SCIENTIFIC TERRESTRIAL SERVICES

# Terrestrial Biodiversity Assessment

**AS PART OF THE ENVIRONMENTAL AUTHORISATION PROCESS FOR THE PROPOSED TOWNSHIP DEVELOPMENT ON REMAINDER OF PTN 601, THE WILLOWS NO 340 – JR.**

## Samcor Park Extension 11


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# EXECUTIVE SUMMARY

Scientific Terrestrial Services (Pty) Ltd. (STS) was appointed to conduct a terrestrial biodiversity assessment as part of the environmental authorisation (EA) process for the proposed township development on the remainder of Portion 601 (a portion of Portion 89), The Willows No 340 – JR; henceforth collectively referred to as the "**study area**". Three areas are targeted for development within the study area which will be split between three separate applications. The current report pertains to "Project 2" of the proposed activities (refer to below section for more details on the proposed activities).

Proposed activities[1]:
The proposed township development includes three sections within the study area and will comprise industrial developments as well as public open space. The following developments are envisioned:

- Proposed Samcor Park Extension (Ext) 12, or "Project 1" hereafter, is located within the north-western portion of the study area. The proposed development will be approximately 9 hectares (ha) in extent;
- Proposed Samcor Park Ext 11, or "Project 2" hereafter, is located within the southern and south-western portions of the study area. The proposed development will be approximately 8.4 ha in extent; and
- Proposed Samcor Park Ext, or "Project 3" hereafter, is located within the eastern portion of the study area. The proposed development will be approximately 14 ha in extent and includes public open space.

An on-site visual assessment of the study area was conducted on the 27th of January 2023 (summer) to confirm the assumptions made during the consultation of the background maps and to determine the ecological status of the habitat associated with the Project 2 area.

**Desktop assessment results:**

The Project 2 area is situated within the Savanna Biome and the Central Bushveld Bioregion. The associated vegetation type is the Marikana Thornveld (SVcb 6) which, according to the 2022 Red List of Ecosystems, is an Endangered (EN) ecosystem (endemic to South Africa). This ecosystem was triggered the criteria B1(i).

From a provincial biodiversity planning perspective, most of the Project 2 area is associated with an Ecological Support Area (ESA).

No national protected or conservation areas are associated with the Project 2 area.

**Habitat and Species Summaries:**

The Project 2 area is in an urban landscape that is surrounded by both residential developments as well as industrial development. The property on which the Project 2 area occurs is, however, within a small section of undeveloped land. The habitat within the Project 2 area has received several direct and indirect impacts over the years that have contributed to a largely degraded state (from a biodiversity perspective). Historically, much of the Project 2 area was cultivated, whereas the central sections included a small patch of natural woodland. Historic satellite imagery from 2004 indicates that the woodland area received significant disturbances resulting from rubble and construction waste dumping. Current disturbances include the transformation of areas in the northern portion of the Project 2 area.

Taking the site history into account and following the field assessments, three broad habitat units could be distinguished within the Project 2 area:

- **Degraded Woodland:** Moderately high levels of disturbance are present within this habitat and overall habitat integrity is poor;
- **Secondary Grassland**: Levels of disturbance in this habitat unit varies between high and moderate, whereas overall habitat integrity can be regarded as poor; and

[1] Details of the proposed townships were obtained from a conceptual layout plan provided by Metroplan | Town and Regional Planners

- **Transformed Habitat**: High levels of disturbance are associated with these areas and the overall habitat integrity is diminished.

From a floral and faunal perspective, the proposed activities will result in the clearance of vegetation that is of **moderately low sensitivity** (Degraded Woodland and Secondary Grassland), and of **low sensitivity** (Transformed Habitat). Direct impacts to the floral and faunal ecology within the Project 2 area will not have significant, residual impacts on a local or regional scale. Edge effects would need to be managed during especially the construction phase to prevent further degradation of the surrounding natural areas (although surrounding areas are also degraded and not increasingly sensitive).

The Project 2 area is not associated with any threatened floral species of conservation concern (SCC), but the habitat is suitable for an Orange Listed (OL) species, namely *Hypoxis hemerocallidea* which was confirmed in the adjacent property. Due to the potential for this species to be on site, if the proposed development is authorised, a walkdown of the footprint areas must take place where all individuals of OL species are marked and relocated to suitable, similar habitat outside of the footprint areas. Relocation to the public open space areas associated with Project 3 is recommended. The walkdown should be focused within the Degraded Woodland and Secondary Grassland. Overall, the proposed activities are not anticipated to impact significantly on floral SCC populations. No faunal SCC were recorded during the site assessment, nor are any expected to occur therein. The likelihood that such species will be encountered and/or impacted upon as a result of the proposed development is considered low.

Assuming that all AIPs are controlled, edge effects are suitably managed and that mitigation measures are implemented, no significant impacts to ecologically important habitat or sensitive species are expected. Although the development will result in the loss/displacment of floral and faunal species from within the study area, development within already degraded and urbanised areas is considered preferable in comparison development in more natural areas beyond the urban footprint. This, combined with the already impacted state of the study area, makes development herein more favourable.

It is the opinion of the ecologists that the proposed development is unlikely to result in significant impacts to the receiving environment provided all mitigation measures are implemented. This study is deemed to provide the relevant information required to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources in the Project 2 area will be made in support of the principle of sustainable development.

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| **AIP** | Alien and Invasive Plant |
| **BGIS** | Biodiversity Geographic Information Systems |
| **BODATSA** | Botanical Database of Southern Africa |
| **CARA** | Conservation of Agricultural Resources Act, 1983 [Act No. 43 of 1983] |
| **CBA** | Critical Biodiversity Area |
| **C-Plan** | Conservation Plan |
| **CR** | Critically Endangered |
| **DEA** | Department of Environmental Affairs |
| **DFFE** | Department of Forestry, Fisheries and the Environment |
| **EA** | Environmental Authorisation |
| **EAP** | Environmental Assessment Practitioner |
| **E-GIS** | Environmental Geographical Information Systems |
| **EIA** | Environmental Impact Assessment |
| **EIS** | Ecological Importance and Sensitivity |
| **EMPr** | Environmental Management Programme |
| **EN** | Endangered |
| **ESA** | Ecological Support Area |
| **EW** | Extinct in the Wild |
| **Ext** | Extension |
| **FEPA** | Freshwater Ecosystem Priority Area |
| **GDARD** | Gauteng Department of Agriculture and Rural Development |
| **GIS** | Geographic Information System |
| **GN** | Government Notice |
| **GPS** | Global Positioning System |
| **Ha** | Hectares |
| **IBA** | Important Bird and Biodiversity Area |
| **IEM** | Integrated Environmental Management |
| **IUCN** | International Union for Conservation of Nature |
| **LC** | Least Concern |
| **m** | metres |
| **MAP** | Mean annual precipitation |
| **MAPE** | Mean Annual Potential Evaporation |
| **MASMS** | Mean Annual Soil Moisture Stress |
| **MAT** | Mean Annual Temperature |
| **MFD** | Mean Frost Days |
| **NBA** | National Biodiversity Assessment |
| **NEMA** | National Environmental Management Act, 1998 [Act No. 107 of 1998] |
| **NEMBA** | National Environmental Management: Biodiversity Act, 2004 [Act No.10 of 2004] |
| **NEMPAA** | National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003] |
| **NFA** | National Forest Act, 1998 [Act No. 84 of 1998] |
| **NPAES** | National Protected Area Expansion Strategy |
| **NYBA** | Not yet been assessed |
| **OL** | Orange Listed |
| **PES** | Present Ecological State |
| **POC** | Probability of Occurrence |
| **QDS** | Quarter Degree Square |
| **RDL** | Red Data Listed |
| **SABAP 2** | South African Bird Atlas Project 2 |
| **SACAD** | South African Conservation Areas Database |
| **SACNASP** | South African Council for Natural Scientific Professions |
| **SANBI** | South African National Biodiversity Institute |
| **SAPAD** | South African Protected Areas Database |
| **SCC** | Species of Conservation Concern |

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| **STS** | Scientific Terrestrial Services [Pty] Ltd |
| **SWSA** | Strategic Water Source Area |
| **tbc** | To be confirmed |
| **TOPS** | Threatened or Protected Species |
| **VEGMAP** | Vegetation Map Project |
| **VU** | Vulnerable |
| **WSA** | Water Source Area |

# GLOSSARY OF TERMS

Most definitions are based on terms and concepts elaborated by Richardson et al. (2011), Hui and Richardson (2017), Wilson et al. (2017), Skowno et al. (2019), and SANBI (2016), with consideration to their applicability in the South African context, especially South African legislation [notably the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), and the associated Alien and Invasive Species Regulations, 2020].

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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. |
| **Baseline (IEM Series)** | Conditions that currently exist. Also called "existing conditions". |
| **Baseline information (IEM Series)** | Information derived from data that:<br>- records the existing elements and trends in the environment; and<br>- records the characteristics of a given project proposal. |
| **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 includes diversity within species, between species, and of ecosystems. |
| **Biodiversity priority areas** | Features in the landscape or seascape that are important for conserving a representative sample of ecosystems and species, for maintaining ecological processes, or for the provision of ecosystem services. They include the following categories, most of which are identified based on systematic biodiversity planning principles and methods: Protected Areas, Critically Endangered and Endangered ecosystems, Critical Biodiversity Areas and Ecological Support Areas, Freshwater Ecosystem Priority Areas, high water yield areas, flagship free-flowing rivers, priority estuaries, Priority Areas for land-based protected area expansion, and Focus Areas for offshore protection. Marine ecosystem priority areas and coastal ecosystem priority areas have yet to be identified but will be included in future.<br><br>The different categories *are not mutually exclusive* and, in some cases, overlap, often because a particular area or site is important for more than one reason. They should be *complementary*, with overlaps *reinforcing the importance* of an area. |
| **Biome - as per Mucina and Rutherford (2006)** | 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. |
| **Carrying Capacity** | The maximum population size of a biological species that can be sustained by that specific environment, given the food, habitat, water, and other resources available. |
| **Community Characterisation** | Comparisons can be made among communities using attributes such as species-richness, species diversity, and evenness.<br>- **Species-richness** is simply the number of species in a community.<br>- **Species diversity** is more complex and includes a measure of the number of species in a community, and a measure of the abundance of each species.<br>- **Species evenness** is a description of the distribution of abundance across the species in a community. Species evenness is highest when all species in a sample have the same abundance. Evenness approaches zero as relative abundances vary.<br><br>Source: https://tinyurl.com/2p9yr3j8 |
| **Corridor** | A dispersal route or a physical connection of suitable habitats linking previously unconnected regions. |

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| **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. |
| **Critically Endangered (CR) (IUCN[2] Red List category)** | **Applied to both species/taxa and ecosystems**: A species is CR when the best available evidence indicates that it meets at least one of the five IUCN criteria for CR, indicating that the species is facing an extremely high risk of extinction. CR ecosystem types are at an extremely high risk of collapse. Most of the ecosystem type has been severely or moderately modified from its natural state. The ecosystem type is likely to have lost much of its natural structure and functioning, and species associated with the ecosystem may have been lost. CR species are those considered to be at extremely high risk of extinction. |
| **Degradation** | The many human-caused processes that drive the decline or loss in biodiversity, ecosystem functions or ecosystem services in any terrestrial and associated aquatic ecosystems. |
| **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. |
| **Driver (ecological)** | A driver is any natural or human-induced factor that directly or indirectly causes a change in ecosystem. A direct driver clearly influences ecosystem processes, where indirect driver influences ecosystem processes through altering one or more direct drivers. |
| **Ecological Condition** | "Ecological condition" means the extent to which the composition, structure and function of an area or biodiversity feature has been modified from a reference condition of "natural".<br>Various terminology can be used for precision of language:<br>- Fair ecological condition: Areas that are moderately modified, semi-natural. An ecological condition class in which ecological function is maintained even though composition and structure have been compromised. Can apply to a site or an ecosystem.<br>- Good ecological condition: Areas that are natural or near-natural. An ecological condition class in which composition, structure and function are still intact or largely intact. Can apply to a site or an ecosystem.<br>- Poor ecological condition: Areas that are severely or irreversibly modified. An ecological condition class in which ecological function has been compromised in addition to structure and composition. Can apply to a site or an ecosystem. |
| **Ecological processes** | The functions and processes that operate to maintain and generate biodiversity. In order to include ecological processes in a biodiversity plan, their spatial components need to be identified and mapped. |
| **Ecological Support Area (ESA)** | An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation. |
| **Ecoregion** | An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region." |
| **Endangered (EN) (IUCN Red List category)** | **Applied to both species/taxa and ecosystems**: A species is EN when the best available evidence indicates that it meets at least one of the five IUCN criteria for EN, indicating that the species is facing a very high risk of extinction. EN ecosystem types are at a very high risk of collapse. EN species are those considered to be at very high risk of extinction. |
| **Endemic species** | 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. |

[2] International Union for Conservation of Nature (IUCN)

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| **Faunal Class** | In biological classification, class (Latin: classis) is a taxonomic rank, as well as a taxonomic unit. Class specifically refers to major groups, namely: mammals, avifauna (birds), reptiles and invertebrates. |
| **Ground-truth** | Ground truth is a term used in various fields to refer to information provided by direct observation (i.e., empirical evidence) as opposed to information provided by inference. |
| **Habitat**<br>**(As per the definition in NEMBA)** | A place where a species or ecological community naturally occurs. |
| **Habitat loss** | Conversion of natural habitat in an ecosystem to a land use or land cover class that results in irreversible change in the composition, structure and functional characteristics of the ecosystem concerned. |
| **Impact**<br>**(IEM Series, draft Offset policy, and NEMA)** | The positive or negative effects on human well-being and/or on the environment.<br>Impact-related terminology:<br>- Cumulative impact: Past, current, and reasonably foreseeable future impacts of an activity, considered together with the impact of the proposed activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.<br>- Impact Significant/significance: Significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e., intensity, duration, and likelihood). Impact significance is the value placed on the change by different affected parties (i.e., level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgements and science-based criteria (i.e., biophysical, social, and economic). Such judgement reflects the political reality of impact assessment in which significance is translated into public acceptability of impacts.<br>- Residual negative impacts: Negative impacts that remain after the proponent has made all reasonable and practicable changes to the location, siting, scale, layout, technology and design of the proposed development, in consultation with the environmental assessment practitioner and specialists (including a biodiversity specialist), in order to avoid and minimise negative impacts, and/or rehabilitate and/or restore impacted areas within 30 years (*It is acknowledged that the time it takes for full restoration differs from ecosystem type to ecosystem type, as well as the local conditions. Given that there is no readily accessible information on the recovery times of the different ecosystem types in South Africa, a general timeframe had to be used. The 30-year general timeframe in the definition of "residual impact" reflects that the difficulty in restoring South African ecosystems once they have been disturbed. It is based on the risk-averse and cautious approach.*).<br>- Significant impact: An impact that may have a notable effect on one or more aspects of the environment or may result in non-compliance with accepted environmental quality standards, thresholds, or targets. |
| **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**<br>**(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 invasive species** | All alien species that are regulated in South Africa under the NEMBA, Alien and Invasive Species Regulations, 2020. |

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| **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 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). |
| **Near Threatened (according to IUCN)** | Close to being at high risk of extinction in the near future. |
| **Niche (ecological)** | The role and position a species have in its environment; how it meets its needs for food and shelter, how it survives, and how it reproduces. A species' niche includes all of its interactions with the biotic and abiotic factors of its environment. |
| **Protected** | Species of high conservation value or national importance that require protection, according to TOPS 2007 and NEMBA. |
| **Red Data Listed (RDL) 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. |
| **Refugia (ecological)** | Refugium (plural: refugia) is a location which supports an isolated or relict population of a once more widespread species. This isolation can be caused by climatic changes, geography, or human activities such as deforestation and overhunting. |
| **Resource (ecological)** | A resource is a substance or object in the environment required by an organism for normal growth, maintenance, and reproduction. Resources can be consumed by one organism and, as a result, become unavailable to another organism. |
| **Species of Conservation Concern (SCC)** | The term SCC in the context of this report refers to all RDL and IUCN listed threatened species as well as provincially and nationally protected species of relevance to the project. |
| **Termitaria** | Colonies of termites, typically within a tall mound of cemented earth. |
| **Threatened ecosystem** | An ecosystem that has been classified as CR, EN or VU, based on an analysis of ecosystem threat status. A threatened ecosystem has lost or is losing vital aspects of its structure, function, or composition. The NEMBA allows the Minister of Environmental Affairs or a provincial MEC for Environmental Affairs to publish a list of threatened ecosystems. To date, threatened ecosystems have been listed only in the terrestrial environment. In cases where no list has yet been published by the Minister, such as for all aquatic ecosystems, the ecosystem threat status assessment in the National Biodiversity Assessment (NBA) can be used as an interim list in planning and decision making. |
| **Threatened species** | A species that has been classified as CR, EN or VU, based on a conservation assessment (Red List), using a standard set of criteria developed by the IUCN for determining the likelihood of a species becoming extinct. A threatened species faces a high risk of extinction in the near future. |
| **Trophic (ecological)** | Refers to feeding and nutrition. |
| **Vulnerable (VU) (Red List category)** | **Applied to both species/taxa and ecosystems**: A species is VU when the best available evidence indicates that it meets at least one of the five IUCN criteria for VU, indicating that the species is facing a high risk of extinction. An ecosystem type is VU when the best available evidence indicates that it meets any of the criteria A to E for VU and is then considered to be at a high risk of collapse. |

# 1 INTRODUCTION

Scientific Terrestrial Services (Pty) Ltd. (STS) was appointed to conduct a terrestrial biodiversity assessment as part of the environmental authorisation (EA) process for the proposed township development on the remainder of Portion 601 (a portion of Portion 89), The Willows No 340 – JR; henceforth collectively referred to as the "**study area**". Three areas are targeted for development within the study area which will be split between three separate applications. The current report pertains to "**Project 2**" of the proposed activities (refer to below section for more details on the proposed activities).

The study area is situated within the eastern sections of Pretoria in a heavily urbanised area comprising of both residential and industrial developments (refer to Figures 1 and 2). The northern boundary of the study area borders Alwyn Road, with the M12 approximately 550 metres (m) to the west of the study area, and the R104 approximately 680 m south of the study area.

Proposed activities[3] (Figure 3)

The proposed township development includes three sections within the study area and will comprise industrial developments as well as public open space. The following developments are envisioned:

- Proposed Samcor Park Extension (Ext) 12, or "Project 1" hereafter, is located within the north-western portion of the study area. The proposed development will be approximately 9 hectares (ha) in extent;
- Proposed Samcor Park Ext 11, or "Project 2" hereafter, is located within the southern and south-western portions of the study area. The proposed development will be approximately 8.4 ha in extent; and
- Proposed Samcor Park Ext, or "Project 3" hereafter, is located within the eastern portion of the study area. The proposed development will be approximately 14 ha in extent and includes public open space.

This report, after consideration and the description of the ecological integrity of the habitat associated with the Project 2 area, must guide the Environmental Assessment Practitioner (EAP), regulatory authorities and developing proponent, by means of the presentation of results and recommendations, as to the ecological viability of the proposed development activities.

[3] Details of the proposed townships were obtained from a conceptual layout plan provided by Metroplan | Town and Regional Planners


**Figure 1: Digital Satellite image depicting the location of the study area and Project 2 area in relation to surrounding areas.**

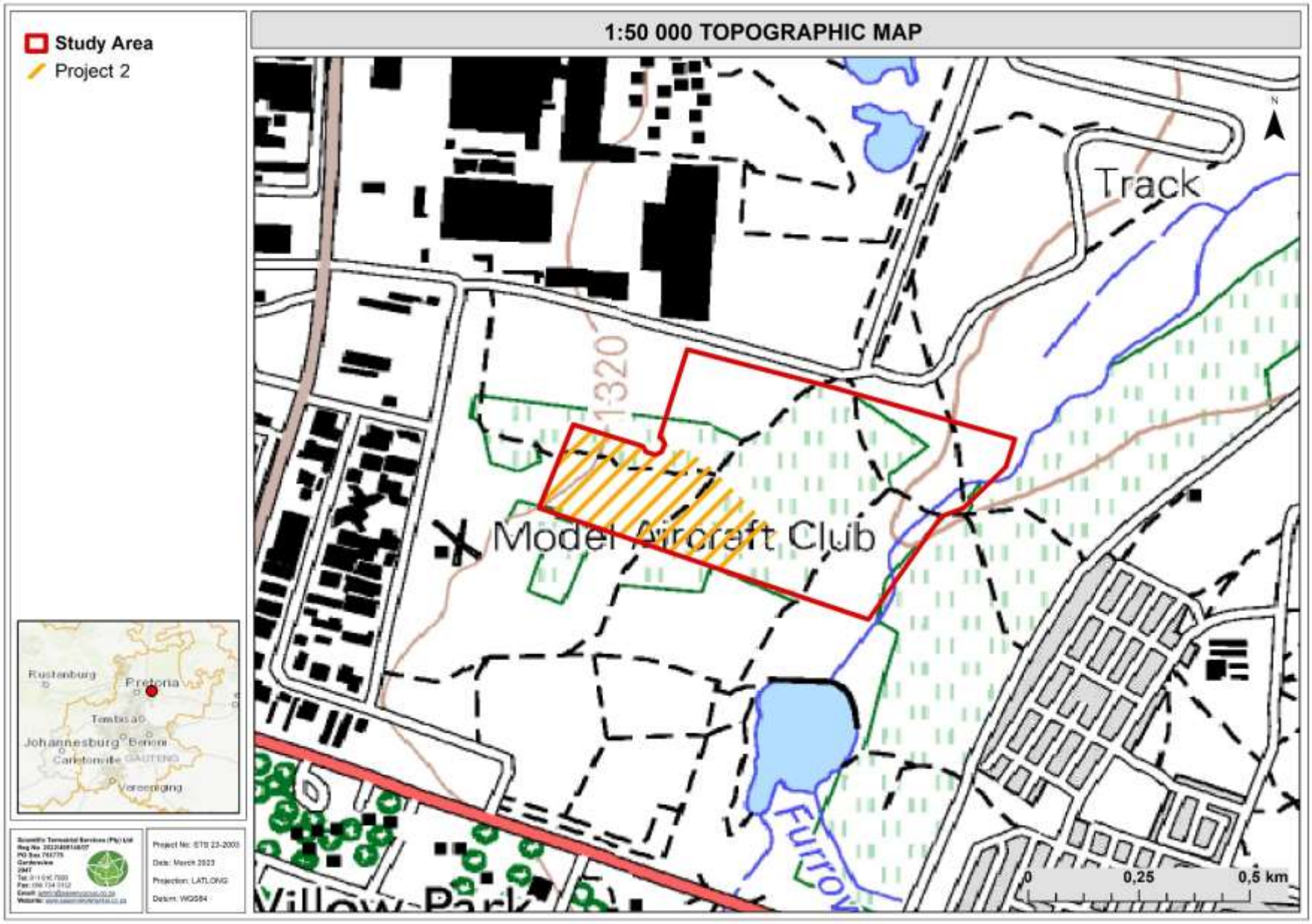



**Figure 2: The study area and Project 2 area depicted on a 1:50 000 topographical map in relation to the surrounding area.**


**Figure 3: The proposed activities in relation to the surrounding area.**

## 1.1 Project Scope

Specific outcomes in terms of this report are outlined below:

- To state the indemnity and terms of use of this report (Appendix A) as well as to provide the details of the specialists who prepared the reports (Appendix I);
- To outline the legislative requirements that were considered for the assessment (Appendix B of this report);
- Compile a desktop assessment with all relevant information as presented by South African National Biodiversity Institute's (SANBI) Biodiversity Geographic Information Systems (BGIS) website (http://bgis.sanbi.org) and the Environmental Geographical Information Systems (E-GIS) website (https://egis.environment.gov.za/). The desktop assessment aims to gain background information on the physical habitat and potential floral and faunal ecology associated with the study area;
- To define the Present Ecological State (PES) of the biodiversity of the Project 2 area;
- To determine and describe habitats, communities and the ecological state of the Project 2 area;
- To conduct a faunal and floral Species of Conservation Concern (SCC) assessment, including the potential of suitable habitat to occur within the Project 2 area for SCC;
- To identify and consider all sensitive landscapes, including rocky ridges, wetlands or any other special features such as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs);
- To determine the environmental impacts that the proposed activities might have on the biodiversity associated with the Project 2 area; and
- To develop mitigation and management measures for all phases of the development.

## 1.2 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The ecological assessment is confined to the Project 2 area and does not include the neighbouring and adjacent properties. The desktop database assessment, however, is confined to the entire study area but discussion of results are focused on the Project 2 area. The surrounding areas are, however, displayed on the various background maps;
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most floral and faunal communities have been accurately assessed and considered;

- Due to the often-secretive nature and habits of most faunal taxa and the time (season) of the assessment, it is unlikely that all species would have been observed during a field assessment of limited duration. Therefore, site observations were compared with literature studies and previous specialist work in the adjacent areas where necessary;
- Sampling by its nature, means that not all individuals are assessed and identified. Some species and taxa within the Project 2 area may have been missed during the assessment;
- The data presented in this report are based on site visits, undertaken on the 27th of January 2023 (summer assessment), but further relied on previous studies for the project (Eco-Agent CC. 2015). A more comprehensive assessment would require that assessments take place in all seasons of the year, especially later during the rainy season. However, considering the availability of previous assessments and the degraded state of the habitat within the Project 2 area, the findings of this assessment are considered to be an accurate reflection of the ecological characteristics on site; and
- Some floral SCC identities will not be made known in this report, although their potential to occur on site will still be assessed. As per the best practice guideline that accompanies the SANBI protocol and National Web-based Environmental Screening Tool ("Screening Tool" hereafter), the name of the sensitive species may not appear in the final Environmental Impact Assessment (EIA) report nor any of the specialist reports released into the public domain. It will be referred to as sensitive plants, and its threat status included, e.g., critically endangered sensitive plant.

## *1.3 Legislative Requirements*

The following legislative requirements were considered during the assessment:

- The Constitution of the Republic of South Africa, 1996[4];
- The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA);
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);
    - Government Notice (GN) number 2747 (Gazette Number 47526): The revised National list of Ecosystems that are Threatened and in need of Protection, dated 18 November 2022, as it relates to the NEMBA;

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

- GN number R.1020: Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated September 2020 as it relates to the NEMBA;
- GN number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 September 2020, as it relates to the NEMBA;
- GN 3009: Regulations Pertaining to Threatened or Protected Terrestrial Species and Freshwater Species ("TOPS" hereafter) in Government Gazette 47984 dated 3 February 2023, as it relates to the NEMBA; and
- GN 3012: List of Terrestrial and Freshwater Species that are Threatened or Protected, Restricted Activities that are Prohibited, and Restricted Activities that are Exempted, in Government Gazette 47984 dated 3 February 2023, as it relates to the NEMBA.

- The National Forest Act, 1998 (Act No. 84 of 1998, amended) (NFA);
  - GN 1935: List of Protected Tree Species as published in the Government Gazette 46094 dated 25 March 2022, as it relates to the NFA;
- The National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA);
- Government Gazette 45421 dated 10 May 2019 as it relates to the Department of Forestry, Fisheries, and the Environment's (DFFE) national environmental screening report required with an application for environmental authorisation as identified in regulation 16(1)(v) of EIA Regulations:
  - For the Terrestrial Biodiversity Theme: GN 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity as published in Government Gazette 43110 dated 20 March 2020; and
  - For Animal and Plant Species Themes**:** GN 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant and Animal Species as published in Government Gazette 43855 dated 30 October 2020;
- The Gauteng Department of Agriculture and Rural Development (GDARD) Requirements for Biodiversity Assessments Version 3 (GDARD, 2014).

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

# 2 ASSESSMENT APPROACH

The below section outlines the methodologies and approaches used for the assessment. Please refer to **Appendices B – D** for more comprehensive methodologies.

## *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 [5]:

- The National Protected Areas Expansion Strategy (NPAES) – 2018 database;
- The South African Conservation Areas Database, Quarter 3 (SACAD, 2022);
- The South African Protected Areas Database, Quarter 3 (SAPAD, 2022);
- The Gauteng Conservation Plan (C-Plan) v3.3 – 2011 data set;
- The National Vegetation Map Project (VEGMAP), with the below vector dataset used for information on Biomes, Bioregions and Vegetation Type(s):
  - 2018 Final Vegetation Map of South Africa, Lesotho, and Swaziland (SANBI, 2018a)
- The Red List of Ecosystems 2022 (SANBI 2022a and b);
- 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).
- 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);
- The Screening Tool (accessed 2023); and

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

- From the 2017 Strategic Water Source Areas (SWSA) project:
    - 2017 SWSA Surface water (Water Research Commission, 2017).

The field assessment was undertaken on the 27th of January 2023 to determine the ecological status of the Project 2 area and to "ground-truth" the results of the desktop assessment. Results of the field assessment are presented in Sections 4.1 (flora) and 4.2 (fauna).

## 2.2 General Approach

An on-site visual assessment of the study area was conducted to confirm the assumptions made during the consultation of the background maps and to determine the ecological status of the habitat associated with the study area.

The vegetation surveys are based on the subjective sampling method which is a technique where the specialist chooses specific sample sites within the area of interest, based on their professional experience and background research done for the site, to allow representative recordings of floral communities and optimal detection of SCC (Appendix C).

For the faunal field surveys, a reconnaissance 'walkabout' was undertaken to confirm habitat types and to consider whether the areas are representative of these habitats, with special emphasis being placed on areas that may potentially support faunal SCC. Sites were investigated on foot to identify and define the faunal assemblage within the footprint area. A detailed explanation of the method of assessment is provided in Appendix D of this report. The faunal categories covered in this assessment include mammals, avifauna, herpetofauna and general invertebrates.

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

- To guide the selection of appropriate sample sites, background data and digital satellite images were consulted before going to site, during which broad habitats, vegetation types and potentially sensitive sites were identified. The results of these analyses were then used to focus the fieldwork on specific areas of concern and to identify areas where targeted investigations were required (e.g., for SCC detection and within the direct footprint of the proposed mining project);
- The subjective sampling method requires that field assessment take place on foot. Based on the broad habitat units delineated before going to site, and points of interest recorded, which is updated based on on-site observations, the selected sample areas

were surveyed on foot, following subjective transects, to identify the occurrence of the dominant plant species and habitat diversities, but also to detect SCC which tend to be sparsely distributed;

- Photographs were taken of each vegetation community that are representative of typical vegetation structure of that community, as well as photographs of all detected SCC (except for species flagged by the Screening Tool as sensitive species for which identities may not be shared within the public domain); and
- Scientific nomenclature for plant species in this report follows that of the SANBI's Red List of South African Plants Online, as it relates to the Botanical Database of Southern Africa (BODATSA) and BRAHMS Online. For alien species, the definitions of Richardson *et al*. (2011) are used. Vegetation structure is described as per Edwards (1983) (refer to Figure B1 in **Appendix B**).

For the methodologies relating to the impact assessment and development of the mitigation measures, please refer to **Appendix D** of this report.

## *2.3 Sensitivity Mapping*

All the ecological features of the study area were considered, and sensitive areas were delineated with the use of a Global Positioning System (GPS). In addition, identified locations of SCC and SANBI protected species were also marked by means of GPS. A Geographic Information System (GIS) was used to project these features onto aerial photographs and topographic maps.

# 3 RESULTS OF THE DESKTOP ANALYSIS

This section provides the outcome of the desk-based assessment.

## *3.1 Conservation Characteristics of the Project 2 area based on National and Provincial Databases*

The following section contains data accessed as part of the desktop assessment and are presented as a "dashboard" report below (Tables 1 and 2). The dashboard report aims to present concise summaries of the data on as few pages as possible to allow for improved assimilation of results by the reader to take place. Where required, further discussion and interpretation are provided.

**Table 1: Summary of the vegetation characteristics associated with the study area (Quarter Degree Square (QDS) 2723CC).**

| DETAILS OF THE PROJECT 2 AREA IN TERMS OF MUCINA & RUTHERFORD (2006) AND THE NATIONAL VEGETATION MAP PROJECT (SANBI, 2018a) - ORIGINAL EXTENT OF MAPPED VEGETATION TYPE | | | | | |
|---|---|---|---|---|---|
| **Biome & Bioregion** | The Project 2 area is situated within the **Savanna Biome** and the **Central Bushveld Bioregion**. | | | | |
| **Vegetation type** | The Project 2 area is within the **Marikana Thornveld (SVcb 6).** | | | | |
| **Climate** | **Summer rainfall with very dry winters.** | | | | |
| | **MAP (mm)** | **MAT (°C)** | **MFD (days)** | **MAPE (mm)** | **MASMS (%)** |
| | 682 | 19.4 | 21 | 2284 | 76 |
| **Altitude (m)** | 1 050 – 1 450 | | | | |
| **Distribution** | North-West and Gauteng Provinces: Occurs on plains from the Rustenburg area in the west, through Marikana and Brits to the Pretoria area in the east. | | | | |
| **Geology & soils** | Most of the area is underlain by the mafic intrusive rocks of the Rustenburg Layered Suite of the Bushveld Igneous Complex. Rocks include gabbro, norite, pyroxenite and anorthosite. The shales and quartzites of the Pretoria Group (Transvaal Supergroup) also contribute. Mainly vertic melanic clays with some dystrophic or mesotrophic plinthic catenas and some freely drained, deep soils. Land types of mainly Ea, Ba and Ae. | | | | |
| **Conservation** | **Endangered (EN).** Target 19%. Less than 1% statutorily conserved in, for example, Magaliesberg Nature Area. More conserved in addition in other reserves, mainly in De Onderstepoort Nature Reserve. Considerably impacted, with 48% transformed, mainly cultivated and urban or built-up areas. Most agricultural development of this unit is in the western regions towards Rustenburg, while in the east (near Pretoria) industrial development is a greater threat of land transformation. Erosion is very low to moderate. Alien invasive plants (AIPs) occur localised in high densities, especially along the drainage lines. | | | | |
| **Vegetation & landscape features (see also Appendix E)** | Open *Vachellia karroo* woodland, occurring in valleys and slightly undulating plains, and some lowland hills. Shrubs are denser along drainage lines, on termitaria and rocky outcrops or in other habitat protected from fire.<br><br>Remark: A few small ridges of SVcb 9 Gold Reef Mountain Bushveld in the Pretoria area have not been mapped separately from this unit. | | | | |
| **DETAILS OF THE PROJECT 2 AREA IN TERMS OF THE 2018 NATIONAL BIODIVERSITY ASSESSMENT - REMAINING EXTENT OF MAPPED VEGETATION TYPE** | | | | | |
| **NBA (2018): Ecosystem Protection Level and Ecosystem Threat Status** | The Project 2 area is located largely within an EN vegetation type (Marikana Thornveld) that is currently poorly protected (Figure 4). Only a small section in the south-western portion of the Project 2 area is not considered to be part of the remaining extent of the Marikana Thornveld.<br><br>The NBA is the primary tool for monitoring and reporting on the state of biodiversity in South Africa. Two headline indicators that are applied to both ecosystems and species are used in the NBA: **threat status** and **protection level**.<br>- Ecosystem threat status tells us about the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function, and composition, on which their ability to provide ecosystem services ultimately depends. Ecosystem types are categorised as Critically Endangered (CR), EN, Vulnerable (VU) or Least Concern (LC), based on the proportion of each ecosystem type that remains in good ecological condition relative to a series of thresholds.<br>- Ecosystem protection level tells us whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as not protected, poorly protected, moderately protected or well protected, based on the proportion of each ecosystem type that occurs within a protected area recognised in the NEMPAA. | | | | |

| NATIONAL THREATENED ECOSYSTEMS ASSOCIATED WITH THE PROJECT 2 AREA (2022) | |
|---|---|
| **National Threatened Ecosystems (2022) (Figure 5)** | In alignment with the 2018 NBA dataset, most of the Project 2 area is indicated by the 2022 Red List of Ecosystems as being associated with an EN ecosystem (i.e., the Marikana Thornveld ecosystem) – an endemic ecosystem within South Africa. The remaining extent of this ecosystem is depicted in Figure 5. This ecosystem was triggered the criteria B1(i).<br><br>According to the Supporting information for GN 2747 (Government Gazette 47526) dated 18 November 2022, the following criteria pertain to the EN ecosystem:<br>- **Historical extent (km²):** 2528.64<br>- **Remaining natural extent (%):** 35<br>- **Limitations**: While this assessment is based on the best available data, the risk of collapse for this ecosystem type may be under-estimated due to a lack of comprehensive data on ecosystem condition/integrity (including biotic disruptions due to invasive species, overutilisation, altered fire regimes and other environmental degradation).<br><br>The purpose of listing protected ecosystems is primarily to preserve witness sites of exceptionally high conservation value. The revised list (known as the Red List of Ecosystems 2022) is based on assessments that followed the IUCN Red List of Ecosystems Framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa (Mucina and Rutherford 2006; with updates described in Dayaram et al., 2019). The revised list identifies 120 threatened terrestrial ecosystem types (55 x CR, 51 x EN and 14 x VU types).<br><br>Following a series of consultations with conservation authorities and the public in 2020/21 the Revised list of terrestrial ecosystems that are threatened and in need of protection was the approved by the Minister for implementation in August 2022. The revised list was published in the Government Gazette (Gazette Number 47526, Notice Number 2747) and came into effect on 18 November 2022. |

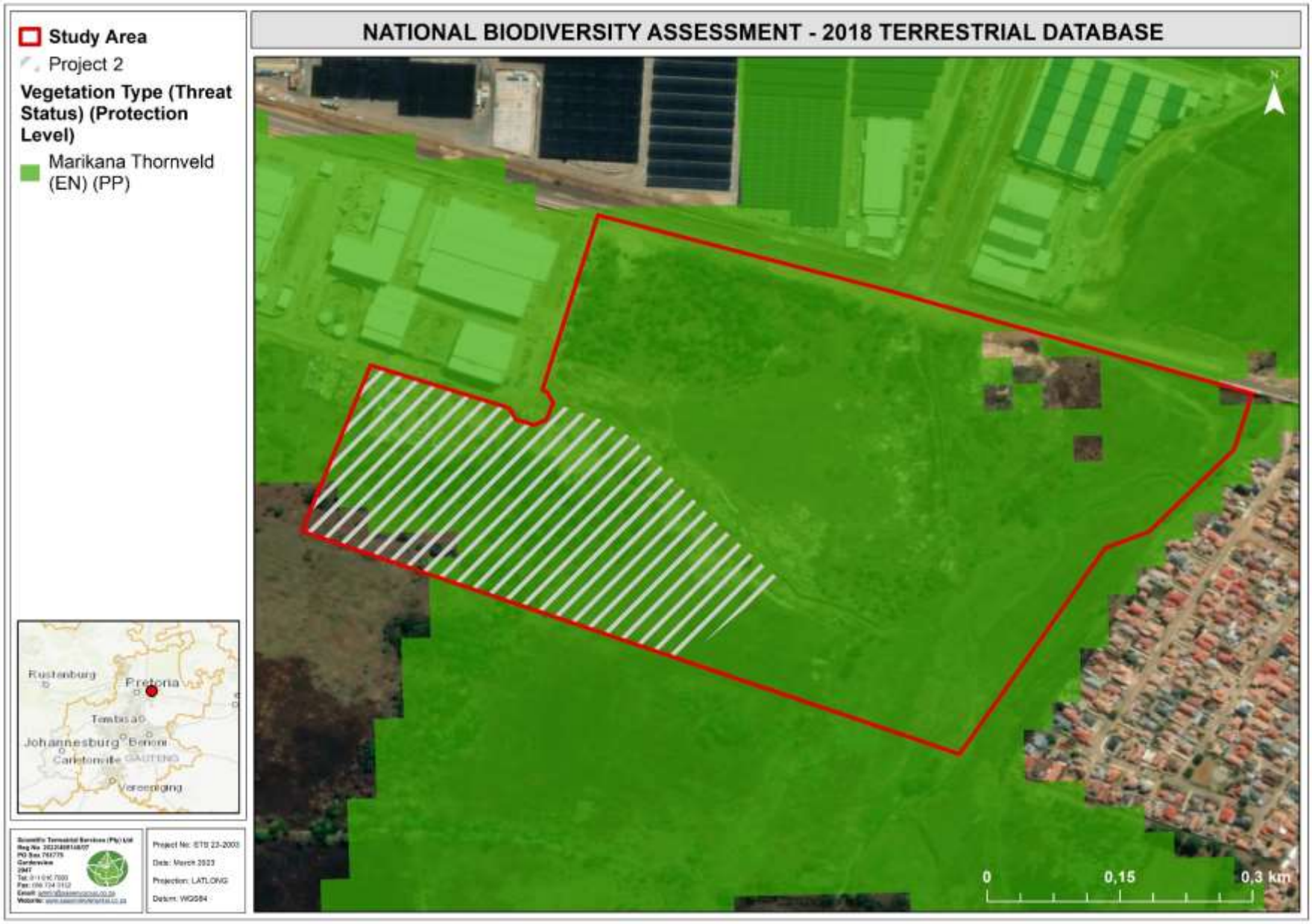



**Figure 4: The remaining extent of the Marikana Thornveld as mapped by the NBA terrestrial dataset.**

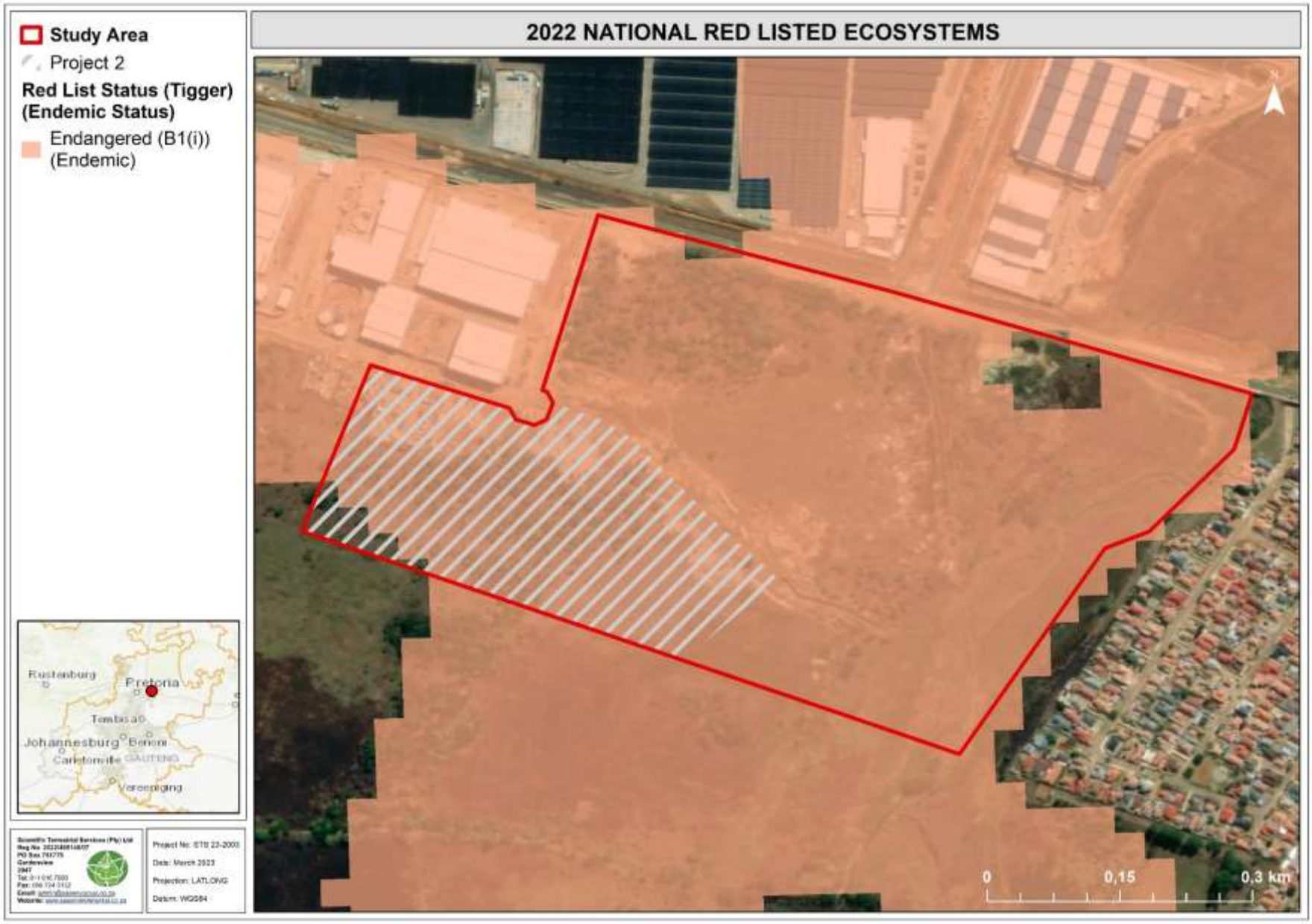



**Figure 5: Threatened ecosystems associated with the Project 2 area (National Threatened Ecosystems, 2021).**

**Table 2: Conservation characteristics of the Project 2 area.**

| | |
|---|---|
| **GAUTENG CONSERVATION PLAN (C-PLAN) V3.3 OF 2011 AND ADDITIONAL GAUTENG DATASETS** | |
| **Ecological Support Area** | Most of the Project 2 area is associated with an **ESA** (Figure 6) – only the north-western corner occurring outside of the ESA.<br><br>**DEFINITION:** Natural, near natural, degraded or heavily modified areas required to be maintained in an ecologically functional state to support CBAs and/or Protected Areas. ESAs maintain the ecological processes on which CBAs and Protected Areas depend. Some ESAs are irreversibly modified but are still required as they still play a significant role in supporting ecological processes. |
| **Wetland and River Buffers** | The Project 2 area is not associated with any rivers, river buffers or wetland buffers. The adjacent, eastern portion of the study area, however, is associated with a river and non-perennial river buffer (Figure 7). |
| **Ridges** | The Project 2 area **does not** occur within any ridge classes. |
| **NATIONAL PROTECTED AND CONSERVATION AREAS (VARIOUS DATABASES)** | |
| The various datasets associated with nationally protected areas (i.e., SAPAD and NPAES) do not indicate any protected areas or focus areas are associated with the Project 2 area. Several protected areas are, however, indicated within 10 km of the Project 2 area (Figure 8), namely: the **Faerie Glen Nature Reserve** (± 5 km south-west of the Project 2 area), the **Colbyn Wetland Nature Reserve** (± 7 km west of the Project 2 area), the **Roodeplaat Nature Reserve** (± 8 km north of the Project 2 area), the **Derdepoort Nature Reserve** (± 9 km north-northwest of the Project 2 area), and the **Frank Struben Bird Sanctuary** (± 9 km south-west of the Project 2 area).<br><br>The various national conservation areas checked for the Project 2 area (i.e., IBA, SACAD, SWSA) did not indicate that the Project 2 area is associated with any conservation areas. Within 10 km of the Project 2 area, however, conservation areas are present (Figure 8), namely: the **Pretoria National Botanical Gardens** (± 5 km west of the Project 2 area), the **Magaliesberg Biosphere Reserve** (± 7 km north-west of the Project 2 area), as well as the **Magaliesberg IBA** (± 7 km north-west of the Project 2 area). | |
| **NATIONAL WEB-BASED ENVIRONMENTAL SCREENING TOOL (ACCESSED 2022) – FIGURE 9** | |
| 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. | |
| **Animal Species Theme** | The Screening Tool indicated that the Project 2 area is of **medium sensitivity** in terms of the Animal Species Theme. Triggering species included:<br>- Aves: *Eupodotis senegalensis* (White-bellied Korhaan; VU).<br>- Mammalia: *Crocidura maquassiensis* (Makwassie Musk Shrew; VU), *Dasymys robertsii* (African Marsh Rat; VU), *Hydrictis maculicollis* (Spotted-necked Otter; VU), *Neamblysomus julianae* (Juliana's Golden Mole; EN).<br>- Reptilia: *Kinixys lobatsiana* (Lobatse Hinge-back Tortoise; VU).<br>- Invertebrate: *Clonia uvarovi* (Uvarov's Clonia; VU). |
| **Aquatic Biodiversity Theme** | The Project 2 area is associated with a **low sensitivity** in terms of the Aquatic Biodiversity Theme. |
| **Plant Species Theme** | The Screening Tool indicated that the Project 2 area is of **medium sensitivity** from a Plant Species Theme perspective. The triggering species include:<br>- Sensitive species 430[6] (VU), and Sensitive species 1248 (VU). |
| **Terrestrial Biodiversity Theme** | For the Terrestrial Biodiversity Theme, the Project 2 area is in an area of **very high sensitivity**. The triggered sensitivity features include an ESA and a VU (now EN as per the 2022 Red Listed Ecosystems) ecosystem. |

**NBA = National Biodiversity Assessment; NPAES = National Protected Areas Expansion Strategy; SAPAD = South African Protected Areas Database; IBA = Important Bird and Biodiversity 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).**

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


**Figure 6: Gauteng C-Plan categories in relation to the Project 2 area.**

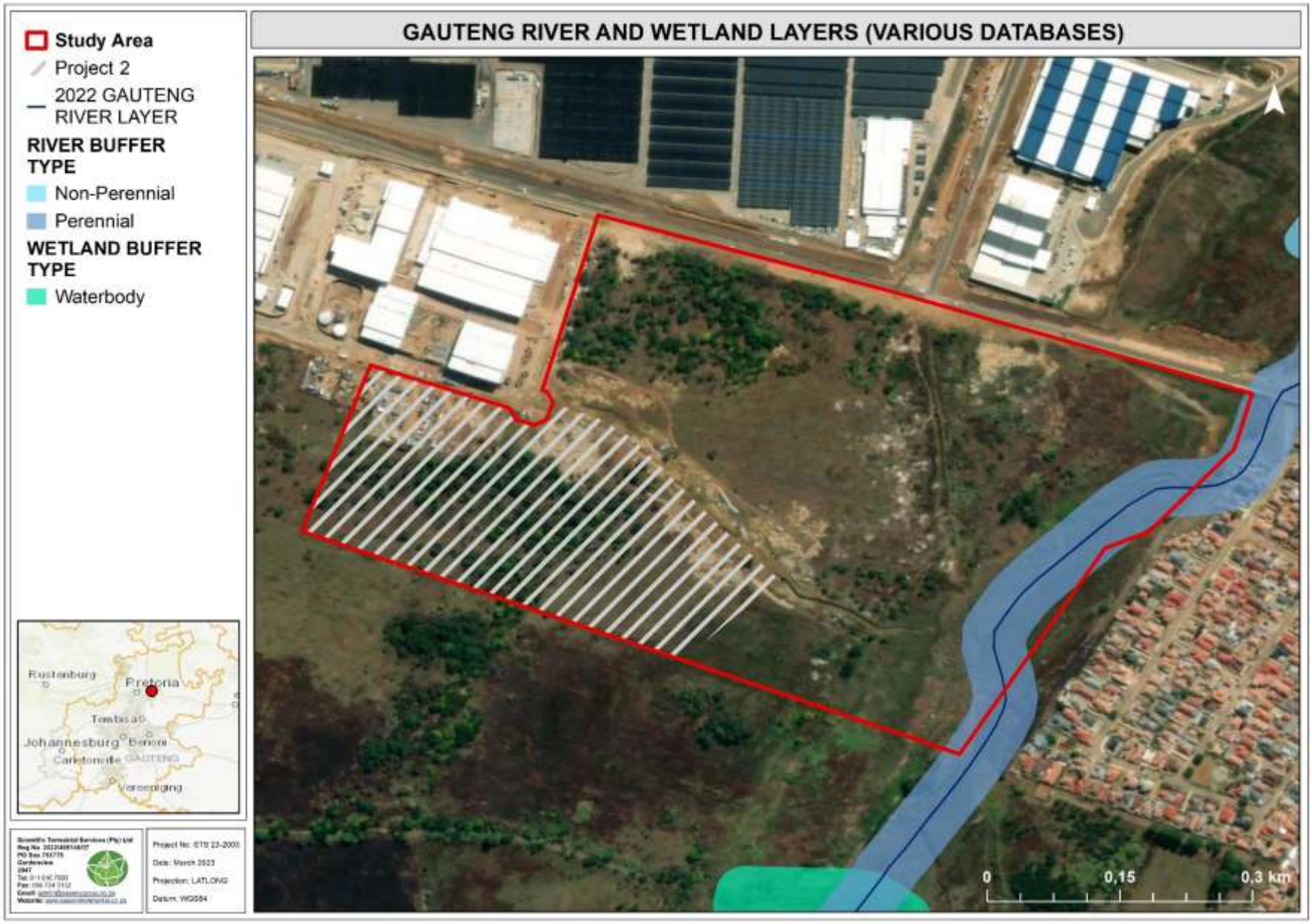



**Figure 7: Gauteng rivers and wetlands (including buffers) in relation to the Project 2 area.**

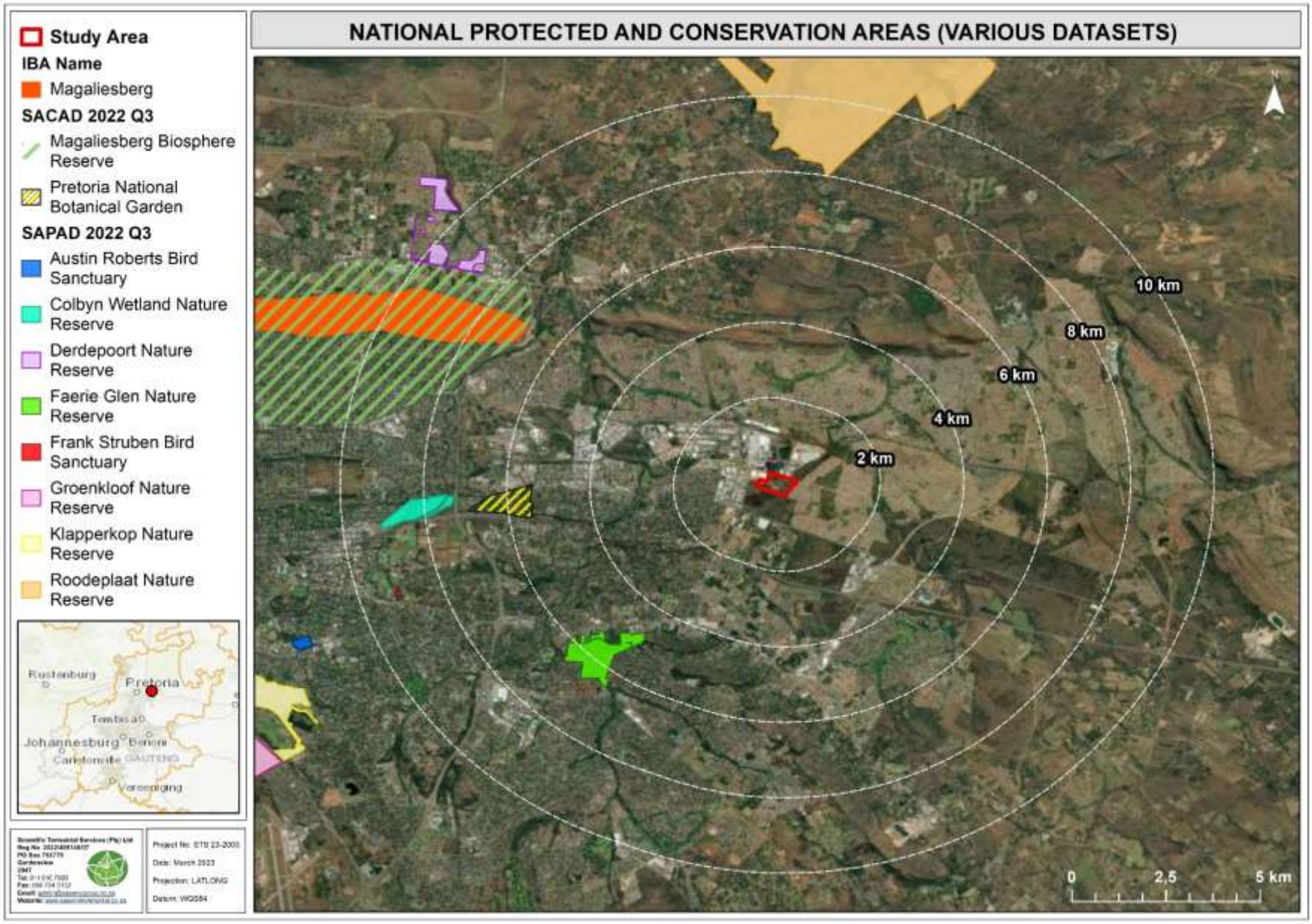



**Figure 8: Nationally protected and conservation areas within 10 km of the Project 2 area.**


**Figure 9: Screening Tool outcome for the study area.**

# 4 RESULTS OF THE BIODIVERSITY ASSESSMENT

The Project 2 area is located in an urban landscape that is surrounded by both residential developments as well as industrial development. The property on which the Project 2 area occurs is, however, within a small section of undeveloped land. The habitat within the Project 2 area has received several direct and indirect impacts over the years that have contributed to a largely degraded state (from a biodiversity perspective). Historically, much of the Project 2 area was cultivated (refer to 2001 imagery in Figure 10), whereas the central sections included a woodland. Historic satellite imagery from 2004 (Figure 10) indicates that the woodland area received significant disturbances resulting from rubble and construction waste dumping. Current disturbances include the transformation of areas in the northern portion of the Project 2 area (2023 imagery in Figure 10 below).


**Figure 10: Historical imagery depicting various disturbances and subsequent changes in the landscape, over time, associated with the Project 2 area. The red polygon indicates the study area, and the yellow polygon indicates the Project 2 area.**

Taking the site history into account and following the field assessments, three broad habitat units could be distinguished within the Project 2 area:

- **Degraded Woodland:** encompassing areas where a distinct tree-dominated vegetation community was recorded; however, the habitat is visibly disturbed as there is a high abundance of alien and invasive plant (AIP) species and remnants of historic dumping. Moderately high levels of disturbance are present within this habitat and overall habitat integrity is poor;
- **Secondary Grassland**: encompassing areas where historic cultivation took place and where the current vegetation communities are dominated by a grass layer. Levels of disturbance in this habitat unit varies between high and moderate, whereas overall habitat integrity can be regarded as poor; and
- **Transformed Habitat**: encompassing areas that are entirely transformed (i.e., associated with vegetation clearance). High levels of disturbance are associated with these areas and the overall habitat integrity is diminished.

The above habitat units are depicted in Figure 12 for the study area and in figure 13 for the Project 2 area. Refer to Section 4.1 for a breakdown of the floral field-verified results and Section 4.2 for the faunal field-verified results.

The Transformed Habitat unit will not be discussed in detail in the below dashboards as the habitat has undergone significant transformation through clearance[7] of vegetation and dumping of rubble, construction waste, etc. Given the intensity of disturbances along with the urban setting of the Transformed Habitat, little to no floral and faunal communities are present within this unit. The habitat does not provide suitable conditions for the establishment of floral or faunal SCC and the likelihood of such species occurring in this habitat unit is very low. The medium (animal and plant species themes) to very high (terrestrial biodiversity theme) sensitivities indicated for this habitat unit by the Screening Tool is thus not supported and, instead, a low sensitivity is suggested. Example photographs of the Transformed Habitat unit are provided in Figure 11. A floral species list for this habitat unit is provided in Section 4.3 and Appendix F.

[7] **Clearance of Indigenous Vegetation Explanatory Document. May 2017**: Clearance is referred to as "Ploughing of land, bulldozing of an area, eradication or removal of vegetation cover with chemicals, amongst others, constitutes clearance of vegetation, provided that this will result in the vegetation being eliminated, removed or eradicated."

**Figure 11: Depiction of the Transformed Habitat unit within the Project 2 area.**

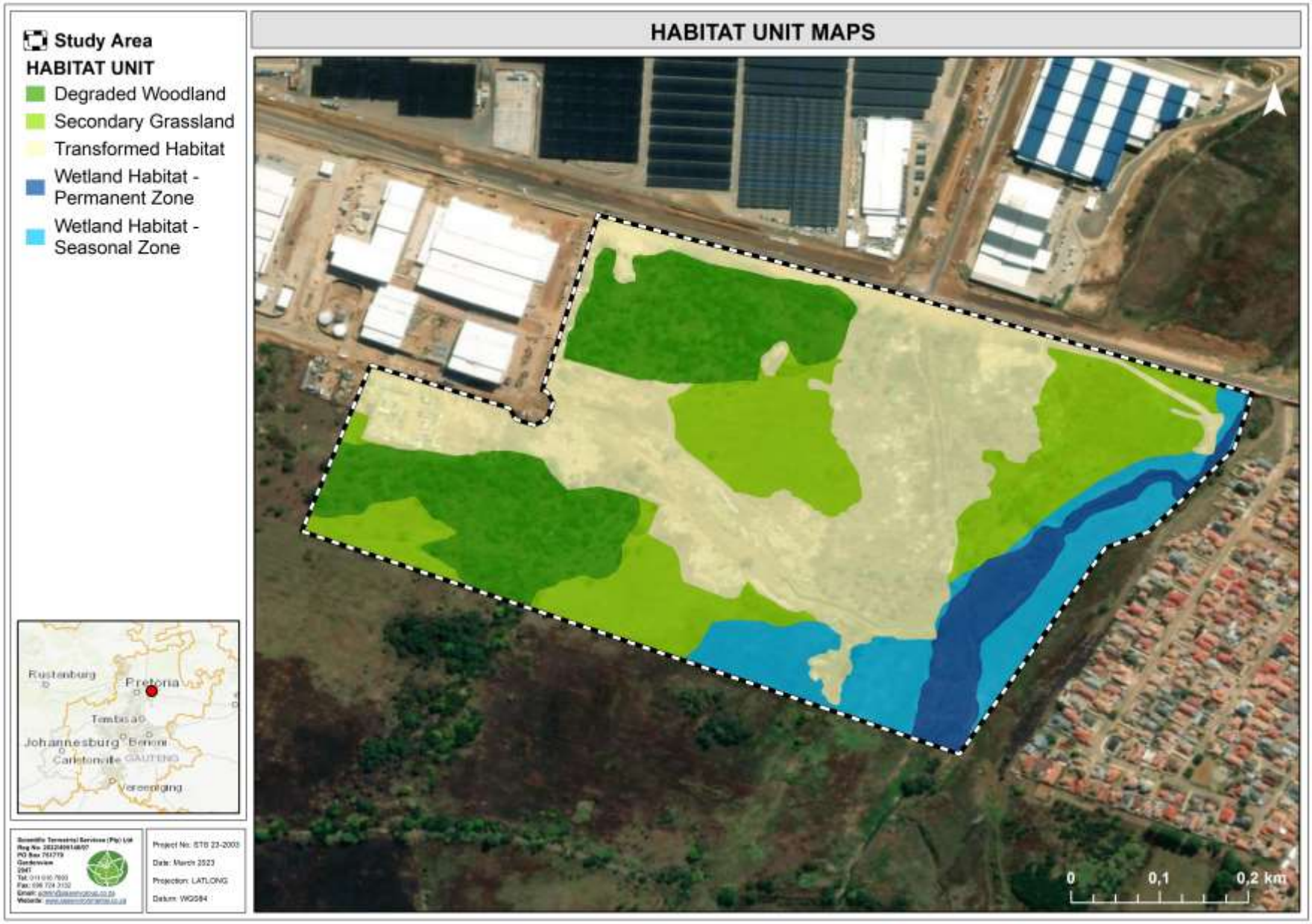



**Figure 12: Map illustrating the habitat units associated with the Project 2 area.**

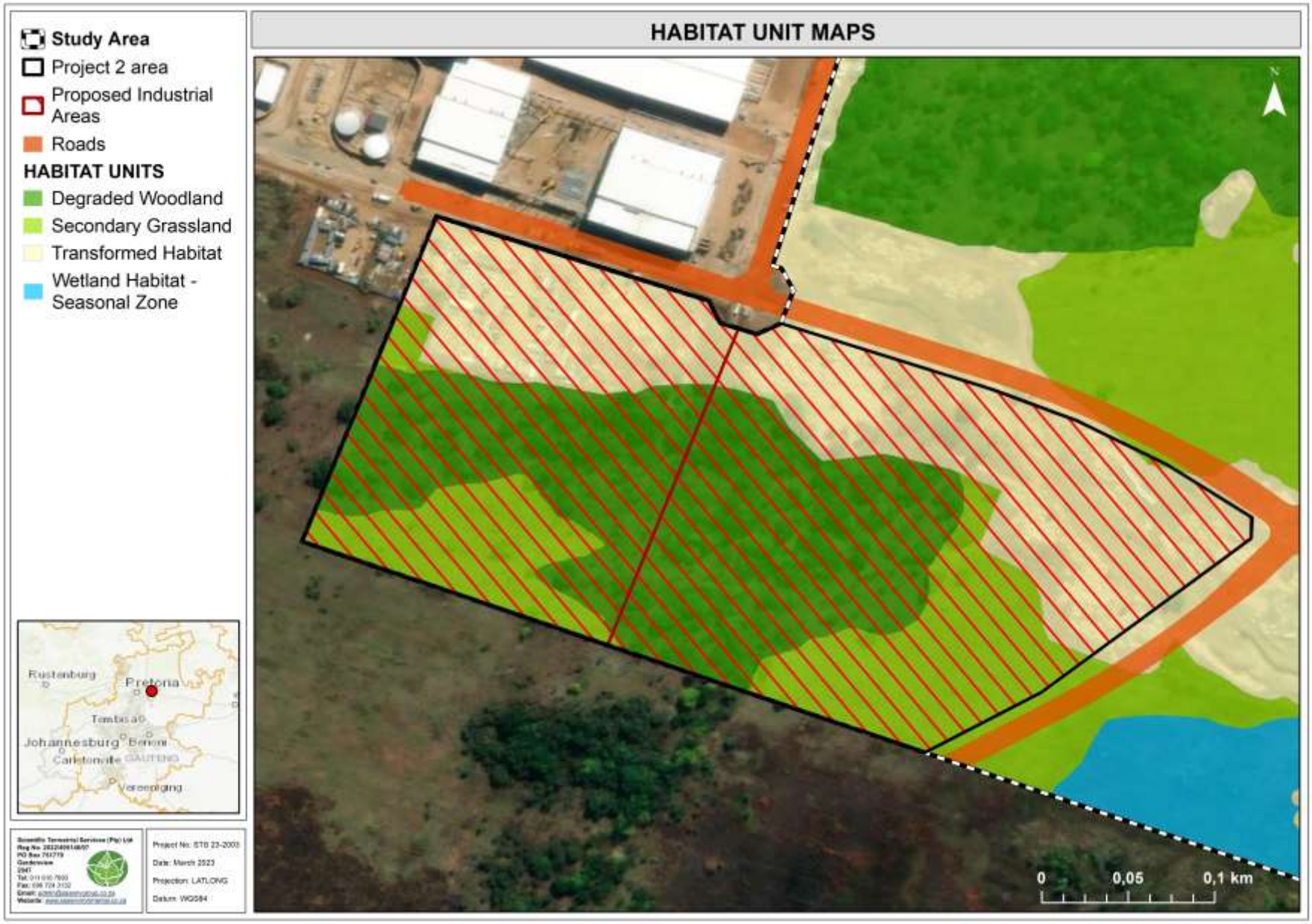



**Figure 13: The proposed activities in relation to the delineated habitat units within the Project 2 area.**

## 4.1 Floral Assessment Results

| INTRODUCTION TO THE HABITAT UNITS IDENTIFIED WITHIN THE PROJECT 2 AREA | |
|---|---|
| **Degraded Woodland** | **Secondary Grassland** |
|  |  |
| This habitat unit is located within the central and western portions of the Project 2 area and is associated with a moderate floral species richness. The vegetation structure can be described as a **closed, short woodland** (as per Diagram B1 in Appendix B) where AIPs and weedy herbaceous species were abundant.<br><br>The vegetation has not received significant disturbances (i.e., topsoil has not been lawfully disturbed) within the preceding 10 years and conforms to the definition of **indigenous vegetation**[8] (per the NEMA Listing Notice definition) regardless of the level of disturbances. | The Secondary Grassland is located within the south-western and south-eastern portions of the Project 2 area and constitutes areas that have been historically cultivated. Primary[9] grasslands have not reinstated since cultivation has stopped within the Project 3 area, and the Secondary Grassland is considered moderately species-rich. The vegetation structure can be described as an **open, short-to-tall grassland** (as per Diagram B1 in Appendix B).<br><br>The vegetation has not received significant disturbances within the preceding 10 years and conforms to the definition of **indigenous vegetation** (per the NEMA Listing Notice definition). |

[8] 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.

[9] SANBI (2013): "**Primary grasslands** are those that have not been significantly modified from their original state; even though they may no longer have their full complement of naturally occurring species, they have not undergone significant or irreversible modification and still retain their essential ecological characteristics." "**Secondary grasslands** are those that have undergone extensive modification and a fundamental shift from their original state (e.g., to cultivated areas), but have then been allowed to return to a 'grassland' state (e.g., when old, cultivated lands are re-colonised by a few grass species)."

| HABITAT OVERVIEW | |
|---|---|
| **Habitat Integrity and ecological processes** | Both the Degraded Woodland and the Secondary Grassland have been subject to historic disturbances such as cultivation and rubble dumping. This prolonged history of disturbances along with the extensive urbanisation of the immediate surroundings have resulted in the exclusion of important ecological processes within the Project 2 area (i.e., modified fire regimes and lack of herbivory). An abundance of AIPs has also established within both these habitat units, although more so within the Degraded Woodland than within the Secondary Grassland (likely a direct result of illegal dumping within the woodland area).<br><br>The Secondary Grassland has recovered to a well-grassed landscape, but the floral communities are not regarded to be a good representative of the threatened Marikana Thornveld ecosystem. The Degraded Woodland is structurally similar to the reference ecosystem; however, from a floral composition perspective, the Degraded Woodland does not include any important features from the reference ecosystem and is considered to have significantly deviated from the Marikana Thornveld.<br><br>Considering the above, both habitat units are considered to be in a **poor ecological condition**, i.e., habitat severely or irreversibly modified (significant deviation from the reference state) and where ecological function has been compromised in addition to structure and composition of the floral communities. |
| **Species overview (For a more comprehensive list of species, please refer to Appendix F of this report.)** | The Degraded Woodland is moderately species-rich. The woody component is most prominent within this habitat units, but is homogenous in composition and comprising several alien tree species (dominated by *Acacia mearnsii* (alien), *Asparagus laricinus, Gymnosporia buxifolia, Melia azedarach* (alien), *Morus nigra* (alien), *Searsia lancea, Vachellia karroo*). The graminoid component was patchy in some sections and had a better coverage in others. Species typically recorded in this habitat unit included *Aristida congesta* subsp. *barbicollisis, Cymbopogon caesius, Eragrostis superba, Melinis repens, Panicum maximum, Setaria* sp., and *Themeda triandra.* The succulent component was largely absent and the herbaceous component often well-represented by weedy species that establish well in disturbed conditions (e.g., *Clematis brachiata, Crabbea hirsute, Dyschoriste burchellii, Hermannia depressa, Hilliardiella elaeagnoides, Ledebouria revoluta, Nidorella anomala, Pseudognaphalium luteo-album, Senecio inornatus,* and *Tolpis capensis*).<br><br>The Secondary Grassland, in turn, had a poor representation of woody species (restricted to seedlings of *Vachellia karroo* and alien trees such as *Melia azedarach*). The graminoid component was well-developed but largely homogenous; grass species that thrive in disturbed conditions often formed homogenous stands or clumps within the Secondary Grassland, including species such as *Cymbopogon caesius, Eragrostis curvula, Eragrostis plana, Eragrostis superba, Heteropogon contortus, Hyparrhenia dregeana,* and *Melinis repens.* Succulent species were not recorded within this habitat unit, but a moderate diversity of herbaceous species was present (albeit mostly weedy species), e.g., *Crabbea hirsute, Euphorbia striata, Helichrysum rugulosum, Hermannia depressa, Ipomoea ommanneyi, Nidorella anomala, Nidorella podocephala, Pelargonium luridum, Plantago lanceolata, Polygala hottentotta,* and *Sida rhombifolia.*<br><br>Refer to **Section 4.3** for additional discussions on AIPs associated with the Project 2 area. |
| **PRESENCE OF UNIQUE LANDSCAPES** | |
| The Screening Tool identified the Project 2 area to be of very high sensitivity due to desktop database triggers such as an ESA and a VU (now EN) ecosystem. None of the habitat units associated with the Project 2 area are considered to be representative of the threatened ecosystem and do not include any important features or species of the threatened ecosystem that would warrant conservation consideration. The ESA was indicated for the Degraded Woodland, Secondary Grassland and Transformed Habitat; however, considering **1)** that the habitat is significantly degraded within these habitat units, and **2)** these habitats do not support any CBAs or Protected Areas within the larger area, the ESA is not considered important or ecologically functional within these habitat units.<br><br>The Screening Tool outcome for the terrestrial biodiversity theme is therefore disputed for the Project 2 area and a low sensitivity instead confirmed/recommended. | |

**SPECIES OF CONSERVATION CONCERN**

As part of the SCC assessment, the following classes were considered:

- **Threatened species**. In terms of Section 56(1) of the NEMBA, threatened species are Red Data Listed (RDL) species falling into the following categories of ecological status: CR, EN, VU or Protected. This includes species listed in terms of the NEMBA List of Terrestrial and Freshwater Species that are Threatened or Protected (i.e., the TOPS species) (GN 3012). Removal, translocation and/or destruction of these species require authorisation from the DFFE; and
- **Protected Species**. Species that do not necessarily fall in the above categories of ecological status, but that are deemed important from a provincial biodiversity perspective, e.g., the Orange Listed (OL)[10] plants for the Gauteng Province (provided by GDARD). The List of Protected Tree Species (GN No. 536) as published in the Government Gazette 41887 dated 7 September 2018 as it relates to the National Forest Act, 1998 (Act No. 10 of 1998) (NFA) was also considered for the SCC assessment.

| Threatened Species | Protected Species |
|---|---|
| According to the outcome of the Screening Tool, the Project 2 area is of medium sensitivity from a plant species theme perspective, triggered by the following species: Sensitive species 430 (VU) and Sensitive species 1248 (VU). During the field assessment, these two species were not found on site and suitable habitat for the establishment of viable populations of these species is not present within the Project 2 area. This agrees with the findings of the previous assessment undertaken by Eco-Agent CC (2015). No other threatened species known from the surrounding area was found on site and the probability of occurrence (POC) for such species within the Project 2 area is low.<br><br>Given the above, the medium sensitivity is disputed for the Project 2 area, and a low sensitivity instead recommended.<br><br>Refer to **Appendix G** for a more comprehensive outcome of the SCC assessment. | No NFA-protected tree species, or any of the species listed on the 2023 TOPS list, were recorded within the Project 2 area. The POC for such species within the Project 2 area was further determined to be low.<br><br>In terms of OL species, a single individual of *Hypoxis hemerocallidea* (LC nationally but Declining provincially) was recorded in the property adjacent to the Project 2 area. Since this species has a broad habitat preference and typically establishes easily within disturbed conditions, it is likely that additional species are present within the Degraded Woodland and Secondary Grassland. However, considering that this species is of medicinal importance, harvesting of individuals may take place within the Project 2 area and could be the cause of this species being poorly represented on site.<br><br>Refer to **Appendix G** for a more comprehensive outcome of the SCC assessment. |

**CONCLUDING REMARKS**

The various habitat units associated with the Project 2 area includes degraded vegetation communities and lacks RDLs (only one OL species potentially present). No significant or important ecological processes are supported within these habitats and the proposed development within these areas will not result in significant loss of floral resources. Development can be optimised within these habitat units given that mitigation measures as presented in Section 6 are implemented.



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

## 4.2 Faunal Assessment Results

**Selected examples of faunal species recorded within the Study Area**



**Photos from left to right:** *Ploceus velatus* (Southern Masked Weaver Nest). *Junonia hierta* (Yellow Pansy) butterfly. *Euplectes albonotatus* (White-winged Widowbird).

**Faunal Overview**

The study area has been subjected to several anthropogenic disturbances, both historically and currently. Such disturbances are largely due its location within the urban edge as well as the fact that portions of the study area were historically cultivated (Secondary Grassland). The Degraded Woodland habitat was not historically cultivated, however it has not escaped disturbance, with notable proliferation of AIPs occurring throughout whilst several areas herein have been used for the disposal of rubble and construction waste. A notable reduction in faunal species diversity and abundance was noted due to the associated habitat degradation, as well as the extensive development within the surrounding landscape leading to loss of habitat connectivity whilst impacting on faunal species dispersal abilities. Although no mammal species were observed, it is likely that small rodents commensurate with urban areas and degraded habitats such as *Rhabdomys pumilio* (Four-striped Grass Mouse), *Mus musculus* (Common house Mouse) and *Rattus Rattus* (Black Rat) will occur in study area. Small reptiles such as *Trachylepis varia* (Variable Skink) were observed intermittently within the study area, often in association with piles of rubble. Larger reptiles such as *Boaedon capensis* (Brown House Snake) may also frequent the study area in search of prey items, notably small rodents as mentioned above. Several individuals of the Family Lycosidae (Wolf Spiders) were also noted under loose piles of concrete and fallen logs, though no scorpion species were found during these searches. The degradation of the habitat is likely a limiting factor for insects, which are a primary food resources for arachnids. Such is likely one of the reasons for the low arachnid diversity observed, though it is acknowledged that an assessment of limited duration will also yield lower observation rates due to the secretive nature of many arachnid and other species. No amphibian species were observed during the site assessment, however as amphibians are largely inactive during the day, it is possible that individuals may have been overlooked. Taking into consideration the habitat available within the study area, it is considered unlikely that a high diversity of amphibians would occur therein. The amphibian assemblage is likely to be very limited, restricted to water independent species such as *Sclerophrys gutturalis* (Guttural Toad). The low insect diversity and abundance within the study area will likely further limit amphibian occurrences, as insects are a primary food resource for amphibians. The low insect diversity and abundance is further a likely indicator of degraded habitat, as increased insect abundance and diversity is often an indication of ecosystem health.

**Faunal SCC**

The Screening Tool indicated that the study area is located within an area of Medium Sensitivity for the Animals Species Theme. The following species were listed by the screening tool as potentially occurring / of potential importance in relation to the study area:

- Aves: *Eupodotis senegalensis* (White-bellied Korhaan; VU);

- Mammalia: *Crocidura maquassiensis* (Makwassie Musk Shrew; VU), *Dasymys robertsii* (African Marsh Rat; VU), *Hydrictis maculicollis* (Spotted-necked Otter; VU), *Neamblysomus julianae* (Juliana's Golden Mole; EN);
- Reptilia: *Kinixys lobatsiana* (Lobatse Hinge-back Tortoise; VU); and
- Invertebrate: *Clonia uvarovi* (Uvarov's Clonia; VU).

The above listed species were taken into consideration when assessing the habitat and overall suitability of the study area. During the site assessment, no faunal SCC or indicative signs of their presence were observed. It is further considered unlikely that any faunal SCC will occur within the study area due to the degraded state of the habitat and increasing levels of anthropogenic activities and impacts.

**CONCLUDING REMARKS**

The habitat within the study area has, over the years, been degraded and impacted upon to the extent that it no longer supports a diverse or abundant assemblage of faunal species. This habitat degradation and the extensive development in the surrounding regions has further led to the likely exclusion of faunal SCC from the study area.

## 4.3 Alien and Invasive Plant (AIP) Species

South Africa is home to an estimated 759 naturalised or invasive terrestrial plant species (Richardson et al., 2020), with 327 plant species, most of which are invasive, listed in national legislation[11]. Many introduced species are beneficial, e.g., almost all agriculture and forestry production are based on alien species, with alien species also widely used in industries such as horticulture. However, some of these species manage to "escape" from their original locations, spread and become invasive. Although only a small proportion of introduced species become invasive (~0.1–10%), those that do proceed to impact negatively on biodiversity and the services that south Africa's diverse natural ecosystems provide (from ecotourism to harvesting food, cut flowers, and medicinal products) (van Wilgen and Wilson, 2018).

### 4.3.1 Legal Context

South Africa has released several articles of legislation that are applicable to the control of alien species. Currently, invasive species are controlled by the NEMBA – Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated 25 October 2020. AIP species defined in terms of NEMBA are assigned a category and listed within the NEMBA List of Alien and Invasive Species (2020) in accordance with Section 70(1)(a) of the NEMBA:

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

[11] Government Notice number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 October 2020, as it relates to the National Environmental Management Biodiversity Act, 2004 (Act No 10 of 2004).

Duty of care related to listed invasive species are referred to in NEMBA Section 73[12]. The motivation for this duty of care is both environmentally and economically driven. Management of alien species in South Africa is estimated to cost at least ZAR 2 billion (US$142 million) each year – this being the amount currently spent by the national government's DFFE – i.e., the Working for Water programme (van Wilgen, 2020). Managing AIPs early on will reduce clearing costs in the long run.

### 4.3.2 Site Results

A total of 42 AIP species were recorded within the Project 2 area and immediate surrounds. Overall, the Transformed Habitat unit was associated with the highest diversity and abundance of AIPs and comprised mainly of both woody and herbaceous species. The Degraded Woodland had a high diversity of AIPs, however, these species were less abundant than within the Transformed Habitat. The Secondary Grassland had the lowest diversity and abundance of AIPs within the Project 2 area.

Of the 42 AIP species recorded within the Project 2 area, 17 species are listed under NEMBA category 1b, two (2) species are listed as NEMBA category 2, two (2) species are listed as NEMBA category 3, and 21 species are not currently listed on the NEMBA Invasive Aliens List (2020). The 24 non-listed species associated with the Project 2 area are regarded as potential problem plants and such species would need to me removed or regularly monitored to ensure their spread to surrounding habitats is prevented.

It is recommended that if the project activities are approved that an AIP plan be compiled and implemented to ensure the spread of these species are managed responsibly.

Refer to the below table for more details on the AIPs recorded within the Project 2 area.



[12] Section 73(2): A person who is the owner of land on which a listed invasive species occurs must-
a) notify any relevant competent authority, in writing, of the listed invasive species occurring on that land;
b) take steps to control and eradicate the listed invasive species and to prevent it from spreading; and
c) take all the required steps to prevent or minimise harm to biodiversity.

**Table 3: Alien and invasive alien species associated with the Project 2 area.**

| SCIENTIFIC NAME | COMMON NAME | COUNTRY OF ORIGIN | NEMBA STATUS | Transformed Habitat | Degraded Woodland | Secondary Grassland |
|---|---|---|---|---|---|---|
| **WOODY SPECIES** | | | | | | |
| *Acacia mearnsii* | Black wattle | South-eastern Australia and Tasmania | 2 | | x | |
| *Acacia podalyriifolia* | Pearl acacia | Australia | 1b | | x | |
| *Ailanthus altissima* | Tree-of-heaven | China | 1b | x | x | |
| *Celtis australis* | Nettle tree, European hackberry | Southern Europe, North Africa, and Asia Minor | 3 | | x | |
| *Ficus carica* | Common fig tree | Asiatic Turkey to northern India, but natural seedlings grow in most Mediterranean countries | Not Listed | | x | |
| *Heptapleurum cf. actinophyllum* (Formerly *Schefflera actinophylla*) | Australian cabbage tree, Queensland umbrella tree | Tropical rainforests and gallery forests in northern and north-eastern Queensland coasts and the Northern Territory of Australia, as well as New Guinea and Java | Not Listed | x | x | |
| *Lantana camara* | Lantana | Central and South America. | 1b | x | x | |
| *Melia azedarach* | Seringa | Asia to Australia the form in southern Africa is an Indian cultivar | 3 in urban areas (1b in wetlands) | x | x | x |
| *Morus nigra* | Black mulberry | Southwestern Asia and the Iberian Peninsula | Not Listed | x | x | x |
| *Solanum maurituanum* | Bugweed | South America | 1b | x | x | |
| *Tecoma stans* | Yellow bells | Mexico and Southern America | 1b | x | x | |
| **HERBACEOUS SPECIES** | | | | | | |
| *Achyranthes aspera* | Burweed | Of uncertain origin. Probably indigenous to South-East Asia and Africa. | Not Listed | x | x | |
| *Amaranthus hybridus* | Pigweed | America | Not Listed | x | x | |
| *Araujia serifera* | Moth catcher | South America | 1b | x | x | |
| *Bidens pilosa* | Common blackjack | Cosmopolitan weed native to South and Central America | Not Listed | x | x | x |
| *Campuloclinium macrocephalum* | Pompom weed | Central & South America (Mexico to Argentina) | 1b | x | x | x |

| SCIENTIFIC NAME | COMMON NAME | COUNTRY OF ORIGIN | NEMBA STATUS | Transformed Habitat | Degraded Woodland | Secondary Grassland |
|---|---|---|---|---|---|---|
| *Centella asiatica* | Asiatic pennywort | Native across much of tropical Africa, Asia, Australia, South America and some islands in the Pacific. | Not Listed | | x | |
| *Chenopodium album* | Goosefoot | Native range is obscure due to extensive cultivation, but includes most of Europe | Not Listed | x | x | |
| *Conyza bonariensis* | Flax-leaf fleabane | Americas | Not Listed | x | x | x |
| *Datura stramonium* | Common thorn apple | Tropical America. | 1b | x | x | x |
| *Euphorbia heterophylla* | Mexican fire plant | Tropical and subtropical America | Not Listed | x | | x |
| *Euphorbia nutans* | Nodding spurge | Much of the United States, Eastern Canada, Mexico, Central America, the Caribbean, and Venezuela | Not Listed | | x | x |
| *Flaveria bidentis* | Smelter's bush | South America | 1b | x | x | |
| *Glandularia aristigera* | Dakota mock vervain | North America, where its natural range extends from the United States south to Nicaragua | Not Listed | x | x | |
| *Hibiscus trionum* | Bladder hibiscus | Native to the Old-World tropics and subtropics. | Not Listed | | x | |
| *Ipomoea purpurea* | Purple morning glory; Common morning glory | Tropical America | 1b | x | x | x |
| *Medicago sativa* | Alfalfa | Seems to have originated in south-central Asia | Not Listed | x | | |
| *Melilotus albus* | Honey clover | Asia and southern Europ | Not Listed | x | x | |
| *Oenothera rosea* | Rose evening primrose | South America | Not Listed | | | x |
| *Physalis viscosa* | Sticky gooseberry | America from the south-eastern and south-central United States southwards throughout Central America and the Antilles to Argentina | Not Listed | x | x | |
| *Phytolacca octandra* | Forest inkberry | Tropical America | 1b | x | x | |
| *Ricinus communis* | Castor-oil plant | NE Africa | 2 | x | x | |
| *Salvia reflexa* | Mintweed | United States and Mexico | Not Listed | x | | |
| *Schkuhria pinnata* | Dwarf marigold | South America | Not Listed | x | x | x |
| *Tagetes minuta* | Khaki bush, khaki weed | South and North America | Not Listed | x | x | x |
| *Tithonia rotundifolia* | Red sunflower | Eastern Mexico and Central Americ | 1b | x | x | |

| SCIENTIFIC NAME | COMMON NAME | COUNTRY OF ORIGIN | NEMBA STATUS | Transformed Habitat | Degraded Woodland | Secondary Grassland |
|---|---|---|---|---|---|---|
| *Verbena bonariensis* | Tall verbena | South America | 1b | x | x | |
| *Verbena brasiliensis* | Brazilian verbain | South America | 1b | x | | x |
| *Xanthium strumarium* | Common cocklebur | Central and South America | 1b | x | x | |
| *Zinnia peruviana* | Peruvian zinnia | Mexico to Brazil, Peru and Bolivia | Not Listed | x | x | |
| **SUCCULENT SPECIES** | | | | | | |
| *Opuntia ficus-indica* | Prickly pear | South America | 1b | x | x | |
| **GRAMINOID SPECIES** | | | | | | |
| *Arundo donax* | Giant reed, Spanish reed | Mediterranean | 1b | x | x | |
| *Pennisetum clandestinum* | Kikuyu grass | East Africa | Not Listed (1b in wetlands) | | x | |

## 4.4 Medicinal Floral Species

Medicinal plant species are not necessarily indigenous species, with many of them regarded as alien invasive weeds. The table below presents a list of plant species with traditional medicinal value and the plant parts traditionally used, which were identified during the field assessments.

An intermediate abundance of medicinal species was encountered during the field assessment. The species listed in the table below are common, widespread species and not confined to the Project 2 area, with several species classified as AIPs. None of the species identified are threatened nor are any of them protected. Thus, the impact on medicinal plant species arising from the proposed development is considered minor.

**Table 4: Dominant traditional medicinal floral species identified during the field assessment. Medicinal applications and application methods are also presented (van Wyk, Oudtshoorn, Gericke, 2009). Alien species are indicated with an asterisk (*).**

| SPECIES | NAME | PLANT PARTS USED | MEDICINAL USES |
|---|---|---|---|
| | | **WOODY SPECIES** | |
| **Ailanthus altissima* | Tree-of-heaven | Bark | Amarum, spasmolytic, dysentery; anthelmintic; amoebicidal; antitumor activities |
| **Melia azederach* | Syringa | Leaves, roots, bark, seeds, fruit | An aqueous extract reduces the intensity of asthmatic attacks. The leaf juice is anthelmintic, antilithic, diuretic and emmenagogue. A decoction is astringent and stomachic. A decoction is used to treat diarrhoea. The leaves are used externally to treat skin conditions such as scabies and itch. A decoction is used as a gargle to treat tooth problems and strengthen the gums. The leaves are harvested during the growing season and can be used fresh or dried. The flowers and leaves are applied as a poultice in the treatment of neuralgia and nervous headache. The stem bark is anthelmintic, astringent, and bitter tonic. It is used as a tonic in India. It can be harvested at any time of the year and is used fresh or dried. The root bark is emetic, emmenagogue, purgative and vermifuge. It is highly effective against ringworm and other parasitic skin diseases. It can be harvested at any time of the year and is used fresh or dried. The fruit is antiseptic and febrifuge. The pulp is used as a vermifuge. The fruit is harvested in the autumn when it is fully ripe and can be used fresh or dried. The seed is antirheumatic. It is used externally. A gum that exudes from the tree is considered by some to have aphrodisiac properties]. This plant should be used with caution, preferably under the supervision of a qualified practitioner. Excess causes diarrhoea, vomiting and symptoms of narcotic poisoning. Source: http://tropical.theferns.info/viewtropical.php?id=Melia+azedarach |
| **Opuntia ficus-indica* | Mission prickly pear, Sweet prickly pear | Flowers and fruit | Astringent; haemostyptic; intestinal disorders |
| *Vachellia karroo* | Sweet thorn | Bark, leaves and gum | Remedy for diarrhoea and dysentery |
| | | **Forbs** | |
| **Bidens pilosa* | Blackjack | Herb | Astringent, diuretic, inflammation of the digestive tract; antidiarrheal |
| **Datura stramonium* | Common thorn apple | Leaves and Seed (rarely the green fruit) | Traditionally used to relieve asthma and relieve pain. The elderly also uses the plant as a hypnotic, where adults use it as an aphrodisiac. This plant is a toxic. |
| **Phytolacca octandra* | Forest inkberry | Roots | The roots of the plants are used for medicine purposes. |
| **Ricinus communis* var *communis* | Caster oil plant | The oil that is extracted from the seeds is mainly used. Sometimes fruits, leaves or seeds also used. | Well-known purgative medicine. In Sotho and Zulu traditional medicine, leaf infusions are used for stomach aches. Root and leaf poultices are also used for wounds, sores and boils. |
| **Tagetes minuta* | Khaki bush, Khaki weed, African marigold | Leaves, stalks and flowers | It is also grown commercially in South Africa, France, and North America for its essential oil. The oil is very effectively used for wounds and a wide variety of infections. |

| SPECIES | NAME | PLANT PARTS USED | MEDICINAL USES |
|---|---|---|---|
| *Clematis brachiata* | Traveller's Joy | NL | Used traditionally to treat abdominal disorders, intestinal worms, head colds, syphilis, as a snake bite remedy and a good luck charm. |
| *Helichrysum rugulosum* | | Not specified | Used in traditional medicine to fumigate huts when children are ill, and an ingredient in protective charms |
| *Helihrysum* sp. *(Helichrysum nudifolium* var *nudifolium)* | Everlastings | Leaves and twigs, sometimes roots | Many ailments are treated, including coughs, colds, fever, headache, and menstrual pain. Also used in wound dressing. |
| *Hermannia sp.* | Doll's Roses | Leaves, Roots | Many members of the genus are used medicinally, for anything ranging from respiratory diseases, coughs, and internal aches, as stimulants or purgatives, to soothing wounds and cuts. |
| *Hilliardiella elaeagnoides* | Groenamara | Leaves and twigs | Infusions are taken as stomach bitters to treat abdominal pain and colic. |
| *Hypoxis hemerocallidea* | African star grass or African potato | Tuberous rootstock (corm). | Dizziness, bladder infections and insanity are treated by using the infusions of the corm as an emetic. Stems and leaves can be used with other ingredients to treat prostate problems. Within the past couple of years, *H. hemerocallidea* has become commercialised as a source of extracts used in prostate preparations, as well as in various tonics and so-called immune boosting preparations. |
| *Ledebouria* spp. | Ledebouria; Common squill | Various parts | *Ledebouria* has been cited as being used for medicinal purposes, including pregnancy, diarrhoea, influenza, backache, skin irritations, wounds, and lumbago (Long 2005). The genus is also reputed to be poisonous in Africa, although it is reported that bushmen eat the bulbs *of L. apertiflora* and *L. evolute* (Pfosser & Speta 2001). |
| *Polygala hottentotta* | Small Purple Broom | Not Specified | Used in traditional medicine to treat abdominal complaints, anthrax and as a charm. |
| *Scabiosa columbaria* | Wild scabious | Leaves and fleshy roots | Remedy for colic and heartburn. Grounded roots were used to make baby powder. |
| *Senecio inornatus* | Tall marsh senecio | Whole plant | Used extensively in traditional medicine to treat palpitations, phthisis, coughs, and difficult breathing. Incorrect application of and treatment with this plant can be dangerous as it contains highly toxic alkaloids that may cause liver damage. |

# 5 SENSITIVITY MAPPING

The Screening Tool identified the entire Project 2 area to be of **medium sensitivity** from a Plant Species Theme and Animal Species Theme perspective, whereas for the Terrestrial Biodiversity Theme, the Screening Tool identified the entire Project 2 area be of **very high sensitivity** (triggered by the presence of an ESA and EN ecosystem). None of these sensitivities were confirmed and a low sensitivity is instead recommended for the animal, plant, and terrestrial biodiversity themes.

Based on the ground-truthed results of the site visit, Tables 5 (flora) and 6 (fauna) below present the sensitivity of each identified habitat unit along with an associated conservation objective and implications for development.

Figures 14 – 15 conceptually illustrate the areas considered to be of varying ecological sensitivity and how they will be impacted by the proposed activities. The areas are depicted according to their sensitivity in terms of the presence or potential for floral and faunal SCC, habitat integrity and levels of disturbance, threat status of the habitat type, the presence of unique landscapes and overall levels of diversity (compared to a reference type).

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

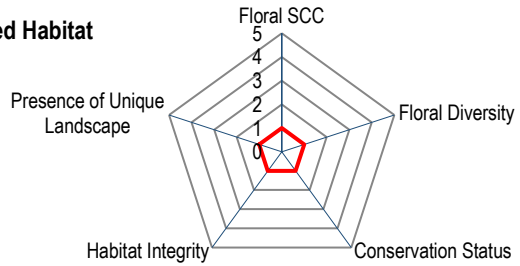
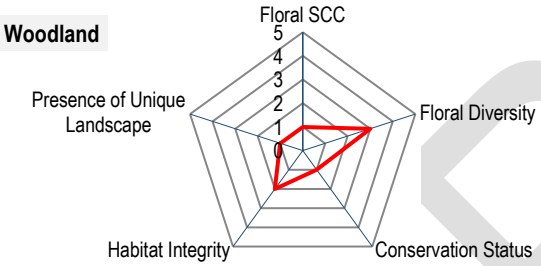
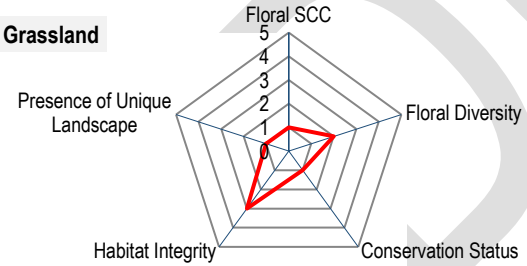
| HABITAT SENSITIVITY | CONSERVATION OBJECTIVE | KEY FLORAL HABITAT CHARACTERISTICS |
|---|---|---|
| **Low**<br>**Transformed Habitat**<br>  <br> | Optimise development potential. | - Indigenous vegetation absent and native floral richness was low to absent;<br>- Habitat not representative of the reference vegetation type/ threatened ecosystem (i.e., Marikana Thornveld); and the potential for the habitat to support viable populations of SCC (especially RDLs) is deemed low. The medium sensitivity assigned to the Plant Species Theme by the Screening Tool is disputed and a low sensitivity recommended; and<br>- No significant biodiversity features were confirmed for this habitat unit and thus the very high sensitivity assigned to the Terrestrial Biodiversity Theme by the Screening Tool is not supported for this unit. |
| **Moderately Low**<br>**Degraded Woodland**<br>  <br><br>**Secondary Grassland**<br>  <br> | Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects. | - Indigenous vegetation present within these habitat units;<br>- Habitat has been degraded due to historic and current anthropogenic-related disturbances, namely historic cultivation, introduction of AIPs, and dumping of rubble;<br>- The floral communities have significantly shifted away from the reference vegetation type (i.e., the Marikana Thornveld) and are no longer representative of important biodiversity features such as threatened ecosystems. The very high sensitivity assigned by the Screening Tool for the Terrestrial Biodoversity Theme is not supported for this unit; and<br>- Floral SCC are not present within these habitat units (apart from one OL species) and the potential for the habitat to support viable populations of such species is deemed low. The medium sensitivity assigned to the Plant Species Theme by the Screening Tool is disputed and a low sensitivity recommended. |

**Table 6: A summary of the faunal sensitivity of each habitat unit and implications for development.**

| | | |
|---|---|---|
| **Low** | **Transformed Habitat**<br><br>Optimise development potential. | - Habitat has been significantly impacted upon with areas already been cleared of vegetation or developed upon. This habitat provides limited to no ecological support to fauna;<br><br>- Very low faunal diversity within this habitat due to impacted and unsuitable state of the habitat; and<br><br>- No faunal SCC are expected within this habitat unit. |
| **Moderately Low** | **Degraded Woodland Secondary Grassland**<br><br>Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects. | - Habitat has been degraded due to historic and current anthropogenic-related disturbances, namely historic cultivation, introduction of AIPs, and dumping of building rubble and waste;<br><br>- Habitat degradation is a limiting factoring for faunal species diversity and overall abundance;<br><br>- Development in the local area limits dispersal and movement of faunal species to and from the study area, notably on a more regional scale; and<br><br>- No faunal SCC observed within these habitats. No faunal SCC expected to occur herein due to degraded and unsuitability of the habitat. |

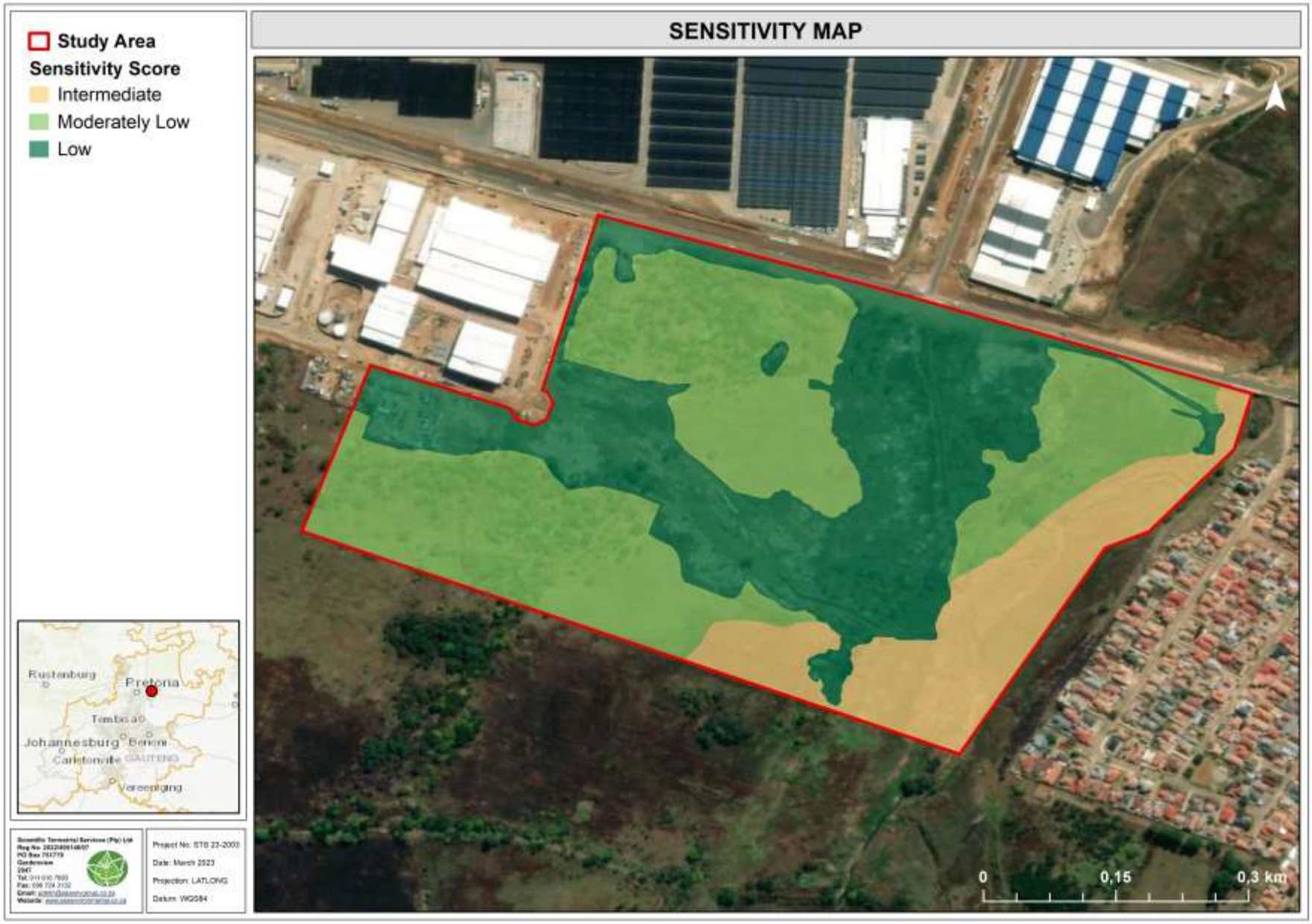



**Figure 14: Combined flora-fauna habitat sensitivity map for the study area.**

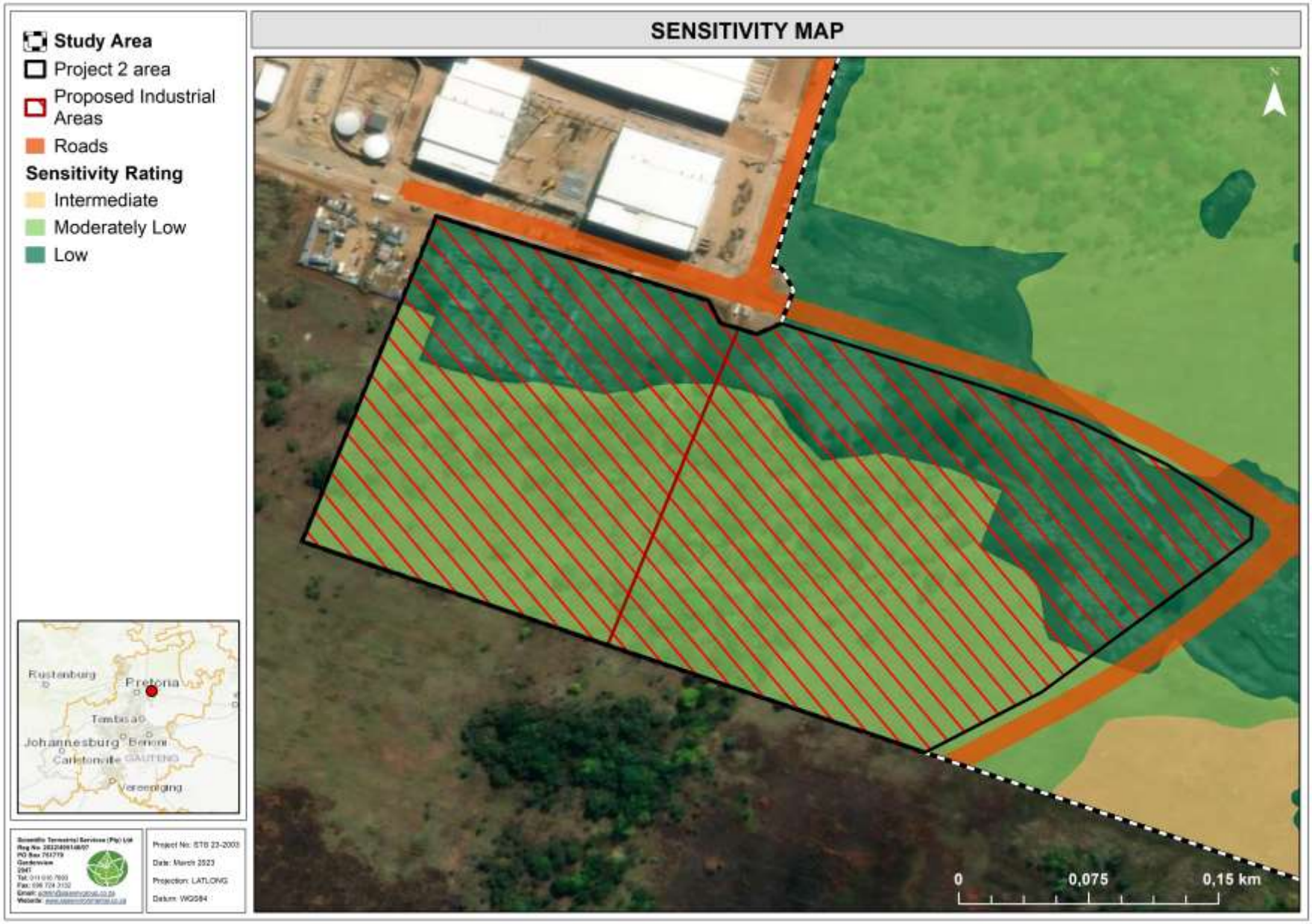



**Figure 15: The proposed activities in relation to the various habitat sensitivities within the Project 2 area.**

# 6 IMPACT ASSESSMENT

The sections below provide the significance of perceived impacts arising from the proposed development for the Project 2 area. An impact discussion and assessment of all potential Pre-Construction, Construction, and Operation and Maintenance Phase impacts are provided in Section 6.2 and 6.3. All mitigatory measures required to minimise the perceived impacts are presented within the tables in Section 6.2 and 6.3.

## *6.1 Activities and Aspect Register*

The tables below indicate the perceived risks to floral and faunal species associated with the activities pertaining to the proposed development.

**Table 7: Activities and Aspects likely to impact on the floral and faunal resources of the Project 2 area.**

| ACTIVITIES AND ASPECTS REGISTER |
|---|
| **Pre-Construction Phase** |
| - Inconsiderate planning, infrastructure placement and design, leading to the loss of floral and faunal species and/or habitat for such species outside of planned footprints.<br>- **Impact:** Degradation and modification of the receiving environment, loss of faunal and floral habitat. |
| - Potential failure to design and implement an AIP Management/Control plan before the commencement of construction activities, resulting in the spread of AIPs from the development footprint to surrounding natural habitat.<br>- **Impact:** Spread of AIPs, leading to potential loss of floral species diversity from surrounding natural habitat. |
| - Potential failure to design an adequate stormwater management and rehabilitation plan.<br>- **Impact:** Increased erosion within the Project 2 area and surrounds, potentially influencing natural areas outside the authorised footprint area. |
| **Construction Phase** |
| - Site clearing and the removal of vegetation.<br>- **Impact:** Loss of faunal and floral habitat and diversity. |
| - Potential failure to conduct a walkdown of the approved footprint area before construction activities where floral SCC (only one OL species anticipated within the Degraded Woodland), where present, are marked.<br>- Potential failure to relocate floral SCC (only OL species anticipated) or faunal SCC to suitable habitat outside the development footprint.<br>- **Impact**: Loss of faunal and/or floral SCC within the development footprint area of the Project 2 area. |
| - Inadequate layout optimisation and demarcation for approved footprints, resulting in site clearing beyond what is required.<br>- **Impact**: Loss of faunal and floral habitat. Loss of indigenous vegetation and infringement on habitat outside of the planned footprints. |
| - Failure to implement AIP plan throughout all phases of the project, resulting in potential proliferation of AIP species that spread with construction vehicles and construction material – consequently colonising in areas of increased disturbances and outcompeting native species in adjacent natural habitat.<br>- **Impact:** Loss of favourable faunal and floral habitat outside of the direct development footprint, including a decrease in species diversity and habitat integrity. |
| - Dumping of construction material within areas where no construction is planned, thereby leading to further habitat disturbance which promotes the establishment and spread of AIPs and further alteration of faunal habitat beyond project footprints. |

| ACTIVITIES AND ASPECTS REGISTER |
|---|
| - **Impact:** Loss of preferred faunal and floral habitat, diversity and habitat integrity as AIPs outcompete and replace native species. |
| - Increased risk of faunal collisions with construction vehicles.<br>- **Impact:** Local loss of faunal SCC abundance and diversity. |
| - Additional pressure on faunal and floral habitat as a result of an increased human presence associated with the proposed development, contributing to:<br>• Potential hunting/trapping/removal/collection of faunal and floral species; and<br>• Increased human activity will lead to the displacement and/or loss of potential faunal SCC.<br>- **Impact:** Loss of faunal and floral habitat and the potential loss of faunal and floral SCC. |
| - Potentially poorly managed edge effects:<br>• Ineffective rehabilitation of compacted areas, bare soils, or eroded areas. Limited vegetation cover exposes the soil to the impact of rain, which may lead to increased erosion;<br>• Areas left disturbed may promote the ongoing proliferation of AIP species and subsequent spread to surrounding natural areas altering the floral habitat beyond the project footprints; and<br>• Compaction of soils, habitat disturbance and fragmentation outside of the Project 2 area footprint due to indiscriminate driving of construction vehicles through remaining natural vegetation.<br>- **Impact:** Loss of floral and faunal habitat and diversity within the direct footprint of the proposed development. Loss of surrounding floral and faunal diversity through the displacement of indigenous flora by AIP species - especially in response to disturbance in natural areas. |
| - Possible increased fire frequency during construction.<br>- **Impact:** Loss or alteration of floral and faunal habitat and species diversity. |
| **Operational and Maintenance Phases** |
| - Potential failure to implement a rehabilitation and an AIP control plan after the construction phase.<br>- **Impact:** Potentially leading to permanent transformation of faunal and floral habitat and long-term degradation of remaining natural habitat within the surroundings. |
| - Increased introduction and proliferation of AIPs due to a lack of maintenance activities, or poorly implemented and monitored AIP Management programme, leading to ongoing displacement of natural vegetation outside of the footprint area.<br>- **Impact:** Ongoing or permanent loss of faunal and floral habitat, diversity, and habitat integrity. |
| - Implement site specific erosion and storm water runoff management measures to prevent (or if prevention is not possible, limit) any erosion from occurring within the development footprint area and surrounding natural areas.<br>- **Impact:** Increased erosion surrounding the Project 2 area reducing the natural habitat and potentially influencing natural areas outside the authorised footprint area. |

## 6.2 Floral Impact Assessment

Results and discussion of the floral impact assessment are presented in the below sections.

### 6.2.1 Floral Impact Assessment Results

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

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

**Table 8: Planning Phase impacts on the floral habitat, diversity, and SCC from the proposed development activities. Required mitigation measures are presented at the bottom of the table.**

| | UNMANAGED | | | | | | | | MANAGED | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Habitat Unit** | **Probability** | **Sensitivity** | **Severity** | **Spatial Scale** | **Duration** | **Likelihood** | **Consequence** | **Significance** | **Probability** | **Sensitivity** | **Severity** | **Spatial Scale** | **Duration** | **Likelihood** | **Consequence** | **Significance** |
| **IMPACT ON FLORAL HABITAT AND DIVERSITY** | | | | | | | | | | | | | | | | |
| Degraded Woodland | 2 | 2 | 3 | 3 | 2 | **4** | **8** | **32 Low** | 1 | 2 | 2 | 2 | 2 | **3** | **6** | **18 Very low** |
| Secondary Grassland | 2 | 2 | 3 | 3 | 2 | **4** | **8** | **32 Low** | 1 | 2 | 2 | 2 | 2 | **3** | **6** | **18 Very low** |
| Transformed Habitat | 2 | 1 | 2 | 3 | 2 | **3** | **7** | **21 Very low** | 1 | 1 | 1 | 2 | 2 | **2** | **5** | **10 Very low** |
| **Mitigation Measures for perceived impacts on habitat and species diversity** | | | | | | | | | | | | | | | | |
| - At all times, ensure that sound environmental management is in place during the planning phase;<br>- Minimise loss of natural vegetation where possible through effective planning, limiting the development footprint to what is essential and approved only. Where possible, minimise paved areas to reduce habitat loss and to increase on-site infiltration of stormwater. Layout designs must further adhere to all legislation and all reasonable precautions must be taken to prevent potential spills and /or leaks;<br>- The area in which construction activities is to take place should be clearly demarcated and the boundary thereof be checked regularly to avoid footprint creep;<br>- An AIP Management/Control Plan should be compiled by a qualified professional and implemented prior to the start of construction activities. No uncertified chemical control of AIPs to occur without a trained professional; and<br>- Appropriate rehabilitation measures, erosion control, and stormwater management must be implemented at all times. | | | | | | | | | | | | | | | |
| **IMPACT ON SCC** | | | | | | | | | | | | | | | | |
| Degraded Woodland | 1 | 2 | 1 | 2 | 1 | **3** | **4** | **12 Very low** | 1 | 2 | 1 | 1 | 1 | **3** | **3** | **9 Very low** |
| Secondary Grassland | 1 | 2 | 1 | 2 | 1 | **3** | **4** | **12 Very low** | 1 | 2 | 1 | 1 | 1 | **3** | **3** | **9 Very low** |
| Transformed Habitat | 1 | 1 | 1 | 2 | 1 | **2** | **4** | **8 Very low** | 1 | 1 | 1 | 1 | 1 | **2** | **3** | **6 Very low** |
| **Mitigation Measures for impacts on SCC** | | | | | | | | | | | | | | | | |
| - Floral SCC anticipated to be within the proposed footprint areas include only Gauteng OL species, namely *Hypoxis hemerocallidea* (one individual recorded adjacent to the Project 2 area). A walkdown of the approved footprint area in the Degraded Woodland and Secondary Grassland is required before construction activities can commence, where OL species are searched and marked for relocation. It is recommended that relocated OL species be incorporated into the adjacent public open space associated with the Samcor Ext 13 project (i.e., Project 3);<br>- The site walkdown needs to occur within the flowering periods of the SCC flagged for concern in this report. The relocation site will need to be fenced-off (or somehow barricaded) and monitoring of relocated / transplanted species will be essential for a maximum of three (3) years; and<br>- A rescue and relocation plan must be drafted and approved by the relevant authorities for all floral SCC that will potentially be impacted by the proposed development. The Rescue and Relocation Plan must be used in conjunction with an approved Rehabilitation Plan for the Project 2 area to ensure successful translocation and/or reinstatement of OL species that have been relocated. The SCC Management Plan can be incorporated into the Rehabilitation Plan. | | | | | | | | | | | | | | | |

**Table 9: Construction Phase impacts on the floral habitat, diversity, and SCC from the proposed development activities. Required mitigation measures are presented at the bottom of the table.**

| | UNMANAGED | | | | | | | | MANAGED | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Habitat Unit** | **Probability** | **Sensitivity** | **Severity** | **Spatial Scale** | **Duration** | **Likelihood** | **Consequence** | **Significance** | **Probability** | **Sensitivity** | **Severity** | **Spatial Scale** | **Duration** | **Likelihood** | **Consequence** | **Significance** |
| **IMPACT ON FLORAL HABITAT AND DIVERSITY** | | | | | | | | | | | | | | | | |
| Degraded Woodland | 5 | 2 | 4 | 3 | 3 | **7** | **10** | **70 Medium-low** | 5 | 2 | 3 | 2 | 3 | **7** | **8** | **56 Medium-low** |
| Secondary Grassland | 5 | 2 | 4 | 3 | 3 | **7** | **10** | **70 Medium-low** | 5 | 2 | 3 | 2 | 3 | **7** | **8** | **56 Medium-low** |
| Transformed Habitat | 5 | 1 | 2 | 2 | 3 | **6** | **7** | **42 Low** | 5 | 1 | 2 | 1 | 3 | **6** | **6** | **36 Low** |

**Mitigation Measures for perceived impacts on habitat and species diversity**

- Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved development footprint – manage footprint creep to surrounding areas;
- The construction footprint must be kept as small as possible to minimise impact on the surrounding environment. Care should be taken during the construction phase of the proposed development to limit edge effects to surrounding habitat outside of the authorised footprint. This can be achieved by:
  - Ensuring continued demarcation of all footprint areas during construction activities as well as ongoing monitoring of demarcated areas to ensure footprints remain in the approved areas;
  - Construction rubble and/or cleared alien vegetation must be disposed of in a sustainable and environmental responsible manner, e.g., taken to a registered waste disposal or garden refuse sites. No construction rubble or cleared alien vegetation to be left on site or within surrounding natural habitat;
  - A rehabilitation plan must be prepared and implemented, and all rehabilitation actions must be adhered to in order to mitigate edge effects on the receiving environment;
  - Ensure that no unnatural preferential flow paths are created during construction, i.e., implement appropriate stormwater management. For stormwater management, best practice must be adhered to, and erosion and siltation subsequently prevented;
  - All soils compacted because of construction activities should be ripped and profiled and reseeded with indigenous seed mixes. Limited vegetation cover exposes the soil to the impact of rain, which may lead to increased erosion; and
  - Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas.
- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal;
- No collection of indigenous floral species must be allowed by construction personnel;
- No dumping of litter, rubble or cleared vegetation on site should be allowed. Infrastructure and rubble removed as a result of the construction activities should be disposed of at an appropriate registered dump site away from the development footprint. No temporary dump sites should be allowed in surrounding areas where natural vegetation remains. Waste disposal containers and bins should be provided during the construction phase for all construction rubble and general waste. Vegetation cuttings must be carefully collected and disposed of at a separate waste facility or garden refuse site;
- If any spills occur, they must be cleaned up immediately to avoid soil contamination which has the potential to hinder re-establishment of vegetation down the line. Spill kits should be kept on-site within workshops. In the event of a breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be practised, preventing the ingress of hydrocarbons into the topsoil; and
- No illicit fires must be allowed during the construction of the proposed development.

| | UNMANAGED | | | | | | | | MANAGED | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Habitat Unit** | **Probability** | **Sensitivity** | **Severity** | **Spatial Scale** | **Duration** | **Likelihood** | **Consequence** | **Significance** | **Probability** | **Sensitivity** | **Severity** | **Spatial Scale** | **Duration** | **Likelihood** | **Consequence** | **Significance** |
| **IMPACT ON SCC** | | | | | | | | | | | | | | | | |
| Degraded Woodland | 3 | 2 | 1 | 2 | 1 | **5** | **4** | **20 Very low** | 2 | 2 | 1 | 2 | 1 | **4** | **4** | **16 Very low** |
| Secondary Grassland | 3 | 2 | 1 | 2 | 1 | **5** | **4** | **20 Very low** | 2 | 2 | 1 | 2 | 1 | **4** | **4** | **16 Very low** |
| Transformed Habitat | 1 | 1 | 1 | 1 | 1 | **2** | **3** | **6 Very low** | 1 | 1 | 1 | 1 | 1 | **2** | **3** | **6 Very low** |
| **Mitigation Measures for impacts on SCC** | | | | | | | | | | | | | | | | |

- Floral SCC individuals that were marked during the site walkdown must be relocated to suitable areas prior to the commencement of construction activities;
- Relocated SCCs must be monitored for a maximum of three years to track relocation success;
- No collection of indigenous vegetation, OL species, or medicinal floral species must be allowed by construction personnel; and
- Edge effect control needs to be implemented to prevent further degradation of favourable habitat and potential loss of floral SCC outside of the proposed development footprint area.

**Table 10: Operation and Maintenance Phase impacts on the floral habitat, diversity, and SCC from the proposed development activities. Required mitigation measures are presented at the bottom of the table.**

| | UNMANAGED | | | | | | | | MANAGED | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Habitat Unit** | **Probability** | **Sensitivity** | **Severity** | **Spatial Scale** | **Duration** | **Likelihood** | **Consequence** | **Significance** | **Probability** | **Sensitivity** | **Severity** | **Spatial Scale** | **Duration** | **Likelihood** | **Consequence** | **Significance** |
| **IMPACT ON FLORAL HABITAT AND DIVERSITY** | | | | | | | | | | | | | | | | |
| Degraded Woodland | 3 | 2 | 2 | 3 | 4 | **5** | **9** | **45 Low** | 2 | 2 | 1 | 2 | 4 | **4** | **7** | **28 Low** |
| Secondary Grassland | 3 | 2 | 2 | 3 | 4 | **5** | **9** | **45 Low** | 2 | 2 | 1 | 2 | 4 | **4** | **7** | **28 Low** |
| Transformed Habitat | 1 | 1 | 1 | 3 | 4 | **2** | **8** | **16 Very low** | 1 | 1 | 1 | 1 | 4 | **2** | **6** | **12 Very low** |
| **Mitigation Measures for perceived impacts on habitat and species diversity** | | | | | | | | | | | | | | | | |
| **Development footprint**<br>- No dumping of litter or garden refuse must be allowed on-site or within surrounding habitat;<br>- Edge effects arising from the proposed development, such as erosion and AIP species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b and 2 AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2020) (section 4.3.2 of this report);<br>- Ongoing AIP monitoring and clearing/control should take place throughout the operation and maintenance phase of the development, especially along road developments where AIPs can be spread more readily to adjacent, natural habitats;<br>- Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of in a sustainable and environmental responsible manner, e.g., taken to garden refuse sites. No cleared alien vegetation to be left on site; and<br>- No uncertified chemical control of AIPs to occur without a trained professional. | | | | | | | | | | | | | | | |
| **IMPACT ON SCC** | | | | | | | | | | | | | | | | |
| Degraded Woodland | 1 | 2 | 1 | 1 | 4 | **3** | **6** | **18 Very low** | 1 | 2 | 1 | 1 | 4 | **3** | **6** | **18 Very low** |
| Secondary Grassland | 1 | 2 | 1 | 1 | 4 | **3** | **6** | **18 Very low** | 1 | 2 | 1 | 1 | 4 | **3** | **6** | **18 Very low** |
| Transformed Habitat | 1 | 1 | 1 | 1 | 4 | **2** | **6** | **12 Very low** | 1 | 1 | 1 | 1 | 4 | **2** | **6** | **12 Very low** |
| **Mitigation Measures for impacts on SCC** | | | | | | | | | | | | | | | | |
| - As far as possible, no collection of floral SCC or medicinal floral species within the adjacent natural habitat (outside of the development footprint) must be allowed during the operation and maintenance phase of the development; and<br>- Relocated OL species must be monitored. | | | | | | | | | | | | | | | | |

### 6.2.2 Impact Discussion

The impact assessment was undertaken on all aspects of floral ecology deemed likely to be affected by the proposed development. The below sections break down the various impacts anticipated for the different aspects of the proposed project.

#### 6.2.2.1 Impact on Floral Habitat and Diversity

The data gathered during the site visit indicated that Transformed Habitat is of **low sensitivity**, and the Degraded Woodland and the Secondary Grassland Habitat of **moderately low** sensitivity. The proposed activities will result in vegetation clearing activities in all three of these habitat units and thus will result in the loss of low and moderately low sensitivity vegetation. Direct impacts to the floral ecology within the Project 2 area will not have significant, residual impacts on a local or regional scale. Edge effects would need to be managed during especially the construction phase to prevent further degradation of the surrounding natural areas (although surrounding areas are also degraded and not increasingly sensitive).

The perceived impact significance is summarised below.

**Table 11: Summary of impact significance on floral habitat and diversity.**

| | Without Mitigation | With Mitigation |
|---|---|---|
| **PRE-CONSTRUCTION PHASE** | | |
| Degraded Woodland | Low | Very low |
| Secondary Grassland | Low | Very low |
| Transformed Habitat | Very low | Very low |
| **CONSTRUCTION PHASE** | | |
| Degraded Woodland | Medium-low | Medium-low |
| Secondary Grassland | Medium-low | Medium-low |
| Transformed Habitat | Low | Low |
| **OPERATIONAL AND MAINTENANCE PHASE** | | |
| Degraded Woodland | Low | Low |
| Secondary Grassland | Low | Low |
| Transformed Habitat | Very low | Very low |

Most significant impacts to affect the floral habitat integrity and species diversity within the Project 2 area include, but are not limited to, the following:

- Loss of indigenous floral habitat and diversity resulting from vegetation clearing activities;
- AIP proliferation into adjacent natural vegetation, displacing indigenous flora and altering favourable habitat conditions for the establishment of indigenous species; and

- Illegal dumping of rubble within the surrounding natural habitats, resulting in greater pressure on natural floral habitat.

#### 6.2.2.2 Impacts on Floral SCC

The Project 2 area is not associated with any threatened SCCs, but the habitat is suitable for an OL species, namely *Hypoxis hemerocallidea* which was confirmed in the adjacent property. Due to the potential for this species to be on site, if the proposed development is authorised, a walkdown of the footprint areas must take place where all individuals of OL species are marked and relocated to suitable, similar habitat outside of the footprint areas. Relocation to the public open space areas associated with Project 3 is recommended. The walkdown should be focused within the Degraded Woodland and Secondary Grassland.

Overall, the proposed activities are not anticipated to impact significantly on floral SCC populations.

The below table summarises the impact significance scores.

**Table 12: Summary table of the anticipated impact significance on floral SCC communities before and after mitigation measures are implemented.**

| | Without Mitigation | With Mitigation |
|---|---|---|
| **PRE-CONSTRUCTION PHASE** | | |
| **Transformed Habitat** | Very low | Very low |
| **Degraded Woodland** | Very low | Very low |
| **Secondary Grassland** | Very low | Very low |
| **CONSTRUCTION PHASE** | | |
| **Transformed Habitat** | Very low | Very low |
| **Degraded Woodland** | Very low | Very low |
| **Secondary Grassland** | Very low | Very low |
| **OPERATIONAL AND MAINTENANCE PHASE** | | |
| **Transformed Habitat** | Very low | Very low |
| **Degraded Woodland** | Very low | Very low |
| **Secondary Grassland** | Very low | Very low |

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

The Project 2 area is not associated with any areas of increased biodiversity significance and no impact to, or loss of, threatened ecosystems or ESAs will result from the proposed activities.

#### 6.2.2.4 Probable Residual Impacts[13]

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

- Permanent loss of floral habitat and diversity due to poorly executed rehabilitation efforts, AIP control, and lack of monitoring during operational and maintenance of the project; and
- Ongoing AIP proliferation encroaching into the adjacent natural vegetation communities.

#### 6.2.2.5 Possible Cumulative Impacts[14]

For the assessment of potential cumulative impacts to vegetation and plant species associated with the proposed activities, consideration was given to past, present, and future (known) projects and natural drivers that affect these aspects. Three areas of concern were identified:

- Habitat fragmentation: The Project 2 area is already significantly fragmented by a heavily urbanised setting. Historically, the Project 2 area was fragmented by agricultural practices. Additional fragmentation of this area will not result in significant cumulative impacts to floral communities in the area.
- Vegetation harvesting (wood collection and medicinal species collection): No sensitive vegetation communities were identified within the Project 2 area or immediate surrounds and, considering the extent of anthropogenic activities surrounding this area, no additional pressures from wood harvesting or medicinal plant species harvesting is anticipated.
- Spread of AIPs: The Project 2 area and surrounds are associated with increased AIPs – several of which are listed as NEMBA category 1b and 2 invaders. If AIPs are not managed and are allowed to spread to adjacent areas (especially the freshwater habitat to the east of the Project 2 area), there is a risk of cumulative degradation of floral communities within the area.

[13] **Probable Residual Impacts**: Negative impacts that remain after the proponent has made all reasonable and practicable changes to the location, siting, scale, layout, technology, and design of the proposed development, in consultation with the environmental assessment practitioner and specialists (including a biodiversity specialist), in order to avoid and minimise negative impacts, and/or rehabilitate and/or restore impacted areas within 30 years.

[14] **Possible Cumulative Impacts**: Past, current, and reasonably foreseeable future impacts of an activity, considered together with the impact of the proposed activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

- Additional (known) planned projects in the area: This project forms part of a larger development project for the property. As such, the property will experience a cumulative loss of floral habitat and diversity; however, no sensitive habitat is anticipated to be impacted.

Overall, the resultant cumulative impacts to the floral habitat and diversity are not anticipated to be significant.

## *6.3 Faunal Impact Assessment*

### 6.3.1 Faunal Impact Assessment Results

The below tables indicate the perceived risks to the faunal ecology associated with all phases of the proposed residential development. The tables also provide the findings of the impact assessment undertaken with reference to the perceived impacts prior to the implementation of mitigation measures and following the implementation of mitigation measures. Mitigation measures applicable to the proposed project have been included in the below tables and are required to suitably manage and mitigate the ecological impacts that are associated with all phases of the proposed activities.

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

**Table 13: Planning Phase impacts on the faunal habitat, diversity, and SCC from the proposed development activities. Required mitigation measures are presented at the bottom of the table.**

| | UNMANAGED | | | | | | | | MANAGED | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Habitat Unit** | **Probability** | **Sensitivity** | **Severity** | **Spatial Scale** | **Duration** | **Likelihood** | **Consequence** | **Significance** | **Probability** | **Sensitivity** | **Severity** | **Spatial Scale** | **Duration** | **Likelihood** | **Consequence** | **Significance** |
| **IMPACT ON FAUNAL HABITAT AND DIVERSITY** | | | | | | | | | | | | | | | | |
| **Transformed Habitat** | 2 | 1 | 1 | 2 | 2 | **3** | **5** | **15 Very low** | 1 | 1 | 1 | 1 | 2 | **2** | **4** | **8 Very low** |
| **Degraded Woodland** | 2 | 2 | 2 | 3 | 2 | **4** | **7** | **28 Low** | 1 | 2 | 1 | 2 | 2 | **3** | **5** | **15 Very low** |
| **Secondary Grassland** | 2 | 2 | 2 | 3 | 2 | **4** | **7** | **28 Low** | 1 | 2 | 1 | 2 | 2 | **3** | **5** | **15 Very low** |
| **Mitigation Measures for perceived impacts on habitat and species diversity** | | | | | | | | | | | | | | | | |
| - At all times, ensure that sound environmental management is in place during the planning phase;<br>- Develop and implement and AIP control plan;<br>- Clearly demarcate the construction footprint boundary; and<br>- As far as possible, plan for vegetation clearance activities to be undertaken in winter, outside of faunal breeding periods. | | | | | | | | | | | | | | | | |
| **IMPACT ON SCC** | | | | | | | | | | | | | | | | |
| **Transformed Habitat** | 1 | 1 | 1 | 2 | 2 | **2** | **5** | **10 Very low** | 1 | 1 | 1 | 1 | 1 | **2** | **3** | **6 Very low** |
| **Degraded Woodland** | 1 | 2 | 1 | 2 | 2 | **3** | **5** | **15 Very low** | 1 | 2 | 1 | 1 | 1 | **3** | **3** | **9 Very low** |
| **Secondary Grassland** | 1 | 2 | 1 | 2 | 2 | **3** | **5** | **15 Very low** | 1 | 2 | 1 | 1 | 1 | **3** | **3** | **9 Very low** |
| **Mitigation Measures for impacts on SCC** | | | | | | | | | | | | | | | | |
| No faunal SCC were observed or are expected, however, should an SCC be encountered for whatever reason, a suitably qualified specialist should be contacted in order to advise on the best way forward. | | | | | | | | | | | | | | | | |

**Table 14: Construction Phase impacts on the faunal habitat, diversity, and SCC from the proposed development activities. Required mitigation measures are presented at the bottom of the table.**

| | UNMANAGED | | | | | | | | MANAGED | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Habitat Unit** | **Probability** | **Sensitivity** | **Severity** | **Spatial Scale** | **Duration** | **Likelihood** | **Consequence** | **Significance** | **Probability** | **Sensitivity** | **Severity** | **Spatial Scale** | **Duration** | **Likelihood** | **Consequence** | **Significance** |
| **IMPACT ON FAUNAL HABITAT AND DIVERSITY** | | | | | | | | | | | | | | | | |
| **Transformed Habitat** | 5 | 1 | 2 | 2 | 3 | **6** | **7** | **42 Low** | 5 | 1 | 1 | 1 | 3 | **6** | **5** | **30 Low** |
| **Degraded Woodland** | 5 | 2 | 3 | 3 | 3 | **7** | **9** | **63 Medium-low** | 5 | 2 | 3 | 2 | 3 | **7** | **8** | **56 Medium-low** |
| **Secondary Grassland** | 5 | 2 | 3 | 3 | 3 | **7** | **9** | **63 Medium-low** | 5 | 2 | 3 | 2 | 3 | **7** | **8** | **56 Medium-low** |
| **Mitigation Measures for perceived impacts on habitat and species diversity** | | | | | | | | | | | | | | | | |
| - Vegetation clearance must be limited to the designated areas only. No clearance of vegetation outside of the construction footprint is permissible;<br>- Vegetation clearance should be undertaken in a phased manner, ideally from west to east or north to south, to allow for faunal species to move away ahead of construction activities, into the natural areas surrounding the study area;<br>- All edge effects are to be managed and controlled, notably AIP proliferation and erosion;<br>- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities;<br>- No collection of faunal species by construction personnel is allowed, unless as part of a rescue and relocation process;<br>- No hunting / trapping of faunal species by construction personnel is allowed;<br>- No dumping of litter, rubble or cleared vegetation is allowed on site or in the surrounding open space areas. All waste material must be disposed of at an authorised site; and<br>- No illicit fires may be allowed during the construction phase. | | | | | | | | | | | | | | | |
| | **UNMANAGED** | | | | | | | | **MANAGED** | | | | | | | |
| **Habitat Unit** | **Probability** | **Sensitivity** | **Severity** | **Spatial Scale** | **Duration** | **Likelihood** | **Consequence** | **Significance** | **Probability** | **Sensitivity** | **Severity** | **Spatial Scale** | **Duration** | **Likelihood** | **Consequence** | **Significance** |
| **IMPACT ON SCC** | | | | | | | | | | | | | | | | |
| **Transformed Habitat** | 1 | 1 | 2 | 2 | 3 | **2** | **7** | **14 Very low** | 1 | 1 | 1 | 1 | 3 | **2** | **5** | **10 Very low** |
| **Degraded Woodland** | 2 | 2 | 1 | 2 | 3 | **4** | **6** | **24 Very Low** | 2 | 2 | 1 | 1 | 3 | **4** | **5** | **20 Very low** |
| **Secondary Grassland** | 2 | 2 | 1 | 2 | 3 | **4** | **6** | **24 Very Low** | 2 | 2 | 1 | 1 | 3 | **4** | **5** | **20 Very low** |
| **Mitigation Measures for impacts on SCC** | | | | | | | | | | | | | | | | |
| No faunal SCC were observed or are expected, however, should an SCC be encountered for whatever reason, a suitably qualified specialist should be contacted in order to advise on the best way forward. | | | | | | | | | | | | | | | | |

**Table 15: Operation and Maintenance Phase impacts on the faunal habitat, diversity, and SCC from the proposed development activities. Required mitigation measures are presented at the bottom of the table.**

| | UNMANAGED | | | | | | | | MANAGED | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Habitat Unit** | **Probability** | **Sensitivity** | **Severity** | **Spatial Scale** | **Duration** | **Likelihood** | **Consequence** | **Significance** | **Probability** | **Sensitivity** | **Severity** | **Spatial Scale** | **Duration** | **Likelihood** | **Consequence** | **Significance** |
| **IMPACT ON FAUNAL HABITAT AND DIVERSITY** | | | | | | | | | | | | | | | | |
| **Transformed Habitat** | 2 | 1 | 2 | 3 | 4 | **3** | **9** | **27 Low** | 1 | 1 | 1 | 2 | 4 | **2** | **7** | **14 Very low** |
| **Degraded Woodland** | 4 | 2 | 2 | 3 | 4 | **6** | **9** | **54 Medium-low** | 3 | 2 | 1 | 2 | 4 | **5** | **7** | **35 Low** |
| **Secondary Grassland** | 4 | 2 | 2 | 3 | 4 | **6** | **9** | **54 Medium-low** | 3 | 2 | 1 | 2 | 4 | **5** | **7** | **35 Low** |
| **Mitigation Measures for perceived impacts on habitat and species diversity** | | | | | | | | | | | | | | | | |
| - No dumping of litter, garden refuse or any waste must be allowed on-site or within surrounding habitat;<br>- Edge effects, notably AIP proliferation must be suitably managed and controlled;<br>- External lighting should be kept to a minimum. Downward facing, soft yellow / red fluorescent lighting should be used for external lights to minimise insect attraction and excessive light pollution;<br>- No trapping or killing of any faunal species is to be allowed, unless as part of a rescue and relocation process; and<br>- Landscaped / garden areas should use indigenous plant species, whilst rock features should also be considered to create additional habitat for invertebrates and reptiles that select for rocky areas. | | | | | | | | | | | | | | | |
| **IMPACT ON SCC** | | | | | | | | | | | | | | | | |
| **Transformed Habitat** | 1 | 1 | 1 | 2 | 4 | **2** | **7** | **14 Very low** | 1 | 1 | 1 | 1 | 4 | **2** | **6** | **12 Very low** |
| **Degraded Woodland** | 1 | 2 | 1 | 2 | 4 | **3** | **7** | **21 Very low** | 1 | 2 | 1 | 1 | 4 | **3** | **6** | **18 Very low** |
| **Secondary Grassland** | 1 | 2 | 1 | 2 | 4 | **3** | **7** | **21 Very low** | 1 | 2 | 1 | 1 | 4 | **3** | **6** | **18 Very low** |
| **Mitigation Measures for impacts on SCC** | | | | | | | | | | | | | | | | |
| No faunal SCC were observed or are expected, however, should an SCC be encountered for whatever reason, a suitably qualified specialist should be contacted in order to advise on the best way forward. | | | | | | | | | | | | | | | | |

### 6.3.2 Impact Discussion

The impact assessment was undertaken on all aspects of faunal ecology deemed likely to be affected by the proposed development. The below sections break down the various impacts anticipated for the different aspects of the proposed project.

#### 6.3.2.1 Loss of Faunal Habitat and Diversity

Much of the study area has already been exposed to varying degrees of impacts and anthropogenic activities. The northern extent of the study area has been significantly transformed, with extensive vegetation removal having already taken place. The remaining habitats in the study area have been subjected to varying impacts extents, all resulting in the degradation of habitat quality and similarly the reduction of faunal abundance and diversity. Development within the study area will result in the clearance of habitat, however the habitat herein supports only a few common faunal species and as such, development herein is considered acceptable and preferable in comparison to development in a more intact area elsewhere. The below table presents a summary of the impact assessment.

**Table 16: Summary of impact significance on faunal habitat and diversity.**

| | Without Mitigation | With Mitigation |
|---|---|---|
| **PRE-CONSTRUCTION PHASE** | | |
| **Transformed Habitat** | Very low | Very low |
| **Degraded Woodland** | Low | Very low |
| **Secondary Grassland** | Low | Very low |
| **CONSTRUCTION PHASE** | | |
| **Transformed Habitat** | Low | Low |
| **Degraded Woodland** | Medium-low | Medium-low |
| **Secondary Grassland** | Medium-low | Medium-low |
| **OPERATIONAL AND MAINTENANCE PHASE** | | |
| **Transformed Habitat** | Low | Very low |
| **Degraded Woodland** | Medium-low | Low |
| **Secondary Grassland** | Medium-low | Low |

#### 6.3.2.2 Impact on Important Faunal Species of Conservation Concern

During the site assessment, no faunal SCC were observed within the study area. The urban setting, anthropogenic activities, lack of suitable habitat and the level of transformation and habitat degradation within study area has resulted in the likely exclusion of faunal SCC from the habitats. Taking this into consideration, potential impacts/risks to faunal SCC are considered to be very low.

The below table presents a summary of the impact assessment.

**Table 17: Summary table of the anticipated impact significance on faunal SCC before and after mitigation measures are implemented.**

| | Without Mitigation | With Mitigation |
|---|---|---|
| **PRE-CONSTRUCTION PHASE** | | |
| **Transformed Habitat** | Very low | Very low |
| **Degraded Woodland** | Very low | Very low |
| **Secondary Grassland** | Very low | Very low |
| **CONSTRUCTION PHASE** | | |
| **Transformed Habitat** | Very low | Very low |
| **Degraded Woodland** | Very low | Very low |
| **Secondary Grassland** | Very low | Very low |
| **OPERATIONAL AND MAINTENANCE PHASE** | | |
| **Transformed Habitat** | Very low | Very low |
| **Degraded Woodland** | Very low | Very low |
| **Secondary Grassland** | Very low | Very low |

#### 6.3.2.3 Probable Residual Impacts[15]

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

- Continued loss of faunal habitat; and
- Continued loss of and altered faunal species diversity.

#### 6.3.2.4 Possible Cumulative Impacts[16]

The proposed development will result in the clearance of vegetation within the study area, leading to further displacement of faunal species within the local area. Furthermore, ineffective control and monitoring of edge effects can result in the spread of AIP species to the surrounding natural areas, which will further alter faunal habitat and subsequently faunal diversity within this area.

Due to the relatively small development footprint and the already degraded state of habitat within the study area, it is unlikely that the proposed development will impact conservation targets for sensitive faunal species.

[15] **Probable Residual Impacts**: Negative impacts that remain after the proponent has made all reasonable and practicable changes to the location, siting, scale, layout, technology and design of the proposed development, in consultation with the environmental assessment practitioner and specialists (including a biodiversity specialist), in order to avoid and minimise negative impacts, and/or rehabilitate and/or restore impacted areas within 30 years.

[16] **Possible Cumulative Impacts**: Past, current, and reasonably foreseeable future impacts of an activity, considered together with the impact of the proposed activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

# 7 CONCLUSION

STS was appointed to conduct a terrestrial biodiversity assessment as part of the environmental authorisation (EA) process for the proposed township development on the remained of Portion 601 (a portion of Portion 89), The Willows No 340 – JR.

Within the Project 2 area, no sensitive floral communities or faunal species were identified, and only one OL floral SCC is considered to potentially occur within the Degraded Woodland and Secondary Grassland (relocation of this species is recommended). Assuming that all AIPs are controlled, edge effects are suitably managed and that mitigation measures are implemented, no significant impacts to ecologically important habitat or sensitive species are expected. Although the development will result in the loss/displacment of floral and faunal species from within the study area, development within already degraded and urbanised areas is considered preferable in comparison development in more natural areas beyond the urban footprint. This, combined with the already impacted state of the study area, makes development herein more favourable.

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 and Indemnity

## 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.

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

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

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

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

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

- Prevent the 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.

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

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

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

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

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

**Section 12:**

Declaration of trees as protected

1) The Minister may declare-
    a. particular tree,
    b. a particular group of trees,
    c. a particular woodland; or
    d. trees belonging to a particular species,
    to be a protected tree, group of trees, woodland or species.
2) The Minister may make such a declaration only if he or she is of the opinion that the tree, group of trees, woodland or species is not already adequately protected in terms of other legislation.

3) In exercising a discretion in terms of this section, the Minister must consider the principles set out in section 3(3) of the NFA.

**Section 15(1):**
No person may cut, disturb, damage, or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence granted by the Minister or in terms of an exemption from the provisions of this subsection published by the Minister in the Gazette.

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

## NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT, 2003 (ACT NO. 57 OF 2003) AS AMENDED[17] (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.

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

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

- A location and description of the application site and proposed activities;
- Photographic record and description of the site characteristics and inventories of the faunal and floral species observed on site, with special mention to Red Listed species;
- Sensitivity map displaying all sensitive areas and associated buffers as listed in the Sensitivity Mapping Rules for Biodiversity Assessments section of GDARD V3 (2014); and
- A list of recommendations and mitigation measures to reduce the potential environmental impacts that the proposed development might have on the terrestrial ecology associated with the site.

[17] Amendments to the NEMPAA:

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

## INDEMNITY AND TERMS OF USE OF THIS REPORT

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

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# APPENDIX B: Floral Method of assessment

The methods outlined in this document are aligned with the assessment guidelines provided by the South African National Biodiversity Institute (SANBI) (SANBI, 2020). SANBI is the regulatory body within South Africa that is responsible for ensuring sustainable development through facilitating access to biodiversity data, generating information and knowledge, building capacity, providing policy advise, and showcasing and conserving biodiversity in respective botanical and zoological gardens.

As the regulatory body for biological data, SANBI provides assessment and reporting protocols. These protocols provide a minimum set of assessment and reporting criteria that must form the basis of specialist investigations required for many of the country's environmental processes. As such, the proposed methodology, as described below, is in accordance with in-country standardised field assessment methodologies.

## *Vegetation Surveys*

Various field sampling methods are available for the purpose of collecting floristic data. Generally, the selection of chosen field methods is dependent on serval factors, including the size of the area to be assessed, the heterogeneity of the vegetation/habitat present, time and budget allocated for field assessments, the scale and magnitude of potential project impacts, and the scope of work to be assessed.

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). An understanding of the location and extent of vegetation types of increased sensitivity, and the location of areas of increased importance for various species of SCC, will focus efforts for the identification and marking of SCC during detailed planning walkdown efforts.

Given the restricted time frames in which the proposed field surveys need to be conducted and the combined objective of accurately demarcating sensitive habitats within the area of interest, the method chosen needs to allow for:

I. Rapid, accurate data collection; and
II. The optimisation of time spent in habitats that are likely to sustain SCC.

Several survey methods, known as rapid biological assessments (Larsen, 2016)[18], can be employed. Example of rapid biological assessments include plot-based assessments or transect-based assessments. SANBI (2020) recommends the use of a transect-based approach, namely timed-meander searches (TMS; Goff et al., 1982[19]). The vegetation surveys presented below are a modified version of the TMS methods (hereafter referred to as modified-meander searches (MMS)). The TMS and MMS are subjective sampling methods which employs techniques where the specialist chooses specific sample sites within the area of interest, based on their professional experience in the area and background research done prior to the site visit. This allows representative recordings of floral communities and optimal detection of SCC.

The difference in the TMS and MMS is that the MMS is not timed. The below list presents the reasons for selection of a modified approach:

- Time, access, and safety constraints are often unpredictable and cannot be planned for prior to a site assessment, especially within remote areas and areas where local communities may not provide consent to specialist to survey their lands. As such, a timed approach may result in disproportionate efforts in some pre-defined habitats.

[18] Larsen, T.H. ed., 2016. Core standardized methods for rapid biological field assessment. Conservation International.
[19] Goff, F.G., Dawson, G.A. and Rochow, J.J., 1982. Site examination for threatened and endangered plant species. Environmental Management, 6(4), pp.307-316.

- Vegetation surveys are conducted at the same time as the SCC assessments which limits the potential for timed assessments as SCC often occur either sporadically, or are difficult to detect and hence, longer surveys in certain areas are necessary (skewing the timed approach). This is especially true for the pre-defined broad habitats within more sensitive areas such as the Sekhukhune Centre of Plant Endemism where desktop databases may not be a true reflection of on-site habitat extent and heterogeneity. Micro habitats where SCC are often found, are often difficult to detect on digital satellite imagery. As such, timing the surveys according to unverified field data will increase the risk of overlooking importance SCC data or habitat integrity features.
- Subjective decisions need to be made on-site that would otherwise interfere with a times-meander approach.

The employment of the presented field methods is beneficial because they allow for rapid data collection and subjective placement (based on professional experience and previous fieldwork knowledge) of the MMSs in habitats that have a higher likelihood of sustaining SCC. Furthermore, this method allows for extensive coverage of the subject property, thus increasing the probability of SCC and micro habitat detection. Extensive coverage of the area of interest will also be advantageous where properties are of large extents that need to be assessed.

Based on the broad habitat units delineated before going to site and the pre-identified points of interest, which is updated based on on-site observations and access constraints, the selected sample areas are surveyed on foot, following the subjective MMT, to identify the occurrence of the dominant plant species and habitat diversities, but also to detect SCC which tend to be sparsely distributed. Photographs are taken of each vegetation community that is representative of typical vegetation structure of that community, as well as photos of all detected SCC (sensitive species will not be presented in the report).

Vegetation structure has been described following the guideline in Edwards (1983). Refer to Figure B1 below:

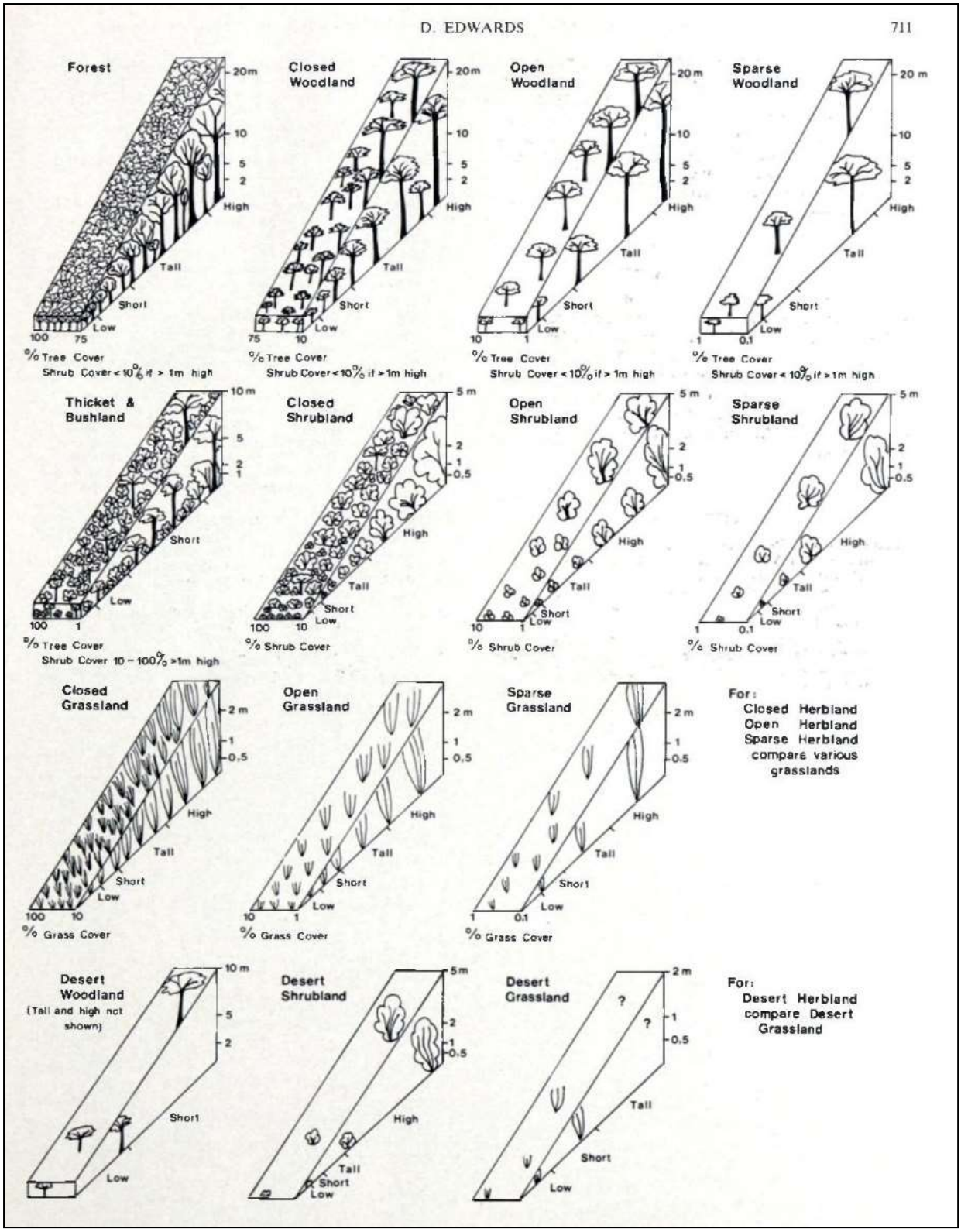



**Figure B1: Diagrammatic representation of structural groups and formation classes. Only dominant growth forms are shown.**

# *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 several 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[20]:

- **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 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).

[20] 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.

### NEMBA TOPS Species

Threatened or Protected Species (TOPS) Regulations (Government Notice 3009): Regulations Pertaining to Threatened or Protected Terrestrial Species and Freshwater Species in Government Gazette 47984 dated 3 February 2023, as it relates to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA).

### Provincial: Orange Listed Species and GDARD Provided SCC lists

The Gauteng Department of Agriculture and Rural Development (GDARD) provides a list of species previously recorded within the site boundary, within the larger property boundary, within 5 km of the site boundary, or within the applicable QDS (as relevant). This data was used to determine if RDL and/or orange listed (OL) plants may be associated with the study area.

### Nationally Protected Trees

The National Forest Act, 1998 (Act No. 10 of 1998) (NFA), affords protection to a list of tree species. All nationally protected trees, whose distribution overlap with the study area, were included as SCC in this report.

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

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

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

| Low POC | Medium POC | High POC | Confirmed |
|---|---|---|---|

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.

**Consideration and application of the precautionary approach**

The precautionary principle is defined by Tickner & Raffensperger (1999) as follows:

"*When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause-and-effect relationships are not fully established scientifically*".

Given time and resource constraints within the field, it is not always feasible to definitively state the presence or absence of Species of conservation concern (SCC) or sensitive habitats. In such instances, the precautionary principle should be applied (SANBI, 2020). By applying such principles, a preventative action is taken in the face of uncertainty. Furthermore, for cryptic species that are often difficult to detect, it is not always easy to provide undeniable proof that a species occurs within a particular area within a subject property. As such, if suitable habitat is identified within the subject property and there is potential evidence to suggest the species did or can occur within the subject property (i.e., confirmed sightings in adjacent properties), then the precautionary principle will be to assume that the species does indeed occur within the area of interest. Appropriate mitigation and management efforts would then need to follow accordingly.

## *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 are also assigned to each sensitivity class which aims to guide the responsible and sustainable utilisation of the habitat unit in question. In order 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

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

### *Mammals*

Mammal species were recorded during the field assessment with the use of visual identification, spoor, call and dung. Specific attention was given to mammal SCC listed on a regional and national level, as well as those identified by the International Union for the Conservation of Nature (IUCN). Prior to the site visit taking place, background databases were assessed in order to provide an indication of previously recorded species for the locality, which could be compared with the on-site habitat and area suitability. Satellite imagery was also assessed in order to gain a better understanding of the study area and to guide the on-site fieldwork, focussing on areas where satellite imagery indicated areas of more suitable habitat (less impacted).

### *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 International Union for the Conservation of Nature (IUCN).

### *Reptiles*

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

### *Amphibians*

Identifying amphibian species is done 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 International Union for the Conservation of Nature (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 International Union for the Conservation of Nature (IUCN).

### *Arachnids*

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

## *Faunal Species of Conservation Concern Assessment*

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 assessment area for fauna (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. 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 assessment 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 assessment 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 utilisation of the assessment 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 (STS Methodology)

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 client to understand the process and rationale upon which risks/impacts have been assessed. The method to be 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'[21]. 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, where possible, 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 Table 3. 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 whether mitigation is necessary[22].

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

[21] The definition has been aligned with that used in the ISO 14001 Standard.
[22] Some risks/impacts that have low significance will however still require 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.**

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

**Table 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 client and its contractors develop 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; and
  - Operation.
    - 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.
    - 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).

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[23]:

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

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

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

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

drainage catchment or numerous residential developments within the same habitat for faunal or floral species.

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

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

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

The significance of residual impacts should be identified on a regional as well as national scale when considering biodiversity conservation initiatives. If the residual impacts lead to irreversible loss or irreplaceable biodiversity the residual impacts should be considered to be of *very high significance* and when residual impacts are considered to be of *very high significance*, offset initiatives are not considered an appropriate way to deal with the magnitude and/or significance of the biodiversity loss. In the case of residual impacts determined to have *medium to high significance*, an offset initiative may

be investigated. If the residual biodiversity impacts are considered of low significance no biodiversity offset is required.[24]

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[25] 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 development. These recommendations also include general management measures which apply to the proposed development as a whole. Mitigation measures have been developed to address issues in all phases throughout the life of the operation from planning, through to construction and operation.



[24] Provincial Guideline on Biodiversity Offsets, Western Cape, 2007.
[25] Mitigation measures should address both positive and negative impacts

# APPENDIX E: Vegetation Types

## Svcb 6 Marikana Thornveld

**Figure E1: Svcb 6 Marikana Thornveld: *Acacia nilotica*-dominated clay thornveld north of Pretoria (near Ga-Rankuwa, Gauteng) after recent fire. Mucina and Rutherford (2006) page 463.**

**Table E1: The table contains the important taxa associated with the Carletonville Dolomite Grassland vegetation type. *(d) = dominant species**

| | |
|---|---|
| **Woody Layer** | |
| **Tall Tree** | *Senegalia burkei* |
| **Small Trees** | *Senegalia caffra* (d), *Vachellia gerrardii* (d), *Vachellia karroo* (d), *Combretum molle* (d), *Searsia lancea* (d), *Ziziphus mucronata* (d), *Vachellia nilotica, Vachellia tortilis* subsp. *heteracantha, Celtis africana, Dombeya rotundifolia, Pappea capensis, Peltophorum africanum, Terminalia sericea.* |
| **Low Shrubs** | *Asparagus cooperi* (d), *Rhynchosia nitens* (d), *Indigofera zeyheri, Justicia flava.* |
| **Woody Climbers** | *Clematis brachiata* (d), *Helinus integrifolius.* |
| **Forb layer** | |
| **Herbs** | *Hermannia depressa* (d), *Ipomoea obscura* (d), *Barleria macrostegia, Dianthus mooiensis* subsp. *mooiensis, Ipomoea oblongata, Vernonia oligocephala.* |
| **Herbaceous Climbers** | *Pentarrhinum insipidum* (d), *Cyphostemma cirrhosum.* |
| **Geophytic Herbs** | *Ledebouria revoluta, Ornithogalum tenuifolium, Sansevieria aethiopica.* |
| **Graminoid layer** | |
| **Graminoids** | *Elionurus muticus* (d), *Eragrostis lehmanniana* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Aristida scabrivalvis* subsp. *scabrivalvis, Fingerhuthia africana, Heteropogon contortus, Hyperthelia dissoluta, Melinis nerviglumis, Pogonarthria squarrosa.* |

# APPENDIX F: Species List

## Floral Species List

**Table F1: Dominant plant species encountered within the Project 2 area, and general surroundings, during the field assessment. Alien species are indicated with an asterisk (*).**

| SCIENTIFIC NAME | TRANSFORMED HABITAT | DEGRADED WOODLAND | SECONDARY GRASSLAND |
|---|---|---|---|
| **WOODY SPECIES** | | | |
| **Acacia mearnsii* | | x | |
| **Acacia podalyriifolia* | | x | |
| **Ailanthus altissima* | x | x | |
| **Celtis australis* | | x | |
| **Ficus carica* | | x | |
| **Heptapleurum cf. actinophyllum* | x | x | |
| **Lantana camara* | x | x | |
| **Melia azedarach* | x | x | x |
| **Morus nigra* | x | x | x |
| **Solanum maurituanum* | x | x | |
| **Tecoma stans* | x | x | |
| *Asparagus laricinus* | | x | |
| *Celtis africana* | | x | |
| *Dichrostachys cinerea* | | x | |
| *Elephanthorrhiza elephantina* | | | x |
| *Felicia muricata* | | x | x |
| *Gymnosporia buxifolia* | | x | |
| *Lantana rugosa* | | x | |
| *Pavonia burchellii* | | x | |
| *Searsia lancea* | x | x | |
| *Searsia pyroides* | | x | |
| *Senegalia caffra* | | x | |
| *Vachellia karroo* | | x | x |
| *Ziziphus zeyheeriana* | | x | |
| **HERBACEOUS SPECIES** | | | |
| **Achyranthes aspera* | x | x | |
| **Amaranthus hybridus* | x | x | |
| **Araujia serifera* | | x | |
| **Araujia serifera* | x | x | |
| **Bidens pilosa* | x | x | x |
| **Campuloclinium macrocephalum* | x | x | x |
| **Centella asiatica* | | x | |
| **Chenopodium album* | x | x | |
| **Conyza bonariensis* | x | x | x |
| **Datura stramonium* | x | x | x |
| **Euphorbia heterophylla* | x | | x |
| **Euphorbia nutans* | | x | x |
| **Flaveria bidentis* | x | x | |
| **Glandularia aristigera* | x | x | |
| **Hibiscus trionum* | | x | |
| **Ipomoea purpurea* | x | x | x |
| **Medicago sativa* | x | | |
| **Melilotus albus* | x | x | |
| **Oenothera rosea* | | | x |
| **Physalis viscosa* | x | x | |
| **Phytolacca octandra* | x | x | |

| SCIENTIFIC NAME | TRANSFORMED HABITAT | DEGRADED WOODLAND | SECONDARY GRASSLAND |
|---|---|---|---|
| **Ricinus communis* | x | x | |
| **Salvia reflexa* | x | | |
| **Schkuhria pinnata* | x | x | x |
| **Tagetes minuta* | x | x | x |
| **Tithonia rotundifolia* | x | x | |
| **Verbena bonariensis* | x | x | |
| **Verbena brasiliensis* | x | | x |
| **Xanthium strumarium* | x | x | |
| **Zinnia peruviana* | x | x | |
| *Albuca virens* | | x | |
| *Berkheya radula* | | | x |
| *Clematis brachiata* | | x | |
| *Crabbea hirsuta* | | x | x |
| *Dyschoriste burchellii* | | x | x |
| *Euphorbia striata* | | | x |
| *Gladiolus* sp. | | x | x |
| *Helichrysum nudifolium* | | | x |
| *Helichrysum rugulosum* | | | x |
| *Hermannia depressa* | | x | x |
| *Hilliardiella elaeagnoides* | | x | x |
| *Hypoxis hemerocallidea* | | x | |
| *Hypoxis rigidula* | | x | |
| *Ipomoea ommanneyi* | | x | x |
| *Jamesbrittenia aurantiaca* | | | x |
| *Ledebouria revoluta* | | x | x |
| *Menodora africana* | | | x |
| *Nidorella anomala* | | x | x |
| *Nidorella podocephala* | | | x |
| *Pachycarpus* sp. | | | x |
| *Pelargonium luridum* | | | x |
| *Phyllanthus parvulus* | | x | x |
| *Plantago lanceolata* | | | x |
| *Polygala hottentotta* | | x | x |
| *Pseudognaphalium luteo-album* | x | x | x |
| *Rhynchosia nervosa* | | | x |
| *Scabiosa columbaria* | | x | |
| *Senecio inornatus* | | x | x |
| *Sida rhombifolia* | | | x |
| *Tephrosia capensis* | | | x |
| *Thesium* sp. | | | x |
| *Tolpis capensis* | | x | x |
| *Wahlenbergia undulata* | | | x |
| **SUCCULENT SPECIES** | | | |
| **Opuntia ficus-indica* | x | x | |
| *Aloe greatheadii* | | x | |
| **GRAMINOID SPECIES** | | | |
| **Arundo donax* | x | x | |
| **Pennisetum clandestinus* | | x | |
| *Aristida bipartita* | x | | x |
| *Aristida congesta* subsp. *barbicollisis* | x | x | x |
| *Chloris virgata* | x | | |
| *Cymbopogon caesius* | | x | x |

| SCIENTIFIC NAME | TRANSFORMED HABITAT | DEGRADED WOODLAND | SECONDARY GRASSLAND |
|---|---|---|---|
| *Cynodon dactylon* | x | x | x |
| *Cyperus eragrostis* | x | | x |
| *Cyperus esculentus* | x | | |
| *Dichanthium aristatum* | | | x |
| *Eragrostis chloromelas* | | | x |
| *Eragrostis curvula* | x | | x |
| *Eragrostis plana* | x | | x |
| *Eragrostis* sp. | | x | |
| *Eragrostis superba* | | x | x |
| *Heteropogon contortus* | | | x |
| *Hyparrhenia dregeana* | | | x |
| *Hyparrhenia hirta* | | | x |
| *Melinis repens* | x | x | x |
| *Panicum maximum* | | x | |
| *Setaria nigrirostris* | x | | x |
| *Setaria* sp. | | x | |
| *Setaria sphacelata* | | | x |
| *Sorghum bicolor* | x | | |
| *Themeda triandra* | | x | x |
| *Urochloa mosambicensis* | x | | x |

# Faunal Species List

**Table F2: Mammal species that may occur in the study area.**

| Scientific Name | Common Name | Threat Status |
|---|---|---|
| *Rhabdomys pumilio* | Four-striped Grass Mouse | LC |
| *Mus musculus* | Common house Mouse | LC |
| *Rattus Rattus* | Black Rat | LC |

LC = Least concerned.

**Table F3: Avifaunal species recorded during the field assessment.**

| Scientific name | Common name | Threat Status |
|---|---|---|
| *Streptopelia capicola* | Cape turtledove | LC |
| *Columba guinea* | Speckled pigeon | LC |
| *Burhinus capensis* | Spotted Thick-knee | LC |
| *Streptopelia semitorquata* | Red-eyed Dove | LC |
| *Pycnonotus tricolor* | Dark-capped Bulbul | LC |
| *Ploceus velatus* | Southern Masked Weaver | LC |
| *Bostrychia hagedash* | Hadeda Ibis | LC |
| *Euplectes albonotatus* | White-winged Widowbird | LC |
| *Vanellus coronatus* | Crowned Lapwing | LC |
| *Spilopelia senegalensis* | Laughing Dove | LC |
| *Acridotheres tristis* | Common Myna | LC |
| *Emberiza flaviventris* | Golden-breasted Bunting | LC |

LC = Least concerned. NT = Near Threatened, VU = Vulnerable NYBA = Not yet been assessed by the IUCN.

**Table F4: Herpetofauna species recorded during the field assessment.**

| Scientific name | Common Name | Threat Status |
|---|---|---|
| *Trachylepis varia* | Variable Skink | NYBA |

NYBA = Not Yet Been Assessed

**Table F5: General insects recorded during the field assessment.**

| Scientific Name | Common Name | Threat Status |
|---|---|---|
| *Acrotylus sp* | Burrowing grasshopper | NA |
| *Acanthacris ruficornis* | Garden Locust | NYBA |
| *Rhachitopis* sp | N/A | NYBA |
| *Systophlochius palochius* | Orange wing | NYBA |
| *Junonia hierta* | Yellow Pansy | LC |
| *Belenois aurota* | Brown-veined White | LC |
| *Pantala flavescens* | Wandering Glider | LC |
| *Phymateus* sp. | Milkweed Locust | NA |
| Asilidae (*Neolophonotus* sp) | Robber fly | NA |
| *Danaus chrysippus* | African Monarch | LC |

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

**Table F6: Arachnid species recorded during the site assessment.**

| Scientific Name | Common Name | Threat Status |
|---|---|---|
| Family Lycosidae | Wolf Spiders | NYBA |

NYBA = Not Yet Been Assessed

# APPENDIX G: Floral SCC

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

## Definitions of the national Red List categories

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

- **Extinct (EX)** A species is Extinct when there is no reasonable doubt that the last individual has died. Species should be classified as Extinct only once exhaustive surveys throughout the species' known range have failed to record an individual.
- **Extinct in the Wild (EW)** A species is Extinct in the Wild when it is known to survive only in cultivation or as a naturalized population (or populations) well outside the past range.
- **Regionally Extinct (RE)** A species is Regionally Extinct when it is extinct within the region assessed (in this case South Africa), but wild populations can still be found in areas outside the region.
- **Critically Endangered, Possibly Extinct (CR PE)** Possibly Extinct is a special tag associated with the category Critically Endangered, indicating species that are highly likely to be extinct, but the exhaustive surveys required for classifying the species as Extinct has not yet been completed. A small chance remains that such species may still be rediscovered.
- **Critically Endangered (CR)** A species is Critically Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Critically Endangered, indicating that the species is facing an extremely high risk of extinction.
- **Endangered (EN)** A species is Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Endangered, indicating that the species is facing a very high risk of extinction.
- **Vulnerable (VU)** A species is Vulnerable when the best available evidence indicates that it meets at least one of the five IUCN criteria for Vulnerable, indicating that the species is facing a high risk of extinction.
- **Near Threatened (NT)** A species is Near Threatened when available evidence indicates that it nearly meets any of the IUCN criteria for Vulnerable and is therefore likely to become at risk of extinction in the near future.
- [N]**Critically Rare** A species is Critically Rare when it is known to occur at a single site but is not exposed to any direct or plausible potential threat and does not otherwise qualify for a category of threat according to one of the five IUCN criteria.
- [N]**Rare** A species is Rare when it meets at least one of four South African criteria for rarity but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to one of the five IUCN criteria. The four criteria are as follows:
  - Restricted range: Extent of Occurrence (EOO) <500 km$^2$, OR
  - Habitat specialist: Species is restricted to a specialized microhabitat so that it has a very small Area of Occupancy (AOO), typically smaller than 20 km$^2$, OR
  - Low densities of individuals: Species always occurs as single individuals or very small subpopulations (typically fewer than 50 mature individuals) scattered over a wide area, OR
  - Small global population: Less than 10 000 mature individuals.
- **Least Concern** A species is Least Concern when it has been evaluated against the IUCN criteria and does not qualify for any of the above categories. Species classified as Least Concern are considered at low risk of extinction. Widespread and abundant species are typically classified in this category.
- **Data Deficient - Insufficient Information (DDD)** A species is DDD when there is inadequate information to make an assessment of its risk of extinction, but the species is well defined. Listing of species in this category indicates that more information is required, and that future research could show that a threatened classification is appropriate.
- **Data Deficient - Taxonomically Problematic (DDT)** A species is DDT when taxonomic problems hinder the distribution range and habitat from being well defined, so that an assessment of risk of extinction is not possible.
- **Not Evaluated (NE)** A species is Not Evaluated when it has not been evaluated against the criteria. The national Red List of South African plants is a comprehensive assessment of all South African indigenous plants, and therefore all species are assessed and given a national Red List status. However, some

species included in Plants of southern Africa: an online checklist are species that do not qualify for national listing because they are naturalized exotics, hybrids (natural or cultivated), or synonyms. These species are given the status Not Evaluated and the reasons why they have not been assessed are included in the assessment justification.

# POC for RDL and provincially protected Floral SCC obtained from BODATSA and the Screening Tool

**Table G1: Provincially protected species (orang listed species) and red data listed (RDL) species previously recorded for the QDS 2528CB as provided by GDARD and obtained from the new Plants of southern Africa (new POSA) online catalogue, or BODATSA. Additional RDL species were identified for the QDS by the Screening Tool and is included in the below table. Information on species distributions and conservation status were derived from the Red List of South African Plants website (http://redlist.sanbi.org/index.php).**

| FAMILY | SPECIES | IUCN | HABITAT ABD ECOLOGY | POC |
|---|---|---|---|---|
| Aizoaceae | *Delosperma gautengense* | VU | Range: Magaliesberg.<br>Major habitats: Gold Reef Mountain Bushveld, Gauteng Shale Mountain Bushveld<br>Description: Amongst rocks on south-facing slopes. | **Low** |
| Aizoaceae | *Delosperma leendertziae* | NT | Range: Magaliesberg, Roodepoort Ridge and Suikerbosrand.<br>Major habitats: Gold Reef Mountain Bushveld, Dwarsberg-Swartruggens Mountain Bushveld, Loskop Mountain Bushveld, Andesite Mountain Bushveld, Gauteng Shale Mountain Bushveld<br>Description: Steep, south-facing slopes of quartzite in mountain grassland. | **Low** |
| Aizoaceae | *Lithops lesliei* subsp. *lesliei* | NT | succulent; Indigenous<br><br>Range: Douglas in the Northern Cape Province to central Limpopo Province and south-eastern Botswana.<br>Major habitats: Grassland, Savanna<br>Description: Primarily in arid grasslands, usually in rocky places, growing under the protection of forbs and grasses. | **Low** |
| Amaryllidaceae | *Boophone disticha* | LC | Range: Throughout South Africa and up to Uganda.<br>Major habitats: Albany Thicket, Fynbos, Grassland, Indian Ocean Coastal Belt, Nama Karoo, Savanna, Succulent Karoo<br>Description: Dry grassland and rocky areas. | **Low** |
| Amaryllidaceae | *Crinum macowanii* | LC | Range: Eastern Cape to Limpopo Province and from Zimbabwe to Eritrea.<br>Major habitats: Albany Thicket, Grassland, Indian Ocean Coastal Belt, Savanna<br>Description: Mountain grassland and stony slopes in hard dry shale, gravely soil or sandy flats. | **Low** |
| Anacardiaceae | *Searsia batophylla* | VU | shrub; Indigenous; Endemic<br><br>Range: Sekhukhuneland.<br>Major habitats: Sekhukhune Mountain Bushveld, Sekhukhune Plains Bushveld, Ohrigstad Mountain Bushveld<br>Description: Dry bushveld, in low-lying areas and along watercourses, 650-975 m. | **Low** |
| Anacardiaceae | *Searsia gracillima* var. *gracillima* | NT | dwarf shrub; Indigenous; Endemic<br><br>Range: Restricted to a small area to the northeast of Pretoria.<br>Major habitats: Savanna<br>Description: Rocky quartzitic outcrops in bushveld. | **Low** |
| Apocynaceae | *Stenostelma umbelluliferum* | NT | succulent; geophyte; herb; Indigenous; Endemic | **Low** |

| FAMILY | SPECIES | IUCN | HABITAT ABD ECOLOGY | POC |
|---|---|---|---|---|
| | | | Range: Pretoria North and adjacent areas in North West Province.<br>Major habitats: Savanna<br>Description: Deep black turf in open woodland mainly in the vicinity of drainage lines. | |
| Crassulaceae | *Adromischus umbraticola* subsp. *umbraticola* | NT | lithophyte; succulent; dwarf shrub; Indigenous; Endemic<br><br>Range: Potchefstroom and Zeerust to Cullinan.<br>Major habitats: Savanna<br>Description: South-facing rock crevices on ridges, restricted to Gold Reef Mountain Bushveld in the northern parts of its range, and Andesite Mountain Bushveld in the south. | **Low** |
| Fabaceae | *Argyrolobium campicola* | NT | herb; Indigenous; Endemic<br><br>Range: Pretoria to Dundee.<br>Major habitats: Grassland<br>Description: Highveld grassland. | **Low** |
| Fabaceae | *Argyrolobium megarrhizum* | NT | dwarf shrub; shrub; Indigenous; Endemic<br><br>Range: Pretoria to Bronkhorstspruit.<br>Major habitats: Savanna<br>Description: Mixed bushveld. | **Low** |
| Gunneraceae | *Gunnera perpensa* | LC | Range: Western Cape to Ethiopia.<br>Major habitats: Albany Thicket, Fynbos, Grassland, Indian Ocean Coastal Belt, Nama Karoo, Savanna<br>Description: Damp marshy area and vleis from coast to 2400 m. | **Low** |
| Hyacinthaceae | *Drimia sanguinea* | NT | Range: Northern Cape and across to Limpopo and Mpumalanga Provinces, Namibia, Botswana and Zimbabwe.<br>Major habitats: Savanna<br>Description: Open veld and scrubby woodland in a variety of soil types. | **Low** |
| Hypoxidaceae | *Hypoxis hemerocallidea* | LC | Range: This species is widespread across northern and eastern South Africa, extending to Botswana, eSwatini (Swaziland) and Mozambique.<br>Major habitats: Albany Thicket, Grassland, Indian Ocean Coastal Belt, Savanna<br>Description: It occurs in a wide range of habitats, including sandy hills on the margins of dune forests, open, rocky grassland, dry, stony, grassy slopes, mountain slopes and plateaus. It appears to be drought and fire tolerant. | **High** |
| Orchidaceae | *Habenaria bicolor* | NT | Range: Gauteng and near Middelburg in Mpumalanga. Also known from two records from Zimbabwe.<br>Major habitats: Grassland<br>Description: Well-drained grasslands at around 1600 m in South Africa. | **Low** |
| Orchidaceae | *Habenaria kraenzliniana* | NT | geophyte; herb; Indigenous; Endemic<br><br>Range: Mainly in Gauteng, with a few isolated records from the Wolkberg Mountains in Limpopo and northern KwaZulu-Natal.<br>Major habitats: Grassland<br>Description: Stony, grassy hillsides, 1000-1400 m. | **Low** |
| Not to be disclosed | Sensitive species 430 | VU | Range: Magaliesberg.<br>Major habitats: Gold Reef Mountain Bushveld, Marikana Thornveld, Andesite Mountain Bushveld, Carletonville Dolomite Grassland | **Low** |

| FAMILY | SPECIES | IUCN | HABITAT ABD ECOLOGY | POC |
|---|---|---|---|---|
| Not to be disclosed | Sensitive species 1248 | VU | Range: Eastern Cape to Limpopo Province. Widespread elsewhere in southern and eastern Africa. Description: Low and medium altitudes, usually along mountain ranges and in thickly vegetated river valleys, often under bush clumps and in boulder screes. | **Low** |

**CR** = Critically Endangered**, DD =** Data Deficient**; EN** = Endangered**, NT** = Near Threatened**, VU** = Vulnerable**, POC** = Probability of Occurrence.

# NFA Protected Trees

**Table G2: NFA plant list for species with a known distribution range falling within the Project 2 area[26]**

| SCIENTIFIC NAME | Habitat & Distribution[27] & IUCN status[28] | National Red List Status | POC |
|---|---|---|---|
| ***Balanites maughamii* subsp. *maughamii*** | The plants can be found in small colonies in the bushveld, sand forest, on sandstone outcrops, along riverbanks, near springs and around pans. | LC | Low |
| ***Boscia albitrunca*** | Habitat mainly includes dry, open woodland and bushveld, mostly in hot, arid, semi-desert areas, often on termitaria. The vast distribution range covers Botswana, Limpopo, Gauteng, North-West, Swaziland, the Free State, Northern Cape, and KwaZulu-Natal. It also extends into Zambia, Zimbabwe, and Mozambique. | LC<br>P | Low |
| ***Pittosporum viridiflorum*** | Cheesewood is widely distributed in the eastern half of South Africa, occurring from the Western Cape up into tropical Africa and beyond to Arabia and India. It grows over a wide range of altitudes and varies in form from one location to another. *Pittosporum viridiflorum* grows in tall forest and in scrub on the forest margin, kloofs and on-stream banks. | LC<br>P | Low |
| ***Sclerocarya birrea*** | Found in Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, North West. It occurs naturally in various types of woodland, on sandy soil or occasionally sandy loam. | LC<br>P | Low |

**CR=** Critically Endangered**, EN** = Endangered**, LC** = Least Concern; **NT =** Near Threatened**, P=** Protected, POC = Probability of Occurrence; **R =** Rare

[26] https://www.thetreeapp.co.za/team/
[27] http://pza.sanbi.org/
[28] http://redlist.sanbi.org/index.php

# APPENDIX H: Faunal SCC

The tables below list the faunal Species of Conservation Concern for the Project 2:

**Table H1: RDL Mammal Species for the Gauteng Province (GDARD 2014).**

| Scientific Name | Common name | IUCN Status | GDARD Status | POC |
|---|---|---|---|---|
| *Aonyx capensis* | African Clawless Otter | NT | - | Low |
| *Atelerix frontalis* | Southern African Hedgehog | LC | NT | Low |
| *Lutra maculicollis* | Spotted-necked Otter | NT | NT | Low |
| *Mystromys albicaudatus* | White-tailed Mouse | EN | EN | Low |
| *Neamblysomus julianae* | Juliana's Golden Mole | EN | VU | Low |
| **BATS** | | | | |
| *Miniopterus schreibersii* | Scheiber's Long-Fingered Bat | NT | NT | Low |
| *Myotis tricolor* | Temminck's Hairy Bat | LC | NT | Low |
| *Rhinolophus blasii* | Blasius's/Peak-Saddle Horseshoe Bat | LC | VU | Low |
| *Rhinolophus clivosus* | Horseshoe Bat | LC | NT | Low |
| *Rhinolophus darlingi* | Darling's Horseshoe Bat | LC | NT | Low |
| *Rhinolophus hildebrandtii* | Hildebrandt's Horseshoe Bat | LC | NT | Low |

VU = Vulnerable, EN = Endangered, NT = Near Threatened, LC= Least Concern

**Table H2: RDL Avifaunal Species for the Gauteng Province (GDARD 2014).**

| Scientific Name | Common name | IUCN Status | GDARD Status | POC |
|---|---|---|---|---|
| *Alcedo semitorquata* | Half-Collared Kingfisher | LC | NT | Low |
| *Anthropoides paradiseus* | Blue Crane | VU | VU | Low |
| *Circus ranivorus* | African Marsh-Harrier | LC | VU | Low |
| *Eupodotis caerulescens* | Blue Korhaan | NT | NT | Low |
| *Eupodotis senegalensis* | White-bellied Korhaan | LC | VU | Low |
| *Gorsachius leuconotus* | White-backed Night-Heron | LC | VU | Low |
| *Gyps coprotheres* | Cape Vulture | EN | VU | Low |
| *Mirafra cheniana* | Melodious Lark | LC | NT | Low |
| *Oxyura maccoa* | Maccoa Duck | VU | VU | Low |
| *Podica senegalensis* | African Finfoot | LC | VU | Low |
| *Sagittarius serpentarius* | Secretarybird | VU | NT | Low |
| *Tyto capensis* | African Grass-Owl | LC | VU | Low |

VU = Vulnerable, NT = Near Threatened, LC = Least Concern, EN = Endangered, Ad mon = Additional Monitoring, End and N-end = Endemic and Near endemic

**Table H3: RDL Invertebrates Species for the Gauteng Province (GDARD 2014). Additional information on the status of the species in South Africa obtained from SANBI (http://speciesstatus.sanbi.org/).**

| Scientific Name | Common name | IUCN Status | GDARD Status | SANBI status | POC |
|---|---|---|---|---|---|
| *Aloeides dentatis* | Roodepoort Copper Butterfly | VU | VU | EN | Low |
| *Chrysoritis aureus* | Heidelberg Copper | NYBA | VU | - | Low |
| *Ichnestoma stobbiai* | Stobbia's Fruit Chafer Beetle | NYBA | VU | - | Low |
| *Lepidochrysops praeterita* | Highveld Blue Butterfly | NYBA | VU | EN | Low |

EN = Endangered, VU = Vulnerable, NYBA = Not yet been assessed.

**Table H4: RDL Reptile Species for the Gauteng Province (GDARD 2014)**

| Scientific Name | Common name | IUCN Status | GDARD Status | POC |
|---|---|---|---|---|
| *Homoroselaps dorsalis* | Striped Harlequin Snake | LC | NT | Low |

NT = Neat Threatened

**Table H5: Avifaunal Species for the pentads within the QDS 2723CC**

| Pentads | Link to pentad summary on the South African Bird Atlas Project 2 web page |
|---|---|
| 2540_2820 | http://sabap2.adu.org.za/coverage/pentad/2540_2820 |

# APPENDIX I: Specialist Information

## DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

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

| | |
|---|---|
| Chris Hooton | BTech Nature Conservation (Tshwane University of Technology) |
| Christien Steyn | MSc Plant Science (University of Pretoria) |
| Samantha-Leigh Daniels | PhD Plant Science (University of Pretoria) |
| Stephen van Staden | MSc Environmental Management (University of Johannesburg) |

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

| | | | |
|---|---|---|---|
| Company of Specialist: | Scientific Terrestrial Services | | |
| Postal address: | PO. Box 751779, Gardenview | | |
| Postal code: | 2047 | Fax: | 086 724 3132 |
| Telephone: | 011 616 7893 | | |
| Name / Contact person: | Chris Hooton | | |
| E-mail: | chris@sasenvgroup.co.za | | |
| Qualifications | BTech Nature Conservation (Tshwane University of Technology)<br>National Diploma Nature Conservation (Tshwane University of Technology) | | |
| Name | Christien Steyn | | |
| E-mail: | christien@sasenvgroup.co.za | | |
| Qualifications | MSc (Plant Science) (University of Pretoria)<br>BSc (Hons) Plant Science (University of Pretoria)<br>BSc (Environmental Sciences) (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) | | |
| Name / Contact person: | Samantha Leigh Daniels | | |
| E-mail: | samantha@sasenvgroup.co.za | | |
| Qualifications | PhD (Plant Science) (University of Pretoria)<br>MSc (Plant Science) (University of Pretoria)<br>BSc (Hons) Zoology & Entomology (University of Pretoria)<br>BSc Zoology & Entomology (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>Member of the Association for Tropical Biology and Conservation (ATBC) | | |
| Name / Contact person: | Stephen van Staden | | |
| E-mail: | stephen@sasenvgroup.co.za | | |
| Qualifications | MSc (Environmental Management) (University of Johannesburg)<br>BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg)<br>BSc (Zoology, Geography and Environmental Management) (University of Johannesburg) | | |
| Registration / Associations | Registered Professional Natural Scientist at South African Council for Natural Scientific Professions (SACNASP)<br>Accredited River Health Practitioner by the South African River Health Program (RHP)<br>Member of the South African Soil Surveyors Association (SASSO)<br>Member of the Gauteng Wetland Forum | | |

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

I, Christopher Hooton, declare that -

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

---

Signature of the Specialist

I, Samantha-Leigh Daniels, declare that -

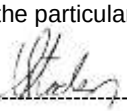
- I act as the **independent specialist (reviewer)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise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

---

Signature of the Specialist

I, Stephen van Staden, declare that -

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



---

Signature of the Specialist

## 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**

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

### AREAS OF WORK EXPERIENCE

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

### KEY SPECIALIST DISCIPLINES

**Biodiversity Assessments**

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

## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

## CURRICULUM VITAE OF SAMANTHA-LEIGH DANIELS

### PERSONAL DETAILS

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

### MEMBERSHIP IN PROFESSIONAL SOCIETIES

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

### EDUCATION

**Qualifications**

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

### AREAS OF WORK EXPERIENCE

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

### KEY SPECIALIST DISCIPLINES

**Biodiversity Assessments**

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

**Training**

- Plant species identification
- Herbarium usage and protocols

## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

## CURRICULUM VITAE OF STEPHEN VAN STADEN

### PERSONAL DETAILS

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

### MEMBERSHIP IN PROFESSIONAL SOCIETIES

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

### EDUCATION

**Qualifications**

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

**Short Courses**

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

### AREAS OF WORK EXPERIENCE

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

### DEVELOPMENT SECTORS OF EXPERIENCE

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

### KEY SPECIALIST DISCIPLINES

**Legislative Requirements, Processes and Assessments**

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

**Freshwater Assessments**

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

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

**Aquatic Ecological Assessment and Water Quality Studies**

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

**Biodiversity Assessments**

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

**Soil and Land Capability Assessment**

- Soil and Land Capability Assessment
- Hydropedological Assessment

**Visual Impact Assessment**

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