

Appendix F.4

TERRESTRIAL BIODIVERSITY





SCIENTIFIC TERRESTRIAL SERVICES

Terrestrial Biodiversity Assessment

AS PART OF THE ENVIRONMENTAL
AUTHORISATION PROCESS FOR THE
PROPOSED TOURNEE SOLAR PARK GRID
CONNECTION NEAR THUTHUKANI,
MPUMALANGA PROVINCE.

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EXECUTIVE SUMMARY

Scientific Terrestrial Services (Pty) Ltd. (STS) was appointed to conduct a terrestrial biodiversity assessment as part of the Environmental Authorisation (EA) application process for the proposed Tourneè Solar Park Grid Connection near Thuthukani, Mpumalanga Province.

At the time of report development, the proponent was also in the process of applying for EA for the nearby “Tourneè Solar Park” which consists of two solar photovoltaic (PV) facilities that each have a generating capacity of 150 megawatts (MW). The proposed Tourneè Solar Park will be connected to the Eskom Alpha 765/400 kilovolt (kV) Substation via a 132kV Overhead Power Line (OHPL), i.e., “the proposed Tourneè Solar Park grid connection project”. The proposed Tourneè Solar Park grid connection project (which is the focus of this report) will include a back-to-back 132 kV substation and 132 kV evacuation OHPL, which will transfer the combined generating capacity of the two PV facilities to the Eskom Alpha substation. The focus of this report was thus to provide an indication of the habitat conditions and associated impacts that the proposed Tourneè Solar Park grid connection project (including substation and OHPL development) would have on the applicable landscape.

The proposed Tourneè Solar Park Grid Connection project and a 300 metre (m) assessment corridor (i.e., 150 m on either side of the OHPL) will be referred to as the “**study area**”. The closest town to the study area is Standerton, within the Lekwa Local Municipality and Gert Sibande District Municipality in the Mpumalanga Province.

The field assessment was undertaken during spring (25th and 26th 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)

The study area occurs within the remaining extent of the Soweto Highveld Grassland vegetation type based on spatial data from the National Biodiversity Assessment (NBA; 2018) and the National Red Listed Ecosystems (RLE, 2022) database; this vegetation type is considered to be vulnerable (VU) in terms of threat status and is currently Not Protected (NP). 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 (Part A)).

From a provincial biodiversity management perspective, the Mpumalanga Biodiversity Sector Plan (MBSP) 2023 dataset identified that the majority of the study area is associated with ‘Heavily Modified Areas’ (e.g., cultivated areas) and ‘Moderately Modified Areas’. Scattered portions of the study area are represented by ‘Other Natural Areas’ (generally located within sections of the study area that are not cultivated) and a very small portion of the study area is identified as a ‘Optimal Critical Biodiversity Area (CBA)’, which located in the central sections of the proposed study area. The triggering features of the CBA, as provided by the Mpumalanga Tourism and Parks Agency (MTPA), is the presence of threatened ecosystems (i.e., Soweto Highveld Grassland) and wetland features.

GROUND TRUTHED RESULTS (SPECIES DIVERSITY AND HABITAT INTEGRITY)

Based on the results of the field investigations conducted between the 25th and 26th of October 2023, three habitat units were identified within the study area, namely:

- **Grassland Habitat:** Distinguished between the Highveld Grassland Habitat (**7.08 ha**) which is considered to be primary grasslands¹ and the Secondary Grassland Habitat (**242.14 ha**);
- **Freshwater Ecosystems:** consisted of an Unchanneled Valley Bottom (UCVB) Wetland (**49.66 ha**) and Relic Wetland habitat (**2.91 ha**), as identified by the freshwater specialist (refer to the freshwater report SAS 23 – 1190, 2023); and
- **Transformed Habitat (197.78 ha):** A large portion of the study area was classified as Transformed Habitat. The Transformed Habitat is associated with cultivated areas and sections dominated by Alien Trees Stand (ATS) vegetation and built-up areas.

¹ Primary grasslands are those that have not been significantly modified from their original state; even though they may no longer have their full complement of naturally-occurring species, they have not undergone significant or irreversible modification and still retain their essential ecological characteristics.



The habitat associated with the Grassland Habitat and Freshwater Ecosystems is considered to be indigenous vegetation² (as per the National Environmental Management Act 1998 (Act No. 107 of 1998) (NEMA) definition); however, the Transformed habitat is no longer considered to support indigenous vegetation as the habitat has been significantly modified within the last 10 years.

Species diversity and habitat integrity:

Overall, the floral habitat within the study area ranged from intact areas with moderate to moderately high species diversity to highly transformed areas in which indigenous vegetation was scarce, and dominated by Alien Invasive Plant (AIP) species. The study area has been fragmented by various anthropogenic activities (e.g., construction of the power station and associated Ashing facility and cultivation). The UCVB wetland habitat and the Highveld Grassland Habitat are located within the centre of the study area and are considered to include intact floral communities that represent connective corridors and support ecological processes. The Secondary Grassland Habitat has been significantly modified by historic activities and is considered to be semi-intact, whereas the Relic Wetland habitat and the Transformed Habitat are no longer considered to be intact, or ecologically functional and both are considered to be in an overall poor ecological condition.

Faunal habitat within the study area ranged from fairly intact habitat within the UCVB Wetland and Highveld Grassland Habitat to less sensitive and degraded habitat within the Secondary Grassland, Relic Wetland and Transformed Habitat. Faunal diversity and abundance were highest in the UCVB Wetland and Highveld Grassland habitats due to plentiful food resources, suitable breeding habitat and areas of refuge. The wetlands and grassland habitats are still largely connected to similar habitats outside of the study area, allowing for relatively unrestricted movement for non-fence bound faunal species within the region. The Secondary Grassland Habitat and Relic Wetland habitat had a low diversity and abundance of fauna, due to historic disturbances and the resultant relatively low diversity of floral species. This habitat is however still being used as a movement corridor between habitats of higher sensitivity and as foraging grounds for several faunal species. The majority of the Transformed Habitat is comprised of cultivated fields, which may provide seasonal food resources for some fauna in the area. However, in terms of faunal ecology, this habitat unit is of low importance.

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 Animal Species Theme, and the Plant Species Theme, is of a low and medium sensitivity respectively and the Terrestrial Biodiversity Theme is of very high sensitivity.

The botanical assessments indicated that one of the triggered plant species of conservation concern (SCC) has a medium probability of occurrence (POC) within the study area namely: Sensitive species 691 (vulnerable; VU). Of the additional Red Data Listed species (RDLs) assessed (i.e., VU, EN, Critically Endangered (CR), and/or Near Threatened (NT) species), only one other species can potentially occur within the study area namely *Kniphofia typhoides* (NT). A walkdown of the pylon footprint areas (especially within the UCVB wetland habitat and Highveld Grassland Habitat) should be done during the Pre-construction and Planning phase of the development (prior to any development taking place). The floral walkdown should be conducted within the optimal flowering season of all or most of the anticipated SCCs (i.e., February to March). Apart from RDLs, the study area (particularly the UCVB wetland habitat and the Highveld Grassland Habitat) is further associated with several species protected under the Mpumalanga Nature Conservation Ordinance Act, 1998 (Act No. 10 of 1998) (MNCA).

As part of the pre-construction process, it is necessary to conduct a walkdown of the project's footprint areas during the optimal flowering season (i.e., February to March) of the most anticipated RDLs. In the event that any floral SCC (protected and/or threatened species) are discovered within the project footprint, it is imperative that permits for the removal of provincially protected species are obtained from the Mpumalanga Tourism and Parks Agency (MTPA). Similarly, permits/authorisation from the DFFE must be sought to remove nationally protected and threatened species from the premises.

² 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.



Two mammal SCCs were observed within the study area i.e., *Aonyx capensis* (Cape Clawless Otter, NT) within the Freshwater Habitat and *Leptailurus serval* (Serval, NT) scat was observed in the Grassland Habitat adjacent to the Freshwater Habitat. Impacts to these species are not expected to be substantial as the proposed footprints of the OHPL are relatively small and expected to fall outside of the preferred habitat (Freshwater Habitat) of these species. *Hippotragus niger* (Sable Antelope, VU), a threatened species which has been introduced on the property as part of the local game farming activities, was observed outside of the study area itself and is not expected to be impacted upon. There are several additional SCCs within the study area with medium POC, including two mammal SCCs and one amphibian SCC. Most of the confirmed and expected faunal SCC are associated with the Freshwater and Highveld Grassland Habitat. It is important to avoid and /or minimise construction, within these habitat units in order to reduce potential impacts on such SCC. Provided that mitigation measures are implemented, the overall impact on faunal SCC as a result of the construction and operation activities is unlikely to significantly impact SCC populations in the region.

SITE ECOLOGICAL IMPORTANCE (SEI)

All vegetation 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.

The below table breaks down the SEI obtained for the floral and faunal components.

Table A1: Summary of the SEI obtained for the floral and faunal components identified within the study area.

HABITAT UNIT	FLORAL SEI	FAUNAL SEI
Highveld Grassland Habitat	High	Medium
Secondary Grassland Habitat	Low	Low
Freshwater Ecosystems:		
➤ UCVB wetland habitat	High	High
➤ Relic Wetlands	Very Low	Low
Transformed Habitat	Very Low	Very Low

IMPACT DISCUSSION

Floral Habitat and Diversity:

The proposed development (i.e., OHPL development and substation expansion) within this study area will result in the direct loss of indigenous vegetation and indirect impacts (i.e., edge effects such as AIP proliferation) on the habitat units associated with 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. The proposed layout is not expected to significantly impact on any CBAs or Threatened Vegetation. However, indirect effects anticipated for the Freshwater Ecosystems, especially the UCVB wetland habitat, and the Highveld Grassland Habitat should be minimised, to reduce the potential impact on the optimal CBA.

Prior to mitigation measures being implemented, the impact significance varies from **low** to **moderate** impact significance, with the activities within the UCVB wetland habitat and the Highveld Grassland Habitat anticipated to have the highest impact significance on floral communities, especially during the construction phase of the proposed development. The anticipated impacts on the habitat units that have lower sensitivity (i.e., Secondary Grassland Habitat, Transformed Habitat and Relic wetland habitat) are expected to be **low**. Post-mitigation, the impact significance varies from **low** to **very low**, with the majority of the impacts being **low** post-implementation of the mitigation measures. The only impact that is considered to remain **moderate** post-mitigation is associated with the substation expansion activities located in the Secondary Grassland habitat and the OHPL activities anticipated to occur within the Highveld Grassland Habitat.

The proposed development is anticipated to only impact very small and localised areas of indigenous vegetation within the study area. The impacts will mostly be associated with areas of moderately low species diversity within the study area. Therefore, no significant impacts on floral habitat and diversity



will occur if the provided mitigation measures are fully implemented, i.e., through (1) implementing mitigation measures to reduce the edge effects within sensitive habitats, also taking into consideration the mitigations provided in the Freshwater report (SAS 22-1190, 2023), (2) only clearing vegetation where absolutely required, and (3) AIP control management is essential in the study area due to the high diversity and abundance of AIPs within the study area, and all measures must be in place to reduce fragmentation of the habitat.

Faunal Habitat and Diversity:

During the pre-construction phase impacts on faunal habitat and diversity can be mitigated through sound planning resulting in largely **very low** impacts for the Highveld Grassland, Secondary Grassland, Relic Wetland and Transformed Habitats with **low** impacts to be expected on the UCVB Wetland Habitat. The most significant impacts resulting from the proposed development are expected during the construction phase as vegetation clearing activities will directly impact on faunal ecology, albeit only small footprints. Without mitigation measures implemented **moderate** impacts can be expected for the most part, which can be reduced to **low** impact significance in the Highveld Grassland, Secondary Grassland, Relic Wetland and Transformed Habitats, if mitigation measures are applied. Impact significance will remain **moderate** in the Secondary Grassland Habitat for the construction of the Substation Infrastructure as a larger area is expected to be cleared. During the operational and maintenance phase, if the proposed mitigation measures are implemented, the significance of long-term impacts can be reduced to acceptable levels (i.e., **low**, and **very low** impact significance).

Floral SCC

Prior to implementing mitigation measures, the perceived impacts on SCC are anticipated to be between **low** and **moderate**, with development within the UCVB wetland habitat and Grassland Habitat anticipated to result in the highest risk to floral SCC (based on the confirmed presence of provincially protected species and the likely occurrence of VU and NT species). Post mitigation the impacts can be lowered to mostly **very low** and **low** impact significance for all habitat units. The greatest impacts are anticipated during the pre-construction and planning phase, since the floral walkdown and species relocation should take place during this stage of the development. If the proposed project is authorised, a walkdown of the final footprint areas must take place prior to vegetation clearing commencing and should take place during the flowering time of most of the anticipated SCCs (e.g., February to March). Where SCCs are encountered, the necessary permitting process must be followed to obtain authorisation to remove or destroy affected species. For threatened and NT species, a rescue and rehabilitation plan must be developed and signed off by the applicable provincial authorities.

Faunal SCC

Impacts on faunal SCC during the pre-construction phase are expected to vary between **low** and **very low** after mitigation measures are applied. During the construction phase some of these species will potentially be impacted upon resulting in **low** to moderate impacts in all habitats except for the Transformed Habitat where no SCC is expected, and **very low** impacts are anticipated. Impacts on SCC during the Operational and Maintenance phase will vary between **low** and **very low** post-mitigation. Provided that mitigation measures are implemented, the overall impact to faunal SCC as a result of the OHPL development and substation expansion is unlikely to significantly impact SCC populations in the region.

CONCLUDING REMARKS:

The proposed activities will impact on the floral communities within the study area to varying degrees. The majority of the proposed OHPL development and substation expansion will be within habitat of **low** and **very low SEI**, whereas only a small aspect of the proposed activities has the potential to impact on habitat with **high SEI** (i.e., directly and indirectly). However, given the mitigation measures as provided (and any additional mitigation measures provided in the freshwater report) the majority of the anticipated impacts from the proposed development is considered to vary between **low** and **very low** impact significance.

From a faunal perspective, the majority of the proposed activities will be within habitats of **low** and **very low** SEI's (Relic Wetland, Secondary Grassland and Transformed Habitat), whereas only a small aspect of the proposed activities has the potential to impact on habitats with **high** and **medium** SEI's (UCVB



Wetland and Highveld Grassland Habitat). However, given the mitigation measures as provided in the faunal report – Part C (and any additional mitigation measures in the freshwater report) the anticipated impacts from the proposed development are considered to vary between **moderate** and **very low** impact significance on faunal ecology.

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 TOURNEE SOLAR PARK GRID
CONNECTION NEAR THUTHUKANI,
MPUMALANGA PROVINCE

Part A: Background Information

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Report Reference: STS 23 - 2059
Date: November 2023
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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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> a) <i>the reasons why an area has been identified as a CBA;</i> b) <i>an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;</i> c) <i>the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s);</i> d) <i>the impact on ecosystem threat status;</i> e) <i>the impact on explicit subtypes in the vegetation;</i> f) <i>the impact on overall species and ecosystem diversity of the site; and</i> 	Part A: Section 3 (desktop analysis) Part B: Section 3 and 5 Part C: Section 3



	g) <i>the impact on any changes to threat status of populations of species of conservation concern in the CBA;</i>	
2.3.7.2	Terrestrial Ecological Support Areas (ESAs), including: <ul style="list-style-type: none"> a) <i>the impact on the ecological processes that operate within or across the site;</i> b) <i>the extent the proposed development will impact on the functionality of the ESA; and</i> c) <i>loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;</i> 	
2.3.7.3	Protected areas as defined by the National Environmental Management Protected Areas Act, 2004 including- <ul style="list-style-type: none"> a) <i>an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;</i> 	Part A: Section 3 (desktop analysis)
2.3.7.4	Priority areas for protected area expansion, including- <ul style="list-style-type: none"> a) <i>the way in which the proposed development will compromise or contribute to the expansion of the protected area network;</i> 	Part A: Section 3 (desktop analysis)
2.3.7.5	SWSAs including: <ul style="list-style-type: none"> a) <i>the impact(s) on the terrestrial habitat of a SWSA; and</i> b) <i>the impacts of the proposed development on the SWSA water quality and quantity (e.g., describing potential increased runoff leading to increased sediment load in water courses);</i> 	Part A: Section 3 (desktop analysis) This section is covered in the Freshwater Ecological Assessment (SAS 22- 1193, 2023)
2.3.7.6	FEPA sub catchments, including- <ul style="list-style-type: none"> a) <i>the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;</i> 	This section is covered in the Freshwater Ecological Assessment (SAS 22- 1193, 2023)
2.3.7.7	Indigenous forests, including: <ul style="list-style-type: none"> a) <i>impact on the ecological integrity of the forest; and</i> b) <i>percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.</i> 	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 based on the Very High sensitivity	
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 C: 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)



	<p>3.1.7 Additional environmental impacts expected from the proposed development;</p> <p>3.1.8 Any direct, indirect and cumulative impacts of the proposed development;</p> <p>3.1.9 The degree to which impacts and risks can be mitigated;</p> <p>3.1.10 The degree to which the impacts and risks can be reversed;</p> <p>3.1.11 The degree to which the impacts and risks can cause loss of irreplaceable resources;</p> <p>3.1.12 Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);</p>	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

<p>Biodiversity priority areas (Skowno et al., 2018)</p>	<p>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.</p>
<p>Biological diversity or Biodiversity (National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA))</p>	<p>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.</p>
<p>Biome - (Mucina and Rutherford (2006); after Low and Rebelo (1998))</p>	<p>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).</p>
<p>Bioregion (Mucina and Rutherford (2006))</p>	<p>A bioregion is a composite of spatial (vegetation) units sharing similar biotic and physio-geographical features and connected by processes operating on a regional scale.</p>
<p>CBA(SANBI, 2020)</p>	<p>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.</p>
<p>Corridor (van Wilgen et al., 2020)</p>	<p>A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.</p>
<p>CR, i.e., International Union for Conservation of Nature (IUCN) Red List category (Skowno et al., 2018)</p>	<p>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.</p>
<p>Degradation (Skowno et al., 2018)</p>	<p>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.</p>
<p>Disturbance (van Wilgen et al., 2020)</p>	<p>A temporal change, either regular or irregular (uncertain), in the environmental conditions that can trigger population fluctuations and secondary succession. Disturbance is an important driver of biological invasions.</p>
<p>Driver (ecological) (Nelson, 2005)</p>	<p>A driver is any natural or human-induced factor that directly or indirectly causes a change in ecosystem. A direct driver clearly influences ecosystem processes, where indirect driver influences ecosystem processes through altering one or more direct drivers.</p>



ESA (Skowno et al., 2018)	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. (2018))	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.
Indigenous vegetation (National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA))	Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Indigenous species (synonym: native species)	(SANBI, 2020 definition) Occurring naturally in a defined area (contrast with endemic) – the area must be specified and is normally taken to be the historical range of a species, notwithstanding the effects of naturally initiated range expansions/ contractions, e.g., the baobab (<i>Adansonia digitata</i>) is indigenous but not endemic to South Africa, but it is not indigenous to KwaZulu-Natal. (NEMBA definition) – a species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic of South Africa, but excludes a species that has been introduced in the Republic as a result of human activity, e.g. the bontebok (<i>Damaliscus pygargus pygargus</i>) is indigenous to only South Africa, but according to previous definition would only be indigenous to the Western Cape.
Indigenous vegetation (NEMA)	Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Integrity (ecological)	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.
Invasive species (ecological) (van Wilgen et al., 2020)	Alien species that sustain self-replacing populations over several life cycles, produce reproductive offspring, often in very large numbers at considerable distances from the parent and/or site of introduction, and have the potential to spread over long distances.
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., 2018)	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 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

AC	Alternating Current
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
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
EIA	Environmental Impact Assessment
EN	Endangered
ESA	Ecological Support Area
EW	Extinct in the Wild
GIS	Geographic Information System
GN	Government Notice
Ha	Hectares
IBA	Important Bird Area
IEM	Integrated Environmental Management
IPP	Independent Power Producer
IUCN	International Union for the Conservation of Nature
km	Kilometres
kV	Kilovolt
m	Metres
M ²	Square meters
MAP	Mean Annual Precipitation
MAPE	Mean Annual Potential for Evaporation
MASMS	Mean Annual Soil Moisture Stress
MAT	Mean Annual Temperature
MBCP	Mpumalanga Biodiversity Conservation Plan
MBSP	Mpumalanga Biodiversity Sector Plan
MFD	Mean Frost Days
MNCA	Mpumalanga Nature Conservation Ordinance
MTPA	Mpumalanga Tourism and Parks Agency
MW	Megawatt
MWh	Megawatt Hour
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)
NP	Not Protected
NPAES	National Protected Areas Expansion Strategy
NT	Near threatened
NWA	National Water Act, 1998 [Act No. 36 of 1998]



OHPL	Over-head Power Line
PV	Photovoltaic
PVSEF	Photovoltaic Solar Energy Facilities
QDS	Quarter Degree Square (1:50,000 topographical mapping references)
RDL	Red Data List
REDZ	Renewable Energy Development Zone
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
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
SEA	Strategic Environmental Assessment
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 Tourneè Solar Park grid connection project near Thuthukani, Mpumalanga Province (Figure 1 and 2).

The proposed Tourneè Solar Park consists of two solar photovoltaic (PV) facilities that each have a generating capacity of 150 megawatts (MW). The two PV facilities include the Tourneè 1 Solar PV Facility and the Tourneè 2 Solar PV Facility (collectively referred to as the “Tourneè Solar Park”). The Tourneè Solar Park is being developed in the context of the Renewable Energy Independent Power Producer Procurement Programme (REIPPP), in conjunction with private off-take or wheeling agreements (where possible). The proposed Tourneè Solar Park will be connected to the Eskom Alpha 765/400 kilovolt (kV) Substation via a 132kV Overhead Power Line (OHPL). The proposed Tourneè Solar Park grid connection project will include a back-to-back 132 kV substation and 132 kV evacuation OHPL, which will evacuate the combined generating capacity of the two facilities to the Eskom Alpha substation.

The proposed Tourneè Solar Park is located near Standerton, within the Lekwa Local Municipality and Gert Sibande District Municipality, in the Mpumalanga Province (Figure 2).

The proposed Tourneè Solar Park Grid Connection project and a 300 metre (m) assessment corridor (i.e., 150 m on either side of the OHPL) will be referred to as the “**study area**”.

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 (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).



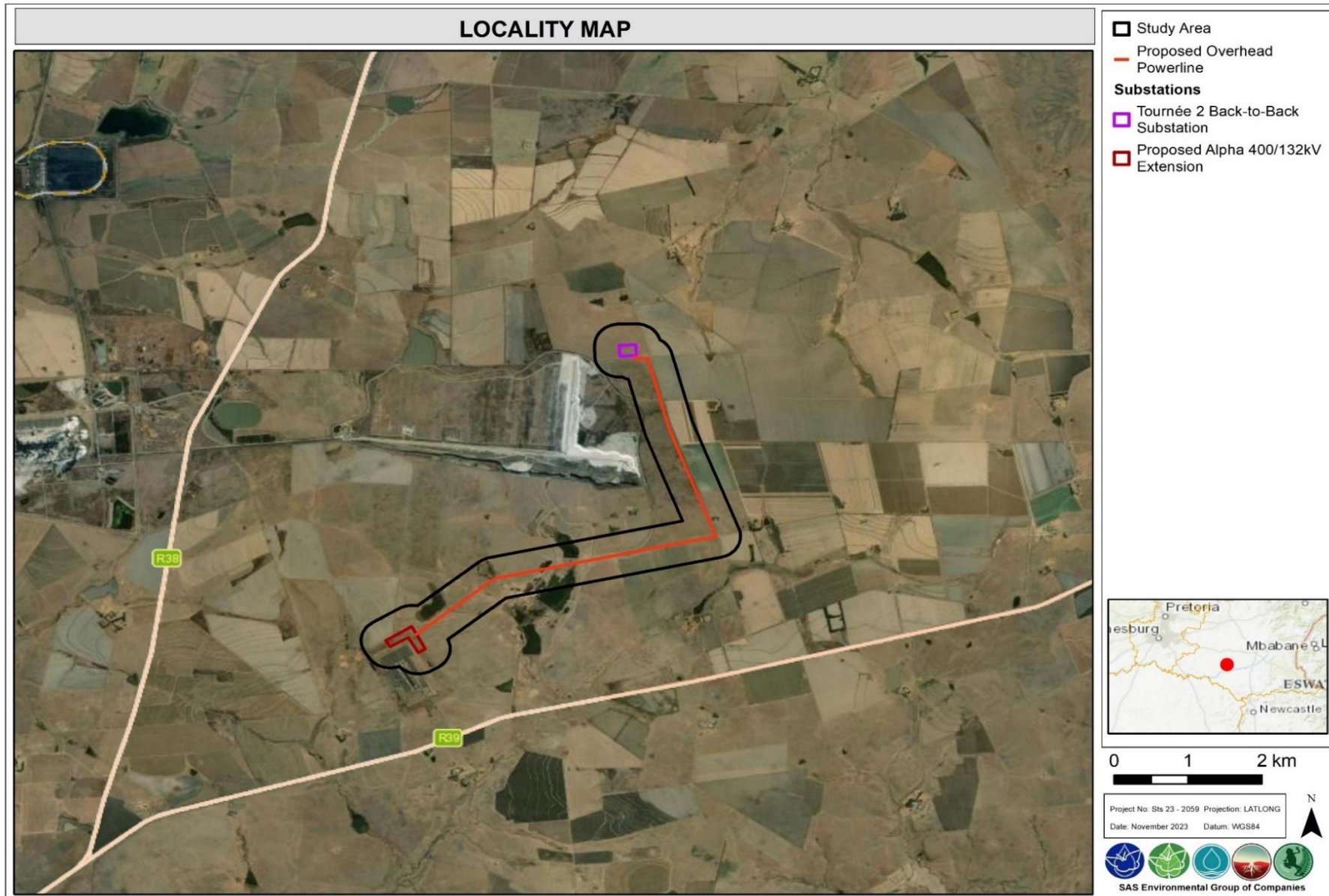


Figure 1. Digital satellite image depicting the study area (i.e.e, a 300 m corridor area surrounding the proposed OHPL) within greater project area in relation to surrounding area.



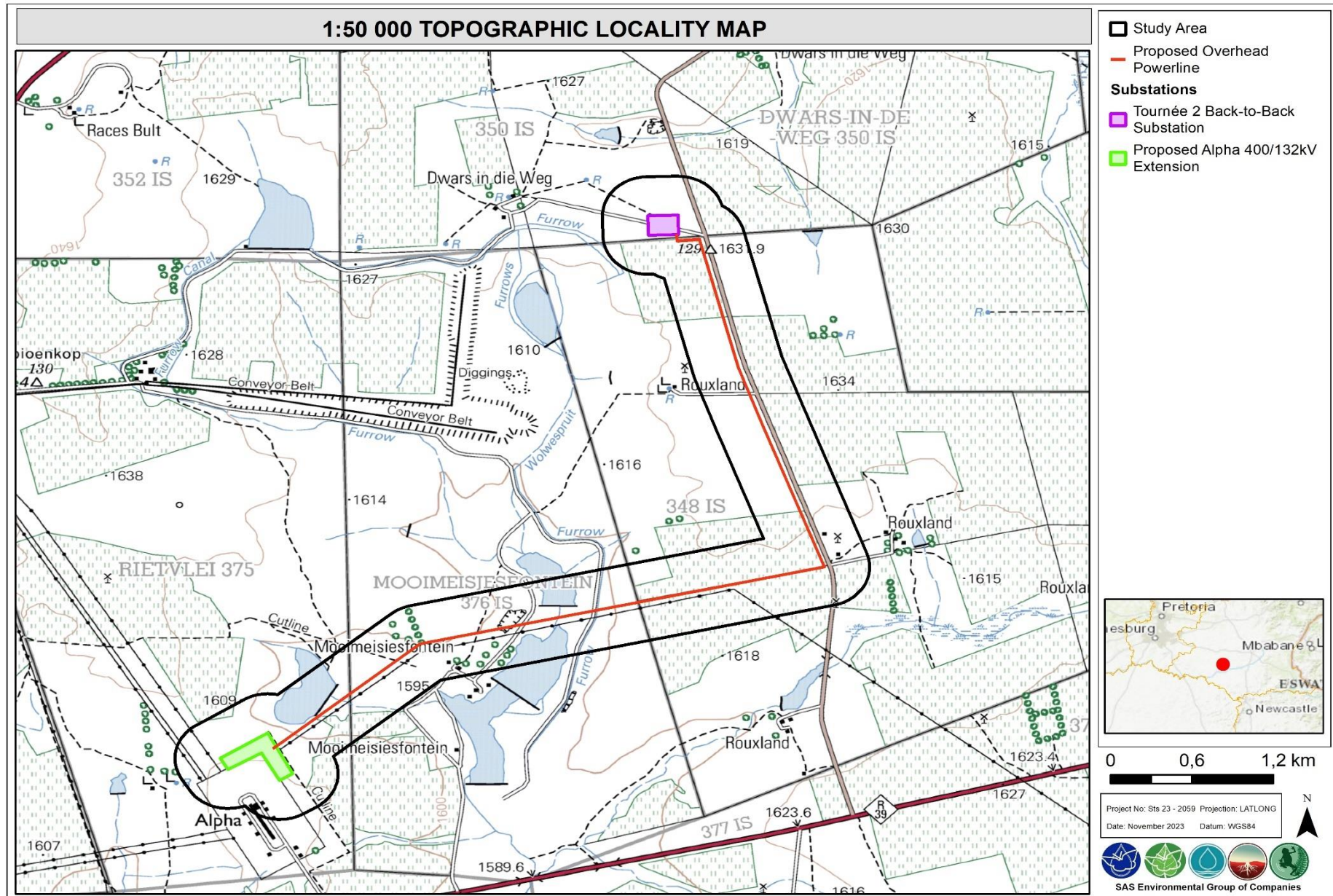


Figure 2. The study area depicted on a 1:50 000 topographical map in relation to the surrounding area.



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 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, 1996³;
- 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);

³ 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 Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) (MNCA).

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



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 include⁴:

- National Protected Areas Expansion Strategy (NPAES) – 2018 database;
- The South African Conservation Areas Database, Quarter 2 (SACAD, 2023);
- The South African Protected Areas Database, Quarter 2 (SAPAD, 2023);
- The Mpumalanga Biodiversity Sector Plan (MBSP) – 2023 terrestrial data set;
- The National Vegetation Map Project (VEGMAP), with the below vector dataset used for information on Biomes, Bioregions and Vegetation Type(s):
 - 2018 Final Vegetation Map of South Africa, Lesotho, and Swaziland (SANBI, 2018a).
- The 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 & c) 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 (25th to 26th 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.

⁴ 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) 2629CD].

DETAILS OF THE STUDY AREA IN TERMS OF THE 2018 FINAL VEGMAP OF SOUTH AFRICA, LESOTHO, AND SWAZILAND (SANBI, 2006-2018) ORIGINAL EXTENT OF VEGETATION TYPES		DESCRIPTION OF THE SOWETO HIGHVELD GRASSLAND ASSOCIATED WITH THE STUDY AREA (MUCINA & RUTHERFORD, 2006)				
Biome	The study area is situated within the Grassland Biome .	Distribution	Mpumalanga, Gauteng (and to a very small extent also in neighbouring Free State and North-West) Provinces: In a broad band roughly delimited by the N17 road between Ermelo and Johannesburg in the north, Perdekop in the southeast and the Vaal River (border with the Free State) in the south. It extends further westwards along the southern edge of the Johannesburg Dome (including part of Soweto) as far as the vicinity of Randfontein. In southern Gauteng it includes the surrounds of Vanderbijlpark and Vereeniging as well as Sasolburg in the northern Free State.			
Bioregion	The study area is situated within the Mesic Highveld Grassland Bioregion .					
Vegetation Type	The study area occurs within the Soweto Highveld Grassland (Gm8) vegetation type.					
CONSERVATION DETAILS PERTAINING TO THE STUDY AREA (VARIOUS DATABASES)		Climate	Summer-rainfall region. Cool-temperate climate with thermic continentality (high extremes between maximum summer and minimum winter temperatures, frequent occurrence of frost, large thermic diurnal differences, especially in autumn and spring).			
NBA (2018)	The NBA (2018) listed the Soweto Highveld Grassland as not protected . DEFINITION: Ecosystem protection level tells us whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as not protected, PP, moderately protected or well protected, based on the proportion of each ecosystem type that occurs within a protected area recognised in the NEMPAA.		MAP (mm)	MAT (°C)	MFD (days)	MAPE (mm)
		662	14.8	41	2060	75
		Altitude (m)	1 420–1 760			
		Conservation	Endangered (EN) . Target 24%. Only a handful of patches statutorily conserved (Waldrift, Krugersdorp, Leeuwkuil, Suikerbosrand, Rolfe’s Pan Nature Reserves) or privately conserved (Johanna Jacobs, Tweefontein, Gert Jacobs, Nikolaas and Avalon Nature Reserves, Heidelberg Natural Heritage Site). Almost half of the area already transformed by cultivation, urban sprawl, mining and building of road infrastructure. Some areas have been flooded by dams (Grootdraai, Leeuwkuil, Trichardtsfontein, Vaal, Willem Brummer). Erosion is generally very low (93%).			



<p>RLE (2022) Figure 3</p>	<p>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), the study area is located within the remaining extent of the vulnerable (VU) Soweto Highveld Grassland. The trigger for the threatened ecosystem was A3, B1 (i) which indicates that this ecosystem is in a historic decline (national data) and that this ecosystem has a restricted distribution (Government of South Africa (2022)).</p>	<p>Vegetation & landscape features (Dominant Floral Taxa in Appendix D)</p>	<p>Gently to moderately undulating landscape on the Highveld plateau supporting short to medium-high, dense, tufted grassland dominated almost entirely by <i>Themeda triandra</i> and accompanied by a variety of other grasses such as <i>Elionurus muticus</i>, <i>Eragrostis racemosa</i>, <i>Heteropogon contortus</i> and <i>Tristachya leucothrix</i>. In places not disturbed, only scattered small wetlands, narrow stream alluvia, pans and occasional ridges or rocky outcrops interrupt the continuous grassland cover.</p>
	<p>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 Critically Endangered [CR], 51 EN and 14 VU types).</p> <p>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 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.</p>	<p>Geology & Soils</p>	<p>Shale, sandstone, or mudstone of the Madzaringwe Formation (Karoo Supergroup) or the intrusive Karoo Suite dolerites which feature prominently in the area. In the south, the Volksrust Formation (Karoo Supergroup) is found and in the west, the rocks of the older Transvaal, Ventersdorp and Witwatersrand Supergroups are most significant. Soils are deep, reddish on flat plains.</p>
<p>SWSAs FOR SURFACE WATER (2021)</p>		<p>MPUMALANGA BIOBASE (2023)</p>	
<p>Surface water SWSAs are defined as areas of land that supply a disproportionate (i.e., relatively large) quantity of mean annual surface water runoff in relation to their size. They include transboundary areas that extend into Lesotho and Swaziland. The sub-national Water Source Areas (WSAs) are not nationally strategic as defined in the report but were included to provide a complete coverage.</p>		<p>The demarcation of floristic regions is based on groups of taxa with more or less similar geographical distributions. Floristic regions can be classified hierarchically to reflect similarities and differences between regions. A phytochorion is a floristic (phytogeographical) region of any rank. At a particular scale, a phytochorion may also be called a 'centre of endemism' when distinguished by a high concentration of endemic plant taxa (van Wyk & Smith 2001). Phytochoria usually incorporates different vegetation types, so it may include forest, grassland, and bushveld, but these will have common recurring floristic elements.</p>	
<p>Name & Criteria</p>	<p>The study area is not within 10 km of a SWSA.</p>	<p>Phyto Regions and centres of Endemism</p>	<p>The study area is not located within any Phyto regions and / or centres of endemism.</p>



MPUMALANGA BIODIVERSITY SECTOR PLAN (2023) TERRESTRIAL DATABASE – FIGURE 4	
Other Natural Areas	<p>Scattered portions of the study area are represented by Other Natural Areas. These areas are generally located within sections of study area that are not cultivated. These are natural areas which are not identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs), but which provide a range of ecosystem services from their ecological infrastructure.</p> <p><u>Primary Objective:</u> Minimise habitat and species loss through strategic landscape planning and ensure basic ecosystem functionality.</p>
Heavily modified	<p>Much of the study area occurs within Heavily Modified areas. These are areas currently modified to such an extent that any valuable biodiversity and ecological functions have been lost to, in this case, the cultivated areas.</p> <p><u>Primary Objective:</u> Manage the land-use in a biodiversity-friendly manner aiming to maximise ecological functionality.</p>
Moderately modified - old lands	<p>The presence of Moderately Modified areas (old lands) is generally adjacent to the Heavily Modified areas and, these areas are old, cultivated lands that have been allowed to recover (within the last 80 years), and support some natural vegetation. Although biodiversity patterns and ecological functioning may have been compromised, the areas may still play a role in supporting biodiversity and providing ecosystem services.</p> <p><u>Primary Objective:</u> Moderately modified areas (old lands) should be stabilised and restored where possible, especially for soil carbon and water-related functionality. In old lands, stabilise ecosystems and manage them to restore ecological functionality, particularly soil carbon and water related functionality, using indigenous plant cover. Old lands should be burnt and grazed appropriately.</p>
CBA: Optimal	<p>A very small portion of the study area is identified as Optimal CBA, located in the central sections of the proposed study area. These are areas required to meet targets and with irreplaceability values of more than 80%; Critical linkages or pinch-points in the landscape that must remain natural; and often include CR ecosystems, or hosts species of conservation concern.</p> <p>The CBA Optimal Areas (previously called ‘important and necessary’ in the Mpumalanga Biodiversity Conservation Plan (MBCP) are the areas optimally located to meet both the various biodiversity targets and other criteria defined in the analysis. Although these areas are not ‘irreplaceable’ they are the most efficient land configuration to meet all biodiversity targets and design criteria.</p> <p><u>Primary Objective:</u> Maintain in a natural state with no loss of ecosystems, functionality, or species; some flexibility in land-use options.</p>
NATIONAL PROTECTED AND CONSERVATION AREAS – VARIOUS DATABASES	
SAPAD (2023, Q2); SACAD (2023, Q2); NPAES (2018); and IBA (2015)	<p>The SAPAD⁵ (2023, Q2) and SACAD⁶ (2023, Q2) databases did not identify any areas that are nationally protected or considered national conservation areas to be located within the study area boundary or within 10 km of the study area.</p>

⁵ **SAPAD (2023):** The definition of protected areas follows the definition of a protected area as defined in the National Environmental Management: Protected Areas Act, (Act 57 of 2003). Chapter 2 of the National Environmental Management: Protected Areas Act, 2003 sets out the “System of Protected Areas”, which consists of the following kinds of protected areas - 1. Special nature reserves; 2. National parks; 3. Nature reserves; 4. Protected environments (1-4 declared in terms of the National Environmental Management: Protected Areas Act, 2003); 5. World heritage sites declared in terms of the World Heritage Convention Act; 6. Marine protected areas declared in terms of the Marine Living Resources Act; 7. Specially protected forest areas, forest nature reserves, and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act No. 84 of 1998); and 8. Mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act No. 63 of 1970).

⁶ **SACAD (2023):** The types of conservation areas that are currently included in the database are the following: 1. Biosphere reserves, 2. Ramsar sites, 3. Stewardship agreements (other than nature reserves and protected environments), 4. Botanical gardens, 5. Transfrontier conservation areas, 6. Transfrontier parks, 7. Military conservation areas and 8. Conservancies.



	<p>The NPAES (2018) database did not identify any priority focus areas within the study area, however, the study area is located within 2 kilometres from a Priority Area (on the southern and northern boundary). This however does not intersect with the distribution of the study area itself and therefore the proposed development will not impact any NPAES focus areas (Figure 5).</p> <p>The IBA (2015) database did not identify the any IBAs within the proposed of the study area, or within 10 km of the study area.</p>
RENEWABLE ENERGY DEVELOPMENT ZONES AND CORRIDORS-	
The proposed study area is not located within a Renewable Energy Development Zone (REDZ).	
STRATEGIC TRANSMISSION CORRIDORS	
The proposed study area is not located within a Strategic Transmission Corridor.	
<p>The five strategic transmission corridors were assessed as part of the 2016 Electricity Grid Infrastructure (EGI) Strategic Environmental Assessment (SEA). These corridors were Gazetted for implementation on 16 February 2018 in Government Gazette 41445, GN 113. The gazette documented notice given by the minister of environmental affairs of alternative procedures to be followed when applying for EA for large scale electricity transmission and distribution development activities, identified in terms of section 24(2)(a) of the NEMA in the identified strategic transmission corridors (i.e., areas declared as geographical areas of strategic importance).</p>	

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 Area.





Figure 3: The study area in relation to the remaining extent of the RLE (2022).



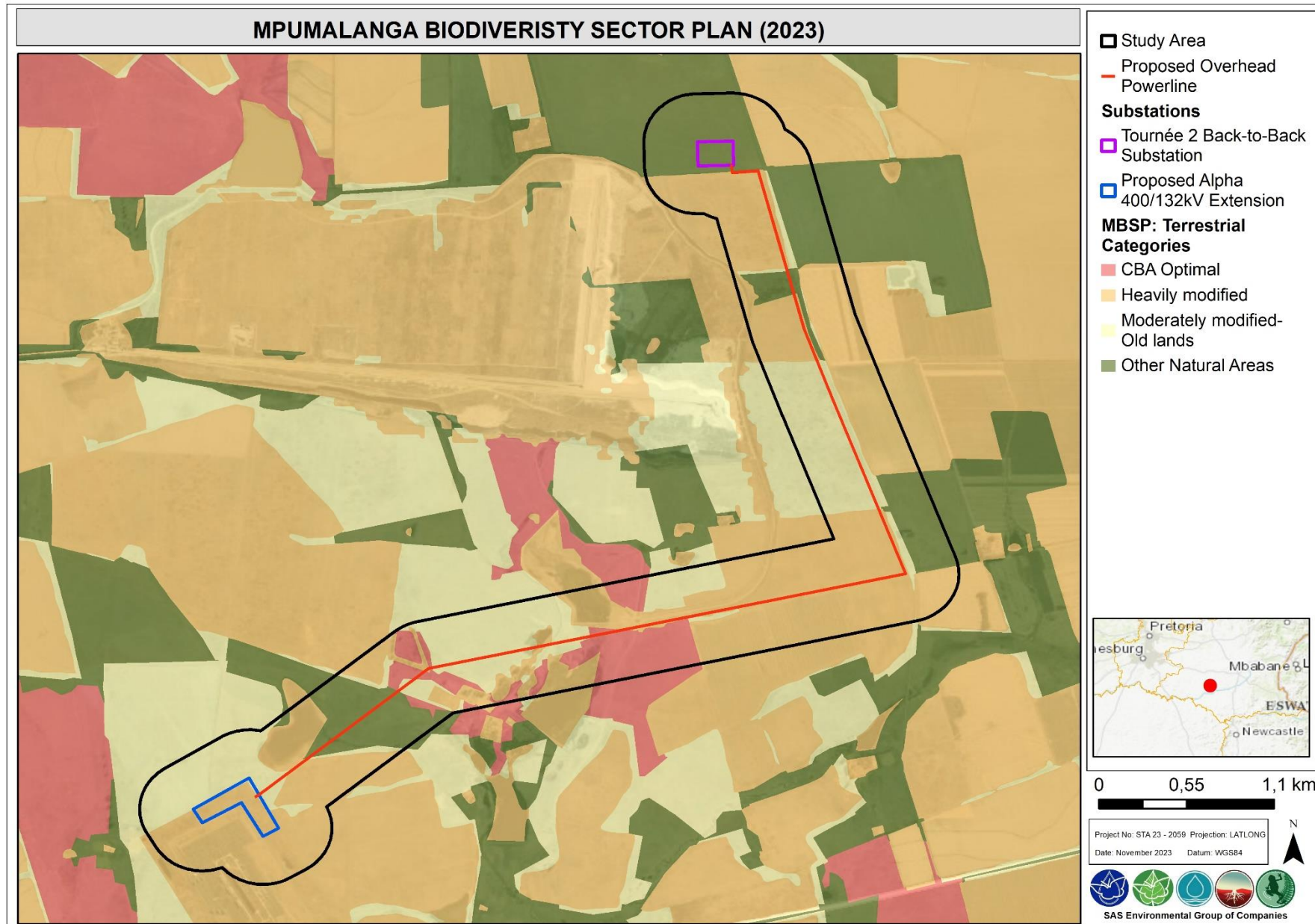


Figure 4: The study area in relation to the sensitivities as identified by the 2023 MBSP spatial dataset.



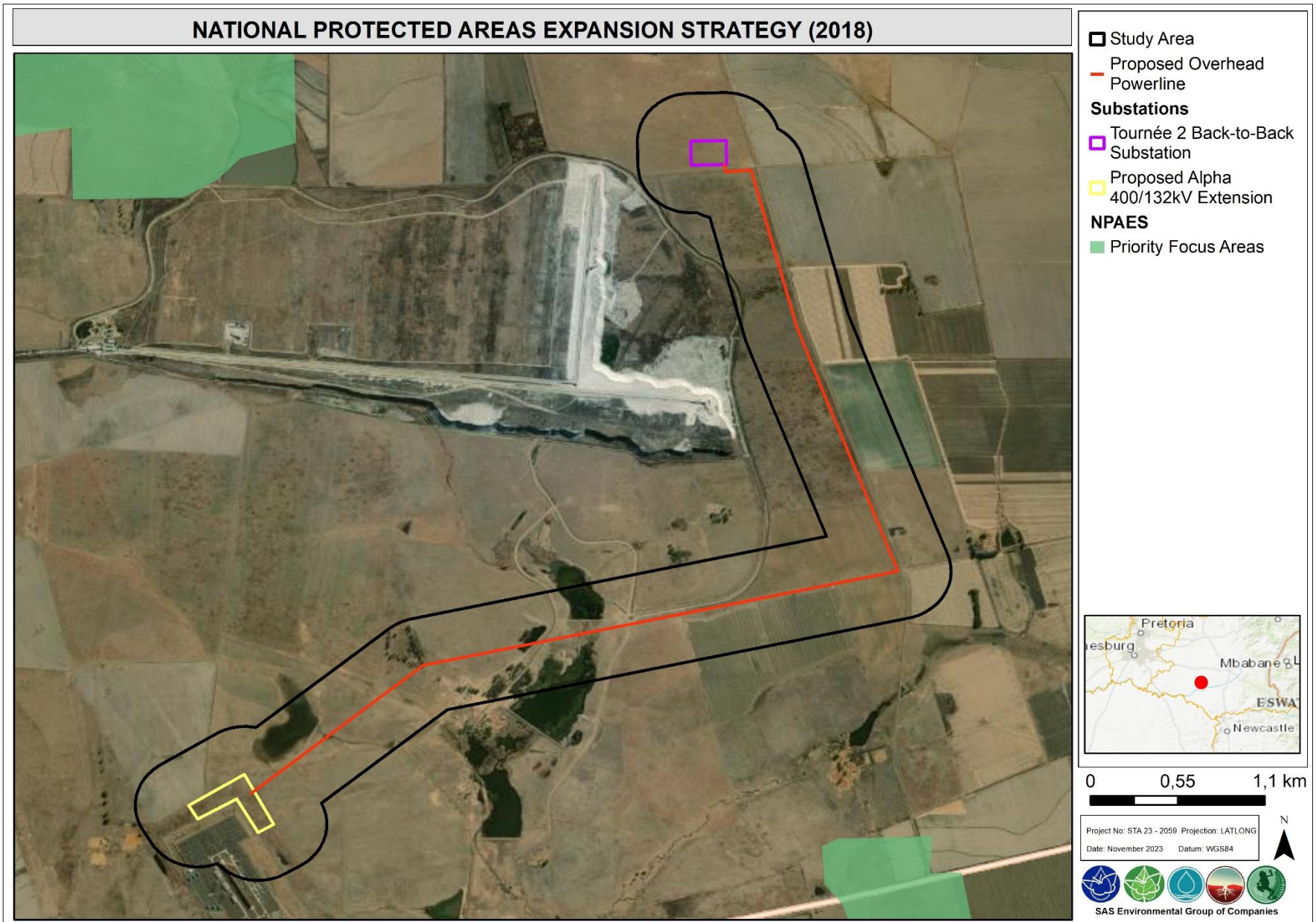


Figure 5: The study area in relation to the sensitivities as identified by the 2018 NPAES spatial dataset.



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 Terrestrial Plant Species, Terrestrial 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)	
<p>The Screening Tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the Environmental Authorisation process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas. The different sensitivity ratings pertaining to the Plant [and Animal] Protocols are described below:</p> <ul style="list-style-type: none"> ➤ 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 Theme Figure 6	<p>For the Animal Species Theme, the study area is located within areas of medium sensitivity and low sensitivity.) The medium sensitivity areas were triggered by the following trigger species:</p> <ul style="list-style-type: none"> - Medium: <u>Aves:</u> <i>Tyto capensis</i> (African Grass Owl; VU) and <i>Hydroprogne caspia</i> (Caspian tern; VU). <u>Insecta:</u> <i>Lepidochrysops procera</i> (Potchefstroom Blue; Rare). <u>Mammalia:</u> <i>Crocidura maquassiensis</i> (Maquassie Musk Shrew; VU).
Plant Species Theme Figure 7	<p>For the Plant Species theme, the Screening Tool identified the study area as a low and medium sensitivity area. There are large portions of the study area considered to have a low sensitivity, with a portion in the centre of the study area identified as a medium sensitivity area. The medium sensitivity is associated with the “other natural areas” as identified by the MBSP (2022). The sensitivity of the study area is due to the potential presence of habitat for the following trigger species:</p> <ul style="list-style-type: none"> - Medium: Sensitive species 1252⁷ (VU) and Sensitive species 691 (VU).
Terrestrial Biodiversity Theme Figure 8	<p>The Terrestrial Sensitivity for the entire study area is considered to be a very high. The trigger features include CBA 2 and a VU ecosystem (Soweto Highveld Grassland). See section 1.2 in Part B of this report for more information.</p>

⁷ 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.



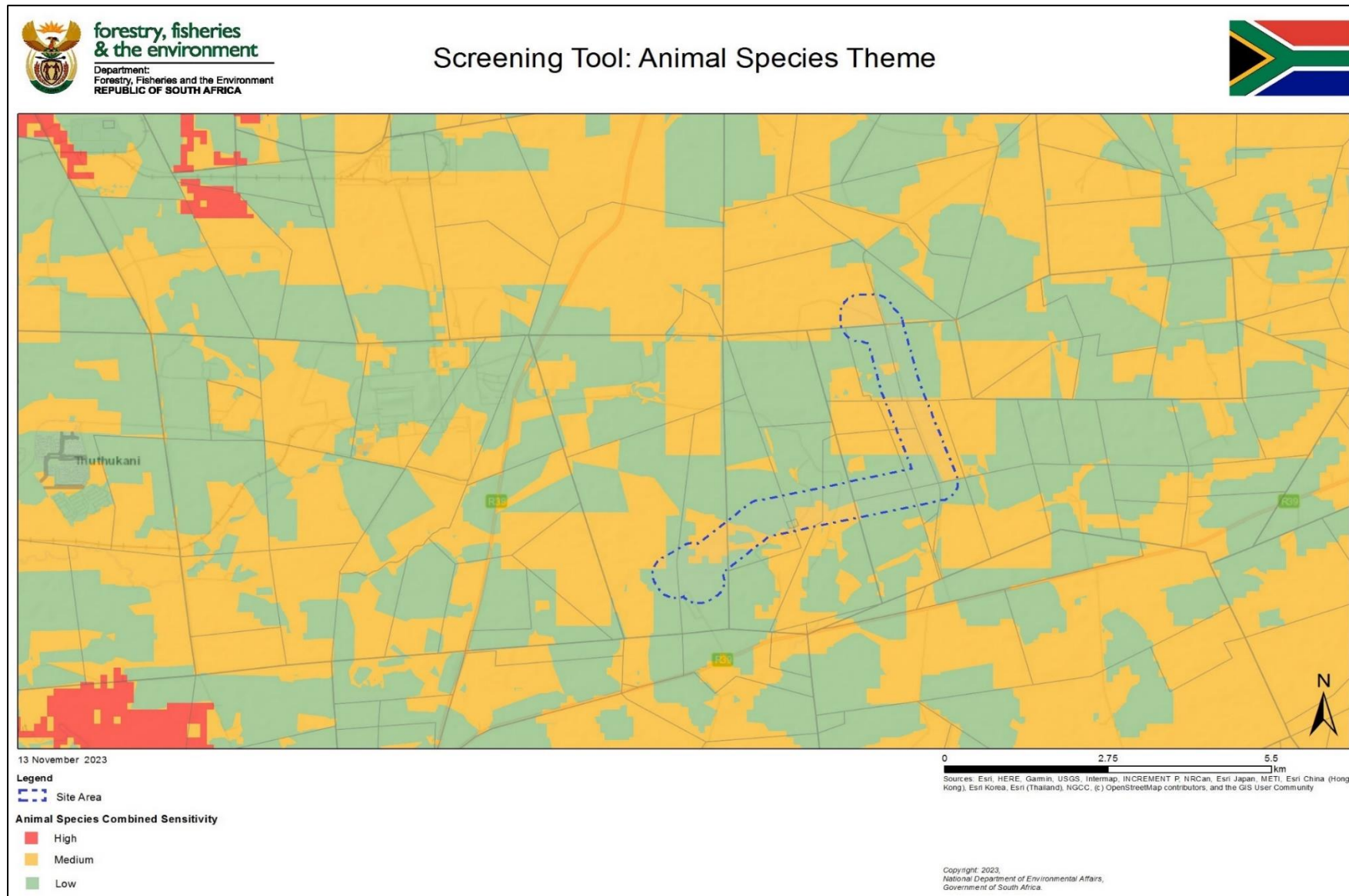


Figure 6: Animal Species Theme sensitivity for the study area as obtained from the Screening Tool (accessed 2023).



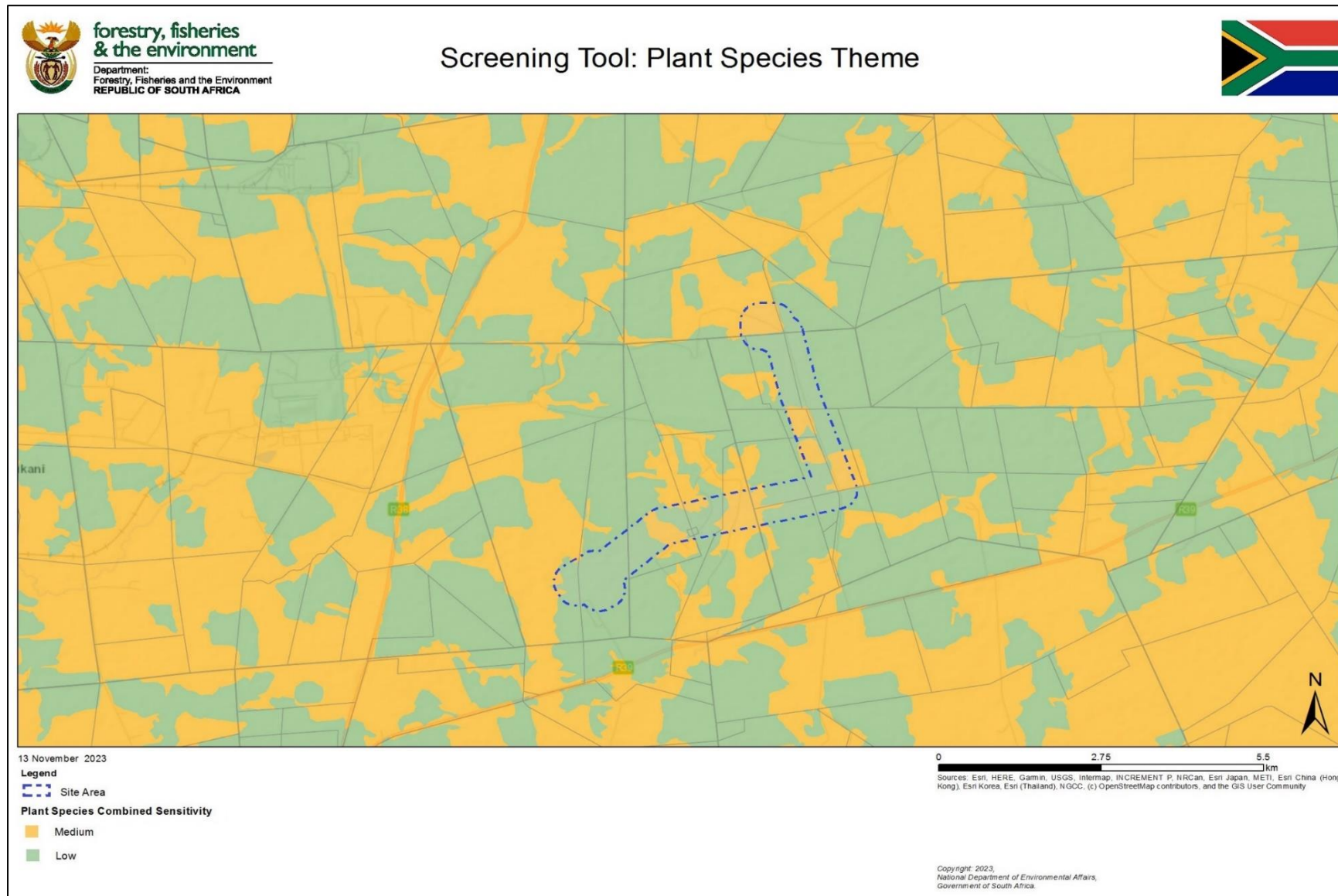


Figure 7: Plant Species Theme sensitivity for the study area as obtained from the Screening Tool (accessed 2023).



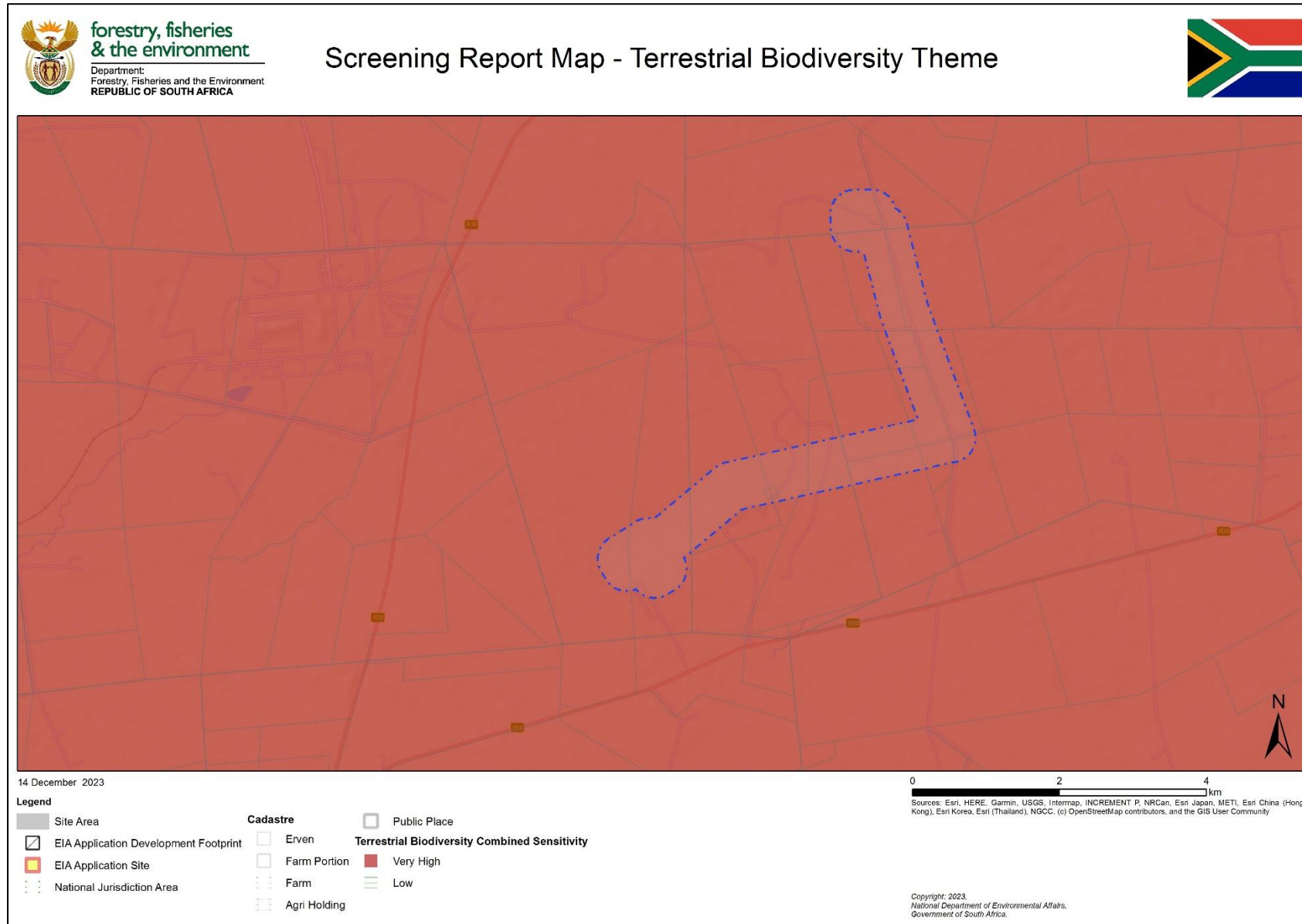


Figure 8: Plant Species Theme sensitivity for the study area as obtained from the Screening Tool (accessed 2023).



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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 AMENDED⁸ (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.

⁸ 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 MPUMALANGA NATURE CONSERVATION ACT, 1998 (ACT NO. 10 OF 1998) (MNCA)

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

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

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

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



APPENDIX C: Impact Assessment Methodology

The methods implemented within this report were provided by the proponent. The impact methodology is as follows:

EIA PHASE

Assessment of Impacts and Mitigation

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct⁹, indirect¹⁰, secondary¹¹ as well as cumulative¹² impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e., residual impact). The significance of environmental aspects is determined and ranked by considering the criteria¹³ presented in Error! Reference source not found..

Table C1: Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries

⁹ Impacts that arise directly from activities that form an integral part of the Project.

¹⁰ Impacts that arise indirectly from activities not explicitly forming part of the Project.

¹¹ Secondary or induced impacts caused by a change in the Project environment.

¹² Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.

¹³ The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.



CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
IMPACT SIGNIFICANCE RATING					
Total Score	4 to 15	16 to 30	31 to 60	61 to 80	81 to 100
Environmental Significance Rating (Negative (-))	Very low	Low	Moderate	High	Very High
Environmental Significance Rating (Positive (+))	Very low	Low	Moderate	High	Very High

Impact Mitigation

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development’s actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore,



offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

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 (Figure D17) 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.¹⁴

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

- Mitigation and performance improvement measures and actions that address the risks and impacts¹⁵ 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.

The mitigation sequence/hierarchy is shown in the Error! Reference source not found. below.

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

¹⁵ Mitigation measures should address both positive and negative impacts



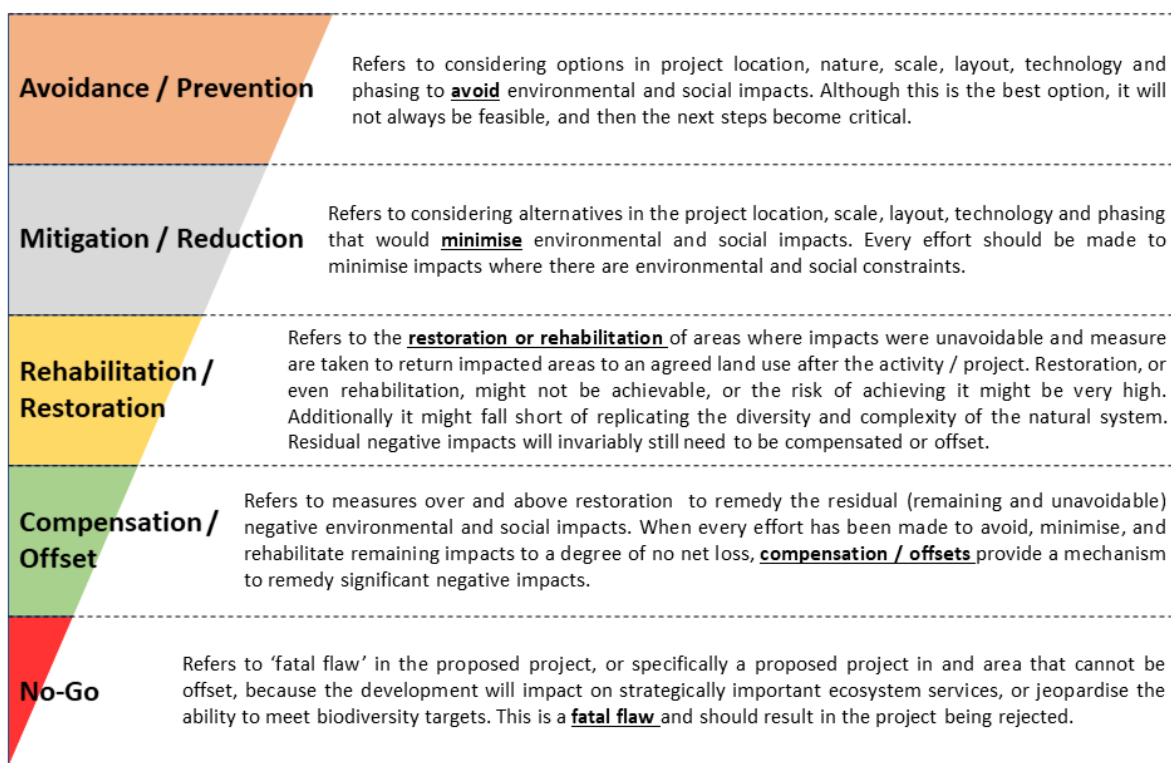


Figure C1: Mitigation Sequence/Hierarchy.

Recommendations

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



APPENDIX D: Reference Vegetation Type

Soweto Highveld Grassland (GM8)



Figure D1: Gm 8 Soweto Highveld Grassland: Typical mesic highveld grassland with *Themeda triandra* and several *Eragrostis* species still found in some parts of the southern Gauteng in natural condition (page 397 Mucina & Rutherford 2006).

Table D1: Floristic species of the Soweto Highveld Grassland (Mucina & Rutherford, 2006).

Plant Community	Species
Dominant and typical floristic species	
Woody Layer	
Low Shrubs	<i>Anthospermum hispidulum</i> , <i>A. rigidum</i> subsp. <i>pumilum</i> , <i>Berkheya annectens</i> , <i>Felicia muricata</i> , <i>Ziziphus zeyheriana</i> .
Forb layer	
Herbaceous climber	<i>Rhynchosia totta</i> .
Herbs	<i>Hermannia depressa</i> (d), <i>Acalypha angustata</i> , <i>Berkheya setifera</i> , <i>Dicoma anomala</i> , <i>Euryops gilfillanii</i> , <i>Geigeria aspera</i> var. <i>aspera</i> , <i>Graderia subintegra</i> , <i>Haplocarpha scaposa</i> , <i>Helichrysum miconiifolium</i> , <i>H. nudifolium</i> var. <i>nudifolium</i> , <i>H. rugulosum</i> , <i>Hibiscus pusillus</i> , <i>Justicia anagalloides</i> , <i>Lippia scaberrima</i> , <i>Rhynchosia effusa</i> , <i>Schistostephium crataegifolium</i> , <i>Selago densiflora</i> , <i>Senecio coronatus</i> , <i>Hilliardiella elaeagnoides</i> , <i>Wahlenbergia undulata</i> .
Geophytic Herbs	<i>Haemanthus humilis</i> subsp. <i>hirsutus</i> , <i>H. montanus</i> .
Graminoid layer	
Graminoids	<i>Andropogon appendiculatus</i> (d), <i>Brachiaria serrata</i> (d), <i>Cymbopogon pospischilii</i> (d), <i>Cynodon dactylon</i> (d), <i>Elionurus muticus</i> (d), <i>Eragrostis capensis</i> (d), <i>E. chloromelas</i> (d), <i>E. curvula</i> (d), <i>E. plana</i> (d), <i>E. planiculmis</i> (d), <i>E. racemosa</i> (d), <i>Heteropogon contortus</i> (d), <i>Hyparrhenia hirta</i> (d), <i>Setaria nigrirostris</i> (d), <i>S. sphacelata</i> (d), <i>Themeda triandra</i> (d), <i>Tristachya leucothrix</i> (d), <i>Andropogon schirensis</i> , <i>Aristida adscensionis</i> , <i>A. bipartita</i> , <i>A. congesta</i> , <i>A. junciformis</i> subsp. <i>galpinii</i> , <i>Cymbopogon caesius</i> , <i>Digitaria diagonalis</i> , <i>Diheteropogon amplexens</i> , <i>Eragrostis micrantha</i> , <i>E. superba</i> , <i>Harpochloa falx</i> , <i>Microchloa caffra</i> , <i>Paspalum dilatatum</i> .



APPENDIX E: Details, Expertise And Curriculum Vitae of Specialists

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

Charne Gouws	MSc Plant Science (University of Pretoria)
Chris Hooton	National Diploma Nature Conservation (Tshwane University of Technology)
Nelanie Cloete	MSc Environmental Management (University of Johannesburg)
Samantha-Leigh Daniels	PhD (Plant Science) (University of Pretoria)
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:	Charne Gouws		
E-mail:	charne@sasenvgroup.co.za		
Qualifications	MSc (Plant Science) (University of Pretoria) BSc (Hons) Plant Science (University of Pretoria) BSc (Environmental Sciences) (University of Pretoria)		
Registration / Associations	SANAP (South African National Antarctic Programme) Golden Key Honorary Society		
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:	Nelanie Cloete		
E-mail:	nelanie@sasenvgroup.co.za		
Qualifications	MSc Environmental Management (University of Johannesburg) MSc Botany (University of Johannesburg) BSc (Hons) Botany (University of Johannesburg) BSc (Botany and Zoology) (Rand Afrikaans University)		
Registration / Associations	Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 400503/14) Member of the South African Association of Botanists (SAAB) Member of the International Affiliation for Impact Assessments (IAIAsa) South Africa group Member of the Grassland Society of South Africa (GSSA) Member of the Botanical Society of South Africa (BotSoc) Member of the Gauteng Wetland Forum (GWF) Member of the South African Wetland Society (SAWS)		
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		

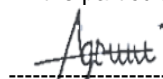


E-mail:	stephen@sasenvgroup.co.za
Qualifications	MSc Environmental Management (University of Johannesburg) BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)
Registration / Associations	Registered Professional 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)

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

I, Charne Gouws, declare that -

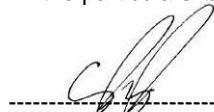
- I act as the **independent specialist** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity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



Specialist Signature

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, Nelanie Cloete, declare that -

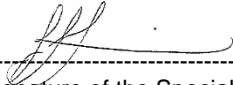
- I act as the **independent specialist (reviewer)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise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



Signature of the Specialist

I, Samantha-Leigh Daniels, 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



I, Sanja Erwee, declare that -

- I act as an **independent specialist** in this assessment;
- 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 CHARNE GOUWS

PERSONAL DETAILS

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

MEMBERSHIP IN PROFESSIONAL SOCIETIES

SANAP (South African National Antarctic Programme)
Golden Key Honorary Society

EDUCATION

Qualifications

MSc Plant Science (University of Pretoria)	2021
BSc (Hons) Plant Science (University of Pretoria)	2018
BSc Environmental Science (University of Pretoria)	2017

Short courses and Training

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

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Limpopo, Mpumalanga, Northern Cape, KwaZulu-Natal, and Eastern Cape

KEY SPECIALIST DISCIPLINES

- Biodiversity Assessments
- Floral Assessments
- Desktop Studies, Mapping and Background Information Research
- Plant permits
- Protected Tree and Floral Marking and Reporting
- Alien and Invasive Control Plan (AICP)





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, Northwest, 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 NELANIE CLOETE

PERSONAL DETAILS

Position in Company	Senior Scientist, Member Water Resource and Botanical Discipline Lead
Joined SAS Environmental Group of Companies	2011
Date of Birth	6 June 1983

MEMBERSHIP IN PROFESSIONAL SOCIETIES

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

EDUCATION

Qualifications

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

Short Courses

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

AREAS OF WORK EXPERIENCE

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

Africa - Democratic Republic of the Congo (DRC)

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

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



- Biodiversity Offset Plan
- **Freshwater Assessments**
- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Plant species and Landscape Plan
- **Legislative Requirements, Processes and Assessments**
- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Environmental and Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions
- Environmental Control Officer monitoring

SELECTED PROJECT EXAMPLES

Floral Assessments

- Floral assessment as part of the environmental assessment and authorisation process for the proposed Mzimvubu water project at Maclear, Eastern Cape.
- Floral assessment as part of the environmental authorisation process for the proposed Assmang Iron Ore Black Rock, Northern Cape Province.
- Floral assessment as part of the environmental authorisation process for the proposed Bloemwater Knellpoort water project pipeline assessment, Free State Province.
- Terrestrial ecological scan as part of the environmental authorisation process for the proposed Sappi Pipeline, Gauteng.
- Floral assessment as part of the proposed Setlagole Mall development, North West Province.
- Floral assessment as part of the coastal habitat changes in the Brand-se Baai area, Western Cape.

Environmental and Ecological Management Plans

- Biodiversity Action plans for African Exploration, Mining and Finance Corporation in line with the NEMBA requirements.
- Biodiversity Action plans for Twickenham Platinum mining operations in line with the NEMBA requirements, Limpopo Province.
- Biodiversity Action plans for Bokoni Platinum mining operations in line with the NEMBA requirements, Limpopo Province.
- Maintenance and Management Plan for the Gamagara River, Northern Cape.
- Development of the Limpopo Province Environmental Outlook Report.

Permit applications for protected tree and floral species

- Permit application for the removal and propagation of protected tree species for the Open Cast Operations within Bokoni Platinum Mine in the Limpopo Province.
- Permit application for the removal of protected tree species for Modikwa Mine within the Limpopo Province.
- Permit application for the removal of protected tree species for the Umfolozi Power line within the Kwa-Zulu Natal Province.
- Permit application for the removal of protected tree species for the expansion activities at Black Rock Mining Operations, Northern Cape Province.
- Permit application for the removal of protected tree species for the expansion activities at Assmang Dwars Rivier Mine, Limpopo Province.





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

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
- 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 **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).

