TERRESTRIAL & FRESHWATER ECOLOGY, & AGRICULTURAL POTENTIAL SCOPING ASSESSMENTS FOR THE PROPOSED SBPM & SCSC SOLAR FACILITIES FOR SIYANDA BAKGATLA PLATINUM MINE

Northam, Limpopo & North West Provinces

February 2022

CLIENT

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1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake a scoping assessment for the proposed SBPM & SCSC Solar Facilities for Siyanda Bakgatla Platinum Mine in Northam, Limpopo Province. The project infrastructure is located in both the Limpopo and also North West provinces. The project is located 6.5 km west from Northam. The scoping assessment comprises of terrestrial (fauna & flora) and freshwater (wetlands) ecology, and also agricultural potential. The Northam focus area has been identified by the potential development area for the construction and operation of solar and battery facilities consisting of the following affected properties:

- SCSC (273 Ha); and
- SBPM (251 Ha) (Figure 1-2).

The approach was informed by the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices 320 (20 March 2020) in terms of NEMA, dated 20 March and 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 theme sensitivity of the project area as "Very High". The agricultural theme sensitivity has been characterised as "High". Whilst the screening tool does not pertain specifically to wetlands, the presence of wetlands does contribute to the aquatic theme sensitivity being characterised as "Very High".

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

1.2.1 SBPM PV RE project, Limpopo Province

Main Street 1886 Proprietary Limited proposes the development of the Solar PV facility and associated infrastructure on a site bordering the eastern end of the Siyanda Bakgatla Platinum Mine area near Northam. The solar PV facility will comprise several arrays of PV panels, a Battery Energy Storage System (BESS), and associated infrastructure with a contracted capacity of up to 100MW.

The purpose of the proposed project is to generate electricity for exclusive use by the Siyanda Mine, following which any excess power produced will be distributed to the national grid, if applicable. The construction of the PV facility aims to reduce the Siyanda Mine's dependency on direct supply from Eskom's national grid for operation activities, while simultaneously decreasing the mine's carbon footprint.

A preferred project site with an extent of ~1138 ha and a development area of 574 ha has been identified by Main Street 1886 Proprietary Limited as a technically suitable area for the development of the Solar PV Facility. The study area is located on Portion 4 of Farm Grootkuil 409. The project site falls within the Thabazimbi Local Municipality within the Waterberg District Municipality in the Limpopo Province. The site is located ~6.5 km west of the town of Northam and is accessible via the Swartklip Road which branches off the R510 provincial route.

Infrastructure associated with the solar PV facility will include:

- 100MW Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Cabling between the project components.

- Battery Energy Storage System.
- On-site facility substation and power lines between the solar PV facility and the Mine and Eskom substation.
- Site offices, Security office, operations and control, and maintenance and storage laydown areas.
- Access roads, internal distribution roads.

Grid connection solution.

To evacuate the generated power to the Siyanda Mine, the grid connection solution consisting of the following is proposed:

The power generated by the solar PV facility will be transferred to the three step up transformers at the on-site/plant substation. Power will then be delivered from each step-up transformer as follows:

- two 6.6 km, 33 kV transmission lines to the Mortimer substation with four step down transformers (33/6.6 kV; 10 MVA).
- two 4.7 km, 33 kV transmission lines to the Fridge substation with two step down transformers (33/6.6 kV; 10 MVA).
- two 2.9 km, 33 kV transmission lines to the Ivan substation with three step down transformers (33/11 kV; 10 MVA).

The grid connection is proposed on the following properties:

- Portion 3 of Farm Grootkuil 409.
- Portion 4 of Farm Grootkuil 409.
- Portion 5 of Farm Grootkuil 409.

The development area of 574ha is larger than the area needed for the construction of a 100MW PV facility and will provide the opportunity for the optimal placement of the infrastructure, ensuring avoidance of major identified environmental sensitivities by the development footprint of ~240ha1. To avoid areas of potential sensitivity and to ensure that potential detrimental environmental impacts are minimised as far as possible, the full extent of the larger development area will be considered in the Scoping Phase, and a development footprint within which the infrastructure of the PV facility and associated infrastructures will be located will be fully assessed during the EIA Phase.

1.2.2 SCSC PV RE project, Limpopo Province

*Note to specialist: Kindly make use of the project description included below as part of the specialist report. Please also ensure that the name of the project (i.e., SCSM solar PV RE project) and the applicant (i.e., Main Street 1886 Proprietary Limited) is used for the report and is consistent throughout.

Main Street 1887 Proprietary Limited proposes the development of the Solar PV facility and associated infrastructure on a site bordering the eastern end of the Siyanda Bakgatla Platinum Mine area near Northam. The solar PV facility will comprise several arrays of PV panels, a BESS, and associated infrastructure with a contracted capacity of up to 100MW.

The purpose of the proposed project is to generate electricity for exclusive use by the Siyanda Mine, following which any excess power produced will be distributed to the national grid, if applicable. The construction of the PV facility aims to reduce the Siyanda Mine's dependency on direct supply from Eskom's national grid for operation activities, while simultaneously decreasing the mine's carbon footprint.

[1] The development footprint is the defined area (located within the development area) where the PV panel array and other associated infrastructure for Solar PV will be planned to be constructed. This will be the actual footprint of the facility, and the area which would be disturbed. The extent of the development footprint will be determined in the EIA Phase.

A preferred project site with an extent of ~1138ha and a development area of 564 has been identified by Main Street 1887 Proprietary Limited as a technically suitable area for the development of the Solar PV Facility with a contracted capacity of up to 100MW. The study area is located on Portion 3 of Farm Grootkuil 409. The project site falls within the Thabazimbi Local Municipality within the Waterberg District Municipality in the Limpopo Province. The site is located ~6.5km west of the town of Northam and is accessible via the Swartklip Road which branches off the R510 provincial route.

Infrastructure associated with the solar PV facility will include:

- 100MW Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Cabling between the project components.
- Battery Energy Storage System (BESS).
- On-site facility substation between the solar PV facility and the Eskom substation.
- Site offices, Security office, operations and control, and maintenance and storage laydown areas.
- Access roads, internal distribution roads.

Grid connection solution.

To evacuate the generated power to the Siyanda Mine, the grid connection solution consisting of the following is proposed:

The power generated by the solar PV facility will be transferred to the three step up transformers at the on-site/plant substation. Power will then be delivered from each step-up transformer as follows:

- two 6.6 km, 33 kV transmission lines to the Mortimer substation with four step down transformers (33/6.6 kV; 10 MVA).
- two 4.7 km, 33 kV transmission lines to the Fridge substation with two step down transformers (33/6.6 kV; 10 MVA).
- two 2.9 km, 33 kV transmission lines to the Ivan substation with three step down transformers (33/11 kV; 10 MVA).
- One 132kV transmission line to the south west area of the project site where a new substation (to be assessed through separate Environmental Impact Assessment (EIA) processes) for the furnace is proposed to be built

The grid connection is proposed on the following properties:

- Portion 3 of Farm Grootkuil 409.
- Portion 4 of Farm Grootkuil 409.
- Portion 5 of Farm Grootkuil 409.

The development area of 574 ha is larger than the area needed for the construction of a 100MW PV facility and will provide the opportunity for the optimal placement of the infrastructure, ensuring avoidance of major identified environmental sensitivities by the development footprint of ~ 240ha[2]. To avoid areas of potential sensitivity and to ensure that potential detrimental environmental impacts are minimised as far as possible, the full extent of the larger development area will be considered in the Scoping Phase, and a development footprint within which the infrastructure of the PV facility and associated infrastructures will be located will be fully assessed during the EIA Phase.

[2] The development footprint is the defined area (located within the development area) where the PV panel array and other associated infrastructure for Solar PV will be planned to be constructed. This will be the actual footprint of the facility, and the area which would be disturbed. The extent of the development footprint will be determined in the EIA Phase.

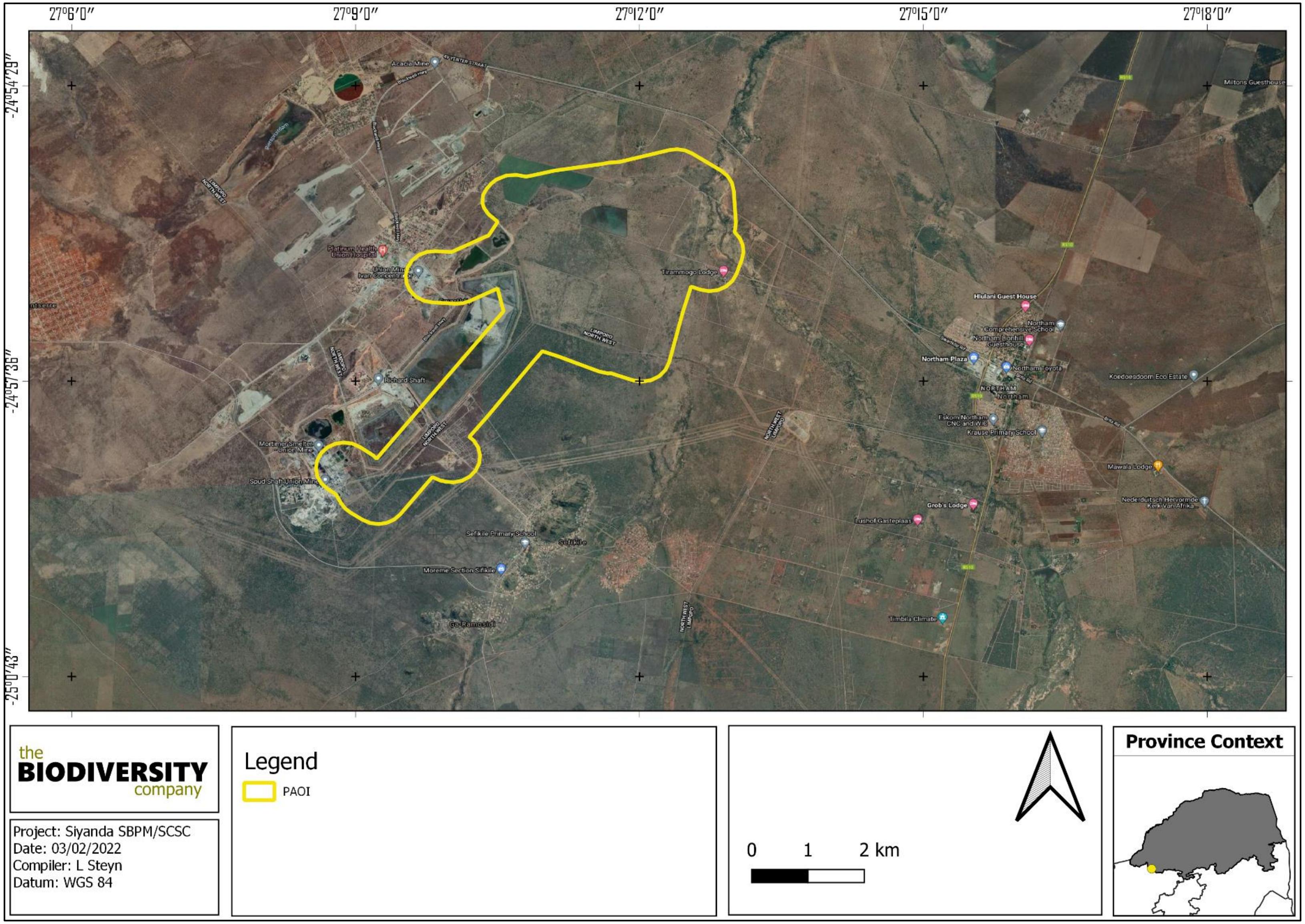

Figure 1-1 ***Proposed location of the project area in relation to the nearby towns***

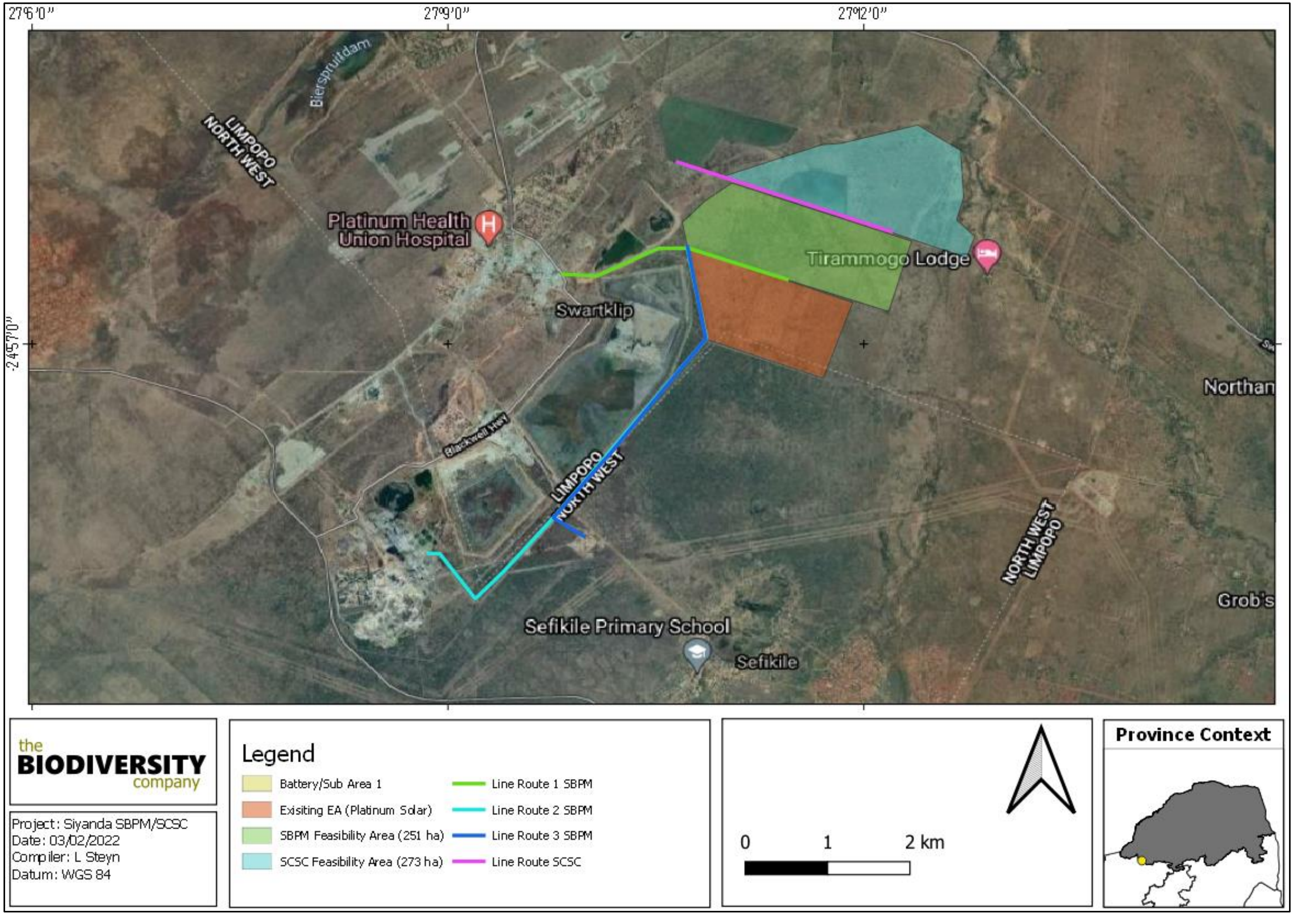

Figure 1-2 The various components of the project

1.3 Specialist Details

Report Name	**TERRESTRIAL & FRESHWATER ECOLOGY, & AGRICULTURAL POTENTIAL SCOPING ASSESSMENTS FOR THE PROPOSED SBPM & SCSC SOLAR FACILITIES FOR SIYANDA BAKGATLA PLATINUM MINE**
Reference	**SBPM/Siyanda PV**
Submitted to	savannah environmental
Report Writer	**Lindi Steyn**
	Dr Lindi Steyn has completed her PhD in Biodiversity and Conservation from the University of Johannesburg. Lindi is a terrestrial ecologist with a special interest in ornithology. She has completed numerous studies ranging from basic Assessments to Environmental Impact Assessments following IFC standards.
Reviewer	**Andrew Husted**
	Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.
Declaration	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.

2 Scope of Work

The principle aim of the assessment was to provide information to guide the risk of the proposed activity to the ecological communities of the associated ecosystems and the agricultural potential within the project area. This was achieved through the following:

- Desktop assessment to identify the relevant ecologically important geographical features within the project area;
- Desktop assessment to compile an expected species list and identify possible threatened flora and fauna species that occur within the project area;
- A desktop description of the land type and soil characteristics for the area; and
- Provide a high level description of potential impact scenarios for the project.

3 Key Legislative Requirements

The legislation, policies and guidelines listed below in Table 3-1 are applicable to the current project. The list below, although extensive, may not be complete and other legislation, policies and guidelines may apply in addition to those listed below.

Table 3-1 A list of key legislative requirements relevant to biodiversity and conservation in the Limpopo and North West Provinces

Region	Legislation / Guideline
International	Convention on Biological Diversity (CBD, 1993)
	The Convention on Wetlands (RAMSAR Convention, 1971)
	The United Nations Framework Convention on Climate Change (UNFCC,1994)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
National	Constitution of the Republic of South Africa (Act No. 108 of 1996)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management: Biodiversity Act (Act No. 10 of 2004), Threatened or Protected Species Regulations
	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)
	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)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989)
	National Protected Areas Expansion Strategy (NPAES)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	National Water Act (NWA) (Act No. 36 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)

	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations and, Alien and Invasive Species List 20142020, published under NEMBA
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
Provincial	Limpopo Conservation Plan (2018)
	Limpopo Environmental Management Act (2003)
	North-West Biodiversity Sector Plan of 2015 (READ, 2015).
	The North West Biodiversity Management Amendment Bill, 2017

4 Methods

4.1 Desktop Assessment

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 date of publishing are provided below.

4.1.1 Ecologically Important Landscape Features

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

- National Biodiversity Assessment 2018 (Skowno et al, 2019) (NBA) - The purpose of the NBA is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species, and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
    - *Ecosystem Threat Status* – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
    - *Ecosystem Protection Level* – indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems.
- Protected areas - South Africa Protected Areas Database (SAPAD) (DEA, 2021) – The SAPAD Database contains spatial data pertinent to the conservation of South African biodiversity. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis and forms 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.

- National Protected Areas Expansion Strategy (NPAES) (SANBI, 2016) – The NPAES provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and therefore, of high importance for biodiversity, climate resilience and freshwater protection.
- Conservation/Biodiversity Sector Plans:

The **Limpopo Conservation Plan** was completed in 2018 for the Limpopo Department of Economic Development, Environment & Tourism (LEDET) (Desmet *et al.,* 2013). The purpose of the LCPv2 was to develop the spatial component of a bioregional plan (i.e., map of Critical Biodiversity Areas and associated land-use guidelines). The previous Limpopo Conservation Plan (LCPv1) was completely revised and updated (Desmet et al., 2013). A Limpopo Conservation Plan map was produced as part of this plan and sites were assigned to the following CBA categories based on their biodiversity characteristics, spatial configuration, and requirement for meeting targets for both biodiversity pattern and ecological processes:

  - Critical Biodiversity Area 1 (CBA1);
  - Critical Biodiversity Area 2 (CBA2);
  - Ecological Support Area 1 (ESA1);
  - Ecological Support Area 2 (ESA2);
  - Other Natural Area (ONA);
  - Protected Area (PA); and
  - No Natural Remaining (NNR).

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (Desmet et al., 2013).

Ecological Support Areas (ESA's) are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services (SANBI, 2017). Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic.

Other Natural Areas (ONAs) consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs. A biodiversity sector plan or bioregional plan must not specify the desired state/management objectives for ONAs or provide land-use guidelines for ONAs (Driver *et al.,* 2017).

Areas with No Natural Habitat Remaining (NNR) are areas in poor ecological condition that have not been identified as CBAs or ESAs. They include all irreversibly modified areas (such as urban or industrial areas and mines), and most severely modified areas (such as cultivated fields and forestry plantations). A biodiversity sector plan or bioregional plan must not specify the desired state/management objective or provide land-use guidelines for NNR areas (Driver *et al.,* 2017).

The **North-West Department of Rural, Environment, and Agricultural Development (READ),** as custodian of the environment in the North West, is the primary implementing agent of the Biodiversity Sector Plan. The spatial component of the Biodiversity Sector Plan is based on systematic biodiversity planning undertaken by READ. The purpose of a Biodiversity Sector Plan is to inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management, undertaken by a range of sectors whose policies and decisions impact on biodiversity. This is done by providing a map of biodiversity priority areas, referred to as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), with accompanying land use planning and decision-making guidelines (READ, 2015).

- Important Bird and Biodiversity Areas (IBAs) (BirdLife South Africa, 2015) – IBAs constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria; and

- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al.,* 2018) – A SAIIAE was established during the NBA of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types and pressures on these systems.

4.1.2 Desktop Flora Assessment

The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) and SANBI (2019) 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 project area (Figure 4-1). 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.

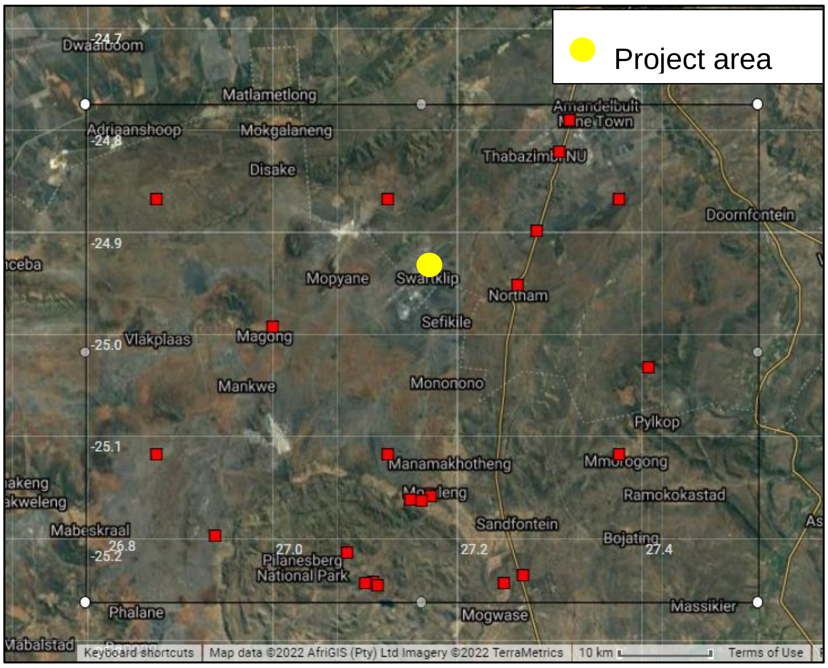

Figure 4-1 ***Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database. Yellow dot indicates approximate location of the project area. The red squares are cluster markers of botanical records as per POSA data***

4.1.3 Desktop Faunal Assessment

The faunal desktop assessment comprised of the following, compiling an expected:

- Amphibian list, generated from the IUCN spatial dataset (2017) and AmphibianMap database (Fitzpatrick Institute of African Ornithology, 2021a), using the 2427 quarter degree square;

- Reptile list, generated from the IUCN spatial dataset (2017) and ReptileMap database (Fitzpatrick Institute of African Ornithology, 2021b), using the 2427 quarter degree square;

- Avifauna list, generated from the SABAP2 dataset by looking at pentads 2450_2700; 2450_2705; 2455_2700; 2455_2700; 2455_2705; 2455_2710; 2500_2700_2500_2705); and
- Mammal list from the IUCN spatial dataset (2017).

4.2 Terms of Methodology

The following methodologies will be implemented for the baseline assessment (phase) of the project.

4.2.1 Flora Survey

The fieldwork and sample sites will be 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 will included the latest applicable biodiversity datasets) available prior to the fieldwork. The focus of the fieldwork will therefore be to maximise coverage and navigate to each target site in the field, to perform a rapid vegetation and ecological assessment at each sample site. Emphasis will be placed on sensitive habitats, especially those overlapping with the proposed project area.

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

The timed random meander method is highly efficient 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 will be performed based on the original technique described by Goff *et al.* (1982). Suitable habitat for SCC will be identified according to Raimondo *et al.* (2009) and targeted as part of the timed meanders.

At each sample site notes will be 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 will be made while navigating through the project area.

4.2.2 Fauna Survey

The faunal assessment within this report pertains to herpetofauna (amphibians and reptiles), avifauna and mammals. The faunal field survey will be comprised of the following techniques:

- Visual and auditory searches - This typically comprises of meandering and using binoculars to view species from a distance without them being disturbed; and listening to species calls;
- Active hand-searches - Used for species that shelter in or under particular micro-habitats (typically rocks, exfoliating rock outcrops, fallen trees, leaf litter, bark etc.);
- Point counts for the avifauna; and
- Utilization of local knowledge.

Relevant field guides and texts that will be consulted for identification purposes included the following:

- Field Guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- A Complete Guide to the Snakes of Southern Africa (Marais, 2004);
- Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland (Bates *et al,* 2014);
- A Complete Guide to the Frogs of Southern Africa (du Preez and Carruthers, 2009);
- Smithers' Mammals of Southern Africa (Apps, 2000);

- A Field Guide to the Tracks and Signs of Southern and East African Wildlife (Stuart and Stuart, 2000);
- Book of birds of South Africa, Lesotho and Swaziland (Taylor *et al.,* 2015); and
- Roberts – Birds of Southern Africa (Hockey *et al.,* 2005).

4.3 Terrestrial Site Ecological Importance

The different habitat types within the project area will be delineated and identified based on observations during the field assessment, and available satellite imagery. These habitat types will be 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 4-1 and Table 4-2, respectively.

Table 4-1 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 4-2 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 4-3.

Table 4-3 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 4-4.

Table 4-4 Summary of Receptor 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 4-5.

Table 4-5 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 proposed project is provided in Table 4-6.

Table 4-6 Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

Site Ecological Importance	Interpretation in relation to proposed 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.

4.4 Wetland Assessment

4.4.1 Wetland Identification and Mapping

The National Wetland Classification Systems (NWCS) developed by the SANBI will be considered for this assessment. This system comprises a hierarchical classification process of defining a wetland based on the principles of the hydrogeomorphic (HGM) approach at higher levels. In addition, the method also includes the assessment of structural features at the lower levels of classification (Ollis et al., 2013).

The wetland areas will be delineated in accordance with the DWAF (2005) guidelines, a cross section is presented in Figure 4-2. The outer edges of the wetland areas will be identified by considering the following four specific indicators, the:

- Terrain Unit Indicator helps to identify those parts of the landscape where wetlands are more likely to occur;
- Soil Form Indicator identifies the soil forms, as defined by the Soil Classification Working Group (1991), which are associated with prolonged and frequent saturation.

- The soil forms (types of soil) found in the landscape were identified using the South African soil classification system namely; Soil Classification: A Taxonomic System for South Africa (Soil Classification Working Group, 1991);

- Soil Wetness Indicator identifies the morphological "signatures" developed in the soil profile due to prolonged and frequent saturation; and
- Vegetation Indicator identifies hydrophilic vegetation associated with frequently saturated soils.

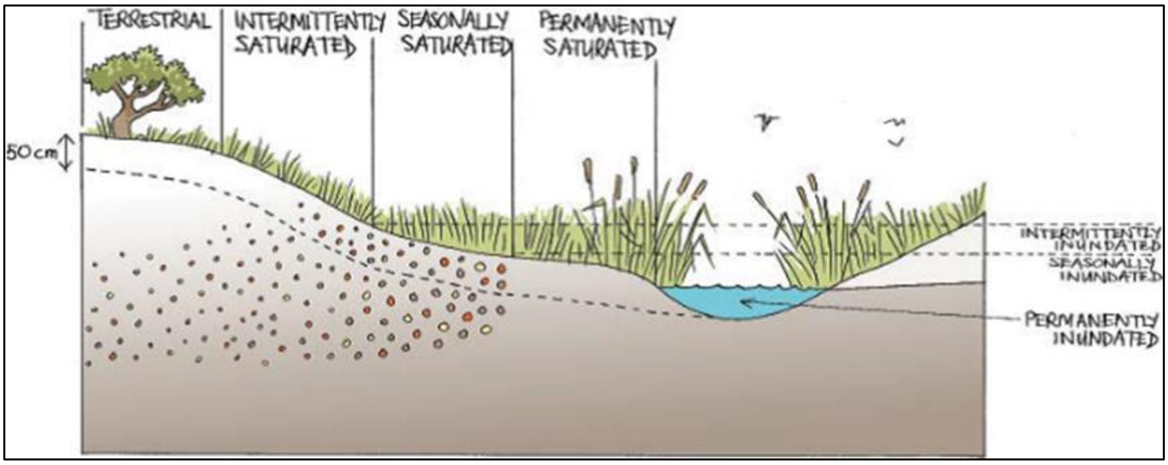

Figure 4-2 ***Cross section through a wetland, indicating how the soil wetness and vegetation indicators change (Ollis et al., 2013).***

4.4.2 Functional Assessment

Wetland Functionality refers to the ability of wetlands to provide healthy conditions for the wide variety of organisms found in wetlands and humans. EcoServices serve as the main factor contributing to wetland functionality.

The assessment of the ecosystem services supplied by the identified wetlands will be conducted per the guidelines as described in WET-EcoServices (Kotze et al. 2008). An assessment will be undertaken that examines and rates the following services according to their degree of importance and the degree to which the services are provided (Table 4-7).

Table 4-7 ***Classes for determining the likely extent to which a benefit is being supplied***

Score	Rating of likely extent to which a benefit is being supplied
< 0.5	Low
0.6 - 1.2	Moderately Low
1.3 - 2.0	Intermediate
2.1 - 3.0	Moderately High
> 3.0	High

4.4.3 Present Ecological Status

The overall approach is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a Present Ecological Status (PES) score. This takes the form of assessing the spatial extent of impact of individual activities/occurrences and then separately assessing the intensity of impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact. The Present State categories are provided in Table 4-8.

Table 4-8 The Present Ecological Status categories (Macfarlane et al., 2009)

Impact Category	Description	Impact Score Range	PES
None	**Unmodified, natural**	**0 to 0.9**	**A**
Small	Largely Natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1.0 to 1.9	B
Moderate	Moderately Modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.	2.0 to 3.9	C
Large	Largely Modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4.0 to 5.9	D
Serious	Seriously Modified. The change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognizable.	6.0 to 7.9	E
Critical	Critical Modification. The modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8.0 to 10	F

4.4.4 Importance and Sensitivity

The importance and sensitivity of water resources is determined to establish resources that provide higher than average ecosystem services, biodiversity support functions or are particularly sensitive to impacts. The mean of the determinants is used to assign the Importance and Sensitivity (IS) category, as listed in Table 4-9 (Rountree and Kotze, 2013).

Table 4-9 Description of Ecological Importance and Sensitivity categories

EIS Category	Range of Mean	Recommended Ecological Management Class
Very High	3.1 to 4.0	**A**
High	2.1 to 3.0	**B**
Moderate	1.1 to 2.0	**C**
Low Marginal	< 1.0	**D**

4.4.5 Determining Buffer Requirements

The “Preliminary Guideline for the Determination of Buffer Zones for Rivers, Wetlands and Estuaries” (Macfarlane et al., 2014) will be used to determine the appropriate buffer zone for the proposed activity.

4.5 Land Capability

Land capability and agricultural potential will be determined by a combination of soil, terrain and climate features. Land capability is defined by the most intensive long-term sustainable use of land under rain-fed conditions. At the same time an indication is given about the permanent limitations associated with the different land use classes.

Land capability is divided into eight classes and these may be divided into three capability groups. Table 4-10 shows how the land classes and groups are arranged in order of decreasing capability and ranges of use. The risk of use and sensitivity increases from class I to class VIII (Smith, 2006).

Table 4-10 Land capability class and intensity of use (Smith, 2006)

Land Capability Class	Increased Intensity of Use									Land Capability Groups
I	W	F	LG	MG	IG	LC	MC	IC	VIC	Arable Land
II	W	F	LG	MG	IG	LC	MC	IC		

III	W	F	LG	MG	IG	LC	MC			
IV	W	F	LG	MG	IG	LC				
V	W	F	LG	MG						Grazing Land
VI	W	F	LG	MG						
VII	W	F	LG							
VIII	W									Wildlife
W - Wildlife		**MG - Moderate Grazing**			**MC - Moderate Cultivation**					
F- Forestry		**IG - Intensive Grazing**			**IC - Intensive Cultivation**					
LG - Light Grazing		**LC - Light Cultivation**			**VIC - Very Intensive Cultivation**					

Land capability has been classified into 15 different categories by the DAFF (2017) which indicates the national land capability category and associated sensitivity related to soil resources.

The land potential classes are determined by combining the land capability results and the climate capability of a region as shown in Table 4-11. The final land potential results are then described in Table 4-12. These land potential classes are regarded as the final delineations subject to sensitivity, given the comprehensive addition of climatic conditions as those relevant to the DAFF (2017) land capabilities. The main contributors to the climatic conditions as per Smith (2006) is that of MAP, Mean Annual Potential Evaporation (MAPE), mean September temperatures, mean June temperatures and mean annual temperatures. These parameters will be derived from Mucina and Rutherford (2006) for each vegetation type located within a relevant project area. This will give the specialist the opportunity to consider micro-climate, aspect, topography etc.

Table 4-11 The combination table for land potential classification

Land capability class	Climate capability class							
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**
I	L1	L1	L2	L2	L3	L3	L4	L4
II	L1	L2	L2	L3	L3	L4	L4	L5
III	L2	L2	L3	L3	L4	L4	L5	L6
IV	L2	L3	L3	L4	L4	L5	L5	L6
V	Vlei	Vlei	Vlei	Vlei	Vlei	Vlei	Vlei	Vlei
VI	L4	L4	L5	L5	L5	L6	L6	L7
VII	L5	L5	L6	L6	L7	L7	L7	L8
VIII	L6	L6	L7	L7	L8	L8	L8	L8

Table 4-12 The Land Potential Classes.

Land potential	Description of land potential class
L1	Very high potential: No limitations. Appropriate contour protection must be implemented and inspected.
L2	High potential: Very infrequent and/or minor limitations due to soil, slope, temperatures or rainfall. Appropriate contour protection must be implemented and inspected.
L3	Good potential: Infrequent and/or moderate limitations due to soil, slope, temperatures or rainfall. Appropriate contour protection must be implemented and inspected.
L4	Moderate potential: Moderately regular and/or severe to moderate limitations due to soil, slope, temperatures or rainfall. Appropriate permission is required before ploughing virgin land.

L5	Restricted potential: Regular and/or severe to moderate limitations due to soil, slope, temperatures or rainfall.
L6	Very restricted potential: Regular and/or severe limitations due to soil, slope, temperatures or rainfall. Non-arable
L7	Low potential: Severe limitations due to soil, slope, temperatures or rainfall. Non-arable
L8	Very low potential: Very severe limitations due to soil, slope, temperatures or rainfall. Non-arable

4.5.1 Climate Capability

According to Smith (2006), climatic capability is determined by taking into consideration various steps pertaining to the temperature, rainfall and Class A-pan of a region. The first step in this methodology is to determine the MAP to Class A-pan ratio.

Table 4-13 Climatic capability (step 1) (Smith, 2006)

Climatic Capability Class	Limitation Rating	Description	MAP: Class A pan Class
C1	None to Slight	Local climate is favourable for good yields for a wide range of adapted crops throughout the year.	0.75-1.00
C2	Slight	Local climate is favourable for a wide range of adapted crops and a year-round growing season. Moisture stress and lower temperature increase risk and decrease yields relative to C1.	0.50-0.75
C3	Slight to Moderate	Slightly restricted growing season due to the occurrence of low temperatures and frost. Good yield potential for a moderate range of adapted crops.	0.47-0.50
C4	Moderate	Moderately restricted growing season due to the occurrence of low temperatures and severe frost. Good yield potential for a moderate range of adapted crops but planting date options more limited than C3.	0.44-0.47
C5	Moderate to Severe	Moderately restricted growing season due to low temperatures, frost and/or moisture stress. Suitable crops at risk of some yield loss.	0.41-0.44
C6	Severe	Moderately restricted growing season due to low temperatures, frost and/or moisture stress. Limited suitable crops that frequently experience yield loss.	0.38-0.41
C7	Severe to Very Severe	Severely restricted choice of crops due to heat and moisture stress.	0.34-0.38
C8	Very Severe	Very severely restricted choice of crops due to heat and moisture stress. Suitable crops at high risk of yield loss.	0.30-0.34

In the event that the MAP: Class A-pan ratio is calculated to fall within the C7 or C8 class, no further steps are required, and the climatic capability can therefore be determined to be C7 or C8. In cases where the above-mentioned ratio falls within C1-C6, steps 2 to 3 will be required to further refine the climatic capability.

Step 2

Mean September temperatures;

- <10℃ = C6
- 10 - 11℃ = C5
- 11 - 12℃ = C4
- 12 - 13℃ = C3
- >13℃ = C1

Step 3

Mean June temperatures;

- <9℃ = C5
- 9 - 10℃ = C4

- 10 - 11 ℃ = C3
- 11 - 12 ℃ = C2

4.5.2 Current Land Use

A generalised land-use will be derived for the larger project area considering agricultural productivity.

- Mining;
- Bare areas;
- Agriculture crops;
- Natural veld;
- Grazing lands;
- Forest;
- Plantation;
- Urban;
- Built-up;
- Waterbodies; and
- Wetlands.

4.6 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The assessment area was based on the area provided by the client and any alterations to the footprint and/or missing GIS information pertaining to the assessment area would have affected the area surveyed;
- The species likelihood of occurrence is based on desktop information and might be changed after the assessment;
- The impact assessment included is preliminary and is solely based on the screening survey and desktop information; and
- No decommissioning phase impacts have been considered for this project. The life of operation is unknown and expected for perpetuity.

5 Results & Discussion

5.1 Desktop Assessment

5.1.1 Ecologically Important Landscape Features

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features is summarised in Table 5-1.

Table 5-1 Summary of relevance of the proposed project to ecologically important landscape features

Desktop Information Considered	Relevant/Irrelevant	Section
Ecosystem Threat Status	Relevant – Overlaps with a Least Concern ecosystem	5.1.1.1
Ecosystem Protection Level	Relevant – Overlaps with a Moderately Protected Ecosystem	5.1.1.2
Protected Areas	Relevant – The project area overlaps with the Rustenburg Platinum Mines (Union Section) Private Nature Reserve	5.1.1.4
Renewable Energy Development Zones	Irrelevant - The project area is 167 km for the closest REDZ	-
Powerline Corridor	Irrelevant- The project area falls 88km from the Northern Corridor	-
National Protected Areas Expansion Strategy	Relevant – The project area overlap with a NPAES protected area	5.1.1.4
Critical Biodiversity Area	Relevant – The project area overlaps with CBA2, ESA1, NNR and ONA classified areas	5.1.1.3

Important Bird and Biodiversity Areas	Relevant – Located adjacent to the Northern Turf Thornveld IBA	5.1.1.5
South African Inventory of Inland Aquatic Ecosystems	Relevant - The project area overlaps with two CR wetlands and is adjacent to 1 CR wetland	5.1.1.6
National Freshwater Priority Area	Relevant – The project area overlaps with an unclassified FEPA wetland and an unclassified FEPA river	5.1.1.7
Strategic Water Source Areas	Irrelevant- The project area is 57 km from the closest SWSA	-
Coordinated Waterbird Count	Relevant – 106 km from a CWAC site	-
Coordinated Avifaunal Road Count	Relevant – 112 km from the closest CAR route	-

5.1.1.1 Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset the proposed project overlaps with a LC ecosystem (Figure 5-1).

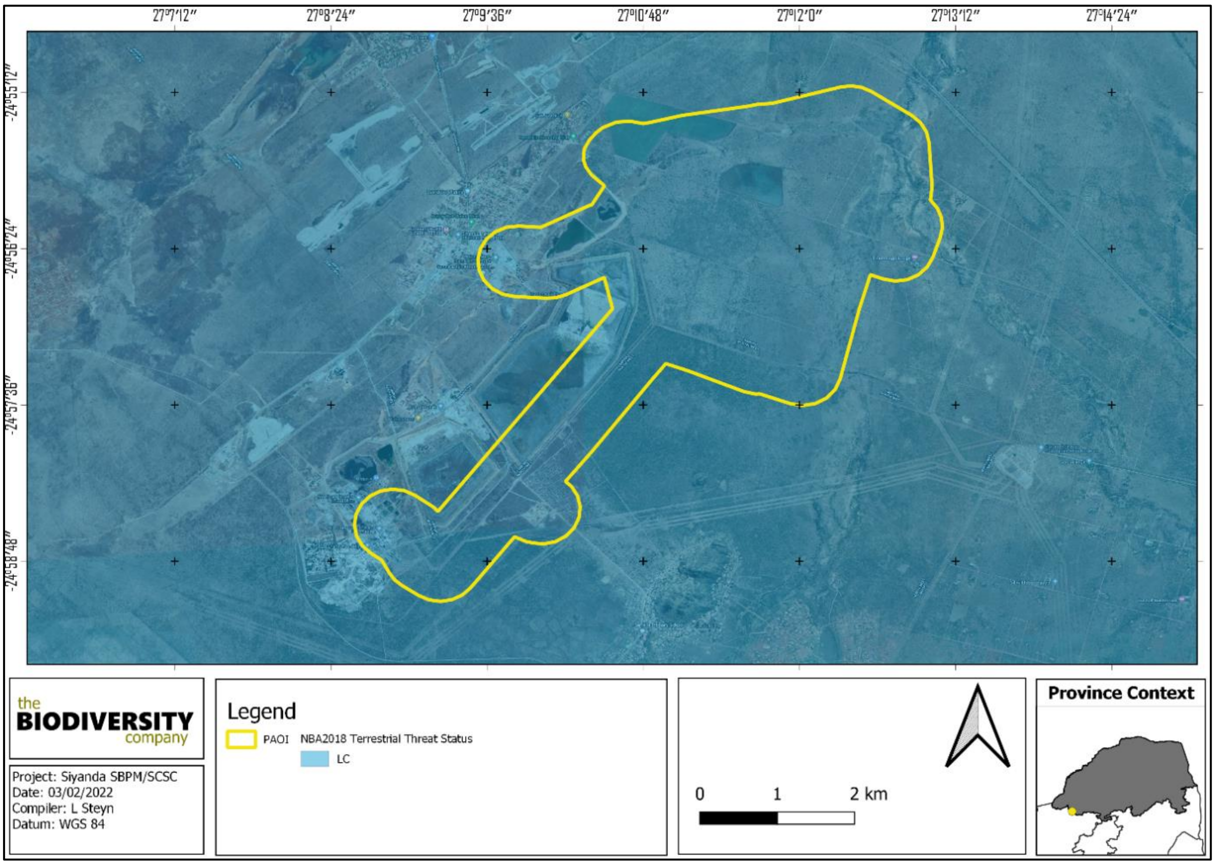

Figure 5-1 Map illustrating the ecosystem threat status associated with the project area.

5.1.1.2 Ecosystem Protection Level

This is an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The proposed project overlaps with a MP ecosystem (Figure 5-2).

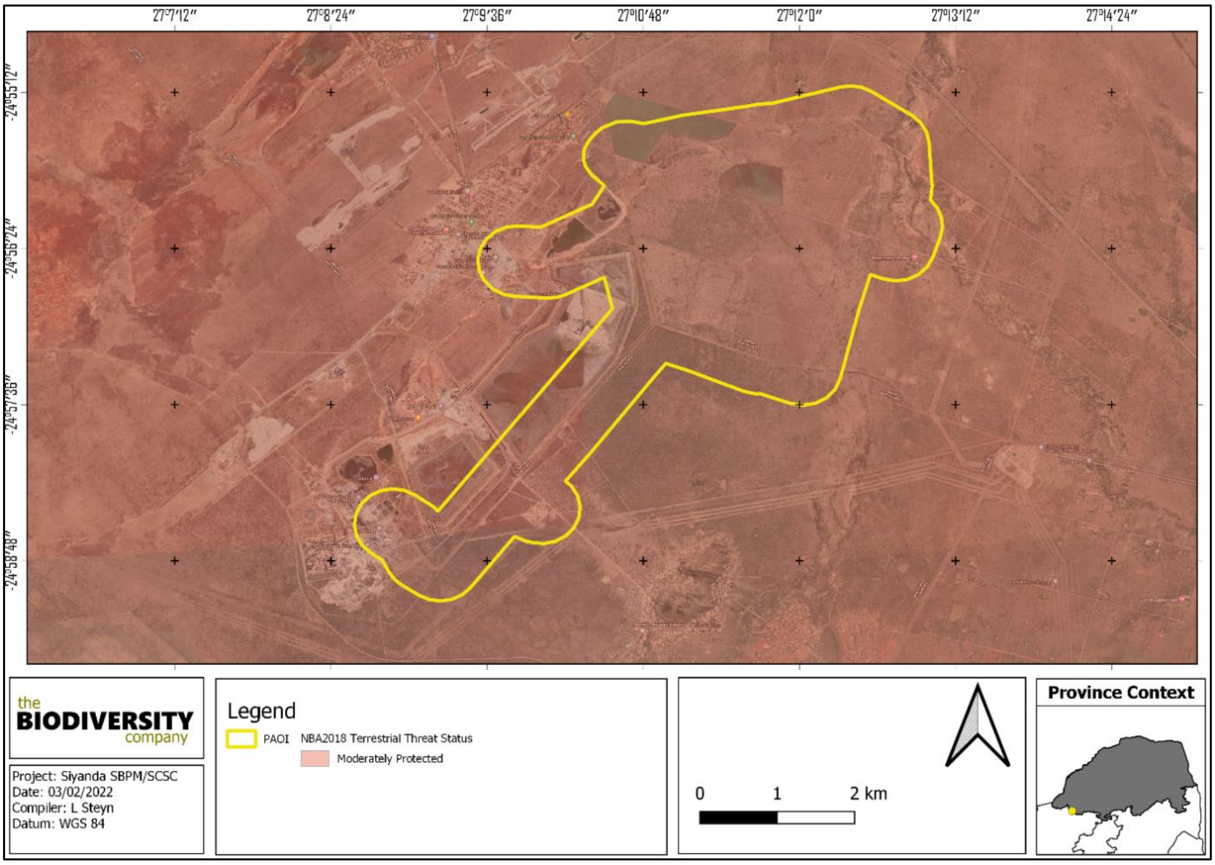

Figure 5-2 Map illustrating the ecosystem protection level associated with the project area

5.1.1.3 Critical Biodiversity Areas and Ecological Support Areas

The conservation of CBAs is crucial, in that if these areas are not maintained in a natural or near-natural state, biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (SANBI-BGIS, 2017).

The provincial CBA spatial data for the North West province indicates that both feasibility areas don't traverse any CBA nor Ecological Support Areas (ESAs) and Other Natural Areas (ONAs). Based on the Limpopo Conservation Plan the SCSC feasibility area traverses ESA1 and NNR areas, whereas the SBPM feasibility area traverses ESA1, NNR and ONA area.

The purpose of the Limpopo C-Plan (2018) is to inform land-use planning and development on a provincial scale and to aid in natural resource management. One of the outputs is a map of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These are classified into different categories, namely Protected Areas, CBA1 areas, CBA2 areas, ESA1 areas, ESA2 areas, Other Natural Areas (ONAs) and areas with No Natural Habitat Remaining (NNR) based on biodiversity characteristics, spatial configuration, and requirements for meeting targets for both biodiversity patterns and ecological processes.

Figure 5-3 shows the project area superimposed on the Terrestrial CBA maps. The project area overlaps with CBA2, ESA1, NNR and ONA classified areas. Development in these areas is feasible, but developments other than the preferred biodiversity-compatible land-uses should be investigated in detail and the mitigation hierarchy applied.

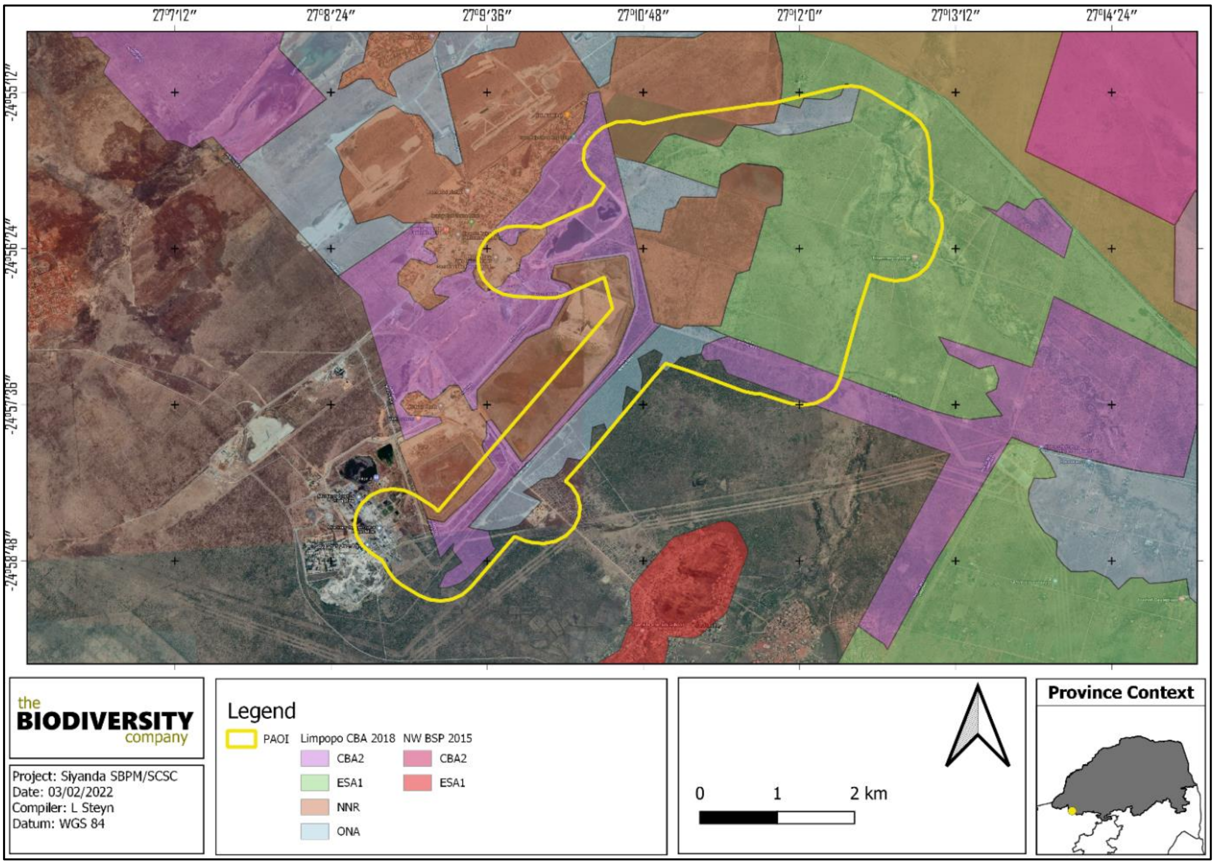

Figure 5-3 Map illustrating the locations of CBAs in the project area

5.1.1.4 Protected areas

According to the protected area spatial datasets from SAPAD (2021), the project area overlaps with the Rustenburg Platinum Mines (Union Section) Private Nature Reserve (Figure 5-4). From the imagery, and confirmed by the site visit, the portion of the reserve in which the project area is located is comprised of an old tailings dam in various stages of rehabilitation and is therefore not considered ecologically sensitive. Several additional private nature reserves are in close proximity to the project area. These are the Leopard Hills, Animalia, Youngs and Leeuwkopje private nature reserves. All of these reserves are within 5km of the project area which means that the project area is within the buffer zone of the nature reserves.

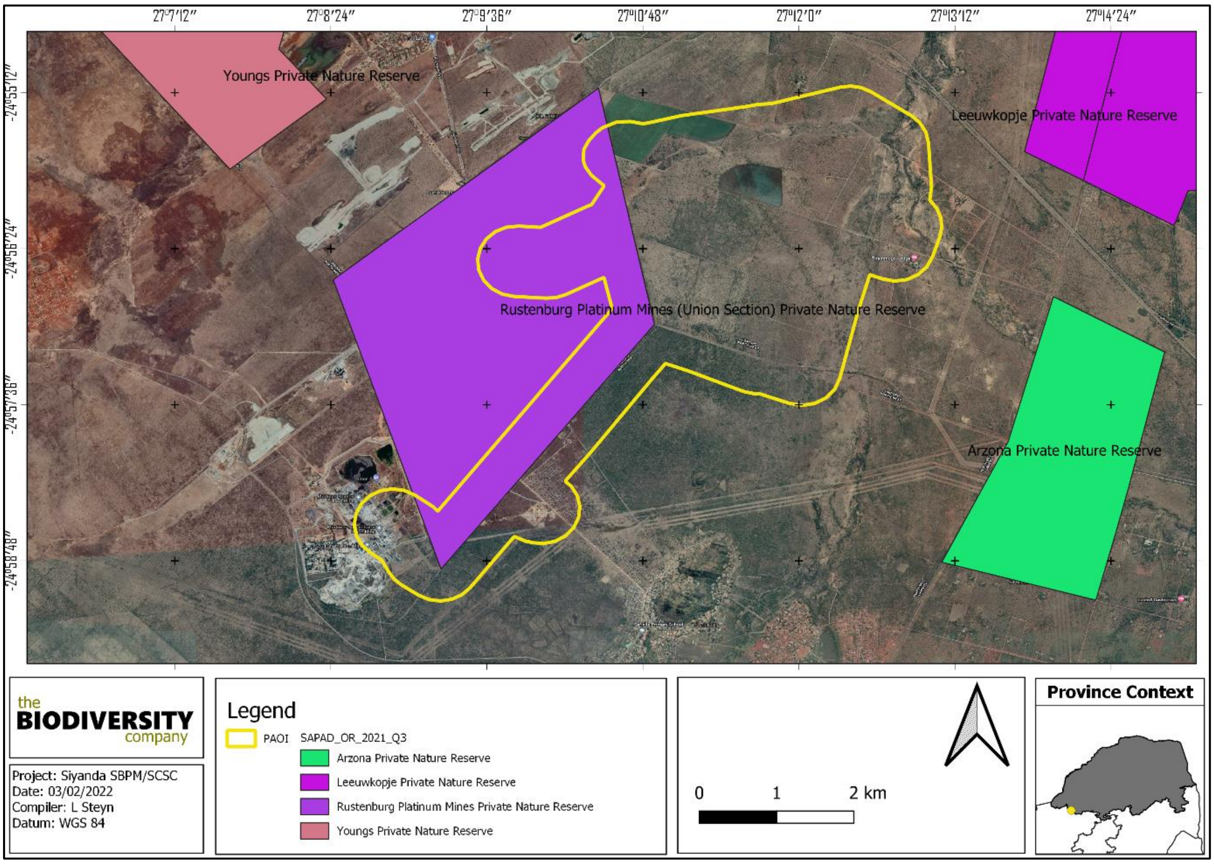

Figure 5-4 The project area in relation to the protected areas

5.1.1.5 National Protected Area Expansion Strategy

National Protected Area Expansion Strategy 2016 (NPAES) areas were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with a strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for finescale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2016). The project area overlaps with an NPAES protected area as can be seen in Figure 5-5. Developments in these areas must be mitigated to an acceptable level.

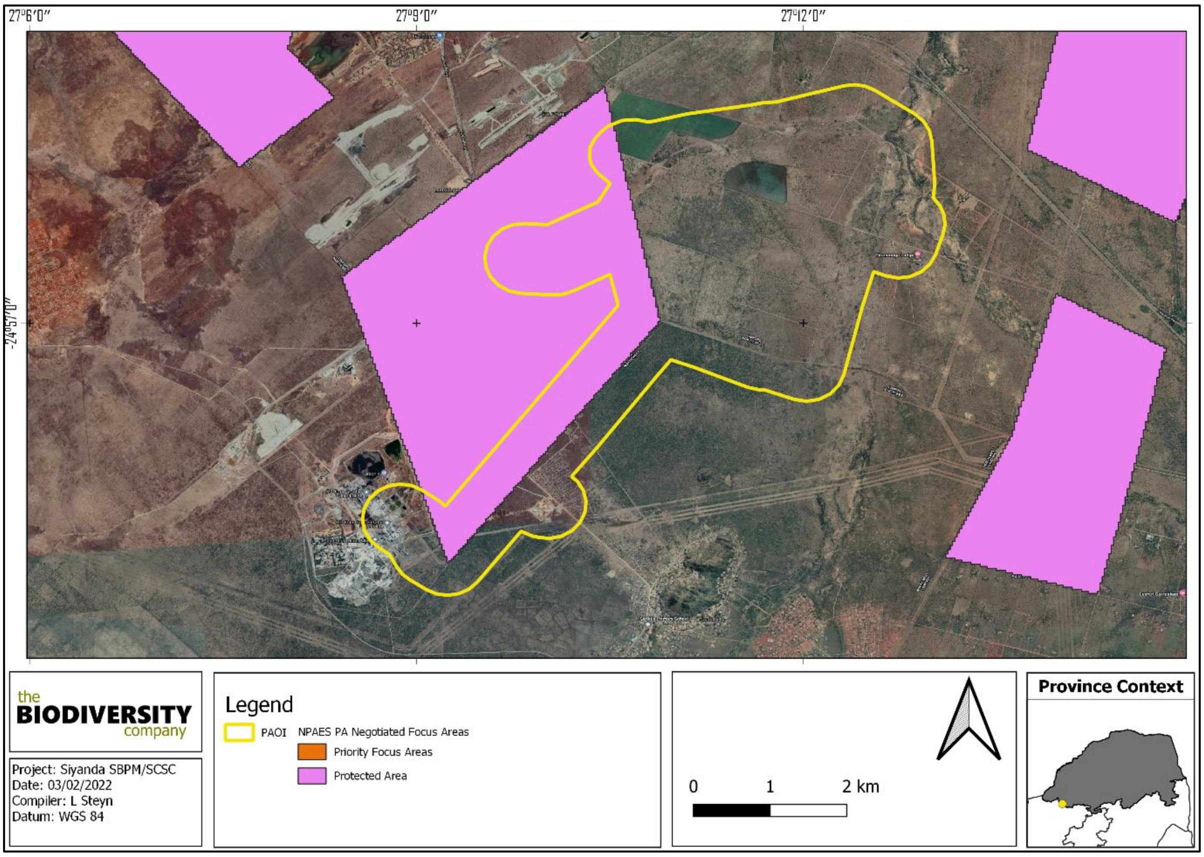

Figure 5-5 The project area in relation to the National Protected Area Expansion Strategy

5.1.1.6 Important Bird and Biodiversity Area

Important Bird & Biodiversity Areas (IBAs) are the sites of international significance for the conservation of the world's birds and other conservation significant species as identified by BirdLife International. These sites are also all Key Biodiversity Areas; sites that contribute significantly to the global persistence of biodiversity (Birdlife, 2017).

According to Birdlife International (2017), the selection of IBAs is achieved through the application of quantitative ornithological criteria, grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among, and enabling comparability between, sites at national, continental and global levels. Figure 5-6 shows the project area is adjacent to the Northern Turf Thornveld IBA.

The Northern Turf Thornveld IBA consists of a group of privately owned farms that forms a triangle delineated roughly by the Crocodile River in the east and the Bierspruit River in the west; the confluence of these two rivers is approximately 3 km south-west of Thabazimbi. This IBA is important as it is home to the Yellow-throated Sandgrouse *Pterocles gutturalis and* is regarded as the core of the resident South African population (Birdlife South Africa, 2015B).

Other important birds in the IBA include the Secretarybird *Sagittarius serpentarius*, Kori Bustard *Ardeotis kori*, Lanner Falcon *Falco biarmicus* and Black-winged Pratincole *Glareola nordmanni*.

Common biome-restricted species found within this IBA include Kurrichane Thrush *Turdus libonyanus*, White-throated Robin-Chat *Cossypha humeralis*, Burchell's Starling *Lamprotornis australis*, White-bellied Sunbird *Cinnyris talatala* and the fairly common Kalahari Scrub Robin *Erythropygia paena* (Birdlife South Africa, 2015B).

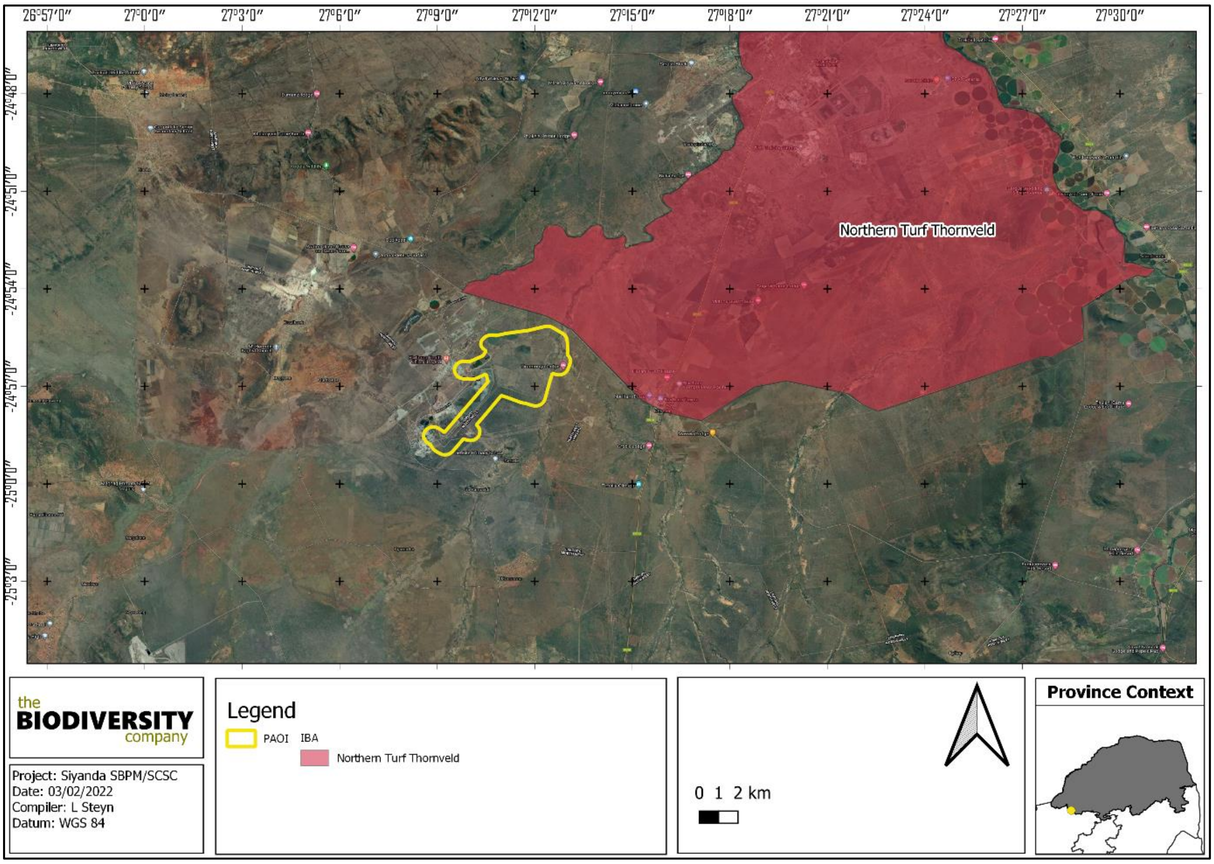

Figure 5-6 The project area in relation to the Northern turf thornveld IBA

5.1.1.7 Hydrological Setting

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the NBA 2018. Ecosystem threat status (ETS) of river and wetland ecosystem types are based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT, with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer *et al.,* 2019; Skowno *et al.,* 2019). The project area overlaps with CR NBA rivers and borders on a CR wetland (Figure 5-7). The reach of the Sefathlane River proximal to the area is regarded as critically endangered (CR)

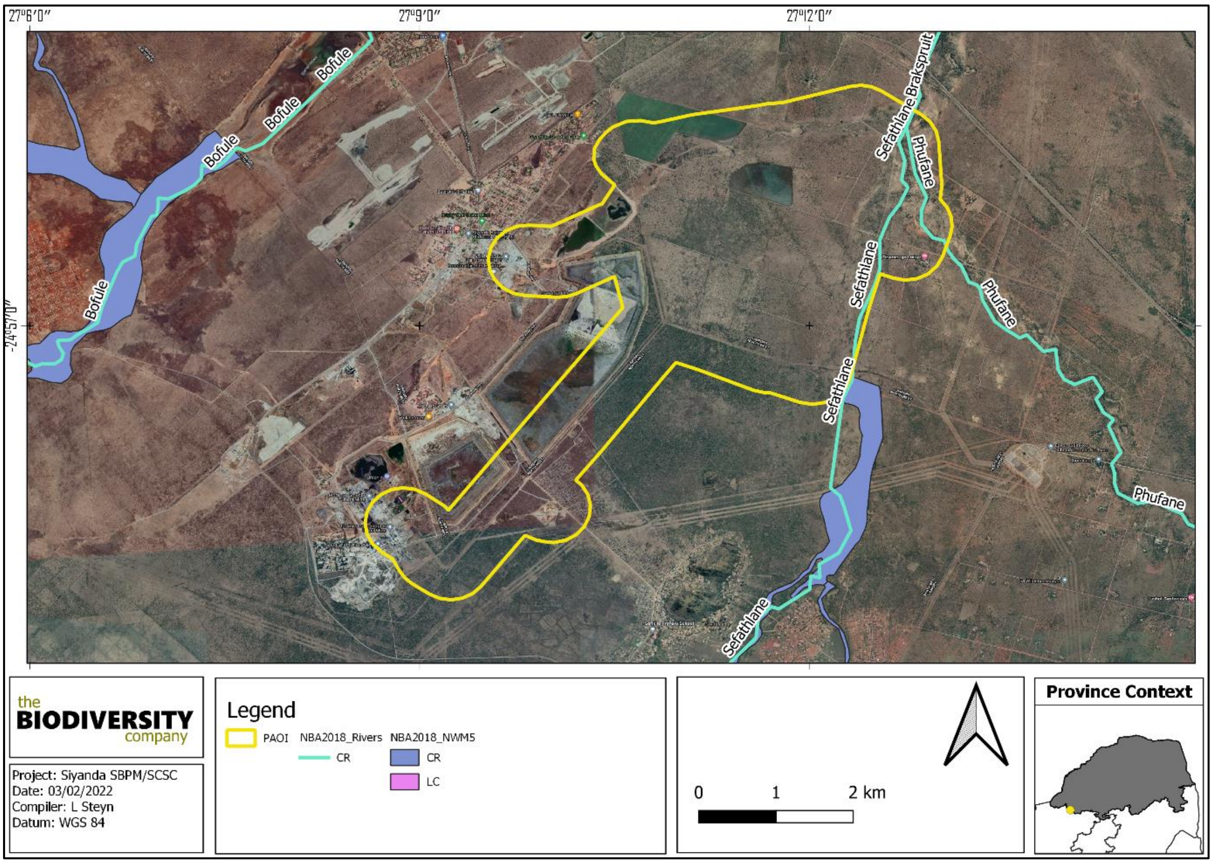

Figure 5-7 Map illustrating ecosystem threat status of rivers and wetland ecosystems in the project area

5.1.1.8 National Freshwater Ecosystem Priority Area Status

In an attempt to better conserve aquatic ecosystems, South Africa has categorised its river 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) (Driver *et al.,* 2011). The FEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's (NEM:BA) biodiversity goals (Nel *et al.,* 2011).

Figure 5-8 shows the project area overlaps with unclassified FEPA wetlands and unclassified FEPA rivers.

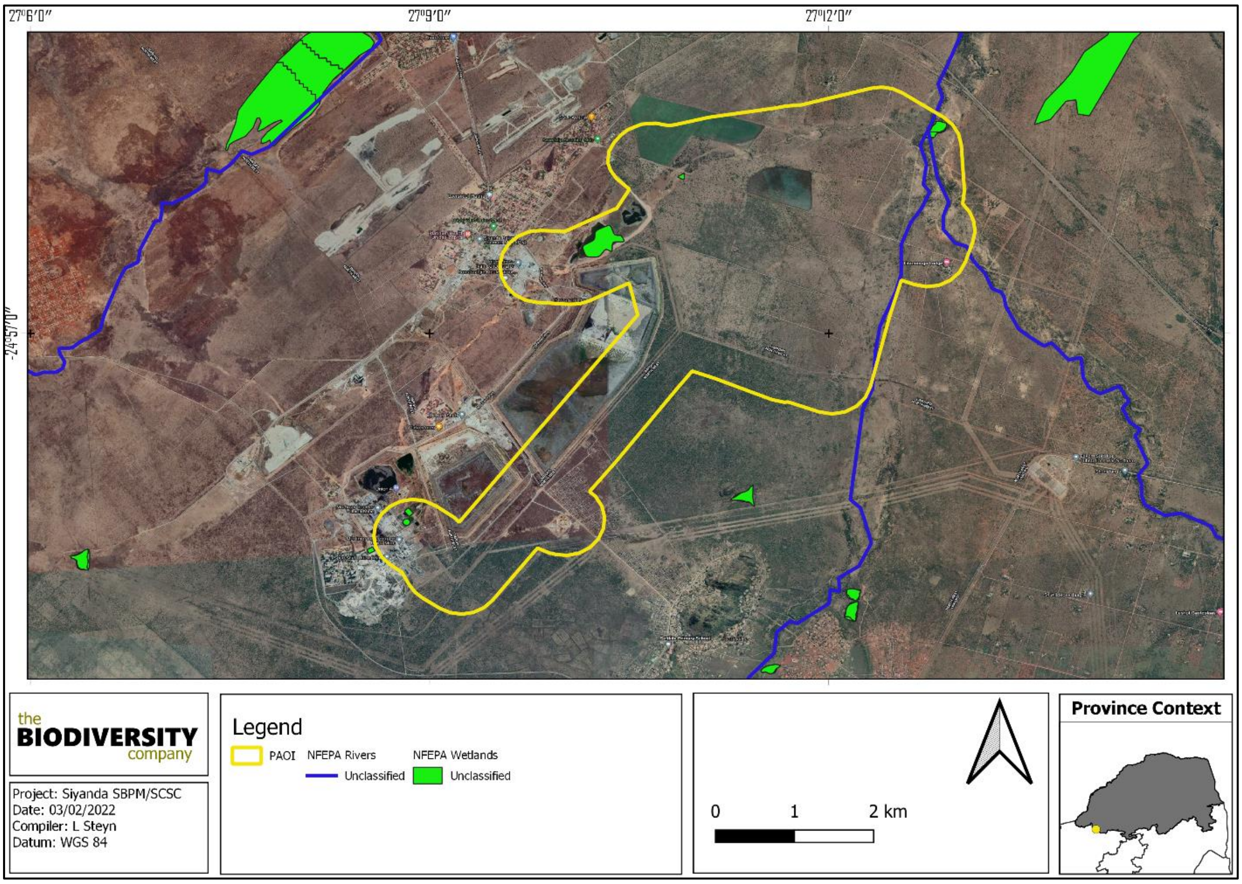

Figure 5-8 The project area in relation to the National Freshwater Ecosystem Priority Areas.

5.1.2 Flora Assessment

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

5.1.2.1 Vegetation Type

The project area is situated in the Savanna biome. The savanna vegetation of South Africa represents the southernmost extension of the most widespread biome in Africa (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the Savanna biome include:

a) Seasonal precipitation; and

b) (Sub) tropical thermal regime with no or usually low incidence of frost (Mucina & Rutherford, 2006).

Most savanna vegetation communities are characterised by a herbaceous layer dominated by grasses and a discontinuous to sometimes very open tree layer (Mucina & Rutherford, 2006).

The savanna biome is the largest biome in South Africa, extending throughout the east and north-eastern areas of the country. Savannas are characterised by a dominant grass layer, over-topped by a discontinuous, but distinct woody plant layer. At a structural level, Africa's savannas can be broadly categorised as either fine-leaved (microphyllous) savannas or broad-leaved savannas. Fine-leaved savannas typically occur on nutrient rich soils and are dominated by microphyllous woody plants of the Mimosaceae family (Common genera include *Acacia and Albizia*) and a generally dense herbaceous layer (Scholes & Walker, 1993).

On a fine-scale vegetation type, the project area overlaps with the Dwaalboom Thornveld vegetation type (Figure 5-9).

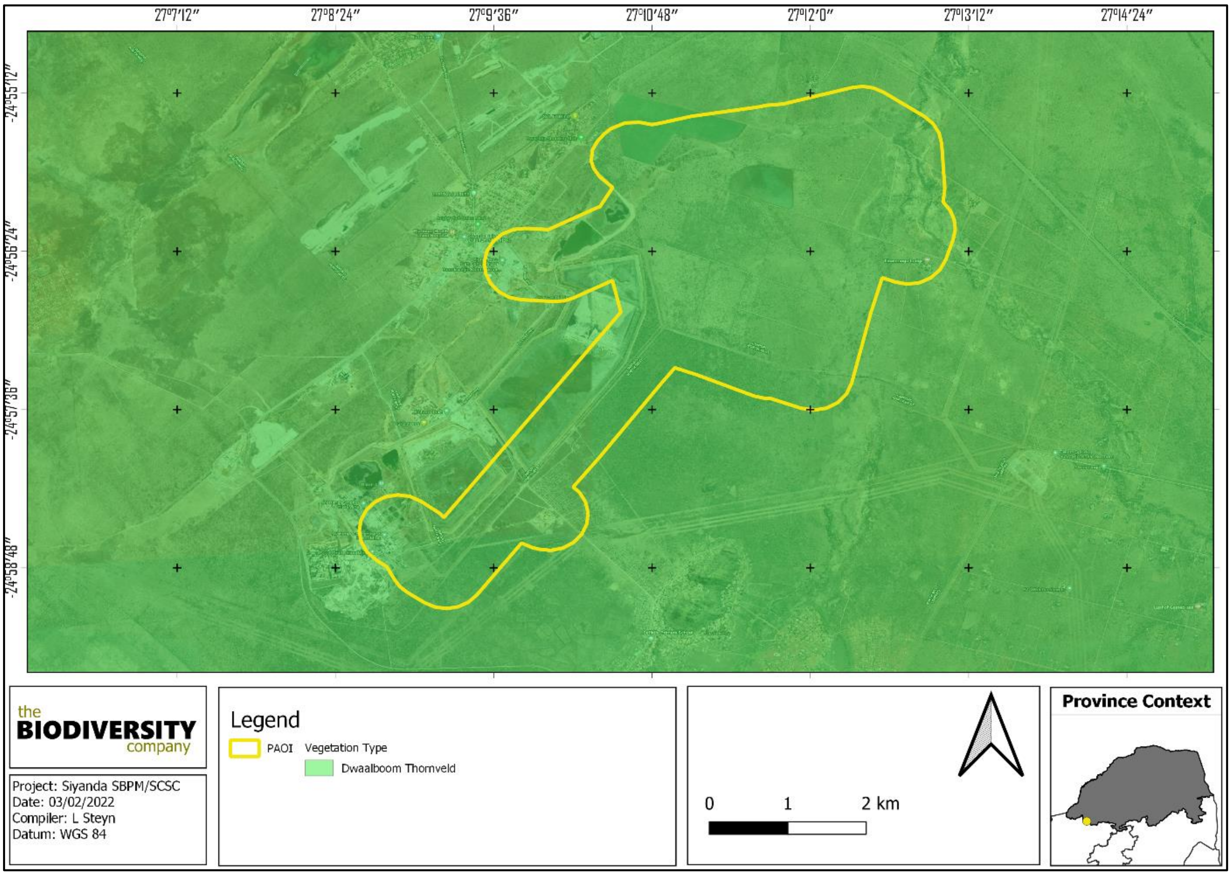

Figure 5-9 Map illustrating the vegetation type associated with the project area

5.1.2.1.1 Dwaalboom Thornveld

Dwaalboom Thornveld is restricted to, and is distributed in, the Limpopo and North-West Provinces within flats north of the Dwarsberge and associated ridges mainly west of the Crocodile River in the Dwaalboom area but including a patch around Sentrum. South of the ridges it extends eastwards from the Nietverdiend area, north of the Pilanesberg to the Northam area at an altitude range of between 900 and 1,200m AMSL. Its main vegetation and landscape features include plains with a layer of scattered, low to medium high, deciduous microphyllous trees and shrubs with a few broad-leaved tree species. There is almost a continuous herbaceous layer dominated by grass species.

Important Plant Taxa in Dwaalboom Thornveld

Based on Mucina and Rutherford's (2006) vegetation classification, important plant taxa are those species that have a high abundance, a frequent occurrence (not being particularly abundant) or are prominent in the landscape within a particular vegetation type. They note the following species are important taxa in the Dwaalboom Thornveld vegetation type:

Trees: *Vachellia erioloba*, *Vachellia erubescens*, *Vachellia nilotica*, *Vachellia tortilis* subsp *heteracantha, Senegalia fleckii, Senegalia burkei, Searsia lancea* (Mucina & Rutherford, 2006).

Shrubs: *Diospyros lycioides* subsp. *lycioides, Grewia flava, Mystroxylon aethiopicum* subsp. *burkenum, Agathisanthemum bojeri* (Mucina & Rutherford, 2006).

Graminoids: *Aristida bipartite, Bothriochloa insculpta, Digitaria eriantha* subsp *eriantha, Ischaemum afrum, Panicum maximum* and *Cymbopogon pospischilii* (Mucina & Rutherford, 2006).

Conservation Status

According to Mucina and Rutherford (2006) Dwaalboom Thornveld is classified as Least Threatened. Although the target for conservation is 19%, only 6%of this vegetation type is currently under statutory conservation in reserves such as the Madikwe Game Reserve (approximately 150km west of the project area). Cultivation and to a lesser extend urbanisation have resulted in the transformation of approximately 14% of Dwaalboom Thornveld and exotic invasive plants are present. Incidences of erosion are low to very low (Mucina & Rutherford, 2006).

5.1.2.2 Expected Flora Species

The POSA database indicates that 428 species of indigenous plants are expected to occur within the project area (The full list of species will be provided in the final report). One (1) SCC based on their conservation status could be expected to occur within the project area and are provided in Table 5-2 below. It is believed that additional SCC will be recorded in the assessment. During the screening assessment a number of protected *Vachellia erioloba* (Camel thorn) trees were recorded within the SCSC feasibility area. This is a nationally protected tree.

Table 5-2 Threatened flora species that may occur within the project area.

Family	Taxon	Author	IUCN	Ecology
Apocynaceae	*Stenostelma umbelluliferum*	(Schltr.) Bester & Nicholas	NT	Indigenous; Endemic

5.1.3 Faunal Assessment

5.1.3.1 Amphibians

Based on the IUCN Red List Spatial Data and AmphibianMap, 30 amphibian species are expected to occur within the area (The full list will be provided in the final assessment). One (1) are regarded as threatened (Table 5-3).

Table 5-3 Threatened amphibian species that are expected to occur within the project area

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Pyxicephalus adspersus	Giant Bullfrog	NT	LC	Moderate

Giant Bull Frog (*Pyxicephalus adspersus*) is a species of conservation concern that will possibly occur in the project area, especially in the area with the wetlands. The Giant Bull Frog is listed as near threatened on a regional scale. It is a species of drier savannas where 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).

5.1.3.2 Reptiles

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 91 reptile species are expected to occur within the area (The full list will be provided in the final assessment). Three (3) are regarded as threatened (Table 5-4).

Table 5-4 Threatened reptile species that are expected to occur within the project area

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Crocodylus niloticus	Nile Crocodile	VU	VU	Moderate
Lygodactylus waterbergensis	Waterberg Dwarf Gecko	NT	NT	Moderate
Pseudocordylus transvaalensis	Northern Crag Lizard	NT	NT	Moderate

Crocodylus niloticus (Nile Crocodile) is listed as VU on a regional basis. The Nile crocodile is quite widespread throughout sub-Saharan Africa, in different types of aquatic environments such as lakes, rivers, and marshlands. The species has a moderate likelihood of occurrence based on the rivers in the project area.

Lygodactylus waterbergensis (Waterberg Dwarf Gecko) is classified as NT both regionally and internationally. This species is endemic to Limpopo Province, where it is found in rocky areas of the grassland and savannas. The likelihood of occurrence is moderate as rocky habitat is present in the project area.

Pseudocordylus transvaalensis (Northern Crag Lizard) is) is categorised as NT on both a regional and a global scale. This species is threatened by the pet trade and is listed on CITES. The likelihood of occurrence in the project area is high because of the moderately correct habitat present for this species.

5.1.3.3 Mammals

The IUCN Red List Spatial Data lists 85 mammal species that could be expected to occur within the area (The full list will be provided in the final assessment). This list includes large mammal species that are normally restricted to protected areas, as these were observed during the screening assessment. Twelve (12) (smaller non protected area restricted species) of these expected species are regarded as threatened (Table 5-5), five of these have a low likelihood of occurrence based on the lack of suitable habitat and food sources in the project area.

Table 5-5 Threatened mammal species that are expected to occur within the project area.

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Aonyx capensis	Cape Clawless Otter	NT	NT	High
Atelerix frontalis	South Africa Hedgehog	NT	LC	Moderate
Cloeotis percivali	Short-eared Trident Bat	EN	LC	High
Crocidura mariquensis	Swamp Musk Shrew	NT	LC	High
Crocuta crocuta	Spotted Hyaena	NT	LC	Low
Felis nigripes	Black-footed Cat	VU	VU	Moderate
Leptailurus serval	Serval	NT	LC	High
Panthera pardus	Leopard	VU	VU	Low
Parahyaena brunnea	Brown Hyaena	NT	NT	Confirmed
Poecilogale albinucha	African Striped Weasel	NT	LC	Low
Redunca fulvorufula	Mountain Reedbuck	EN	LC	Low
Smutsia temminckii	Temminck's Ground Pangolin	VU	VU	Low

Aonyx capensis (Cape Clawless Otter) is the most widely distributed otter species in Africa (IUCN, 2017). This species is predominantly aquatic, and it is seldom found far from water. This species has a high likelihood of occurrence based on the presence of the two rivers in the project area.

Atelerix frontalis (South African Hedgehog) has a tolerance to a degree for 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. Suitable grasslands occur in the project area, although somewhat disturbed, that can function as habitat for this species, as such the likelihood of occurrence is rated as moderate.

Cloeotis percivali (Short-eared Trident Bat) occurs in savanna areas where there is sufficient cover in the form of caves and mine tunnels for day roosting (IUCN, 2017). It feeds exclusively on moths and appears to be very sensitive to disturbance. Suitable habitat and roosting area can be found around the project area and therefore the likelihood of finding this species is rated as high.

Crocidura maquassiensis (Maquassie Musk Shrew) is listed as VU on a regional basis and is known to be found in rocky, mountain habitats. It may tolerate a wider range of habitats and individuals have been collected in Kwa-Zulu Natal from a garden, and in mixed bracken and grassland alongside a river at 1,500 m (IUCN, 2017). This species has a high likelihood of occurring based on the rocky habitat found in the project area.

Felis nigripes (Black-footed cat) is endemic to the arid regions of southern Africa. This species is naturally rare, has cryptic colouring, is small in size and is nocturnal. These factors have contributed to a lack of information on this species. The highest densities of this species have been recorded in the more arid Karoo region of South Africa. The habitat in the project area can be considered to be somewhat suitable for the species and the likelihood of occurrence is therefore 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. Suitable habitat is present for this species in the project area, as such the likelihood of occurrence is rated as high.

Parahyaena brunnea (Brown Hyaena) is endemic to southern Africa. This species occurs in dry areas, generally with annual rainfall less than 100 mm, particularly along the coast, semi-desert, open scrub and open woodland savanna. Given its known ability to persist outside of formally protected areas the likelihood of occurrence of this species in the project area is moderate to good. This species were confirmed during the screening assessment.

5.1.3.4 Avifauna

The SABAP2 Data lists 306 avifauna species that could be expected to occur within the area (The full list will be provided in the final assessment). Ten (10) of these expected species are regarded as threatened (Table 5-6). Three of the species have a low likelihood of occurrence due to lack of suitable habitat and food sources in the project area. The likelihood of occurrence is also related to the disturbed nature of the project area.

Table 5-6 Threatened avifauna species that are expected to occur within the project area

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Ardeotis kori	Bustard, Kori	NT	NT	Low
Ciconia nigra	Stork, Black	VU	LC	Low
Coracias garrulus	Roller, European	NT	LC	Moderate
Falco biarmicus	Falcon, Lanner	VU	LC	High
Glareola nordmanni	Pratincole, Black-winged	NT	NT	Low
Mycteria ibis	Stork, Yellow-billed	EN	LC	Moderate
Polemaetus bellicosus	Eagle, Martial	EN	EN	High
Pterocles gutturalis	Sandgrouse, Yellow-throated	NT	LC	High
Sagittarius serpentarius	Secretarybird	VU	EN	High

Tyto capensis	Grass-owl, African	VU	LC	High

Coracias garrulous (European Roller) is a winter migrant from most of South-central Europe and Asia occurring throughout sub-Saharan Africa (IUCN, 2017). The European Roller has a preference for bushy plains and dry savannah areas (IUCN, 2017). There is a moderate chance of this species occurring in the project area as they prefer to forage in open areas.

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 project area is rated as high due to the natural veld condition and the presence of many bird species on which Lanner Falcons may predate.

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 presence of some water bodies within the project area creates a high possibility that this species may occur there.

Polemaetus bellicosus (Martial Eagle) is listed as EN on a regional scale and on a global scale. This species has an extensive range across much of sub-Saharan Africa, but populations are declining due to deliberate and incidental poisoning, habitat loss, reduction in available prey, pollution and collisions with power lines (IUCN, 2017). It inhabits open woodland, wooded savanna, bushy grassland, thorn-bush and, in southern Africa, more open country and even sub-desert (IUCN, 2017). Suitable foraging and breeding area is found in the project area.

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 is rated as high due to the extensive grasslands and wetland areas present in the project area.

Tyto capensis (African Grass-owl) is rated as VU on a regional basis. The distribution of the species includes the eastern parts of South Africa. The species is generally solitary, but it does also occur in pairs in moist grasslands where it roosts (IUCN, 2017). This species specifically has a preference for nesting in dense stands of the grass species *Imperata cylindrica*. Wetlands with suitable habitat can be found in the project area therefore the likelihood of occurrence is rated as high.

5.1.4 Agricultural Potential

As part of the desktop assessment, soil information was obtained using published South African Land Type Data. Land type data for the site was obtained from the Institute for Soil Climate and Water (ISCW) of the Agricultural Research Council (ARC) (Land Type Survey Staff, 1972 - 2006). The land type data is presented at a scale of 1:250 000 and comprises of the division of land into land types. In addition, a Digital Elevation Model (DEM) as well as the slope percentage of the area was calculated by means of the National Aeronautics and Space Administration (NASA) Shuttle Radar Topography Mission Global 1 arc second digital elevation data by means of Quantum geographic information system (QGIS) and System for Automated Geoscientific Analyses (SAGA) software.

5.1.4.1 Climate

According to the Köppen-Geiger classification of climate zones (Köppen 1936) the project area falls within the climate classified as Bsh = Hot semi-arid climates, this climate is characterized by hot summers, mild winters, and low precipitation levels. The area is characteristically warm with erratic and extremely variable rainfall, ranging from 450 to 750 mm per year, with an average of 620 mm. The rainfall in the area is exclusively due to thunderstorms that occur during the summer months (October to March); whilst winter months are normally dry. Hail, which is often associated with thunderstorms, occurs during the sizzling summer months. Given the project area's proximity to Swartklip, the climate should be similar. Swartklip has a semi-arid climate prevailing. The highest average temperature in Swartklip is 29°C in January and the lowest is 19°C in June. The average annual temperature for Swartklip is 25°C and there is about 353 mm of rain in a year Figure 3 1. It is dry for 215 days a year with an average humidity of 52% and a UV index of five.

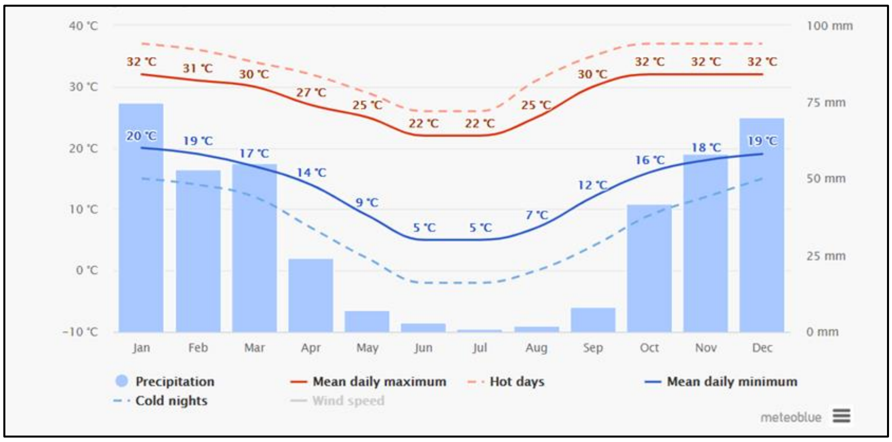

Figure 5-10 Swartklip Monthly Temperatures, Precipitation and Wind speed (Meteoblue, 2021)

5.1.4.2 Geology and Soil

The geology of this area is characterised by predominantly norite and pyroxenite of the Bushveld Complex, and red syenite of the Pilanesberg Complex in places. The area is characterised by vertic black ultramafic clays which developed from norite and gabbro, also locally in small depressions along streams, and some areas have less clay (Mucina and Rutherford, 2006).

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project infrastructure is located in the Ea 70 land type. The Ea land type consists of one or more of the following soils: Vertic, Melanic, and red structured diagnostic horizons, of which these soils are all undifferentiated. The land terrain unit for the featured land type is illustrated from Figure 5-11 with the expected soils listed in Table 5-7.

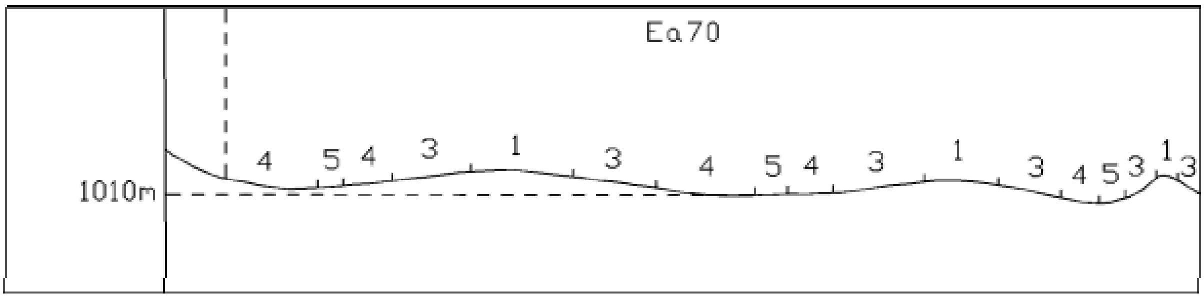

Figure 5-11 Illustration of land type Ea 70 terrain unit (Land Type Survey Staff, 1972 - 2006)

Table 5-7 Soils expected at the respective terrain units within the Da 76 land type (Land Type Survey Staff, 1972 - 2006)

Terrain Units							
1 (20%)		3 (40%)		4 (31%)		4 (9%)	
Rocks	13%	Arcadia	74%	Arcadia	76%	Arcadia	33%
Arcadia	60%	Shortlands	9%	Shortlands	6%	Valsrivier	5%
Shortlands	7%	Hutton	5%	Hutton	5%	Rensburg	34%

Hutton	8%	Glenrosa	4%	Valsrivier	11%	Oakleaf	22%
Glenrosa	7%	Milkwood	2%	Bonheim	2%	Bonheim	6%
Milkwood	5%						

5.1.4.3 Terrain

The slope percentage of the project area has been calculated and is illustrated in Figure 5-12. Most of the project area is characterised by a slope percentage between 0 and 10%, with some smaller patches within the project area characterised by a slope percentage in excess of 40%. This illustration indicates relatively uniform topography for the area. The DEM of the project area (Figure 5-13) indicates an elevation of 977 to 1 059 Metres Above Sea Level (MASL).

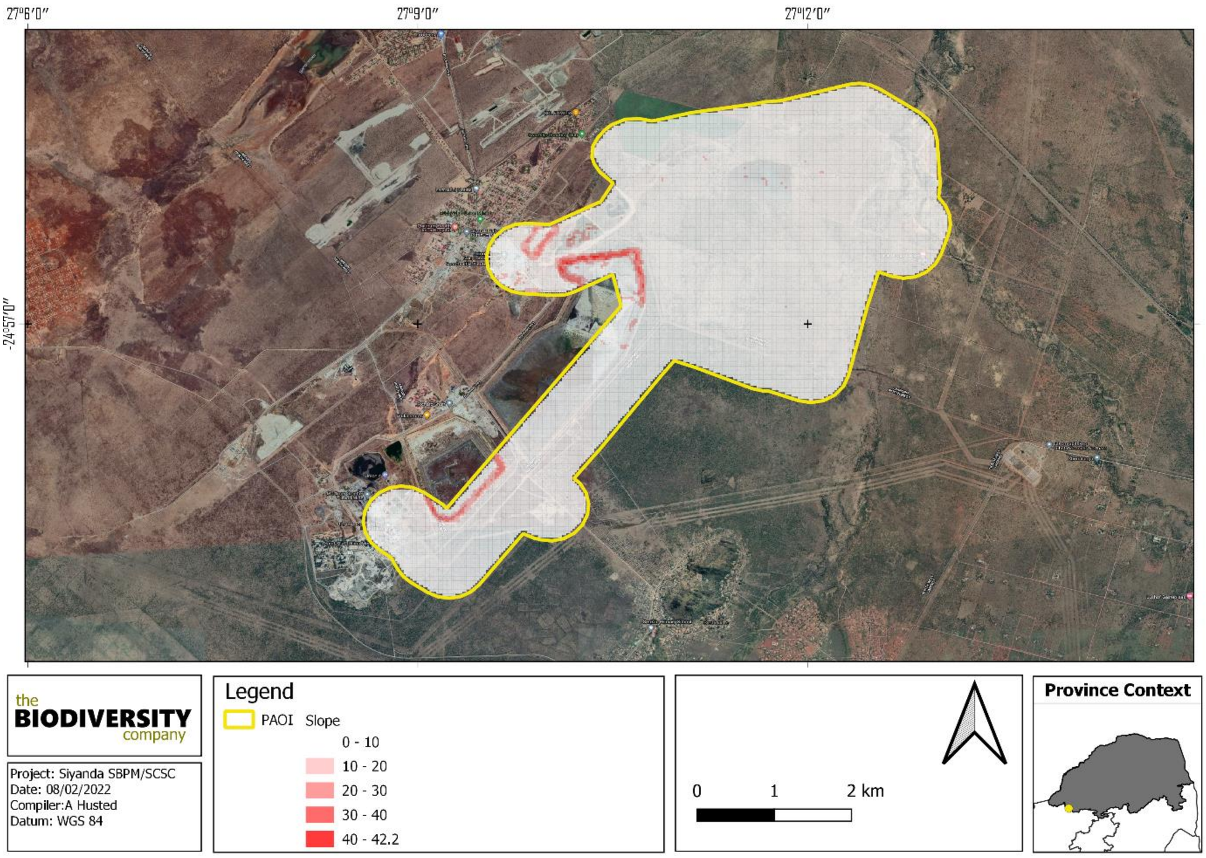

Figure 5-12 The slope percentage calculated for the project area

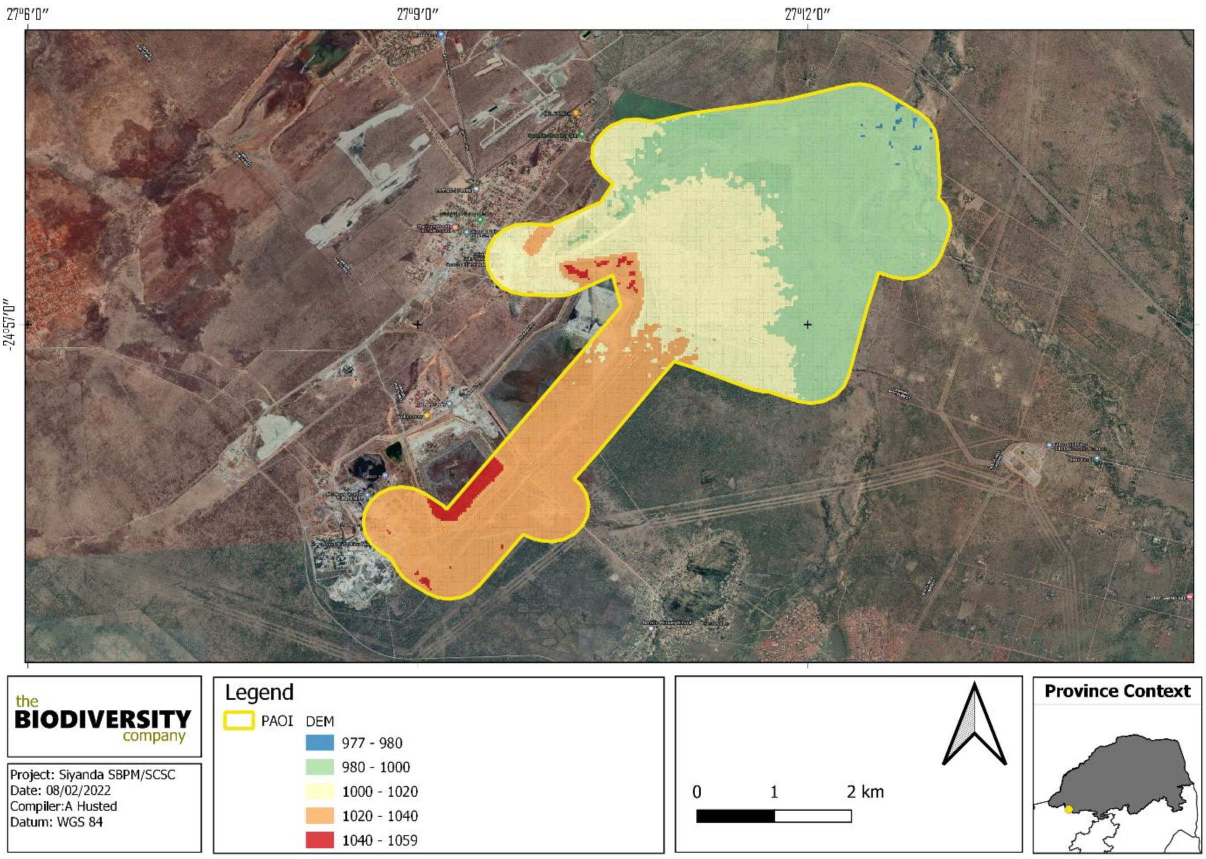

Figure 5-13 The DEM generated for the project area

6 Impact Statement

6.1.1 Terrestrial Ecology

Anthropogenic activities drive habitat destruction causing displacement of fauna and flora and possibly direct mortality. Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, nesting sites and wildlife movement corridors such as rivers, streams and drainage lines, or other locally important features. The removal of natural vegetation may reduce the habitat available for fauna species and may reduce animal populations and species compositions within the area.

The terrestrial habitat expected in the project area consists of Dwaalboom Thornveld, which based on the screening assessment contains a number of protected *Vachellia erioloba* (Camel thorn) trees. It is also believed that due to the mostly natural state of the area that additional flora SCCs will be recorded. Portions of the project area are classified as CBA2 and ESA1, these areas also border a CR wetland and overlap with CR rivers. The importance of these areas are highlighted by the number of fauna SCCs expected. A total of nine fauna SCCs were given a high likelihood of occurrence, while a further eight were given a moderate likelihood of occurrence. During the screening assessment one NT mammal SCC, the Brown Hyena were recorded. A den of this species was also found. Based on the desktop and initial screening assessment infrastructure placement, within the Secondary Bushveld habitat unit which has a low sensitivity.

Table 6-1 Scoping evaluation table summarising the impacts identified to terrestrial biodiversity

Impact Biodiversity loss/disturbance			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**

Destruction, fragmentation and degradation of habitats (vegetation) and ecosystems	Direct impacts: » Disturbance / degradation / loss to vegetation and habitats » Ecological corridors are disrupted » Habitat fragmentation Indirect impacts: » Erosion risk increases » Fire risk increases » Increase in invasive alien species	Local	Water resources and buffer area
Spread and/or establishment of alien and/or invasive species	Direct impacts: » Loss of vegetation and habitat due to increase in alien species Indirect impacts: » Creation of infrastructure suitable for breeding activities of alien and/or invasive species » Spreading of potentially dangerous diseases due to invasive and pest species	Local	None identified at this stage
Direct mortality of fauna	Direct impacts: » Loss of SCC species » Loss of fauna diversity Indirect impacts: » Loss of diversity and species composition in the area. » Possible impact on the food chain	Regional	None identified at this stage
Reduced dispersal/migration of fauna	Direct impacts: » Loss of genetic diversity » Isolation of species and groups leading to inbreeding Indirect impacts: » Reduced seed dispersal » Loss of ecosystem services	Local	None identified at this stage
Environmental pollution due to water runoff, spills from vehicles and erosion	Direct impacts: » Pollution in watercourses and the surrounding environment » Faunal mortality (direct and indirectly) Indirect impacts: » Ground water pollution » Loss of ecosystem services	Local	None identified at this stage
Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust, heat radiation and light pollution.	Direct impacts: » Disruption/alteration of ecological life cycles due to noise » Reduced pollination and growth of vegetation due to dust » Faunal mortality due to light pollution (nocturnal species becoming more visible to predators) » Heat radiation could lead to the displacement of species Indirect impacts: » Loss of ecosystem services	Local	None identified at this stage
Staff and others interacting directly with fauna (potentially dangerous) or poaching of animals	Direct impacts: » Loss of SCCs or TOPS species Indirect impacts: » Loss of ecosystem service » Loss of genetic diversity	Local	None identified at this stage

Description of expected significance of impact

The development of the area could result in the loss or degradation of the habitat and vegetation, dominated by Mixed Bushveld, with small portions of Transformed habitat as well as Secondary Bushveld. The construction of the solar facility could also lead to the displacement/mortalities of the fauna and more specifically SCC fauna species. The operation of the facility could result in the disruption of ecological life cycles. This could be as a result of a number of things, but mainly due to dust, noise, light pollution and heat radiation. The disturbance of the soil/vegetation layer will allow for the establishment of flora alien invasive species, the new infrastructure in turn will provide refuge for invasive/feral fauna species. Erosion is another possible impact that could result from the disturbance of the top soil and vegetation cover. A number of machines, vehicles and equipment will be required, aided by chemicals and concrete mixes for the project. Leaks, spillages or breakages from any of these could result in contamination of the receiving water resources. Contaminated water resources are likely to have an effect on the associated biota.

Gaps in knowledge & recommendations for further study

- This is completed at a desktop level only.
- Identification and descriptions of habitats.
- Identification of the Site Ecological Importance.
- Location and identification of SCCs as well as in the case of fauna their location of the nests/dens.
- Determine a suitable buffer width for the identified features.

Recommendations with regards to general field surveys

- Field surveys to prioritise the development areas, but also consider the 500 m PAOI.
- Fieldwork to be undertaken during the wet season period.
- Avifauna assessment field work to be conducted over two seasons to ensure migratory species are considered.

6.1.1.1 Cumulative Impacts

Cumulative impacts are assessed in context of the extent of the proposed project area; other developments in the area; and general habitat loss and transformation resulting from other activities in the area.

The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a point in time may represent a significant change from the original state of the system. This section describes the potential impacts of the project that are cumulative for fauna and flora.

Localised cumulative impacts include the cumulative effects from operations that are close enough to potentially cause additive effects on the environment or sensitive receivers (such as nearby solar farm activities within the area). These include dust deposition, noise and vibration, disruption of corridors or habitat, groundwater drawdown, groundwater and surface water quality, and transport.

Long-term cumulative impacts due to extensive solar development footprint, powerlines and substations can lead to the loss of endemic species and threatened species, loss of habitat and vegetation types and even degradation of well conserved areas (Table 6-2).

Table 6-2 Cumulative impact of the solar plant and battery system

The development of the proposed infrastructure will contribute to cumulative habitat loss within CBAs/ ESAs and thereby impact the ecological processes in the region.

	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Moderate (3)	High (4)
Duration	Moderate term (3)	Long term (4)
Magnitude	Low (4)	High (8)
Probability	Probable (3)	Highly probable (4)
Significance	**Medium**	**High**
Status (positive or negative)	Negative	Negative
Reversibility	High	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation:		

• This impact cannot be mitigated as the loss of vegetation is unavoidable.

Residual Impacts:
Will result in the loss of: » CBA2 & ESA1 » Endemic species; » SCC fauna and flora species; » Portions of a NPAES; and » Niche habitats.

6.1.2 Wetland Ecology

A key consideration for the impact assessment is the presence of the Sefathlane system to the east of the project area. This system is classified as CR, and a wetland system is also located on the border of the area. The available data also suggests the presence of drainage features in the area, with an expected low sensitivity for these systems.

The following potential main impacts on the wetlands were considered for the construction phase of the proposed project. Construction could result in the encroachment into water resources and result in the loss or degradation of these system, most of which are functional and provide ecological services. Water resources are also likely to be traversed by roads and other linear infrastructure which might create a barrier to flow and biotic movement across the systems. These disturbances could also result in the infestation and establishment of alien vegetation would affect the functioning of the systems. During construction earthworks will expose and mobilise earth materials which could result in sedimentation of the receiving systems. A number of machines, vehicles and equipment will be required for the phase, aided by chemicals and concrete mixes for the project. Leaks, spillages or breakages from any of these could result in contamination of the receiving water resources. Contaminated water resources are likely to have an effect on the associated biota. The following potential impacts during site clearing and preparation were considered:

- Wetland disturbance / loss.
  - Direct disturbance / degradation / loss to wetland soils or vegetation due to the construction of the facility and associated infrastructure; and
- Water runoff from construction site;
  - Increased erosion and sedimentation; and
  - Contamination of receiving water resources.

During the operational phase an increase in stormwater runoff is anticipated due to the hardened surfaces, resulting in an increase in run-off volume and velocities due to the altered flow regimes. The changes could result in physical changes to the receiving systems caused by erosion, run-off and also sedimentation, and the functional changes could result in changes to the vegetative structure of the systems. The reporting of surface run-off to the systems could also result in the contamination of the systems, transporting (in addition to sediment) diesel, hydrocarbons and soil from the operational areas. The following potential impacts were considered:

- Hardened surfaces;
  - Potential for increased stormwater runoff, leading to increased erosion and sedimentation; and
- Contamination;
  - Potential for increased contaminants entering the wetland systems.

Table 6-3 Scoping evaluation table summarising the impacts identified to wetlands

Impact Wetland disturbance / loss			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**

Disturbance / degradation / loss to wetland soils or vegetation due to the construction of the facility and associated infrastructure, such as crossings	Direct impacts: » Disturbance / degradation / loss to wetland soils or vegetation Indirect impacts: » Loss of ecosystem services	Local	Water resources and buffer area
Increased erosion and sedimentation & contamination of resources	Direct impacts: » Erosion and structural changes to the systems Indirect impacts: » Sedimentation & contamination of downstream reaches	Local	None identified at this stage

Description of expected significance of impact

The development of the area could result in the encroachment into water resources and result in the loss or degradation of these system, most of which are functional and provide ecological services. Water resources are also likely to be traversed by roads and other linear infrastructure which might create a barrier to flow and biotic movement across the systems. These disturbances could also result in the infestation and establishment of alien vegetation would affect the functioning of the systems. Earthworks will expose and mobilise earth materials which could result in sedimentation of the receiving systems. A number of machines, vehicles and equipment will be required, aided by chemicals and concrete mixes for the project. Leaks, spillages or breakages from any of these could result in contamination of the receiving water resources. Contaminated water resources are likely to have an effect on the associated biota. It is anticipated to increase stormwater runoff due to the hardened surfaces and the crossings will result in an increase in run-off volume and velocities, resulted in altered flow regimes. The changes could result in physical changes to the receiving systems caused by erosion, run-off and also sedimentation, and the functional changes could result in changes to the vegetative structure of the systems. The reporting of surface run-off to the systems could also result in the contamination of the systems, transporting (in addition to sediment) diesel, hydrocarbons and soil from the operational areas.

Gaps in knowledge & recommendations for further study

- This is completed at a desktop level only.
- Identification, delineation and characterisation of water resources.
- Undertake a functional assessment of systems where applicable.
- Determine a suitable buffer width for the resources.

Recommendations with regards to general field surveys

- Field surveys to prioritise the development areas, but also consider the 500 m regulation area.
- Beneficial to undertake fieldwork during the wet season period.

6.1.2.1 Cumulative Impacts

The expected post-mitigation risk significance is expected to be low, and the overall cumulative impact is therefore expected to be low. The expected post-mitigation risk significance for the project in isolation is expected to be low, and in consideration of the local anthropogenic activities the overall cumulative impact is expected to be low (Table 6-4). This is expected due to the potential to avoid any direct impacts to these systems.

Table 6-4 Cumulative impact of the solar plant and battery system

Impact Nature: Contamination		
Potential for increased contaminants entering the watercourse		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and the proposed projects in the area**
Extent	Low (2)	Low (2)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Improbable (2)	Improbable (2)
Significance	**Low**	**Low**

Impact Nature: Contamination		
Potential for increased contaminants entering the watercourse		
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Residual Impacts:		
Watercourse deterioration over time caused by altered hydro-dynamics, and alien vegetation infestation. Loss / deterioration of ecosystem services.		

6.1.3 Agricultural Potential

Construction could result in the encroachment into areas characterised by high land potential properties (such as Hutton soil forms), which can ultimately result in the loss of land capability. These disturbances could also result in the infestation and establishment of alien vegetation, which in turn can have a detrimental impact on soil resources. During construction earthworks will expose and mobilise earth materials which could result in compaction and/or erosion.

A number of machines, vehicles and equipment will be required for the phase, aided by chemicals and concrete mixes for the project. Leaks, spillages or breakages from any of these could result in contamination of soil resources, which could affect the salinity or pH of the soil, which can render the fertility of the soil unable to provide nutrition to plants. The following potential impacts during site clearing and preparation were considered:

- Loss of land capability
    - Erosion which results in the loss of topsoil and valuable macro nutrients;
    - Compaction, which will ultimately reduce infiltration, aeration, micro-biological activities etc.; and
    - Soil stripping and stockpiling, which, if not treated and ameliorated, could degrade significantly over time.

During the operational phase, the impacts associated with the substation and collector sub will be easily managed by best "housekeeping" practices. This phase will be permanent, which emphasises the need to conserve resources in the direct surroundings of the associated footprint areas.

Table 6-5 Scoping evaluation table summarising the impacts identified to soils

Impact Loss of land capability			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Compaction/soil stripping/transformation of land use which leads to loss of land capability	<u>Direct impacts:</u> » Loss of soil / land capability <u>Indirect impacts:</u> » Loss of land capability	Local	None identified at this stage
Erosion and loss of soil resources	<u>Direct impacts:</u> » Erosion and loss of soil resources <u>Indirect impacts:</u> » Changes to topography and cultivated areas	Local	None identified at this stage
Description of expected significance of impact The development of the area could result in the encroachment into areas characterised by high land potential properties, which can ultimately result in the loss of land capability. These disturbances could also result in the infestation and establishment of alien vegetation, which in turn can have a detrimental impact on soil resources. Earthworks will expose and mobilise earth materials which could result in			

compaction and/or erosion. A number of machines, vehicles and equipment will be required, aided by chemicals and concrete mixes for the project. Leaks, spillages or breakages from any of these could result in contamination of soil resources, which could affect the salinity or pH of the soil, which can render the fertility of the soil unable to provide nutrition to plants. During the operational phase, the impacts associated with the substation and collector sub will be easily managed by best "housekeeping" practices.
Gaps in knowledge & recommendations for further study » This is completed at a desktop level only. » Identification and delineation of soil forms. » Determine of soil sensitivity. **Recommendations with regards to general field surveys** » Field surveys to prioritise the development areas.

6.1.3.1 Cumulative Impacts

Cumulative impacts are assessed in context of the extent of the proposed project area; other developments in the area; and general loss of high-quality land capability areas. The expected post-mitigation risk significance is expected to be low, and the overall cumulative impact is therefore expected to be medium (Table 6-6). This is attributed to the extent of land use changes to the local area.

Table 6-6 Cumulative impact of the solar plant and battery system

Impact Nature: Loss of land capability		
General degradation of soil resources		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Low (2)	Moderate (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	**Low**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Residual Impacts:		
Unlikely considering the adherence to recommendations and mitigations		

7 Conclusion

7.1 Terrestrial Ecology

Based on the desktop assessment it can be said that the project area is sensitive, with the Secondary Bushveld habitat unit classified as a low sensitivity. There is a moderate-high likelihood of species of conservation concern occurring. This assumption is based on the CBA2, ESA1, NPAES (protected area), Northern Turfveld IBA and CR rivers found in and around the project area.

Development in an ESA area is not as restricted as within the CBA but should be minimised and mitigation measures should be put in place that will ensure sustainable development and the highly sensitive areas within this class (ESA1) should be avoided. It is possible that the proposed projects can be mitigated to an acceptable level of residual impact.

7.2 Wetlands

A key consideration for the impact assessment is the presence of the Sefathlane system to the east of the project area. This system is classified as CR, and a wetland system is also located on the border of the area. The available data also suggests the presence of drainage features in the area, with an expected low sensitivity for these systems.

Construction could result in the encroachment into water resources and result in the loss or degradation of these system, most of which are functional and provide ecological services. These disturbances could also result in the infestation and establishment of alien vegetation would affect the functioning of the systems. Leaks and/or spillages could result in contamination of the receiving water resources. Contaminated water resources are likely to have an effect on the associated biota. An increase in stormwater runoff could result in physical changes to the receiving systems caused by erosion, run-off and also sedimentation, and the functional changes could result in changes to the vegetative structure of the systems

7.3 Agricultural Potential

Various soil forms are expected throughout the project area, of which some are commonly associated with high land capabilities. Even though the soil depth, texture and permeability of these soils ensure high land capability, the climatic capability of the area often reduces the land potential considerably. Areas characterised by “High” land potential are expected for selected areas.

The proposed development can result in the loss of land capability. The disturbances could further also result in the infestation and establishment of alien vegetation, which in turn can have a detrimental impact on soil resources. The development of the area could also result in compaction and/or erosion. Further to this, these activities could also cause leaks and/or spillages resulting in contamination of soil resources, which could affect the salinity or pH of the soil, which can render the fertility of the soil unable to provide nutrition to plants.

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9 Appendix Items

9.1 Appendix A – Specialist Declaration of Independence

I, Lindi Steyn, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the 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.

Lindi Steyn

Biodiversity Specialist

The Biodiversity Company

February 2022