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# BIODIVERSITY SCOPING REPORT AS PART OF THE ENVIRONMENTAL IMPACT ASSESSMENT AND AUTHORISATION PROCESS FOR THE PROPOSED DEVELOPMENT AT WONDERSTONE MINE, OTTOSDAL, NORTH WEST

## Prepared for

## Envirogistics

## February 2022

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**Report reference:** STS 210067

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# GLOSSARY OF TERMS

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

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| **Alien species (syn. exotic species; non-native species)** | A species that is present in a region outside its natural range due to human actions (intentional or accidental) that have enabled it to overcome biogeographic barriers. |
| **Biological diversity or Biodiversity (as per the definition in NEMBA)** | The variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems. |
| **Biome - as per Mucina and Rutherford (2006); after Low and Rebelo (1998).** | A broad ecological spatial unit representing major life zones of large natural areas – defined mainly by vegetation structure, climate and major large-scale disturbance factors (such as fires). |
| **Bioregion (as per the definition in NEMBA)** | A geographic region which has in terms of section 40(1) been determined as a bioregion for the purposes of this Act. |
| **Critical Biodiversity Area (CBA)** | A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation and ridges. |
| **Corridor** | A dispersal route or a physical connection of suitable habitats linking previously unconnected regions. |
| **Disturbance** | 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. |
| **Ecoregion** | An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region". |
| **Endangered** | Organisms in danger of extinction if causal factors continue to operate. |
| **Endemic species** | 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. |
| **Ecological Support Area (ESA)** | An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation. |
| **Ground-Truth** | To check the accuracy of (remotely sensed data) by means of in-situ observations. |
| **Habitat (as per the definition in NEMBA)** | A place where a species or ecological community naturally occurs. |
| **Important Bird and Biodiversity Area (IBA)** | The IBA Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that: are globally threatened, have a restricted range, are restricted to specific biomes/vegetation types or sites that have significant populations. |
| **Indigenous vegetation (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. |
| **Integrity (ecological)** | The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes. |
| **Invasive species** | 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. |
| **Native species (syn. indigenous species)** | Species that are found within their natural range where they have evolved without human intervention (intentional or accidental). Also includes species that have |

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

# LIST OF ACRONYMS

| | |
|---|---|
| **AIP** | Alien Invasive Plant |
| **BGIS** | Biodiversity Geographic Information Systems |
| **CARA** | Conservation of Agricultural Resource Act |
| **CBA** | Critical Biodiversity Area |
| **CR** | Critically Endangered |
| **DFFE** | Department of Forestry, Fisheries and the Environment |
| **E-GIS** | Environmental Geographical Information Systems |
| **EA** | Environmental Authorisation |
| **EIA** | Environmental Impact Assessment |
| **EN** | Endangered |
| **ESA** | Ecological Support Area |
| **GIS** | Geographic Information System |
| **GN** | Government Notice |
| **GPS** | Global Positioning System |
| **Ha** | Hectares |
| **IBA** | Important Bird Area |
| **IEM** | Integrated Environmental Management |
| **IUCN** | International Union for the Conservation of Nature |
| **Km** | Kilometers |
| **m** | Metres |
| **NOMR** | New Order Mining Right |
| **MAP** | Mean Annual Precipitation |
| **MAPE** | Mean Annual Potential for Evaporation |
| **MASMS** | Mean Annual Soil Moisture Stress |
| **MAT** | Mean Annual Temperature |
| **MFD** | Mean Frost Days |
| **MPRDA** | Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) |
| **MRA** | Mining Right Area |
| **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) |
| **NPAES** | National Protected Areas Expansion Strategy |
| **NT** | Near Threatened |
| **NWBSP** | North West Biodiversity Sector Plan |
| **NWDEDECT** | North West Department: Economic Development, Environment, Conservation and Tourism |
| **P** | Protected, according to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004): Amendment of Critically Endangered, Endangered, Vulnerable and Protected Species List. December 2007 |
| **PES** | Present Ecological State |
| **QDS** | Quarter Degree Square (1:50,000 topographical mapping references) |
| **RDL** | Red Data List |
| **SABAP 2** | Southern African Bird Atlas 2 |
| **SACAD** | South Africa Conservation Areas Database |
| **SANBI** | South African National Biodiversity Institute |
| **SANParks** | South African National Parks |
| **SAPAD** | South Africa Protected Area Database |
| **SCC** | Species of Conservation Concern |
| **STS** | Scientific Terrestrial Services CC |

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| **SWSA** | Strategic Water Source Area |
| **TNCO** | Transvaal Nature Conservation Ordinance, 1983 (Ordinance No. 12 of 1983) |
| **TOPS** | Threatened Or Protected Species |
| **VEGMAP** | National Vegetation Map Project |
| **VU** | Vulnerable |
| **WRD** | Waste Rock Dump |
| **WSAs** | Water Source Areas |
| **WST** | Wonderstone Limited |

# 1 INTRODUCTION

## 1.1 Background and Project Description

Scientific Terrestrial Services CC (STS) was appointed to conduct a biodiversity assessment as part of the Environmental Impact Assessment (EIA) and Environmental Authorisation (EA) process for the proposed mining development at Wonderstone Mine, Ottosdal, North West province. This report includes a desktop screening assessment as part of the Scoping Phase of the EIA process.

Wonderstone Limited (WST) is a mining operation owned by Assore Ltd., mining Pyrophyllite deposits since 1935. The operation currently holds two mining rights, NW 30/1/2/2/398 MR (registered right dated 23 December 2014) and a New Order Mining Right (NOMR) NW 30/5/1/2/2/397 MR. WST aims to consolidate the mining rights into one right, and abandon some areas included in the NOMR, using a reduced portion (hereafter the New Mining Rights Area (NMRA) of the approved NOMR area.

The new operation activities are proposed to include an additional five mining blocks. Two areas have been demarcated for sorting and a south-eastern section is demarcated for the temporary storage of overburden in a Waste Rock Dump (WRD). The temporary overburden will be used for the back backfilling of the opencast pits. To cater for the additional mining area, the existing haul roads will be extended. The footprint comprising the five proposed additional mining blocks, areas demarcated for sorting and temporary storage of overburden, as well as the extended haul roads will henceforth collectively be referred to as the “study area” (Figures 1 – 3).

The study area is located approximately 90 km southeast of Ventersdorp and 9 km north of Ottosdal. It is situated within the Tswaing Local Municipality, Ngaka Modiri Molema District Municipality, North West province.

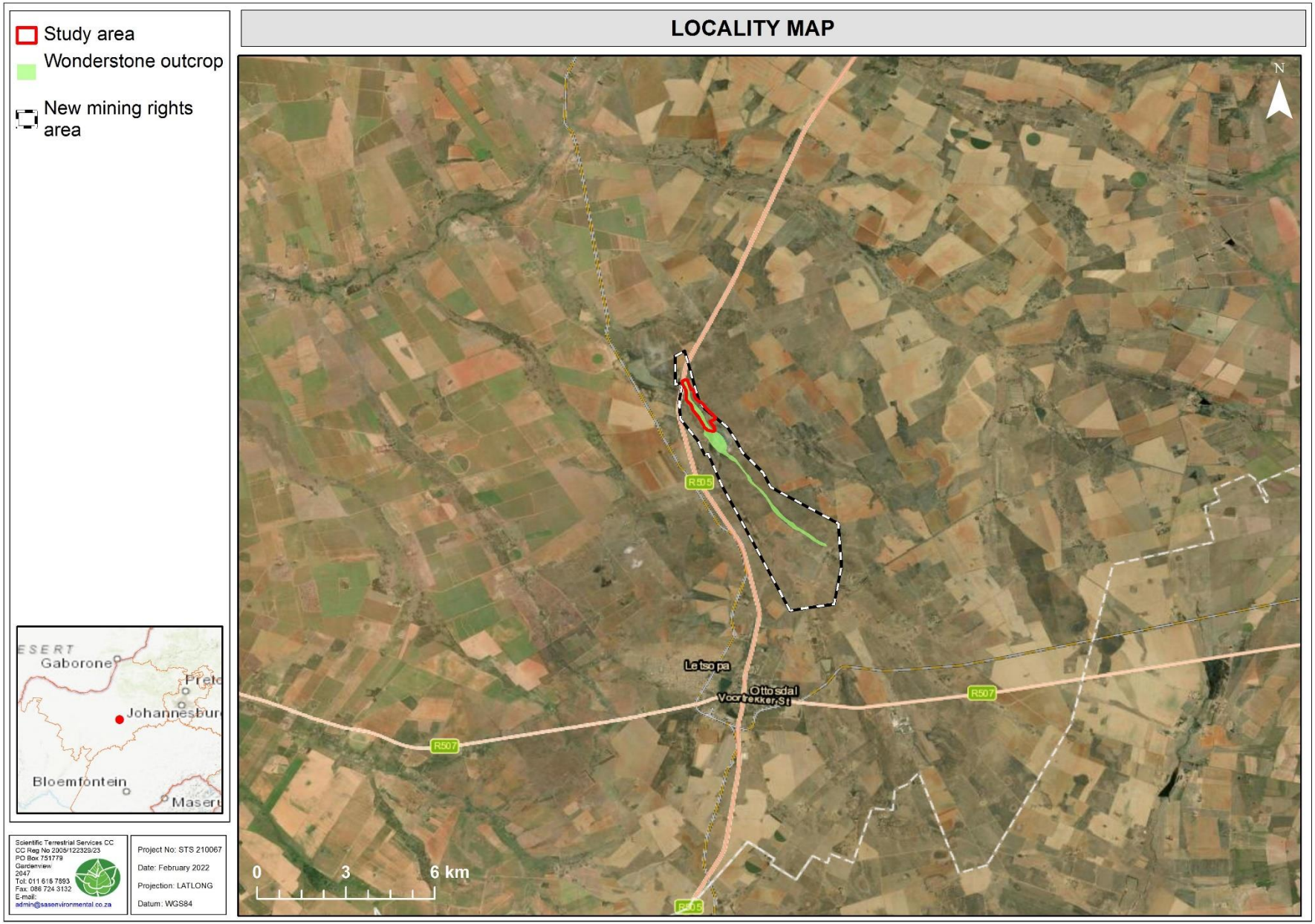


**Figure 1: Digital satellite image depicting the study area in relation to surrounding area and new mining rights area.**

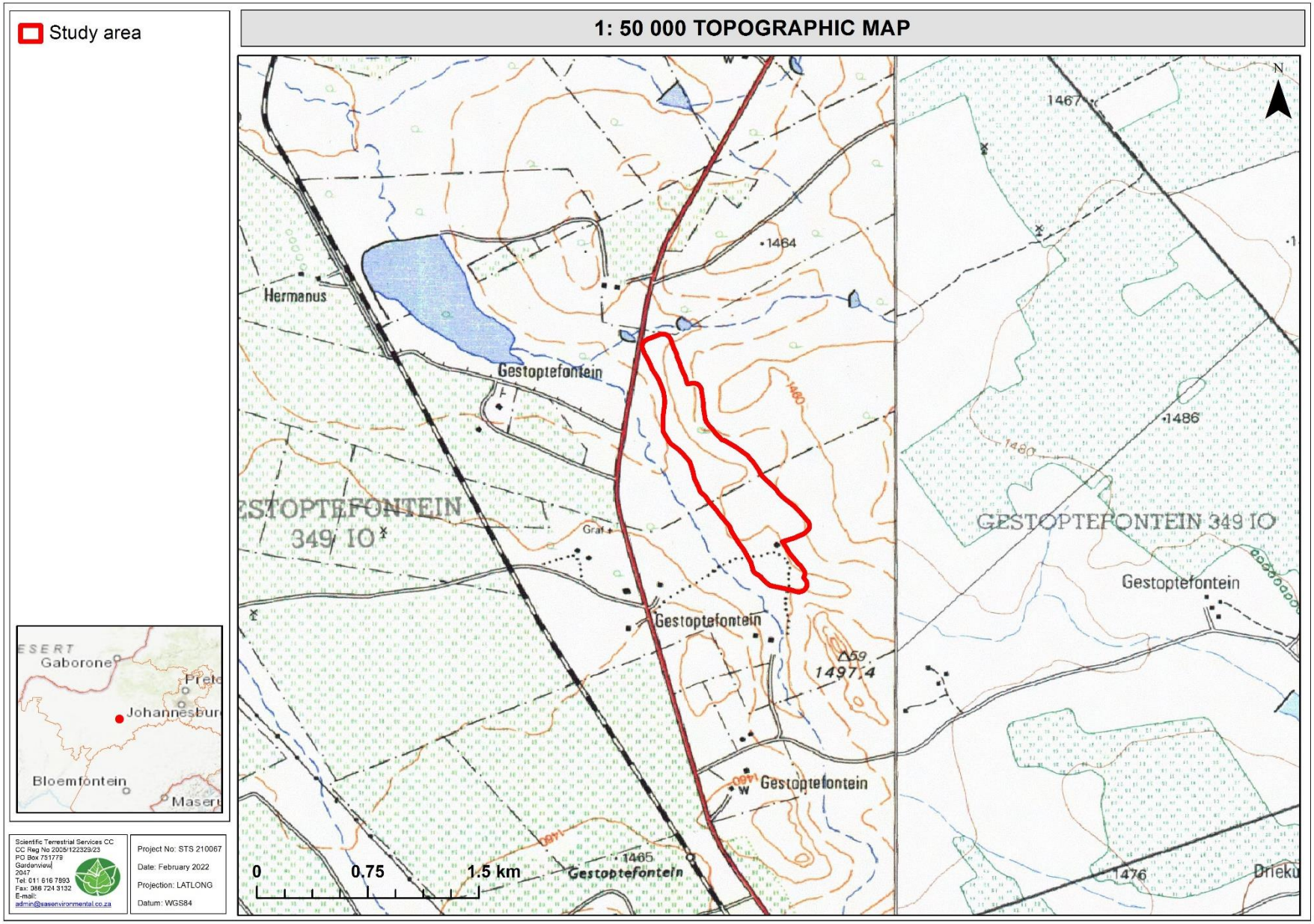


**Figure 2: The study area depicted on a 1:50 000 topographical map in relation to the surrounding area.**

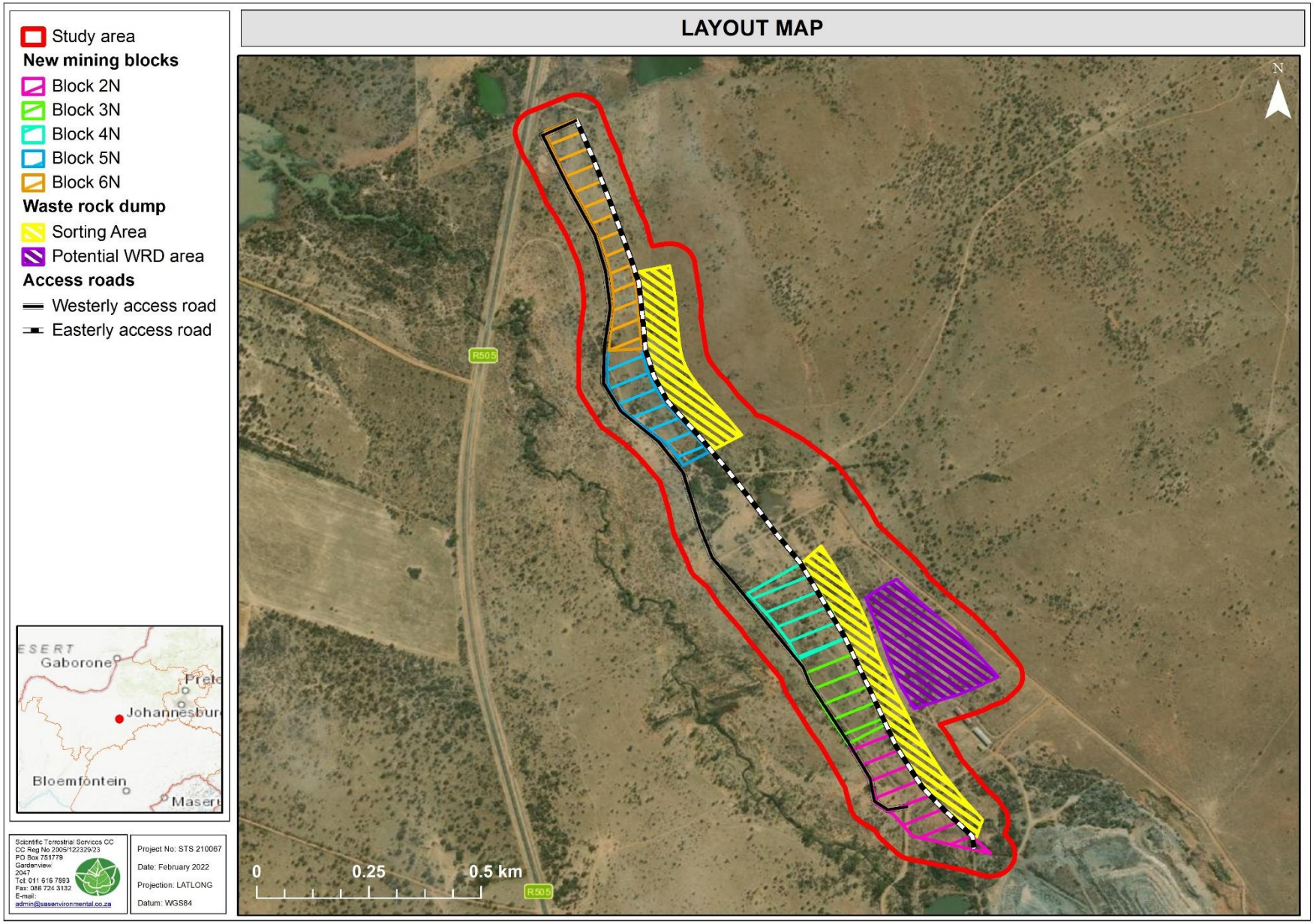


**Figure 3: The proposed layout of the Wonderstone Mine, overlaid on digital satellite imagery.**

## 1.2 Scope of Work

Specific outcomes in terms of the Scoping Phase report are as follows:

- To compile a desktop assessment with all relevant information as presented by South African National Biodiversity Institute's (SANBI's) Biodiversity Geographic Information Systems (BGIS) website (http://bgis.sanbi.org) and the Environmental Geographical Information Systems (E-GIS) website (https://egis.environment.gov.za/). The desktop assessment aims to gain background information on the physical habitat and potential floral and faunal ecology associated with the study area;
- Compile a report presenting the results and findings of the scoping assessment; as well as identify potential impacts associated with the proposed infrastructure development within the study area; and
- Present the plan of study for the EIA phase of the project including the methods of assessment to be used.

## 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 did not include the entire Wonderstone NOMR nor any neighbouring and adjacent properties, although the sensitivity of surrounding areas are included on the respective maps;
- This scoping phase study was undertaken as a desktop assessment only, and as such, the information gathered must be considered with caution, as inaccuracies and data capturing errors are often present within these databases. Since this information forms part of the scoping phase, this desktop assessment is considered to provide adequate information for informed decision making and to inform the Plan of Study for the EIA phase; and
- A site visit was conducted between the 1st and 3rd of February 2022 to comply with the National Environmental Management Act (NEMA; Act 107 of 1998), associated EIA Regulations (Government Notice (GN) number R982, GN R983, R984 and R985 of 2014). The findings of the site assessment, as well as an impact assessment, will be included as part of the EIA phase report.

## 1.4 Legislative Requirements

The following legislative requirements were considered during the assessment:

- The Constitution of the Republic of South Africa, 1996[1];
- 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):
  - Government Notice (GN) number R982, R983, R984 and R985 of 2014
- The National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA);
- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);
- GN number R.1020: Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated September 2020 as it relates to the NEMBA:
  - GN number 1003: Legislation to come into force on the 1st of March 2021: Government Notice number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 September 2020, as it relates to the NEMBA.
- The National Forest Act, 1998 (Act No. 84 of 1998, amended) (NFA);
  - GN 536: List of Protected Tree Species as published in the Government Gazette 41887 dated 7 September 2018, as it relates to the NFA;
- Government Gazette 45421 dated 10 May 2019 as it relates to the Department of Forestry, Fisheries and the Environment (DFFE's) national environmental screening report required with an application for environmental authorisation as identified in regulation 16(1)(v) of EIA Regulations:
  - 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;
- The Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA); and
- The Transvaal Nature Conservation Ordinance, 1983 (Ordinance No. 12 of 1983) (TNCO).

[1] 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 not the acts amending it are allocated act numbers.

# 2 ASSESSMENT APPROACH

## 2.1 Desktop Assessment

Maps and digital satellite images were generated prior to the field assessment to determine broad habitats, vegetation types and potentially sensitive sites. The biodiversity desktop assessment is confined to the study area and does not include the neighbouring and adjacent properties, although the sensitivity of surrounding areas is included on the respective maps. Relevant databases and documentation that were considered during the assessment of the study area include: [2]

- 2010 National Protected Area Expansion Strategy (NPAES) (Government of South Africa. 2010; DEA & SANBI, 2009), including the below listed vector datasets:
  - NPAES Study areas 2010: National Protected Areas Expansion Strategy: Study areas for protected area expansion (South African National Parks (SanParks), 2010);
  - NPAES Formal: Polygons of formal protected national parks areas in South Africa (SANParks/SANBI, 2013); and
  - NPAES Protected Areas – Informal: Informal conservation areas in South Africa (SANParks/SANBI, 2012).
- The South African Conservation Areas Database, Quarter 3 (SACAD, 2021);
- The South African Protected Areas Database, Quarter 3 (SAPAD, 2021);
- The 2015 North West Terrestrial Critical Biodiversity Areas, (READ, 2015b);
- The National Vegetation Map Project (VEGMAP), with the below vector dataset used for information on Biomes, Bioregions and Vegetation Type(s):
  - 2018 Final Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018a)
- The National List of Threatened Ecosystems 2011 (SANBI 2011; South Africa, 2011);
- From the National Biodiversity Assessment (NBA, 2018) Terrestrial Assessment project (Skowno et al, 2019):
  - 2018 Terrestrial ecosystem threat status and protection level - remaining extent (SANBI, 2018b); and
  - 2018 Terrestrial ecosystem threat status and protection level layer (SANBI, 2018c).

[2] Datasets obtained from:

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

- 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);
- The International Union for Conservation of Nature (IUCN) Red List (accessed 2022);
- The National Web-Based Environmental Screening Tool (accessed 2021);
- The 2013 Mining and Biodiversity Guidelines utilising the Mining and Biodiversity Guidelines 2012 Raster dataset (SANBI, 2012); and
- From the 2017 Strategic Water Source Areas (SWSA) project:
    - 2017 SWSA Surface water (Water Research Commission, 2017).

The field assessment took place during the summer season (1st to the 3rd of February 2022) to "ground-truth" the results of the desktop assessment. Results of the field assessment will be presented in Parts B and C during the EIA phase of the study.

# 3 RESULTS OF THE DESKTOP ANALYSIS

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

**Table 1: Summary of the biodiversity characteristics associated with the study area.**

| DETAILS OF THE AREA OF INTEREST IN TERMS OF MUCINA & RUTHERFORD (2006) | | | | | | |
|---|---|---|---|---|---|---|
| **BIOME** | The study area (including the study area) is situated within the **Grassland Biome**. | | | | | |
| **BIOREGION** | The study area (including the study area) is located within the **Dry Highveld Grassland Bioregion**. | | | | | |
| **VEGETATION TYPE** | The study area is situated within the **Klerksdorp Thornveld (Gh 13)** and the **Western Highveld Sandy Grassland (Gh 14)** vegetation types. | | | | | |
| **CLIMATE** | **Vegetation type** | **Altitude** | **MAP (mm)** | **MAT (°C)** | **MFD** | **MAPE (mm)** |
| | Klerksdorp Thornveld | 1 260 – 1 580 | 533 | 16.4 | 37 | 2423 |
| | Western High Sandy Grassland | 1 280 – 1 520 | 520 | 17 | 36 | 2598 |
| **CONSERVATION** | Klerksdorp Thornveld: **Vulnerable:** Target 24%. Only about 2.5% conserved in the statutory Mafikeng Game Reserve, private Botsolano Game Park and Faan Meintjes Nature Reserve. Almost a third already transformed for cultivation and by urban sprawl. This vegetation unit has a high grazing capacity, and this leads to overutilisation and degradation, and subsequent invasion of *Vachellia karroo* into adjacent dry grassland. Due to the great habitat and floristic diversity and for aesthetical reasons, the landscape deserves to be conserved.<br><br>Western Highveld Sandy Grassland: **Endangered:** Target 24%. Only a very small portion statutorily conserved (Barberspan Nature Reserve). More than 60% has been ploughed. Nonarable parts are on shallow aeolian soils which become easily overutilised through grazing. Erosion is very low. About 95% of this land is suitable for cultivation, but the low rainfall makes it a high-risk area for agriculture. Therefore, the natural vegetation is often restricted to nonarable bush clumps, shallow soils, aeolian sands and pans. | | | | | |
| **DISTRIBUTION** | Klerksdorp Thornveld: North-West Province: In two sets of patches, one in the Wolmaransstad, Ottosdal and Hartbeesfontein region, and the other from the Botsolano Game Park north of Mafikeng to the vicinity of Madibogo in the south.<br><br>Western Highveld Sandy Grassland: North-West Province: From Mafikeng to Schweizer-Reneke in the south and from Broedersput and Kameel in the west to Lichtenburg and Ottosdal in the east. | | | | | |
| **GEOLOGY & SOILS** | Klerksdorp Thornveld: Shale, slate and quartzite of the Pretoria Group with interlaid diabase sills and Hekpoort lava supporting relatively shallow and rocky soils (Glenrosa and Mispah forms), typical of the Fb land type. Equally represented are eutrophic red plinthic soils (Hutton form), derived mainly from a thick succession of volcanics and sediments of the Ventersdorp Supergroup (Bc land type). Bd and Ae of minor occurrence.<br><br>Western Highveld Sandy Grassland: Basaltic lavas of the Klipriviersberg Group and andesitic lavas of the Allanridge Formation (both Ventersdorp Supergroup) covered by aeolian sand (western part of the area) or calcrete, with the eutrophic plinthic soils, which are mainly yellow apedals (Avalon and Pinedene) and rarely red apedals (Hutton) or Clovelly in bottomlands. Bd land type dominant. | | | | | |
| **VEGETATION & LANDSCAPE FEATURES** | Klerksdorp Thornveld: Plains or slightly irregular undulating plains with open to dense *Vachellia karroo* bush clumps in dry grassland.<br><br>Western Highveld Sandy Grassland: Flat to gently undulating plains with short, dry grassland, with some woody species occurring in bush clumps. | | | | | |

| CONSERVATION DETAILS PERTAINING TO THE AREA OF INTEREST (VARIOUS DATABASES) | |
|---|---|
| **NATIONAL BIODIVERSITY ASSESSMENT (NBA,2018 DATASET): FIGURE 4** | The study area is located within two vegetation types, namely i) the **Klerksdorp Thornveld** which is **Least Concern** and is currently **Poorly Protected**, and ii) the **Western Highveld Sandy Grassland** which is currently **Endangered** and is **Not Protected.**<br><br>Ecosystem types are categorised[3] as "not protected", "poorly protected", "moderately protected" and "well protected" based on the proportion of each ecosystem type that occurs within a protected area recognised in the NEMPAA, and compared with the biodiversity target for that ecosystem type. |
| **National Threatened Ecosystems (2011) Figure 5** | The north-eastern portion of the study areas is located within the **Western Highveld Sandy Grassland** ecosystem, according to the National Threatened Ecosystem Database (2011). The Nation Threatened Ecosystem Database (2011) categorised this vegetation type as **Critically Endangered.**<br><br>The purpose of listing protected ecosystems is primarily to preserve witness sites of exceptionally high conservation value. The first national list of threatened terrestrial ecosystems for South Africa was gazetted on 9 December 2011 (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011).<br><br>**Note**: *The National List of Threatened Terrestrial Ecosystems published in terms of the NEMBA in 2011 remains in legal force. The data contained in NBA 2018 represents an update of the assessment of threat status for terrestrial ecosystems, but the National List of Threatened Terrestrial Ecosystems has not yet been revised*. |
| **IBA (2015)** | The study area is not located within 10 km of an IBA. |
| **SAPAD (2021, Q3); SACAD (2021, Q3); NPAES (2010).** | The study area is not located within 10 km of a protected area or reserve according to SAPAD (2021, Q3), SACAD (2021, Q3) and NPAES (2010) |
| **NORTH WEST BIODIVERSITY SECTOR PLAN (NWBSP) (2015)** | |
| **Terrestrial Ecosystems Figure 6** | The study area is located within a Critical Biodiversity Area (CBA) 1 and 2.<br><br>Land management objectives as per the NWBSP (READ, 2015a):<br>- **CBA1** - should be maintained in a natural or near-natural state that maximises the retention of biodiversity patterns and ecological processes. CBA1 are described as i) vulnerably ecosystems that remain largely intact, the ecosystems remaining is less than the target biodiversity, thus remaining patches are of highest conservation priority and further impacts on natural habitat should be avoided. ii) irreplaceable sites which are mandatory if biodiversity targets are to be achieved. iii) critical biodiversity corridors linkages existing within the biodiversity network, in which there is limited conversion to maintain the connectivity in the landscape. iv) important terrestrial habitats, areas identified by experts as being important for biodiversity conservation (less than 10 000 ha) and v) important terrestrial habitats: Kloofs large and medium kloof habitats which are identified as important for climate change adaptation.<br>- **CBA2** – should be maintained in a natural or near-natural state that maximises the retention of biodiversity patterns and ecological processes. CBA2 are characterised by the following i) ecosystems and species are fully or are largely intact or undistributed, ii) areas with intermediate irreplaceability or some flexibility in terms of meeting biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without |

[3] The ecosystem protection level status is assigned using the following criteria:

i. If an ecosystem type has more than 100% of its biodiversity target protected in a formal protected area either A or B, it is classified as Well Protected;
ii. When less than 100% of the biodiversity target is met in formal A or B protected areas it is classified it as Moderately Protected;
iii. If less than 50% of the biodiversity target is met, it is classified it as Poorly Protected; and
iv. If less than 5% it is Hardly Protected.

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| | compromising the ability to achieve biodiversity targets, although loss of these sites would require alternative sites to be added to the portfolio of CBAs, and iii) these are biodiversity features that are approaching but have not passes their limits of acceptable change; and |
| **IMPORTANCE OF THE STUDY AREA IN TERMS OF THE MINING AND BIODIVERSITY GUIDELINES (2013)** | |
| **BIODIVERSITY IMPORTANCE Figure 7** | Most of the study area is located within areas identified as **High Biodiversity Importance,** according to the Mining and Biodiversity Guidelines (2013). A small section in the southeast of the study area falls within an area considered to be of **Moderate Biodiversity Importance** and a small section in the north west of the study area is located within an area considered to be of **Highest Biodiversity Importance.**<br><br>**Areas of Highest Biodiversity Importance**<br>Risk for mining: Highest risk for mining.<br>Implications for mining: EIA's and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features, and to provide site-specific basis on which to apply the mitigation hierarchy to inform regulatory decision-making for mining, water use licenses, and environmental authorisations. If confirmed, the risk of fatal flaws is high.<br><br>**Areas of High Biodiversity Importance**<br>Risk for mining: High risk for mining.<br>Implications for mining: These areas are important for conserving biodiversity, for supporting or buffering other biodiversity priority areas, for maintaining important ecosystem services for communities or the country. An EIA should include an assessment of optimum, sustainable land use for a particular area and will determine the significance of the impact on spatial biodiversity.<br><br>**Areas of Moderate Biodiversity Importance**<br>Risk for mining: Moderate risk for mining.<br>Implications for mining: EIAs and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features (e.g., threatened species) not included in the existing datasets, and on providing site-specific information to guide the application of the mitigation hierarchy. |
| **STRATEGIC WATER SOURCE AREAS FOR SURFACE WATER (2017)** | |
| 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. | |
| **NAME & CRITERIA** | The study area is **not** within 10 km of a Strategic Water Source Area. |

| NATIONAL WEB BASED ENVIRONMENTAL SCREENING TOOL (ACCESSED 2022) | |
|---|---|
| The screening tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas. The different sensitivity ratings pertaining to the plant [and animal] protocols are described below:<br>➢ 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 km² are considered critical habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under critically endangered (CR), endangered (EN), or vulnerable (VU) 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.<br>➢ High: recent occurrence records for all threatened (CR, EN, VU) and/or rare endemic species are included in the high sensitivity level.<br>➢ Medium: model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level.<br>➢ Low: areas where no species of conservation concern (SCC) are known or expected to occur. | |
| **TERRESTRIAL BIODIVERSITY THEME Figure 8** | For the terrestrial biodiversity theme, the study area is considered to have an overall **very high sensitivity**. The triggered sensitivity features include a CBA1, Ecological Support Area 1 (ESA1), a ESA2, a critically endangered ecosystem, and focus areas for land-based protected areas expansion and South African Protected Areas. |
| **PLANT SPECIES THEME Figure 9** | For the plant species theme, majority of the study area is considered to have a **medium sensitivity,** a small section (less than 5%) is considered to have a **low sensitivity.** The triggered sensitive species includes Sensitive Species 1261 (VU) |
| **ANIMAL SPECIES THEME Figure 10** | For the animal species theme, the entire study area is considered to have a **low sensitivity**. |

**NBA = National Biodiversity Assessment; SAPAD = South African Protected Areas Database; SACAD = South African Conservation Areas Database; NPAES = National Protected Areas Expansion Strategy; IBA = Important Bird Area; MAP = Mean annual precipitation; MAT = Mean annual temperature; MAPE = Mean annual potential evaporation; MFD = Mean Frost Days; MASMS = Mean annual soil moisture stress (% of days when evaporative demand was more than double the soil moisture supply); CBA = Critical Biodiversity Areas; ESA = Ecological Support Areas.**

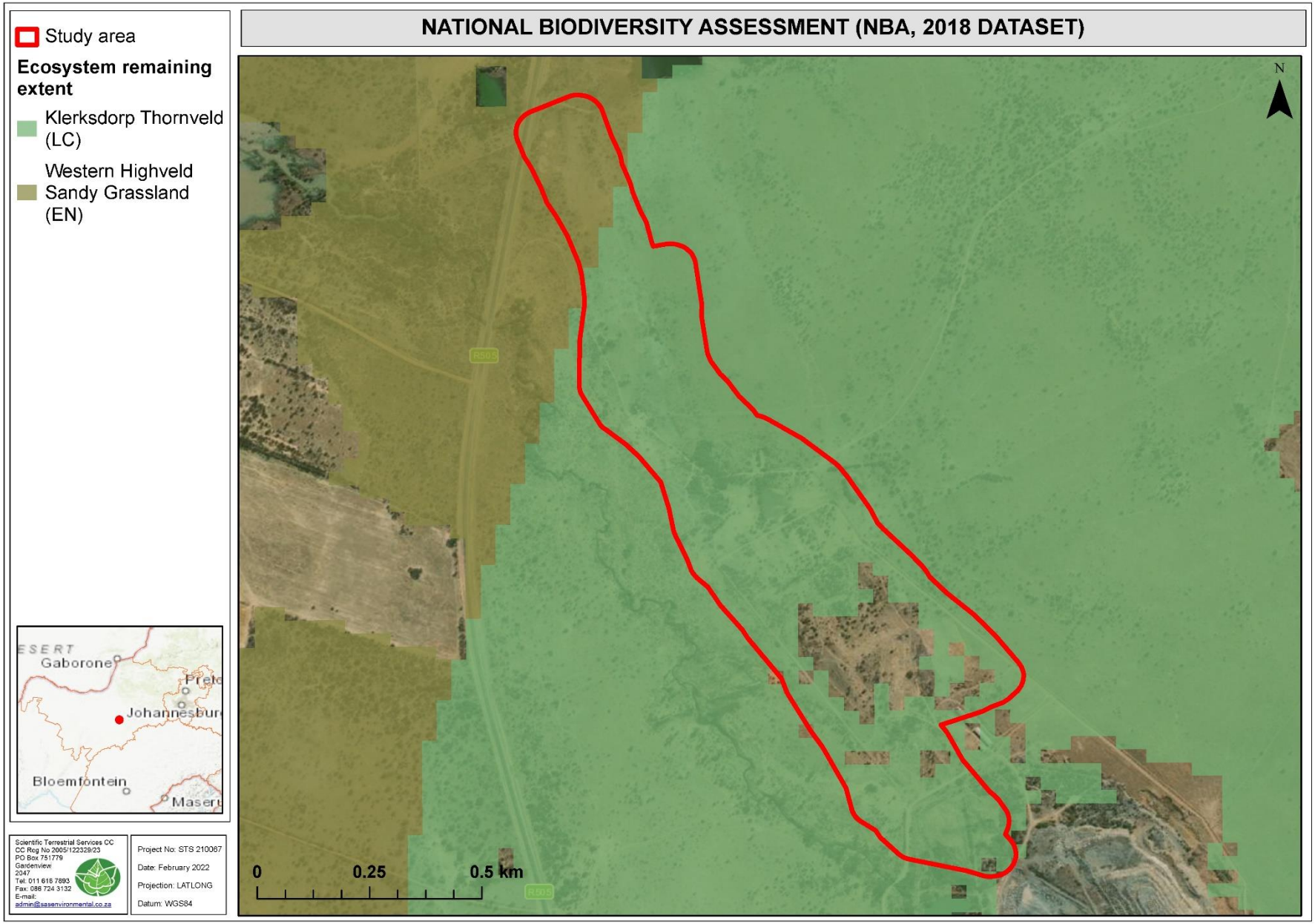


**Figure 4: The remaining extent of the vegetation type associated with the study area according to the National Biodiversity Assessment (NBA, 2018).**

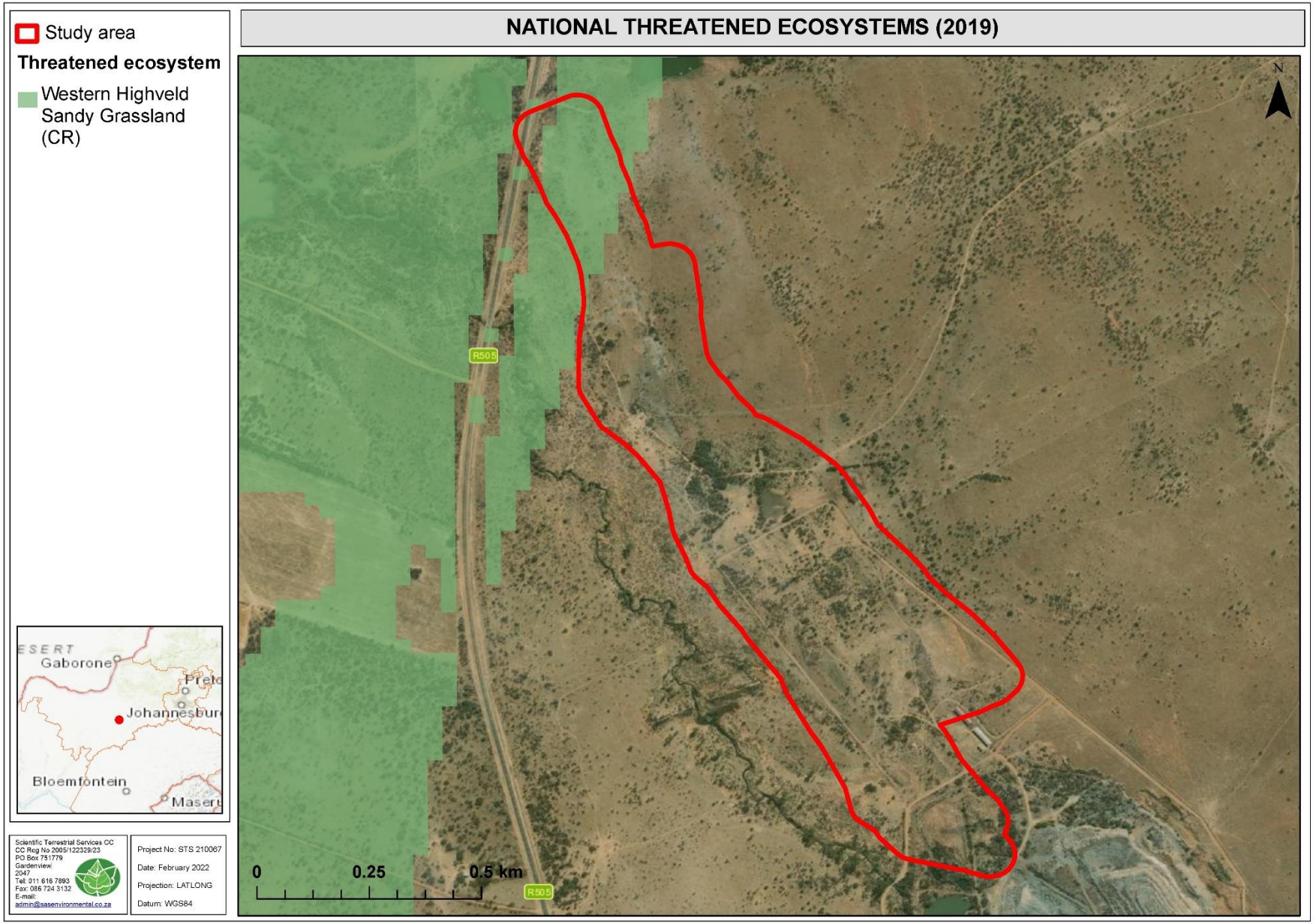


**Figure 5: The study area in relation to the remaining extent of the National Threatened Ecosystems (2011).**

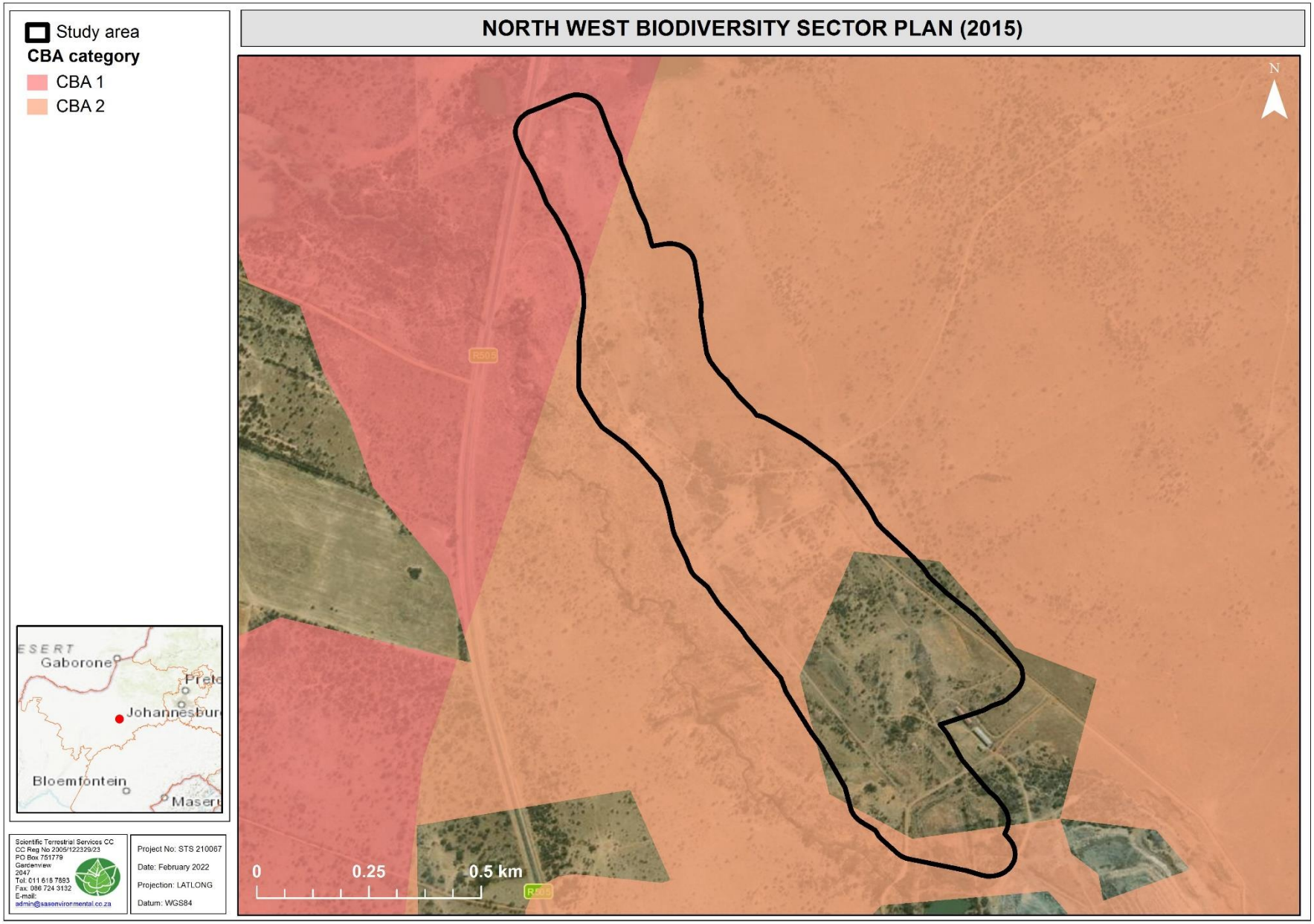


**Figure 6: The study area in relation to the North West Biodiversity Sector Plan Version 2 (NWBSP, 2015).**

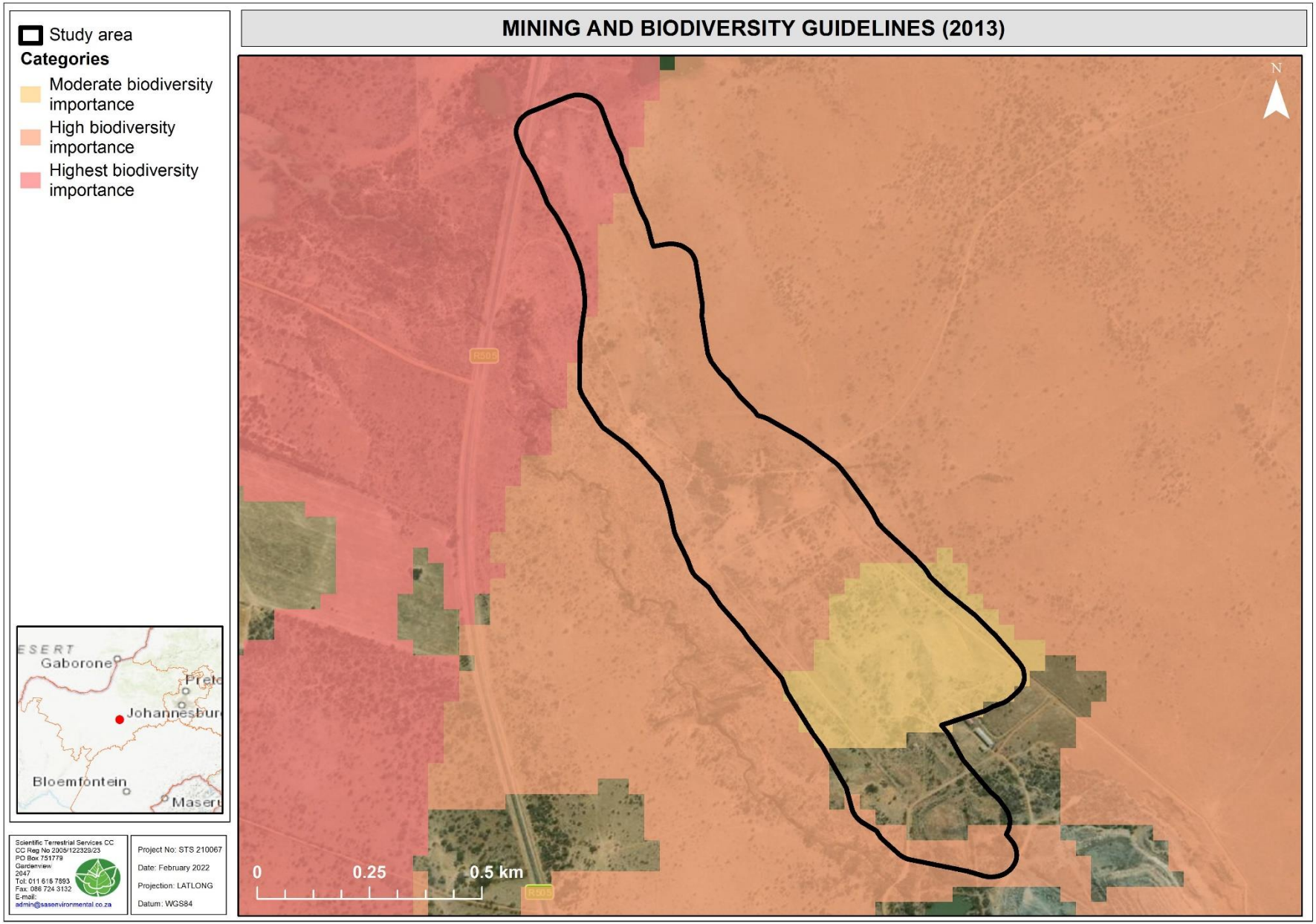


**Figure 7: Importance of the study area according to the Mining and Biodiversity Guidelines.**

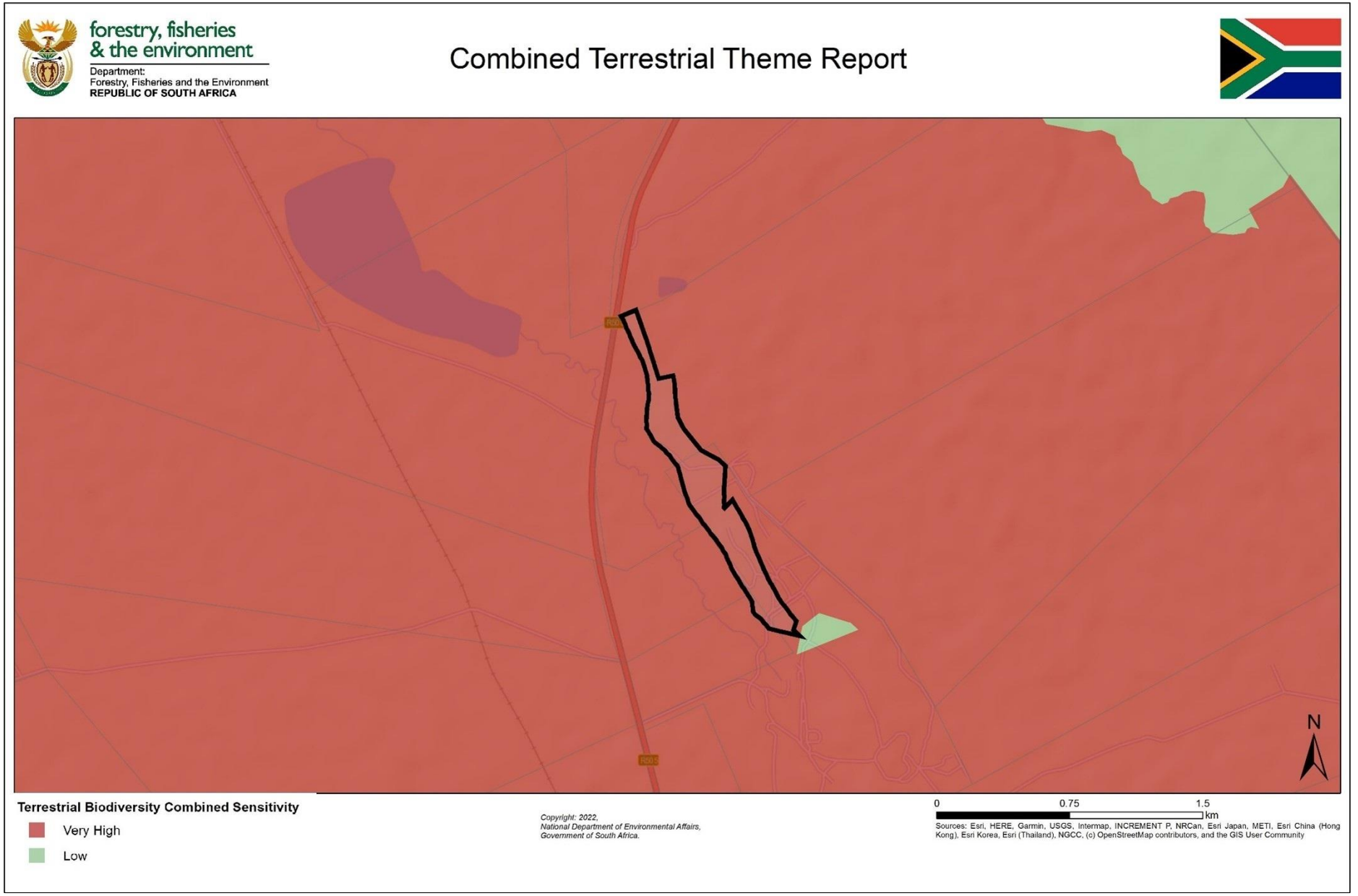


**Figure 8: The combined terrestrial sensitivity assigned to the study area by the screening tool.**

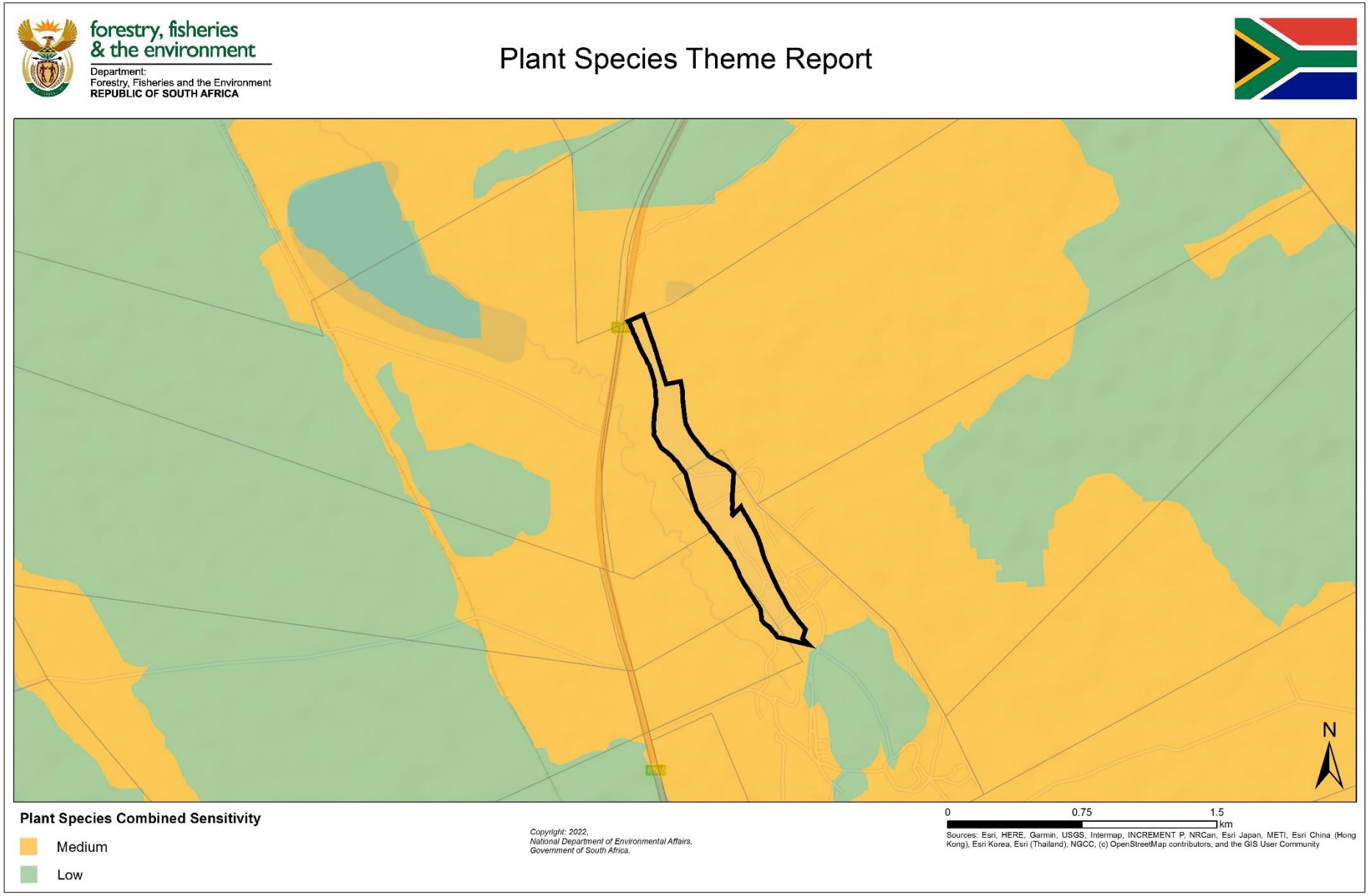


**Figure 9: Plant species sensitivity assigned to the study area by the screening tool.**

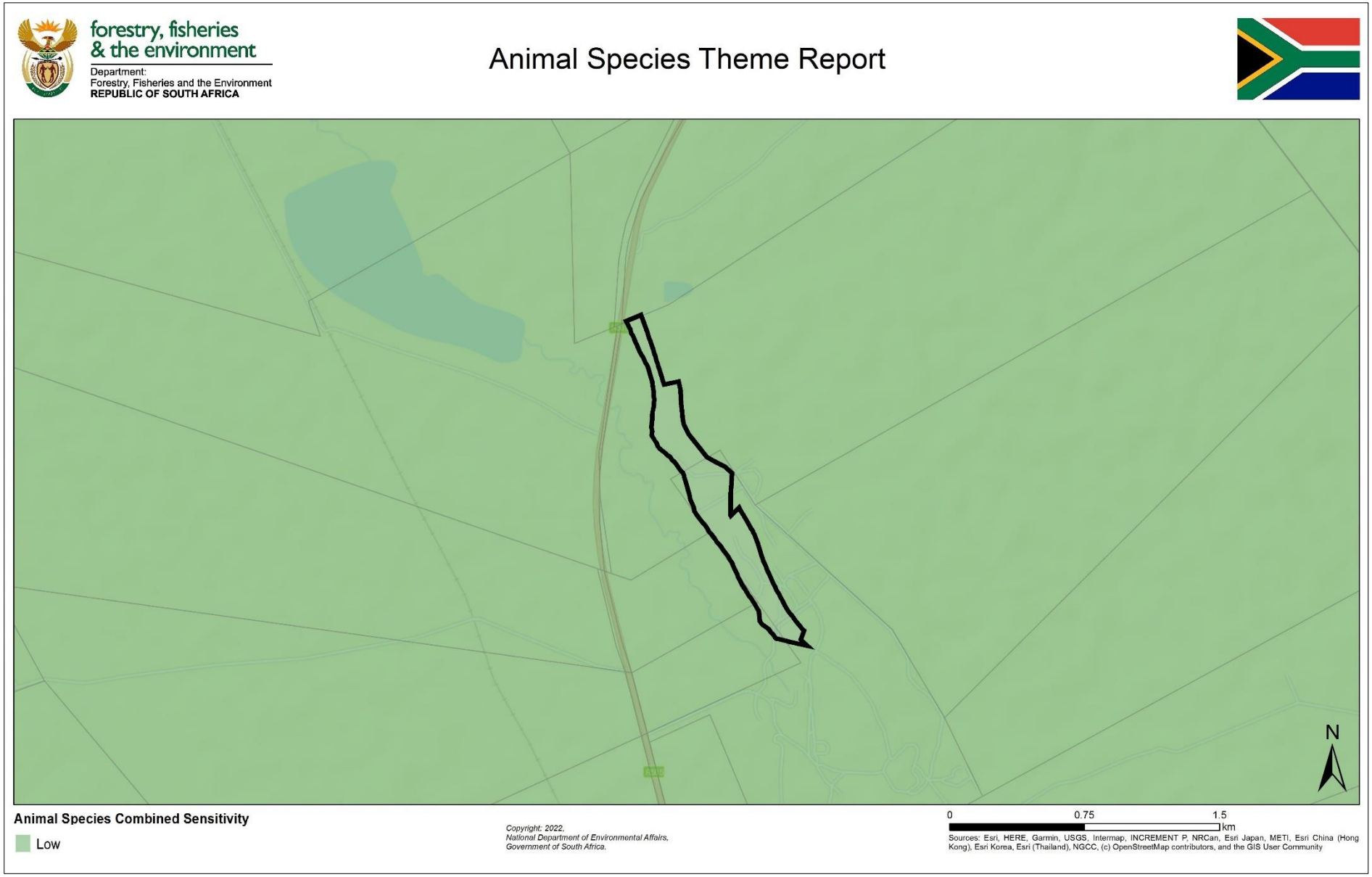


**Figure 10: Animal species sensitivity assigned to the study area by the screening tool.**

# 4. POTENTIAL IMPACTS AND PROPOSED MANAGEMENT MEASURES

## *4.1. Description of potential impacts associated with the proposed infrastructure development*

Several potential risks to the receiving environment by the proposed infrastructure development have been identified and are presented in the bullets below:

- Vegetation clearing and construction activities will lead to habitat destruction and disturbance within the direct footprint area and will likely lead to the loss of floral and faunal communities, consequently impacting on the terrestrial biodiversity within the study area and impacting upon the overall conservation targets of the defined CBAs;
- Vegetation clearing and construction activities may result in the loss of faunal and floral SCC within the directly impacted areas;
- The proposed opencast pits, waste rock dumps, and roads are likely to have a significant impact on the habitat within the direct footprint. Potential sensitivities associated with the habitat within the study area relate to the following:
    - The northern portion of the study area is located within a CBA 1, and most of the remaining sections are located in a CBA 2. As such, development within these areas may impact upon the overall conservation targets of the defined CBAs;
    - The study area is anticipated to host provincially protected fauna and floral species listed in the TNCO(12 of 1983), NEMBA:TOPS (2007), the Screening Tool, including protected trees under the NFA. As such, the proposed mining activities threaten potentially occurring floral and faunal SCC habitat and populations. Alteration, degradation, loss, or destruction of faunal and floral habitat:
    - Vehicles may impact potential sensitive habitat associated with the EN Western Highveld Sandy Grassland during construction, operation, and potentially poorly implemented rehabilitation, resulting in a consequent loss of species diversity. Vehicular movement and construction activities could additionally cause increased erosion, leading to poor growth and unsuitable conditions for the establishment of indigenous floral species and, consequently, providing sub-optimal living conditions for faunal species;
    - Mining infrastructure and the dumping of construction and operational waste materials in the surrounding habitat will result in floral and faunal habitat changes, which is likely to push faunal species out of their current home ranges, resulting in

an increased competition for space and resources within the study area and in surrounding areas;
- Earthworks may lead to increased runoff and erosion resulting in a further loss of faunal and floral habitat;
- Risk of discharge of contaminated water from operational facilities may pollute receiving environment leading to altered floral and faunal habitat;
- Degradation of the surrounding watercourses and wetland habitat within the study area will result in significant loss of both floral and faunal habitat (specifically species reliant on wet environments), impacting upon species diversity and abundance;

- Potential indiscriminate fires by construction personnel may lead to uncontrolled / run-away fires, impacting on floral and faunal communities of the study area and surrounds;
- Introduction of foreign material (e.g., soil) during construction activities may lead to the further introduction of alien invader species, impacting on the floral characteristics of the study area;
- Permanent surface scarring may reduce favourable habitat for floral and faunal species;
- Increased personnel on site may result in an increased risk of harvesting/overutilisation of SCC). Moreover, increased personnel within the study area inherently brings an increased risk of harvesting activities, threatening the current faunal populations;
- Increased risk of hunting/trapping of local faunal species;
- Potential for poor rehabilitation and monitoring of sensitive habitat that will as a consequence be affected as a result of edge effects associated with mining activities, thereby leading to declines in species diversity;
- Dust generated by ineffective, or lack of, rehabilitation of exposed areas may impact on the floral characteristics of the property;
- Failure to implement an alien floral control plan may result in widespread degradation or loss of indigenous flora and fauna within the study area and possibly in surrounding areas;
- Ineffective removal and control of alien invader species, and poor rehabilitation of exposed areas could lead to re-establishment of invasive species, impacting on floral community rehabilitation efforts.

Please note that the above list is not exhaustive. Additional impacts will need to be identified during a detailed impact assessment.

## 4.2. Preliminary Management Measures

The implementation of mitigation measures is important to manage the overall risk to floral and faunal diversity, habitat and SCC. The list below highlights the preliminary mitigation measures that are applicable to the proposed mining activities to suitably manage and mitigate the ecological impacts on faunal and floral communities that are associated with the proposed mining activities.

Habitat and Species Diversity:

- At all times, ensure that sound environmental management is in place during the planning phase;
- The design plans should take cognisance of sensitive habitats described during the EIA phase, in line with the DFFE mitigation hierarchy. As far as feasibly possible, sensitive habitats must be excluded from the proposed mining activities. Development should be prioritised in habitats of decreased sensitivity;
- Where possible, and feasible, access roads should be kept to existing roads so to reduce further fragmentation of existing natural habitat;
- The construction and operational footprints must be kept as small as possible, clearly demarcated, and prioritised in habitats of low sensitivity, in order to minimise impact on the surrounding environment;
- Where site clearing is necessary, it should take place in a phased manner to allow for faunal species present to move out of the footprint area;
- Informal fires by construction personnel should be prohibited, and no uncontrolled fires whatsoever should be allowed;
- No harvesting of any floral or faunal species may take place; and
- Smaller species of invertebrates and herpetofauna are likely to be less mobile, as such should any be observed in the footprint areas during clearing and operational activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Operational personnel are to be educated about these species and the need for their conservation. Harmless reptiles should be carefully relocated by a suitably nominated construction person or nominated mine official. For larger venomous snakes, a suitably trained mine official should be contacted to affect the relocation of the species, should it not move off on its own.

Species of Conservation Concern:

- In terms of the DFFE (2013) mitigation hierarchy, avoidance should be undertaken primarily to avoid high impacts to floral and faunal SCC. Following this, and if not

completely possible (based on location of the mined resources) a search and rescue should be undertaken prior to the vegetation clearing activities.

- Prior to any vegetation clearing activities taking place, an authorised search and rescue plan must be implemented for floral and faunal SCC within the proposed footprint areas. From a faunal perspective, rescue efforts should focus on SCC that lack mobility and will therefore be unable to flee disturbance;
- Search and rescue efforts should focus on smaller, less mobile faunal SCC that will not be able to move away from the disturbances. Rescue efforts should also include a walkdown of the proposed footprint areas to detect and/or mark all (potentially) occurring floral SCC. This should be overseen by a suitably qualified specialist or nominated mine personnel in order to ensure that species loss during construction activities is kept to a minimum;
- Where faunal and floral SCC are located in the proposed footprint areas, the appropriate permits must be obtained from the relevant authorities before any further work can be conducted; and
- Should any floral species be found within the proposed development footprint, they must be legally relocated to suitable, similar habitat in close proximity to where they were removed from, but outside the disturbance footprint.

<u>General Waste Management:</u>

- Infrastructure design should be environmentally sound and all vehicles in a good working condition, and all possible precautions taken to prevent potential spills and /or leaks; and
- No dumping of general or hazardous waste should take place. If any spills occur, they should be immediately cleaned up, and be disposed of at a registered waste facility.

<u>Rehabilitation and Edge Effect Control:</u>

- All soils compacted outside that of the footprint area as a result of construction and operational activities should be ripped and reprofiled to natural levels and revegetated with indigenous vegetation. Special attention should be paid to alien and invasive plant control within these areas; and
- Edge effects of all operational and any planned reclamation activities, such as erosion and alien plant species proliferation, which may affect adjacent natural vegetation, need to be strictly managed adjacent to the project footprint areas. Re-vegetation efforts during rehabilitation, should focus on re-planting disturbed areas with indigenous vegetation found in the study area prior to clearing.

# 5. A PLAN OF STUDY FOR EIA PHASE

Specific outcomes in terms of the EIA phase report are presented in the points below:

- To identify and consider all sensitive landscapes including rocky ridges, wetlands and/or any other special features;
- The terrestrial ecological assessment will focus on:
    - Conducting a SCC assessment, including potential for species to occur within the study area;
    - Providing floral and faunal inventories of species that were encountered on site;
    - Describing the spatial significance of the proposed infrastructure development with regards to surrounding natural areas;
    - Describing floral habitats, communities and ecological state of the proposed infrastructure development as is determined on site;
    - Identifying dominant floral and faunal species for each habitat type;
    - Focus will be given to identifying areas of severe alien and invader encroachment and listing Category 1, 2 and 3 species in terms of GN No. 864 Alien and Invasive Species List, 2016: National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);
    - Specific focus will also be given to establishing the presence of Red Data Listed (RDL) and protected fauna and flora as listed under the IUCN, the TNCO (Schedules 2, 11 and 12),the NFA, and the NEMBA: TOPS list of 2007);
- The reports produced will include a detailed impact assessment of all identified significant risks, including cumulative impacts on ecological assemblages in the region; and
- Recommendations on the management and mitigation measures (including opportunities and constraints) with regards to the construction and operation of the proposed activities, will be provided to manage and mitigate impacts on the terrestrial ecology of the area.

Please refer to Appendices B to D for the envisioned methods of assessment.

# 6. CONCLUSION

STS was appointed to conduct a biodiversity scoping report as part of the EIA and EA) process for the proposed mining development at Wonderstone Mine, Ottosdal, North West province. The footprint comprising five proposed additional mining blocks, areas demarcated for sorting and temporary storage of overburden, as well as the extended haul roads was collectively referred to as the “study area”. This report provides the desktop results for the scoping phase of the project.

Based on the preliminary desktop assessment, the study area is located within the Grassland Biome, within the Dry Highveld Grassland Bioregion. According to Mucina & Rutherford (2006), two vegetation types are associated with the study area, namely the Vulnerable (VU) Klerksdorp Thornveld (Gh 13) and the Endangered (EN) Western Highveld Sandy Grassland (Gh 14). The study area is not located within 10 km of any IBAs or any protected areas.

According to the North West Biodiversity Sector Plan (NWBSP) (2015), the northern portion of the study area is in a CBA 1, with the remaining sections in a CBA 2. CBAs are defined as “irreplaceable” and need be maintained in the appropriate condition for their category, to reach biodiversity targets. The Mining and Biodiversity Guidelines (2013) identifies that most of the study area is located in an areas considered to be of High Biodiversity Importance, with a small northern section considered of “Highest Biodiversity Importance”, posing a “high” and “highest risk” for new mining operations. A small section in the southeast of the study area falls within an area considered to be of Moderate Biodiversity Importance

The National Web-Based Environmental Screening Tool assigned the majority of the study area is considered to have a **very high sensitivity f**or the terrestrial biodiversity theme, with a small section southwest of the study area considered to have a **low sensitivity.** The triggered sensitivity features for the very high sensitivity include a CBA1, ESA1, ESA2, critically endangered ecosystem, and focus areas for land-based protected areas expansion and South African Protected Areas. For the plant species theme, majority of the study area is considered to have a **medium sensitivity,** a small section (less than 5%) is considered to have a low sensitivity. The triggered sensitive species includes Sensitive Species 1261 (VU). For the animal species theme, the entire study area is considered to have a **low sensitivity** and no faunal SCC were triggered.

From a terrestrial desktop assessment point of view, the study area is considered to range from moderate to high sensitivity. The full biodiversity assessment in the EIA phase will, however, confirm/negate these sensitivities as identified by the relevant desktop datasets based on the detailed field assessment. Sections 4 to 5 provide preliminary impacts, management measures and legal implications pertaining to the proposed mining development based.

More information will be provided during the EIA phase. Sensitive habitat types as well as detailed lists of floral and faunal SCC, or species protected under the TNCO (12 of 1983) or NEMBA:TOPS (2007) will be provided in the full biodiversity assessment reports. A comprehensive list of the risks to the receiving floral and faunal environment will be identified, and additional, relevant mitigatory recommendations will be presented in line with the mitigation hierarchy, as advocated by the DMR *et al.* (2013), in order to ensure informed decision making and improved sustainable development in the study area.

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.

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# APPENDIX A: 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 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 species should take place throughout the construction and operation, phases.

## 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. 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 impact.

## 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.

The NEMBA 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.

## THE NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT, 2003 (ACT NO. 57 OF 2003) AS AMENDED[4] (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.

## 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 unauthorised introduction and spread of alien and invasive species to ecosystems and habitats where they do not naturally occur,
- Manage and control alien and invasive species, to prevent or minimise 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.

[4] 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 July 2014. Commencement date: 2 July 2014.
- Schedule 2 amendment by General Notice 2 of 2016 in Government Gazette 39728 dated 25 February 2016. Commencement date: 25 February 2016.

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

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

## THE NATIONAL FOREST ACT, 1998 (ACT NO. 10 OF 1998) (NFA)

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

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

**Section 12:**

Declaration of trees as protected

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

**Section 15(1):**

No person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence granted by the Minister or in terms of an exemption from the provisions of this subsection published by the Minister in the Gazette. Contravention of this declaration is regarded as a first category offence that may result in a person who is found guilty of being sentenced to a fine or imprisonment for a period up to three years, or both a fine and imprisonment.

## THE TRANSVAAL NATURE CONSERVATION ORDINANCE (ORDINANCE NO.12 of 1983) (TNCO)

To consolidate and amend the laws relating to nature conservation and to provide matters incidental thereto and they relate to the following:

- Establishment of nature conservation division, nature conservation advisory board and nature conservation advisory committees, and appointment of officers;
- Declaration of nature reserves;
- Wild animals;
- Professional hunters and hunting-outfitters;
- Problem animals;
- Fisheries;
- Indigenous plants;
- Endangered and rare species of fauna and flora; and
- Trading in and preservation of cave-formations.

# APPENDIX B: Floral Method of Assessment during EIA phase

## *Floral Species of Conservational Concern Assessment*

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

### The National Web-Based Environmental Screening Tool

The Screening Tool was accessed to obtain a list of potentially occurring species of conservation concern for the study area. Each of the themes in the Screening Tool consists of theme-specific spatial datasets which have been assigned a sensitivity level namely, "*low*", "*medium*", "*high*" and "*very high*" sensitivity. The four levels of sensitivity are derived and identified in different ways, e.g. for **confirmed** areas of occupied habitat for SCC a Very High and High Sensitivity is assigned and for areas of suitable habitat where SCC may occur based on spatial models only, a Medium Sensitivity is assigned. The different sensitivity ratings pertaining to the Plant [and Animal] Protocols are described below[5]:

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

### BRAHMS Online Website

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

- This website provides access to South African plant names (taxa), specimens (herbarium sheets) and observations of plants made in the field (botanical records). Data is obtained from the Botanical Database of Southern Africa (BODATSA), which contains records from the National Herbarium in Pretoria (PRE), the Compton Herbarium in Cape Town (NBG & SAM) and the KwaZulu-Natal Herbarium in Durban (NH).

[5] More details on the use of the Screening Tool for Species of Conservation Concern can be found in the below resources:

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

- Information on habitat requirements etc. is obtained from the SANBI Red List of South African Plants website (http://redlist.sanbi.org/).
- Typically, data is extracted for the Quarter Degree Square (QDS) in which the study area is situated but where it is deemed appropriate, a larger area can be included.

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

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

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

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

## *Vegetation Surveys*

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

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

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

## *Floral Habitat Sensitivity*

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

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

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

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

**Table B1: Floral habitat sensitivity rankings and associated land-use objectives.**

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

# APPENDIX C: Faunal Method of Assessment during the EIA phase

It is important to note that due to the nature and habits of fauna, varied stages of life cycles, seasonal and temporal fluctuations along with other external factors, it is unlikely that all faunal species will have been recorded during the site assessment. The presence of anthropogenic activities adjacent to the sites will have an impact on faunal behaviour and in turn the rate of observations.

## *Mammals*

Mammal species were recorded during the field assessment with the use of visual identification, spoor, calls, dung and other notable field signs. Sherman traps were used to capture small rodents and camera traps were employed to increase observation rates of cryptic, nocturnal species. Specific attention was paid to mammal SCC as listed by the International Union for the Conservation of Nature (IUCN), the North West Province and NEMBA.

## *Avifauna*

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

## *Reptiles*

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

## *Amphibians*

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

## *Invertebrates*

Whilst conducting transects through the study area, all insect species visually observed were identified, and where possible, photographs taken. It must be noted, however that due to the cryptic nature and habits of insects, varied stages of life cycles and seasonal and temporal fluctuations within the environment, it is unlikely that all insect species will have been recorded during the site assessment period. Nevertheless, the data gathered during the assessment along with the habitat analysis provided an accurate indication of which species are likely to occur in the study area at the time of the survey. Specific attention was given to insect SCC listed on a regional and national level, as well as those identified by the IUCN.

### *Arachnids*

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

## *Faunal Species of Conservation Concern Assessment*

The Probability of Occurrence (POC) for each faunal SCC was determined using the following four parameters:

- Species distribution;
- Habitat availability;
- Food availability; and
- Habitat disturbance.

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

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

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

## *Faunal Habitat Sensitivity*

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

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

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

**Table C1: Faunal habitat sensitivity rankings and associated land-use objectives.**

| Score | Rating significance | Conservation objective |
|---|---|---|
| 1.0 < 1.5 | Low | Optimise development potential. |
| ≥1.5 <2.5 | Moderately low | Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects. |
| ≥2.5 <3.5 | Intermediate | Preserve and enhance biodiversity of the habitat unit and surrounds while optimising development potential. |
| ≥3.5<4.5 | Moderately high | Preserve and enhance the biodiversity of the habitat unit, limit development and disturbance. |
| ≥4.5 ≤ 5.0 | High | Preserve and enhance the biodiversity of the habitat unit, no-go alternative must be considered. |

# APPENDIX D: Impact Assessment Methodology

## *Ecological Impact Assessment Method*

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

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

- An **activity** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or infrastructure that is possessed by an organisation.
- An **environmental aspect** is an 'element of an organizations activities, products and services which can interact with the environment'[6]. The interaction of an aspect with the environment may result in an impact.
- **Environmental risks/impacts** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. In the case where the impact is on human health or wellbeing, this should be stated. Similarly, where the receptor is not anthropogenic, then it should be stipulated what the receptor is.
- **Receptors** can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as wetlands, flora and riverine systems.
- **Resources** include components of the biophysical environment.
- **Frequency of activity** refers to how often the proposed activity will take place.
- **Frequency of impact** refers to the frequency with which a stressor (aspect) will impact on the receptor.
- **Severity** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.
- **Spatial extent** refers to the geographical scale of the impact.
- **Duration** refers to the length of time over which the stressor will cause a change in the resource or receptor.

The significance of the impact is then assessed by rating each variable numerically according to the defined criteria. Refer to the Table B1. The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity, spatial scope and duration of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact occurring and can obtain a maximum value of 10. The values for likelihood and consequence of the impact are then read off a significance-rating matrix and are used to determine the level of mitigation that may be necessary[7].

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

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

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

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

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

**Table D1: Criteria for assessing significance of impacts**

## LIKELIHOOD DESCRIPTORS

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

## CONSEQUENCE DESCRIPTORS

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

**Table D2: Significance Rating Matrix.**

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

**Table D3: Positive/Negative Mitigation Ratings.**

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

The following points were considered when undertaking the assessment:

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

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

## *Mitigation measure development*

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

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

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

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

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

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

Pressures on biodiversity are numerous and increasing. According to the DEA *et al.,* (2013) Loss of natural habitat is the single biggest cause of biodiversity loss in South Africa and much of the world. The most severe transformation of habitat arises from the direct conversion of natural habitat for human requirements, including[8]:

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

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

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

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

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

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

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

- **Avoid/prevent impact:** can be done through utilising alternative sites, technology, and scale of projects to prevent impacts. In some cases, if impacts are expected to be too high the "no project" option should also be considered, especially where it is expected that the lower levels of mitigation will not be adequate to limit environmental damage and eco-service provision to suitable levels;
- **Minimise impact:** can be done through utilisation of alternatives that will ensure that impacts on biodiversity and ecoservices provision are reduced. Impact minimisation is considered an essential part of any development project;
- **Rehabilitate impact:** is applicable to areas where impact avoidance and minimisation are unavoidable where an attempt to re-instate impacted areas and return them to conditions which are ecologically similar to the pre-project condition or an agreed post project land use, for example arable land. Rehabilitation can however not be considered as the primary mitigation tool as even with significant resources and effort rehabilitation usually does not lead to adequate replication of the diversity and complexity of the natural system. Rehabilitation often only restores ecological function to some degree to avoid ongoing negative impacts and to minimise aesthetic damage to the setting of a project. Practical rehabilitation should consist of the following phases in best practice:
  - **Structural rehabilitation** which includes physical rehabilitation of areas by means of earthworks, potential stabilisation of areas as well as any other activities required to develop a long terms sustainable ecological structure;
  - **Functional rehabilitation** which focuses on ensuring that the ecological functionality of the ecological resources on the study 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 latent 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.[9]

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

➢ Mitigation and performance improvement measures and actions that address the risks and impacts[10] are identified and described in as much detail as possible;
➢ Measures and actions to address negative impacts will favour avoidance and prevention over minimisation, mitigation, or compensation where possible; and
➢ Desired outcomes are defined and have been developed in such a way as to be measurable events with performance indicators, targets and acceptable criteria that can be tracked over defined periods, with estimates of the resources (including human resource and training requirements) and responsibilities for implementation wherever possible.

## *Recommendations*

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

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

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

# APPENDIX E: Specialist Information

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

| | |
|---|---|
| Michelle Hall | BSc (Hons) Animal, Plant and Environmental Sciences (University of the Witwatersrand) |
| Paige van Niekerk | BSc (Hons) Animal, Plant and Environmental Sciences (University of the Witwatersrand) |
| Nelanie Cloete | MSc Botany and Environmental Management (University of Johannesburg) |
| Christopher Hooton | BTech Nature Conservation (Tshwane University of Technology) |
| Christien Steyn | MSc (Plant Science) (University of Pretoria) |

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

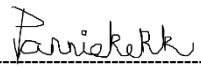
| | | | |
|---|---|---|---|
| Company of Specialist: | Scientific Terrestrial Services | | |
| Name / Contact person: | Nelanie Cloete | | |
| Postal address: | PO. Box 751779, Gardenview | | |
| Postal code: | 2047 | Fax: | 086 724 3132 |
| Telephone: | 011 616 7893 | | |
| E-mail: | Nelanie@sasenvgroup.co.za | | |
| Qualifications | MSc Environmental Management (University of Johannesburg)<br>MSc Botany (University of Johannesburg)<br>BSc (Hons) Botany (University of Johannesburg)<br>BSc (Botany and Zoology) (Rand Afrikaans University) | | |
| Registration / Associations | Professional member of the South African Council for Natural Scientific Professions (SACNASP)<br>Member of the South African Association of Botanists (SAAB)<br>Member of the International Affiliation for Impact Assessments (IAIAsa) South Africa group<br>Member of the Grassland Society of South Africa (GSSA) | | |

| | | | |
|---|---|---|---|
| Company of Specialist: | Scientific Terrestrial Services | | |
| Name / Contact person: | Christien Steyn | | |
| Postal address: | PO. Box 751779, Gardenview | | |
| Postal code: | 2047 | Fax: | 086 724 3132 |
| Telephone: | 011 616 7893 | | |
| E-mail: | christien@sasenvgroup.co.za | | |
| Qualifications | MSc (Plant Science) (University of Pretoria)<br>BSc (Hons) Plant Science (Invasion Biology) (University of Pretoria)<br>BSc Environmental Science (University of Pretoria) | | |
| Registration / Associations | Member of the South African Association of Botanists (SAAB)<br>Member of the Botanical Society of South Africa (BotSoc)<br>Professional member of the South African Council for Natural Scientific Professions (SACNASP)<br>Member of the Grassland Society of South Africa (GSSA)<br>Member of the Land Rehabilitation Society of Southern Africa (LARSSA) | | |

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

I, Paige van Niekerk, declare that -

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



---

Signature of the Specialist

I, Nelanie Cloete, declare that -

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

---

Signature of the Specialist

I, Michelle Hall, declare that

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

---

Signature of the Specialist

I, Christopher Hooton, 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.

---

Specialist Signature

I, Christien Steyn, declare that -

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

---

Signature of the Specialist

## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

## CURRICULUM VITAE OF MICHELLE RITA HALL

### PERSONAL DETAILS

| | |
|---|---|
| Position in Company | Junior Aquatic, Faunal and Floral Ecologist |
| Joined SAS Environmental Group of Companies | 2021 |

### MEMBERSHIP IN PROFESSIONAL SOCIETIES

Member of the Field Guide Association of Southern Africa

### EDUCATION

**Qualifications**

| | |
|---|---|
| FGASA Apprentice Field Guide | 2021 |
| BSc (Hons) Animal, Plant and Environmental Sciences (University of the Witwatersrand) | 2019 |
| BSc Archaeology and Animal, Plant and Environmental Sciences (University of the Witwatersrand) | 2018 |

### AREAS OF WORK EXPERIENCE

**South Africa** – Gauteng, Mpumalanga, Limpopo, Eastern Cape, Western Cape

### KEY SPECIALIST DISCIPLINES

**Biodiversity Assessments**

- Veld condition assessments
- Savanna biodiversity assessments
- Grassland biodiversity assessments
- Freshwater river biodiversity assessments
- Socio-economic and environmental services surveys
- Red Data/ Species of Special Concern Faunal and Floral Species
- Desktop studies, mapping and general GIS
- Faunal and floral field data analysis and preparation

**Training**

- ArcGIS and Global Mapper, GIS mapping
- Philosophy of science
- Biological statistics
- Practical plant identification, including herbarium usage and protocols
- Game ranching
- Livestock rearing
- Photography
- Ethnoecology
- Environmental education
- Snake handling and identification
- Heritage conservation.

**SAS ENVIRONMENTAL GROUP OF COMPANIES –**
**SPECIALIST CONSULTANT INFORMATION**

# CURRICULUM VITAE OF PAIGE FRANCES VAN NIEKERK

## PERSONAL DETAILS

| | |
|---|---|
| Position in Company | Faunal Ecologist |
| Joined SAS Environmental Group of Companies | 2020 |

## EDUCATION

**Qualifications**

| | |
|---|---|
| BSc (Hons) Animal, Plant and Environmental Sciences (University of the Witwatersrand) | 2019 |
| B.Tech Nature Conservation (Tshwane University of Technology) | 2017 |
| N. Diploma Nature Conservation (Tshwane University of Technology) | 2015 |

## AREAS OF WORK EXPERIENCE

**South Africa** – Gauteng, Mpumalanga, Limpopo

## KEY SPECIALIST DISCIPLINES

**Terrestrial Ecological Assessments:**

- Detailed Faunal Field Assessments, Fauna Ecology and Species Assemblage Reports
- Ecological Scan
- Red Data/Species of Special Concern Faunal Species Assessments
- Consulting maps, aerial photographs and digital satellite images
- Desktop studies, Mapping and General GIS
- Compilation of Impact Assessments
- Faunal Field Data Analysis and Preparation

**Training**

- GIS mapping in ArcGIS and Global Mapper
- Philosophy of Science
- Statistics for field biology
- Academic writing
- Advanced grass identification course with Frits Van Oudtshoorn

## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

# CURRICULUM VITAE OF NELANIE CLOETE

### PERSONAL DETAILS

| | |
|---|---|
| Position in Company | Senior Scientist, Member<br>Botanical Science and Terrestrial Ecology |
| Joined SAS Environmental Group of Companies | 2011 |

### MEMBERSHIP IN PROFESSIONAL SOCIETIES

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

### EDUCATION

**Qualifications**

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

**Short Courses**

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

### AREAS OF WORK EXPERIENCE

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

### KEY SPECIALIST DISCIPLINES

**Biodiversity Assessments**

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

**Freshwater Assessments**

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

**Legislative Requirements, Processes and Assessments**

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

## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

# CURRICULUM VITAE OF CHRISTOPHER HOOTON

### PERSONAL DETAILS

| | |
|---|---|
| Position in Company | Senior Scientist, Member<br>Biodiversity Specialist |
| Joined SAS Environmental Group of Companies | 2013 |

### EDUCATION

**Qualifications**

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

### AREAS OF WORK EXPERIENCE

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

### KEY SPECIALIST DISCIPLINES

**Biodiversity Assessments**

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

**Freshwater Assessments**

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

## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

# CURRICULUM VITAE OF CHRISTIEN STEYN

### PERSONAL DETAILS

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

### MEMBERSHIP IN PROFESSIONAL SOCIETIES

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

### EDUCATION

**Qualifications**

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

**Short courses and Training**

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

### AREAS OF WORK EXPERIENCE

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

### KEY SPECIALIST DISCIPLINES

**Biodiversity Assessments**

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