



TERRESTRIAL ECOLOGY ASSESSMENT FOR THE PROPOSED HARMONY NOOITGEDACHT TAILINGS STORAGE FACILITY (TSF) AND PROPOSED PIEPLINE PROJECT

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CLIENT



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| Report Name | TERRESTRIAL ECOLOGY ASSESSMENT FOR THE PROPOSED HARMONY NOOITGEDACHT TAILINGS STORAGE FACILITY (TSF) AND PROPOSED PIPELINE PROJECT | |
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| Declaration | <p>The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.</p> | |

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1 Introduction

1.1 Background

The Biodiversity Company was appointed to compile a terrestrial biodiversity baseline and impact assessment report for the proposed Nooitgedacht Tailings Storage Facility (TSF) Expansion and proposed slurry pipeline Project (Figure 1-3). Harmony Gold Mining Company Limited (Harmony) own and operate a number of Gold Mines and Plants, and currently deposit tailings onto the Free State South (FSS) 2 TSF, St. Helena 4 TSF, St. Helena 123 TSF, Dam 23 TSF, Brand D TSF and Target 1&2 TSF. The current planned Life of Mine (LOM) of the Free State Operations exceed the available deposition capacity of these TSFs and Harmony is undertaking a feasibility assessment to construct the new Nooitgedacht TSF with associated slurry pipelines.

To determine the baseline ecological state of the area and to present a detailed description of the receiving environment, both a desktop assessment as well as a field survey were conducted on January 26 to 27, 11 to 13 April and 10 to 11 October 2023. Furthermore, the desktop assessment and field survey both involved the detection, identification and description of any locally relevant sensitive receptors and habitats, and the manner in which these sensitive features may be affected by the proposed development was also investigated.

This assessment was conducted in accordance with the amendments to the Environmental Impact Assessment Regulations, 2014 (No. 326, 7 April 2017) of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998). The approach has taken cognisance of the recently published Government Notice 3717 in terms of NEMA dated 28 July 2023, Government Notice 320 in terms of NEMA dated 20 March 2020 as well as the Government Notice 1150 in terms of NEMA dated 30 October 2020: "Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998 , when applying for Environmental Authorisation" (Reporting Criteria). The National Web based Environmental Screening Tool has characterised the terrestrial biodiversity theme sensitivity as "Very High" across the PAOI.

This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making, as to the ecological viability of the proposed project.

1.2 Project Description

A reserve reclamation study which looked at the reclamation and treatment of the 774Mt of tailings contained in reserve status in TSFs in the Free State through the sequentially reprocessing of tailings through Target Plant and Harmony One Plant, as Run of Mine Ore is depleted, will require deposition space in future. The Nooitgedacht TSF was identified as a deposition site for residue from the reclamation of tailings during Project Saints in 2007. The properties, Goedgedacht 53, Nooitgedacht 50 and Jacobsdal 37 were subsequently purchased with the intention of constructing a new Tailings Storage Facility on this site. Harmony commenced with feasibility assessment for the Nooitgedacht Tailings Deposition Project that of the project is to secure future deposition capacity for Harmony Free State Operations for residue from both Run of Mine and Tailings Reclamation operations. The following are proposed for the project:

- Infrastructure will include the TSF and associated infrastructure including possible access roads and water management infrastructure including pipelines and a return water dam;
- The infrastructure will cover a total area of up to 895 hectares. Topsoil stockpile will be 3 m;
- Tailing deposition method to be used: cyclone deposition. TSF side slope gradient of 1:3;

- The height of the TSF is still being determined through the engineering designs however current design scope of the Nooitgedacht TSF is based on a height of 100m at 1426 mamsl; and
- The TSF barrier system will be determined in consultation with the authorities and will be in compliance with relevant norms and standards for determination of liner requirements.

The following pipelines are being proposed:

- One 10 km long slurry lines from Harmony One Plant to the St Helena Booster Pump Station;
- One 16 km long slurry line from Brand A TSF to the St Helena Booster Pump Station; and
- One 17 km slurry line from the St Helena Booster Pump Station to FSN 1 TSF.

The proposed pipelines traverse the following farm portions:

- Vlakplaats 125 Ptn 3, 4 and 5;
- Mijannie RE/66 Ptn 0;
- Toronto RE/115 Ptn 7 and 0;
- Rietpan 17 Ptn 0;
- Rietkuil 28 Ptn 0;
- Rheeders Dam 31 Ptn 0;
- Farm 41 Ptn 20;
- Ouders Gift 48 Ptn 0;
- Nooitgedacht 50 Ptn 0; and
- Goedgedacht.

The pipelines will be flanged steel pipelines of over 0.36 m in diameter and installed above-ground on pre-cast concrete plinths. A 3.5m wide access road, adjacent to the pipelines, will be cleared/graded to provide access for construction, maintenance and inspections.

1.2.1 Design Description Update

The Free State Reclamation (FSR) Project seeks to increase tailings reclamation at Harmony's Free State operations from 800ktpm to 2000ktpm, with residue deposited at the new 800Ha Nooitgedacht TSF. During the environmental authorisation and water licensing process, the Department of Water and Sanitation indicated that in the return water from the Nooitgedacht TSF was pumped back to 13 Dam it would have to be lined.

The 13 Dam is the water source for the current reclamation and the return point for process and decant water from the TSFs. The lining of 13 Dam was not considered a viable option.

Low Pressure Water Supply

A trade off study was conducted considering three options for the 40 megalitre Low Pressure (LP) water storage system and considered:

- Two HDPE lined earth dams – footprint 190m X 125m;
- Two concrete tanks – footprint 95m X 45m;
- Twelve Steel tanks. – footprint 210m X 65M.



Figure 1-1: Three options considered for the 40 megalitre Low Pressure (LP) water storage system (Provided by EIMS, 2025)

All of the water for the FSR Project will be pumped to the LP water system. The water source for the reclamation operation will include:

- Return water from the Nooitgedacht TSF;
- Treated effluent from Waste Water Treatment works;
- Ground water from boreholes; and
- Overflow water from the Metallurgical Plants.

The option with the smallest footprint, at ground level, that provides a simple suction manifold layout and positive suction head for the pumps at all times is the installation of the two 40m diameter concrete tanks.

The concrete tanks designed according to the guidelines from the Department of Water and Sanitation and the SANS standards will:

- Be constructed above natural ground level;
- Be to atmosphere;
- Be placed on a 95m x 45m concrete slab foundation, with a 2m concrete apron surrounding the water tanks;
- Be 40m diameter and 18m high and open at the top with internal and external access ladders for maintenance purposes;

- Have the suction outlet pipe 1.5m above the base of the tank;
- Have the outlets joined with a t-piece to the pump suction manifold;
- Have an internal finish of cementitious flexible waterproofing slurry.



Figure 1-2 Proposed LP water system (Provided by EIMS, 2025)

1.3 Project Area of Influence

The project boundaries as provided were utilised as the Project Area of Influence (PAOI) which represents the total area to be assessed. The area surrounding the PAOI consists mainly of open veld, mining activities and secondary roads. The project layout is shown in Figure 1-4 and Figure 1-5.

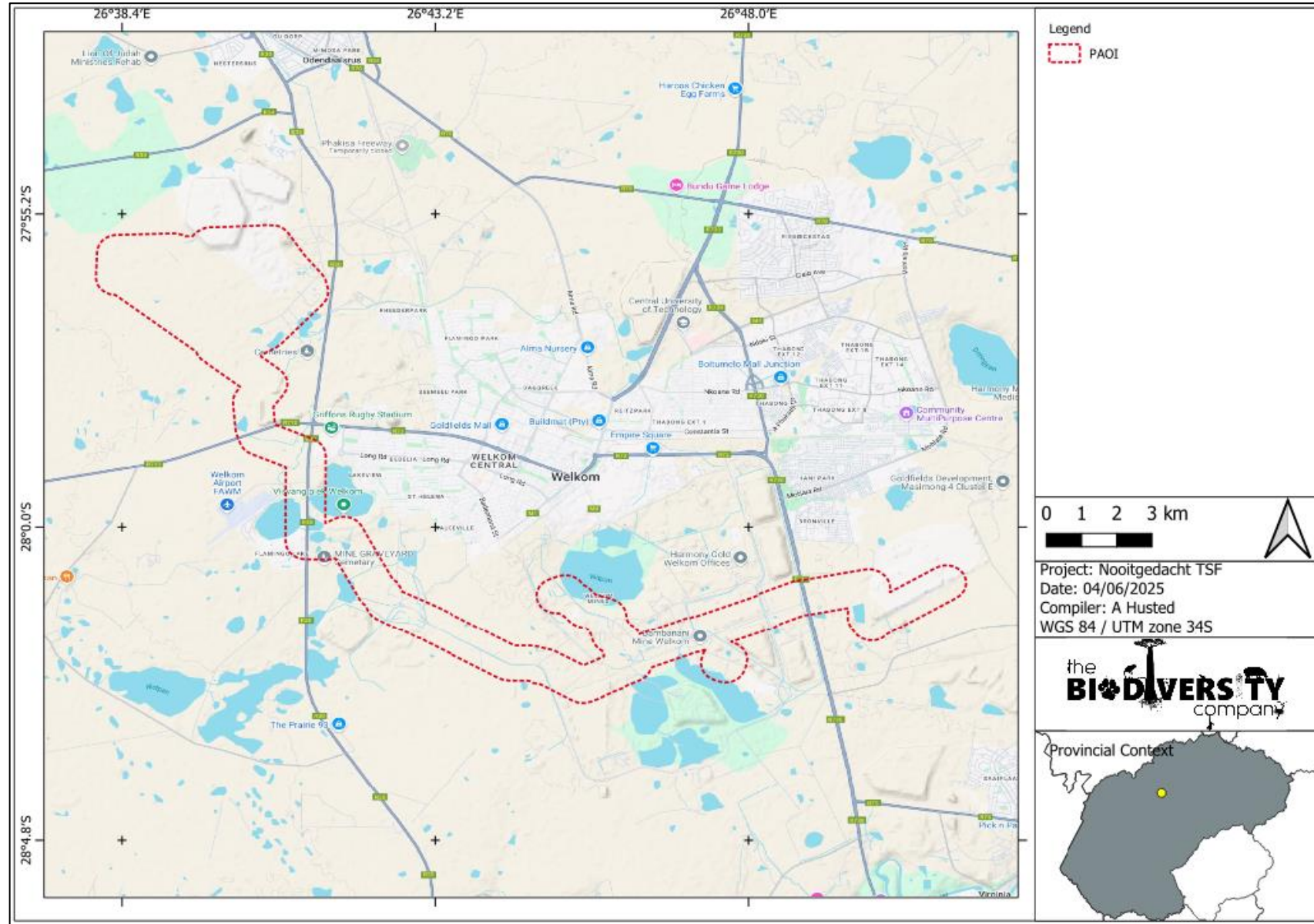


Figure 1-3 Map illustrating the location of the PAOI

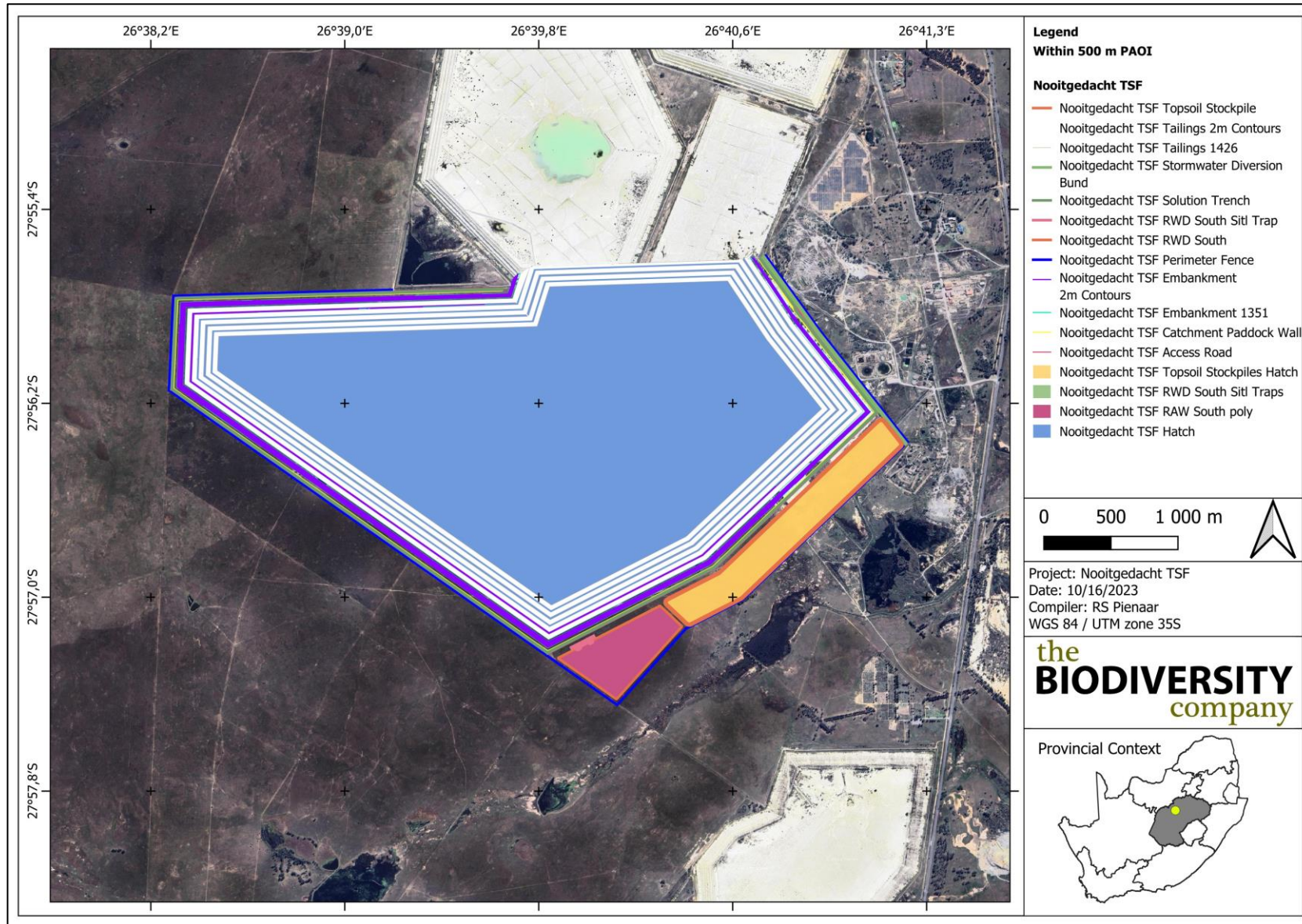


Figure 1-4 Proposed layout associated with the PAOI

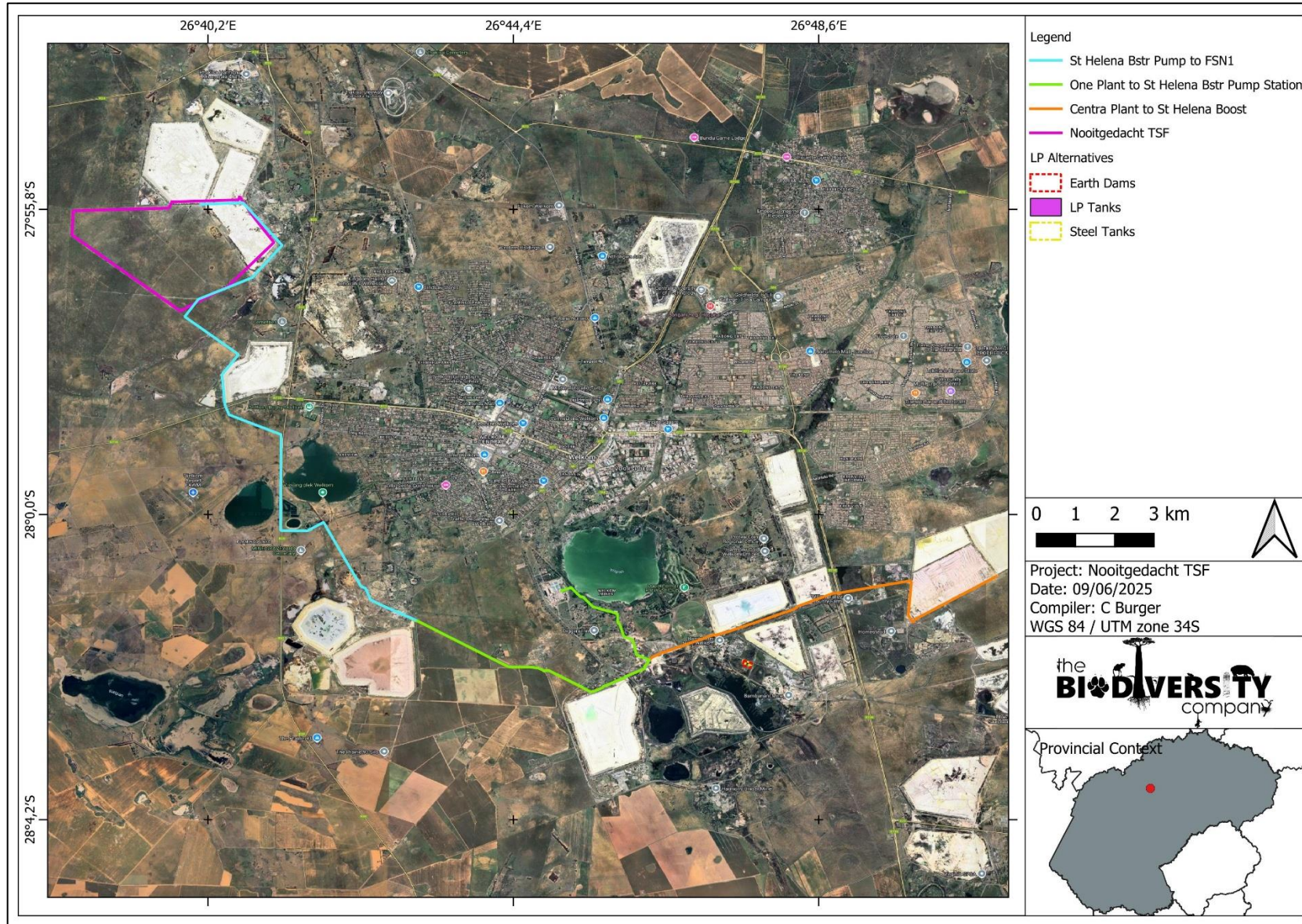


Figure 1-5 Map illustrating the proposed layout of the Pipelines associated with the PAOI

1.4 Scope of Work

The principle aim of the assessment was to determine the ecological constraints and risks associated with the proposed project. This was achieved through the following:

- Desktop assessment to identify the relevant ecologically important geographical features within the PAOI;
- Desktop assessment to compile an expected species list and possible threatened flora and fauna species that occur within the PAOI;
- Field survey to ascertain the species composition of the present flora and fauna community within the PAOI;
- Delineate and map the habitats and their respective sensitivities that occur within the PAOI;
- Identify the manner that the proposed project impacts the flora and fauna community and habitat systems to evaluate the level of risk being posed; and
- The prescription of mitigation measures and recommendations for identified risks.

1.5 Assumptions and Limitations

The following assumptions and limitations are applicable to this assessment:

- The assessment area was based on the spatial data provided by the client and any alterations to the route and/or missing GIS information pertaining to the assessment area would have affected the area surveyed;
- For the purposes of this assessment, the results from the desktop evaluation and field survey considered the entire PAOI;
- Whilst every effort was made to cover as much of the site as possible, it is possible that some flora and fauna species that are present on site were not recorded during the field survey, especially secretive or rare species;
- The assessment area was only surveyed during a single season site visit and therefore, this assessment does not consider temporal trends, however sufficient to derive meaningful baseline;
- The second survey that was undertaken in collaboration with the Endangered Wildlife Trust (EWT) focused primarily on the location of Sensitive Species 15;
- The GPS used in the assessment has an accuracy of 5 m and consequently any spatial features may be offset by 5 m.

1.6 Key Legislative Requirements

The legislation, policies and guidelines listed below are applicable to the current project in terms of biodiversity and ecological support systems. The list below, although extensive, is not exhaustive and other legislation, policies and guidelines may apply in addition to those listed below (Table 1-1).

Table 1-1 *A list of key legislative requirements relevant to biodiversity and conservation in Free State*

| Region | Legislation / Guideline | Comment |
|-------------------|--|---|
| National | The National Environmental Management Act (NEMA) (Act No. 107 of 1998) | Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017), Appendix 6 requirements |
| | The National Environmental Management: Biodiversity Act (Act No. 10 of 2004), Threatened or Protected Species Regulations | The protection of species and ecosystems that warrant protection |
| | Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 320 of Government Gazette 43310 (March 2020) | The minimum criteria for reporting. |
| | Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 1150 of Government Gazette 43855 (October 2020) | Protocol for the specialist assessment and minimum report content requirements. |
| | The National Environmental Management: Waste Act, 2008 (Act 59 of 2008); | The regulation of waste management to protect the environment. |
| | National Water Act (NWA) (Act No. 36 of 1998) | The regulation of water uses. |
| | Alien and Invasive Species Regulations and, Alien and Invasive Species List 2014/2020, published under NEMBA | The regulation and management of alien invasive species. |
| Provincial | Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA) | To provide for control over the utilization of the natural agricultural resources including the vegetation and the combating of weeds and invader plants. |
| | Boputhatswana Nature Conservation Act 3 of 1973 | To provide for the management and conservation of the province's biophysical environment and protected areas. |
| | Free State Nature Conservation Ordinance 8 of 1969 | To inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management |

2 Definitions

2.1 Species of Conservation Concern

In accordance with the National Red List of South African Plants website, managed and maintained by the South African National Biodiversity Institute (SANBI), a Species of Conservation Concern (SCC) is a species that has a high conservation importance in terms of preserving South Africa's rich biodiversity. This classification covers a range of red list categories as illustrated in Figure 2-1 below.

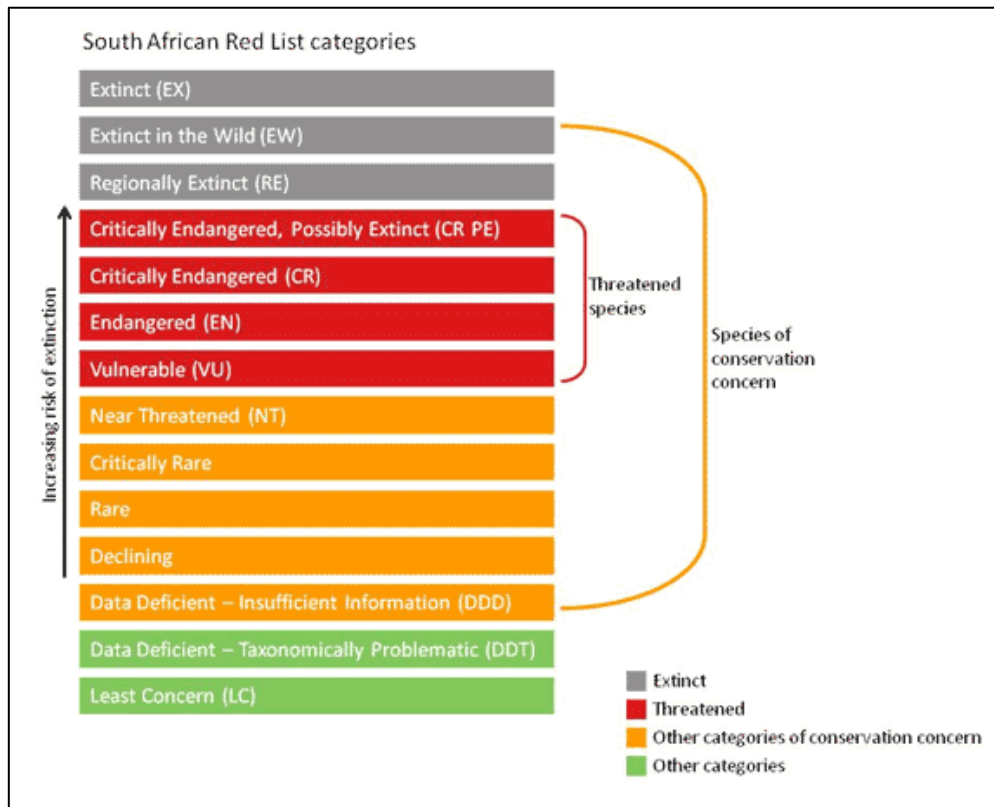


Figure 2-1 Threatened species and Species of Conservation Concern (SANBI, 2016)

South Africa uses the internationally endorsed International Union for Conservation of Nature (IUCN) Red List Categories and Criteria (IUCN, 2012). This scientific system is designed to measure species' risk of extinction and its purpose is to highlight those species that are in need of critical conservation action. As this system has been adopted from the IUCN, the definition of an SCC as described and categorised above is extended to all red list classifications relevant to fauna as well as the IUCN categories, for the purposes of this report.

2.2 Protected Species

Protected species include both floral and faunal species that are protected according to some form of relevant legislation, be it provincial, national, or international. Provincial legislation may include that published in the form of a provincial ordinance, bill, or act, and national legislation includes that which is published in terms of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) or the National Forest Act (Act No. 84 of 1998). Relevant international legislation includes the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 2021).

3 Methods

3.1 Desktop Assessments

The desktop assessment was principally undertaken using a Geographic Information System (GIS) to access the latest available spatial datasets to develop digital cartographs and species lists. These datasets and their respective dates of publishing are provided below.

3.1.1 Ecologically Important Landscape Features

Existing ecologically relevant data layers were incorporated into GIS software to establish how the proposed project might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

- Free State Biodiversity Sector Plan (2015);
- 2018 National Biodiversity Assessment (NBA, 2018) (Skowno *et al.*, 2019);
- Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018);
- South Africa Protected and Conservation Areas Databases, 2023 (DFFE, 2023 & DFFE, 2023a);
- National Protected Areas Expansion Strategy, 2018 (DEA, 2018);
- Important Bird and Biodiversity Areas, 2015 (Marnewick *et al.*, 2015);
- South African Inventory of Inland Aquatic Ecosystems (SAIIAE), NBA 2018 Rivers and Wetlands (Awuah, 2018 & Van Deventer *et al.*, 2019);
- National Freshwater Priority Areas, Rivers and Wetlands, 2011 (Nel *et al.*, 2011); and
- Strategic Water Source Areas, 2021 (Lötter & Le Maitre, 2021).

Descriptions of these datasets, and their associated relevance to terrestrial biodiversity, are provided below.

3.1.1.1 Provincial Conservation Plan

The Free State Critical Biodiversity Areas (CBA) (2015) map accounts for terrestrial fauna and flora only. The inclusion of the aquatic component was limited to the Freshwater Ecosystem Priority Areas (FEPA) catchments (included in the cost layer and for the identification of Ecological Support Areas (ESAs)) and wetland clusters (included in the ESAs only). The areas are subdivided as Critical Biodiversity Areas (CBA1), CBA2, Degraded, ESA1, ESA2, Other and Protected:

Critical Biodiversity Areas (CBAs) –Areas considered critical for meeting biodiversity targets and thresholds, and which are required to ensure the persistence of viable populations of species and the functionality of ecosystems.

Ecological Support Areas (ESAs) - Areas are required to support and sustain the ecological functioning of Critical Biodiversity Areas (CBAs). For terrestrial and aquatic environments, these areas are functional but are not necessarily pristine natural areas. They are however required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within the CBAs, and which also contributes significantly to the maintenance of Ecological Infrastructure.

3.1.1.2 National Biodiversity Assessment 2018

The National Biodiversity Assessment (NBA) was completed as a collaboration between the South African National Biodiversity Institute (SANBI), the Department of Environmental Affairs (DEA), and

other stakeholders including scientists and biodiversity management experts throughout the country over a three-year period (Skowno *et al.*, 2019).

The purpose of the NBA is to assess the state of South Africa's biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The two headline indicators assessed in the NBA are Ecosystem Threat Status and Ecosystem Protection Level (Skowno *et al.*, 2019).

- **Ecosystem Threat Status (ETS)** outlines 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), Endangered (EN), Vulnerable (VU) or Least Concern (LC), based on the proportion of each ecosystem type that remains in a good or healthy ecological condition (Skowno *et al.*, 2019). CR, EN, or VU ecosystem types are collectively referred to as threatened ecosystems.
- **Ecosystem Protection level (EPL)** informs on whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Not Protected (NP), Poorly Protected (PP), Moderately Protected (MP) or Well Protected (WP), based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Skowno *et al.*, 2019). NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems.

3.1.1.3 South Africa Protected and Conservation Areas

The South African Protected Areas Database (SAPAD) and the South Africa Conservation Areas Database (SACAD) contains spatial data critical for the conservation of South Africa's natural resources (DFFE, 2023 & DFFE, 2023a). It includes spatial and attribute information for both formally protected areas and areas that have less formal protection, such as conservation areas. These databases are updated regularly and form the basis for the Register of Protected Areas, which is a legislative requirement under the National Environmental Management: Protected Areas Act (Act 57 of 2003).

Formally protected areas are categorised according to several different types, and each type is subject to specific legislative restrictions and management guidelines, many of which restrict development to some degree. Generally, these areas are assigned a buffer of influence of between 5 and 10 km (the latter pertaining to National Parks and World Heritage Sites), within which certain laws and management actions may apply. Many of the protected area types are further classified into sub-types as well. Formally protected area types include:

- National Parks;
- Nature Reserves;
- Special Nature Reserves;
- Mountain Catchment Areas;
- World Heritage Sites;
- Protected Environments;
- Forest Nature Reserves and Forest Wilderness Areas;
- Specially Protected Forest Areas; and
- Marine Protected Areas.

3.1.1.3.1 National Protected Areas Expansion Strategy

The Department of Environmental Affairs (now the Department of Forestry, Fisheries and the Environment) led the development of the National Protected Areas Expansion Strategy (NPAES) in consultation with the protected area agencies and other key private and public sector stakeholders. The need for the development of the NPAES was established in the National Biodiversity Framework in 2009. The NPAES is a 20-year strategy with 5-year implementation targets aligned with a 5-year revision cycle. (DEA, 2018).

South Africa's protected area network currently falls far short of representing all ecosystems and maintaining healthy functioning ecological processes. In this context, the goal of the NPAES is to achieve cost effective protected area expansion thus enabling better ecosystem representation, ecological sustainability, and resilience to climate change. A comprehensive set of priority areas was compiled based on the priorities identified by provincial and other agencies in their respective protected area expansion strategies. These focus areas are generally large, intact and unfragmented and are therefore of high importance for biodiversity, climate resilience and freshwater protection (DEA, 2018).

3.1.1.4 Important Bird and Biodiversity Areas

Important Bird & Biodiversity Areas (IBAs) are sites of international significance for the conservation of the world's birds, and other conservation significant species, as identified through multi-stakeholder processes using globally standardised, quantitative, and scientifically agreed criteria. These sites are also Key Biodiversity Areas; sites that contribute significantly to the global persistence and health of biodiversity (Birdlife, 2020).

The selection of IBAs is achieved through the application of quantitative ornithological criteria, grounded in up-to-date knowledge on the sizes and trends of bird populations. The criteria ensures that sites selected as IBAs have true significance for the international conservation of bird populations, and it also ensures classification consistency among sites at all geographic levels.

IBAs constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. Approximately 60% of the IBA network is unprotected, leaving these sites vulnerable to habitat transformation and mismanagement. Additionally, habitats within many IBAs are poorly managed, leading to habitat degradation, especially in unprotected sites (BirdLife SA, 2022).

3.1.1.5 Aquatic Habitats

Three inland aquatic habitat datasets are used to identify the ecological sensitivity of the PAOI with regards to local aquatic habitat, which is critical for the healthy functioning of both aquatic and terrestrial biodiversity. The presence of aquatic ecosystems is often a strong indicator for the presence of unique flora as well as the regular presence of fauna. Many national SCC are only found within or near to aquatic habitat.

- **The South African Inventory of Inland Aquatic Ecosystems (SAIIAE):** Established during the 2018 NBA, the SAIIAE is a collection of spatial data layers that represent the extent of river and inland wetland ecosystem types as well as the pressures on these systems. The same two headline indicators, and their associated categorisations, are applied as with the terrestrial ecosystem NBA, namely Ecosystem Threat Status and Ecosystem Protection Level. The Ecosystem Threat Status of river and wetland ecosystem types are based on the extent to which each ecosystem type had been altered from its natural condition.
- **National Freshwater Ecosystem Priority Areas, Rivers and Wetlands (NFEPA):** In an attempt to better conserve aquatic ecosystems, South Africa has categorised its inland aquatic systems according to set ecological criteria (i.e., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs). The FEPAs are intended to be conservation support tools and it is envisioned

that they will guide the effective implementation of measures to achieve the National Environment Management: Biodiversity Act's biodiversity conservation goals (Nel *et al.*, 2011).

- **Strategic Water Source Areas (SWSAs):** SWSAs are defined as areas of land that supply a disproportionate quantity of mean annual surface water runoff in relation to their size, and therefore contribute considerably to the overall water supply of the country, as well as national aquatic and terrestrial biodiversity resources. These are considered key ecological infrastructure assets and the effective protection of SWSAs is vital for national security because a lack of water security will compromise national security and human wellbeing on all levels.

3.1.2 Desktop Flora Assessment

The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) was used to identify the vegetation type that would have occurred under natural or pre-anthropogenically altered conditions. Furthermore, the Plants of Southern Africa (POSA) database was accessed to compile a list of expected flora species within the proposed development area and surrounding landscape. The Red List of South African Plants (Raimondo *et al.*, 2009; SANBI, 2020) was utilized to provide the most current national conservation status of flora species.

Relevant field guides and texts consulted for identification purposes in the field during the surveys included the following:

- Field Guide to the Wild Flowers of the Highveld (Van Wyk & Malan, 1997);
- A field guide to Wild flowers (Pooley, 1998);
- Guide to Grasses of Southern Africa (Van Oudtshoorn, 1999);
- Orchids of South Africa (Johnson & Bytebier, 2015);
- Guide to the Aloes of South Africa (Van Wyk & Smith, 2014);
- Mesembs of the World (Smith *et al.*, 1998);
- Medicinal Plants of South Africa (Van Wyk *et al.*, 2013);
- Freshwater Life: A field guide to the plants and animals of southern Africa (Griffiths & Day, 2016); and
- Identification guide to southern African grasses. An identification manual with keys, descriptions and distributions (Fish *et al.*, 2015).

Additional information regarding ecosystems, vegetation types, and Species of Conservation Concern (SCC) included the following sources:

- The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2012); and
- Red List of South African Plants (Raimondo *et al.*, 2009; SANBI, 2016).

The field work methodology included the following survey techniques:

- Timed meanders;
- Sensitivity analysis based on structural and species diversity; and
- Identification of floral red-data species.

3.1.3 Desktop Faunal Assessment

The faunal desktop assessment comprised the following:

- Compilation of expected species lists;
- Identification of any Red Data or SCC potentially occurring in the area; and

- Emphasis was placed on the probability of occurrence of species of provincial, national and international conservation importance.

Mammal distribution data was obtained from the following information sources:

- The Mammals of the Southern African Subregion (Skinner & Chimimba, 2005);
- Bats of Southern and Central Africa (Monadjem *et al.*, 2010);
- The 2016 Red List of Mammals of South Africa, Lesotho and Swaziland (www.ewt.org.za) (EWT, 2016); and
- Animal Demography Unit (ADU) - MammalMap Category (MammalMap, 2019) (mammalmap.adu.org.za).

While the Avifauna distribution, and other pertinent data, was obtained from:

- Southern African Bird Atlas Project 2 (SABAP2, 2019);
- Birdlife South Africa (2015);
- Birdlife. (2017). Important Bird Areas Factsheets;
- Checklist of the Birds of the World (Del Hoyo *et al.*, 1996);
- Book of birds of South Africa, Lesotho and Swaziland (Taylor *et al.*, 2015); and
- Roberts – Birds of Southern Africa (Hockey *et al.*, 2005).

A herpetofauna desktop assessment of the possible species in the area was undertaken and attention was paid to the SCCs, sources used included the IUCN (2017) and ADU (2019). Herpetofauna distributional data was obtained from the following information sources:

- South African Reptile Conservation Assessment (SARCA) (sarca.adu.org);
- A Guide to the Reptiles of Southern Africa (Alexander & Marais, 2007);
- Field guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- Atlas and Red list of Reptiles of South Africa, Lesotho and Swaziland (Bates *et al.*, 2014);
- A Complete Guide to the Frogs of Southern Africa (du Preez & Carruthers, 2009);
- Animal Demography Unit (ADU) - FrogMAP (frogmap.adu.org.za);
- Atlas and Red Data Book of Frogs of South Africa, Lesotho and Swaziland (Mintner *et al.*, 2004); and
- Ensuring a future for South Africa's frogs (Measey, 2011).

3.2 Biodiversity Field Assessment

Three separate surveys were undertaken; one from January 26th - 27th 2023, another during the 11th - 13th of April 2023, another 10th - 11th of October 2023, which constitutes wet-season surveys, to determine the presence of Species of Conservation Concern (SCC) and to ascertain an overview of the ecological condition of the PAOI. Effort was made to cover the different habitat types within the limits of time and access. The fieldwork was placed within targeted areas perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation) and GIS analysis (which included the latest applicable biodiversity datasets) available prior to the fieldwork.

3.2.1 Flora Survey

The fieldwork and sample sites were placed within targeted areas (i.e. target sites) perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation)

and GIS analysis (which included the latest applicable biodiversity datasets) available prior to the fieldwork. The focus of the fieldwork was therefore to maximise coverage and navigate to each target site in the field to perform a vegetation and ecological assessment. Emphasis was placed on sensitive habitats, especially those overlapping with the proposed opencast areas.

Homogenous vegetation units were subjectively identified using satellite imagery and existing land cover maps. The floristic diversity and search for flora SCC were conducted through timed meanders within representative habitat units delineated during the scoping fieldwork. Emphasis was placed mostly on sensitive habitats overlapping with the proposed PAOIs.

The timed random meander method is a highly efficient method for conducting floristic analysis, specifically in detecting flora SCC and maximising floristic coverage. In addition, the method is time and cost effective and highly suited for compiling flora species lists and therefore gives a rapid indication of flora diversity. The timed meander search was performed based on the original technique described by Goff *et al.* (1982). Suitable habitat for SCC were identified according to Raimondo *et al.* (2009) and targeted as part of the timed meanders.

At each sample site notes were made regarding current impacts (e.g. livestock grazing, erosion etc.), subjective recording of dominant vegetation species and any sensitive features (e.g. wetlands, outcrops etc.). In addition, opportunistic observations were made while navigating through the PAOI.

3.2.2 Fauna Survey

The faunal assessment within this report pertains to herpetofauna (amphibians and reptiles) avifauna and mammals. The field survey component of the assessment utilised a variety of sampling techniques including, but not limited to, the following:

- Visual and auditory searches - This typically comprised of meandering and using binoculars to view species from a distance without them being disturbed as well as listening to species calls;
- Identification of tracks and signs; and
- Utilization of local knowledge.

Site selection for trapping focussed on the representative habitats within the PAOI. Sites were selected based on GIS mapping and Google Earth imagery and then the final selection was confirmed through ground-truthing during the surveys.

The herpetofauna field assessment was conducted in each habitat or vegetation type within the PAOI, as identified from the desktop assessment, with a focus on those areas which will be most impacted by the proposed development (i.e. the infrastructure development and waste dumping areas). The herpetological field survey comprised the following techniques:

- Hand searching is used for reptile species that shelter in or under particular habitats. Visual searches, typically undertaken for species which activities occur on surfaces or for species that are difficult to detect by hand-searches or trap sampling. Active hand-searches - are used for species that shelter in or under particular micro-habitats (typically rocks, exfoliating rock outcrops, fallen trees, leaf litter, bark etc.).

3.3 Terrestrial Site Ecological Importance

The different habitat types within the PAOI were delineated and identified based on observations during the field assessment, and available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of species of conservation concern and their ecosystem processes.

Site Ecological Importance (SEI) is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and Receptor Resilience (RR) (its resilience to impacts) as follows.

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows. The criteria for the CI and FI ratings are provided in Table 3-1 and Table 3-2, respectively.

Table 3-1 Summary of Conservation Importance (CI) criteria

| Conservation Importance | Fulfilling Criteria |
|-------------------------|---|
| Very High | Confirmed or highly likely occurrence of Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Extremely Rare or CR species that have a global extent of occurrence (EOO) of < 10 km ² . Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of an EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population). |
| High | Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km ² . IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population). |
| Medium | Confirmed or highly likely occurrence of populations of Near Threatened (NT) species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC. |
| Low | No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC. |
| Very Low | No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining. |

Table 3-2 Summary of Functional Integrity (FI) criteria

| Functional Integrity | Fulfilling Criteria |
|----------------------|--|
| Very High | Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts, with no signs of major past disturbance. |
| High | Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity, with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts, with no signs of major past disturbance and good rehabilitation potential. |
| Medium | Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts, with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential. |
| Low | Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts. |
| Very Low | Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts. |

BI can be derived from a simple matrix of CI and FI as provided in Table 3-3.

Table 3-3 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

| Biodiversity Importance (BI) | | Conservation Importance (CI) | | | | |
|------------------------------|-----------|------------------------------|-----------|----------|----------|----------|
| | | Very high | High | Medium | Low | Very low |
| Functional Integrity (FI) | Very high | Very high | Very high | High | Medium | Low |
| | High | Very high | High | Medium | Medium | Low |
| | Medium | High | Medium | Medium | Low | Very low |
| | Low | Medium | Medium | Low | Low | Very low |
| | Very low | Medium | Low | Very low | Very low | Very low |

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor, as summarised in Table 3-4.

Table 3-4 Summary of Resource Resilience (RR) criteria

| Resilience | Fulfilling Criteria |
|------------------|---|
| Very High | Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed. |
| High | Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed. |
| Medium | Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed. |
| Low | Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed. |
| Very Low | Habitat that is unable to recover from major impacts, or species that are unlikely to: (i) remain at a site even when a disturbance or impact is occurring, or (ii) return to a site once the disturbance or impact has been removed. |

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 3-5.

Table 3-5 Matrix used to derive Site Ecological Importance from Receptor Resilience (RR) and Biodiversity Importance (BI)

| Site Ecological Importance | | Biodiversity Importance (BI) | | | | |
|----------------------------|-----------|------------------------------|-----------|----------|----------|----------|
| | | Very high | High | Medium | Low | Very low |
| Receptor Resilience (RR) | Very Low | Very high | Very high | High | Medium | Low |
| | Low | Very high | Very high | High | Medium | Very low |
| | Medium | Very high | High | Medium | Low | Very low |
| | High | High | Medium | Low | Very low | Very low |
| | Very High | Medium | Low | Very low | Very low | Very low |

Interpretation of the SEI in the context of the project is provided in Table 3-6.

Table 3-6 *Guidelines for interpreting Site Ecological Importance in the context of the development activities*

| Site Ecological Importance | Interpretation in relation to development activities |
|----------------------------|--|
| Very High | Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains. |
| High | Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities. |
| Medium | Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities. |
| Low | Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities. |
| Very Low | Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required. |

The SEI evaluated for each taxon can be combined into a single multi-taxon evaluation of SEI for the assessment area. Either a combination of the maximum SEI for each receptor should be applied, or the SEI may be evaluated only once per receptor but for all necessary taxa simultaneously. For the latter, justification of the SEI for each receptor is based on the criteria that conforms to the highest CI and FI, and the lowest RR across all taxa.

4 Results and discussion

4.1 Desktop Baseline

4.1.1 Ecologically Important Landscape Features

The following features describe the general area and habitat, this assessment is based on spatial data that are provided by various sources such as the provincial environmental authority and SANBI. The desktop analysis and their relevance to this project are listed in Table 4-1.

Table 4-1 Summary of relevance of the proposed project to ecologically important landscape features.

| Desktop Information Considered | Relevant/Irrelevant | Section |
|--|---|-----------|
| Provincial Conservation Plan | Relevant – The PAOI overlaps with CBA 1, CBA2, ESA1, ESA2, Other and Degraded areas | 4.1.1.1 |
| Ecosystem Threat Status | Irrelevant – PAOI overlaps with a Least Concern and Endangered ecosystem | 4.1.1.2.1 |
| Ecosystem Protection Level | Relevant – Overlaps with a Poorly Protected and Not Protected Ecosystem. | 4.1.1.2.2 |
| South African Inventory of Inland Aquatic Ecosystems | Relevant – The PAOI's 500 m Regulated area overlaps with CR and LC wetlands and a CR River | 4.1.1.3.1 |
| National Freshwater Priority Area and Inland Water | Relevant – The PAOI and its 500 m Regulated area overlaps with both classified and unclassified FEPA wetlands as well as an Unclassified FEPA River | 4.1.1.3.2 |
| Strategic Water Source Areas | Irrelevant – The PAOI is not close to any SWSA | - |
| Protected Areas | Irrelevant – The PAOI is located 2 km from the closest Protected Area | 4.1.1.4 |
| National Protected Areas Expansion Strategy | Irrelevant – The PAOI isn't close to any NPAES | - |
| Important Bird and Biodiversity Areas | Irrelevant – The PAOI is located 63 km from the nearest IBA | - |

4.1.1.1 Biodiversity Spatial Plan

The Free State Department of Environment and Nature Conservation has developed a Free State Biodiversity Sector Plan, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape. The identification of Critical Biodiversity Areas for the Free State was undertaken using a Systematic Conservation Planning approach. Available data on biodiversity features (incorporating both pattern and process, and covering terrestrial and inland aquatic realms), their condition, current Protected Areas and Conservation Areas, and opportunities and constraints for effective conservation were collated. Figure 4-1 indicates that the PAOI overlaps with CBA 1, CBA 2 ESA 1, ESA 2, Other and Degraded areas.

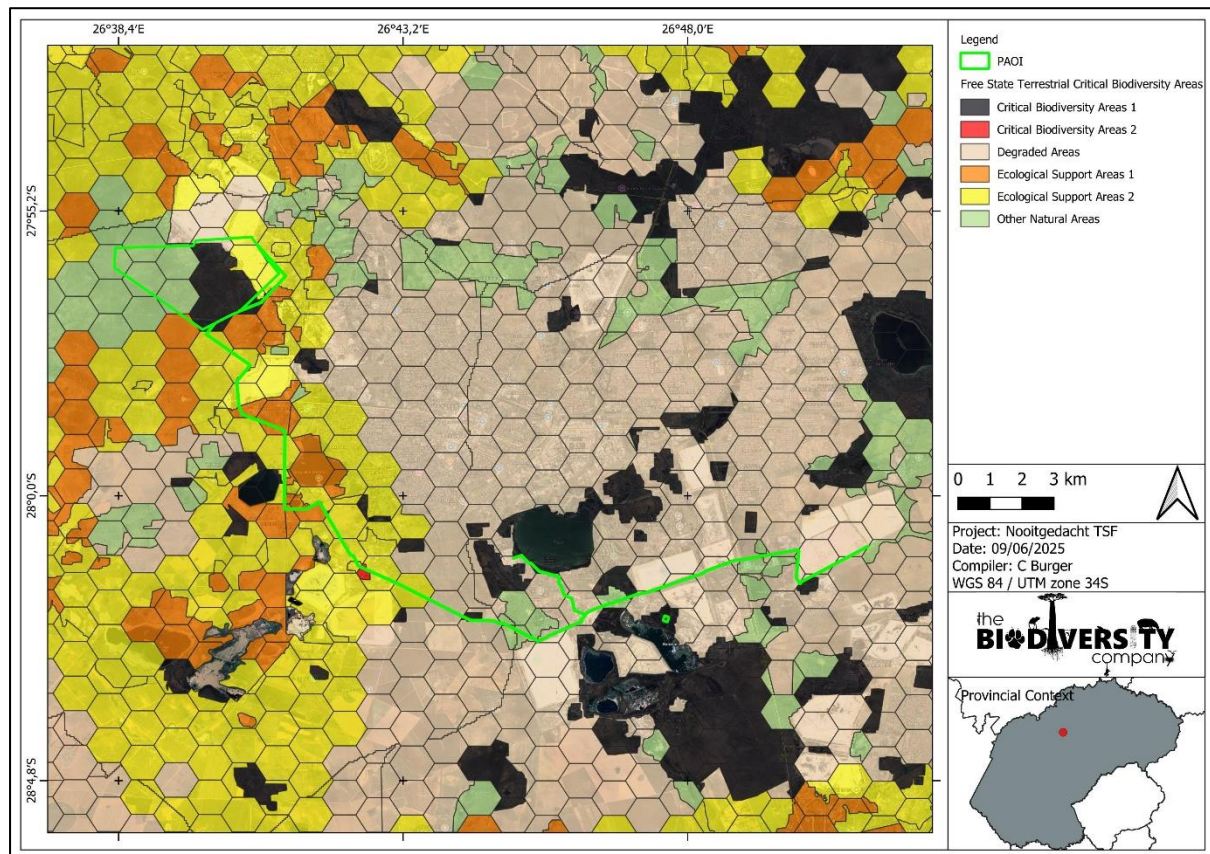


Figure 4-1 PAOI superimposed on the Free State BSP

4.1.1.2 The National Biodiversity Assessment

The National Biodiversity Assessment (NBA) was completed as a collaboration between the SANBI, the DEA and other stakeholders, including scientists and biodiversity management experts throughout the country over a three-year period (Skowno *et al.*, 2019).

The purpose of the NBA is to assess the state of South Africa's biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors (Skowno *et al.*, 2019).

The two headline indicators assessed in the NBA are *ecosystem threat status* and *ecosystem protection level* (Skowno *et al.*, 2019).

4.1.1.2.1 Ecosystem Threat Status

Ecosystem threat status outlines 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 (Skowno *et al.*, 2019).

Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Threatened (LT), based on the proportion of each ecosystem type that remains in good ecological condition (Skowno *et al.*, 2019).

The PAOI was superimposed on the terrestrial ecosystem threat status (Figure 4-2). According to the spatial dataset the proposed development overlaps with a Least Concern and Endangered ecosystem.

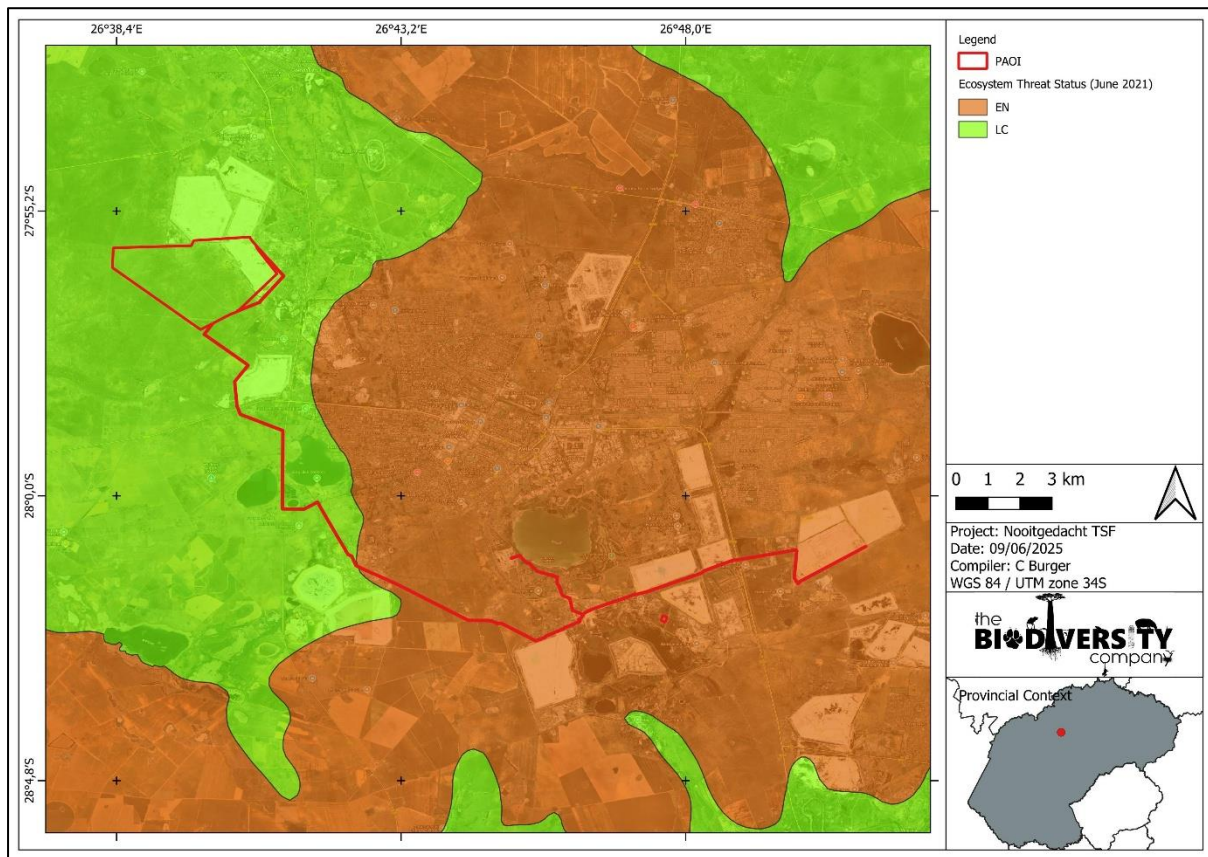


Figure 4-2 The PAOI showing the regional ecosystem threat status of the associated terrestrial ecosystems (NBA, 2018)

4.1.1.2.2 Ecosystem Protection Level

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 Protected Areas Act (Skowno *et al.*, 2019).

The PAOI was superimposed on the ecosystem protection level map to assess the protection status of terrestrial ecosystems associated with the development (Figure 4-3). The proposed development overlaps with a NP and PP ecosystems.

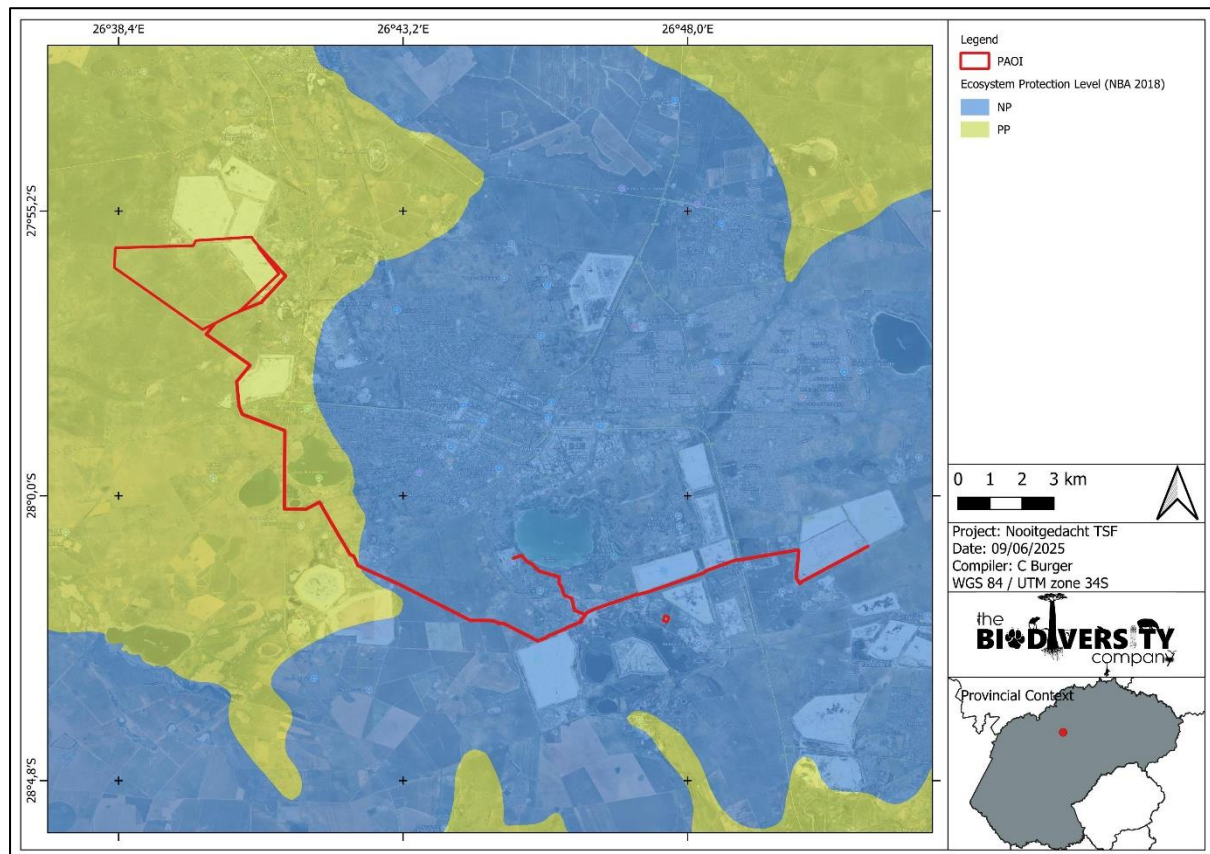


Figure 4-3 The PAOI showing the regional level of protection of terrestrial ecosystems (NBA, 2018)

4.1.1.3 Hydrological Setting

4.1.1.3.1 SAIIE

According to the SAIIE database, the PAOI's 500 m Regulated area overlaps with CR and LC wetlands and a CR River (Figure 4-4).

'Critically Endangered' systems are considered to be at an extremely high risk of collapse. Most of the ecosystem type has been severely or moderately modified from its natural state and 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 (SANBI, 2019).

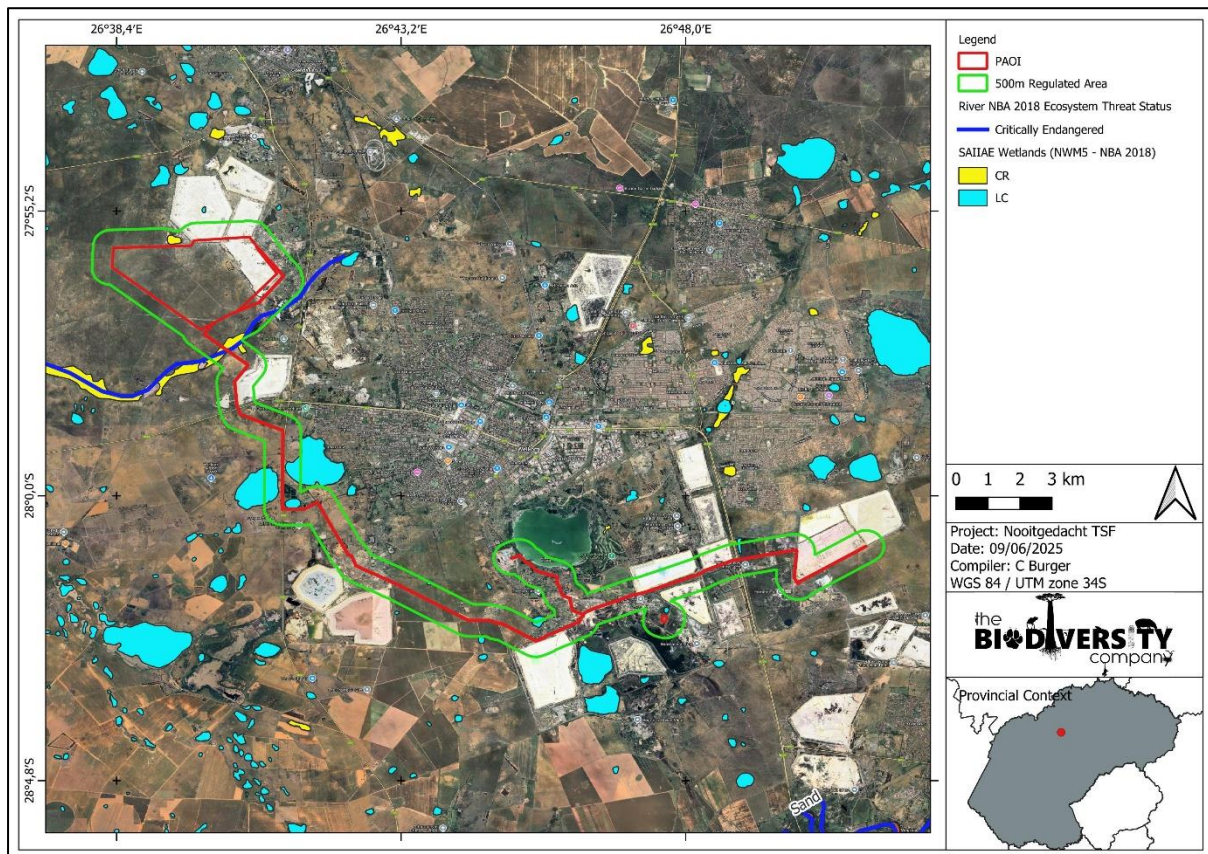


Figure 4-4 Map illustrating the hydrological context of the assessment area based on the NBA spatial dataset (2018)

4.1.1.3.2 National Freshwater Ecosystem Priority Areas

Freshwater Ecosystem Priority Areas (FEPAs) (Driver *et al.*, 2011) are intended to be conservation support tools and are envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act (NEM:BA) biodiversity goals (Nel *et al.*, 2011).

The PAOI and its 500 m Regulated Area overlaps with both classified and unclassified FEPA wetlands as well as an Unclassified FEPA River (Figure 4-5).

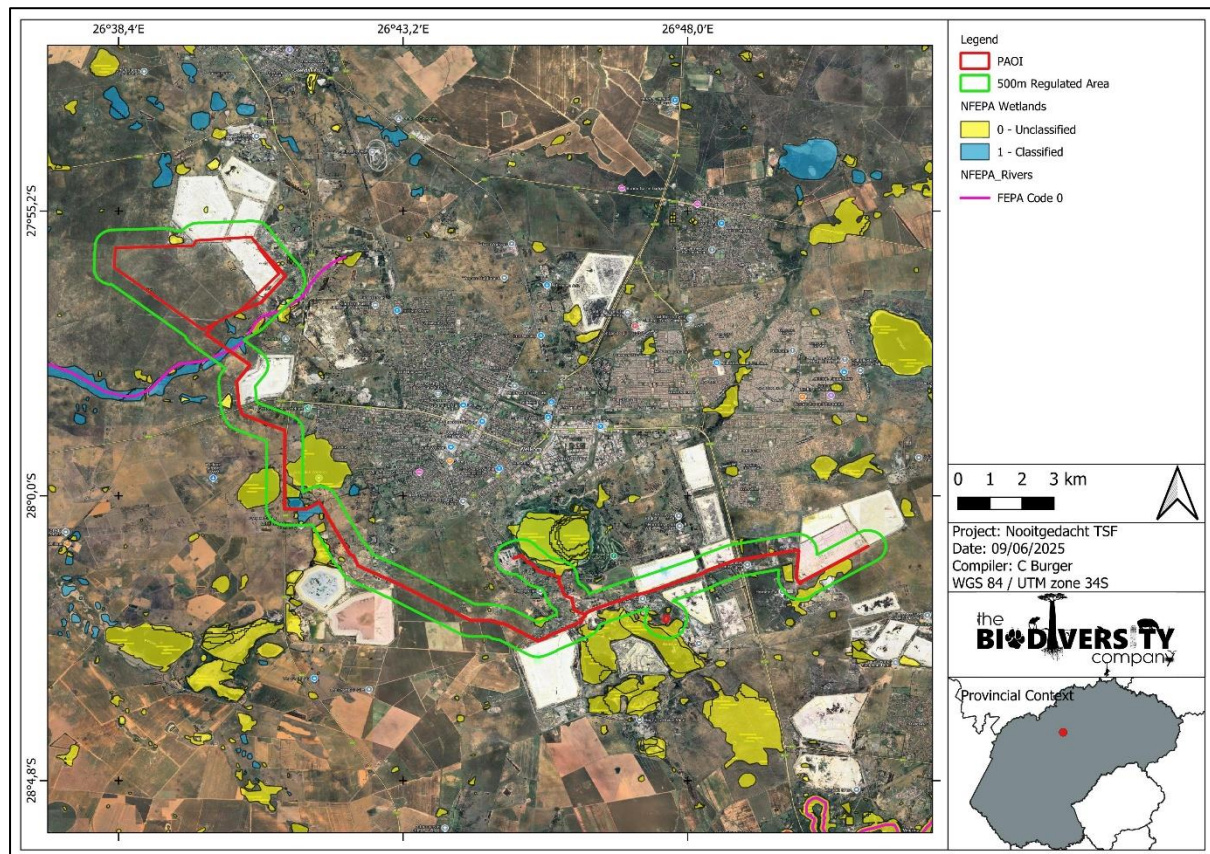


Figure 4-5 Map illustrating the hydrological context of the assessment area based on the NFEPA spatial dataset (2011)

4.1.1.4 Protected Areas

According to the protected area spatial datasets from SAPAD (2023) and SACAD (2023), the Thabong Game Ranch is located 2 km east of the PAOI (Figure 4-6).

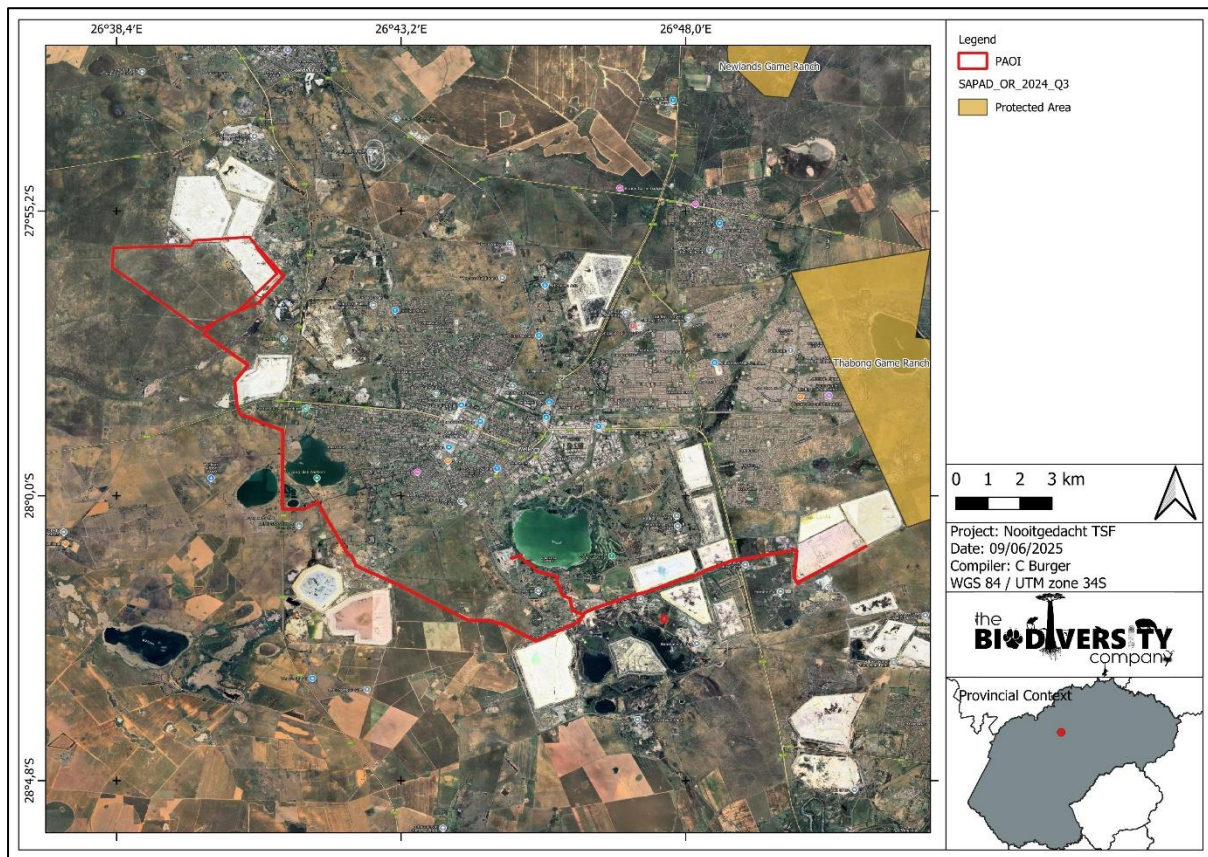


Figure 4-6 The PAOI in relation to the protected areas

4.1.2 Environmental Screening Tool

The terrestrial biodiversity theme sensitivity, as indicated in the screening report, was derived to be Very High, (Figure 4-7), the animal species theme sensitivity is assigned a high sensitivity and the plant species theme sensitivity is assigned a Very High sensitivity (Figure 4-8 and Figure 4-9). The Very High terrestrial theme sensitivity is mainly attributed to the CBA/ESA present in the area as well as EN Ecosystem. The High sections of animal species theme sensitivity are attributed to sensitive species expected to occur in certain areas/habitats. The Very High sensitivity attributed to the Plant theme is the potential presence of one sensitive species.

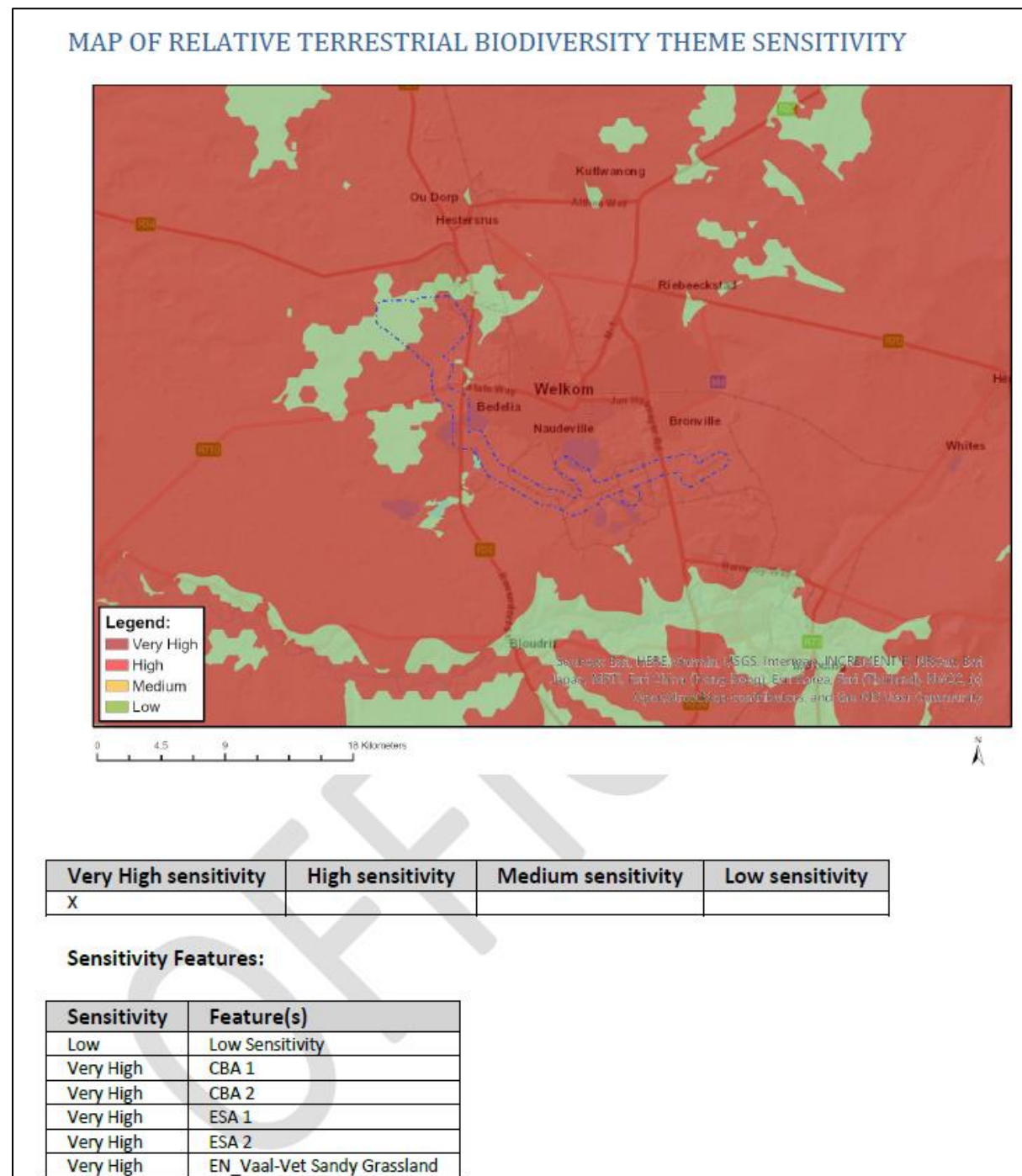
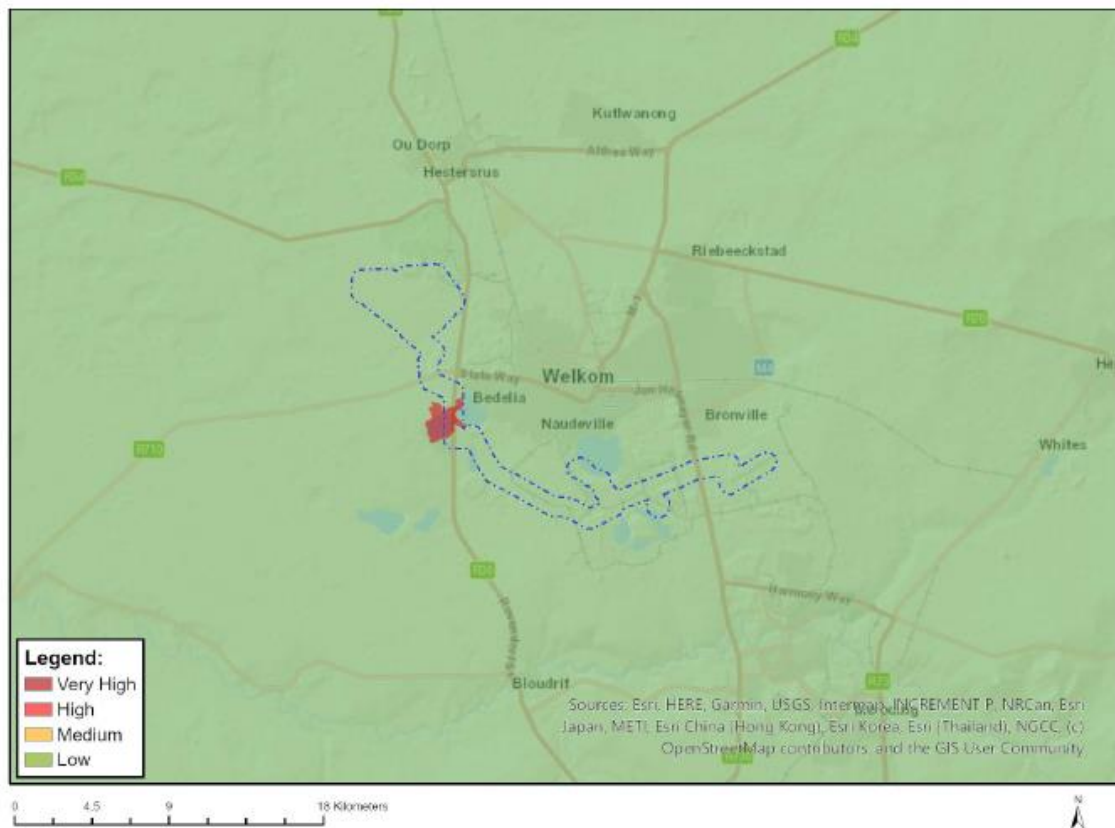


Figure 4-7 Terrestrial Biodiversity Theme Sensitivity for the PAOI, National Web based Environmental Screening Tool.

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|-----------------------|------------------|--------------------|-----------------|
| X | | | |

Sensitivity Features:

| Sensitivity | Feature(s) |
|-------------|-----------------------|
| Low | Low Sensitivity |
| Very High | Sensitive species 164 |

Figure 4-8 Plant Theme Sensitivity for the PAOI, National Web based Environmental Screening Tool.

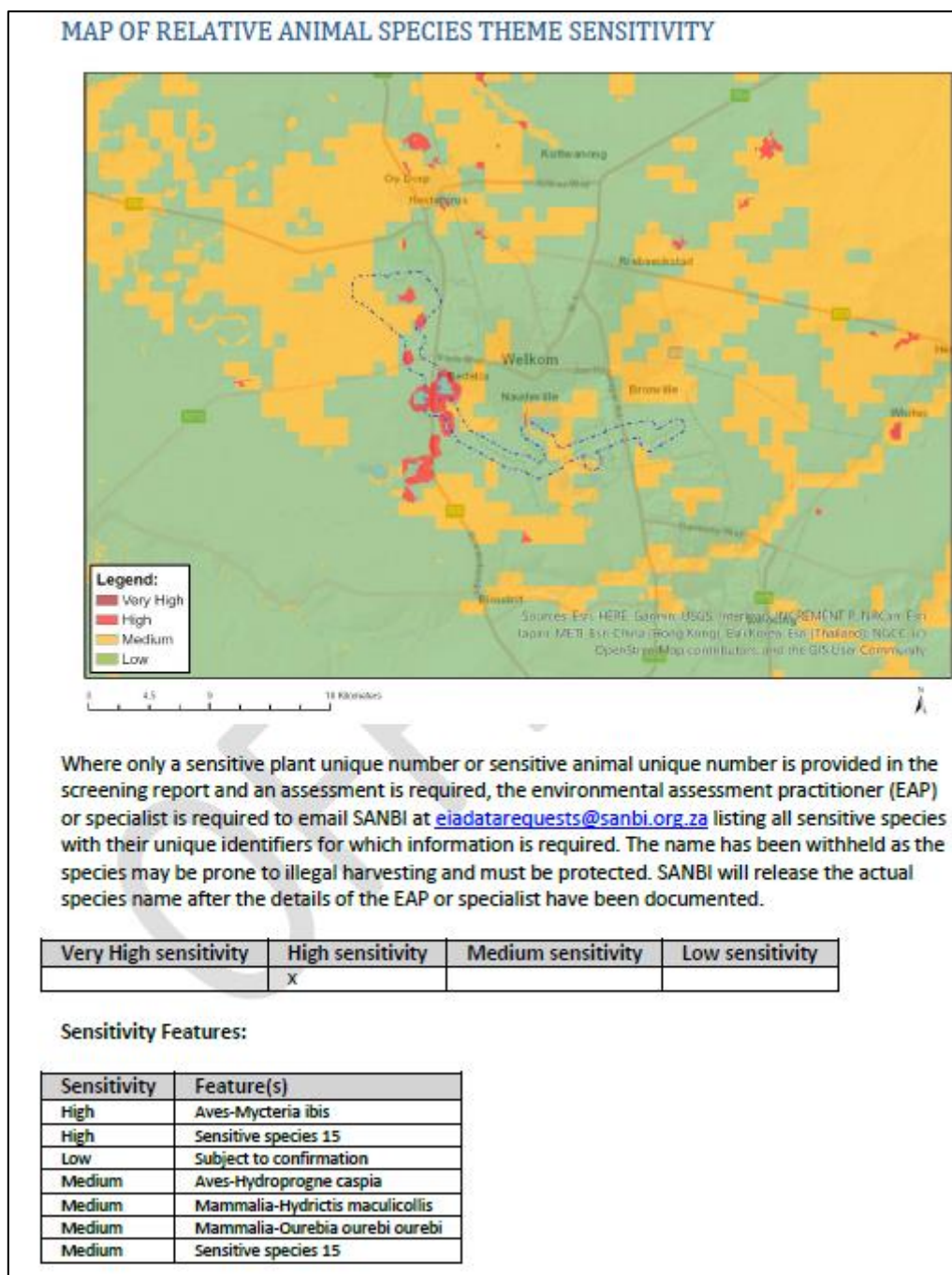


Figure 4-9 Animal Theme Sensitivity for the PAOI, National Web based Environmental Screening Tool.

4.1.3 Desktop Vegetation Baseline

This section is divided into a description of the vegetation type expected under natural conditions and the expected flora species.

4.1.3.1 Vegetation Types

The PAOI is situated within the Grassland biome. This biome is centrally located in southern Africa, and adjoins all except the desert, fynbos and succulent Karoo biomes (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the grassland biome include:

- a) Seasonal precipitation; and
- b) The minimum temperatures in winter (Mucina & Rutherford, 2006).

The grassland biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal and the Eastern Cape. The topography is mainly flat and rolling but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level.

Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Thus, trees are typically absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

On a fine-scale vegetation type, the PAOI overlaps with the Western Free State Clay Grassland and the Vaal-Vet Sandy Grassland Vegetation Types (Figure 4-10).

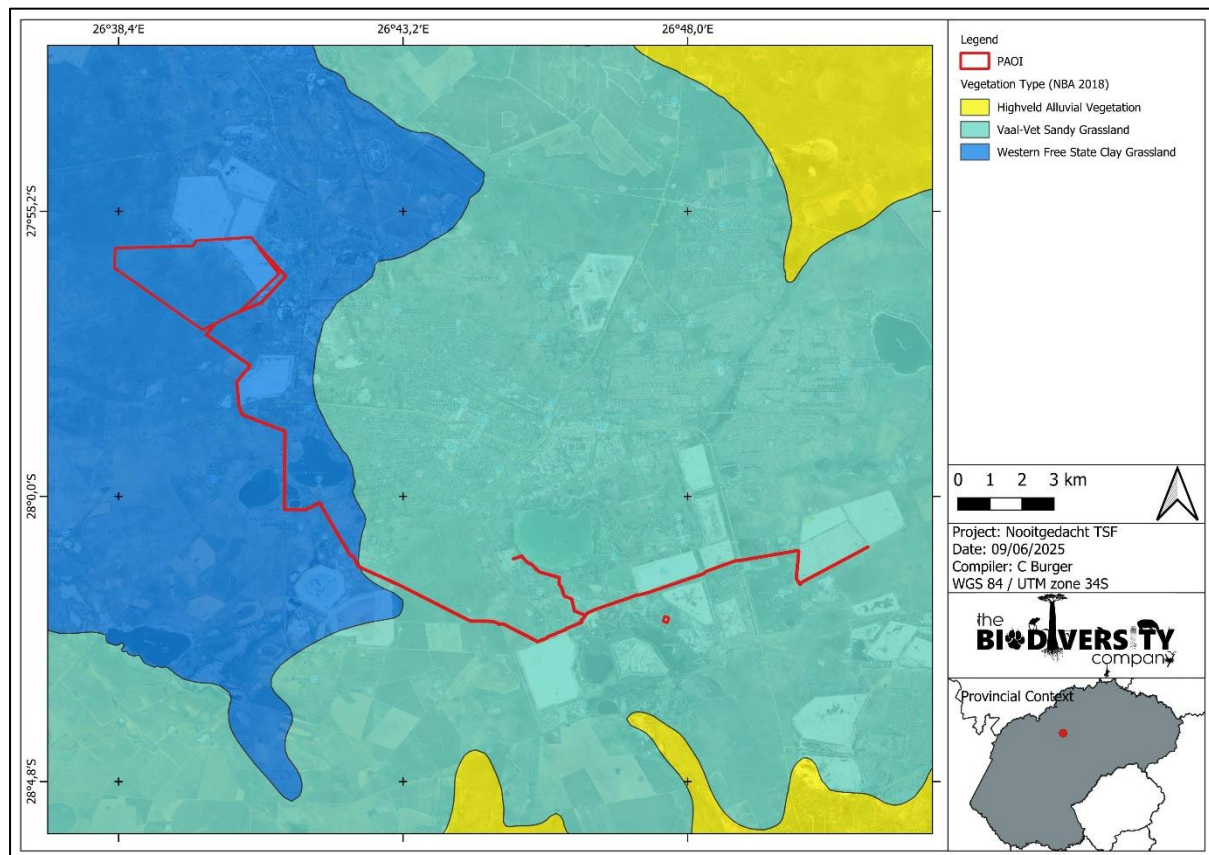


Figure 4-10 The PAOI showing the vegetation type based on the Vegetation Map of South Africa, Lesotho & Swaziland (BGIS, 2018)

4.1.3.1.1 Western Free State Clay Grassland

Flat areas which support dry species, known as poor grassland with a high number of salt pans embedded. Dwarf karoo shrublands surround the playas in disturbed habitats.

Important Taxa

Important plant taxa are those species that have a high abundance, a frequent occurrence or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006).

The following species are important in the Western Free State Clay Grassland vegetation type d=dominant:

Graminoids: *Aristida adscensionis* (d), *A. bipartita* (d), *Cynodon dactylon* (d), *Eragrostis chloromelas* (d), *E. lehmanniana* (d), *Panicum coloratum* (d), *Themeda triandra* (d), *Aristida congesta*, *Cymbopogon pospischilii*, *Digitaria eriantha*, *Eragrostis bicolor*, *E. curvula*, *E. micrantha*, *E. obtusa*, *E. plana*, *E. superba*, *E. trichophora*, *Heteropogon contortus*, *Setaria nigrirostris*, *Tragus berteronianus*, *T. koelerioides*, *T. racemosus*.

Herbs: *Berkheya onopordifolia* var. *onopordifolia*, *Chamaesyce inaequilatera*, *Gnaphalium declinatum*, *Indigofera alternans*, *Kohautia cynanchica*, *Nidorella microcephala*, *Platycarpha parvifolia*, *Salvia stenophylla*, *Selago paniculata*, *Stachys spathulata*.

Geophytic Herbs: *Bulbine narcissifolia*, *Oxalis depressa*.

Succulent Herb: *Tripteris aghillana* var. *integrifolia*.

Low Shrubs: *Lycium cinereum* (d), *Pentzia globosa* (d), *Amphiglossa triflora*, *Aptosimum elongatum*, *Berkheya annectens*, *Felicia filifolia* subsp. *filifolia*, *F. muricata*, *Gnidia polycephala*, *Helichrysum dregeanum*, *Melolobium candicans*, *Nenax microphylla*, *Rosenia humilis*, *Selago saxatilis*.

Succulent Shrub: *Hertia pallens*.

Conservation status

Least threatened with a conservation target of 24%. None conserved in statutory conservation areas. Almost 20% already transformed for maize and wheat cultivation. Erosion very low (38%), low (30%) and moderate (28%).

4.1.3.1.2 Vaal Vet Sandy Grassland

This vegetation type is a plains-dominated landscape with some scattered, slightly undulating plains and hills. Mainly low-tussock grasslands with an abundant karroid element occurs here. Dominance of *Themeda triandra* is an important feature of this vegetation unit. Locally low cover of *T. triandra* and the associated increase in *Elionurus muticus*, *Cymbopogon pospischilii* and *Aristida congesta* is attributed to heavy grazing and/or erratic rainfall (Mucina & Rutherford, 2006).

Important Taxa

Important plant taxa are those species that have a high abundance, a frequent occurrence or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006).

The following species are important in the Vaal Vet Sandy Grassland vegetation type, d=dominant:

Graminoids: *Antheophora pubescens* (d), *Aristida congesta* (d), *Chloris virgata* (d), *Cymbopogon caesius* (d), *Cynodon dactylon* (d), *Digitaria argyrograptia* (d), *Elionurus muticus* (d), *Eragrostis chloromelas* (d), *E. lehmanniana* (d), *E. plana* (d), *E. trichophora* (d), *Heteropogon contortus* (d), *Panicum gilvum* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Tragus berteronianus* (d), *Brachiaria serrata*, *Cymbopogon pospischilii*, *Digitaria eriantha*, *Eragrostis curvula*, *E. obtusa*, *E. superba*, *Panicum coloratum*, *Pogonarthria squarrosa*, *Trichoneura grandiglumis*, *Triraphis andropogonoides*.

Herbs: *Stachys spathulata* (d), *Barleria macrostegia*, *Berkheya onopordifolia* var. *onopordifolia*, *Chamaesyce inaequilatera*, *Geigeria aspera* var. *aspera*, *Helichrysum caespititium*, *Hermannia*

depressa, *Hibiscus pusillus*, *Monsonia burkeana*, *Rhynchosia adenodes*, *Selago densiflora*, *Vernonia oligocephala*.

Geophytic Herbs: *Bulbine narcissifolia*, *Ledebouria marginata*. Succulent Herb: *Tripteris aghillana* var. *integrifolia*.

Low Shrubs: *Felicia muricata* (d), *Pentzia globosa* (d), *Anthospermum rigidum* subsp. *pumilum*, *Helichrysum dregeanum*, *H. paronychioides*, *Ziziphus zeyheriana*.

Endemic Taxon

Herb: *Lessertia phillipsiana*.

Conservation status

This vegetation type is classified as Endangered according to Mucina and Rutherford (2006). The conservation target for this vegetation type is 24% with only 0.3% statutorily conserved in the Bloemhof Dam, Schoonspruit, Sandveld, Faan Meintjies, Wolwespruit and Soetdoring Nature Reserves. More than 63% has been transformed for cultivation (ploughed for commercial crops) and the rest under strong grazing pressure from cattle and sheep.

4.1.3.2 Plant Species of Conservation Concern

Based on the Plants of Southern Africa (BODATSA-POSA, 2022) database, 455 plant species have the potential to occur in the PAOI and its surroundings (Figure 4-11) and can be seen in (Appendix B). Of these 455 plant species, no species are listed as being Species of Conservation Concern (SCC).

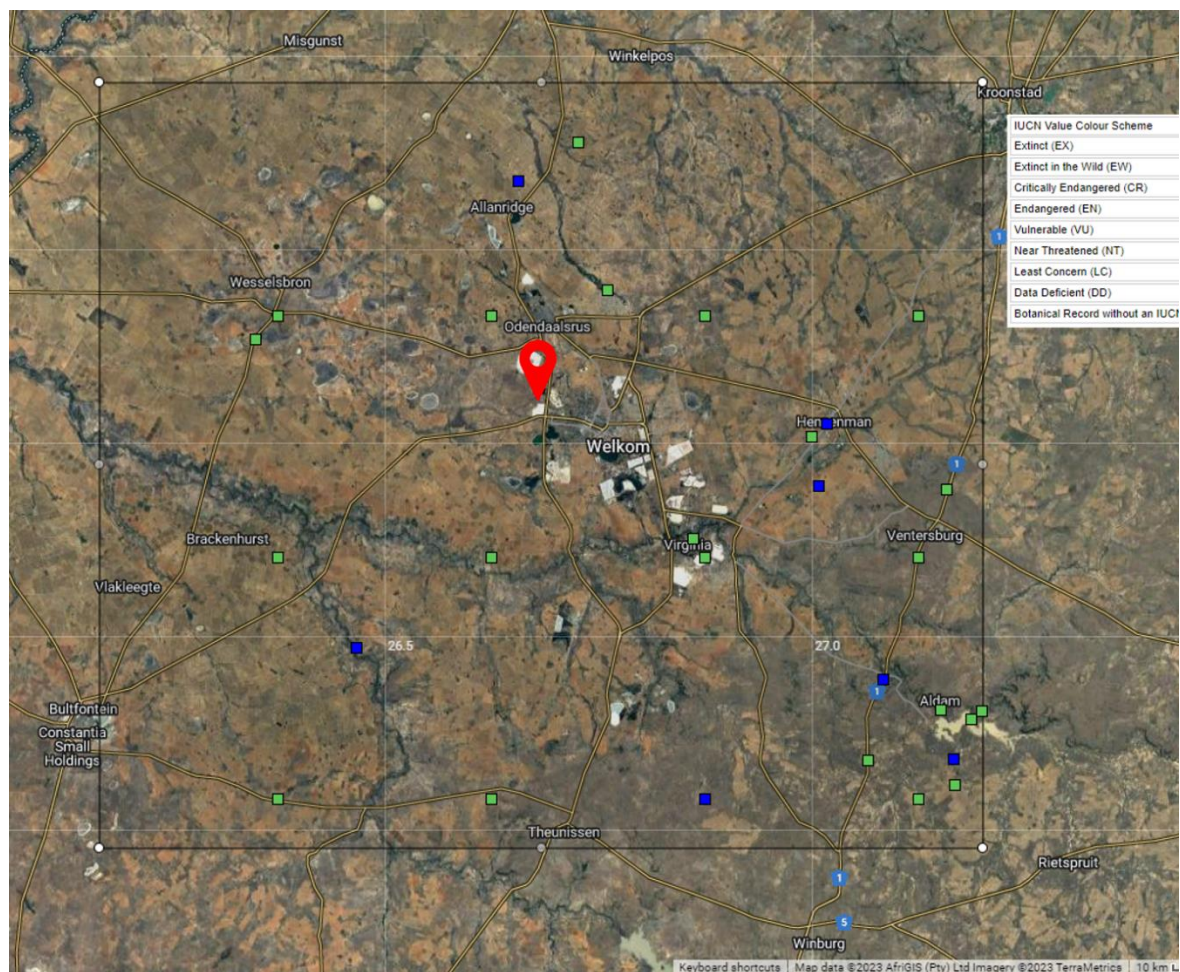


Figure 4-11 Map showing the grid drawn in order to compile an expected plant species list (BODATSA-POSA). The icon indicates the general project location.

4.1.4 Desktop Faunal Baseline

4.1.4.1.1 Avifauna

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 236 bird species have the potential to occur in the vicinity of the PAOI. The full list of potential bird species is provided in Appendix C. The SCC expected can be seen in Table 4-2; and eleven of these have a moderate-high likelihood of occurrence based on the suitable habitat and food sources present in the PAOI. One species were confirmed during a field assessment. The DEA Screening Tool lists one high and one medium sensitivity species that can be expected within the PAOI.

Table 4-2 List of bird species of regional or global conservation importance that are expected to occur in close vicinity to the PAOI.

| Species | Common Name | Conservation Status | | Likelihood of occurrence | Screening Tool Sensitivity |
|---------------------------------|-------------------------|---------------------|--------|--------------------------|----------------------------|
| | | Regional | Global | | |
| <i>Calidris ferruginea</i> | Sandpiper, Curlew | LC | NT | High | |
| <i>Charadrius pallidus</i> | Plover, Chestnut-banded | NT | NT | Moderate | |
| <i>Ciconia abdimii</i> | Stork, Abdim's | NT | LC | Low | |
| <i>Ciconia nigra</i> | Stork, Black | VU | LC | Low | |
| <i>Eupodotis caerulescens</i> | Korhaan, Blue | LC | NT | Moderate | |
| <i>Falco biarmicus</i> | Falcon, Lanner | VU | LC | Moderate | |
| <i>Gyps africanus</i> | Vulture, White-backed | CR | CR | Moderate | |
| <i>Hydroprogne caspia</i> | Tern, Caspian | VU | LC | Moderate | Medium |
| <i>Mycteria ibis</i> | Stork, Yellow-billed | EN | LC | Confirmed | High |
| <i>Oxyura maccoa</i> | Duck, Maccoa | NT | VU | High | |
| <i>Phoeniconaias minor</i> | Flamingo, Lesser | NT | NT | High | |
| <i>Phoenicopterus roseus</i> | Flamingo, Greater | NT | LC | High | |
| <i>Rostratula benghalensis</i> | Painted-snipe, Greater | NT | LC | High | |
| <i>Sagittarius serpentarius</i> | Secretarybird | EN | EN | Moderate | |

Calidris ferruginea (Curlew Sandpiper) is migratory species which breeds on slightly elevated areas in the lowlands of the high Arctic and may be seen in parts of South Africa during winter. During winter, the species occurs at the coast, but also inland on the muddy edges of marshes, large rivers and lakes (both saline and freshwater), irrigated land, flooded areas, dams and salt pans (IUCN, 2017). Due to the presence of some suitable habitat within the PAOI the likelihood of occurrence of this species was rated as high.

Charadrius pallidus (Chestnut-banded Plover) is listed as near threatened on a regional and a global scale. The species is found in salt lakes and estuaries, they do migrate inland when the coastal waters dry up. The likelihood of this species occurring in the project area is moderate.

Eupodotis caerulescens (Blue Korhaan) is listed as near threatened according to the IUCN (2017). Their moderately rapid decline is accredited to habitat loss that is a result of intensive agriculture. They are found in high grassveld in close proximity to water, usually above an altitude of 1 500m (del Hoyo, et al., 1996). The species nests in bare open ground, situated in thick grass or cropland. Based on the required habitat the likelihood of occurrence of this species is rated as moderate.

Falco biarmicus (Lanner Falcon) is native to South Africa and inhabits a wide variety of habitats, from lowland deserts to forested mountains (IUCN, 2017). They may occur in groups up to 20 individuals but have also been observed solitary. Their diet is mainly composed of small birds such as pigeons and

francolins. The likelihood of incidental records of this species in the PAOI is rated as high due to the presence of many bird species on which Lanner Falcons may predate.

Gyps africanus (White-backed Vulture) has a large range and only occurs throughout sub-Saharan Africa. Primarily a lowland species of open wooded savanna, particularly areas of *Acacia* (*Vachellia*). It requires tall trees for nesting. According to the IUCN (2017) this species faces similar threats to other African vultures, being susceptible to habitat conversion to agro-pastoral systems, loss of wild ungulates leading to a reduced availability of carrion, hunting for trade, persecution, and poisoning. The likelihood of suitably large trees for nesting for this species is low at the project site, but due to the presence of game and livestock on the property, the likelihood of occurrence for the species is moderate.

Hydroprogne caspia (Caspian Tern) is native to South Africa and are known to occur in inland freshwater systems such as large rivers, creeks, floodlands, reservoirs and sewage ponds. Habitat suitability was found to be moderate and thus the likelihood of occurrence is moderate.

Mycteria ibis (Yellow-billed Stork) is listed as EN on a regional scale and LC on a global scale. This species is migratory and has a large distributional range which includes much of sub-Saharan Africa. It is typically associated with freshwater ecosystems, especially wetlands and the margins of lakes and dams (IUCN, 2017). The species were confirmed during a site visit.

Oxyura maccoa (Maccoa Duck) has a large northern and southern range, South Africa is part of its southern distribution. During the species' breeding season, it inhabits small temporary and permanent inland freshwater lakes, preferring those that are shallow and nutrient-rich with extensive emergent vegetation such as reeds (*Phragmites* spp.) and cattails (*Typha* spp.) on which it relies for nesting (IUCN, 2017). The likelihood of occurrence in the PAOI is rated as high due to the availability of suitable habitat.

Phoeniconaias minor (Lesser Flamingo) is listed as NT on a global and regional scale whereas *Phoenicopterus roseus* (Greater Flamingo) is listed as NT on a regional scale only. Both species have similar habitat requirements, and the species breed on large undisturbed alkaline and saline lakes, salt pans or coastal lagoons, usually far out from the shore after seasonal rains have provided the flooding necessary to isolate remote breeding sites from terrestrial predators and the soft, muddy material for nest building (IUCN, 2017). Suitable habitat is located in close proximity to the PAOI and therefore the likelihood of occurrence is rated as high.

Rostratula benghalensis (Greater Painted-snipe) shows a preference for recently flooded areas in shallow lowland freshwater temporary or permanent wetland, it has a wide range of these freshwater habitats which they occur in, in this case, sewage pools, reservoirs, mudflats overgrown with marsh grass which may possibly exist within the PAOI, thus the likelihood of occurrence is high.

Sagittarius serpentarius (Secretarybird) occurs in sub-Saharan Africa and inhabits grasslands, open plains, and lightly wooded savanna. It is also found in agricultural areas and sub-desert (IUCN, 2017). The likelihood of occurrence in the PAOI is rated as moderate due to the availability of suitable habitat.

4.1.4.1.2 Mammals

The IUCN Red List Spatial Data and the MammalMap database lists 89 mammal species that could be expected to occur within the area (Appendix D). This list excludes large mammal species that are normally limited to protected areas, however, these are still included in the appendices. Ten (10) of these expected species are regarded as SCC. The DEA Screening Tool lists no additional species.

Table 4-3 List of mammal species of conservation concern that may occur in the PAOI as well as their global and regional conservation statuses.

| Species | Common Name | Conservation Status | | Likelihood of occurrence |
|-----------------------|---------------------|---------------------|--------|--------------------------|
| | | Regional | Global | |
| <i>Aonyx capensis</i> | Cape Clawless Otter | NT | NT | Low |

| | | | | |
|-------------------------------|---------------------------------|----|----|----------|
| <i>Atelerix frontalis</i> | South Africa Hedgehog | NT | LC | Moderate |
| <i>Eidolon helvum</i> | African Straw-colored Fruit Bat | LC | NT | Low |
| <i>Felis nigripes</i> | Black-footed Cat | VU | VU | Low |
| <i>Hydrictis maculicollis</i> | Spotted-necked Otter | VU | NT | Low |
| <i>Leptailurus serval</i> | Serval | NT | LC | Moderate |
| <i>Mystromys albicaudatus</i> | White-tailed Rat | VU | EN | Low |
| <i>Panthera pardus</i> | Leopard | VU | VU | Low |
| <i>Parahyaena brunnea</i> | Brown Hyaena | NT | NT | Low |
| <i>Poecilogale albinucha</i> | African Striped Weasel | NT | LC | Moderate |

Atelerix frontalis (South African Hedgehog) has a tolerance of a degree of habitat modification and occurs in a wide variety of semi-arid and sub-temperate habitats (IUCN, 2017). Based on the Red List of Mammals of South Africa, Lesotho and Swaziland (2016), *A. frontalis* populations are decreasing due to the threats of electrocution, veld fires, road collisions, predation from domestic pets and illegal harvesting. Although the species is cryptic and therefore not often seen, there is suitable habitat in the PAOI and therefore the likelihood of occurrence is rated as moderate.

Leptailurus serval (Serval) occurs widely through sub-Saharan Africa and is commonly recorded from most major national parks and reserves (IUCN, 2017). The Serval's status outside reserves is not certain, but they are inconspicuous and may be common in suitable habitat as they are tolerant of farming practices provided there is cover and food available. In sub-Saharan Africa, they are found in habitat with well-watered savanna long-grass environments and are particularly associated with reedbeds and other riparian vegetation types. Due to the presence of suitable habitat in the PAOI the likelihood of occurrence is rated as moderate.

Poecilogale albinucha (African Striped Weasel) is usually associated with savanna habitats, although it probably has a wider habitat tolerance (IUCN, 2017). Due to its secretive nature, it is often overlooked in many areas where it does occur. There is sufficient habitat for this species in the PAOI and the likelihood of occurrence of this species is therefore considered to be moderate.

4.1.4.1.3 Herpetofauna (Reptiles & Amphibians)

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 48 reptile species are expected to occur within the area (Appendix E). One (1) is regarded as SCC and is listed by the DEA Screening Tool as a high sensitivity species (Table 4-4).

Table 4-4 Threatened reptile species that are expected to occur within the PAOI

| Species | Common Name | Conservation Status | | Likelihood of Occurrence | Screening Tool Sensitivity |
|-----------------------------|-------------|---------------------|--------|--------------------------|----------------------------|
| | | Regional | Global | | |
| Sensitive Species 15 | - | VU | VU | Confirmed | High |

Based on the IUCN Red List Spatial Data and AmphibianMap, 17 amphibian species are expected to occur within the area (Appendix F). One of the species are SCCs (Table 4-5).

Table 4-5 Threatened amphibian species that are expected to occur within the PAOI

| Species | Common Name | Conservation Status | | Likelihood of Occurrence |
|-------------------------------|----------------|---------------------|--------|--------------------------|
| | | Regional | Global | |
| <i>Pyxicephalus adspersus</i> | Giant Bullfrog | NT | LC | High |

The Giant Bull Frog (*Pyxicephalus adspersus*) is a species of conservation concern that may potentially occur in the PAOI. The Giant Bull Frog is listed as NT on a regional scale. It is a species of drier savannahs. It is fossorial for most of the year, remaining buried in cocoons. They emerge at the start of the rains, and breed in shallow, temporary waters in pools, pans and ditches (IUCN, 2017). The likelihood of occurrence in the PAOI is rated as high due to the availability of suitable habitat.

4.2 Field Survey

The following sections provide the results from the field survey for the proposed development that was undertaken during the survey.

4.2.1 Flora Assessment

This section is divided into the following sections:

- Indigenous flora;
 - Protected plant species; and
- Alien and Invasive Plants (AIPs).

4.2.1.1 Indigenous Flora

The vegetation assessment was conducted throughout the extent of the PAOI. A total of 60 tree, shrub, herbaceous and graminoid plant species were recorded in the PAOI during the field assessment (Table 4-6). No SCC species were recorded nor are expected due to the nature of the POAI.

The list of plant species recorded is by no means comprehensive, and repeated surveys during different phenological periods not covered may likely yield up to 20% additional flora species for the PAOI. However, floristic analysis conducted to date is regarded as a sound representation of the local flora for the PAOI.

Table 4-6 Trees, shrub and herbaceous plant species recorded in the PAOI.

| Family | Scientific Name | Threat Status (SANBI) | SA Endemic |
|-----------------|---|-------------------------|-------------|
| Amaryllidaceae | <i>Ammocharis coranica</i> | LC-Schedule 6 Protected | Not Endemic |
| Anacardiaceae | <i>Searsia lancea</i> | LC | Not Endemic |
| Anacardiaceae | <i>Searsia leptodictya</i> | LC | Not Endemic |
| Asclepiadaceae | <i>Gomphocarpus fruticosus</i> subsp. <i>fruticosus</i> | LC | Not Endemic |
| Asparagaceae | <i>Asparagus cooperi</i> | LC | Not Endemic |
| Asparagaceae | <i>Asparagus laricin</i> | LC | Not Endemic |
| Asphodelaceae | <i>Bulbine abyssinica</i> | LC | Not Endemic |
| Asteraceae | <i>Cotula anthemoides</i> | LC | Not Endemic |
| Asteraceae | <i>Felicia muricata</i> subsp. <i>muricata</i> | LC | Not Endemic |
| Asteraceae | <i>Geigeria burkei</i> | LC | Not Endemic |
| Asteraceae | <i>Nidorella anomala</i> | LC | Not Endemic |
| Asteraceae | <i>Stoebe plumosa</i> | LC | Not Endemic |
| Asteraceae | <i>Pseudognaphalium oligandrum</i> | LC | Not Endemic |
| Cyperaceae | <i>Cyperus congestus</i> | LC | Not Endemic |
| Cyperaceae | <i>Cyperus difformis</i> | LC | Not Endemic |
| Cyperaceae | <i>Schoenoplectus muricin</i> | LC | Not Endemic |
| Caryophyllaceae | <i>Pollichia campestris</i> | LC | Not Endemic |

| | | | |
|------------------|---|-------------------------|-------------|
| Combretaceae | <i>Combretum erythrophyllum</i> | LC | Not Endemic |
| Fabaceae | <i>Vachellia karroo</i> | LC | Not Endemic |
| Hyacinthaceae | <i>Eucomis autumnalis</i> | LC-Schedule 6 Protected | Not Endemic |
| Pentzia Globosa | <i>Pentzia globosa</i> | LC | Not Endemic |
| Poaceae | <i>Aristida adscensionis</i> | LC | Not Endemic |
| Poaceae | <i>Aristida canescens subsp. canescens</i> | LC | Not Endemic |
| Poaceae | <i>Aristida congesta subsp. barbicollis</i> | LC | Not Endemic |
| Poaceae | <i>Aristida congesta subsp. congesta</i> | LC | Not Endemic |
| Poaceae | <i>Bewisia biflora</i> | LC | Not Endemic |
| Poaceae | <i>Cenchrus ciliaris</i> | LC | Not Endemic |
| Poaceae | <i>Chloris gayana</i> | LC | Not Endemic |
| Poaceae | <i>Cymbopogon caesius</i> | LC | Not Endemic |
| Poaceae | <i>Cynodon dactylon</i> | LC | Not Endemic |
| Poaceae | <i>Digitaria eriantha</i> | LC | Not Endemic |
| Poaceae | <i>Eragrostis chloromelas</i> | LC | Not Endemic |
| Poaceae | <i>Eragrostis curvula</i> | LC | Not Endemic |
| Poaceae | <i>Eragrostis gummiflua</i> | LC | Not Endemic |
| Poaceae | <i>Eragrostis obtusa</i> | LC | Not Endemic |
| Poaceae | <i>Eragrostis superba</i> | LC | Not Endemic |
| Poaceae | <i>Heteropogon contortus</i> | LC | Not Endemic |
| Poaceae | <i>Hyparrhenia hirta</i> | LC | Not Endemic |
| Poaceae | <i>Hyperthelia dissoluta</i> | LC | Not Endemic |
| Poaceae | <i>Melinis repens</i> | LC | Not Endemic |
| Poaceae | <i>Panicum maximum</i> | LC | Not Endemic |
| Poaceae | <i>Paspalum dilatatum</i> | LC | Not Endemic |
| Poaceae | <i>Phragmites australis</i> | LC | Not Endemic |
| Poaceae | <i>Pogonarthria squarrosa</i> | LC | Not Endemic |
| Poaceae | <i>Setaria pumila</i> | LC | Not Endemic |
| Poaceae | <i>Setaria sphacelata var. Sericea</i> | LC | Not Endemic |
| Poaceae | <i>Setaria sphacelata var. sphacelata</i> | LC | Not Endemic |
| Poaceae | <i>Setaria sphacelata var. torta</i> | LC | Not Endemic |
| Poaceae | <i>Setaria verticillata</i> | LC | Not Endemic |
| Poaceae | <i>Sporobolus africanus</i> | LC | Not Endemic |
| Poaceae | <i>Themeda triandra</i> | LC | Not Endemic |
| Poaceae | <i>Trichoneura grandiglumis</i> | LC | Not Endemic |
| Poaceae | <i>Urochloa mosambicensis</i> | LC | Not Endemic |
| Polygalaceae | <i>Polygala hottentotta</i> | LC | Not Endemic |
| Rhamnaceae | <i>Ziziphus mucronata subsp. mucronata</i> | LC | Not Endemic |
| Scrophulariaceae | <i>Selago densiflora</i> | LC | Not Endemic |
| Solanaceae | <i>Solanum campylacanthum</i> | LC | Not Endemic |

| | | | |
|----------------|----------------------------|----|-------------|
| Solanaceae | <i>Lycium hirsutum</i> | LC | Not Endemic |
| Typhaceae | <i>Typha capensis</i> | LC | Not Endemic |
| Zygophyllaceae | <i>Tribulus terrestris</i> | LC | Not Endemic |

4.2.1.1.1 Protected Plant Species

Two species of protected plant species (*Eucomis autumnalis* and *Ammocharis coranica*) which are protected by the Free State Nature Conservation Ordinance 8 of 1969 were observed within the PAOI. According to the list of protected species under Schedule 6, if any individuals of these plant species are to be disturbed, permits must be obtained from the Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (FSDESTEA). Refer to Figure 4-12 below for photographs of the species.



Figure 4-12 Protected flora recorded within the PAOI; A) *Ammocharis coranica* and B) *Eucomis autumnalis*.

4.2.1.2 Alien and Invasive Plants

Alien and Invasive Plants (AIPs) tend to dominate or replace indigenous flora, thereby transforming the structure, composition and functioning of ecosystems. Therefore, it is important that these plants are controlled by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species.

NEMBA is the most recent legislation pertaining to alien invasive plant species. In August 2014, the list of Alien Invasive Species was published in terms of the NEMBA. The Alien and Invasive Species Regulations were published in the Government Gazette No. 44182, 24th of February 2021. The legislation calls for the removal and / or control of AIP species (Category 1 species). In addition, unless authorised thereto in terms of the NWA, no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse. Below is a brief explanation of the three categories in terms of the NEMBA:

- **Category 1a:** Invasive species requiring compulsory control. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.

- **Category 1b:** Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- **Category 2:** Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.
- **Category 3:** Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

Note that according to the Alien and Invasive Species Regulations, a person who has under his or her control a category 1b listed invasive species must immediately:

- Notify the competent authority in writing
- Take steps to manage the listed invasive species in compliance with:
 - Section 75 of the NEMBA;
 - The relevant invasive species management programme developed in terms of regulation 4; and
 - Any directive issued in terms of section 73(3) of the NEMBA.

Twenty-three (23) AIP species were recorded within the PAOI. These species are listed under the Alien and Invasive Species List 2020, Government Gazette No. GN1003 as Category 1b and Not Indigenous (Exotic) respectively. The twelve (12) species in green (Table 4-7), are AIP species that must be controlled by implementing an AIP Management Programme, in compliance of section 75 of the NEMBA, as stated above.

Table 4-7 Summary of AIP recorded within the PAOI of Influence (PAOI) during the field survey period.

| Family | Scientific Name | Alien Category |
|---------------|---------------------------------|--------------------|
| Amaranthaceae | <i>Atriplex nummularia</i> | Naturalized exotic |
| Amaranthaceae | <i>Gomphrena celosioides</i> | Naturalized exotic |
| Anacardiaceae | <i>Schinus terebinthifolius</i> | Naturalized exotic |
| Asteraceae | <i>Bidens pilosa</i> | Naturalized exotic |
| Asteraceae | <i>Cirsium vulgare</i> | NEMBA Category 1b. |
| Asteraceae | <i>Conyza bonariensis</i> | Naturalized exotic |
| Asteraceae | <i>Schkuhria pinnata</i> | Naturalized exotic |
| Asteraceae | <i>Tagetes minuta</i> | Naturalized exotic |
| Asteraceae | <i>Xanthium spinosum</i> | NEMBA Category 1b. |
| Asteraceae | <i>Flaveria bidentis</i> | NEMBA Category 1b. |
| Meliaceae | <i>Melia azedarach</i> | NEMBA Category 1b. |
| Myrtaceae | <i>Eucalyptus camaldulensis</i> | NEMBA Category 1b. |
| Papaveraceae | <i>Argemone ochroleuca</i> | NEMBA Category 1b. |
| Pinaceae | <i>Pinus pinaster</i> | NEMBA Category 2 |
| Poaceae | <i>Arundo donax</i> | NEMBA Category 1b. |

| | | |
|--------------|--------------------------------|--------------------|
| Poaceae | <i>Cortaderia selloana</i> | NEMBA Category 1b. |
| Poaceae | <i>Eleusine coracana</i> | Naturalized exotic |
| Poaceae | <i>Pennisetum clandestinum</i> | NEMBA Category 1b. |
| Polygonaceae | <i>Persicaria lapathifolia</i> | Naturalized exotic |
| Solanaceae | <i>Datura ferox</i> | NEMBA Category 1b. |
| Tamaricaceae | <i>Tamarix chinensis</i> | NEMBA Category 1b. |
| Verbenaceae | <i>Verbena astrigera</i> | Naturalized exotic |
| Verbenaceae | <i>Verbena bonariensis</i> | NEMBA Category 1b. |

4.2.2 Faunal Assessment

Avifauna, Mammal and Herpetofauna observations and recordings fall under this section.

4.2.2.1 Avifauna

Sixty (60) species were recorded in the PAOI during the survey based on either direct observation, vocalisations, or the presence of visual tracks & signs, (Table 4-8) (Figure 4-13). Two (2) (red text) species are rated as SCC.

Table 4-8 A list of avifaunal species recorded for the PAOI

| Species | Common Name | Conservation Status | |
|-------------------------------|-------------------------------------|---------------------|--------|
| | | Regional | Global |
| <i>Acridotheres tristis</i> | Myna, Common | Unlisted | LC |
| <i>Afrotis afraoides</i> | Korhaan, Northern Black | Unlisted | LC |
| <i>Alopochen aegyptiaca</i> | Goose, Egyptian | Unlisted | LC |
| <i>Anas erythrorhyncha</i> | Teal, Red-billed | Unlisted | LC |
| <i>Anas sparsa</i> | Duck, African Black | Unlisted | LC |
| <i>Anas undulata</i> | Duck, Yellow-billed | Unlisted | LC |
| <i>Apus apus</i> | Swift, Common | Unlisted | LC |
| <i>Ardea cinerea</i> | Heron, Grey | Unlisted | LC |
| <i>Ardea intermedia</i> | Egret, Yellow-billed (Intermediate) | Unlisted | LC |
| <i>Ardea melanocephala</i> | Heron, Black-headed | Unlisted | LC |
| <i>Ardea purpurea</i> | Heron, Purple | Unlisted | LC |
| <i>Ardeola ralloides</i> | Heron, Squacco | Unlisted | LC |
| <i>Bostrychia hagedash</i> | Ibis, Hadedda | Unlisted | LC |
| <i>Bubulcus ibis</i> | Egret, Cattle | Unlisted | LC |
| <i>Burhinus capensis</i> | Thick-knee, Spotted | Unlisted | LC |
| <i>Charadrius tricollaris</i> | Plover, Three-banded | Unlisted | LC |
| <i>Chlidonias hybrida</i> | Tern, Whiskered | Unlisted | LC |
| <i>Chrysococcyx caprius</i> | Cuckoo, Diderick | Unlisted | LC |
| <i>Cisticola juncidis</i> | Cisticola, Zitting | Unlisted | LC |
| <i>Columba livia</i> | Dove, Rock | Unlisted | LC |
| <i>Corvus albus</i> | Crow, Pied | Unlisted | LC |
| <i>Elanus caeruleus</i> | Kite, Black-shouldered | Unlisted | LC |

| | | | |
|----------------------------------|------------------------------|----------|----|
| <i>Estrilda astrild</i> | Waxbill, Common | Unlisted | LC |
| <i>Euplectes afer</i> | Bishop, Yellow-crowned | Unlisted | LC |
| <i>Euplectes ardens</i> | Widowbird, Red-collared | Unlisted | LC |
| <i>Euplectes orix</i> | Bishop, Southern Red | Unlisted | LC |
| <i>Euplectes progne</i> | Widowbird, Long-tailed | Unlisted | LC |
| <i>Fulica cristata</i> | Coot, Red-knobbed | Unlisted | LC |
| <i>Himantopus himantopus</i> | Stilt, Black-winged | Unlisted | LC |
| <i>Hirundo dimidiata</i> | Swallow, Pearl-breasted | Unlisted | LC |
| <i>Lamprotornis bicolor</i> | Starling, Pied | Unlisted | LC |
| <i>Lanius collaris</i> | Fiscal, Common (Southern) | Unlisted | LC |
| <i>Lybius torquatus</i> | Barbet, Black-collared | Unlisted | LC |
| <i>Merops apiaster</i> | Bee-eater, European | Unlisted | LC |
| <i>Mycteria ibis</i> | Stork, Yellow-billed | EN | LC |
| <i>Myrmecocichla formicivora</i> | Chat, Anteater | Unlisted | LC |
| <i>Netta erythrophthalma</i> | Pochard, Southern | Unlisted | LC |
| <i>Numida meleagris</i> | Guineafowl, Helmeted | Unlisted | LC |
| <i>Passer domesticus</i> | Sparrow, House | Unlisted | LC |
| <i>Phoenicopterus roseus</i> | Flamingo, Greater | NT | LC |
| <i>Platalea alba</i> | Spoonbill, African | Unlisted | LC |
| <i>Plectropterus gambensis</i> | Goose, Spur-winged | Unlisted | LC |
| <i>Plegadis falcinellus</i> | Ibis, Glossy | Unlisted | LC |
| <i>Plocepasser mahali</i> | Sparrow-weaver, White-browed | Unlisted | LC |
| <i>Ploceus velatus</i> | Masked-weaver, Southern | Unlisted | LC |
| <i>Podiceps cristatus</i> | Grebe, Great Crested | Unlisted | LC |
| <i>Podiceps nigricollis</i> | Grebe, Black-necked | Unlisted | LC |
| <i>Prinia flavicans</i> | Prinia, Black-chested | Unlisted | LC |
| <i>Pternistis swainsonii</i> | Spurfowl, Swainson's | Unlisted | LC |
| <i>Quelea quelea</i> | Quelea, Red-billed | Unlisted | LC |
| <i>Saxicola torquatus</i> | Stonechat, African | Unlisted | LC |
| <i>Spatula hottentota</i> | Teal, Hottentot | Unlisted | LC |
| <i>Spilopelia senegalensis</i> | Dove, Laughing | Unlisted | LC |
| <i>Sporopipes squamifrons</i> | Finch, Scaly-feathered | Unlisted | LC |
| <i>Streptopelia capicola</i> | Turtle-dove, Cape | Unlisted | LC |
| <i>Sturnus vulgaris</i> | Starling, Common | Unlisted | LC |
| <i>Tachybaptus ruficollis</i> | Grebe, Little | Unlisted | LC |
| <i>Tadorna cana</i> | Shelduck, South African | Unlisted | LC |
| <i>Threskiornis aethiopicus</i> | Ibis, African Sacred | Unlisted | LC |
| <i>Vanellus armatus</i> | Lapwing, Blacksmith | Unlisted | LC |
| <i>Vanellus coronatus</i> | Lapwing, Crowned | Unlisted | LC |

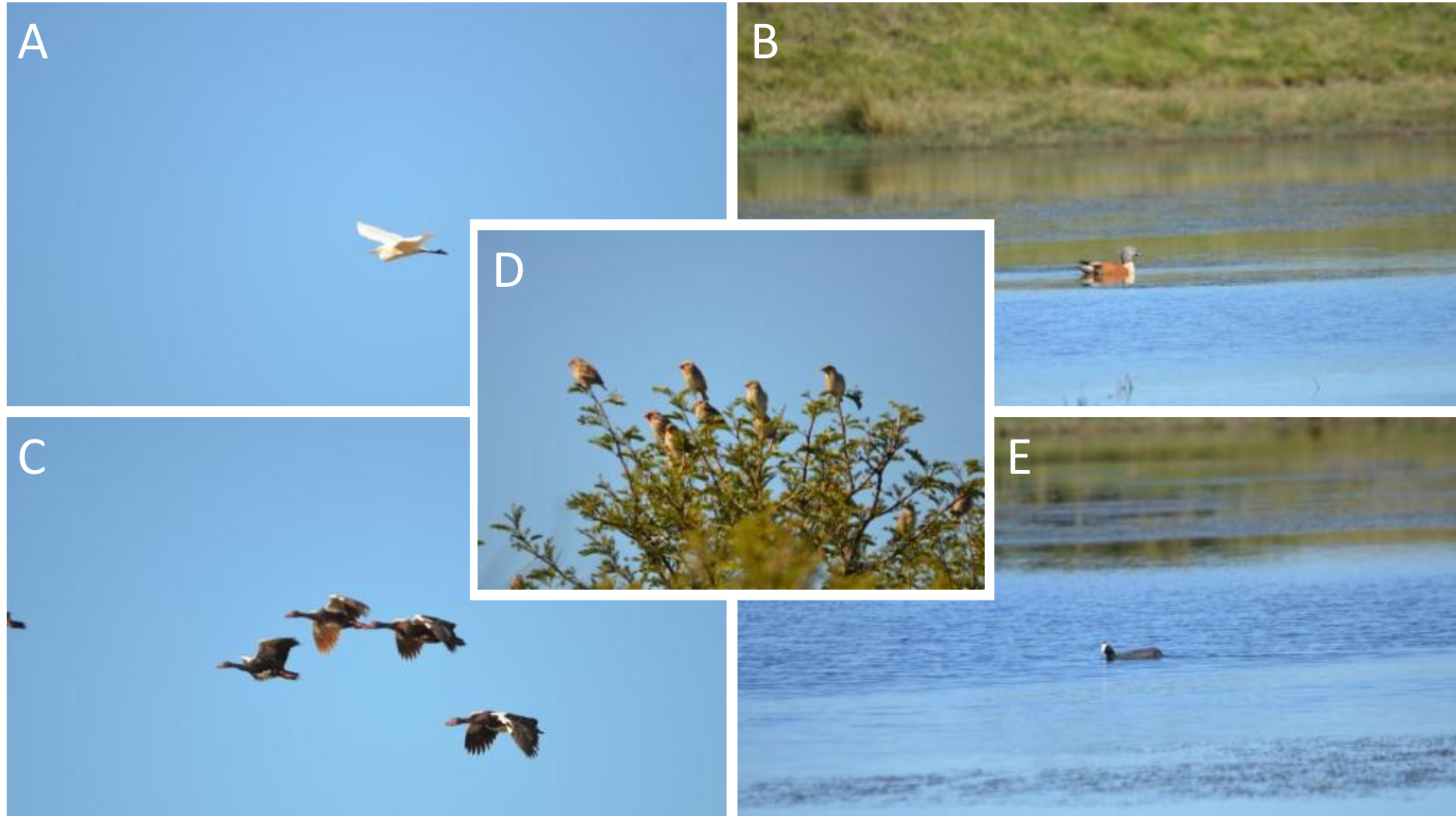


Figure 4-13 Some of the avifaunal species recorded; A) *Bubulcus ibis* (Egret, Cattle), B) *Tadorna cana* (Shelduck, South African), C) *Plectropterus gambensis* (Goose, Spur-winged), D) *Quelea quelea* (Quelea, Red-billed) and E) *Fulica cristata* (Coot, Red-knobbed).

4.2.2.2 Mammals

Eight (8) mammal species were observed during the survey of the PAOI (Table 4-9) based on either direct observation or the presence of visual tracks and signs (Figure 4-14). No bat species were observed during the field assessment and limited species are expected to occur within the PAOI due to a lack of suitable habitat.

Table 4-9 Summary of mammal species recorded within the PAOI

| Family | Species | Common Name | Conservation Status | |
|--------------|------------------------------|-------------------------------|---------------------|--------|
| | | | Regional | Global |
| Bathyergidae | <i>Cryptomys hottentotus</i> | Common Mole-rat | LC | LC |
| Canidae | <i>Lupulella mesomelas</i> | Black-backed jackal | LC | LC |
| Herpestidae | <i>Atilax paludinosus</i> | Water Mongoose | LC | LC |
| Herpestidae | <i>Suricata suricatta</i> | Suricate | LC | LC |
| Leporidae | <i>Lepus saxatilis</i> | Scrub Hare | LC | LC |
| Mustelidae | <i>Ictonyx striatus</i> | Striped Polecat | LC | LC |
| Sciuridae | <i>Geosciurus inauris</i> | South African Ground Squirrel | LC | LC |
| Herpestidae | <i>Cynictis penicillata</i> | Yellow Mongoose | LC | LC |



Figure 4-14 Photograph illustrating some of the mammal species recorded in the PAOI: A) South African Ground Squirrel (*Geosciurus inauris*), B) Suricate (*Suricata suricatta*) and C) Yellow Mongoose (*Cynictis penicillata*).

4.2.2.3 Herpetofauna

One (1) species of reptiles and no amphibian species were recorded in the PAOI during survey period. (Table 4-10). One SCC, *Sensitive species 15* was recorded during the field assessment. However, there is the possibility of more species being present, as certain herpetofauna species are secretive and require long-term surveys to ensure capture.

Sensitive species 15 is categorised as VU on both a regional and an international scale. Additionally, the species is listed in the Convention on International Trade in Endangered Species (CITES) Appendix II, as well as a Threatened or Protected Species (TOPS). It is endemic to South Africa, where it is found only in the grasslands of the northern Free State and the southwestern parts of Mpumalanga with an estimated EOO (km²) of 37 617 (Alexander *et al.*, 2018). The species is considered to be a habitat specialist, that is highly philopatric (tending to return to or remain near a particular site or area) for burrowing sites. The species is known to not disperse across the landscape to make new burrows should its habitat be destroyed (Alexander *et al.*, 2018)

Habitat loss due to agriculture is a continuing threat. Large portions of the grassland habitat are underlain by coal beds of varying quality and extent, and exploitation of coal for fuel has and will result in further habitat loss. Another substantial threat to the species is illegal collection for the pet trade to an extent that it is one of the most exported species from South Africa with 1 194 individuals exported between 1985 and 2014 for pet trade (Parusnath *et al.*, 2017; UNEP-WCMC, 2017).

Due to the sensitivity of this species, especially in regard to its illegal collection, no waypoints will be displayed or provided in this report.

Table 4-10 Summary of reptile species recorded within the PAOI.

| Species | Conservation Status | |
|-----------------------------|---------------------|--------|
| | Regional | Global |
| <i>Sensitive species 15</i> | VU | VU |

4.2.3 Site Sensitivity Verification

4.2.3.1 Site Ecological Importance

Six (6) main terrestrial habitat types were delineated within the PAOI, including a set of water resources, with the associated buffers as a whole. Examples of these habitats can be seen from Figure 4-15 to Figure 4-20.



Figure 4-15 *Examples of grassland habitat from the PAOI.*



Figure 4-16 *Examples of secondary grassland habitat from the PAOI.*



Figure 4-17 *Examples of degraded grassland habitat from the PAOI.*



Figure 4-18 Examples of disturbed grassland habitat from the project area.



Figure 4-19 A photo of the wetland habitat in the PAOI.



Figure 4-20 A photo of the modified habitat in the PAOI.

As per the terms of reference for the project, GIS sensitivity maps are required in order to identify sensitive features in terms of the relevant specialist discipline/s within the PAOI. The sensitivity scores identified during the field survey for each terrestrial habitat are mapped. The location and extent of these habitats are illustrated in Figure 4-21. Based on the criteria provided in Section 3.3 of this report, all habitats within the assessment area of the proposed project were allocated a sensitivity category (Table 4-12). The sensitivities of the habitat types delineated are illustrated in 'Very High/High Sensitivity' areas are due to the following, and the guidelines can be seen in Table 4-11:

- Habitats within the assessment area that were observed to be utilised by threatened (local classification) species during the field survey, these species comprised of:
 - One (1) reptile species; and
- Unique, important (CBA1/ESA 1 & 2) and low resilience habitats; and
- Habitat that is regarded as crucial to the survival of a threatened species.

Table 4-11 *Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities*

| Site Ecological Importance | Interpretation in relation to development activities |
|----------------------------|--|
| Very High | Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains. |
| High | Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities. |
| Medium | Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities. |
| Very Low | Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required. |

Table 4-12 Summary of habitat types delineated within the field assessment area of the PAOI

| Habitat | Description | Ecosystem Processes and Services | Conservation Importance | Functional Integrity | Biodiversity Importance | Receptor Resilience | Site Ecological Importance |
|--------------------------------------|---|---|--|---|-------------------------|--|----------------------------|
| Grassland (Sensitive Species) | Grassland system with evidence of past and current grazing activities. Provides niche habitat to a VU species. | Provides grazing and foraging resources for indigenous fauna and livestock. Aids in the filtration of water permeating through the soil into the drainage areas. Important corridor for fauna dispersion within the landscape. Current human infringement occurs, especially in areas close to roads. Provides niche habitat to a VU species. | High Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km ² . | High | High | Low Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality | Very High |
| Wetlands | Permanently to seasonally wet portions of land as delineated by the wetland specialist. Even though somewhat disturbed, the ecological integrity, importance and functioning of these areas play a crucial role as a water resource system locally and regionally and an important habitat for various fauna and flora, including the SCC recorded. | Provides surface water resources within the landscape. Aids in trapping sediment and nutrients carried by surface runoff. Corridor for fauna dispersion within the landscape and important foraging and nesting habitat. | Medium > 50% of receptor contains natural habitat with potential to support SCC. | Medium Only narrow corridors of good habitat connectivity. Mostly minor current negative ecological impacts, with some major impacts and a few signs of minor past disturbance. | Medium | Medium Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality | Medium |
| Secondary Grasslands | This habitat is associated with grassland habitat that has been exposed to modifications due to land use and mismanagement but differs from the degraded grassland in the extent of disturbance that has taken place, with the degraded grassland being exposed to more severe disturbance. | Provides grazing and foraging resources for indigenous fauna and livestock. Aids in the filtration of water permeating through the soil into the drainage areas. Important corridor for fauna dispersion within the landscape. Current human infringement occurs, especially in areas close to roads. | Medium > 50% of receptor contains natural habitat with potential to support SCC. | Medium Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts, with some major impacts and a few signs of minor past disturbance. | Medium | Low Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality | High |

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| Habitat | Description | Ecosystem Processes and Services | Conservation Importance | Functional Integrity | Biodiversity Importance | Receptor Resilience | Site Ecological Importance |
|-------------------------------------|---|---|---|---|-------------------------|---|----------------------------|
| Degraded Grasslands | Degraded Grassland is characterised by open grassland impacted by weed populations, low pioneer grasses, and AIPs. The habitat isn't entirely modified but in a constant disturbed state and can't recover to a more natural state due to ongoing disturbances and impacts received from grazing, edge effects from land use and mismanagement. | Provides grazing and foraging resources for indigenous fauna and livestock. Aids in the filtration of water permeating through the soil into the drainage areas. Important corridor for fauna dispersion within the landscape. | Medium | Medium | Medium | Medium | Medium |
| | | | > 50% of receptor contains natural habitat with potential to support SCC. | Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts, with some major impacts and a few signs of minor past disturbance. | | Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality | |
| Disturbed Grassland | The disturbed habitat is regarded as areas that has been impacted by edge effects of modified areas as well as direct impacts from historic and ongoing overgrazing, dumping and infringement | This habitat provides ecological services to the surrounding region, including runoff and erosion control enabling rainwater percolation, nutrient cycling within the topsoil layers supporting the healthy functioning of indigenous flora and re-seeding processes, carbon sequestration, and foraging and nesting resources for livestock and local indigenous fauna species (including occasional SCC). | Low | Low | Low | Medium | Low |
| | | | No confirmed or highly likely populations of SCC. < 50% of receptor contains natural habitat with limited potential to support SCC. | Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat. Several minor and major current negative ecological impacts. | | Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality | |
| Modified/Artificial Wetlands | The modified and artificial wetland areas have little to no remaining natural vegetation due to land transformation by historic and current mining, agriculture and mismanagement. These habitats exist in a constant disturbed state as it cannot recover to a more natural state due to ongoing disturbances and impacts it receives. | The ecological services provided by this habitat are limited due to the extensive cover of impermeable surfaces and the large amount of bare land. Locally common bird species will forage and nest in the larger trees, and parts of the area may be considered a movement corridor. | Very Low | Very Low | Very Low | Medium | Very Low |
| | | | No natural habitat remaining. | Several major current negative ecological impacts. | | Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality | |

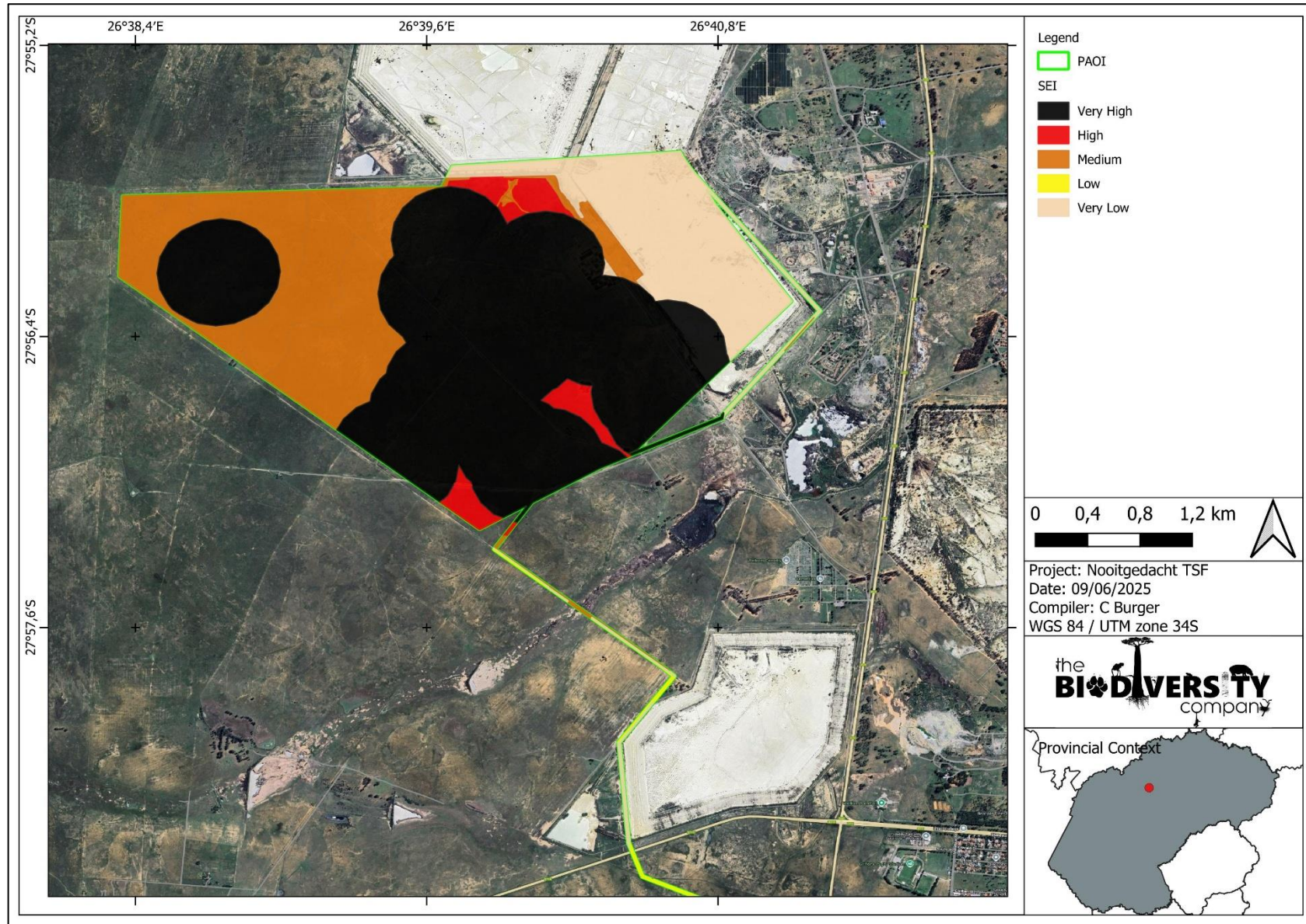


Figure 4-21 The PAOI superimposed over the sensitivities in the area (Map 1)

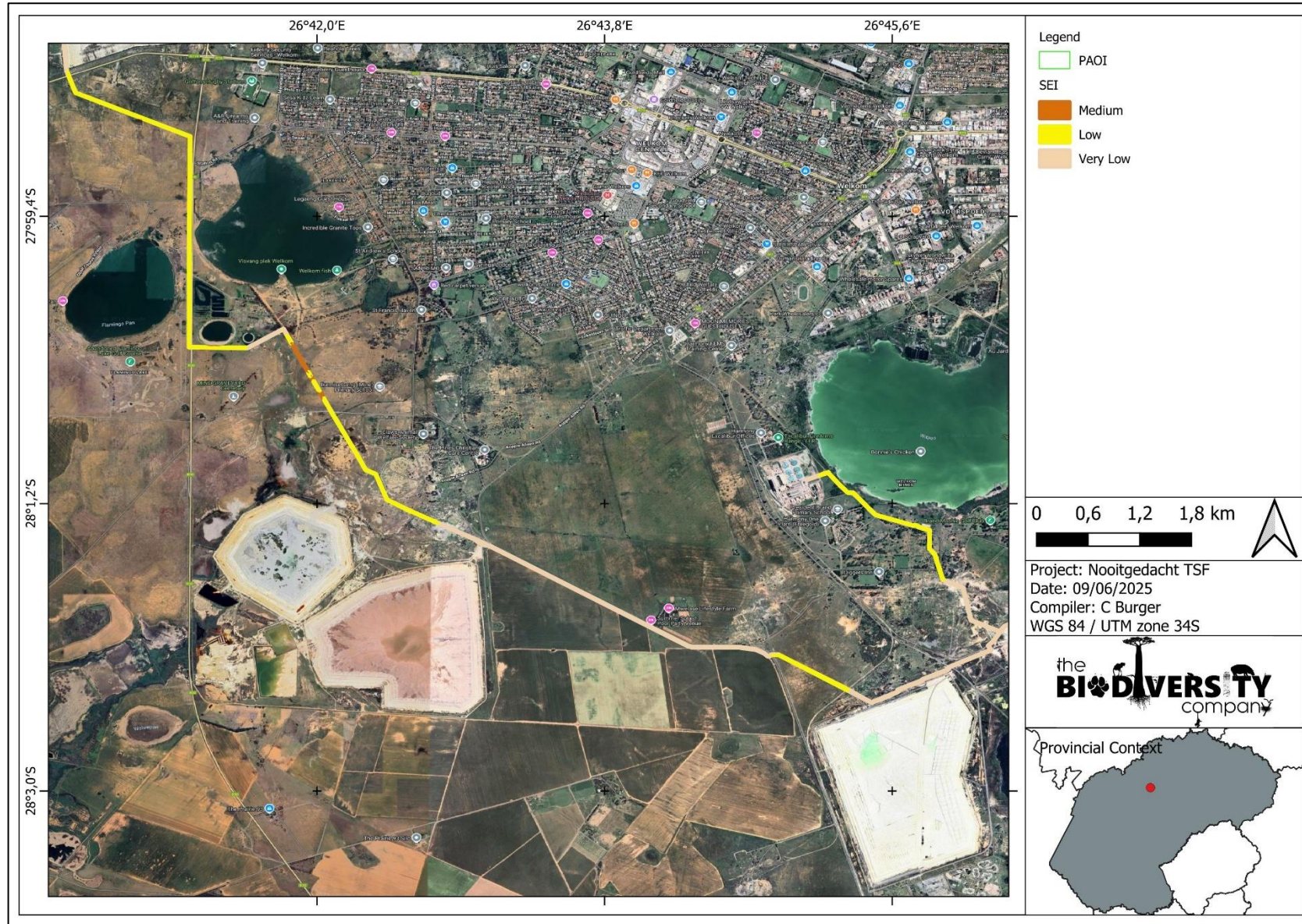


Figure 4-22 The PAOI superimposed over the sensitivities in the area (Map 2)

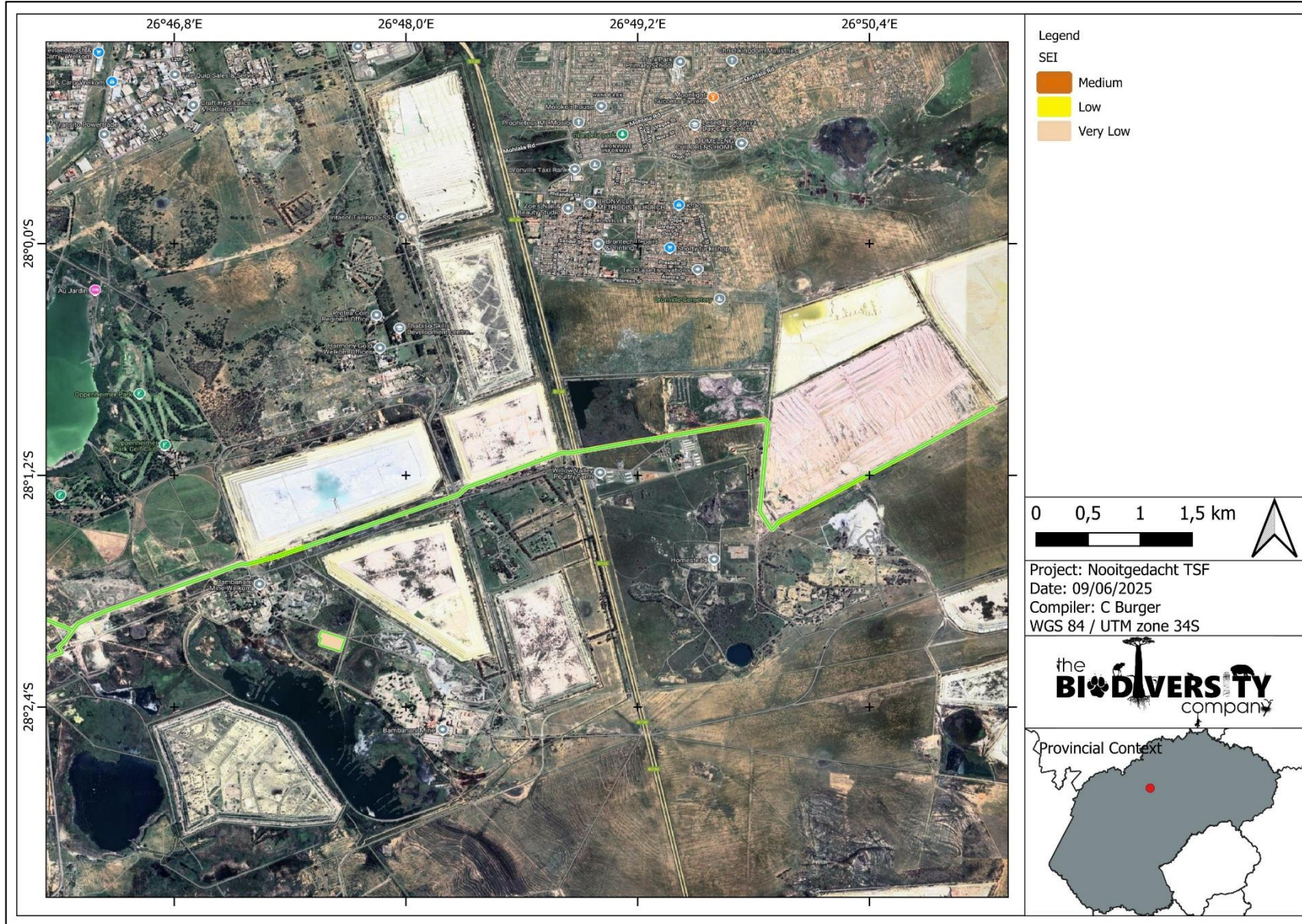


Figure 4-23 The PAOI superimposed over the sensitivities in the area (Map 3)

5 Impact Assessment

Potential impacts were evaluated against the data captured during the fieldwork to identify relevance to the PAOI, specifically the proposed development footprint area. The relevant impacts were then subjected to a prescribed impact assessment methodology. The details of this methodology can be provided on request.

Impacts were assessed in terms of the construction/operational phases. Mitigation measures were only applied to impacts deemed relevant based on the impact analysis and can be seen in section 6.

5.1 Impact Assessment Methodology

An impact assessment methodology was provided by EIMS to determine the environmental risk associated with various aspects related to the proposed activities. This impact assessment takes the following components into consideration.

- The nature of the associated impact (positive or negative);
- The extent of the proposed activities;
- The duration of the proposed activities;
- The magnitude of the effects caused by the proposed activities;
- The reversibility of associated impacts; and
- The probability of relevant aspects affecting sensitive receptors.

Each one of the above-mentioned components are given a rating, which cumulatively provides the specialist with a pre-mitigation environmental risk rating. These components are then scored again taking into consideration mitigating factors. The cumulative impact and irreplaceable loss to sensitive receptors are then scored to ultimately indicate a “Priority Factor” score.

5.2 Current Impacts

The current impacts observed during surveys are listed below. Photographic evidence of a selection of these impacts is shown in Figure 5-1.

- Fences;
- Overgrazing and trampling of natural vegetation and wetlands by livestock;
- Secondary Roads (and associated traffic and wildlife road mortalities);
- Unregulated burning
- Alien and/or Invasive Plants (AIP);
- Servitudes and infrastructure (powerlines);
- Water contamination and sewage;
- Vegetation removal.



Figure 5-1 Some of the identified impacts within the PAOI; A) Livestock grazing, B) Roads and associated edge effects, C) Mining activities and D) Powerline infrastructure.

5.3 Terrestrial Impact Assessment

The impacts regarding the proposed development were assessed for construction and the operational stages, no decommission/rehabilitation phases were considered.

5.3.1 Anticipated Impacts

In the impacts anticipated for the proposed activities are considered in order to predict and quantify these impacts and assess & evaluate the magnitude on the identified terrestrial biodiversity.

Table 5-1 Anticipated impacts for the proposed activities on terrestrial biodiversity

| Main Impact | Project activities that can cause loss of habitat | Secondary impacts anticipated |
|--|--|--|
| 1. Destruction, fragmentation and degradation of habitats and ecosystems | Physical removal of vegetation | Displacement/loss of flora & fauna (including SCC) Increased potential for soil erosion Habitat fragmentation Increased potential for establishment of alien & invasive vegetation |
| | Access roads and servitudes | |
| | Soil dust precipitation | |
| | Dumping of waste products | |
| | Random events such as fire (cooking fires or cigarettes) | |
| Main Impact | Project activities that can cause the spread and/or establishment of alien and/or invasive species | Secondary impacts anticipated |
| 2. Spread and/or establishment of alien and/or invasive species | Vegetation removal | Habitat loss for native flora & fauna (including SCC) Spreading of potentially dangerous diseases due to invasive and pest species Alteration of fauna assemblages due to habitat modification |
| | Vehicles potentially spreading seed | |
| | Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive rodents | |
| | Creation of infrastructure suitable for breeding activities of alien and/or invasive birds | |
| Main Impact | Project activities that can cause the Direct mortality of fauna | Secondary impacts anticipated |
| 3. Direct mortality of fauna | Clearing of vegetation | Loss of ecosystem services Increase in rodent populations and associated disease risk |
| | Roadkill due to vehicle collision | |
| | Pollution of water resources due to dust effects, chemical spills or sewage leakages | |
| Main Impact | Project activities that can cause reduced dispersal/migration of fauna | Secondary impacts anticipated |
| 4.. Reduced dispersal/migration of fauna | Loss of landscape used as corridor | Loss of ecosystem services Reduced plant seed dispersal |
| | Compacted roads | |
| | Removal of vegetation | |
| | Light, noise and dust disturbance | |
| Main Impact | Project activities that can cause pollution in water courses and the surrounding environment | Secondary impacts anticipated |
| 5. Environmental pollution due to water/ mine drainage runoff | Chemical (organic/inorganic) spills | Faunal mortality (direct and indirectly) Groundwater pollution Loss of ecosystem services |
| | Erosion | |
| Main Impact | Project activities that can cause disruption/alteration of ecological life cycles due to sensory disturbance and dust. | Secondary impacts anticipated |
| 6. Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust and light pollution. | Operation of machinery (Large earth moving machinery, generators) | Loss of ecosystem services |
| | Vehicles | |
| Main Impact | Project activities that can cause staff to interact directly with potentially dangerous fauna | Secondary impacts anticipated |

| | | |
|--|--|----------------------------|
| 8. Staff and others interacting directly with fauna (potentially dangerous) or poaching of animals | All unregulated/supervised activities outdoors | Harm to fauna and/or staff |
|--|--|----------------------------|

5.3.2 Unplanned Events

The planned activities will have anticipated impacts as discussed; however, unplanned events may occur on any project and may have potential impacts which will need management.

Table 5-2 is a summary of the findings of an unplanned event assessment from a terrestrial ecology perspective. Note, not all potential unplanned events may be captured herein, and this must therefore be managed throughout all phases according to recorded events.

Table 5-2 Summary of unplanned events for terrestrial biodiversity

| Unplanned Event | Potential Impact | Mitigation |
|---|--|---|
| Hydrocarbon spills into the surrounding environment | Contamination of habitat as well as water resources associated with spillage. | A spill response kit must be available at all times. The incident must be reported on and if necessary, a biodiversity specialist must investigate the extent of the impact and provide rehabilitation recommendations. |
| Fire | Uncontrolled/unmanaged fire that spreads to the surrounding natural grassland and wetlands | Appropriate/Adequate fire management plan need to be implemented. |

5.3.3 Alternatives Considered

Three alternative designs for the proposed Low Pressure Water Storage system were considered. However, due to the limited scale of the system and the anticipated similarity in environmental impacts among the alternatives, a separate impact assessment for each option was not conducted. Instead, a comparative evaluation was undertaken, and the most feasible alternative is recommended in the conclusion.

5.3.4 Construction Phase

The following potential impacts on the biodiversity were considered for the construction phase of the project. This phase refers to the period during construction when the proposed infrastructure is constructed. This phase usually has the largest direct impact on biodiversity. The following potential impacts to terrestrial biodiversity were considered.

5.3.4.1 Destruction, further loss and fragmentation of the vegetation community

Through site clearing, more of the vegetation communities will be lost. Unmitigated, this will also lead to habitat fragmentation and the establishment of alien invasive species as well as soil erosion.

Activities that will contribute to this impact:

- Driving/ moving outside of designated areas;
- Physical removal of vegetation;
- Temporary site establishment (laydown, chemical toilets etc.);
- Soil dust precipitation as a result of site establishment;
- Dumping of waste products;

- Hydrocarbon storage and leakages; and
- Random events such as fire (cooking fires or cigarettes).

5.3.4.1.1 Cumulative Impacts

- Loss of habitat for indigenous species; and
- Spread of invasive species to surrounding areas.

5.3.4.1.2 Irreplaceable Loss of Resources

- Loss of CBA and ESA habitat.

5.3.4.2 Introduction of alien species, especially plants

The spread of alien invasive species will result in the loss of habitat and water for indigenous fauna and flora. It can also contribute to the spreading of potentially dangerous diseases due to invasive - and pest species. Overall, the fauna assemblage will be changed. Activities that will contribute to this impact:

- Vegetation removal and disturbance of soil;
- Vehicles potentially spreading seed;
- Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive; and
- Eating area increasing pest species such as rats and flies.

5.3.4.2.1 Cumulative Impacts

- Loss of habitat for indigenous species; and
- Spread of disease to surrounding areas.

5.3.4.2.2 Irreplaceable Loss of Resources

- Loss of CBA and ESA habitat.

5.3.4.3 Erosion due to storm water runoff and wind

Erosion will lead to the loss of vegetation, the removal/ relocation of the topsoil and the destruction of habitat. Activities that will contribute to this impact:

- Storm water runoff from roads, and other paved areas;
- Vehicles driving outside demarcated areas;
- Footpaths outside demarcated areas;
- Clearing of vegetation;
- Runoff from areas with bare soil; and
- Compacting of roads.

5.3.4.3.1 Cumulative Impacts

- Removal of topsoil; and
- Loss of habitat for indigenous species.

5.3.4.3.2 Irreplaceable Loss of Resources

- Loss of CBA and ESA areas.

5.3.4.4 Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching).

Faunal community will be influenced in a number of ways, including the loss of habitat, disturbances that will either make them move out of the area if possible or have to adapt and possible deaths due to physical harm or indirect harm. Activities that will contribute to this impact:

- Clearing of vegetation;
- Roadkill due to vehicle collision;
- Pollution of water resources due to dust effects and run-off;
- Intentional killing of fauna for food (hunting) or otherwise (killing of snakes);
- Disease caused by increased dust levels;
- Increase in pest species in the area due to new food source created; and
- Vibrations, noise and rock chips skidding out due to the construction activities.

5.3.4.4.1 Cumulative Impacts

- Loss of habitat for indigenous species.

5.3.4.4.2 Irreplaceable Loss of Resources

- Loss of faunal SCCs.

5.3.4.5 Potential leaks, discharges, pollutant from machinery and storage leaching into the surrounding environment.

Hydrocarbons leaching into the surrounding area will result in the loss of usable water resources, the loss of fauna and flora species. This will also result in the contamination of the topsoil and reduce the likelihood of successful rehabilitation of an area.

Activities that will contribute to this impact:

- Loss of vegetation; and
- Loss of topsoil.

5.3.4.5.1 Cumulative Impacts

- Loss of usable water resources for fauna species; and
- Loss of viable habitat.

5.3.4.5.2 Irreplaceable Loss of Resources

- Loss of usable water resources for fauna species resulting in loss of SCC and other species.

5.3.5 Operational Phase

The operational phase impacts of daily activities are anticipated to result in the further spreading of the AIP, as well as the deterioration of the habitats due to the increase of dust and edge effect impacts. Dust reduces the ability of plants to photosynthesize and thus leads to degradation/retrogression of the veld. Moving maintenance vehicles don't only cause sensory disturbances to fauna, affecting their life cycles and movement, but will lead to direct mortalities due to collisions.

5.3.5.1 Continued encroachment of an indigenous and vegetation community by alien invasive plant species as well as erosion due to disturbed soils

The spread of alien invasive species will result in the loss of habitat and water for indigenous fauna and flora. Overall, the fauna assemblage will be changed. Erosion will also disrupt the vegetation in the surrounding areas and result in habitat loss. Activities that will contribute to this impact:

- Vehicles potentially spreading seed;
- Storm water runoff from roads, and other bare areas;
- Vehicles driving outside demarcated areas; and
- Footpaths outside demarcated areas.

5.3.5.1.1 Cumulative Impacts

- Loss of habitat; and
- Loss of indigenous flora species due to competition.

5.3.5.1.2 Irreplaceable Loss of Resources

- Loss of habitat and food sources for Fauna SCCs.

5.3.5.2 Continued displacement and fragmentation of the faunal community (including threatened species) due to ongoing anthropogenic disturbances (noise, dust and vibrations) and habitat degradation/loss (litter, road mortalities and/or poaching).

The operation and maintenance of the proposed development may lead to disturbance or persecution of fauna in the vicinity of the development through;

- Increased anthropogenic disturbances (noise, human presence, litter and poaching/snaring);
- Intentional killing of fauna for food (hunting) or otherwise (killing of snakes);
- The disruption of natural faunal movement corridors.

5.3.5.2.1 Cumulative Impacts

- Loss of suitable habitat.

5.3.5.2.2 Irreplaceable Loss of Resources

- Loss of faunal SCCs.

5.3.5.3 Potential leaks, discharges, pollutant from the TSF spreading into the surrounding environment.

Tailings leaking into the surrounding area will result in the loss of usable water resources, the loss of fauna and flora species and the associated habitat.

Activities that will contribute to this impact:

- Damage to/or leaking of TSF.

5.3.5.3.1 Cumulative Impacts

- Loss of usable water resources for fauna species; and
- Loss of viable habitat.

5.3.5.3.2 Irreplaceable Loss of Resources

- Loss of usable water resources for fauna species resulting in loss of SCC and other species.

5.3.6 Assessment of Significance

Table 5-3 shows the significance of potential impacts associated with the proposed activities, on biodiversity before and after the implementation of mitigation measures as well as cumulative and irreplaceable loss.

Table 5-3 *Assessment of significance of potential impacts on terrestrial biodiversity associated with the project.*

| Identifier | Impact | Pre-mitigation ER | Post-mitigation ER | Confidence | Cumulative Impact | Irreplaceable loss | Priority Factor | Final score |
|---------------------------|--|-------------------|--------------------|------------|-------------------|--------------------|-----------------|-------------|
| Construction Phase | | | | | | | | |
| | Destruction, further loss and fragmentation of the vegetation community | -15 | -9 | High | 2 | 2 | 1.25 | -11.25 |
| | Introduction of alien species, especially plants | -9.75 | -5 | High | 2 | 2 | 1.25 | -6.25 |
| | Erosion due to storm water runoff and wind | -13 | -6.75 | High | 2 | 2 | 1.25 | -8.4375 |
| | Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching). | -21.25 | -18.75 | High | 2 | 3 | 1.38 | -25.78125 |
| | Potential leaks, discharges, pollutant from machinery and storage leaching into the surrounding environment. | -9 | -5 | High | 2 | 2 | 1.25 | -6.25 |
| Operational Phase | | | | | | | | |
| | Continued encroachment of an indigenous vegetation community by alien invasive plant species as well as erosion due to disturbed soils | -9.75 | -5.5 | Medium | 2 | 2 | 1.25 | -6.875 |
| | Continued displacement and fragmentation of the faunal community (including threatened or protected species) due to ongoing anthropogenic disturbances (noise, dust and vibrations) and habitat degradation/loss (litter, road mortalities and/or poaching). | -15 | -14 | Medium | 2 | 3 | 1.38 | -19.25 |
| | Potential leaks, discharges, pollutant from the TSF spreading into the surrounding environment. | -11.25 | -9.75 | High | 2 | 2 | 1.25 | -12.1875 |

6 Specialist Management Plan

Table 6-1 presents the recommended mitigation measures and the respective timeframes, targets and performance indicators for the respective studies. The mitigations within this section have been taken into consideration during the impact assessment in cases where the post-mitigation environmental risk is lower than that of the pre-mitigation environmental risk.

The focus of mitigation measures is to reduce the significance of potential impacts associated with the development and thereby to:

- Prevent the further loss and fragmentation of vegetation communities and the CBA/ESA areas in the vicinity of the PAOI;
- Conserve sensitive receptors linked with wetland habitats to ensure that the functional integrity of all systems is ensured;
- As far as possible, reduce the negative fragmentation effects of the development and enable safe movement of faunal species;
- Prevent the direct and indirect loss and disturbance of faunal species and community (including confirmed SCC);
- Adequately follow the guidelines for interpreting the Site Ecological Importance ratings assigned to the Project Area (see Table 3-6).

Table 6-1 Summary of relevance of the proposed project to ecologically important landscape features.

| Management outcome: Vegetation and Habitats | | | | |
|---|------------------------------------|---|---|---|
| Impact Management Actions | Implementation | | Monitoring | |
| | Phase | Responsible Party | Aspect | Frequency |
| Proposed footprints must be designed to avoid all 'Very High' sensitivity areas and buffers. Any development proposed within the High sensitivity areas must be limited and guided by a biodiversity management plan. | Planning and Construction Phase | Project manager, engineer, contractor & Environmental Officer | Development footprint | Ongoing |
| Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. Maintain small patches of natural vegetation within the construction site to accelerate restoration and succession of cleared patches. All activities must be restricted too within the Very Low/Medium sensitivity areas. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon (including fencing off the defined PAOI). | Life of operation | Project manager, Environmental Officer | Areas of indigenous vegetation (High and Very High SEI Areas) | Ongoing |
| All activities must make use of existing roads and tracks as far as practically and feasibly possible. No new roads or servitudes should be constructed where existing infrastructure can be used. | Construction/Operational Phase | Environmental Officer & Design Engineer | Roads and paths used | Ongoing |
| All laydown, chemical toilets etc. should be restricted to Very Low SEI areas. Any materials may not be stored for extended periods of time and must be removed from the PAOI once the construction/closure phase has been concluded. No permanent structures should be permitted sites. No storage of vehicles or equipment will be allowed outside of the designated PAOIs. | Construction/Operational Phase | Environmental Officer & Design Engineer | Laydown areas and material storage & placement. | Ongoing |
| Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion. This will also reduce the likelihood of encroachment by alien invasive plant species | Closure Phase/Rehabilitation phase | Environmental Officer & Contractor | Assess the state of rehabilitation and encroachment of alien vegetation | Quarterly for up to two years after the closure |
| All footprints to be rehabilitated and landscaped after construction is complete. Rehabilitation of the disturbed areas existing in the PAOI must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type. | Operational Phase | Environmental Officer & Contractor | Footprint rehabilitation | Quarterly monitoring |
| Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion. | Operational Phase | Environmental Officer & Contractor | Footprint rehabilitation | During Phase |
| A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers | Life of operation | Environmental Officer & Contractor | Spill events, Vehicles dripping. | Ongoing |
| Leaking equipment and vehicles must be repaired immediately or be removed from PAOI to facilitate repair. | Life of operation | Environmental Officer & Contractor | Leaks and spills | Ongoing |

| <p>It should be made an offence for any staff to /take bring any plant species into/out of any portion of the PAOI. No plant species whether indigenous or exotic should be brought into/taken from the PAOI, to prevent the spread of exotic or invasive species or the illegal collection of plants.</p> <p>Any topsoil that is removed during construction must be appropriately removed and stored according to the national and provincial guidelines. This includes on-going maintenance of such topsoil piles so that they can be utilised during decommissioning phases and re-vegetation</p> <p>A fire action plan needs to be compiled and implemented to restrict the impact unplanned fires might have on the surrounding areas.</p> | Life of operation | Project manager, Environmental Officer | Any instances | Ongoing |
|--|---------------------------------|--|--|--------------|
| | Construction/Operational Phase | Project manager, Environmental Officer | Topsoil removal and storage | Ongoing |
| | Construction Phase | Environmental Officer & Contractor | Fire Management | During Phase |
| Management outcome: Fauna | | | | |
| Impact Management Actions | Implementation | | Monitoring | |
| | Phase | Responsible Party | Aspect | Frequency |
| All areas classified as Very High sensitivity, along with their buffers, must be strictly adhered to. Any development within these areas requires approval from the relevant departments following the completion of a search and rescue operation for Sensitive Species 15. | Planning and Construction Phase | Environmental Officer, Ecologist, Contractor | Presence of fauna and faunal SCC. Buffers | During phase |
| Once a final proposed footprint is defined, a thorough site walk through must be conducted for the footprint by several trained individuals and a species specialist immediately prior to the commencement of land-clearing/construction activities. This is such that any fauna species present can move out of the area, and any active nests/dens and/or observed SCC must be noted and GPS pinned, and activities must halt until the relevant specialist is able to determine the most appropriate course of action. | Planning and Construction Phase | Environmental Officer, Ecologist, Contractor | Presence of fauna and faunal SCC | During phase |
| Any land clearing must be done over at least three days and conducted linearly and successively – always towards an open area away from the PAOI centre (allowing animals a safe evacuation route). | Construction Phase | Environmental Officer & Contractor | Progressive land clearing operations and the movement of fauna | Ongoing |
| The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. | Construction/Operational Phase | Project manager, Environmental Officer | Infringement into these areas | Ongoing |
| No construction staff are to be allowed outside of the authorised and fenced off construction areas at any time. | All phases | Project manager, Environmental Officer & Contractor | Staff movement | Ongoing |
| The duration of the activities should be minimized to as short a term as possible, to reduce the period of disturbance on fauna. | Construction | Project manager, Environmental Officer & Design Engineer | Construction/Closure Phase | Ongoing |
| Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals | Construction/Operational Phase | Environmental Officer | Noise levels | Ongoing |
| No trapping, killing, or poisoning of any wildlife is to be allowed. | Life of operation | Environmental Officer | Evidence of trapping etc | Ongoing |
| <ul style="list-style-type: none"> Signs must be put up to enforce this. | Life of operation | Health and Safety Officer | Compliance to the training. | Ongoing |
| All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited. | Life of operation | Project manager, Environmental Officer & Design Engineer | Activities should take place during the day in the case. | Ongoing |
| Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons. Activities should take place during the day in the case. | Life of operation | Project manager, Environmental Officer & Design Engineer | Activities should take place during the day in the case. | Ongoing |

| Any holes/deep excavations must be done in a progressive manner on a needs basis only. No holes/excavations may be left open overnight. In the event holes/excavations are required to remain open overnight, these areas must be covered to prevent fauna falling into these areas and subsequently inspected prior to backfilling. | Construction/Operational Phase | Environmental Officer & Design Engineer | Sealing of holes | After each sit, progressively. |
|--|--------------------------------|---|--|--|
| The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into highly sensitive areas and the surrounding environments, i.e the wetlands and Very High SEI areas; <ul style="list-style-type: none"> Signs must be put up to enforce this Driving on access roads close to these areas should be prevented in order to reduce or prevent wildlife road mortalities which occur more frequently during this period | Construction/Operational Phase | Project manager, Environmental Officer | Infringement into these areas | Ongoing |
| Wildlife-permeable fencing with holes large enough for mongoose and other smaller fauna should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area. | Planning and construction | Environmental Officer & Contractor, Engineer | Fauna movement corridor | Ongoing |
| Use environmentally friendly cleaning and dust suppressant products. | Construction and operation | Environmental Officer & Contractor, Engineer | Presence of chemicals in and around the project area | Ongoing |
| Management outcome: Alien Vegetation | | | | |
| Impact Management Actions | Implementation | | Monitoring | |
| | Phase | Responsible Party | Aspect | Frequency |
| Compile and implement an alien vegetation management plan from the onset of construction. The plan must identify areas for action (if any) and prescribe the necessary removal methods and frequencies to be applied. This plan must be also prescribing a monitoring plan and be updated as/when new data is collated. | Life of operation | Project manager, Environmental Officer & Contractor | Assess presence and encroachment of alien vegetation | Quarterly monitoring |
| The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. | Construction/Operational Phase | Project manager, Environmental Officer & Contractor | Footprint Area | Life of operation |
| Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site | Life of operation | Environmental Officer & Health and Safety Officer | Presence of waste | Life of operation |
| A pest control plan must be put in place and implemented; it is imperative that poisons not be used due to the presence of SCCs | Life of operation | Environmental Officer & Health and Safety Officer | Evidence or presence of pests | Ongoing |
| Management outcome: Dust | | | | |
| Impact Management Actions | Implementation | | Monitoring | |
| | Phase | Responsible Party | Aspect | Frequency |
| Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and dumps especially. This includes wetting of exposed soft soil surfaces and not conducting activities on windy days which will increase the likelihood of dust being generated. No non-environmentally friendly suppressants may be used as this could result in pollution of the environment, especially water sources | Life of operation | Contractor | Dustfall | As per the air quality report and the dust monitoring program. |

| Management outcome: Waste Management | | | | |
|--|----------------------------|---|---|-----------|
| Impact Management Actions | Implementation | | Monitoring | |
| | Phase | Responsible Party | Aspect | Frequency |
| Waste management must be a priority and all waste must be collected and stored effectively. | Life of operation | Environmental Officer & Contractor | Waste Removal | Weekly |
| Litter, spills, fuels, chemicals and human waste in and around the PAOI. | Construction/Closure Phase | Environmental Officer & Health and Safety Officer | Presence of Waste | Daily |
| Toilets at the recommended Health and Safety standards must be provided. These should be emptied regularly and once no longer required, they must be pumped dry to prevent leakage into the surrounding environment and removed from site. | Life of operation | Environmental Officer & Health and Safety Officer | Number of toilets per staff member. Waste levels | Daily |
| The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility | Life of operation | Environmental Officer & Health and Safety Officer | Availability of bins and the collection of the waste. | Ongoing |
| Where a registered disposal facility is not available close to the PAOI, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site | Life of operation | Environmental Officer, Contractor & Health and Safety Officer | Collection/handling of the waste. | Ongoing |
| Refuse bins will be emptied and secured Temporary storage of domestic waste shall be in covered waste skips. Maximum domestic waste storage period will be 10 days. | Life of operation | Environmental Officer, Contractor & Health and Safety Officer | Management of bins and collection of waste | Ongoing |
| Management outcome: Environmental awareness training | | | | |
| Impact Management Actions | Implementation | | Monitoring | |
| | Phase | Responsible Party | Aspect | Frequency |
| All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within and near to the PAOI to inform contractors and site staff of the presence of SCC and protected species and sensitive habitat, their identification, conservation status and importance, biology, habitat requirements and management requirements in line with the Biodiversity management plan, Environmental Authorisation and within the EMP. | Life of operation | Health and Safety Officer | Compliance to the training. | Ongoing |
| Contractors and employees must all undergo the induction and must be made aware of all sensitive areas and species to be avoided. | | | | |
| Management outcome: Avifauna and Bats | | | | |
| Areas developed/disturbed be specifically demarcated so that during the construction/activity phase, only the demarcated areas be impacted upon. | Construction Phase | Project manager, Environmental Officer | Development footprint | Ongoing |
| Minimisation of light pollution and artificial habitat creation. Only use lights with low sensitivity motion sensors that switch off automatically. Only use lights if/when required for the operation. | Life of operation | Project manager, Environmental Officer | Development footprint | Ongoing |
| Minimise noise disturbances. All noises to be within the prescribed limits provided by the appointed noise study, ensuring best practices are followed. | Life of operation | Project manager, Environmental Officer | Development footprint | Ongoing |

| | | | | |
|---|---------------------------------------|--|--------------------------|---------|
| All areas to be developed must be walked through prior to any activity to ensure no nests or avifauna species are found in the area. | Construction Phase | Project manager, Environmental Officer | Development footprint | Ongoing |
| All vehicles accessing the site should adhere to a low speed limit on site (40 km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g. nightjars and owls) which sometimes forage or rest on roads, especially at night. | Construction and Operational Phase | Environmental Officer, Design Engineer, and Contractor | Collisions with avifauna | Ongoing |

7 Conclusion

7.1 Terrestrial Ecology

The aim of this Biodiversity Assessment was to provide information to guide the risk of the proposed activity to the ecosystems and their inherent fauna and flora within the project area.

Populations of a sensitive TOPS-listed fauna species were recorded across the PAOI, and these are assigned no-go buffers. Two avifauna SCC was recorded across the PAOI, and two provincially protected plant species were observed.

The most pertinent is Sensitive Species 15 which is associated with the grassland habitat that has been assigned a 400 m buffer as per the Species Environmental Guideline (2020). It is recommended that the feasibility of search and rescue operations be investigated in collaboration with the Endangered Wildlife Trust (EWT).

Completion of the terrestrial biodiversity assessment led to an overall validation of the 'Very High' classification for the terrestrial biodiversity theme sensitivity as allocated by the National Environmental Screening Tool. This is because the PAOI (associated with the TSF) is mostly comprised of Very High and High sensitivity habitat, which is regarded as an ecologically viable contribution to the local CBA1, ESA1 and ESA2 portions. The animal species theme is assigned a high sensitivity, validating the screening tool report. These validations are due to the presence of SCC and protected species within the PAOI. The plant species theme is assigned a Low sensitivity, also validating the project screening tool report for the most part.

7.2 Impact Statement

Based on the outcomes of the SEI determination, the grassland habitat areas within the PAOI have been identified as possessing a 'Very High' SEI. This classification indicates that avoidance mitigation is necessary, and no destructive development activities should be considered in these areas. This recommendation stems from the presence of Sensitive Species 15 within this habitat unit. It is advised that a search and rescue operation, followed by appropriate relocation, be carried out in collaboration with the Endangered Wildlife Trust (EWT). This approach is essential to ensure the feasibility of the proposed project.

Three alternatives were evaluated for the Low-Pressure Water Storage system. From a terrestrial ecological perspective, the option involving two concrete tanks is considered the most feasible, as it presents the smallest physical footprint among the alternatives. This reduced footprint is expected to minimise potential impacts on local habitats, flora, and fauna, thereby supporting the conservation of ecological integrity in the PAOI. However, it should be noted that the spatial extent of the other two alternatives is only marginally greater, and the associated terrestrial ecological impacts are likewise expected to be only slightly higher and not significantly different from the preferred option.

7.3 Specialist Recommendations

The following recommendation are provided to ensure that the ecosystem and biodiversity is adequately protected:

- Implement a monitoring program for Sensitive Species 15:
 - Accurately determine the population size and extent of the species.
 - Ensure the conservation of this vulnerable species (VU).
- Conduct a search and rescue operation for Sensitive Species 15:

- This operation is currently in progress and must be completed before the commencement of construction activities.

8 References

- Alexander, G. & Marais, J. (2007). A guide to the Reptiles of Southern Africa. Struik, Cape Town.
- Awuah, A. 2018. NBA 2018 Rivers and NBA 2018 National Wetland Map 5. South African National Biodiversity Institute (SANBI), Newlands, Cape Town.
- Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J & de Villiers, M.S. (Eds). (2014). Atlas and Red List of Reptiles of South Africa, Lesotho and Swaziland. Suricata 1. South African Biodiversity Institute, Pretoria.
- BODATSA-POSA. (2019). South African National Biodiversity Institute. 2016. Botanical Database of Southern Africa (BODATSA) [dataset]. <http://newposa.sanbi.org/>.
- Branch, B. (2008). Tortoises, Terrapins, and Turtles of Africa. Struik, Cape Town.
- Branch, W.R. (1998). Field Guide to Snakes and Other Reptiles of Southern Africa. Struik, Cape Town.
- Del Hoyo, J., Collar, N.J., Christie, D.A., Elliott, A., Fishpool, L.D.C., Boesman, P. & Kirwan, G.M. 1996. HBW and BirdLife International Illustrated Checklist of the Birds of the World. Volume 2: Passerines. Lynx Editions and BirdLife International, Barcelona, Spain and Cambridge, UK.
- Department of Environment, Forestry and Fisheries (DEFF), 2021b. Notice of the list of protected tree species under the National Forests Act, 1998 (Act no. 84 of 1998). National Gazettes, No. 44204 of 01 March 2021.
- Department of Environment, Forestry and Fisheries (DEFF). 2022a. Screening Report for an Environmental Authorization or for a Part Two Amendment of an Environmental Authorisation as Required by the 2014 EIA Regulations – Proposed Site Environmental Sensitivity.
- Department of Environmental Affairs (DEA).2016. National Protected Areas Expansion Strategy for South Africa 2016. Department of Environmental Affairs, Pretoria, South Africa.
- Department of Forestry, Fisheries and the Environment (DFFE). 2023a. South Africa Protected Areas Database (SAPAD_OR_2023_Q1). Available at: <http://egis.environment.gov.za>
- Department of Forestry, Fisheries and the Environment (DFFE). 2023b. South Africa Conservation Areas Database (SACAD_OR_2023_Q1). Available at: <http://egis.environment.gov.za>
- Du Preez, L. & Carruthers, V. 2009. A Complete Guide to the Frogs of Southern Africa. Struik Nature, Cape Town.
- Eskom. (2015). Taylor, M.R., Peacock, F. & Wanless, R.M. (Eds). The 2015 Eskom Red Data Book of birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.
- EWT (Endangered Wildlife Trust). (2017). Threatened Amphibian Programme. 2015. The Southern African Frog Atlas Project <https://www.ewt.org.za/TAP/reference.html> (SAFAP, now FrogMAP). <http://vmus.adu.org.za>
- EWT. (2016). Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The 2016 Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.
- Eyssell, A. (2017). Vegetation Assessment and Management Input Report for G&W Base and Industrial Minerals, Koppies Bentonite Mine. Dimela Eco Consulting, Pretoria.
- Fish, L., Mashau, A.C., Moeaha, M.J. & Nembudani, M.T. 2015. Identification Guide to Southern African Grasses: An Identification Manual with Keys, Descriptions, and Distributions. SANBI, Pretoria.

FitzPatrick Institute of African Ornithology. 2023a. FrogMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=FrogMAP>

FitzPatrick Institute of African Ornithology. 2023b. ReptileMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=ReptileMAP>

FitzPatrick Institute of African Ornithology. 2023c. MammalMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=MammalMAP>

Goff, F., Dawson, G., & Rochow, J. (1982). Site examination for threatened and endangered plant species. *Environmental Management*, 6(4), 307-316.

Griffiths, C., Day, J. & Picker, M. (2016). Freshwater Life: A Field Guide to the Plants and Animals of Southern Africa. Struik Nature, Cape Town.

Hockey, P.A.R., Dean, W.R.J. & Ryan, P.G. (Eds). (2005). Roberts – Birds of Southern Africa, VIIth ed. The Trustees of the John Voelcker Bird Book Fund, Cape Town.

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

IUCN 2016. The IUCN Red List of Threatened Species. Version 2016-1. <http://www.iucnredlist.org>. Downloaded on < June 2023>.

IUCN. (2012). IUCN Red List Categories and Criteria: Version 3.1. Second edition. Gland, Switzerland and Cambridge, UK: IUCN. iv + 32pp.

Johnson, S. & Bytebier, B. (2015). Orchids of South Africa: A Field Guide. Struik publishers, Cape Town.

Kasl, B. (2017). Assessment of faunal species richness, with focus on vertebrate species, within the mineral boundary of koppies bentonite mine near koppies, free state province, for G&W Base Minerals (Pty) Ltd. Commissioned by Dimela Eco Consulting, Pretoria.

Leroy, A. & Leroy, J. (2003). Spiders of Southern Africa. Struik publishers, Cape Town.

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

Measey, G.J. (2011). Ensuring a Future for South Africa's Frogs: A Strategy for Conservation Research. South African National Biodiversity Institute, Pretoria.

Minter, L., Burger, M., Harrison, J.A. & Klopfer, D. (2004). Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland. Smithsonian Institute Avian Demography Unit, Washington; Cape Town.

Monadjem, A., Taylor, P.J., Cotterill, F.D.P. & Schoeman, C. (2010). Bats of southern and central Africa: a biogeographic and taxonomic synthesis. Wits University Press, Johannesburg.

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

National Environmental Screening Tool, 2023. Available from the Department of Forestry, Fisheries and the Environment website:

<https://screening.environment.gov.za/screeningtool/index.html#/pages/welcome>

NBA. (2018). Terrestrial Ecosystem Threat Status and Protection Level 2018. <http://bgis.sanbi.org/>.

Nel, J. L., Driver, A., Strydom, W. F., Maherry, A. M., Petersen, C. P., Hill, L., Roux, D. J., Nienaber, S., van Deventer, H., Swartz, E. R. & Smith-Adao, L. B. (2011). Atlas of Freshwater Ecosystem Priority

Areas in South Africa: Maps to support sustainable development of water resources, WRC Report No. TT 500/11. Water Research Commission, Pretoria.

Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., Van Deventer, H., Funke, N., Swartz, E.R., Smith-Adao, L.B., Mbona, N., Downsborough, L. and Nienaber, S. (2011). Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801. Water Research Commission, Pretoria.

NPAES. (2018). National Protected Areas Expansion Strategy. www.environment.gov.za

Pooley, E. (1998). A Field Guide to Wild Flowers: KwaZulu-Natal and Eastern Region. The Flora Publications Trust; ABC Bookshop, Durban.

Raimondo, Domitilla & von Staden, Lize & Foden, Wendy & Victor, Janine & Helme, N.A. & Turner, R.C. & Kamundi, D.A. & Manyama, P.A. (2009). Red list of South African plants 2009. Strelitzia. 25.

SACAD (South Africa Conservation Areas Database) and SADAP (South Africa Protected Areas Database) (2019). <http://egis.environment.gov.za>

SANBI BGIS (Biodiversity GIS) (2018). <http://bgis.sanbi.org/>

SANBI. (2016). Red List of South African Plants version 2020. [Redlist.sanbi.org](http://redlist.sanbi.org)

SANBI. (2017). Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning. Driver, A., Holness, S. & Daniels, F. (Eds). 1st Edition. South African National Biodiversity Institute, Pretoria.

SANBI. 2013. Grasslands Ecosystem Guidelines: landscape interpretation for planners and managers. Compiled by Cadman, M., de Villiers, C., Lechmere-Oertel, R. and D. McCulloch. South African National Biodiversity Institute, Pretoria. 139 pages.

Skinner, J.D. & Chimimba, C.T. (2005). The Mammals of the Southern African Subregion (New Edition). Cambridge University Press, South Africa.

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

Smith, G.F., Chesselet, P., van Jaarsveld, E.J., Hartmann, H., Hammer, S., van Wyk, B., Burgoyne, P., Klak, C. & Kurzweil, H. (1998). Mesembs of the world. Briza Publishers, Pretoria.

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

South African National Biodiversity Institute (SANBI). 2018. Terrestrial ecosystem threat status and protection level layer [Vector] 2018. Available from the Biodiversity GIS website: <http://bgis.sanbi.org/SpatialDataset/Detail/2675>

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

South African National Biodiversity Institute (SANBI). 2022. South Africa's official site for Species Information and National Red Lists. <http://speciesstatus.sanbi.org/> (Accessed: June 2023).

Taylor, M.R., Peacock, F. & Wanless, R.M. (Eds). (2015). The 2015 Eskom Red Data Book of birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.

Van Deventer, H., Smith-Adao, L., Mbona, N., Petersen, C., Skowno, A., Collins, N.B., Grenfell, M., Job, N., Lötter, M., Ollis, D., Scherman, P., Sieben, E. & Snaddon, K. 2018. South African National Biodiversity Assessment 2018: Technical Report. Volume 2a: South African Inventory of Inland Aquatic Ecosystems (SAIIAE). Version 3, final released on 3 October 2019. Council for Scientific and Industrial Research (CSIR) and South African National Biodiversity Institute (SANBI): Pretoria, South Africa. Report Number: CSIR report number CSIR/NRE/ECOS/IR/2018/0001/A; SANBI report number <http://hdl.handle.net/20.500.12143/5847>.

Van Ginkel, CE. & Cilliers, CJ. (2020). Aquatic and Wetland Plants of Southern Africa. First Edition. Briza Publications, Pretoria.

Van Oudtshoorn, F. (2004). Guide to the Grasses of Southern Africa. Second Edition. Briza Publikasies, Pretoria.

Van Wyk, B-E. & Malan, S. (1998). Field Guide to the Wildflowers of the Highveld: Also Useful in Adjacent Grassland and Bushveld, Struik Publishers, Cape Town.

Van Wyk, B-E. & Smith, G. (2014). Guide to the Aloes of South Africa. Third Edition. Briza Publications, Pretoria.

Van Wyk, B-E. & Van Wyk, P. (1997). Field guide to trees of Southern Africa. Struik Publishers, Cape Town.

Van Wyk, B-E., Van Oudtshoorn, B. & Gericke, N. (2013). Medicinal Plants of South Africa. Briza Publications, Pretoria.

9 Appendices

9.1 Appendix A Specialist declarations

DECLARATION

I, Carami Burger, 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 Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, 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; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Carami Burger

Ecologist

The Biodiversity Company

July 2024

DECLARATION

I, Andrew Husted, 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 Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, 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; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Andrew Husted

Ecologist

The Biodiversity Company

July 2024

9.2 Appendix B Flora species expected in the PAOI and surrounds

| Family | Species | Author1 | Ran k1 | Sp2 | IU CN | Ecology |
|---------------|-----------------------------------|---------------------------|------------|----------------|----------|---------------------------------------|
| Acanthaceae | <i>Crabbea hirsuta</i> | Harv. | | | LC | Indigenous |
| Acanthaceae | <i>Barleria macrostegia</i> | Nees | | | LC | Indigenous |
| Acanthaceae | <i>Isoglossa woodii</i> | C.B.Clarke | | | LC | Indigenous; Endemic |
| Acanthaceae | <i>Crabbea angustifolia</i> | Nees | | | LC | Indigenous; Endemic |
| Acanthaceae | <i>Justicia orchoides</i> | L.f. | sub sp. | glabrata | LC | Indigenous; Endemic |
| Acanthaceae | <i>Blepharis squarrosa</i> | (Nees) T.Anderson | | | LC | Indigenous; Endemic |
| Acanthaceae | <i>Dicliptera leistneri</i> | K.Balkwill | | | LC | Indigenous; Endemic |
| Achariaceae | <i>Kiggelaria africana</i> | L. | | | LC | Indigenous |
| Aizoaceae | <i>Stomatium ermininum</i> | (Haw.) Schwantes | | | LC | Indigenous; Endemic |
| Aizoaceae | <i>Ruschia sp.</i> | | | | | |
| Aizoaceae | <i>Mestoklema arboriforme</i> | (Burch.) N.E.Br. ex Glen | | | LC | Indigenous; Endemic |
| Aizoaceae | <i>Chasmatophyllum musculinum</i> | (Haw.) Dinter & Schwantes | | | LC | Indigenous |
| Aizoaceae | <i>Trianthema salsoloides</i> | Fenzl ex Oliv. | var. | transvaalensis | LC | Indigenous |
| Aizoaceae | <i>Trianthema parvifolia</i> | E.Mey. ex Sond. | var. | parvifolia | LC | Indigenous |
| Aizoaceae | <i>Delosperma sp.</i> | | | | | |
| Aizoaceae | <i>Ruschia rigens</i> | L.Bolus | | | LC | Indigenous; Endemic |
| Aizoaceae | <i>Ruschia ruralis</i> | (N.E.Br.) Schwantes | | | LC | Indigenous; Endemic |
| Amaranthaceae | <i>Atriplex semibaccata</i> | R.Br. | | | | Not indigenous; Naturalised; Invasive |
| Amaranthaceae | <i>Achyranthes aspera</i> | L. | var. | aspera | | Not indigenous; Naturalised |
| Amaranthaceae | <i>Salsola glabrescens</i> | Burt Davy | | | LC | Indigenous |
| Amaranthaceae | <i>Cyphocarpa angustifolia</i> | (Moq.) Lopr. | | | LC | Indigenous |
| Amaranthaceae | <i>Cyathula uncinulata</i> | (Schrud.) Schinz | | | LC | Indigenous |
| Amaranthaceae | <i>Salsola aphylla</i> | L.f. | | | LC | Indigenous |
| Amaranthaceae | <i>Bassia indica</i> | (Wight) A.J.Scott | | | | Not indigenous; Naturalised |
| Amaranthaceae | <i>Sericorema remotiflora</i> | (Hook.f.) Lopr. | | | LC | Indigenous |
| Amaranthaceae | <i>Atriplex nummularia</i> | Lindl. | sub sp. | nummularia | | Not indigenous; Naturalised; Invasive |
| Amaranthaceae | <i>Atriplex suberecta</i> | I.Verd. | | | LC | Not indigenous; Naturalised; Invasive |
| Amaranthaceae | <i>Achyranthes aspera</i> | L. | var. | sicula | | Indigenous |
| Amaranthaceae | <i>Amaranthus thunbergii</i> | Moq. | | | LC | Indigenous |
| Amaranthaceae | <i>Salsola kali</i> | L. | | | | Not indigenous; Naturalised; Invasive |
| Amaranthaceae | <i>Amaranthus hybridus</i> | L. | sub sp. | hybridus | | Not indigenous; Naturalised |
| Amaranthaceae | <i>Dysphania multifida</i> | (L.) Mosyakin & Clemants | | | | Not indigenous; Naturalised; Invasive |
| Amaranthaceae | <i>Alternanthera sessilis</i> | (L.) DC. | | | | Not indigenous; Naturalised; Invasive |

| | | | | | | |
|--------------------------|----------------------------------|-----------------------------------|---------|-------------|----|---------------------|
| Amaryllidaceae | <i>Haemanthus humilis</i> | Jacq. | sub sp. | humilis | LC | Indigenous; Endemic |
| Amaryllidaceae | <i>Brunsvigia radulosa</i> | Herb. | | | LC | Indigenous |
| Amaryllidaceae | <i>Boophone disticha</i> | (L.f.) Herb. | | | LC | Indigenous |
| Amaryllidaceae | <i>Nerine laticoma</i> | (Ker Gawl.) T.Durand & Schinz | | | LC | Indigenous |
| Anacampserotaceae | <i>Anacampseros ustulata</i> | E.Mey. ex Fenzl | | | LC | Indigenous; Endemic |
| Anacampserotaceae | <i>Anacampseros filamentosa</i> | (Haw.) Sims | sub sp. | filamentosa | | Indigenous; Endemic |
| Anacardiaceae | <i>Searsia ciliata</i> | (Licht. ex Schult.) A.J.Mill. | | | LC | Indigenous |
| Anacardiaceae | <i>Searsia leptodictya</i> | (Diels) T.S.Yi, A.J.Mill. & J.Wen | forma | leptodictya | NE | Indigenous |
| Anacardiaceae | <i>Searsia lancea</i> | (L.f.) F.A.Barkley | | | LC | Indigenous |
| Anacardiaceae | <i>Searsia tridactyla</i> | (Burch.) Moffett | | | LC | Indigenous; Endemic |
| Anacardiaceae | <i>Searsia burchellii</i> | (Sond. ex Engl.) Moffett | | | LC | Indigenous |
| Anacardiaceae | <i>Searsia dentata</i> | (Thunb.) F.A.Barkley | | | LC | Indigenous |
| Anacardiaceae | <i>Searsia pyroides</i> | (Burch.) Moffett | var. | pyroides | LC | Indigenous |
| Apiaceae | <i>Deverra burchellii</i> | (DC.) Eckl. & Zeyh. | | | LC | Indigenous |
| Apiaceae | <i>Choritaenia capensis</i> | Benth. | | | LC | Indigenous; Endemic |
| Apiaceae | <i>Bupleurum mundtii</i> | Cham. & Schltld. | | | LC | Indigenous |
| Apiaceae | <i>Heteromorpha arborescens</i> | (Spreng.) Cham. & Schltld. | var. | abyssinica | LC | Indigenous |
| Apocynaceae | <i>Ceropegia differens</i> | Bruyns | sub sp. | grata | | Indigenous; Endemic |
| Apocynaceae | <i>Cynanchum viminale</i> | (L.) L. | sub sp. | viminale | | Indigenous |
| Apocynaceae | <i>Cordylogyne globosa</i> | E.Mey. | | | LC | Indigenous |
| Apocynaceae | <i>Stapelia grandiflora</i> | Masson | var. | grandiflora | LC | Indigenous |
| Apocynaceae | <i>Huernia sp.</i> | | | | | |
| Apocynaceae | <i>Asclepias meyeriana</i> | (Schltr.) Schltr. | | | LC | Indigenous |
| Apocynaceae | <i>Aspidoglossum interruptum</i> | (E.Mey.) Bullock | | | LC | Indigenous |
| Apocynaceae | <i>Raphionacme dyeri</i> | Retief & Venter | | | LC | Indigenous |
| Apocynaceae | <i>Xysmalobium undulatum</i> | (L.) W.T.Aiton | var. | undulatum | LC | Indigenous |
| Aponogetonaceae | <i>Aponogeton junceus</i> | Lehm. | | | LC | Indigenous |
| Araceae | <i>Lemna gibba</i> | L. | | | LC | Indigenous |
| Araliaceae | <i>Cussonia paniculata</i> | Eckl. & Zeyh. | sub sp. | sinuata | LC | Indigenous |
| Asparagaceae | <i>Asparagus laricinus</i> | Burch. | | | LC | Indigenous |
| Asparagaceae | <i>Asparagus suaveolens</i> | Burch. | | | LC | Indigenous |
| Asparagaceae | <i>Asparagus setaceus</i> | (Kunth) Jessop | | | LC | Indigenous |
| Asphodelaceae | <i>Bulbine abyssinica</i> | A.Rich. | | | LC | Indigenous |
| Asphodelaceae | <i>Bulbine narcissifolia</i> | Salm-Dyck | | | LC | Indigenous |

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|----------------------|---------------------------------------|-------------------------------------|---------|------------------------|----|---------------------------------------|
| Asphodelaceae | <i>Trachyandra asperata</i> | Kunth | var. | <i>asperata</i> | LC | Indigenous |
| Aspleniaceae | <i>Asplenium capense</i> | (Kunze) Bir, Fraser-Jenk. & Lovis | | | LC | Indigenous |
| Aspleniaceae | <i>Asplenium adiantum-nigrum</i> | L. | var. | <i>adiantum-nigrum</i> | LC | Indigenous |
| Aspleniaceae | <i>Asplenium aethiopicum</i> | (Burm.f.) Bech. | | | LC | Indigenous |
| Asteraceae | <i>Oedera humilis</i> | (Less.) N.G.Bergh | | | | Indigenous |
| Asteraceae | <i>Gnaphalium filagopsis</i> | Hilliard & B.L.Burt | | | LC | Indigenous |
| Asteraceae | <i>Chrysocoma sp.</i> | | | | | |
| Asteraceae | <i>Osteospermum leptolobum</i> | (Harv.) Norl. | | | LC | Indigenous; Endemic |
| Asteraceae | <i>Senecio affinis</i> | DC. | | | LC | Indigenous |
| Asteraceae | <i>Helichrysum nudifolium</i> | (L.) Less. | var. | <i>nudifolium</i> | LC | Indigenous |
| Asteraceae | <i>Osteospermum scariosum</i> | DC. | var. | <i>scariosum</i> | NE | Indigenous |
| Asteraceae | <i>Osteospermum muricatum</i> | E.Mey. ex DC. | sub sp. | <i>muricatum</i> | LC | Indigenous |
| Asteraceae | <i>Berkheya pinnatifida</i> | (Thunb.) Thell. | sub sp. | <i>stobaeoides</i> | LC | Indigenous |
| Asteraceae | <i>Aster sp.</i> | | | | | |
| Asteraceae | <i>Euryops sp.</i> | | | | | |
| Asteraceae | <i>Artemisia afra</i> | Jacq. ex Willd. | var. | <i>afra</i> | LC | Indigenous |
| Asteraceae | <i>Helichrysum paronychioides</i> | DC. | | | LC | Indigenous |
| Asteraceae | <i>Tarchonanthus minor</i> | Less. | | | LC | Indigenous |
| Asteraceae | <i>Helichrysum cerastioides</i> | DC. | var. | <i>cerastioides</i> | LC | Indigenous |
| Asteraceae | <i>Bidens pilosa</i> | L. | | | | Not indigenous; Naturalised |
| Asteraceae | <i>Felicia burkei</i> | (Harv.) L.Bolus | | | LC | Indigenous |
| Asteraceae | <i>Schistostephium crataegifolium</i> | (DC.) Fenzl ex Harv. | | | LC | Indigenous |
| Asteraceae | <i>Conyza podocephala</i> | DC. | | | | Indigenous |
| Asteraceae | <i>Helichrysum pumilio</i> | (O.Hoffm.) Hilliard & B.L.Burt | sub sp. | <i>pumilio</i> | LC | Indigenous; Endemic |
| Asteraceae | <i>Geigeria burkei</i> | Harv. | sub sp. | <i>burkei</i> | NE | Indigenous |
| Asteraceae | <i>Senecio achilleifolius</i> | DC. | | | LC | Indigenous |
| Asteraceae | <i>Pentzia globosa</i> | Less. | | | LC | Indigenous |
| Asteraceae | <i>Hilliardiella capensis</i> | (Houtt.) H.Rob., Skvarla & V.A.Funk | | | | Indigenous |
| Asteraceae | <i>Berkheya onopordifolia</i> | (DC.) O.Hoffm. ex Burt Davy | var. | <i>onopordifolia</i> | LC | Indigenous |
| Asteraceae | <i>Crassosiphon protecta</i> | (Dinter) B.Nord. | | | LC | Indigenous |
| Asteraceae | <i>Dicoma anomala</i> | Sond. | sub sp. | <i>anomala</i> | LC | Indigenous |
| Asteraceae | <i>Cirsium vulgare</i> | (Savi) Ten. | | | | Not indigenous; Naturalised; Invasive |
| Asteraceae | <i>Geigeria aspera</i> | Harv. | var. | <i>aspera</i> | LC | Indigenous |
| Asteraceae | <i>Senecio coronatus</i> | (Thunb.) Harv. | | | LC | Indigenous |
| Asteraceae | <i>Curio radicans</i> | (L.f.) P.V.Heath | | | LC | Indigenous |

| | | | | | | |
|------------------------|----------------------------------|-----------------------------|---------|---------------|----|---------------------------------------|
| Asteraceae | <i>Denekia capensis</i> | Thunb. | | | LC | Indigenous |
| Asteraceae | <i>Tarchonanthus camphoratus</i> | L. | | | LC | Indigenous |
| Asteraceae | <i>Platycarphella parvifolia</i> | (S.Moore) V.A.Funk & H.Rob. | | | LC | Indigenous; Endemic |
| Asteraceae | <i>Garuleum pinnatifidum</i> | (Thunb.) DC. | | | LC | Indigenous; Endemic |
| Asteraceae | <i>Helichrysum zeyheri</i> | Less. | | | LC | Indigenous |
| Asteraceae | <i>Hypochaeris microcephala</i> | (Sch.Bip.) Cabrera | var. | albiflora | | Not indigenous; Naturalised |
| Asteraceae | <i>Senecio hastatus</i> | L. | | | LC | Indigenous |
| Asteraceae | <i>Cotula anthemoides</i> | L. | | | LC | Indigenous |
| Asteraceae | <i>Arctotis stoechadifolia</i> | P.J.Bergius | | | LC | Indigenous; Endemic |
| Asteraceae | <i>Schkuhria pinnata</i> | (Lam.) Kuntze ex Thell. | | | | Not indigenous; Naturalised |
| Asteraceae | <i>Gazania krebsiana</i> | Less. | sub sp. | krebsiana | LC | Indigenous |
| Asteraceae | <i>Tagetes minuta</i> | L. | | | | Not indigenous; Naturalised; Invasive |
| Asteraceae | <i>Hertia ciliata</i> | (Harv.) Kuntze | | | LC | Indigenous |
| Asteraceae | <i>Senecio consanguineus</i> | DC. | | | LC | Indigenous |
| Asteraceae | <i>Euryops empetrifolius</i> | DC. | | | LC | Indigenous |
| Asteraceae | <i>Dimorphotheca zeyheri</i> | Sond. | | | LC | Indigenous |
| Asteraceae | <i>Haplocarpha scaposa</i> | Harv. | | | LC | Indigenous |
| Boraginaceae | <i>Heliotropium lineare</i> | (A.DC.) Gurke | | | LC | Indigenous |
| Boraginaceae | <i>Lithospermum hirsutum</i> | E.Mey. ex A.DC. | | | LC | Indigenous; Endemic |
| Boraginaceae | <i>Trichodesma angustifolium</i> | Harv. | sub sp. | angustifolium | LC | Indigenous |
| Boraginaceae | <i>Anchusa riparia</i> | A.DC. | | | LC | Indigenous |
| Boraginaceae | <i>Lithospermum scabrum</i> | Thunb. | | | LC | Indigenous; Endemic |
| Brassicaceae | <i>Sisymbrium capense</i> | Thunb. | | | LC | Indigenous |
| Brassicaceae | <i>Erucastrum strigosum</i> | (Thunb.) O.E.Schulz | | | LC | Indigenous |
| Brassicaceae | <i>Lepidium bonariense</i> | L. | | | | Not indigenous; Naturalised |
| Brassicaceae | <i>Heliophila carnosa</i> | (Thunb.) Steud. | | | LC | Indigenous |
| Bryaceae | <i>Bryum argenteum</i> | Hedw. | | | | Indigenous |
| Bryaceae | <i>Bryum dichotomum</i> | Hedw. | | | | Indigenous |
| Campanulaceae | <i>Wahlenbergia albens</i> | (Spreng. ex A.DC.) Lammers | | | LC | Indigenous |
| Campanulaceae | <i>Wahlenbergia androsacea</i> | A.DC. | | | LC | Indigenous |
| Cannabaceae | <i>Celtis africana</i> | Burm.f. | | | LC | Indigenous |
| Caryophyllaceae | <i>Corrigiola litoralis</i> | L. | sub sp. | litoralis | NE | Indigenous |
| Caryophyllaceae | <i>Silene undulata</i> | Aiton | | | | Indigenous |
| Caryophyllaceae | <i>Dianthus basuticus</i> | Burt Davy | sub sp. | basuticus | NE | Indigenous |
| Caryophyllaceae | <i>Dianthus micropetalus</i> | Ser. | | | LC | Indigenous |

| | | | | | | |
|-----------------------|-----------------------------------|------------------------------------|---------|----------------|----|---------------------------------------|
| Celastraceae | <i>Gymnosporia buxifolia</i> | (L.) Szyszyl. | | | LC | Indigenous |
| Celastraceae | <i>Maytenus undata</i> | (Thunb.) Blakelock | | | LC | Indigenous |
| Cleomaceae | <i>Cleome rubella</i> | Burch. | | | LC | Indigenous |
| Commelinaceae | <i>Commelina africana</i> | L. | var. | africana | LC | Indigenous |
| Commelinaceae | <i>Commelina africana</i> | L. | var. | lancispatha | LC | Indigenous |
| Commelinaceae | <i>Commelina livingstonii</i> | C.B.Clarke | | | LC | Indigenous |
| Commelinaceae | <i>Cyanotis speciosa</i> | (L.f.) Hassk. | | | LC | Indigenous |
| Commelinaceae | <i>Commelina subulata</i> | Roth | | | LC | Indigenous |
| Convolvulaceae | <i>Cuscuta campestris</i> | Yunk. | | | | Not indigenous; Naturalised; Invasive |
| Convolvulaceae | <i>Ipomoea simplex</i> | Thunb. | | | LC | Indigenous |
| Convolvulaceae | <i>Seddera capensis</i> | (E.Mey. ex Choisy) Hallier f. | | | LC | Indigenous |
| Convolvulaceae | <i>Convolvulus boedeckerianus</i> | Peter | | | LC | Indigenous; Endemic |
| Convolvulaceae | <i>Ipomoea oblongata</i> | E.Mey. ex Choisy | | | LC | Indigenous |
| Convolvulaceae | <i>Ipomoea oenotheroides</i> | (L.f.) Raf. ex Hallier f. | | | LC | Indigenous |
| Crassulaceae | <i>Crassula corallina</i> | Thunb. | sub sp. | corallina | LC | Indigenous |
| Crassulaceae | <i>Crassula tabularis</i> | Dinter | | | LC | Indigenous |
| Crassulaceae | <i>Crassula nudicaulis</i> | L. | var. | nudicaulis | LC | Indigenous |
| Crassulaceae | <i>Crassula lanceolata</i> | (Eckl. & Zeyh.) Endl. ex Walp. | sub sp. | transvaalensis | LC | Indigenous |
| Crassulaceae | <i>Crassula sp.</i> | | | | | |
| Crassulaceae | <i>Kalanchoe thyrsiflora</i> | Harv. | | | LC | Indigenous |
| Cucurbitaceae | <i>Acanthosicyos naudinianus</i> | (Sond.) C.Jeffrey | | | LC | Indigenous |
| Cucurbitaceae | <i>Cucumis myriocarpus</i> | Naudin | sub sp. | myriocarpu s | LC | Indigenous |
| Cyperaceae | <i>Kyllinga alba</i> | Nees | | | LC | Indigenous |
| Cyperaceae | <i>Cyperus difformis</i> | L. | | | LC | Indigenous |
| Cyperaceae | <i>Schoenoplectus muricinix</i> | (C.B.Clarke) J.Raynal | | | LC | Indigenous |
| Cyperaceae | <i>Cyperus decurvatus</i> | (C.B.Clarke) C.Archer & Goetgh. | | | LC | Indigenous |
| Cyperaceae | <i>Cyperus fastigiatus</i> | Rottb. | | | LC | Indigenous |
| Cyperaceae | <i>Fimbristylis dichotoma</i> | (L.) Vahl | sub sp. | dichotoma | LC | Indigenous |
| Cyperaceae | <i>Schoenoplectus corymbosus</i> | (Roth ex Roem. & Schult.) J.Raynal | | | LC | Indigenous |
| Cyperaceae | <i>Carex uhligii</i> | K.Schum. ex C.B.Clarke | | | | Indigenous |
| Cyperaceae | <i>Cyperus marginatus</i> | Thunb. | | | LC | Indigenous |
| Cyperaceae | <i>Cyperus esculentus</i> | L. | var. | esculentus | LC | Indigenous |
| Cyperaceae | <i>Cyperus denudatus</i> | L.f. | | | LC | Indigenous |
| Cyperaceae | <i>Bulbostylis hispidula</i> | (Vahl) R.W.Haines | sub sp. | pyriformis | LC | Indigenous |
| Cyperaceae | <i>Kyllinga alata</i> | Nees | | | LC | Indigenous |

| | | | | | | |
|------------------------|---------------------------------|-----------------------------------|---------|--------------|----|--------------------------------|
| Cyperaceae | <i>Cyperus usitatus</i> | Burch. | | | LC | Indigenous |
| Cyperaceae | <i>Fuirena pubescens</i> | (Poir.) Kunth | var. | pubescens | LC | Indigenous |
| Cyperaceae | <i>Afroscirpoides dioeca</i> | (Kunth) Garcia-Madr. | | | | Indigenous |
| Cyperaceae | <i>Cyperus capensis</i> | (Steud.) Endl. | | | LC | Indigenous; Endemic |
| Cyperaceae | <i>Cyperus semitrifidus</i> | Schrad. | | | LC | Indigenous |
| Cyperaceae | <i>Carex sparteae</i> | Wahlenb. | | | | Indigenous |
| Cyperaceae | <i>Cyperus longus</i> | L. | var. | tenuiflorus | NE | Indigenous |
| Cyperaceae | <i>Eleocharis limosa</i> | (Schrad.) Schult. | | | LC | Indigenous |
| Cyperaceae | <i>Carex glomerabilis</i> | V.I.Krecz. | | | LC | Indigenous |
| Cyperaceae | <i>Cyperus laevigatus</i> | L. | | | LC | Indigenous |
| Cyperaceae | <i>Cyperus eragrostis</i> | Lam. | | | | Not indigenous; Naturalised |
| Cyperaceae | <i>Schoenoxiphium sp.</i> | | | | | |
| Dryopteridaceae | <i>Dryopteris inaequalis</i> | (Schltdl.) Kuntze | | | LC | Indigenous |
| Ebenaceae | <i>Euclea crispa</i> | (Thunb.) Gurke | sub sp. | crispa | LC | Indigenous |
| Ebenaceae | <i>Diospyros austroafricana</i> | De Winter | var. | microphylla | LC | Indigenous |
| Ebenaceae | <i>Diospyros lycioides</i> | Desf. | sub sp. | lycioides | LC | Indigenous |
| Elatinaceae | <i>Bergia sp.</i> | | | | | |
| Euphorbiaceae | <i>Euphorbia inaequilatera</i> | Sond. | | | LC | Indigenous |
| Euphorbiaceae | <i>Euphorbia rhombifolia</i> | Boiss. | | | LC | Indigenous |
| Euphorbiaceae | <i>Euphorbia spartaria</i> | N.E.Br. | | | LC | Indigenous |
| Euphorbiaceae | <i>Euphorbia striata</i> | Thunb. | | | LC | Indigenous |
| Euphorbiaceae | <i>Euphorbia pulvinata</i> | Marloth | | | LC | Indigenous |
| Fabaceae | <i>Sesbania notialis</i> | J.B.Gillett | | | LC | Indigenous; Endemic |
| Fabaceae | <i>Indigofera torulosa</i> | E.Mey. | var. | angustiloba | LC | Indigenous; Endemic |
| Fabaceae | <i>Crotalaria burkeana</i> | Benth. | | | LC | Indigenous |
| Fabaceae | <i>Indigofera sessilifolia</i> | DC. | | | LC | Indigenous |
| Fabaceae | <i>Indigofera daleoides</i> | Benth. ex Harv. | var. | daleoides | NE | Indigenous |
| Fabaceae | <i>Zornia capensis</i> | Pers. | sub sp. | capensis | LC | Indigenous |
| Fabaceae | <i>Crotalaria virgulata</i> | Klotzsch | sub sp. | grantiana | LC | Indigenous |
| Fabaceae | <i>Rhynchosia totta</i> | (Thunb.) DC. | var. | totta | LC | Indigenous |
| Fabaceae | <i>Crotalaria sphaerocarpa</i> | Perr. ex DC. | sub sp. | sphaerocarpa | LC | Indigenous |
| Fabaceae | <i>Vachellia hebeclada</i> | (DC.) Kyal. & Boatwr. | sub sp. | hebeclada | LC | Indigenous |
| Fabaceae | <i>Rhynchosia pentheri</i> | Schltr. ex Zahlbr. | var. | pentheri | LC | Indigenous |
| Fabaceae | <i>Lessertia stricta</i> | L.Bolus | | | LC | Indigenous |
| Fabaceae | <i>Leobordea adpressa</i> | (N.E.Br.) B.-E. van Wyk & Boatwr. | sub sp. | adpressa | LC | Indigenous |
| Fabaceae | <i>Lotononis divaricata</i> | (Eckl. & Zeyh.) Benth. | | | NE | Indigenous |

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|----------------------|--------------------------------|---------------------------------|---------|----------------|----|--|
| Fabaceae | <i>Rhynchosia adenodes</i> | Eckl. & Zeyh. | | | LC | Indigenous |
| Fabaceae | <i>Vachellia karroo</i> | (Hayne) Banfi & Galasso | | | LC | Indigenous |
| Fabaceae | <i>Tephrosia sp.</i> | | | | | |
| Fabaceae | <i>Lessertia depressa</i> | Harv. | | | LC | Indigenous |
| Fabaceae | <i>Indigofera zeyheri</i> | Spreng. ex Eckl. & Zeyh. | | | LC | Indigenous |
| Fabaceae | <i>Listia marlothii</i> | (Engl.) B.-E. van Wyk & Boatwr. | | | LC | Indigenous |
| Fabaceae | <i>Prosopis glandulosa</i> | Torr. | var. | glandulosa | NE | Not indigenous; Naturalised |
| Fabaceae | <i>Dolichos linearis</i> | E.Mey. | | | LC | Indigenous |
| Fabaceae | <i>Tephrosia capensis</i> | (Jacq.) Pers. | var. | capensis | LC | Indigenous |
| Fabaceae | <i>Lessertia frutescens</i> | (L.) Goldblatt & J.C.Manning | sub sp. | microphylla | LC | Indigenous |
| Fabaceae | <i>Indigofera filipes</i> | Benth. ex Harv. | | | LC | Indigenous |
| Fabaceae | <i>Listia heterophylla</i> | E.Mey. | | | LC | Indigenous |
| Fabaceae | <i>Calpurnia sericea</i> | Harv. | | | LC | Indigenous |
| Fabaceae | <i>Dolichos angustifolius</i> | Eckl. & Zeyh. | | | LC | Indigenous |
| Fabaceae | <i>Bolusia acuminata</i> | (DC.) Polhill | | | LC | Indigenous |
| Frankeniaceae | <i>Frankenia pulverulenta</i> | L. | | | LC | Indigenous |
| Geraniaceae | <i>Pelargonium dolomiticum</i> | R.Knuth | | | LC | Indigenous |
| Hyacinthaceae | <i>Massonia jasminiflora</i> | Burch. ex Baker | | | LC | Indigenous |
| Hyacinthaceae | <i>Drimia sp.</i> | | | | | |
| Hyacinthaceae | <i>Dipcadi longifolium</i> | (Ker Gawl.) Baker | | | LC | Indigenous |
| Hypericaceae | <i>Hypericumalandii</i> | Choisy | | | LC | Indigenous |
| Iridaceae | <i>Babiana hypogaea</i> | Burch. | | | LC | Indigenous |
| Iridaceae | <i>Gladiolus ecklonii</i> | Lehm. | | | LC | Indigenous |
| Iridaceae | <i>Gladiolus dalenii</i> | Van Geel | sub sp. | dalenii | LC | Indigenous |
| Iridaceae | <i>Lapeirousia plicata</i> | (Jacq.) Diels | sub sp. | foliosa | | Indigenous |
| Iridaceae | <i>Moraea pallida</i> | (Baker) Goldblatt | | | LC | Indigenous |
| Iridaceae | <i>Gladiolus permeabilis</i> | D.Delaroche | sub sp. | edulis | LC | Indigenous |
| Iridaceae | <i>Duthiastrum linifolium</i> | (E.Phillips) M.P.de Vos | | | LC | Indigenous; Endemic |
| Juncaceae | <i>Juncus rigidus</i> | Desf. | | | LC | Indigenous |
| Lamiaceae | <i>Mentha longifolia</i> | (L.) Huds. | sub sp. | capensis | LC | Indigenous |
| Lamiaceae | <i>Salvia repens</i> | Burch. ex Benth. | var. | repens | LC | Indigenous |
| Lamiaceae | <i>Mentha longifolia</i> | (L.) Huds. | sub sp. | polyadena | LC | Indigenous |
| Lamiaceae | <i>Stachys spathulata</i> | Burch. ex Benth. | | | LC | Indigenous |
| Lamiaceae | <i>Salvia repens</i> | Burch. ex Benth. | var. | transvaalensis | LC | Indigenous |
| Lamiaceae | <i>Salvia runcinata</i> | L.f. | | | LC | Indigenous |
| Lamiaceae | <i>Salvia verbenaca</i> | L. | | | LC | Not indigenous; Naturalised; Invasive |

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|------------------------|------------------------------------|-------------------------|---------|--------------|----|--|
| Linaceae | <i>Linum thunbergii</i> | Eckl. & Zeyh. | | | LC | Indigenous |
| Lobeliaceae | <i>Lobelia erinus</i> | L. | | | LC | Indigenous |
| Lobeliaceae | <i>Lobelia sonderiana</i> | (Kuntze) Lammers | | | LC | Indigenous |
| Lobeliaceae | <i>Lobelia thermalis</i> | Thunb. | | | LC | Indigenous |
| Malvaceae | <i>Hibiscus pusillus</i> | Thunb. | | | LC | Indigenous |
| Malvaceae | <i>Hibiscus calyphyllus</i> | Cav. | | | LC | Indigenous |
| Malvaceae | <i>Hermannia sp.</i> | | | | | |
| Malvaceae | <i>Hermannia bicolor</i> | Engl. & Dinter | | | LC | Indigenous |
| Malvaceae | <i>Sida dregei</i> | Burt Davy | | | LC | Indigenous |
| Malvaceae | <i>Grewia occidentalis</i> | L. | var. | occidentalis | LC | Indigenous |
| Malvaceae | <i>Hibiscus microcarpus</i> | Garcke | | | LC | Indigenous |
| Malvaceae | <i>Hibiscus trionum</i> | L. | | | | Not indigenous; Naturalised |
| Malvaceae | <i>Grewia flava</i> | DC. | | | LC | Indigenous |
| Malvaceae | <i>Abutilon galpinii</i> | A.Meeuse | | | LC | Indigenous |
| Malvaceae | <i>Corchorus asplenifolius</i> | Burch. | | | LC | Indigenous |
| Malvaceae | <i>Abutilon sp.</i> | | | | | |
| Malvaceae | <i>Corchorus schimperi</i> | Cufod. | | | LC | Indigenous |
| Malvaceae | <i>Malva pusilla</i> | Sm. | | | | Not indigenous; Naturalised |
| Malvaceae | <i>Hermannia depressa</i> | N.E.Br. | | | LC | Indigenous |
| Malvaceae | <i>Malva neglecta</i> | Wallr. | | | | Not indigenous; Naturalised |
| Menispermaceae | <i>Antizoma angustifolia</i> | (Burch.) Miers ex Harv. | | | LC | Indigenous |
| Mniaceae | <i>Mielichhoferia subnuda</i> | Sim | | | | Indigenous |
| Myrsinaceae | <i>Myrsine africana</i> | L. | | | LC | Indigenous |
| Oleaceae | <i>Olea europaea</i> | L. | sub sp. | cuspidata | | Indigenous |
| Onagraceae | <i>Oenothera indecora</i> | Cambess. | | | | Not indigenous; Naturalised |
| Onagraceae | <i>Oenothera tetraptera</i> | Cav. | | | | Not indigenous; Naturalised; Invasive |
| Ophioglossaceae | <i>Ophioglossum polyphyllum</i> | A.Braun | var. | polyphyllum | LC | Indigenous |
| Orobanchaceae | <i>Striga bilabiata</i> | (Thunb.) Kuntze | sub sp. | bilabiata | LC | Indigenous |
| Orobanchaceae | <i>Striga sp.</i> | | | | | |
| Papaveraceae | <i>Papaver aculeatum</i> | Thunb. | | | LC | Indigenous |
| Pedaliaceae | <i>Pterodiscus speciosus</i> | Hook. | | | LC | Indigenous |
| Peraceae | <i>Clutia pulchella</i> | L. | var. | pulchella | LC | Indigenous |
| Peraceae | <i>Clutia natalensis</i> | Bernh. | | | LC | Indigenous |
| Phrymaceae | <i>Mimulus gracilis</i> | R.Br. | | | LC | Indigenous |
| Phyllanthaceae | <i>Phyllanthus maderaspatensis</i> | L. | | | LC | Indigenous |
| Phyllanthaceae | <i>Flueggea virosa</i> | (Roxb. ex Willd.) Royle | sub sp. | virosa | LC | Indigenous |

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|---------|----------------------------------|---|------------|--------------|----|--|
| Poaceae | <i>Bromus leptoclados</i> | Nees | | | LC | Indigenous |
| Poaceae | <i>Sporobolus fimbriatus</i> | (Trin.) Nees | | | LC | Indigenous |
| Poaceae | <i>Sporobolus discosporus</i> | Nees | | | LC | Indigenous |
| Poaceae | <i>Setaria incrassata</i> | (Hochst.) Hack. | | | LC | Indigenous |
| Poaceae | <i>Eragrostis superba</i> | Peyr. | | | LC | Indigenous |
| Poaceae | <i>Urochloa panicoides</i> | P.Beauv. | | | LC | Indigenous |
| Poaceae | <i>Aristida adscensionis</i> | L. | | | LC | Indigenous |
| Poaceae | <i>Eragrostis tef</i> | (Zuccagni) Trotter | | | NE | Not indigenous; Naturalised |
| Poaceae | <i>Elionurus muticus</i> | (Spreng.) Kunth | | | LC | Indigenous |
| Poaceae | <i>Aristida stipitata</i> | Hack. | sub sp. | graciliflora | LC | Indigenous |
| Poaceae | <i>Eragrostis lappula</i> | Nees | | | LC | Indigenous |
| Poaceae | <i>Digitaria tricholaenoides</i> | Stapf | | | LC | Indigenous |
| Poaceae | <i>Panicum schinzii</i> | Hack. | | | LC | Indigenous |
| Poaceae | <i>Eragrostis obtusa</i> | Munro ex Ficalho & Hiern | | | LC | Indigenous |
| Poaceae | <i>Sporobolus ludwigii</i> | Hochst. | | | LC | Indigenous |
| Poaceae | <i>Cymbopogon caesius</i> | (Hook. & Arn.) Stapf | | | LC | Indigenous |
| Poaceae | <i>Eustachys paspaloides</i> | (Vahl) Lanza & Mattei | | | LC | Indigenous |
| Poaceae | <i>Dactyloctenium aegyptium</i> | (L.) Willd. | | | LC | Indigenous |
| Poaceae | <i>Setaria pumila</i> | (Poir.) Roem. & Schult. | | | LC | Indigenous |
| Poaceae | <i>Eragrostis cilianensis</i> | (All.) Vignolo ex Janch. | | | LC | Indigenous |
| Poaceae | <i>Tragus racemosus</i> | (L.) All. | | | LC | Indigenous |
| Poaceae | <i>Tarigidia aequiglumis</i> | (Gooss.) Stent | | | LC | Indigenous |
| Poaceae | <i>Setaria sphacelata</i> | (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss | var. | torta | LC | Indigenous |
| Poaceae | <i>Eragrostis nindensis</i> | Ficalho & Hiern | | | LC | Indigenous |
| Poaceae | <i>Bromus catharticus</i> | Vahl | | | NE | Not indigenous; Naturalised; Invasive |
| Poaceae | <i>Chloris virgata</i> | Sw. | | | LC | Indigenous |
| Poaceae | <i>Aristida bipartita</i> | (Nees) Trin. & Rupr. | | | LC | Indigenous |
| Poaceae | <i>Paspalum dilatatum</i> | Poir. | | | NE | Not indigenous; Naturalised; Invasive |
| Poaceae | <i>Eragrostis planiculmis</i> | Nees | | | LC | Indigenous |
| Poaceae | <i>Brachiaria serrata</i> | (Thunb.) Stapf | | | LC | Indigenous |
| Poaceae | <i>Sporobolus sp.</i> | | | | | |
| Poaceae | <i>Melinis nerviglumis</i> | (Franch.) Zizka | | | LC | Indigenous |
| Poaceae | <i>Eragrostis mexicana</i> | (Hornem.) Link | sub sp. | virescens | NE | Not indigenous; Naturalised |
| Poaceae | <i>Cymbopogon marginatus</i> | (Steud.) Stapf ex Burt Davy | | | LC | Indigenous |
| Poaceae | <i>Diheteropogon amplexans</i> | (Nees) Clayton | var. | amplexans | LC | Indigenous |
| Poaceae | <i>Cenchrus sphacelatus</i> | (Nees) Morrone | | | LC | Indigenous |
| Poaceae | <i>Themeda triandra</i> | Forssk. | | | LC | Indigenous |

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|---------|----------------------------------|---------------------------------|---------|-------------|----|---------------------------------------|
| Poaceae | <i>Eriochloa fatmensis</i> | (Hochst. & Steud.) Clayton | | | LC | Indigenous |
| Poaceae | <i>Eragrostis lehmanniana</i> | Nees | var. | lehmanniana | LC | Indigenous |
| Poaceae | <i>Digitaria eriantha</i> | Steud. | | | LC | Indigenous |
| Poaceae | <i>Digitaria sanguinalis</i> | (L.) Scop. | | | NE | Not indigenous; Naturalised |
| Poaceae | <i>Eragrostis plana</i> | Nees | | | LC | Indigenous |
| Poaceae | <i>Panicum coloratum</i> | L. | | | LC | Indigenous |
| Poaceae | <i>Andropogon schirensis</i> | Hochst. ex A.Rich. | | | LC | Indigenous |
| Poaceae | <i>Paspalum distichum</i> | L. | | | LC | Not indigenous; Naturalised; Invasive |
| Poaceae | <i>Enneapogon desvauxii</i> | P.Beauv. | | | LC | Indigenous |
| Poaceae | <i>Trisetopsis imberbis</i> | (Nees) Roser, A.Wolk & Veldkamp | | | | Indigenous |
| Poaceae | <i>Hyparrhenia anamesa</i> | Clayton | | | LC | Indigenous |
| Poaceae | <i>Phragmites australis</i> | (Cav.) Steud. | | | LC | Indigenous |
| Poaceae | <i>Aristida canescens</i> | Henrard | sub sp. | canescens | LC | Indigenous |
| Poaceae | <i>Eragrostis remotiflora</i> | De Winter | | | LC | Indigenous; Endemic |
| Poaceae | <i>Echinochloa holubii</i> | (Stapf) Stapf | | | LC | Indigenous |
| Poaceae | <i>Andropogon appendiculatus</i> | Nees | | | LC | Indigenous |
| Poaceae | <i>Bromus sp.</i> | | | | | |
| Poaceae | <i>Panicum sp.</i> | | | | | |
| Poaceae | <i>Eragrostis micrantha</i> | Hack. | | | LC | Indigenous |
| Poaceae | <i>Eragrostis sp.</i> | | | | | |
| Poaceae | <i>Chloris pycnothrix</i> | Trin. | | | LC | Indigenous |
| Poaceae | <i>Brachiaria eruciformis</i> | (Sm.) Griseb. | | | LC | Indigenous |
| Poaceae | <i>Eragrostis bicolor</i> | Nees | | | LC | Indigenous |
| Poaceae | <i>Sporobolus ioclados</i> | (Trin.) Nees | | | LC | Indigenous |
| Poaceae | <i>Brachiaria nigropedata</i> | (Ficalho & Hiern) Stapf | | | LC | Indigenous |
| Poaceae | <i>Panicum maximum</i> | Jacq. | | | LC | Indigenous |
| Poaceae | <i>Digitaria argyrograpta</i> | (Nees) Stapf | | | LC | Indigenous |
| Poaceae | <i>Chloris gayana</i> | Kunth | | | LC | Indigenous |
| Poaceae | <i>Eragrostis pseudobtusa</i> | De Winter | | | NE | Indigenous; Endemic |
| Poaceae | <i>Antheophora pubescens</i> | Nees | | | LC | Indigenous |
| Poaceae | <i>Eragrostis chloromelas</i> | Steud. | | | LC | Indigenous |
| Poaceae | <i>Panicum stapfianum</i> | Fourc. | | | LC | Indigenous |
| Poaceae | <i>Aristida congesta</i> | Roem. & Schult. | sub sp. | barbicollis | LC | Indigenous |
| Poaceae | <i>Melinis repens</i> | (Willd.) Zizka | sub sp. | repens | LC | Indigenous |
| Poaceae | <i>Melica racemosa</i> | Thunb. | | | LC | Indigenous |
| Poaceae | <i>Cynodon transvaalensis</i> | Burt Davy | | | LC | Indigenous |

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|---------|----------------------------------|---|---------|-------------|----|-----------------------------|
| Poaceae | <i>Heteropogon contortus</i> | (L.) Roem. & Schult. | | | LC | Indigenous |
| Poaceae | <i>Eragrostis trichophora</i> | Coss. & Durieu | | | LC | Indigenous |
| Poaceae | <i>Hyparrhenia dregeana</i> | (Nees) Stapf ex Stent | | | LC | Indigenous |
| Poaceae | <i>Enneapogon scoparius</i> | Stapf | | | LC | Indigenous |
| Poaceae | <i>Echinochloa crus-galli</i> | (L.) P.Beauv. | | | LC | Indigenous |
| Poaceae | <i>Triraphis andropogonoides</i> | (Steud.) E.Phillips | | | LC | Indigenous |
| Poaceae | <i>Cynodon incompletus</i> | Nees | | | LC | Indigenous; Endemic |
| Poaceae | <i>Oropetium capense</i> | Stapf | | | LC | Indigenous |
| Poaceae | <i>Aristida congesta</i> | Roem. & Schult. | sub sp. | congesta | LC | Indigenous |
| Poaceae | <i>Hyparrhenia hirta</i> | (L.) Stapf | | | LC | Indigenous |
| Poaceae | <i>Eragrostis capensis</i> | (Thunb.) Trin. | | | LC | Indigenous |
| Poaceae | <i>Aristida junciformis</i> | Trin. & Rupr. | sub sp. | junciformis | LC | Indigenous |
| Poaceae | <i>Pogonarthria squarrosa</i> | (Roem. & Schult.) Pilg. | | | LC | Indigenous |
| Poaceae | <i>Eragrostis barrelieri</i> | Daveau | | | NE | Not indigenous; Naturalised |
| Poaceae | <i>Setaria sphacelata</i> | (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss | var. | sphacelata | LC | Indigenous |
| Poaceae | <i>Eragrostis stapfii</i> | De Winter | | | LC | Indigenous |
| Poaceae | <i>Koeleria capensis</i> | (Steud.) Nees | | | LC | Indigenous |
| Poaceae | <i>Agrostis lachnantha</i> | Nees | var. | lachnantha | LC | Indigenous |
| Poaceae | <i>Tragus koelerioides</i> | Asch. | | | LC | Indigenous |
| Poaceae | <i>Setaria sp.</i> | | | | | |
| Poaceae | <i>Eragrostis curvula</i> | (Schrud.) Nees | | | LC | Indigenous |
| Poaceae | <i>Eleusine coracana</i> | (L.) Gaertn. | sub sp. | africana | LC | Indigenous |
| Poaceae | <i>Ehrharta erecta</i> | Lam. | var. | natalensis | LC | Indigenous |
| Poaceae | <i>Aristida diffusa</i> | Trin. | sub sp. | burkei | LC | Indigenous |
| Poaceae | <i>Leptochloa fusca</i> | (L.) Kunth | | | LC | Indigenous |
| Poaceae | <i>Microchloa caffra</i> | Nees | | | LC | Indigenous |
| Poaceae | <i>Melica decumbens</i> | Thunb. | | | LC | Indigenous |
| Poaceae | <i>Tragus berteronianus</i> | Schult. | | | LC | Indigenous |
| Poaceae | <i>Trichoneura grandiglumis</i> | (Nees) Ekman | | | LC | Indigenous |
| Poaceae | <i>Stipagrostis uniplumis</i> | (Licht.) De Winter | var. | neesii | LC | Indigenous |
| Poaceae | <i>Eragrostis racemosa</i> | (Thunb.) Steud. | | | LC | Indigenous |
| Poaceae | <i>Setaria nigrirostris</i> | (Nees) T.Durand & Schinz | | | LC | Indigenous |
| Poaceae | <i>Eleusine indica</i> | (L.) Gaertn. | | | LC | Indigenous |
| Poaceae | <i>Cymbopogon pospischilii</i> | (K.Schum.) C.E.Hubb. | | | NE | Indigenous |
| Poaceae | <i>Setaria verticillata</i> | (L.) P.Beauv. | | | LC | Indigenous |
| Poaceae | <i>Eragrostis gummiflua</i> | Nees | | | LC | Indigenous |

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|------------------|-----------------------------------|-------------------------------|---------|-------------|----|--|
| Poaceae | <i>Hemarthria altissima</i> | (Poir.) Stapf & C.E.Hubb. | | | LC | Indigenous |
| Poaceae | <i>Eragrostis biflora</i> | Hack. ex Schinz | | | LC | Indigenous |
| Poaceae | <i>Cynodon dactylon</i> | (L.) Pers. | | | LC | Indigenous |
| Poaceae | <i>Fingerhuthia africana</i> | Lehm. | | | LC | Indigenous |
| Poaceae | <i>Aristida meridionalis</i> | Henrard | | | LC | Indigenous |
| Poaceae | <i>Panicum deustum</i> | Thunb. | | | LC | Indigenous |
| Polygalaceae | <i>Polygala hottentotta</i> | C.Presl | | | LC | Indigenous |
| Polygonaceae | <i>Persicaria lapathifolia</i> | (L.) Delarbre | | | | Not indigenous; Naturalised; Invasive |
| Portulacaceae | <i>Portulaca quadrifida</i> | L. | | | LC | Indigenous |
| Potamogetonaceae | <i>Potamogeton pectinatus</i> | L. | | | LC | Indigenous |
| Pottiaceae | <i>Trichostomum brachydontium</i> | Bruch | | | | Indigenous |
| Pteridaceae | <i>Cheilanthes eckloniana</i> | (Kunze) Mett. | | | LC | Indigenous |
| Pteridaceae | <i>Pellaea calomelanos</i> | (Sw.) Link | var. | calomelanos | LC | Indigenous |
| Ranunculaceae | <i>Ranunculus trichophyllus</i> | Chaix | | | LC | Indigenous |
| Resedaceae | <i>Oligomeris dregeana</i> | (Mull.Arg.) Mull.Arg. | | | LC | Indigenous |
| Resedaceae | <i>Reseda lutea</i> | L. | sub sp. | lutea | NE | Not indigenous; Naturalised; Invasive |
| Rhamnaceae | <i>Ziziphus mucronata</i> | Willd. | sub sp. | mucronata | LC | Indigenous |
| Rhamnaceae | <i>Rhamnus prinoides</i> | L'Her. | | | LC | Indigenous |
| Rhamnaceae | <i>Helinus integrifolius</i> | (Lam.) Kuntze | | | LC | Indigenous |
| Ricciaceae | <i>Riccia okahandjana</i> | S.W.Arnell | | | | Indigenous |
| Ricciaceae | <i>Riccia atropurpurea</i> | Sim | | | | Indigenous |
| Ricciaceae | <i>Riccia volkii</i> | S.W.Arnell | | | | Indigenous |
| Ricciaceae | <i>Riccia albovestita</i> | O.H.Volk | | | | Indigenous |
| Ricciaceae | <i>Riccia pottsiana</i> | Sim | | | | Indigenous; Endemic |
| Ricciaceae | <i>Riccia cavernosa</i> | Hoffm. | | | | Indigenous |
| Ricciaceae | <i>Riccia argenteolimbata</i> | O.H.Volk & Perold | | | | Indigenous |
| Ricciaceae | <i>Riccia simii</i> | Perold | | | | Indigenous |
| Ricciaceae | <i>Riccia albolimbata</i> | S.W.Arnell | | | | Indigenous |
| Rosaceae | <i>Potentilla supina</i> | L. | | | | Indigenous |
| Rosaceae | <i>Rosa rubiginosa</i> | L. | | | | Not indigenous; Naturalised; Invasive |
| Rubiaceae | <i>Oldenlandia herbacea</i> | (L.) Roxb. | | | | Indigenous |
| Rubiaceae | <i>Nenax microphylla</i> | (Sond.) T.M.Salter | | | LC | Indigenous |
| Rubiaceae | <i>Galium capense</i> | Thunb. | sub sp. | garipense | NE | Indigenous |
| Rubiaceae | <i>Anthospermum sp.</i> | | | | | |
| Rubiaceae | <i>Cordylostigma virgatum</i> | (Willd.) Groeninckx & Dessein | | | | Indigenous |
| Rubiaceae | <i>Rubia petiolaris</i> | DC. | | | LC | Indigenous |
| Salicaceae | <i>Salix babylonica</i> | L. | var. | babylonica | | Not indigenous; Naturalised |

| | | | | | | |
|-------------------------|------------------------------------|------------------------------|---------|--------------|----|---------------------------------------|
| Salicaceae | <i>Scolopia zeyheri</i> | (Nees) Harv. | | | LC | Indigenous |
| Santalaceae | <i>Thesium resedoides</i> | A.W.Hill | | | LC | Indigenous |
| Santalaceae | <i>Viscum rotundifolium</i> | L.f. | | | LC | Indigenous |
| Santalaceae | <i>Osyris lanceolata</i> | Hochst. & Steud. | | | LC | Indigenous |
| Scrophulariaceae | <i>Jamesbrittenia aurantiaca</i> | (Burch.) Hilliard | | | LC | Indigenous |
| Scrophulariaceae | <i>Manulea parviflora</i> | Benth. | var. | limonioides | LC | Indigenous; Endemic |
| Scrophulariaceae | <i>Jamesbrittenia albiflora</i> | (L.Verd.) Hilliard | | | LC | Indigenous; Endemic |
| Scrophulariaceae | <i>Gomphostigma virgatum</i> | (L.f.) Baill. | | | LC | Indigenous |
| Scrophulariaceae | <i>Chaenostoma neglectum</i> | J.M.Wood & M.S.Evans | | | LC | Indigenous |
| Scrophulariaceae | <i>Aptosimum elongatum</i> | (Hiern) Engl. | | | LC | Indigenous |
| Scrophulariaceae | <i>Jamesbrittenia atropurpurea</i> | (Benth.) Hilliard | sub sp. | atropurpurea | LC | Indigenous |
| Scrophulariaceae | <i>Chaenostoma patriticum</i> | (Hiern) Kornhall | | | LC | Indigenous |
| Scrophulariaceae | <i>Jamesbrittenia stricta</i> | (Benth.) Hilliard | | | LC | Indigenous |
| Scrophulariaceae | <i>Nemesia fruticans</i> | (Thunb.) Benth. | | | LC | Indigenous |
| Solanaceae | <i>Lycium arenicola</i> | Miers | | | LC | Indigenous |
| Solanaceae | <i>Lycium hirsutum</i> | Dunal | | | LC | Indigenous |
| Solanaceae | <i>Solanum retroflexum</i> | Dunal | | | LC | Indigenous |
| Solanaceae | <i>Solanum campylacanthum</i> | Hochst. ex A.Rich. | | | | Indigenous |
| Solanaceae | <i>Cestrum aurantiacum</i> | Lindl. | | | | Not indigenous; Naturalised; Invasive |
| Solanaceae | <i>Lycium cinereum</i> | Thunb. | | | LC | Indigenous |
| Tamaricaceae | <i>Tamarix chinensis</i> | Lour. | | | | Not indigenous; Naturalised; Invasive |
| Thymelaeaceae | <i>Gnidia sp.</i> | | | | | |
| Urticaceae | <i>Didymodoxa caffra</i> | (Thunb.) Friis & Wilmot-Dear | | | LC | Indigenous |
| Verbenaceae | <i>Chascanum pinnatifidum</i> | (L.f.) E.Mey. | var. | pinnatifidum | LC | Indigenous |
| Verbenaceae | <i>Glandularia aristigera</i> | (S.Moore) Tronc. | | | | Not indigenous; Naturalised; Invasive |
| Verbenaceae | <i>Verbena bonariensis</i> | L. | | | | Not indigenous; Naturalised; Invasive |
| Verbenaceae | <i>Lantana rugosa</i> | Thunb. | | | LC | Indigenous |
| Vitaceae | <i>Rhoicissus tridentata</i> | (L.f.) Wild & R.B.Drumm. | sub sp. | cuneifolia | NE | Indigenous |
| Xyridaceae | <i>Xyris gerrardii</i> | N.E.Br. | | | LC | Indigenous |

9.3 Appendix C Avifauna species expected in the PAOI

| Species | Common Name | Conservation Status | |
|----------------------------------|------------------------------|------------------------|-------------|
| | | Regional (SANBI, 2016) | IUCN (2021) |
| <i>Apalis thoracica</i> | Apalis, Bar-throated | Unlisted | LC |
| <i>Recurvirostra avosetta</i> | Avocet, Pied | Unlisted | LC |
| <i>Tricholaema leucomelas</i> | Barbet, Acacia Pied | Unlisted | LC |
| <i>Lybius torquatus</i> | Barbet, Black-collared | Unlisted | LC |
| <i>Trachyphonus vaillantii</i> | Barbet, Crested | Unlisted | LC |
| <i>Batis pririt</i> | Batis, Pririt | Unlisted | LC |
| <i>Merops apiaster</i> | Bee-eater, European | Unlisted | LC |
| <i>Merops bullockoides</i> | Bee-eater, White-fronted | Unlisted | LC |
| <i>Euplectes orix</i> | Bishop, Southern Red | Unlisted | LC |
| <i>Euplectes afer</i> | Bishop, Yellow-crowned | Unlisted | LC |
| <i>Ixobrychus minutus</i> | Bittern, Little | Unlisted | LC |
| <i>Telophorus zeylonus</i> | Bokmakierie, Bokmakierie | Unlisted | LC |
| <i>Pycnonotus nigricans</i> | Bulbul, African Red-eyed | Unlisted | LC |
| <i>Emberiza tahapisi</i> | Bunting, Cinnamon-breasted | Unlisted | LC |
| <i>Buteo buteo</i> | Buzzard, Common (Steppe) | Unlisted | LC |
| <i>Buteo rufofuscus</i> | Buzzard, Jackal | Unlisted | LC |
| <i>Crithagra atrogularis</i> | Canary, Black-throated | Unlisted | LC |
| <i>Crithagra flaviventris</i> | Canary, Yellow | Unlisted | LC |
| <i>Myrmecocichla formicivora</i> | Chat, Anteating | Unlisted | LC |
| <i>Oenanthe familiaris</i> | Chat, Familiar | Unlisted | LC |
| <i>Emarginata sinuata</i> | Chat, Sickie-winged | Unlisted | LC |
| <i>Cisticola textrix</i> | Cisticola, Cloud | Unlisted | LC |
| <i>Cisticola aridulus</i> | Cisticola, Desert | Unlisted | LC |
| <i>Cisticola tinniens</i> | Cisticola, Levaillant's | Unlisted | LC |
| <i>Cisticola chiniana</i> | Cisticola, Rattling | Unlisted | LC |
| <i>Cisticola juncidis</i> | Cisticola, Zitting | Unlisted | LC |
| <i>Petrochelidon spilodera</i> | Cliff-swallow, South African | Unlisted | LC |
| <i>Fulica cristata</i> | Coot, Red-knobbed | Unlisted | LC |
| <i>Microcarbo africanus</i> | Cormorant, Reed | Unlisted | LC |
| <i>Phalacrocorax lucidus</i> | Cormorant, White-breasted | Unlisted | LC |
| <i>Centropus burchellii</i> | Coucal, Burchell's | Unlisted | Unlisted |
| <i>Rhinoptilus africanus</i> | Courser, Double-banded | Unlisted | LC |
| <i>Cursorius temminckii</i> | Courser, Temminck's | Unlisted | LC |
| <i>Zapornia flavirostra</i> | Crake, Black | Unlisted | LC |
| <i>Corvus albus</i> | Crow, Pied | Unlisted | LC |
| <i>Chrysococcyx caprius</i> | Cuckoo, Diderick | Unlisted | LC |
| <i>Clamator jacobinus</i> | Cuckoo, Jacobin | Unlisted | LC |

| | | | |
|----------------------------------|-------------------------------------|----------|----|
| <i>Chrysococcyx klaas</i> | Cuckoo, Klaas's | Unlisted | LC |
| <i>Cuculus solitarius</i> | Cuckoo, Red-chested | Unlisted | LC |
| <i>Anhinga rufa</i> | Darter, African | Unlisted | LC |
| <i>Spilopelia senegalensis</i> | Dove, Laughing | Unlisted | LC |
| <i>Oena capensis</i> | Dove, Namaqua | Unlisted | LC |
| <i>Streptopelia semitorquata</i> | Dove, Red-eyed | Unlisted | LC |
| <i>Columba livia</i> | Dove, Rock | Unlisted | LC |
| <i>Anas sparsa</i> | Duck, African Black | Unlisted | LC |
| <i>Dendrocygna bicolor</i> | Duck, Fulvous | Unlisted | LC |
| <i>Oxyura maccoa</i> | Duck, Maccoa | NT | VU |
| <i>Thalassornis leuconotus</i> | Duck, White-backed | Unlisted | LC |
| <i>Dendrocygna viduata</i> | Duck, White-faced Whistling | Unlisted | LC |
| <i>Anas undulata</i> | Duck, Yellow-billed | Unlisted | LC |
| <i>Hieraaetus pennatus</i> | Eagle, Booted | Unlisted | LC |
| <i>Bubo africanus</i> | Eagle-owl, Spotted | Unlisted | LC |
| <i>Bubulcus ibis</i> | Egret, Cattle | Unlisted | LC |
| <i>Ardea alba</i> | Egret, Great | Unlisted | LC |
| <i>Egretta garzetta</i> | Egret, Little | Unlisted | LC |
| <i>Ardea intermedia</i> | Egret, Yellow-billed (Intermediate) | Unlisted | LC |
| <i>Falco amurensis</i> | Falcon, Amur | Unlisted | LC |
| <i>Falco biarmicus</i> | Falcon, Lanner | VU | LC |
| <i>Falco peregrinus</i> | Falcon, Peregrine | Unlisted | LC |
| <i>Amadina erythrocephala</i> | Finch, Red-headed | Unlisted | LC |
| <i>Sporopipes squamifrons</i> | Finch, Scaly-feathered | Unlisted | LC |
| <i>Lagonosticta rhodopareia</i> | Firefinch, Jameson's | Unlisted | LC |
| <i>Lagonosticta senegala</i> | Firefinch, Red-billed | Unlisted | LC |
| <i>Lanius collaris</i> | Fiscal, Common (Southern) | Unlisted | LC |
| <i>Haliaeetus vocifer</i> | Fish-eagle, African | Unlisted | LC |
| <i>Phoenicopterus roseus</i> | Flamingo, Greater | NT | LC |
| <i>Phoeniconaias minor</i> | Flamingo, Lesser | NT | NT |
| <i>Stenostira scita</i> | Flycatcher, Fairy | Unlisted | LC |
| <i>Melaenornis silens</i> | Flycatcher, Fiscal | Unlisted | LC |
| <i>Muscicapa striata</i> | Flycatcher, Spotted | Unlisted | LC |
| <i>Scleroptila gutturalis</i> | Francolin, Orange River | Unlisted | LC |
| <i>Anser anser</i> | Goose, Domestic | Unlisted | LC |
| <i>Alopochen aegyptiaca</i> | Goose, Egyptian | Unlisted | LC |
| <i>Plectropterus gambensis</i> | Goose, Spur-winged | Unlisted | LC |
| <i>Micronisus gabar</i> | Goshawk, Gabar | Unlisted | LC |
| <i>Melierax canorus</i> | Goshawk, Southern Pale Chanting | Unlisted | LC |
| <i>Podiceps nigricollis</i> | Grebe, Black-necked | Unlisted | LC |

| | | | |
|--------------------------------------|--------------------------|----------|----------|
| <i>Podiceps cristatus</i> | Grebe, Great Crested | Unlisted | LC |
| <i>Tachybaptus ruficollis</i> | Grebe, Little | Unlisted | LC |
| <i>Chlorocichla flaviventris</i> | Greenbul, Yellow-bellied | Unlisted | LC |
| <i>Tringa nebularia</i> | Greenshank, Common | Unlisted | LC |
| <i>Numida meleagris</i> | Guineafowl, Helmeted | Unlisted | LC |
| <i>Chroicocephalus cirrocephalus</i> | Gull, Grey-headed | Unlisted | LC |
| <i>Larus dominicanus</i> | Gull, Kelp | Unlisted | LC |
| <i>Scopus umbretta</i> | Hamerkop, Hamerkop | Unlisted | LC |
| <i>Polyboroides typus</i> | Harrier-Hawk, African | Unlisted | LC |
| <i>Egretta ardesiaca</i> | Heron, Black | Unlisted | LC |
| <i>Ardea melanocephala</i> | Heron, Black-headed | Unlisted | LC |
| <i>Ardea goliath</i> | Heron, Goliath | Unlisted | LC |
| <i>Ardea cinerea</i> | Heron, Grey | Unlisted | LC |
| <i>Ardea purpurea</i> | Heron, Purple | Unlisted | LC |
| <i>Ardeola ralloides</i> | Heron, Squacco | Unlisted | LC |
| <i>Indicator indicator</i> | Honeyguide, Greater | Unlisted | LC |
| <i>Upupa africana</i> | Hoopoe, African | Unlisted | LC |
| <i>Lophoceros nasutus</i> | Hornbill, African Grey | Unlisted | LC |
| <i>Threskiornis aethiopicus</i> | Ibis, African Sacred | Unlisted | LC |
| <i>Plegadis falcinellus</i> | Ibis, Glossy | Unlisted | LC |
| <i>Bostrychia hagedash</i> | Ibis, Hadedda | Unlisted | LC |
| <i>Vidua funerea</i> | Indigobird, Dusky | Unlisted | LC |
| <i>Vidua chalybeata</i> | Indigobird, Village | Unlisted | LC |
| <i>Actophilornis africanus</i> | Jacana, African | Unlisted | LC |
| <i>Falco rupicoloides</i> | Kestrel, Greater | Unlisted | LC |
| <i>Falco naumanni</i> | Kestrel, Lesser | Unlisted | LC |
| <i>Falco rupicolus</i> | Kestrel, Rock | Unlisted | LC |
| <i>Halcyon albiventris</i> | Kingfisher, Brown-hooded | Unlisted | LC |
| <i>Megaceryle maxima</i> | Kingfisher, Giant | Unlisted | Unlisted |
| <i>Corythornis cristatus</i> | Kingfisher, Malachite | Unlisted | Unlisted |
| <i>Ceryle rudis</i> | Kingfisher, Pied | Unlisted | LC |
| <i>Elanus caeruleus</i> | Kite, Black-shouldered | Unlisted | LC |
| <i>Eupodotis caeruleus</i> | Korhaan, Blue | LC | NT |
| <i>Afrotis afraoides</i> | Korhaan, Northern Black | Unlisted | LC |
| <i>Vanellus armatus</i> | Lapwing, Blacksmith | Unlisted | LC |
| <i>Vanellus coronatus</i> | Lapwing, Crowned | Unlisted | LC |
| <i>Mirafrasciata fasciolata</i> | Lark, Eastern Clapper | Unlisted | LC |
| <i>Calandrella cinerea</i> | Lark, Red-capped | Unlisted | LC |
| <i>Mirafrasciata africana</i> | Lark, Rufous-naped | Unlisted | LC |
| <i>Calendulauda sabota</i> | Lark, Sabota | Unlisted | LC |

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|----------------------------------|------------------------------|----------|----------|
| <i>Chersomanes albofasciata</i> | Lark, Spike-heeled | Unlisted | LC |
| <i>Macronyx capensis</i> | Longclaw, Cape | Unlisted | LC |
| <i>Riparia paludicola</i> | Martin, Brown-throated | Unlisted | LC |
| <i>Ptyonoprogne fuligula</i> | Martin, Rock | Unlisted | Unlisted |
| <i>Ploceus velatus</i> | Masked-weaver, Southern | Unlisted | LC |
| <i>Gallinula chloropus</i> | Moorhen, Common | Unlisted | LC |
| <i>Urocolius indicus</i> | Mousebird, Red-faced | Unlisted | LC |
| <i>Colius striatus</i> | Mousebird, Speckled | Unlisted | LC |
| <i>Colius colius</i> | Mousebird, White-backed | Unlisted | LC |
| <i>Acridotheres tristis</i> | Myna, Common | Unlisted | LC |
| <i>Cisticola fulvicapilla</i> | Neddicky, Neddicky | Unlisted | LC |
| <i>Nycticorax nycticorax</i> | Night-Heron, Black-crowned | Unlisted | LC |
| <i>Struthio camelus</i> | Ostrich, Common | Unlisted | LC |
| <i>Tyto alba</i> | Owl, Barn | Unlisted | LC |
| <i>Asio capensis</i> | Owl, Marsh | Unlisted | LC |
| <i>Rostratula benghalensis</i> | Painted-snipe, Greater | NT | LC |
| <i>Cypsiurus parvus</i> | Palm-swift, African | Unlisted | LC |
| <i>Terpsiphone viridis</i> | Paradise-flycatcher, African | Unlisted | LC |
| <i>Vidua paradisaea</i> | Paradise-whydah, Long-tailed | Unlisted | LC |
| <i>Anthoscopus minutus</i> | Penduline-tit, Cape | Unlisted | LC |
| <i>Columba guinea</i> | Pigeon, Speckled | Unlisted | LC |
| <i>Anthus cinnamomeus</i> | Pipit, African | Unlisted | LC |
| <i>Anthus leucophrys</i> | Pipit, Plain-backed | Unlisted | LC |
| <i>Charadrius pallidus</i> | Plover, Chestnut-banded | NT | NT |
| <i>Charadrius hiaticula</i> | Plover, Common Ringed | Unlisted | LC |
| <i>Pluvialis squatarola</i> | Plover, Grey | Unlisted | LC |
| <i>Charadrius pecuarius</i> | Plover, Kittlitz's | Unlisted | LC |
| <i>Charadrius tricollaris</i> | Plover, Three-banded | Unlisted | LC |
| <i>Netta erythrophthalma</i> | Pochard, Southern | Unlisted | LC |
| <i>Prinia flavicans</i> | Prinia, Black-chested | Unlisted | LC |
| <i>Pytilia melba</i> | Pytilia, Green-winged | Unlisted | LC |
| <i>Coturnix coturnix</i> | Quail, Common | Unlisted | LC |
| <i>Ortygospiza atricollis</i> | Quailfinch, African | Unlisted | LC |
| <i>Quelea quelea</i> | Quelea, Red-billed | Unlisted | LC |
| <i>Rallus caerulescens</i> | Rail, African | Unlisted | LC |
| <i>Acrocephalus baeticatus</i> | Reed-warbler, African | Unlisted | Unlisted |
| <i>Acrocephalus arundinaceus</i> | Reed-warbler, Great | Unlisted | LC |
| <i>Cossypha caffra</i> | Robin-chat, Cape | Unlisted | LC |
| <i>Coracias caudatus</i> | Roller, Lilac-breasted | Unlisted | LC |
| <i>Calidris pugnax</i> | Ruff | Unlisted | LC |

| | | | |
|---------------------------------|-------------------------------|----------|----|
| <i>Actitis hypoleucos</i> | Sandpiper, Common | Unlisted | LC |
| <i>Calidris ferruginea</i> | Sandpiper, Curlew | LC | NT |
| <i>Tringa stagnatilis</i> | Sandpiper, Marsh | Unlisted | LC |
| <i>Tringa glareola</i> | Sandpiper, Wood | Unlisted | LC |
| <i>Rhinopomastus cyanomelas</i> | Scimitarbill, Common | Unlisted | LC |
| <i>Cercotrichas paena</i> | Scrub-robin, Kalahari | Unlisted | LC |
| <i>Cercotrichas coryphoeus</i> | Scrub-robin, Karoo | Unlisted | LC |
| <i>Sagittarius serpentarius</i> | Secretarybird | VU | EN |
| <i>Tadorna cana</i> | Shelduck, South African | Unlisted | LC |
| <i>Spatula smithii</i> | Shoveler, Cape | Unlisted | LC |
| <i>Lanius minor</i> | Shrike, Lesser Grey | Unlisted | LC |
| <i>Lanius collurio</i> | Shrike, Red-backed | Unlisted | LC |
| <i>Gallinago nigripennis</i> | Snipe, African | Unlisted | LC |
| <i>Passer melanurus</i> | Sparrow, Cape | Unlisted | LC |
| <i>Passer domesticus</i> | Sparrow, House | Unlisted | LC |
| <i>Passer diffusus</i> | Sparrow, Southern Grey-headed | Unlisted | LC |
| <i>Accipiter melanoleucus</i> | Sparrowhawk, Black | Unlisted | LC |
| <i>Eremopterix leucotis</i> | Sparrowlark, Chestnut-backed | Unlisted | LC |
| <i>Plocepasser mahali</i> | Sparrow-weaver, White-browed | Unlisted | LC |
| <i>Platalea alba</i> | Spoonbill, African | Unlisted | LC |
| <i>Pternistis natalensis</i> | Spurfowl, Natal | Unlisted | LC |
| <i>Pternistis swainsonii</i> | Spurfowl, Swainson's | Unlisted | LC |
| <i>Lamprotornis nitens</i> | Starling, Cape Glossy | Unlisted | LC |
| <i>Sturnus vulgaris</i> | Starling, Common | Unlisted | LC |
| <i>Lamprotornis bicolor</i> | Starling, Pied | Unlisted | LC |
| <i>Onychognathus morio</i> | Starling, Red-winged | Unlisted | LC |
| <i>Creatophora cinerea</i> | Starling, Wattled | Unlisted | LC |
| <i>Himantopus himantopus</i> | Stilt, Black-winged | Unlisted | LC |
| <i>Calidris minuta</i> | Stint, Little | LC | LC |
| <i>Saxicola torquatus</i> | Stonechat, African | Unlisted | LC |
| <i>Ciconia abdimii</i> | Stork, Abdim's | NT | LC |
| <i>Ciconia nigra</i> | Stork, Black | VU | LC |
| <i>Ciconia ciconia</i> | Stork, White | Unlisted | LC |
| <i>Mycteria ibis</i> | Stork, Yellow-billed | EN | LC |
| <i>Chalcomitra amethystina</i> | Sunbird, Amethyst | Unlisted | LC |
| <i>Cinnyris fuscus</i> | Sunbird, Dusky | Unlisted | LC |
| <i>Cinnyris talatala</i> | Sunbird, White-bellied | Unlisted | LC |
| <i>Hirundo rustica</i> | Swallow, Barn | Unlisted | LC |
| <i>Cecropis cucullata</i> | Swallow, Greater Striped | Unlisted | LC |
| <i>Hirundo dimidiata</i> | Swallow, Pearl-breasted | Unlisted | LC |

| | | | |
|------------------------------------|------------------------------|----------|----------|
| <i>Cecropis semirufa</i> | Swallow, Red-breasted | Unlisted | LC |
| <i>Hirundo albigularis</i> | Swallow, White-throated | Unlisted | LC |
| <i>Porphyrio madagascariensis</i> | Swamphe, African Purple | Unlisted | Unlisted |
| <i>Acrocephalus gracilirostris</i> | Swamp-warbler, Lesser | Unlisted | LC |
| <i>Apus barbatus</i> | Swift, African Black | Unlisted | LC |
| <i>Tachymarptis melba</i> | Swift, Alpine | Unlisted | LC |
| <i>Apus apus</i> | Swift, Common | Unlisted | LC |
| <i>Apus affinis</i> | Swift, Little | Unlisted | LC |
| <i>Apus caffer</i> | Swift, White-rumped | Unlisted | LC |
| <i>Tchagra australis</i> | Tchagra, Brown-crowned | Unlisted | LC |
| <i>Anas capensis</i> | Teal, Cape | Unlisted | LC |
| <i>Spatula hottentota</i> | Teal, Hottentot | Unlisted | LC |
| <i>Anas erythrorhyncha</i> | Teal, Red-billed | Unlisted | LC |
| <i>Chlidonias hybrida</i> | Tern, Whiskered | Unlisted | LC |
| <i>Chlidonias leucopterus</i> | Tern, White-winged | Unlisted | LC |
| <i>Burhinus capensis</i> | Thick-knee, Spotted | Unlisted | LC |
| <i>Turdus smithi</i> | Thrush, Karoo | Unlisted | LC |
| <i>Melaniparus cinerascens</i> | Tit, Ashy | Unlisted | LC |
| <i>Curruca subcoerulea</i> | Tit-babbler, Chestnut-vented | Unlisted | Unlisted |
| <i>Streptopelia capicola</i> | Turtle-dove, Cape | Unlisted | LC |
| <i>Gyps africanus</i> | Vulture, White-backed | CR | CR |
| <i>Motacilla capensis</i> | Wagtail, Cape | Unlisted | LC |
| <i>Phylloscopus trochilus</i> | Warbler, Willow | Unlisted | LC |
| <i>Brunhilda erythronotos</i> | Waxbill, Black Cheeked | Unlisted | LC |
| <i>Uraeginthus angolensis</i> | Waxbill, Blue | Unlisted | LC |
| <i>Estrilda astrild</i> | Waxbill, Common | Unlisted | LC |
| <i>Amandava subflava</i> | Waxbill, Orange-breasted | Unlisted | Unlisted |
| <i>Granatina granatina</i> | Waxbill, Violet-eared | Unlisted | LC |
| <i>Oenanthe pileata</i> | Wheatear, Capped | Unlisted | LC |
| <i>Myrmecocichla monticola</i> | Wheatear, Mountain | Unlisted | LC |
| <i>Zosterops virens</i> | White-eye, Cape | Unlisted | LC |
| <i>Zosterops pallidus</i> | White-eye, Orange River | Unlisted | LC |
| <i>Vidua macroura</i> | Whydah, Pin-tailed | Unlisted | LC |
| <i>Vidua regia</i> | Whydah, Shaft-tailed | Unlisted | LC |
| <i>Euplectes progne</i> | Widowbird, Long-tailed | Unlisted | LC |
| <i>Euplectes albonotatus</i> | Widowbird, White-winged | Unlisted | LC |
| <i>Phoeniculus purpureus</i> | Wood-hoopoe, Green | Unlisted | LC |
| <i>Dendropicos fuscescens</i> | Woodpecker, Cardinal | Unlisted | LC |
| <i>Jynx ruficollis</i> | Wryneck, Red-throated | Unlisted | LC |

9.4 Appendix D Mammals expected in the PAOI

| Species | Common Name | Conservation Status | |
|---------------------------------|---------------------------------|------------------------|-------------|
| | | Regional (SANBI, 2016) | IUCN (2021) |
| <i>Aethomys ineptus</i> | Tete Veld Rat | LC | LC |
| <i>Aethomys namaquensis</i> | Namaqua rock rat | LC | LC |
| <i>Antidorcas marsupialis</i> | Slater's Shrew | LC | LC |
| <i>Aonyx capensis</i> | Cape Clawless Otter | NT | NT |
| <i>Atelerix frontalis</i> | South Africa Hedgehog | NT | LC |
| <i>Atilax paludinosus</i> | Water Mongoose | LC | LC |
| <i>Canis mesomelas</i> | Black-backed Jackal | LC | LC |
| <i>Caracal caracal</i> | Caracal | LC | LC |
| <i>Chlorocebus pygerythrus</i> | Vervet Monkey | LC | LC |
| <i>Crociodura cyanea</i> | Reddish-grey Musk Shrew | LC | LC |
| <i>Crociodura fuscomurina</i> | Tiny Musk Shrew | LC | LC |
| <i>Cynictis penicillata</i> | Yellow Mongoose | LC | LC |
| <i>Desmodillus auricularis</i> | Short-tailed Gerbil | LC | LC |
| <i>Eidolon helvum</i> | African Straw-colored Fruit Bat | LC | NT |
| <i>Elephantulus myurus</i> | Eastern Rock Sengi | LC | LC |
| <i>Eptesicus hottentotus</i> | Long-tailed Serotine Bat | LC | LC |
| <i>Felis nigripes</i> | Black-footed Cat | VU | VU |
| <i>Felis silvestris</i> | African Wildcat | LC | LC |
| <i>Genetta genetta</i> | Small-spotted Genet | LC | LC |
| <i>Gerbilliscus brantsii</i> | Highveld Gerbil | LC | LC |
| <i>Gerbilliscus leucogaster</i> | Bushveld Gerbil | LC | LC |
| <i>Herpestes sanguineus</i> | Slender Mongoose | LC | LC |
| <i>Hydrictis maculicollis</i> | Spotted-necked Otter | VU | NT |
| <i>Hystrix africaeaustralis</i> | Cape Porcupine | LC | LC |
| <i>Ichneumia albicauda</i> | White-tailed Mongoose | LC | LC |
| <i>Ictonyx striatus</i> | Striped Polecat | LC | LC |
| <i>Leptailurus serval</i> | Serval | NT | LC |
| <i>Lepus capensis</i> | Cape Hare | LC | LC |
| <i>Lepus saxatilis</i> | Scrub Hare | LC | LC |
| <i>Lepus victoriae</i> | African Savanna Hare | LC | LC |
| <i>Malacothrix typica</i> | Gerbil Mouse | LC | LC |
| <i>Mastomys coucha</i> | Multimammate Mouse | LC | LC |
| <i>Mellivora capensis</i> | Honey Badger | LC | LC |
| <i>Mus musculus</i> | House Mouse | Unlisted | LC |
| <i>Mus orangiae</i> | Free State Pygmy Mouse | NE | Unlisted |
| <i>Myotis welwitschii</i> | Welwitsch's Hairy Bat | LC | LC |
| <i>Mystromys albicaudatus</i> | White-tailed Rat | VU | EN |

| | | | |
|---------------------------------------|--------------------------|---------------------|----|
| <i>Neoromicia capensis</i> | Cape Serotine Bat | LC | LC |
| <i>Neoromicia zuluensis</i> | Aloe Bat | LC | LC |
| <i>Orycteropus afer</i> | Aardvark | LC | LC |
| <i>Otocyon megalotis</i> | Bat-eared Fox | LC | LC |
| <i>Otomys irroratus</i> | Vlei Rat (Fynbos type) | LC | LC |
| <i>Panthera pardus</i> | Leopard | VU | VU |
| <i>Papio ursinus</i> | Chacma Baboon | LC | LC |
| <i>Parahyaena brunnea</i> | Brown Hyaena | NT | NT |
| <i>Pedetes capensis</i> | Springhare | LC | LC |
| <i>Phacochoerus africanus</i> | Common Warthog | LC | LC |
| <i>Poecilogale albinucha</i> | African Striped Weasel | NT | LC |
| <i>Procavia capensis</i> | Rock Hyrax | LC | LC |
| <i>Proteles cristata</i> | Aardwolf | LC | LC |
| <i>Raphicerus campestris</i> | Steenbok | LC | LC |
| <i>Rattus rattus</i> | House Rat | Exotic (Not listed) | LC |
| <i>Rhabdomys pumilio</i> | Xeric Four-striped Mouse | LC | LC |
| <i>Rhinolophus clivosus</i> | Geoffroy's Horseshoe Bat | LC | LC |
| <i>Rhinolophus darlingi</i> | Darling's Horseshoe Bat | LC | LC |
| <i>Saccostomus campestris</i> | Pouched Mouse | LC | LC |
| <i>Scotophilus dinganii</i> | Yellow House Bat | LC | LC |
| <i>Steatomys krebsii</i> | Krebs's Fat Mouse | LC | LC |
| <i>Suncus varilla</i> | Lesser Dwarf Shrew | LC | LC |
| <i>Suricata suricatta</i> | Suricate | LC | LC |
| <i>Sylvicapra grimmia</i> | Common Duiker | LC | LC |
| <i>Tadarida aegyptiaca</i> | Egyptian Free-tailed Bat | LC | LC |
| <i>Thryonomys swinderianus</i> | Greater Cane Rat | LC | LC |
| <i>Vulpes chama</i> | Cape Fox | LC | LC |
| <i>Xerus inauris</i> | Cape Ground Squirrel | LC | LC |

9.5 Appendix E Reptiles species expected in the PAOI

| Species | Common Name | Conservation Status | |
|--|-------------------------------|------------------------|-------------|
| | | Regional (SANBI, 2016) | IUCN (2021) |
| <i>Acontias gracilicauda</i> | Thin-tailed Legless Skink | LC | LC |
| <i>Afroedura nivaria</i> | Drakensberg Flat Gecko | LC | LC |
| <i>Agama aculeata distantii</i> | Eastern Ground Agama | LC | LC |
| <i>Agama atra</i> | Southern Rock Agama | LC | LC |
| <i>Agama hispida</i> | Southern Spiny Agama | LC | LC |
| <i>Aparallactus capensis</i> | Black-headed Centipede-eater | LC | LC |
| <i>Bitis arietans arietans</i> | Puff Adder | LC | Unlisted |
| <i>Boaedon capensis</i> | Brown House Snake | LC | LC |
| <i>Chamaeleo dilepis</i> | Common Flap-neck Chameleon | LC | LC |
| <i>Crotaphopeltis hotamboeia</i> | Red-lipped Snake | LC | Unlisted |
| <i>Dasypeltis scabra</i> | Rhombic Egg-eater | LC | LC |
| <i>Elapsoidea sundevallii</i> | Sundevall's Garter Snake | LC | Unlisted |
| <i>Gerrhosaurus flavigularis</i> | Yellow-throated Plated Lizard | LC | Unlisted |
| <i>Hemachatus haemachatus</i> | Rinkhals | LC | LC |
| <i>Homopus femoralis</i> | Greater Dwarf Tortoise | LC | LC |
| <i>Homoroselaps dorsalis</i> | Striped Harlequin Snake | LC | LC |
| <i>Karusasaurus polyzonus</i> | Southern Karusa Lizard | LC | LC |
| <i>Lamprophis aurora</i> | Aurora House Snake | LC | LC |
| <i>Leptotyphlops scutifrons scutifrons</i> | Peters' Thread Snake | LC | Unlisted |
| <i>Lycophidion capense capense</i> | Cape Wolf Snake | LC | Unlisted |
| <i>Lygodactylus capensis</i> | Common Dwarf Gecko | LC | Unlisted |
| <i>Monopeltis capensis</i> | Cape Worm Lizard | LC | LC |
| <i>Naja nivea</i> | Cape Cobra | LC | Unlisted |
| <i>Nucras holubi</i> | Holub's Sandveld Lizard | LC | Unlisted |
| <i>Nucras intertexta</i> | Spotted Sandveld Lizard | LC | Unlisted |
| <i>Pachydactylus capensis</i> | Cape Gecko | LC | Unlisted |
| <i>Pachydactylus mariquensis</i> | Common Banded Gecko | LC | LC |
| <i>Panaspis wahlbergi</i> | Wahlberg's Snake-eyed Skink | LC | Unlisted |
| <i>Pedioplanis burchelli</i> | Burchell's Sand Lizard | LC | LC |
| <i>Pedioplanis lineocellata lineocellata</i> | Spotted Sand Lizard | LC | Unlisted |
| <i>Pelomedusa galeata</i> | South African Marsh Terrapin | Not evaluated | Unlisted |
| <i>Prosymna ambigua</i> | Angolan Shovel-snout | Unlisted | LC |
| <i>Prosymna sundevallii</i> | Sundevall's Shovel-snout | LC | LC |
| <i>Psammobates oculifer</i> | Serrated Tent Tortoise | LC | Unlisted |
| <i>Psammophis crucifer</i> | Cross-marked Grass Snake | LC | LC |
| <i>Psammophis leightoni</i> | Cape Sand Snake | LC | LC |
| <i>Psammophylax rhombeatus</i> | Spotted Grass Snake | LC | Unlisted |

| | | | |
|---|--------------------------------|----|----------|
| <i>Psammophylax tritaeniatus</i> | Striped Grass Snake | LC | LC |
| <i>Pseudaspis cana</i> | Mole Snake | LC | Unlisted |
| <i>Rhinotyphlops lalandei</i> | Delalande's Beaked Blind Snake | LC | Unlisted |
| <i>Smaug giganteus</i> | Giant Dragon Lizard | VU | VU |
| <i>Stigmochelys pardalis</i> | Leopard Tortoise | LC | LC |
| <i>Trachylepis capensis</i> | Cape Skink | LC | Unlisted |
| <i>Trachylepis punctatissima</i> | Speckled Rock Skink | LC | LC |
| <i>Trachylepis punctulata</i> | Speckled Sand Skink | LC | Unlisted |
| <i>Trachylepis varia</i> | Variable Skink | LC | LC |
| <i>Varanus albigularis albigularis</i> | Southern Rock Monitor | LC | Unlisted |
| <i>Varanus niloticus</i> | Water Monitor | LC | Unlisted |

9.6 Appendix F Amphibian expected in the PAOI

| Species | Common Name | Conservation Status | |
|------------------------------------|------------------------|------------------------|-------------|
| | | Regional (SANBI, 2016) | IUCN (2021) |
| <i>Amietia delalandii</i> | Delalande's River Frog | LC | Unlisted |
| <i>Amietia fuscigula</i> | Cape River Frog | LC | LC |
| <i>Amietia poyntoni</i> | Poynton's River Frog | LC | LC |
| <i>Cacosternum boettgeri</i> | Common Caco | LC | LC |
| <i>Kassina senegalensis</i> | Bubbling Kassina | LC | LC |
| <i>Phrynobatrachus natalensis</i> | Snoring Puddle Frog | LC | LC |
| <i>Poyntonophrynus vertebralis</i> | Southern Pygmy Toad | LC | LC |
| <i>Pyxicephalus adspersus</i> | Giant Bullfrog | NT | LC |
| <i>Sclerophrys capensis</i> | Raucous Toad | LC | LC |
| <i>Sclerophrys gutturalis</i> | Guttural Toad | LC | LC |
| <i>Sclerophrys poweri</i> | Power's Toad | LC | LC |
| <i>Tomopterna cryptotis</i> | Tremelo Sand Frog | LC | LC |
| <i>Tomopterna natalensis</i> | Natal Sand Frog | LC | LC |
| <i>Tomopterna tandyi</i> | Tandy's Sand Frog | LC | LC |
| <i>Xenopus laevis</i> | Common Platanna | LC | LC |