Scoping Assessment for the proposed Middelvlei Solar Photovoltaic (PV) Project

Randfontein, Gauteng Province

January 2023

CLIENT

Prepared by:

The Biodiversity Company

Cell: +27 81 319 1225

Fax: +27 86 527 1965

info@thebiodiversitycompany.com

www.thebiodiversitycompany.com

Table of Contents

List of Tables

List of Figures

1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake a scoping assessment for the proposed Middelvlei Solar Photovoltaic (PV) Energy Facility near Randfontein, Gauteng Province (Figure 1-1 and Figure 1-2). The scoping assessment comprises terrestrial and freshwater ecosystems and agricultural potential.

The Applicant, a special purpose vehicle (SPV) of Sigma Solar Africa Pty Ltd, is proposing the construction of a PV solar energy facility (known as Middelvlei Solar) located on a site approximately 7 km south-west of the town of Randfontein in the Gauteng Province. The Solar PV facility will be developed on Portion 132 (a portion of portion 6) of the Farm Middelvlei 255 IQ and will comprise several arrays of single axis tracking Solar PV panels and associated infrastructure and will have a contracted capacity of up to 120 MW. The project area is situated within the Rand West City Local Municipality within the West Rand District Municipality. The site is accessible via existing gravel roads which provide access to the project area.

The project infrastructure will include:

- Solar PV Plant comprising approximately 220 000 PV panels on single axis tracking PV modules;
- Inverters and transformers (up to 120 MW);
- Cabling between the panels;
- Onsite facility substation, including a Twin-Tern Conductor ~379 MVA. Substation capacity - 2× 80 MVA, 132/33 kV substation ~ 50 × 70 m^2 - including Eskom metering site;
- Cabling from the onsite substation to the collector substation (either underground or overhead);
- Electrical and auxiliary equipment required at the collector substation that serves the solar energy facility, including switchyard/bay, control building, fences, etc.;
- Battery Energy Storage System (BESS);
- Site and internal access roads (up to 8 m wide);
- Temporary and permanent laydown area; and
- Operations Building of ~180 sqm.

The property, Portion 132 of the Farm Middelvlei 255 IQ, has an extent of 204.44 ha, of which 200 ha will be developed for the proposed project. The site is a vacant stand with sufficient space to construct the 120 MW PV facility and associated infrastructure. 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 project site 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.

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*".

The National Web based Environmental Screening Tool has characterised the terrestrial sensitivity of the project area as “Low”.

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 Literature Review

Two ecological reports have been reviewed and conserved to provide supplementary information for this project. The two reports include:

- Enviroxcellence Services. 2018. Ecological Baseline Survey - Proposed Montrose Extension 1 Township Development on Remaining Extent of Portion 6 of Farm Middelvlei 225 IQ, Rand City West Local Municipality, Gauteng Province; and

- Enviro-Niche Consulting. 2018. Draft Wetland delineation study, Proposed expansion of the residential area on the remaining extent of portion 6 of farm Middelvlei 255 IQ (Montrose Phase II), Randfontein area Gauteng Province.

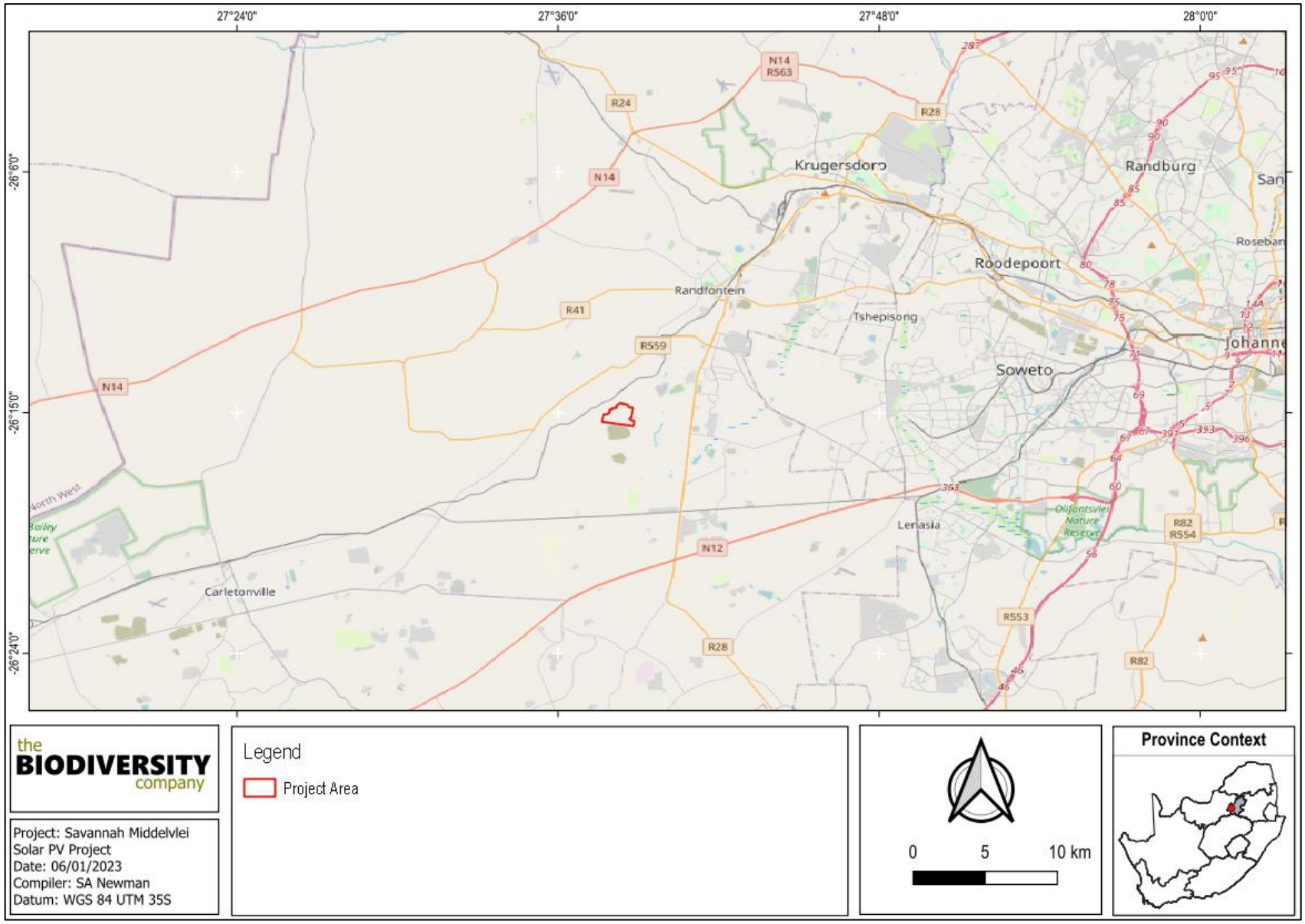


Figure 1-1 Map illustrating the regional context of the project area

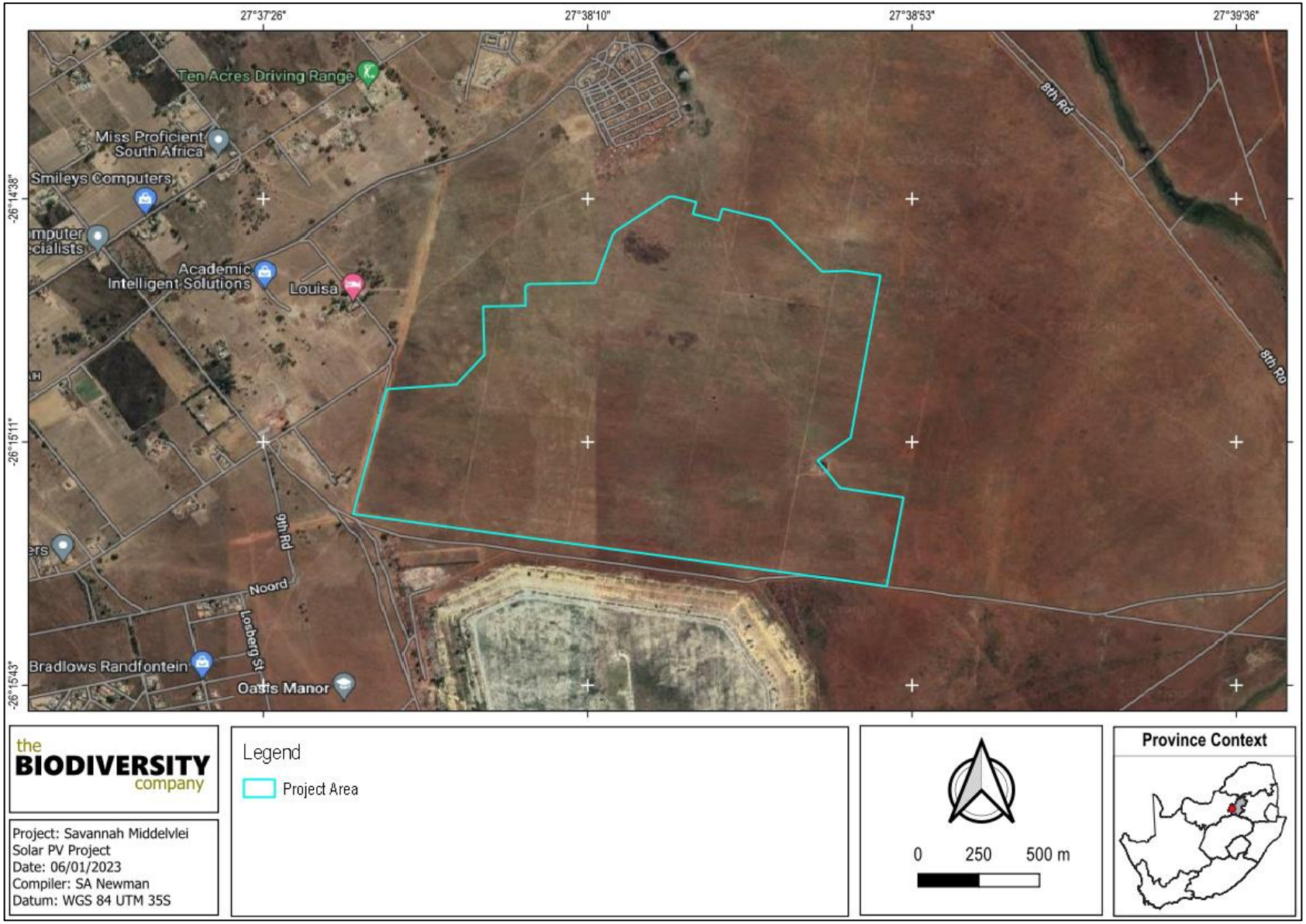


Figure 1-2 Map illustrating the project area

1.3 Specialist Details

Report Name	**Scoping Assessment for the proposed Middelvlei Solar Photovoltaic (PV) Project**
Reference	Middelvlei Solar PV Project
Submitted to / Client	savannah environmental
Report Writer	Sarah Newman 
	Sarah completed a Master of Science degree in Entomology at the University of Pretoria in 2018. She has varying experience working in the fields of conservation, ecology, and biodiversity research.
Reviewer	Carami Burger 
	Carami Burger has completed her Bachelor of Science Honours degree in Ecological Interactions and Ecosystem Resilience. Carami is an ecologist and has completed various studies as part of Basic Assessments and Environmental Impact Assessments.
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 13 years' experience in the environmental consulting field.
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.

1.4 Scope of Work

The principle aim of the scoping assessment was to identify any constraints for the development of the 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;
- Desktop assessment to identify the relevant ecologically important hydrological features within the project area;
- Desktop assessment to identify the relevant land capability, land types and soil types within the project area;
- Completion of a high level impact assessment; and
- The prescription of mitigation measures and recommendations for identified risks.

2 Key Legislative Requirements

The legislation, policies and guidelines listed below in Table 2-1 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 2-1 A list of key legislative requirements relevant to biodiversity and conservation in the Gauteng Province

Region	Legislation / Guideline
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)
	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)
	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

	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)
Provincial	GDARD Requirements for Biodiversity Assessments (Version 3, 2014a)
	Gauteng Department of Agriculture and Rural Development (GDARD): Checklist for Biodiversity Assessments
	GDARD Mining and Environmental Impact Guide

3 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.

3.1 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, 2022) – 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 Plan:

  The Gauteng Conservation Plan (Version 3.3) (GDARD, 2014b) classified areas within the province on the basis of its contribution to reach the conservation targets within the province. These areas are classified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas

(ESAs) to ensure sustainability in the long term. The CBAs are classified as either 'Irreplaceable' (must be conserved), or 'Important'.

CBAs are areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and healthy functioning of important species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then provincial biodiversity targets cannot be met (SANBI, 2017).

ESAs are areas that are not essential for meeting biodiversity representation targets but play an important role in supporting the ecological functioning of ecosystems as well as adjacent Critical Biodiversity Areas, and/or in delivering ecosystem services that support socio-economic development (SANBI, 2017).

- Gauteng Ridges:

  The quartzite ridges of Gauteng are one of the most important natural assets in this northern province of South Africa. This is because these ridges, and the areas immediately surrounding them, provide unique habitat for a wide variety of fauna and flora, some of which are Red-Listed, rare or endemic species, or in the case of certain plant species, are found nowhere else in South Africa or around the world.

  In order to give practical effect to this policy, the Gauteng Department of Agriculture and Rural Development (GDARD) has classified all ridges in Gauteng into one of four classes, based on the existing extent and percentage of area converted by urban development or disturbed by other human activities. According to GDARD (2019), the ridges within Gauteng may be classified as follows:

  - Class 1 Ridges: 5% or less of the ridge area has been transformed by human activity (Approx. 58% of ridges fall within this category);
  - Class 2 Ridges: Between 6 and 34% of the ridge area has been transformed by human activity (Approx. 23% of ridges fall within this category);
  - Class 3 Ridges: Between 35 and 64% of the ridge area has been transformed by human activity (Approx. 8% of ridges fall within this category); and
  - Class 4 Ridges: Over 65% of the ridge area has been transformed by human activity (Approx. 11% of ridges fall within this category).

  The 2019 Ridges Guideline has defined general guidelines that must be followed with regards to the amount of development that should be permitted on different ridges according to their class. GDARD (2019) stipulates that no development is to be permitted on any class 1 ridge, and varying levels of development may be permissible with regards to the higher ridge classes – depending on the impact level of the proposed activity and the corresponding spatial scale.

- Important Bird and Biodiversity Areas (IBAs) (BirdLife South Africa, 2017) – 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.

- Hydrological setting:

  - South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer et al., 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Assessment of 2018. It is a collection of

data layers that represent the extent of the river and inland wetland ecosystem types as well as pressures on these systems;

- Strategic Water Source Areas (SWSAs) (Le Maitre et al, 2018) – SWSAs are defined as areas of land that supply a quantity of mean annual surface water runoff in relation to their size and therefore, contribute considerably to the overall water supply of the country. These are key ecological infrastructure assets and the effective protection of surface water SWSAs is vital for national security because a lack of water security will compromise national security and human wellbeing; and

- National Freshwater Ecosystem Priority Area (NFEPA) (Nel et al, 2011) – The NFEPA database provides strategic spatial priorities for conserving the country's freshwater ecosystems and associated biodiversity as well as supporting sustainable use of water resources.

- The land capability sensitivity (DAFF, 2017) expected for the area, also presenting the extent of crop field boundaries.

3.2 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 3-1). The Red List of South African Plants (Raimondo *et al.,* 2009; SANBI, 2020) was utilised to provide the most current national conservation status of flora species.

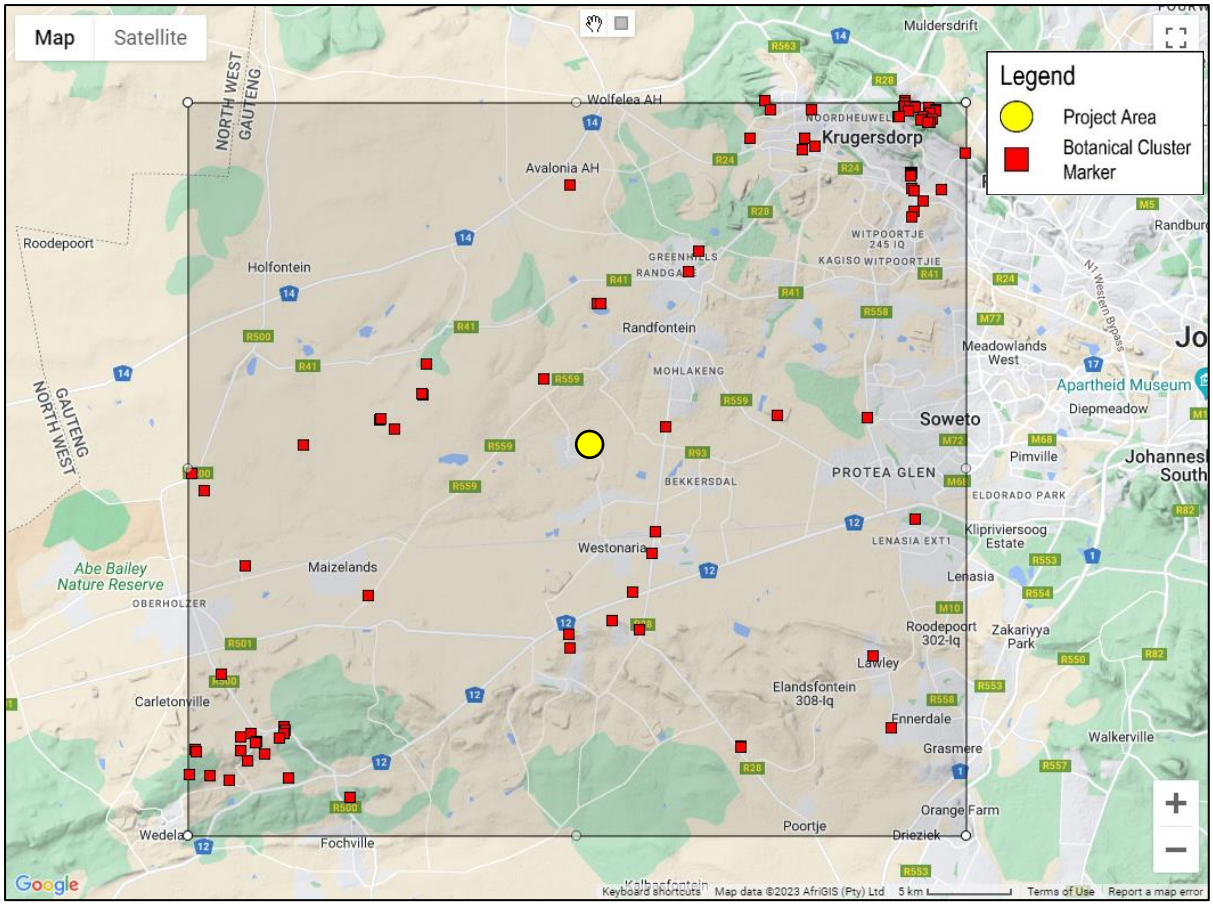


Figure 3-1 ***Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database. Yellow dot indicates approximate location of the project area. The red squares are cluster markers of botanical records as per POSA data.***

The latest information regarding provincially, and nationally protected flora was obtained from the following published legislative sources:

- Provincially Protected Plant Species (Schedules 11 and 12 of the Transvaal Nature Conservation Ordinance 12 of 1983); and
- List of Nationally Protected Tree Species (DEFF, 2022).

3.3 Desktop Faunal Assessment

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

- Amphibian list, generated from the IUCN spatial dataset (2017) and FrogMap database (Fitzpatrick Institute of African Ornithology, 2021a), using the 2627 quarter degree square;
- Reptile list, generated from the IUCN spatial dataset (2017) and ReptileMap database (Fitzpatrick Institute of African Ornithology, 2021b), using the 2627 quarter degree square;
- Avifauna list, generated from the SABAP2 dataset by looking at pentads 2610_2730, 2610_2735, 2610_2740, 2615_2730, 2615_2735, 2615_27440, 2620_2730, 2620_2735 and 2620_2740; and
- Mammal list from the IUCN spatial dataset (2017) and MammalMap database (Fitzpatrick Institute of African Ornithology, 2021b), using the 2627 quarter degree square.

The latest information regarding provincially, and nationally protected fauna was obtained from the following published legislative lists:

- Provincially Protected Wildlife Species (Schedules 2, 3, 4, and 5 of the Transvaal Nature Conservation Ordinance 12 of 1983); and
- Nationally Protected Wildlife species (The 2007 lists of Threatened or Protected Species (TOPS), published in terms of Section 56(1) of the National Environmental Management: Biodiversity Act, No. 10 of 2004).

3.4 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 scoping assessment has been completed at a desktop level only. All datasets and species lists have been considered for the local area and surrounds; and
- The species likelihood of occurrence is based on desktop information and might be changed after the assessment.

4 Results & Discussion

4.1 Ecologically Important Landscape Features

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features is summarised in Table 4-1.

Table 4-1 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.	4.1.1
Ecosystem Protection Level	Relevant – Overlaps with a 'Poorly Protected' Ecosystem.	4.1.2
Provincial Conservation Plan	Irrelevant – The project area does not overlap with any relevant areas	4.1.3
Protected Areas	Irrelevant – The nearest protected area is the 'Magaliesberg Biosphere Reserve' situated just under 19 km north of the project area	4.1.4
National Protected Areas Expansion Strategy	Relevant – The project area does not overlap with any NPAES areas but occurs within the 5 km buffer zone	4.1.5
Important Bird and Biodiversity Areas	Irrelevant – The nearest IBA is the 'Magaliesberg' IBA situated just under 19 km north of the project area	4.1.6
South African Inventory of Inland Aquatic Ecosystems	Irrelevant – The project area does not overlap with any SAIIAE	4.1.7
National Freshwater Priority Area	Irrelevant – The project area does not overlap with any NFEPA's	4.1.8
Strategic Water Source Areas	Irrelevant – The project area does not overlap with any SWSAs	-
REDZ	Irrelevant – Does not overlap with any Renewable Energy Development Zones	-
Powerline Corridor	Relevant – Overlaps with the Central Corridor	4.1.9
Gauteng Ridges	Irrelevant – The project area does not overlap with any Gauteng ridges but falls adjacent to a class 4 ridge	4.1.10
Strategic Water Source Area	The project does not overlay a national SWSA (dataset March 2021)	-

4.1.1 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 an LC ecosystem (Figure 4-1).

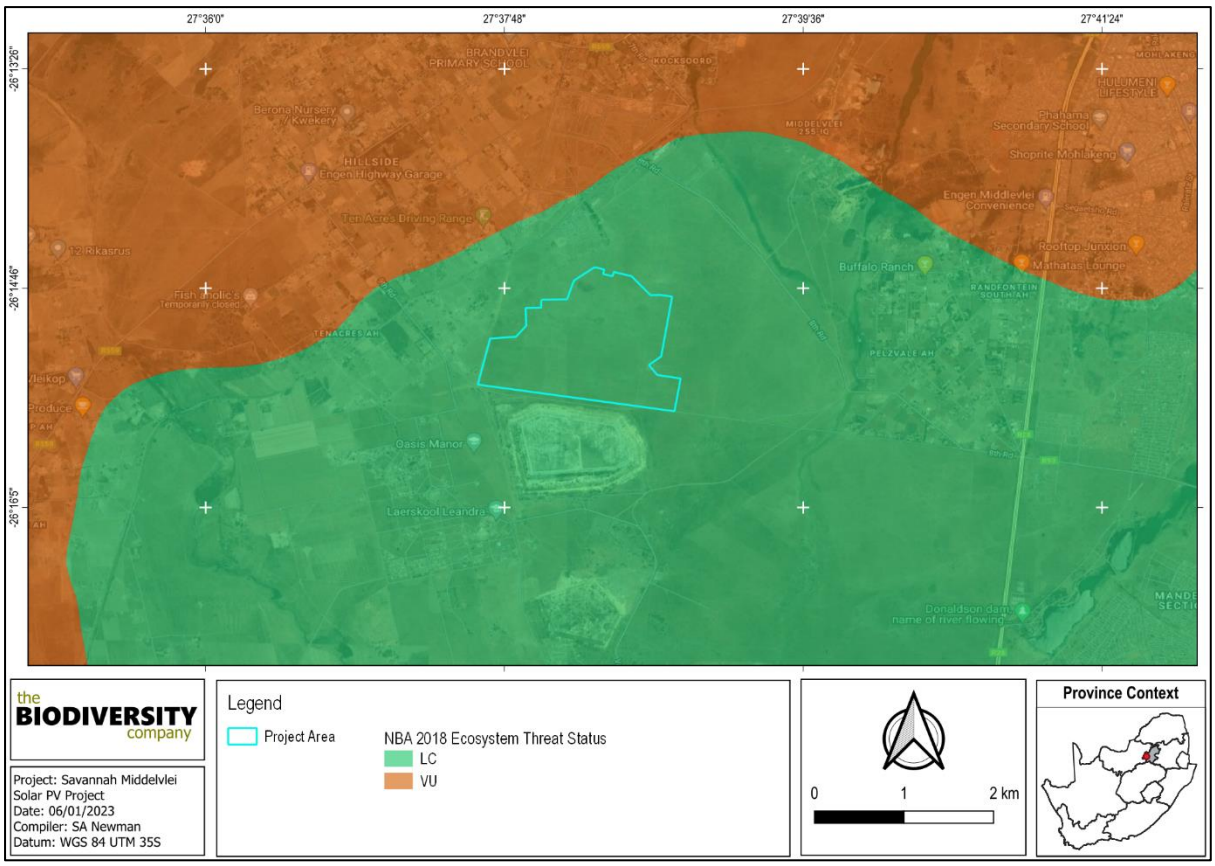


Figure 4-1 Map illustrating the ecosystem threat status associated with the project area

4.1.2 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 PP ecosystem (Figure 4-2).

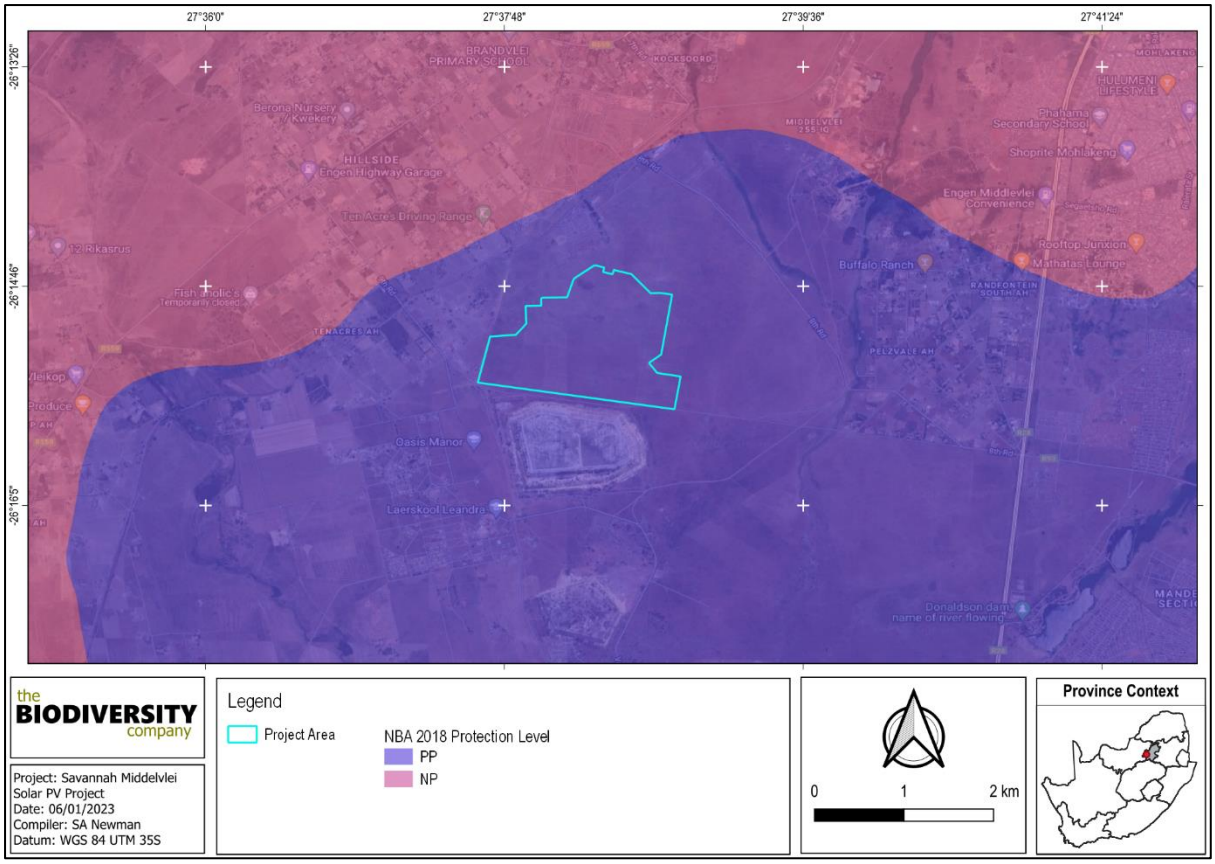


Figure 4-2 Map illustrating the ecosystem protection level associated with the project area

4.1.3 Critical Biodiversity Areas and Ecological Support Areas

The Gauteng Conservation Plan (Version 3.3) (GDARD, 2014b) classified areas within the province on the basis of its contribution to reach the conservation targets within the province. These areas are classified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) to ensure sustainability in the long term. The CBAs are classified as either 'Irreplaceable' (must be conserved), or 'Important'.

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.

Figure 4-3 shows the project area superimposed on the Gauteng Conservation Plan. The project area does not overlap with any relevant areas but falls adjacent to an 'Important Area'.

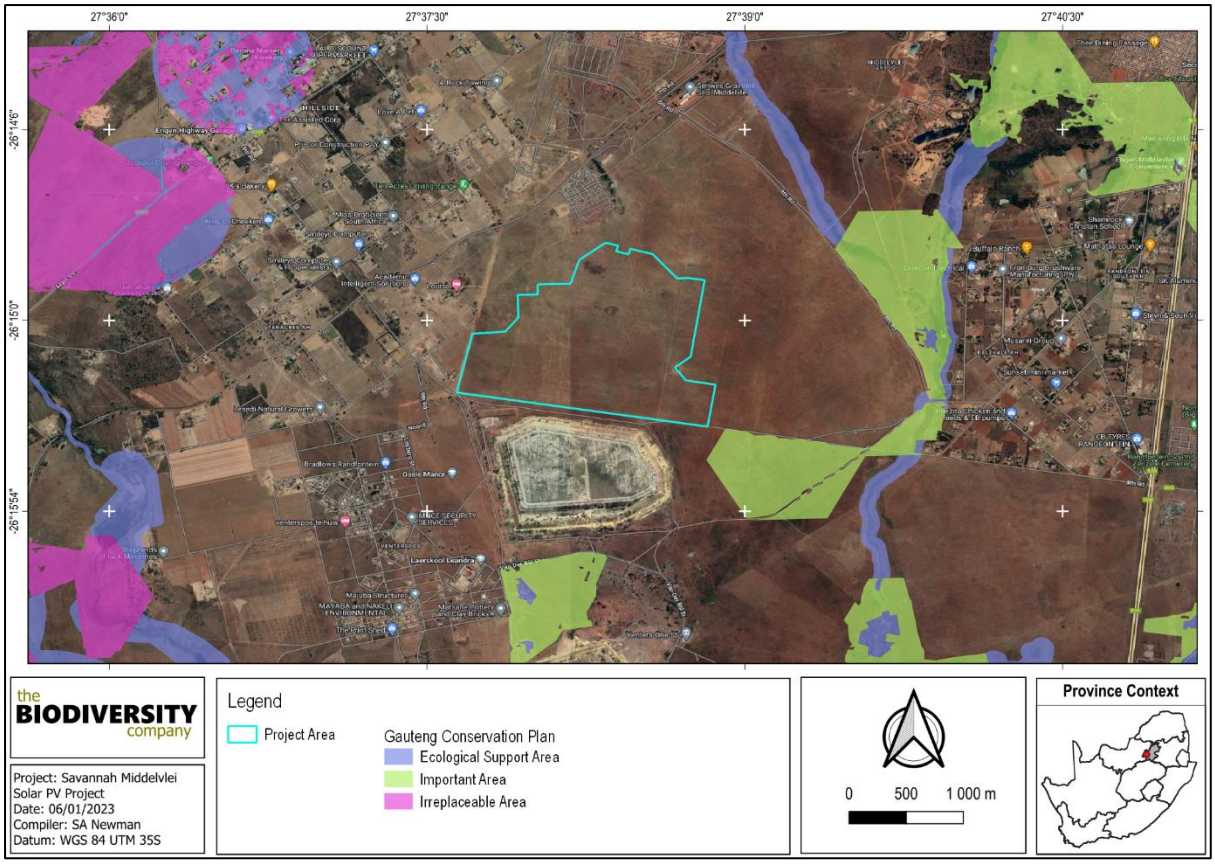


Figure 4-3 Map illustrating the project area in relation to the Gauteng Conservation Plan

4.1.4 Protected Areas

According to the protected area spatial datasets from SAPAD (2022) and SACAD (2022), the project area is situated 18.95 km south of the Magaliesberg Biosphere Reserve and 24.9 km north-west of the Olifantsvlei Nature Reserve (Figure 4-4).

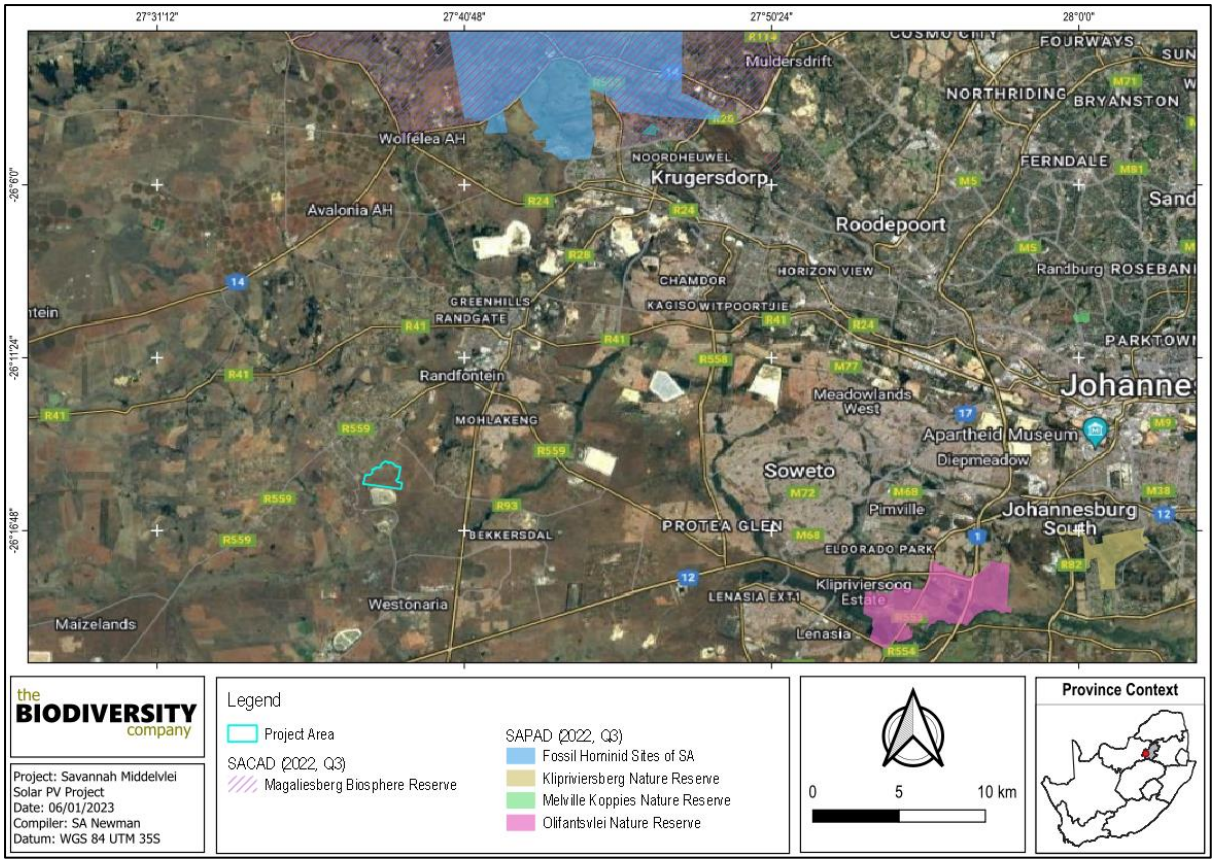


Figure 4-4 The project area in relation to the protected areas

4.1.5 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 fine scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2016). The project area does not overlap with any NPAES areas but occurs within the 5 km buffer zone of a NPAES Priority Focus Areas (Figure 4-5).

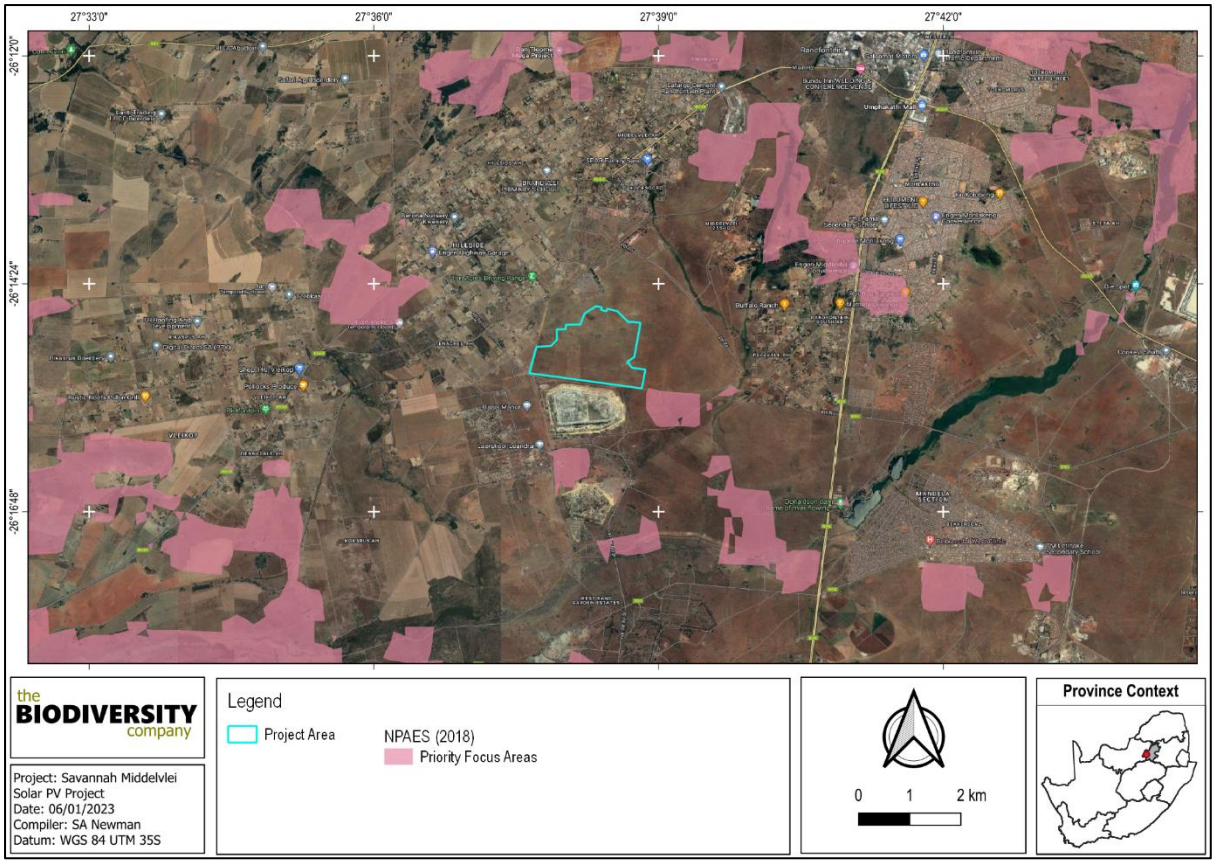


Figure 4-5 The project area in relation to the National Protected Area Expansion Strategy

4.1.6 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 South Africa, 2017).

According to Birdlife South Africa (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 4-6 shows that the project area does not occur near any IBAs. The nearest IBA, the Magaliesberg IBA, is situated 18.95 km away.

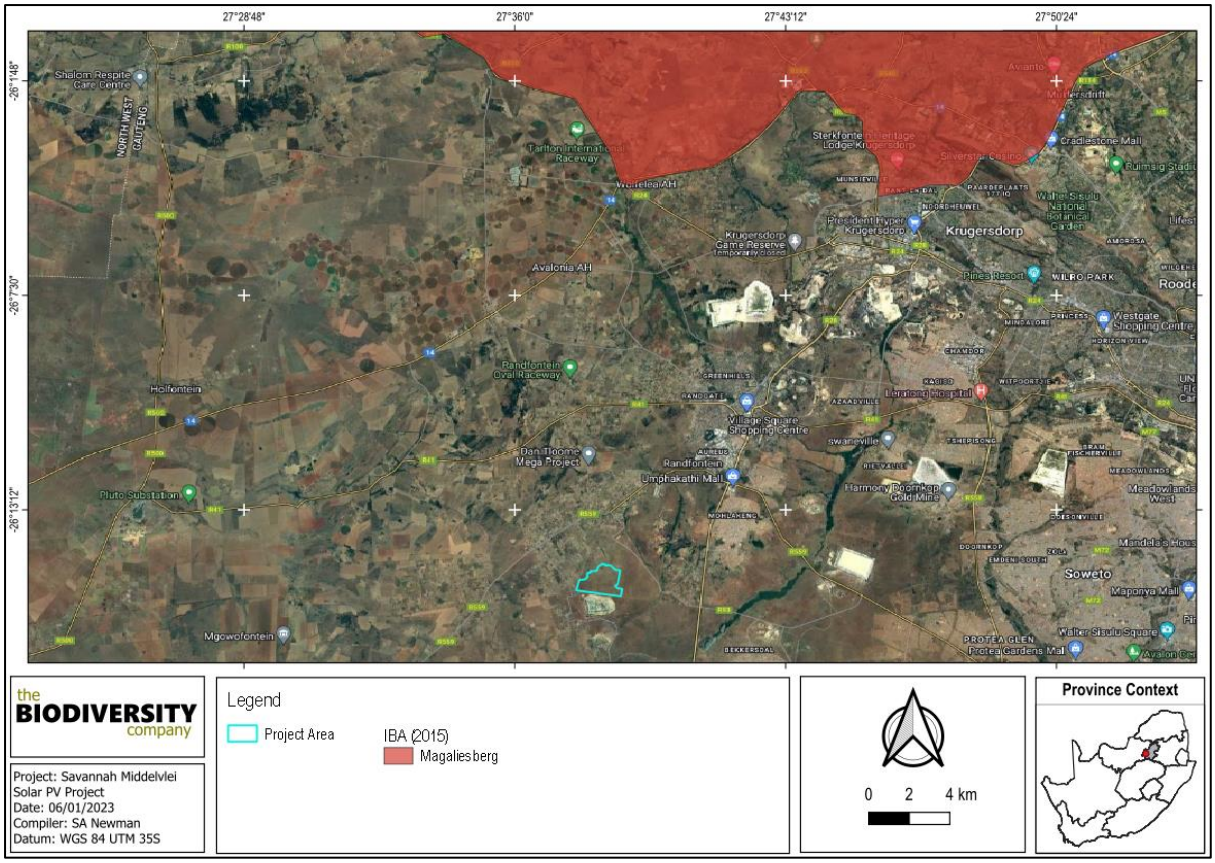


Figure 4-6 The project area in relation to the nearest IBAs

4.1.7 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 and its 500m Regulated Area does not overlap with any SAIIAE (Figure 4-7).

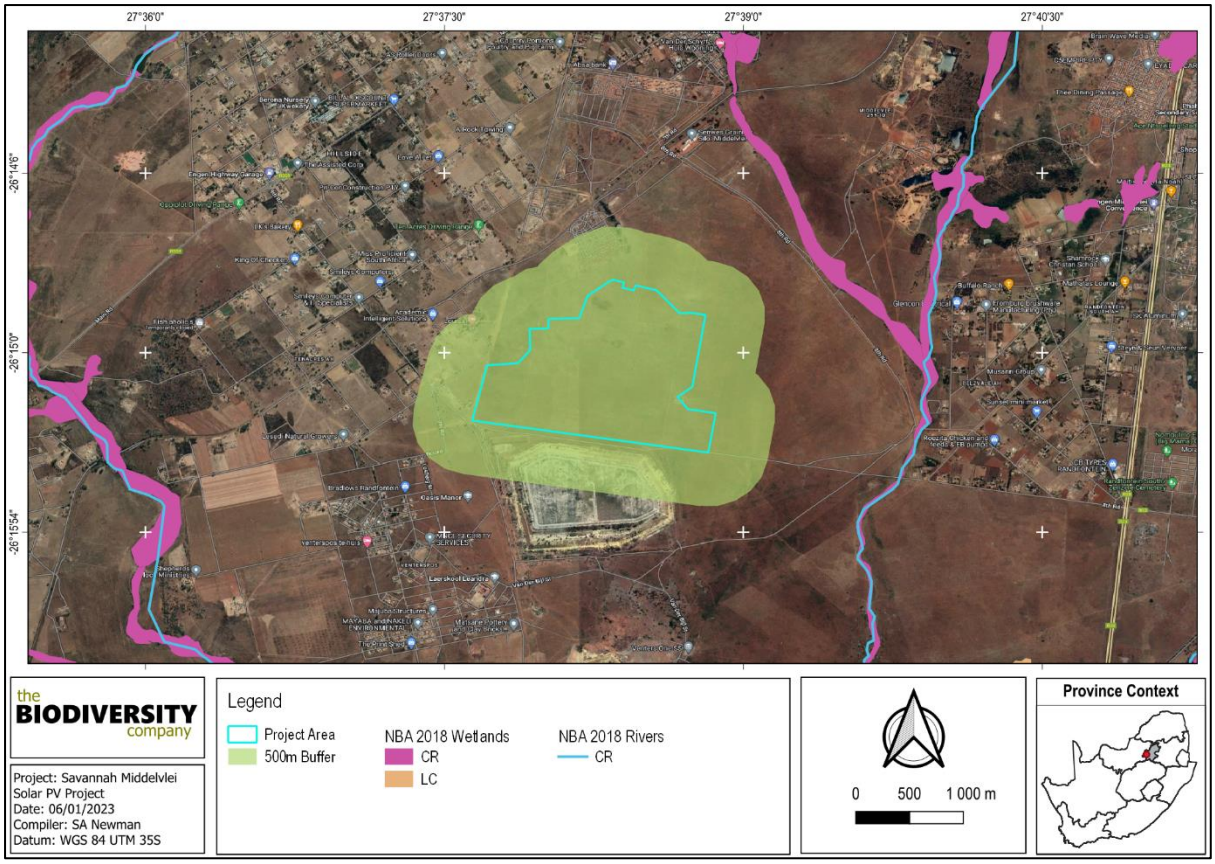


Figure 4-7 Map illustrating the project area in relation to the South African Inventory of Inland Aquatic Ecosystems

4.1.8 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 4-8 shows that the project area and its 500m Regulated Area does not overlap with any NFEPAs.

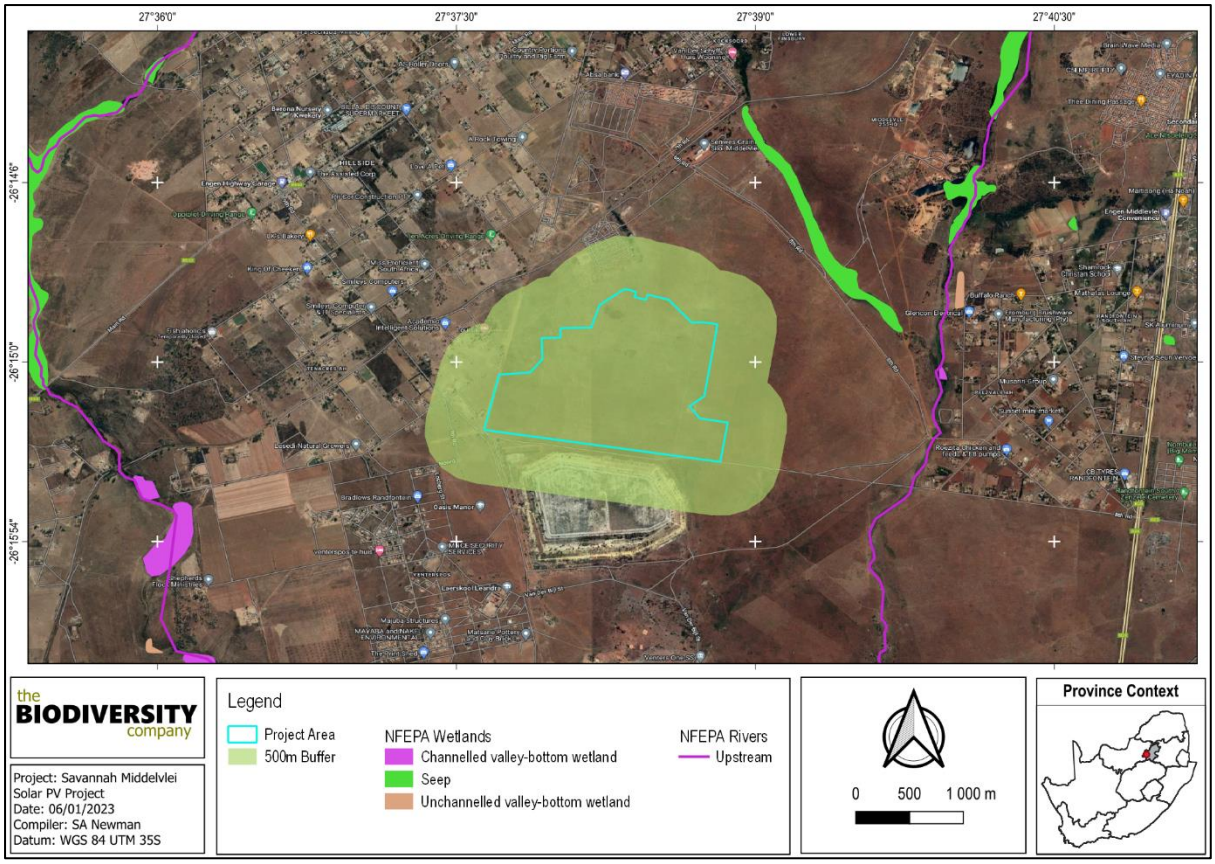


Figure 4-8 The project area in relation to the National Freshwater Ecosystem Priority Areas

4.1.9 Strategic Transmission Corridors (EGI)

On the 16 February 2018 Minister Edna Molewa published Government Notice No. 113 in Government Gazette No. 41445 which identified 5 strategic transmission corridors important for the planning of electricity transmission and distribution infrastructure as well as procedure to be followed when applying for environmental authorisation for electricity transmission and distribution expansion when occurring in these corridors.

On 29 April 2021, Minister Barbara Dallas Creecy published Government Notice No. 383 in Government Gazette No. 44504, which expanded the eastern and western transmission corridors and gave notice of the applicability of the application procedures identified in Government Notice No. 113, to these expanded corridors. More information on this can be obtained from https://egis.environment.gov.za/egi. Figure 4-9 indicates that the project area falls within the Central EGI corridor.

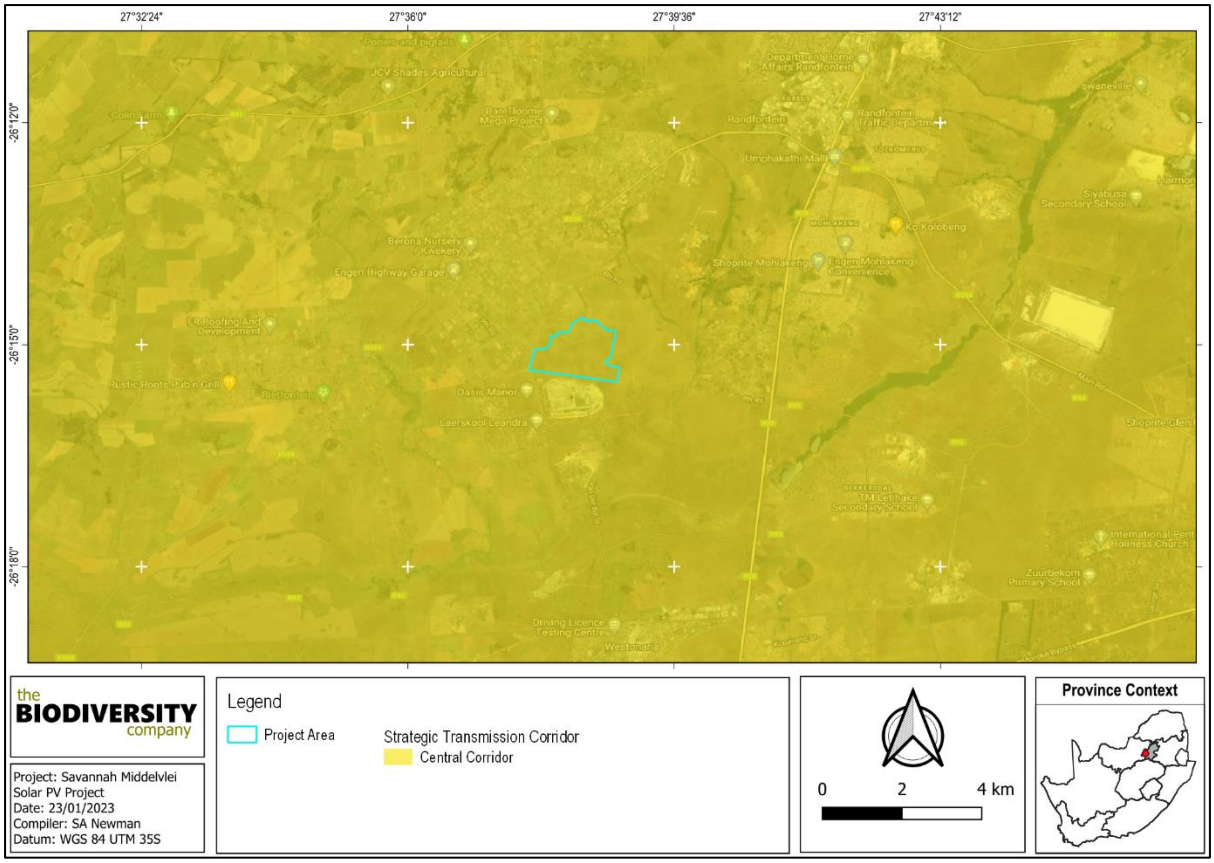


Figure 4-9 Map illustrating the project in relation to the Strategic Transmission Corridors

4.1.10 Gauteng Ridges

The quartzite ridges of Gauteng are one of the most important natural assets in this northern province of South Africa. This is because these ridges, and the areas immediately surrounding them, provide unique habitat for a wide variety of fauna and flora, some of which are Red-Listed, rare or endemic species, or in the case of certain plant species, are found nowhere else in South Africa or around the world.

Figure 4-10 indicates that the project area falls adjacent to a class 4 Gauteng Ridge.

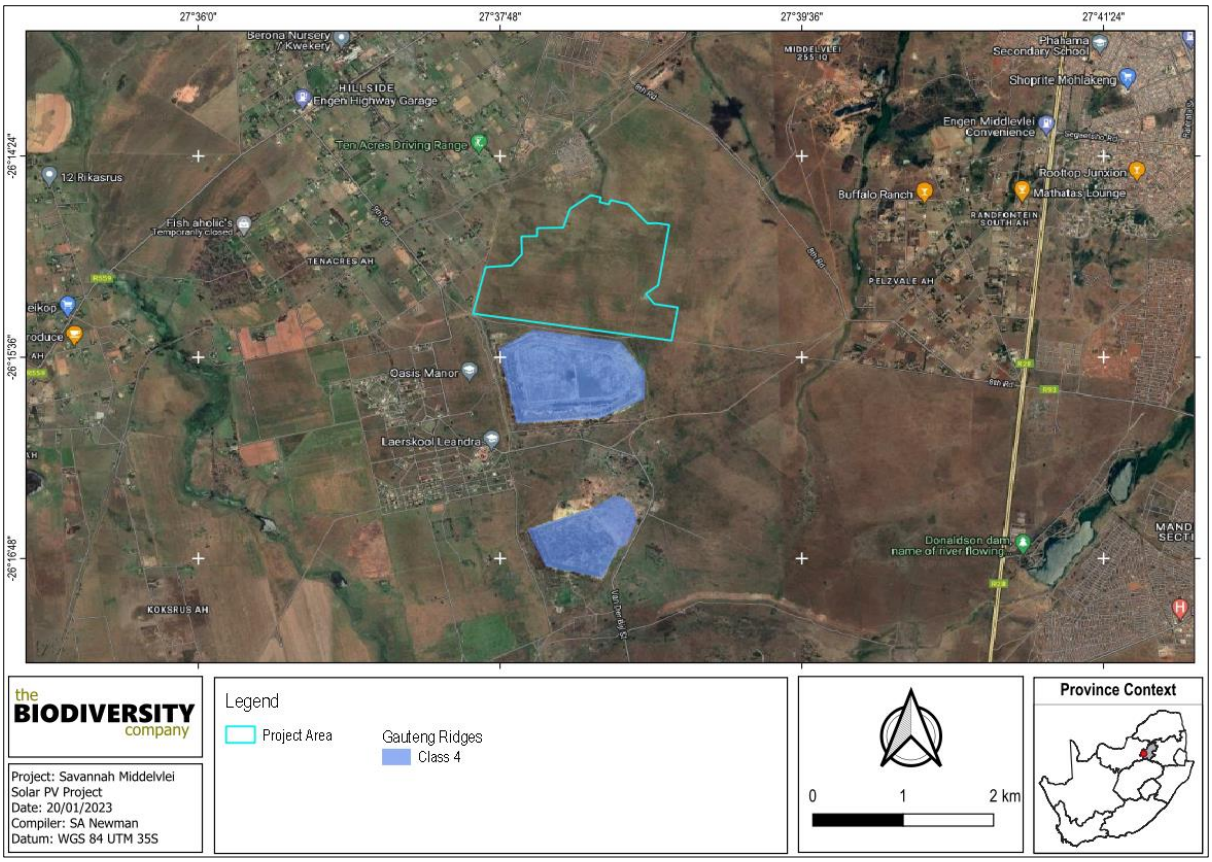


Figure 4-10 Map illustrating the project area in relation to the Gauteng Ridges dataset

4.1.11 Land Capability

Fifteen land capabilities have been digitised by (DAFF, 2017) across South Africa, of which ten potential land capability classes are located within the proposed project areas, including;

- Land Capability 1 to 5 (Very low, Very low/Low to Low Sensitivity);
- Land Capability 6 to 8 (Low/Moderate to Moderate Sensitivity); and
- Land Capability 9 to 10 (Moderate to High).

The sensitivities as per the Department of Agriculture, Forestry and Fisheries (DAFF, 2017) national raster file indicated that the land capabilities range from low-moderate to moderate-high across the project area (Figure 4-11).

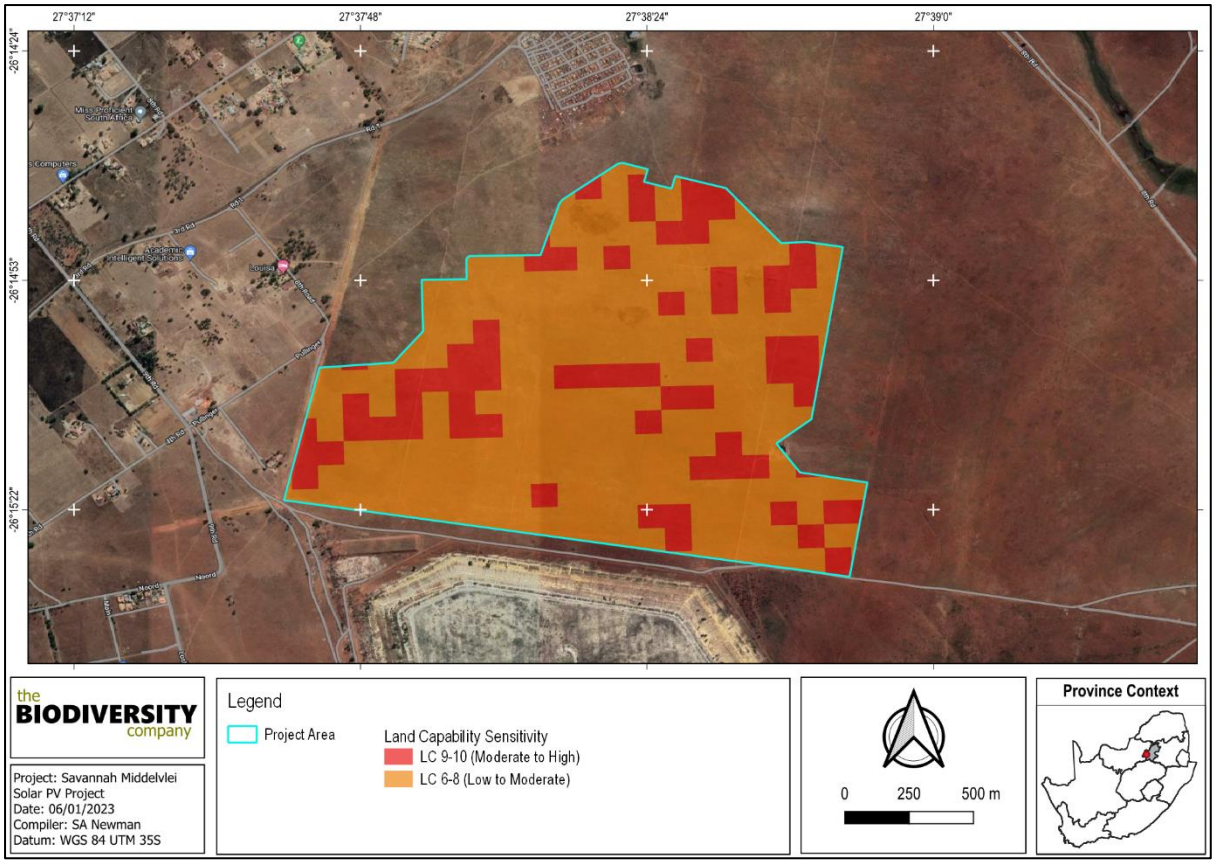


Figure 4-11 Land Capability Sensitivity (DAFF, 2017)

4.1.12 Climate

The Gh 15 Carletonville Dolomite Grassland vegetation type is characterised by a Mean Annual Precipitation (MAP) of 593 mm (Figure 4-12). This vegetation type experiences summer rainfall. Temperatures are high in summer and severe frosts frequently occur during the winter months (Mucina & Rutherford, 2006).

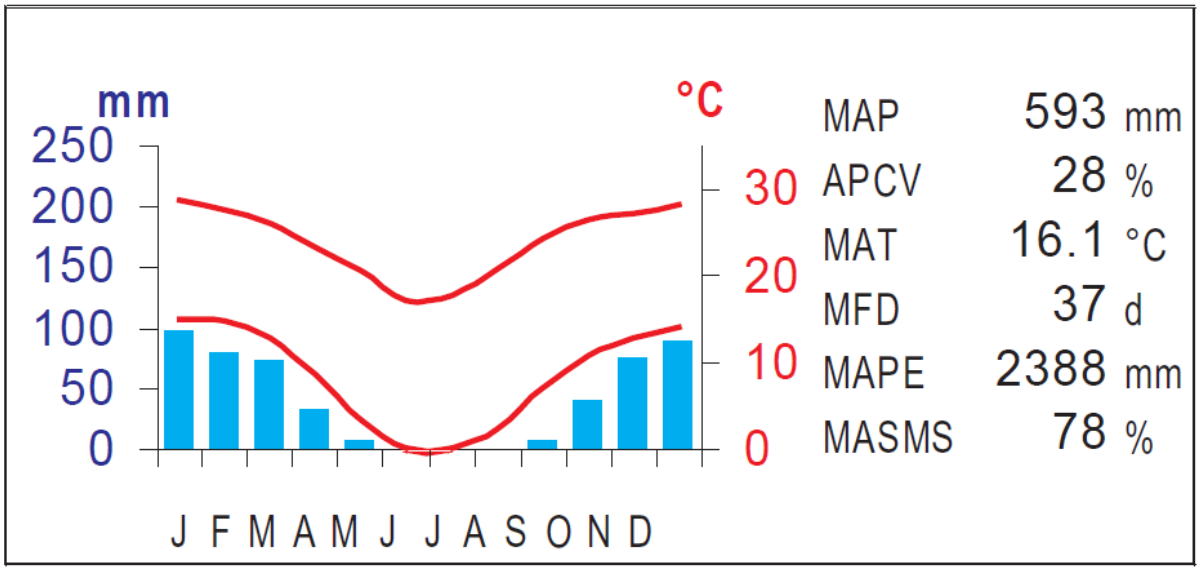


Figure 4-12 Climate for the Gh 15 Carletonville Dolomite Grassland (Mucina & Rutherford, 2006)

4.1.13 Geology and Soil

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. According to the land type database (Land Type Survey Staff, 1972 – 2006) the development falls within the Ab 7 land type (Figure 4-13).

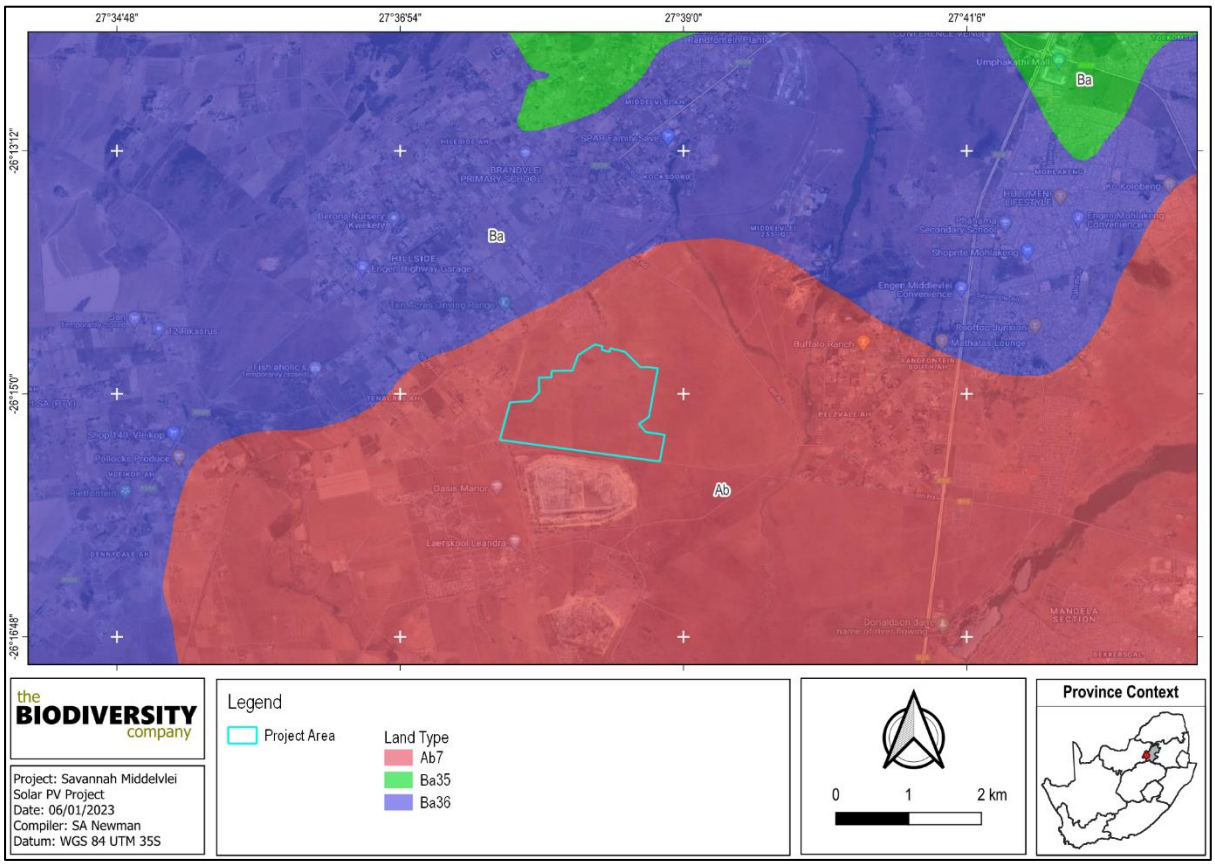


Figure 4-13 Land Types associated with the project area

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Ab 7 land type. The Ab land type is characterised by Mispah and Glenrosa soil forms with the possibility of other soils and bare rocks also occurring. Red-yellow well drained soils with a low to medium base status occur in the area. The land terrain units for the featured Ab 7 land type are illustrated in Figure 4-14 with the expected soils listed in Table 4-2.

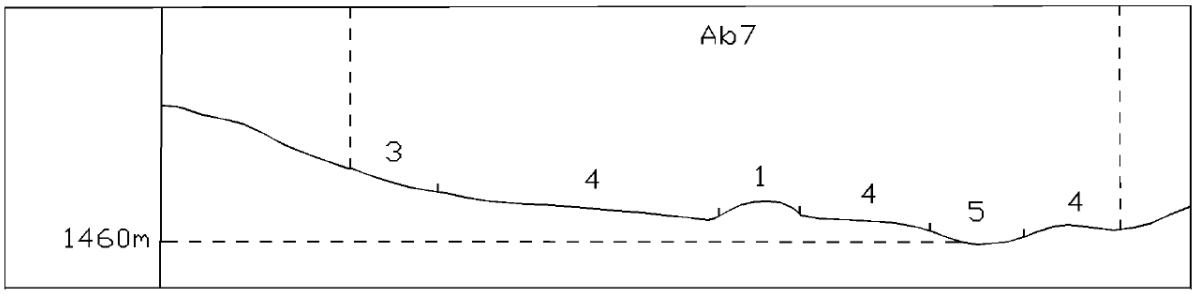


Figure 4-14 Illustration of the land type terrain units (Land Type Survey Staff, 1972 – 2006)

Table 4-2 Soils expected at the terrain units within the land type (Land Type Survey Staff, 1972 - 2006)

Ab 7 Terrain units							
1 (2%)		**3 (10%)**		**4 (82%)**		**5 (6%)**	
Rock	15%	Rock	2%	Rock	1%	Rock	1%
Mispah, Glenrosa	70%	Mispah, Glenrosa	30%	Mispah, Glenrosa	1%	Mispah, Glenrosa	16%
Hutton	15%	Hutton	68%	Hutton	97%	Hutton	50%
				Glencoe, Avalon, Clovelly	1%	Rensburg, Katspruit, Oakleaf, Longlands,	33%

4.1.14 Flora Assessment

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

4.1.14.1 Vegetation Type

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

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

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

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

On a fine-scale vegetation type, the project area overlaps with the Carletonville Dolomite Grassland vegetation type (Figure 4-15).

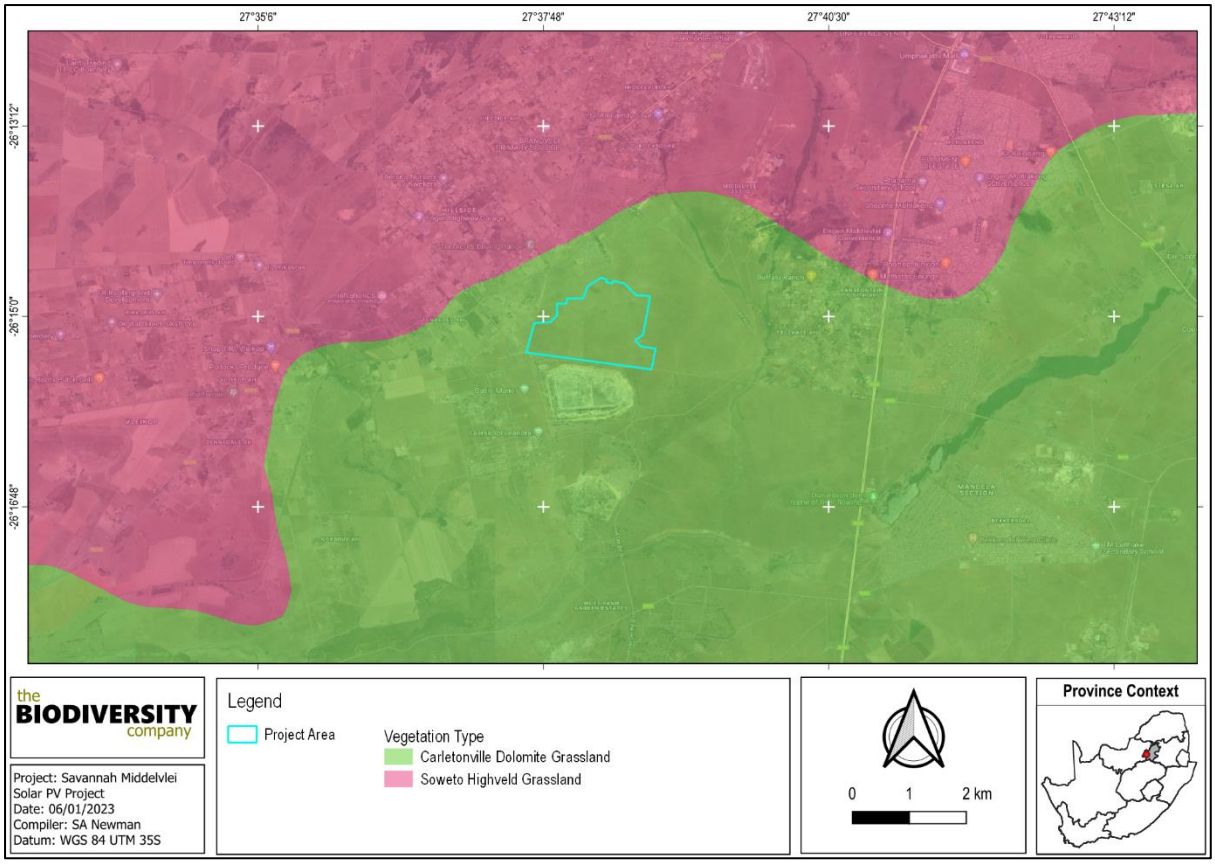


Figure 4-15 Map illustrating the vegetation types associated with the project area

4.1.14.1.1 Carletonville Dolomite Grassland

This vegetation type occurs on slightly undulating plains dissected by prominent rocky chert ridges. Species-rich grasslands forming a complex mosaic pattern dominated by many species (Mucina & Rutherford, 2006). This vegetation type occurs in the North-West, Gauteng and marginally into the Free State Province: In the region of Potchefstroom, Ventersdorp and Carletonville, extending westwards to the vicinity of Ottoshoop, but also occurring as far east as Centurion and Bapsfontein in Gauteng Province.

Important Plant Taxa

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

The following species are important in the Carletonville Dolomite Grassland vegetation type:

Graminoids: *Aristida congesta , Brachiaria serrata, Cynodon dactylon, Digitaria tricholaenoides , Diheteropogon amplectens, Eragrostis chloromelas, E. racemosa, Heteropogon contortus, Loudetia simplex, Schizachyrium sanguineum, Setaria sphacelata, Themeda triandra, Alloteropsis semialata subsp. eckloniana, Andropogon schirensis, Aristida canescens, A. diffusa, Bewsia biflora, Bulbostylis burchellii, Cymbopogon caesius, C. pospischilii, Elionurus muticus, Eragrostis curvula, E. gummiflua, E. plana, Eustachys paspaloides, Hyparrhenia hirta, Melinis nerviglumis, M. repens subsp. repens, Monocymbium ceresiiforme, Panicum coloratum, Pogonarthria squarrosa, Trichoneura grandiglumis, Triraphis andropogonoides, Tristachya leucothrix, T. rehmannii.*

Herbs: *Acalypha angustata, Barleria macrostegia, Chamaecrista mimosoides, Chamaesyce inaequilatera, Crabbea angustifolia, Dianthus mooiensis, Dicoma anomala, Helichrysum caespititium, H. miconiifolium, H. nudifolium var. nudifolium, Ipomoea ommaneyi, Justicia anagalloides, Kohautia*

amatymbica, Kyphocarpa angustifolia, Ophrestia oblongifolia, Pollichia campestris, Senecio coronatus, Vernonia oligocephala.

Geophytic Herbs: *Boophone disticha, Habenaria mossii.*

Low Shrubs*: Anthospermum rigidum subsp. pumilum, Indigofera comosa, Pygmaeothamnus zeyheri var. rogersii, Searsia magalismontana, Tylosema esculentum, Ziziphus zeyheriana.*

Geoxylic Suffrutices: *Elephantorrhiza elephantina, Parinari capensis subsp. capensis*.

Conservation Status

According to Mucina and Rutherford (2006), this vegetation type is classified as Vulnerable (VU). The national target for conservation protection for both these vegetation types is 24%, but only a small extent is conserved in statutory (Sterkfontein Caves — part of the Cradle of Humankind World Heritage Site, Oog Van Malmanie, Abe Bailey, Boskop Dam, Schoonspruit, Krugersdorp, Olifantsvlei, Groenkloof) and in at least six private conservation areas. Almost a quarter already transformed for cultivation, by urban sprawl or by mining activity as well as the building of the Boskop and Klerkskraal Dams.

4.1.14.2 Expected Flora Species

The POSA database indicates that 355 species of indigenous plants are expected to occur within the project area (the full list of species will be provided in the final report). Six (6) SCCs based on their conservation status could be expected to occur within the project area and are provided in Table 4-3 below. Thirty (30) provincially (GDARD) and nationally (National Forest Act (Act No. 84 of 1998)) protected species could be expected to occur and are listed in Table 4-4.

Table 4-3 Threatened flora species that may occur within the project area

Family	Taxon	Author	IUCN	Ecology
Aizoaceae	*Khadia beswickii*	(L.Bolus) N.E.Br.	VU	Indigenous; Endemic
Crassulaceae	*Adromischus umbraticola*	C.A.Sm.	NT	Indigenous; Endemic
Fabaceae	*Lessertia phillipsiana*	Burtt Davy	DDD	Indigenous; Endemic
Fabaceae	*Pearsonia bracteata*	(Benth.) Polhill	NT	Indigenous; Endemic
Orchidaceae	*Holothrix randii*	Rendle	NT	Indigenous
Orchidaceae	*Brachycorythis conica*	(Summerh.) Summerh.	CR	Indigenous; Endemic

Table 4-4 Protected flora species that may occur within the project area

Family	Taxon	Author	IUCN	Status
Amaryllidaceae	*Crinum graminicola*	I.Verd.	LC	Gauteng Provincially Protected Genus
Apocynaceae	*Ceropegia circinata*	(E.Mey.) Bruyns		Gauteng Provincially Protected Genus
Apocynaceae	*Huernia transvaalensis*	Stent	LC	Gauteng Provincially Protected Genus
Apocynaceae	*Ceropegia oiantha*	(Schltr.) Bruyns		Gauteng Provincially Protected Genus
Araliaceae	*Cussonia paniculata*	Eckl. & Zeyh.	LC	Gauteng Provincially Protected Genus
Asphodelaceae	*Aloe verecunda*	Pole-Evans	LC	Gauteng Provincially Protected Genus
Asphodelaceae	*Aloe bergeriana*	(Dinter) Boatwr. & J.C.Manning	DDT	Gauteng Provincially Protected Genus
Asphodelaceae	*Kniphofia porphyrantha*	Baker	LC	Gauteng Provincially Protected Genus
Dioscoreaceae	*Dioscorea dregeana*	(Kunth) T.Durand & Schinz	LC	Gauteng Provincially Protected Genus
Ericaceae	*Erica alopecurus*	Harv.	LC	Gauteng Provincially Protected Species
Hyacinthaceae	*Eucomis pallidiflora*	Baker	LC	Gauteng Provincially Protected Genus
Iridaceae	*Babiana bainesii*	Baker	LC	Gauteng Provincially Protected Genus

Iridaceae	*Gladiolus papilio*	Hook.f.	LC	Gauteng Provincially Protected Genus
Iridaceae	*Gladiolus crassifolius*	Baker	LC	Gauteng Provincially Protected Genus
Nymphaeaceae	*Nymphaea nouchali*	Burm.f.	LC	Gauteng Provincially Protected Genus
Orchidaceae	*Eulophia ovalis*	Lindl.	LC	Gauteng Provincially Protected Family
Orchidaceae	*Orthochilus leontoglossus*	(Rchb.f.) Bytebier	LC	Gauteng Provincially Protected Family
Orchidaceae	*Disperis anthoceros*	Rchb.f.	LC	Gauteng Provincially Protected Family
Orchidaceae	*Habenaria schimperiana*	Hochst. ex A.Rich.	LC	Gauteng Provincially Protected Family
Orchidaceae	*Habenaria nyikana*	Rchb.f.	LC	Gauteng Provincially Protected Family
Orchidaceae	*Disperis micrantha*	Lindl.	LC	Gauteng Provincially Protected Family
Orchidaceae	*Eulophia hians*	Spreng.	LC	Gauteng Provincially Protected Family
Orchidaceae	*Holothrix randii*	Rendle	NT	Gauteng Provincially Protected Family
Orchidaceae	*Satyrium hallackii*	Bolus	LC	Gauteng Provincially Protected Family
Orchidaceae	*Brachycorythis conica*	(Summerh.) Summerh.	CR	Gauteng Provincially Protected Family
Orchidaceae	*Habenaria galpinii*	Bolus	LC	Gauteng Provincially Protected Family
Pittosporaceae	*Pittosporum viridiflorum*	Sims	LC	Nationally Protected Tree
Proteaceae	*Protea caffra*	Meisn.	LC	Gauteng Provincially Protected Genus
Proteaceae	*Protea roupelliae*	Meisn.	LC	Gauteng Provincially Protected Genus
Proteaceae	*Protea welwitschii*	Engl.	LC	Gauteng Provincially Protected Genus

4.1.15 Faunal Assessment

4.1.15.1 Amphibians

Based on the IUCN Red List Spatial Data and FrogMap, 22 amphibian species are expected to occur within the project area (the full list will be provided in the final assessment). One (1) amphibian SCC is expected to occur within the project area (Table 4-5).

Table 4-5 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 Bull Frog	NT	LC	Moderate

The Giant Bull Frog (*Pyxicephalus adspersus*) is a species of conservation concern that will possibly occur in the project area. The Giant Bull Frog is listed as near threatened on a regional scale. It is a species of drier savannahs. It is fossorial for most of the year, remaining buried in cocoons. They emerge at the start of the rains, and breed in shallow, temporary waters in pools, pans and ditches (IUCN, 2017). Due to the presence of suitable habitat in the project area the likelihood of occurrence is rated as moderate.

4.1.15.2 Reptiles

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 67 reptile species are expected to occur within the area (the full list will be provided in the final assessment). Three (3) species are regarded as SCCs (Table 4-6).

Table 4-6 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)	
Chamaesaura aenea	Coppery Grass Lizard	NT	LC	Moderate
Crocodylus niloticus	Nile Crocodile	VU	LC	Low
Homoroselaps dorsalis	Striped Harlequin Snake	NT	LC	High

Chamaesaura aenea (Coppery Grass Lizard) is listed as near threatened (NT) globally and regionally (ADU, 2017; IUCN, 2017). The species is found in Southern Africa, in the grassland biome. Their decline is mainly linked to habitat loss as well as a decline in habitat quality. The likelihood of occurrence is rated as moderate.

Homoroselaps dorsalis (Striped Harlequin Snake) is partially fossorial and known to inhabit old termitaria in grassland habitat (IUCN, 2017). Most of its range is at moderately high altitudes, reaching 1,800 m in Mpumalanga and Swaziland, but it is also found at elevations as low as about 100 m in KwaZulu-Natal. The likelihood of occurrence was rated as high due to the presence of suitable habitat.

4.1.15.3 Mammals

The IUCN Red List Spatial Data and MammalMap lists 108 mammal species that could be expected to occur within the area (the full list will be provided in the final assessment). This list excludes large mammal species that are normally restricted to protected areas. Fifteen (15) of these expected species are regarded as threatened (Table 4-7). Of these 15 SCCs, 11 have been assigned a low likelihood of occurrence based on the lack of suitable habitat in the project area. Three (3) species have been assigned a moderate likelihood of occurrence and one (1) has a high likelihood of occurrence.

Table 4-7 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	African Clawless Otter	NT	NT	Low
Atelerix frontalis	Southern African Hedgehog	NT	LC	High
Cloeotis percivali	Percival's Short-eared Trident Bat	EN	LC	Low
Crocidura maquassiensis	Makwassie Musk Shrew	VU	LC	Moderate
Crocidura mariquensis	Swamp Musk Shrew	NT	LC	Low
Eidolon helvum	African Straw-colored Fruit Bat	LC	NT	Moderate
Felis nigripes	Black-footed Cat	VU	VU	Low
Hydrictis maculicollis	Spotted-necked Otter	VU	NT	Low
Leptailurus serval	Serval	NT	LC	Low
Mystromys albicaudatus	African White-tailed Rat	VU	EN	Moderate
Otomys auratus	Southern African Vlei Rat (Grassland type)	NT	NT	Low
Panthera pardus	Leopard	VU	VU	Low
Pipistrellus rusticus	Rusty Pipistrelle	LC	NT	Low
Poecilogale albinucha	African Striped Weasel	NT	LC	Low
Rhinolophus blasii	Blasius's Horseshoe Bat	NT	LC	Low

Atelerix frontalis (South African Hedgehog) has a tolerance of a degree of habitat modification and occurs in a wide variety of semi-arid and sub-temperate habitats (IUCN, 2017). Based on the Red List

of Mammals of South Africa, Lesotho and Swaziland (2016), *A. frontalis* populations are decreasing due to the threats of electrocution, veld fires, road collisions, predation from domestic pets and illegal harvesting. Although the species is cryptic and therefore not often seen, there is suitable habitat in the project area and therefore the likelihood of occurrence is rated as high.

Crocidura maquassiensis (Maquassie Musk Shrew) is listed as Vulnerable (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). There is potentially suitable habitat for this species in the project area and therefore the likelihood of occurrence is rated as moderate.

Eidolon helvum (African Straw-coloured Fruit Bat) is listed as LC on a regional scale and NT on a global scale. This species has been recorded from a very wide range of habitats across the lowland rainforest and savanna zones of Africa (IUCN, 2017). Although considered to be widespread and abundant across its range, certain populations are decreasing due to severe deforestation, hunting for food and medicinal use (IUCN, 2017). This species is known to form large roosts and colonies numbering in the thousands to even millions of individuals (IUCN, 2017). No colonies of this species are known to occur in the Project area or in the immediate vicinity and, although individuals may occasionally be recorded, it is not expected to be resident within the Project area and therefore it's likelihood of occurrence is rated as moderate.

Mystromys albicaudatus (White-tailed Rat) is listed as Vulnerable (VU) on a regional basis and Endangered (EN) on a global scale. It is relatively widespread across South Africa and Lesotho; the species is known to occur in shrubland and grassland areas. A major requirement of the species is black loam soils with good vegetation cover. The vegetation type is suitable, therefore the likelihood of occurrence of this species is rated as moderate.

4.1.15.4 Avifauna

The SABAP2 Data lists 265 avifauna species that could be expected to occur within the area (the full list will be provided in the final assessment). Nine (9) of these expected species are regarded as SCC (Table 4-8). Five (5) of these SCCs species have been assigned a low likelihood of occurrence due to a lack of suitable habitat and food sources in the project area and four have a moderate likelihood of occurrence.

Table 4-8 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)	
Circus ranivorus	Marsh-harrier, African	EN	LC	Moderate
Crithagra mozambica	Seedeater, Protea (Canary)	NT	NT	Moderate
Falco biarmicus	Falcon, Lanner	VU	LC	Low
Glareola nordmanni	Pratincole, Black-winged	NT	NT	Moderate
Gyps coprotheres	Vulture, Cape	EN	EN	Low
Mirafra cheniana	Lark, Melodious	LC	NT	Low
Oxyura maccoa	Duck, Maccoa	NT	VU	Low
Phoenicopterus roseus	Flamingo, Lesser	NT	NT	Low
Sagittarius serpentarius	Secretarybird	VU	EN	Moderate

Circus ranivorus (African Marsh Harrier) is found in wetlands from South Africa north to the Democratic Republic of Congo (DRC) and southern Sudan, with the Okavango marshes in Botswana being its probable stronghold (IUCN, 2017). Threats include the drainage, burning and grazing of wetlands as well as the accumulation of chemical pollutants in eggs (IUCN, 2017). Despite the loss of natural

wetlands, African Marsh Harriers have also adapted to new man-made wetlands created by dams and sewage-works, potentially mitigating the effects of habitat loss (IUCN, 2017). The presence of wetlands near the project area contributed to a moderate likelihood of occurrence for this species.

Glareola nordmanni (Black-winged Pratincole) is a migratory species which is listed as NT both globally and regionally. This species has a very large range, breeding mostly in Europe and Russia, before migrating to southern Africa. Overall population declines of approximately 20% for this species are suspected (IUCN, 2017). This species generally occurs near water and damp meadows, or marshes overgrown with dense grass. Due to it's migratory nature, this species will only be present in South Africa for a few months during the year and will not breed locally. There is a small amount of suitable habitat within the project area and adjacent to it and as such the likelihood of occurrence is rated as moderate.

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 moderate due to the presence of potentially suitable grassland habitat, as well as the agricultural areas present in which this species may forage.

4.1.16 DEA Screening Tool

According to the Screening Tool Report generated (Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended), the following sensitivity classifications were gathered from the National Web-based Environmental Screening Tool:

- Terrestrial Biodiversity Theme sensitivity is low for the project area (Figure 4-16);
- Plant Species Theme sensitivity is Medium for the project area, with the possibility of multiple medium and low sensitivity plant species being present (Figure 4-17);
- Animal Species Theme sensitivity is Medium for the project area, with the possibility of multiple medium sensitivity species being present (Figure 4-18);
- Aquatic Biodiversity Theme sensitivity is Very High for the project area, with the possibility of a SWSA being present (Figure 4-19); and
- Agricultural Theme sensitivity is High for the project area, with land capability ranging from Medium to High (Figure 4-20).

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY

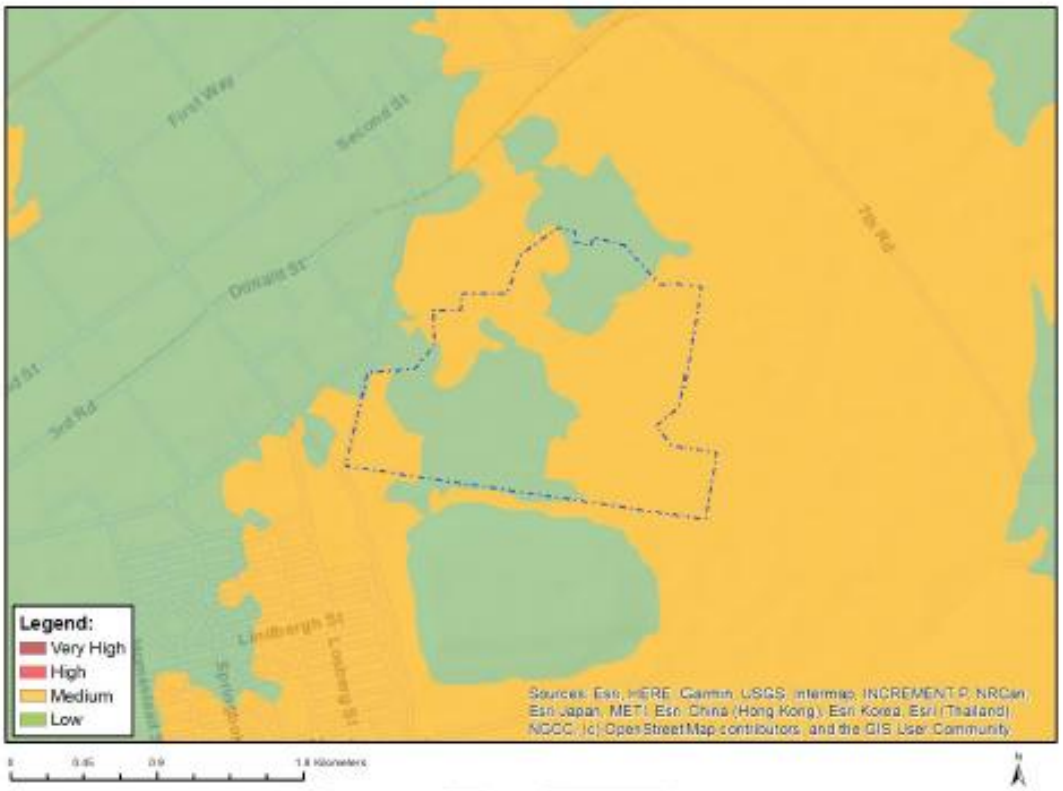
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Figure 4-16 Relative terrestrial biodiversity theme sensitivity for the project area

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



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

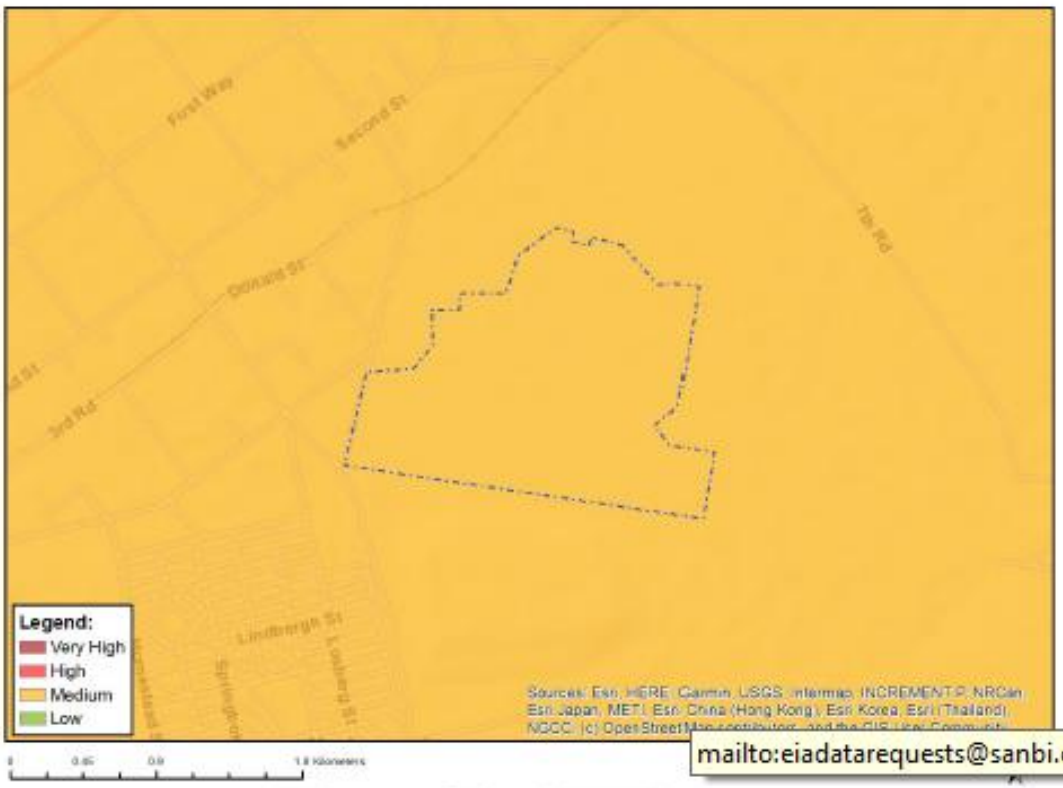
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Khadia beswickii
Medium	Sensitive species 1147
Medium	Sensitive species 1248

Figure 4-17 Relative plant species theme sensitivity for the project area

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



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

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Aves-Tyto capensis
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Hydrictis maculicollis
Medium	Invertebrate-Clonia uvarovi

Figure 4-18 Relative animal species theme sensitivity for the project area

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

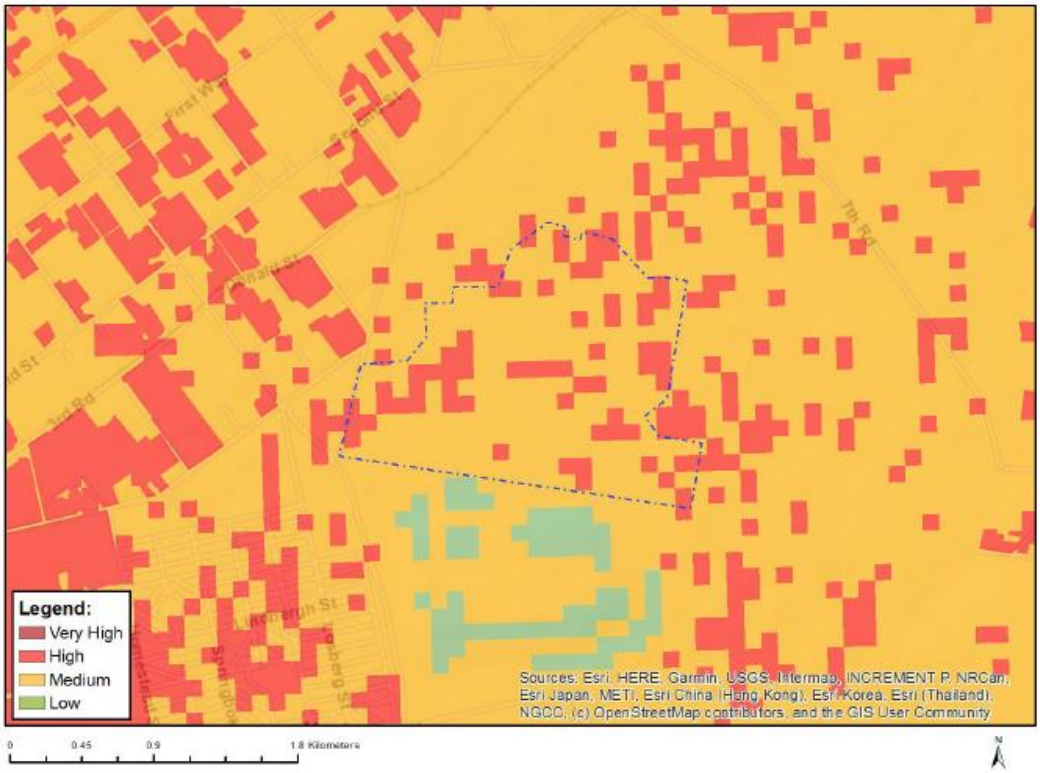
Sensitivity Features:

Sensitivity	Feature(s)
Very High	Strategic water source area

Figure 4-19 Relative aquatic biodiversity theme sensitivity[1] for the project area

[1] The project does not overlay the updated national SWSA (dataset March 2021), whereas the 2017 dataset does indicate the presence of a SWSA.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Land capability;09. Moderate-High/10. Moderate-High
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

Figure 4-20 Relative agriculture theme sensitivity for the project area

5 Impact Screening

5.1 Terrestrial Impact Assessment

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 majority of terrestrial habitat expected in the project area consists of Carletonville Dolomite Grassland, which based on the desktop scoping assessment is expected to host six (6) flora SCCs. The project area does not overlap with any SAIIAE or NFEPA. A total of two (2) fauna SCCs were given a high likelihood of occurrence, while a further nine (9) were given a moderate likelihood of occurrence. Based on the desktop assessment information it can be said that the sensitivity rating of the project area will most likely be low to moderate. However, the actual state of the project area must be confirmed by a field assessment.

Table 5-1 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 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	None identified at this stage
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	Local	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:	National/ Local	None identified at this stage

	» Loss of diversity and species composition in the area. » Possible impact on the food chain		
Environmental pollution due to water runoff, spills from vehicles and erosion	Direct impacts: » Pollution in waterbodies and the surrounding environment » Faunal mortality (direct and indirectly) Indirect impacts: » Ground water pollution » Loss of ecosystem services	Regional/ 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 which is expected to support a number of flora SCC species. 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. In turn, the new infrastructure could provide refuge for invasive/feral fauna species. Erosion is another possible impact that could result from the disturbance of the topsoil 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. The significance of these impacts will be determined after a field assessment has been conducted.

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 regulated zone.
- 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.

5.2 Wetland Impact Assessment

A key consideration for the scoping level impact assessment is the presence of the water resources located in proximity beyond the project area. The available data suggests that no SAIIAE or NFEPA are present in the project area or in the Zone of Regulation (ZoR) of 500 m.

Table 5-2 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	None identified at this stage
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 is unlikely to result in encroachment into water resources, but this must be confirmed during a site visit. Disturbances such as these could result in degradation of the system and the infestation and establishment of alien vegetation which would affect the functioning of the systems. Earthworks will expose and mobilise earth materials which could result in sedimentation of a receiving system. 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 a receiving water resource. Contaminated water resources are likely to influence the associated biota. It is anticipated to increase stormwater runoff due to the hardened surfaces which will result in an increase in run-off volume and velocities, resulting in altered flow regimes. The changes could result in physical changes to a receiving system caused by erosion, run-off and also sedimentation, and the functional changes could result in changes to the vegetative structure of the system. The reporting of surface run-off to the system could also result in the contamination of the system, transporting (in addition to sediment) diesel, hydrocarbons and soil from the operational areas. The significance of these impacts will be determined after a field assessment has been conducted.			
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 regulated zone. » Beneficial to undertake fieldwork during the wet season period.			

5.3 Soil Impact Assessment

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

Table 5-3 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	Direct impacts: » Loss of soil / land capability Indirect impacts: » Loss of land capability	Local	None identified at this stage
Erosion	Direct impacts: » Loss of topsoil Indirect impacts:	Site/Local	None identified at this stage

	» Loss of land capability		

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 solar PV array will be easily managed by best "housekeeping" practices. The significance of these impacts will be determined after a field assessment has been conducted.

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 Conclusion

6.1 Terrestrial Ecology

Based on the desktop assessment it can be said that the project area is moderately sensitive with a moderate to high likelihood of species of conservation concern occurring. This assumption is based on the proximity to a CBA and an NPAES Priority Focus Area.

The expected anthropogenic activities are likely to drive habitat destruction, causing displacement of fauna and flora, and possibly event 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.

6.2 Freshwater Ecology

A key consideration for the impact assessment is the presence of the identified water resources in relation to the project area. The available data suggests that no SAIIAE and NFEPA systems occur within or in close proximity to the project area (500 m Regulation Zone). However, this must be confirmed during the field survey.

Construction could result in the encroachment into water resources and result in the loss or degradation of these systems (if available), most of which will provide ecological services. These disturbances could also result in the infestation and establishment of alien vegetation, which 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 influence the associated biota. An increase in stormwater runoff could result in physical changes to the receiving systems caused by erosion, run-off and sedimentation, and the functional changes could result in changes to the vegetative structure of the systems.

6.3 Land Capability

Various soil forms are expected throughout the project area, of which some are commonly associated with higher land capabilities. Even though the soil depth, texture and permeability of these soils ensure higher land capability, the climatic capability of an area often reduces the land potential. 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. Furthermore, 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.

7 Terms of Methodology

7.1 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.

7.2 Fauna Survey

The faunal assessment within this report pertains to herpetofauna (amphibians and reptiles), avifauna (Regime 1) 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
- Utilisation 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).

7.3 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 7-1 and Table 7-2, respectively.

Table 7-1 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 7-2 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 7-3.

Table 7-3 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 7-4.

Table 7-4 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 7-5.

Table 7-5 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 7-6.

Table 7-6 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.

7.4 Freshwater Assessment

7.4.1 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 will also include 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 7-1. 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.

Vegetation will be used as the primary wetland indicator. However, in practise the soil wetness indicator tends to be the most important, and the other three indicators will be used in a confirmatory role.

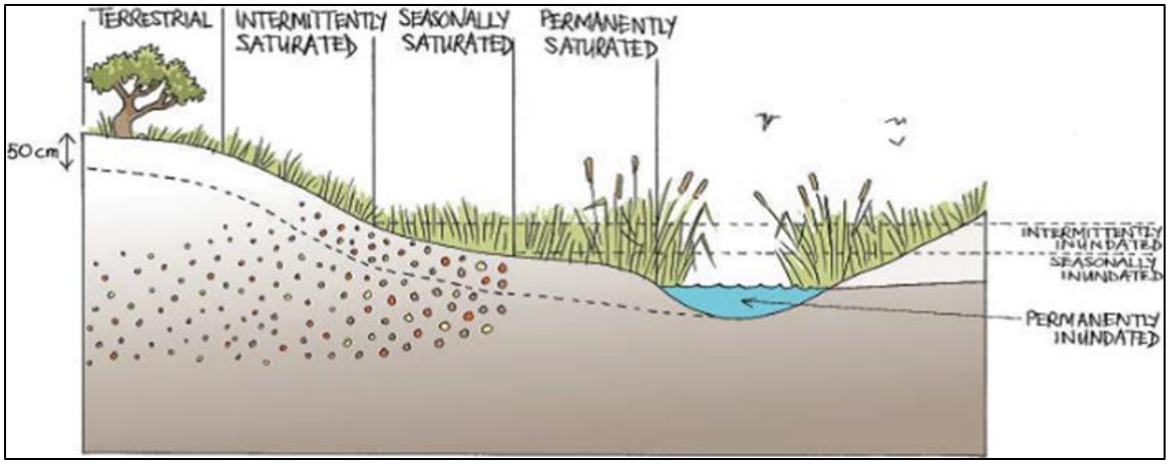


Figure 7-1 Cross section through a wetland, indicating how the soil wetness and vegetation indicators change (Ollis et al., 2013).

7.4.2 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 7-7).

Table 7-7 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

7.4.3 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 7-8.

Table 7-8 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

7.4.4 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 7-9 (Rountree and Kotze, 2013).

Table 7-9 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**

7.4.5 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

7.4.6 Risk Assessment

The risk assessment will be completed in accordance with the requirements of the DWS General Authorisation (GA) in terms of Section 39 of the NWA for water uses as defined in Section 21(c) or Section 21(i) (GN 509 of 2016).

7.5 Agricultural Potential

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 7-10 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 7-10 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 7-11. The final land potential results are then described in Table 7-12. 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 7-11 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 7-12 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

7.5.1 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 7-13 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

7.5.2 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.

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9 Appendix Items

9.1 Appendix A – Specialist Declaration of Independence

I, Sarah Newman, 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.

Sarah Newman

Environmental Consultant

The Biodiversity Company

January 2023

I, Andrew Husted, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Andrew Husted

Terrestrial Ecologist

The Biodiversity Company

January 2023