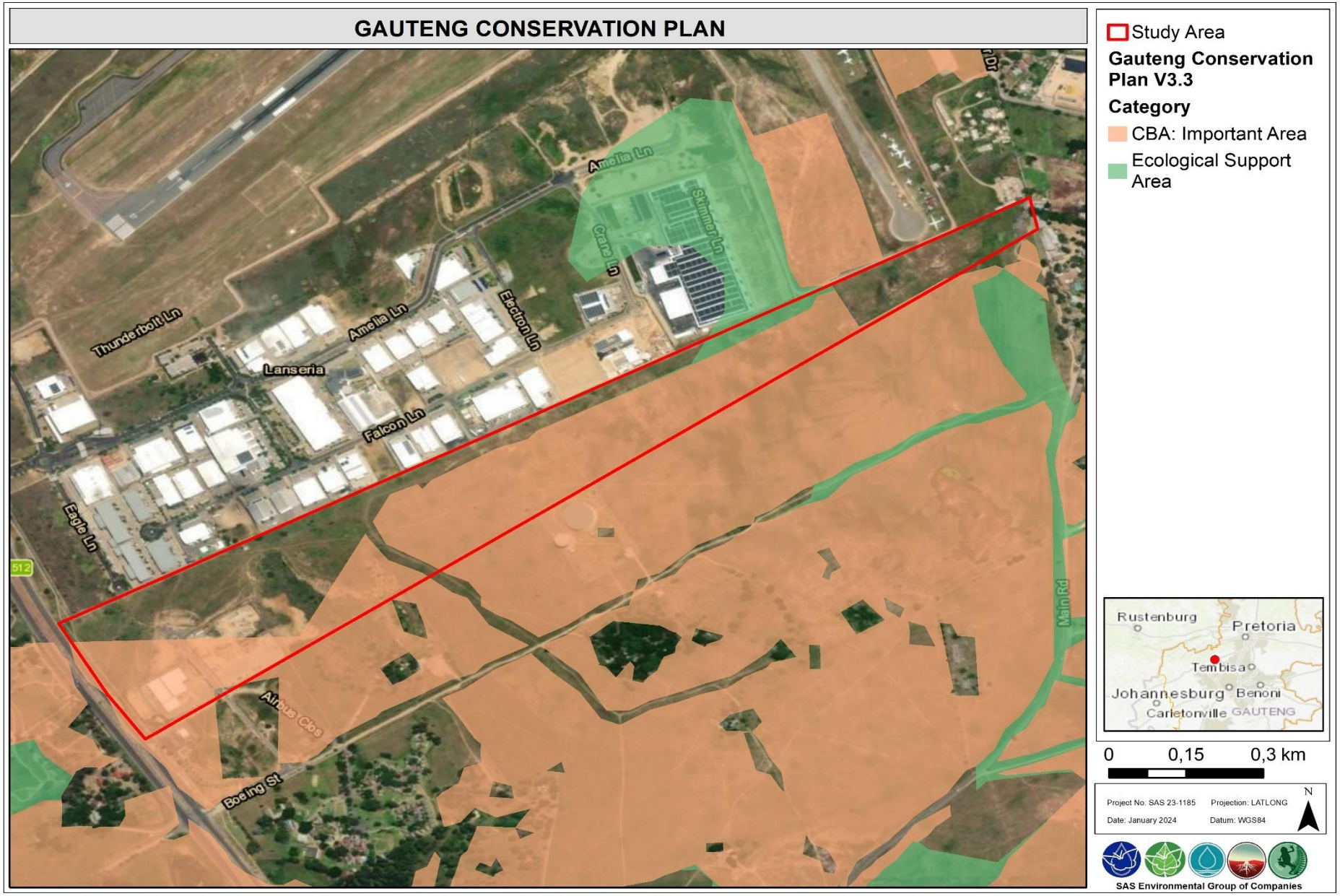

Figure 8: The critical biodiversity areas (CBAs) in relation to the study area, according to the Gauteng Conservation Plan (2011).

3.2 Screening Tool Outcomes

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 Environmental Assessment Practitioner (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 in relation to 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 particular 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 study area.

NATIONAL WEB-BASED ENVIRONMENTAL SCREENING TOOL (accessed 2023)	
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 (km²) are considered Critical Habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under **CR**, **EN**, or **VU** (**D** criteria) of the IUCN or species listed as Critically/ Extremely Rare under South Africa's National Red List Criteria. For each species reliant on a Critical Habitat, all remaining suitable habitat has been manually mapped at a fine scale. ➢ High: Recent occurrence records for all threatened (CR, EN, VU) and/or rare endemic species are included in the high sensitivity level. ➢ Medium: Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level**.** ➢ Low: Areas where no Species of Conservation Concern (SCC) are known or expected to occur.	
Animal Species **Figure 9**	For the Animal Species Theme, the study area is located within areas of **medium sensitivity** and **high sensitivity**. The medium and high sensitivity areas were triggered by the following trigger species: - **High:** Aves: *Tyto capensis* (African Grass Owl; VU); - **Medium:** Aves: *Eupodotis senegalensis* (White-bellied bustard, VU); Invertebrate: *Clonia uvarovi* (Uvarov's Clonia, VU); and Mammalia: *Dasymys robertsii* (Robert's shaggy rat, VU), *Crocidura maquassiensis* (Maquassie Musk Shrew; VU), and *Hydrictis maculicollis* (Spotted-necked otter, VU).
Plant Species	For the Plant Species theme, the screening tool identified the entire study area as having a **medium sensitivity**. The sensitivity of the study area is due to the potential presence of habitat for the following trigger species: - **Medium:** *Melolobium subspicatum* (VU) and Sensitive species 1248[11] (VU).
Terrestrial Sensitivity	The Terrestrial Sensitivity for the entire study area is considered to be a **very high**. The trigger features include **CBA 1, CBA 2, ESA 1, an NPAES priority area, and the CR ecosystem (Egoli Granite Grassland).**

[11] According to the best practise guidelines provided by SANBI, the name of sensitive species provided by the Online EIA Screening Tool may not appear in the final EIA report nor any of the specialist reports released into the public domain. This is to protect species that are under threat to factors such as illegal harvesting and overexploitation.

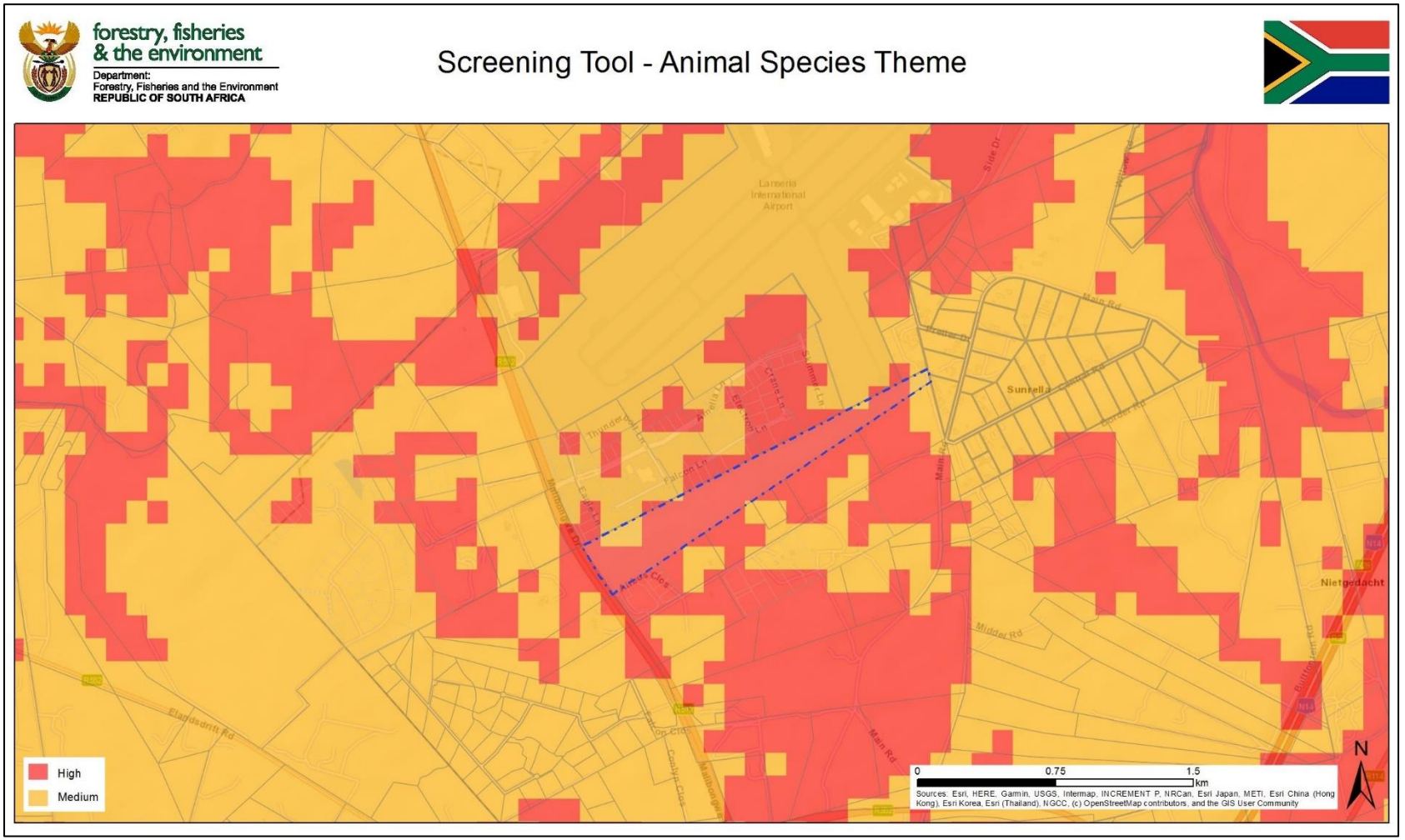

Figure 9: Animal Species Theme sensitivity for the study area as obtained from the Screening Tool (accessed 2023).

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APPENDIX A: Indemnity and Terms of Use of this Report

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

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APPENDIX B: Legislative Requirements

THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA, 1996

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

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

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

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

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

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

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

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

a) A specimen of a listed threatened or protected species;
b) Specimens of an alien species; or
c) A specimen of a listed invasive species without a permit.

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

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

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

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

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

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

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

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.

[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.

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

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

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

According to the department of Department of Environment, Forestry and Fisheries (DEFF) (previously the Department of Agriculture, Forestry and Fisheries (DAFF)) ©2019 website (https://www.daff.gov.za/daffweb3/):
"In terms of the National Forests Act of 1998 certain tree species (types of trees) can be identified and declared as protected. The Department of Water Affairs and Forestry followed an objective, scientific and participative process to arrive at the new list of protected tree species, enacted in 2004. All trees occurring in natural forests are also protected in terms of the Act. Protective actions take place within the framework of the Act as well as national policy and guidelines. Trees are protected for a variety of reasons, and some species require strict protection while others require control over harvesting and utilisation."

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

Section 12:

Declaration of trees as protected

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

Section 15(1):

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

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

GDARD REQUIREMENTS FOR BIODIVERSITY ASSESSMENTS VERSION 3 (GDARD, 2014B).

The biodiversity assessment must comply with the minimum requirements as stipulated by GDARD Version 3 of 2014 and must contain the following information:

- A location and description of the application site and proposed activities;
- Photographic record and description of the site characteristics and inventories of the faunal and floral species observed on site, with special mention to Red Listed species;
- Sensitivity map displaying all sensitive areas and associated buffers as listed in the Sensitivity Mapping Rules for Biodiversity Assessments section of GDARD V3 (2014b); and

A list of recommendations and mitigation measures to reduce the potential environmental impacts that the proposed development might have on the terrestrial ecology associated with the site.

APPENDIX C: Impact Assessment Methodology

Ecological Impact Assessment Method

For the Environmental Assessment Practitioner (EAP) to allow for sufficient consideration of all environmental impacts, impacts were assessed using a common, defensible method of assessing significance that will enable comparisons to be made between risks/impacts and will enable authorities, stakeholders and the applicant to understand the process and rationale upon which risks/impacts have been assessed. The method used for assessing risks/impacts is outlined in the sections below.

The first stage of risk/impact assessment is the identification of environmental activities, aspects, and impacts. This is supported by the identification of receptors and resources, which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. The definitions used in the impact assessment are presented below.

- An **activity** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or infrastructure that is possessed by an organisation.
- An **environmental aspect** is an 'element of an organizations activities, products and services which can interact with the environment'[13]. The interaction of an aspect with the environment may result in an impact.
- **Environmental risks/impacts** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. In the case where the impact is on human health or wellbeing, this should be stated. Similarly, where the receptor is not anthropogenic, then it should be stipulated what the receptor is.
- **Receptors** can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as wetlands, flora and riverine systems.
- **Resources** include components of the biophysical environment.
- **Frequency of activity** refers to how often the proposed activity will take place.
- **Frequency of impact** refers to the frequency with which a stressor (aspect) will impact on the receptor.
- **Severity** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.
- **Spatial extent** refers to the geographical scale of the impact.
- **Duration** refers to the length of time over which the stressor will cause a change in the resource or receptor.

The significance of the impact is then assessed by rating each variable numerically according to the defined criteria. Refer to the Table C1. The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity, spatial scope and duration of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact occurring and can obtain a maximum value of 10. The values for likelihood and consequence of the impact are then read off a significance-rating matrix and are used to determine the level of mitigation that may be necessary[14].

The assessment of significance is undertaken twice. Initial significance is based on only natural and existing mitigation measures (including built-in engineering designs). The subsequent assessment takes into account the recommended management measures required to mitigate the impacts.

[13] The definition has been aligned with that used in the ISO 14001 Standard.

[14] Some risks/impacts that have low significance will however still require mitigation.

Measures such as demolishing infrastructure, and reinstatement and rehabilitation of land, are considered post-mitigation.

The model outcome of the impacts was then assessed in terms of impact certainty and consideration of available information. The Precautionary Principle is applied in line with South Africa's National Environmental Management Act, 1998 (Act No. 107 of 1998) in instances of uncertainty or lack of information, by increasing assigned ratings or adjusting final model outcomes. In certain instances, where a variable or outcome requires rational adjustment due to model limitations, the model outcomes have been adjusted.

Table C1: Criteria for assessing significance of impacts

LIKELIHOOD DESCRIPTORS

Probability of impact	**RATING**
Highly unlikely	1
Possible	2
Likely	3
Highly likely	4
Definite	5
Sensitivity of receiving environment	**RATING**
Ecology not sensitive/important	1
Ecology with limited sensitivity/importance	2
Ecology moderately sensitive/ /important	3
Ecology highly sensitive /important	4
Ecology critically sensitive /important	5

CONSEQUENCE DESCRIPTORS

Severity of impact	**RATING**
Insignificant / ecosystem structure and function unchanged	1
Small / ecosystem structure and function largely unchanged	2
Significant / ecosystem structure and function moderately altered	3
Great / harmful/ ecosystem structure and function largely altered	4
Disastrous / ecosystem structure and function seriously to critically altered	5
Spatial scope of impact	**RATING**
Activity specific/ < 5 ha impacted / Linear developments affected < 100m	1
Development specific/ within the site boundary / < 100ha impacted / Linear developments affected < 100m	2
Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear developments affected < 1000m	3
Regional within 5 km of the site boundary / < 2000ha impacted / Linear developments affected < 3000m	4
Entire habitat unit / Entire system/ > 2000ha impacted / Linear developments affected > 3000m	5
Duration of impact	**RATING**
One day to one month	1
One month to one year	2
One year to five years	3
Life of operation or less than 20 years	4
Permanent	5

Table C2: Significance Rating Matrix.

LIKELIHOOD (Frequency of activity + Frequency of impact)	CONSEQUENCE (Severity + Spatial Scope + Duration)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Table C3: Positive/Negative Mitigation Ratings.

Significance Rating	Value	Negative Impact Management Recommendation	Positive Impact Management Recommendation
Very high	126-150	Critically consider the viability of proposed projects Improve current management of existing projects significantly and immediately	Maintain current management
High	101-125	Comprehensively consider the viability of proposed projects Improve current management of existing projects significantly	Maintain current management
Medium-high	76-100	Consider the viability of proposed projects Improve current management of existing projects	Maintain current management
Medium-low	51-75	Actively seek mechanisms to minimise impacts in line with the mitigation hierarchy	Maintain current management and/or proposed project criteria and strive for continuous improvement
Low	26-50	Where deemed necessary seek mechanisms to minimise impacts in line with the mitigation hierarchy	Maintain current management and/or proposed project criteria and strive for continuous improvement
Very low	1-25	Maintain current management and/or proposed project criteria and strive for continuous improvement	Maintain current management and/or proposed project criteria and strive for continuous improvement

The following points were considered when undertaking the assessment:

- Risks and impacts were analysed in the context of the *project's area of influence* encompassing:
  - Primary project site and related facilities that the proponent and their contractors develops or controls;
  - Areas potentially impacted by cumulative impacts for any existing project or condition and other project-related developments; and
  - Areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.
- Risks/Impacts were assessed for all stages of the project cycle including:
  - Pre-construction;
  - Construction;
  - Operation; and
  - Closure and decommissioning.
- If applicable, transboundary or global effects were assessed;
- Individuals or groups who may be differentially or disproportionately affected by the project because of their *disadvantaged* or *vulnerable* status were assessed; and

- Particular attention was paid to describing any residual impacts that will occur after rehabilitation.

Mitigation measure development

According to the DEA *et al.,* (2013[15]) "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 fresh water;
- 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 (Act 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[16]:

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

[15] Department of Environmental Affairs, Department of Mineral Resources, Chamber of Mines, South African Mining and Biodiversity Forum, and South African National Biodiversity Institute. 2013. Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector. Pretoria. 100 pages.

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

- 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 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 focus area 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.[17]

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[18] 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; and
- 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.

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.

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

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

APPENDIX D: Vegetation Types

Egoli Granite Grassland (Gm10)

Figure D1: Gm 10 Egoli Granite Grassland: Rocky outcrop at Knoppieslaagte, west of Valhalla near Centurion (Gauteng) with *Aloe greatheadii*, *Hypoxis rigidula*, *Pygmaeothamnus zeyheri*, *Thesium magalismontanum* and *Crassula capitella* and grasses such as *Elionurus muticus*, *Tristachya leucothrix*, *Melinis repens* and *Trachypogon spicatus*e. Image by D.B. Hoare, page 398 (Mucina & Rutherford, 2006).

Table D1: Floristic species of *The Egoli Granite Grassland* (Mucina & Rutherford, 2006[19]).

Plant Community	Species
Woody Layer	
Trees	**Small Tree**: *Vangueria infausta*
Shrubs	**Tall Shrub**: *Searsia pyroides*. **Low Shrubs**: *Anthospermum hispidulum*, *Anthospermum rigidum* subsp. *pumilum*, *Lasiosiphon capitatus*, *Helichrysum kraussii*, *Ziziphus zeyheriana*. **Succulent Shrub**: *Lopholaena coriifolia*.
Forb layer	
Herbs	*Acalypha angustata*, *Acalypha peduncularis*, *Ocimum obovatum*, *Berkheya insignis*, *Crabbea hirsuta*, *Cyanotis speciosa*, *Dicoma anomala*, *Helichrysum rugulosum*, *Justicia anagalloides*, *Kohautia amatymbica*, *Nidorella hottentotica*, *Pentanisia prunelloides* subsp. *latifolia*, *Pseudognaphalium luteo-album*, *Senecio venosus*.
Geophytic Herbs	*Cheilanthes deltoidea*, *Cheilanthes hirta*.
Graminoid layer	
Graminoids	*Aristida canescens* (d), *Aristida congesta* (d), *Cynodon dactylon* (d), *Digitaria monodactyla* (d), *Eragrostis capensis* (d), *Eragrostis chloromelas* (d), *Eragrostis curvula* (d), *Eragrostis racemosa* (d), *Heteropogon contortus* (d), *Hyparrhenia hirta* (d), *Melinis repens* subsp. *repens* (d), *Monocymbium ceresiiforme* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Tristachya leucothrix* (d), *Andropogon eucomus*, *Aristida aequiglumis*, *Aristida diffusa*, *Aristida scabrivalvis* subsp. *borumensis*, *Bewsia biflora*, *Brachiaria serrata*, *Bulbostylis burchellii*, *Cymbopogon caesius*, *Digitaria tricholaenoides*, *Diheteropogon amplectens*, *Eragrostis gummiflua*, *Eragrostis sclerantha*, *Panicum natalense*, *Schizachyrium sanguineum*, *Setaria nigrirostris*, *Tristachya rehmannii*, *Urelytrum agropyroides*.

*(d) = dominant

[19] Mucina, L. and Rutherford, M.C. (2006). The vegetation of South Africa, Lesotho, and Swaziland. Strelitzia 19., (South African National Biodiversity Institute: Pretoria, South Africa). Memoirs of the Botanical Survey of South Africa.

APPENDIX E: Details, Expertise And Curriculum Vitae of Specialists

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

Samantha-Leigh Daniels	PhD (Plant Science) (University of Pretoria)
Jandre Potgieter	Hons Zoology & Entomology (University of Pretoria)
Christien Steyn	MSc Plant Science (University of Pretoria)
Chris Hooton	National Diploma Nature Conservation (Tshwane University of Technology)
Paul da Cruz	BA (Hons) (Geography and Environmental Studies) (University of the Witwatersrand)
Stephen van Staden	MSc Environmental Management (University of Johannesburg)
Sanja Erwee	BSc Zoology (University of Pretoria)

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

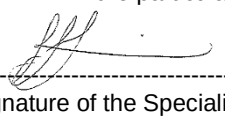
Company of Specialist:	**Scientific Terrestrial Services**		
Postal address:	PO. Box 751779, Gardenview		
Postal code:	2047	Fax:	086 724 3132
Telephone:	011 616 7893		
Name / Contact person:	Chris Hooton		
E-mail:	chris@sasenvgroup.co.za		
Qualifications	BTech Nature Conservation (Tshwane University of Technology) National Diploma Nature Conservation (Tshwane University of Technology)		
Name / Contact person:	Christien Steyn		
E-mail:	christien@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	Registered Professional Scientist at 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) Grassland Society of South Africa (GSSA) Land Rehabilitation Society of Southern Africa (LaRSSA)		
Name / Contact person:	Paul da CRuz		
E-mail:	paul@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	Registered Certificated Scientist at South African Council for Natural Scientific Professions (SACNASP) Registered Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioners Association of South Africa (EAPASA) Member of the South African Wetland Society (SAWS)		
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	Member of the South African Association of Botanists (SAAB) Member of the Botanical Society of South Africa (BotSoc) Member of the Association for Tropical Biology and Conservation (ATBC)		

Name / Contact person:	Stephen van Staden
E-mail:	stephen@sasenvgroup.co.za
Qualifications	MSc Environmental Management (University of Johannesburg) BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)
Registration / Associations	Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP) Accredited River Health Practitioner by the South African River Health Program (RHP) Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum Member of the Gauteng Wetland Forum Member of International Association of Impact Assessors (IAIA) South Africa; Member of the Land Rehabilitation Society of South Africa (LaRSSA)
Name / Contact person:	Sanja Erwee
E-mail:	sanja@sasenvgroup.co.za
Qualifications	BSc Zoology (University of Pretoria)
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)

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

I, Samantha-Leigh Daniels, declare that -

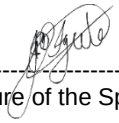
- I act as the **independent specialist** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity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



Signature of the Specialist

I, Jandre Potgieter, declare that -

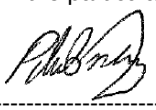
- I act as the **independent specialist** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity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



Signature of the Specialist

I, Paul da Cruz, declare that -

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



Signature of the Specialist

I, Sanja Erwee, declare that -

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

Signature of the Specialist

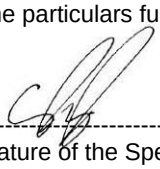
I, Christien Steyn, declare that -

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

Signature of the Specialist

I, Chris Hooton Steyn, declare that -

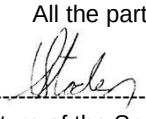
- I act as the **independent specialist (reviewer)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise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



Signature of the Specialist

I, Stephen van Staden, declare that -

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



Signature of the Specialist

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHRISTOPHER HOOTON

PERSONAL DETAILS

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

EDUCATION

Qualifications

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

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Eastern Cape, Western Cape, Northern Cape, Free State
Africa - Zimbabwe, Sierra Leone, Zambia

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

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

Freshwater Assessments

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

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF PAUL DA CRUZ

PERSONAL DETAILS

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

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered Certificated Scientist at South African Council for Natural Scientific Professions (SACNASP)
Registered Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioners Association of South Africa (EAPASA)
Member of the South African Wetland Society (SAWS)

EDUCATION

Qualifications

BA (Hons) (Geography and Environmental Studies) (University of the Witwatersrand)	1998
BA (Geography) (University of the Witwatersrand)	1197

Short courses and Training

- Taxonomy of Wetland Plants (Water Research Commission) (2017)
- Advanced Grass Identification (Frits van Outshoorn) (2010)
- Grass Identification (Frits van Outshoorn) (2009)
- Soil Form Classification and Wetland Delineation (TerraSoil Science) (2008)

AREAS OF WORK EXPERIENCE

South Africa – All provinces
Southern Africa – Lesotho, Botswana
International – United Kingdome (England and Scotland); USA

KEY SPECIALIST DISCIPLINES

Legislative Requirements, Processes and Assessments

- EIA / BA Applications
- Environmental Authorisation Amendments
- EMPr Compilation
- Environmental Compliance Monitoring (Environmental Auditing)
- Environmental Screening Assessments and Listing Notice 3 Trigger Identification / Mapping
- Strategic Environmental Assessments and Environmental Management Frameworks
- EIA / Specialist Study Peer Review

Freshwater Assessments

- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Maintenance and Management Plans
- Plant Species and Landscape Plans
- Freshwater Assessments in support of Environmental Screening Assessments, Precinct Planning & SEA
- Wetland Construction (Compliance) Monitoring

Biodiversity Assessments

- Avifaunal Assessments
- Strategic Biodiversity Assessment

Visual Impact Assessment

- Visual Impact Assessments

GIS / Spatial Analysis

- GIS Spatial Analysis and Listing Notice 3 mapping.

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHRISTIEN STEYN

PERSONAL DETAILS

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

MEMBERSHIP IN PROFESSIONAL SOCIETIES

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

EDUCATION

Qualifications

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

Short courses and Training

- BotSoc Branch: Species Environmental Assessment Guidelines Course (2022).
- Advanced Grass Identification Course (2021).
- Practical Plant Identification, including Herbarium Usage and Protocols.
- Vegetation Classification and Mapping: Use of Geographic Information System for understanding vegetation pattern and biodiversity conservation.
- Introduction to Statistics for Biologists: Applications of plant ecology principles in plant conservation, i.e., species distribution modelling, alien plant invasions, conservation planning.
- International Plant Functional Trait Course: Hands-on, field-based exploration of plant functional traits, along with experience in the usage of plant traits data in climate-change research and ecosystem ecology. https://www.uib.no/en/rg/EECRG/97477/plant-functional-traits-course-2

AREAS OF WORK EXPERIENCE

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

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

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

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF SAMANTHA-LEIGH DANIELS

PERSONAL DETAILS

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

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Member of the South African Association of Botanists (SAAB)
Member of the Botanical Society of South Africa (BotSoc)
Member of the Association for Tropical Biology and Conservation (ATBC)

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, Western Cape

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
- Desktop Studies, Mapping and Background Information Research

Training

- Plant species identification
- Herbarium usage and protocols

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF JANDRE POTGIETER

PERSONAL DETAILS

Position in Company	Junior 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

AREAS OF WORK EXPERIENCE

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

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Faunal Assessments

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF STEPHEN VAN STADEN

PERSONAL DETAILS

Position in Company	Group CEO, Water Resource Discipline Lead, Managing Member, Ecologist, Aquatic Ecologist
Joined SAS Environmental Group of Companies	2003 (year of establishment)

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)
Accredited River Health Practitioner by the South African River Health Program (RHP)
Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum
Member of the Gauteng Wetland Forum
Member of International Association of Impact Assessors (IAIA) South Africa;
Member of the Land Rehabilitation Society of South Africa (LaRSSA)

EDUCATION

Qualifications

MSc Environmental Management (University of Johannesburg)	2003
BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg)	2001
BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)	2000

Short Courses

Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs	2017
Tools for Wetland Assessment (Rhodes University)	2017
Legal liability training course (Legricon Pty Ltd)	2018
Hazard identification and risk assessment training course (Legricon Pty Ltd)	2018
Wetland Management: Introduction and Delineation (WLID1502S) (University of the Free State)	2018
Hydropedology and Wetland Functioning (TerraSoil Science and Water Business Academy)	2018

AREAS OF WORK EXPERIENCE

South Africa – All Provinces
Southern Africa – Lesotho, Botswana, Mozambique, Zimbabwe Zambia
Eastern Africa – Tanzania Mauritius
West Africa – Ghana, Liberia, Angola, Guinea Bissau, Nigeria, Sierra Leona
Central Africa – Democratic Republic of the Congo

DEVELOPMENT SECTORS OF EXPERIENCE

1. Mining: Coal, chrome, Platinum Group Metals (PGMs), mineral sands, gold, phosphate, river sand, clay, fluorspar
2. Linear developments (energy transmission, telecommunication, pipelines, roads)
3. Minerals beneficiation
4. Renewable energy (Hydro, wind and solar)
5. Commercial development
6. Residential development
7. Agriculture
8. Industrial/chemical

KEY SPECIALIST DISCIPLINES

Legislative Requirements, Processes and Assessments

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

Freshwater Assessments

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

- Maintenance and Management Plans
- Plant Species and Landscape Plans
- Freshwater Offset Plans
- Hydropedological Assessment
- Pit Closure Analysis

Aquatic Ecological Assessment and Water Quality Studies

- Habitat Assessment Indices (IHAS, HRC, IHIA & RHAM)
- Aquatic Macro-Invertebrates (SASS5 & MIRAI)
- Fish Assemblage Integrity Index (FRAI)
- Fish Health Assessments
- Riparian Vegetation Integrity (VEGRAI)
- Toxicological Analysis
- Water quality Monitoring
- Screening Test
- Riverine Rehabilitation Plans

Biodiversity Assessments

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

Soil and Land Capability Assessment

- Soil and Land Capability Assessment
- Hydropedological Assessment

Visual Impact Assessment

- Visual Baseline and Impact Assessments
- Visual Impact Peer Review Assessments

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION CURRICULUM VITAE OF SANJA ERWEE

PERSONAL DETAILS

Position in Company	GIS Technician and Visual Specialist
Joined SAS Environmental Group of Companies	2014

EDUCATION

Qualifications

BSC Zoology (University of Pretoria)	2013

Short Courses

Global Mapper	2015
SANBI BGIS Course	2017
Global Mapper Lidar Course	2017
ESRI MOOC ARCGIS Cartography	2018

AREAS OF WORK EXPERIENCE

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

KEY SPECIALIST DISCIPLINES

Freshwater Assessments

- Desktop Freshwater Delineation
- Plant species and Landscape Plan

Visual Impact Assessment

- Visual Baseline and Impact Assessments
- Visual Impact Peer Review Assessments
- View Shed Analyses
- Visual Modelling

GIS

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