TERRESTRIAL AND WETLAND SSVR AND COMPLIANCE STATEMENT FOR THE PROPOSED LANGSIDE RENWABLE ENERGY FACILITY

Kumani, Eastern Cape Province

October 2022 (Updated October 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 terrestrial biodiversity (fauna and flora) & freshwater ecology assessments for the proposed Photovoltaic (PV) Solar Facility on the Farm Langside (Portion 7 of Farm 198) near Komani, Eastern Cape (Figure 1-2).

The approach was informed by the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices 320 (20 March 2020) in terms of NEMA, dated 20 March and 30 October 2020: "*Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation*" (Reporting Criteria). The National Web based Environmental Screening Tool (DEFF, 2023) has characterised the terrestrial biodiversity theme sensitivity of the project area as "Very High", the aquatic biodiversity theme sensitivity as "Low" sensitivity.

The development footprint (site area) has been used as the project area throughout this report. A 500 m buffer has been delineated for the project infrastructure to facilitate the identification of water resources within the regulation area. This delineated area has been referred to as the Project Area of Influence (POAI) from hereon.

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.

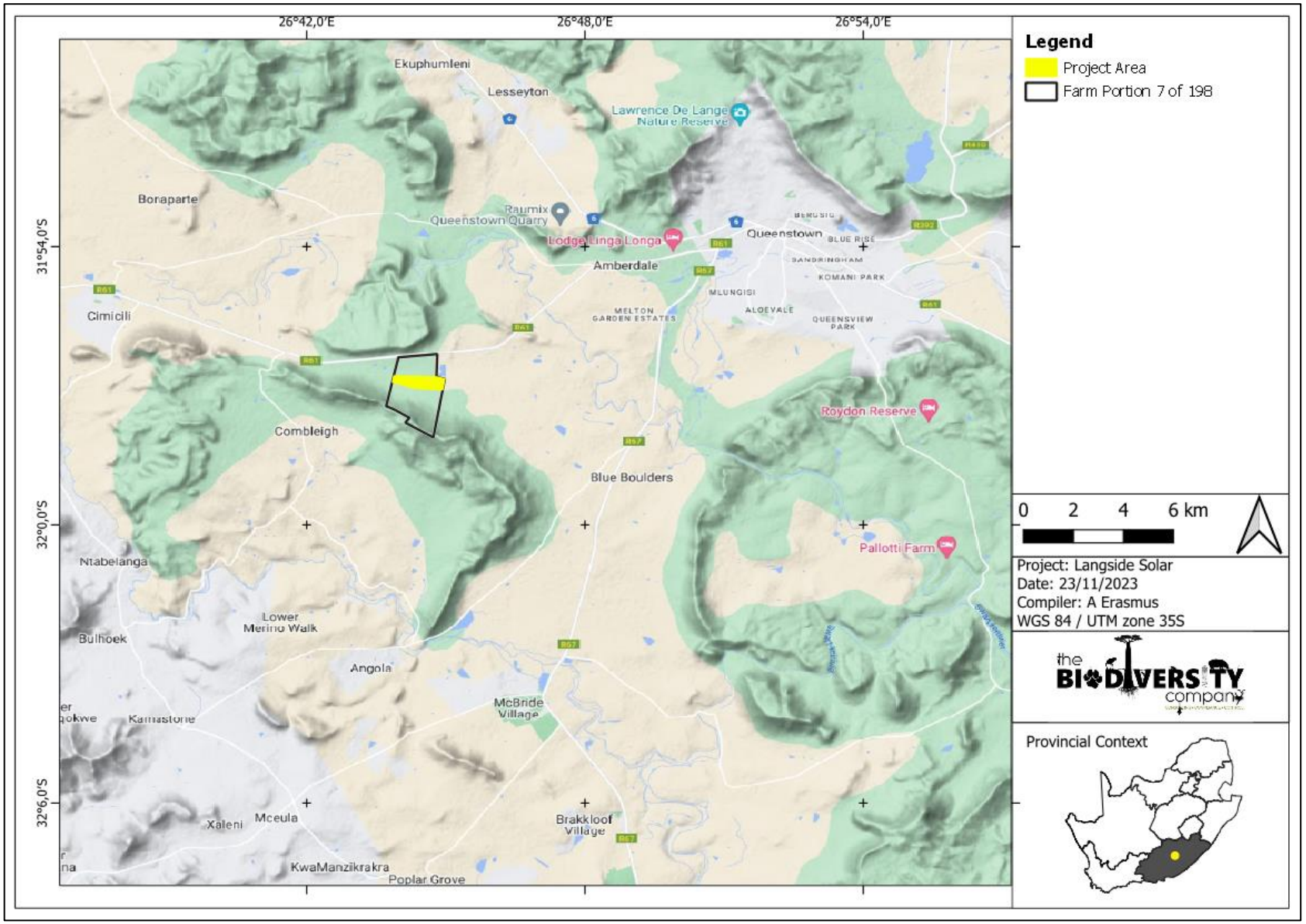


Figure 1-1 Proposed location of the project area in relation to the nearby towns

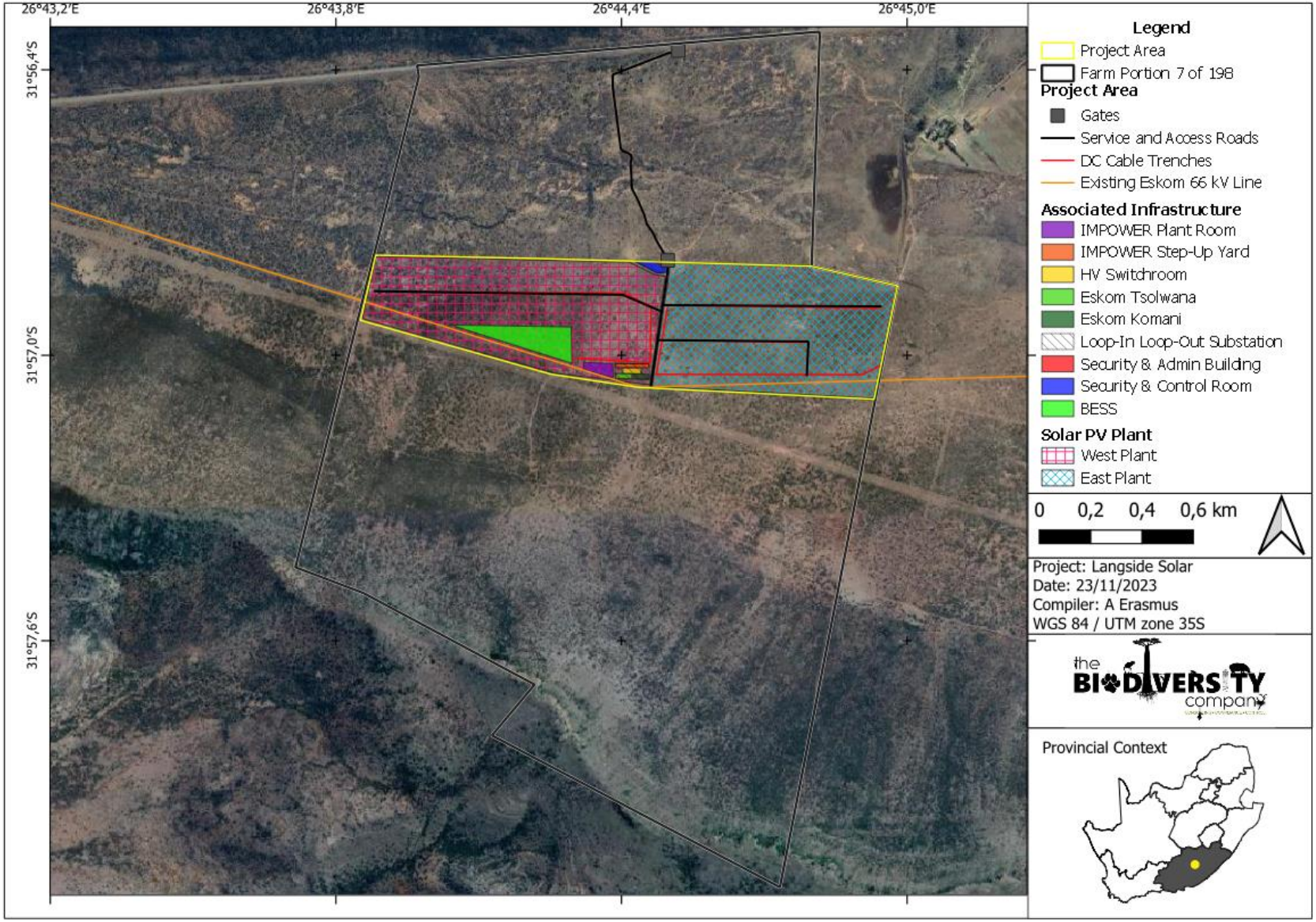


Figure 1-2 Details of the project area

1.2 Specialist Details

Report Name	**TERRESTRIAL AND WETLAND SSVR AND COMPLIANCE STATEMENT FOR THE PROPOSED LANGSIDE RENWABLE ENERGY FACILITY**
Reference	**Langside Solar**
Submitted to	
Report Writer	**Andine Erasmus** 
	Andine Erasmus completed her Master of Science degree in Zoology at the University of Pretoria. She is a terrestrial specialist and ecologist with experience in conducting flora and fauna surveys, and report writing. She has applied for her SACNASP candidacy.
Report Contributor	**Rowan Buhrmann** 
	Rowan Buhrmann is Pr Sci Nat registered (136853) in Environmental Science field of practice. Rowan has experience in terrestrial ecology (specialised in grassland ecology) and climate change. He obtained his M.Sc in Plant EcoPhysiology, specifically assessing the effects of elevated temperatures on the Sandstone Sourveld grasslands in eThekwini.
Report Contributor	**Marnus Erasmus** 
	Martinus Erasmus obtained his B-Tech degree in Nature Conservation in 2016 at the Tshwane University of Technology. Martinus has been conducting EIAs, IFC standard surveys, basic assessments and assisting specialists in field during his studies since 2015. Martinus is Pr. Sci. Nat. registered (118630) is a specialist terrestrial ecologist and botanist which conducts floral surveys faunal surveys which include mammals, birds, amphibians and reptiles.
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 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.

1.3 Scope of Work

The following scope of work is applicable for this project:

1.3.1 Terrestrial biodiversity (fauna and flora) assessment

- 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;
- Field survey to ascertain the species composition of the present flora and fauna community within the project area;
- Identify the manner that the proposed project impacts the flora and fauna community based on the screening assessment information, the desktop information, and the field survey, and evaluate the level of risk of these potential impacts; and
- The prescription of mitigation measures and recommendations for identified risks.

1.3.2 Freshwater assessment

- The delineation, classification and assessment of systems within the regulated area;
- Completion of a functional assessment;
- Conduct risk assessments relevant to the proposed activity; 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 Eastern Cape Provinces

Region	Legislation / Guideline	Comment
National	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)	Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017), Appendix 6 requirements
	The National Environmental Management: Biodiversity Act (Act No. 10 of 2004), Threatened or Protected Species Regulations	The protection of species and ecosystems that warrant protection
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 320 of Government Gazette 43310 (March 2020)	The minimum criteria for reporting.
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 1150 of Government Gazette 43855 (October 2020)	Protocol for the specialist assessment and minimum report content requirements.
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);	The regulation of waste management to protect the environment.
	National Water Act (NWA) (Act No. 36 of 1998)	The regulation of water uses.
	Alien and Invasive Species Regulations and, Alien and Invasive Species List 20142020, published under NEMBA	The regulation and management of alien invasive species.
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)	To provide for control over the utilization of the natural agricultural resources including the vegetation and the combating of weeds and invader plants.

Provincial	Eastern Cape Environmental Management Bill, in terms of Rule 147 (2019)	To provide for the management and conservation of the province's biophysical environment and protected areas. To inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management,
	Transkei Environmental Conservation Decree 9 of 1992	
	Eastern Cape Biodiversity Conservation Plan (ECBCP) (2019)	
	Nelson Mandela Bay Bioregional Plan (2015)	

3 Methods

3.1 Desktop Assessment

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

3.1.1 Ecologically Important Landscape Features

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

- **National Biodiversity Assessment 2018** (Skowno *et al*, 2019) (NBA) - The purpose of the NBA is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species, and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
    - **Ecosystem Threat Status (ETS)** is the 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. The revised red list of threatened ecosystems was developed between 2016 and 2021 incorporating the best available information on terrestrial ecosystem extent and condition, pressures and drivers of change. The revised list (known as the **Red List of Ecosystems (RLE) 2022**) is based on assessments that followed the International Union for Conservation of Nature (IUCN) Red List of Ecosystems Framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa (Mucina and Rutherford 2006; with updates described in Dayaram et al., 2019). The revised list identifies 120 threatened terrestrial ecosystem types (55 Critically Endangered, 51 Endangered and 14 Vulnerable types). The revised list was published in the Government Gazette (Gazette Number 47526, Notice Number 2747) and came into effect on 18 November 2022 (Skowno & Monyeki, 2021).
    - **Ecosystem Protection level (EPL)** informs on whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Not Protected (NP), Poorly Protected (PP), Moderately Protected (MP) or Well Protected (WP), based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Skowno *et al.,* 2019). NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems.
- **Protected areas** - South Africa Protected Areas Database **(SAPAD)** (DEA, 2023) – 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, 2018) – 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.
- **Eastern Cape Biodiversity Conservation Plan** (2019):
    - The Biodiversity Conservation Plan classifies areas within the province on the basis of their contributions to reaching the associated conservation targets within the province. These areas are primarily classified as either Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species, as well as the long-term ecological functioning of the landscape as a whole.
        - **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).
        - Provincial CBAs and ESAs are often further classified into sub-categories, such as CBA1 and CBA2 or ESA1 and ESA2. These present fine scale habitat and biodiversity area baseline requirements and associated land management objectives or outcomes. The highest categorisation level is often referred to as a CBA1 ‘Irreplaceable Critical Biodiversity Area’ which usually represents pristine natural habitat that is very important for conservation.
        - The terrestrial CBA maps categories include:
            - Protected Areas (PA);
            - Critical Biodiversity Areas (CBA);
            - Ecological Support Areas (ESA);
            - Other Natural Areas (ONA); and
            - No Natural Habitat remaining (NNR).
- **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; and
- **South African Inventory of Inland Aquatic Ecosystems (SAIIAE)** (Van Deventer *et al.,* 2018) – A SAIIAE was established during the NBA of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types and pressures on these systems.

3.1.2 Desktop Flora Assessment

The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) and SANBI (2019) was used to identify the vegetation type that would have occurred under natural or pre-

anthropogenically altered conditions. Furthermore, the Plants of Southern Africa (POSA) database was accessed to compile a list of expected flora species within the project area (Figure 3-1). The Red List of South African Plants (Raimondo *et al.,* 2009; SANBI, 2020) was utilized to provide the most current national conservation status of flora species.

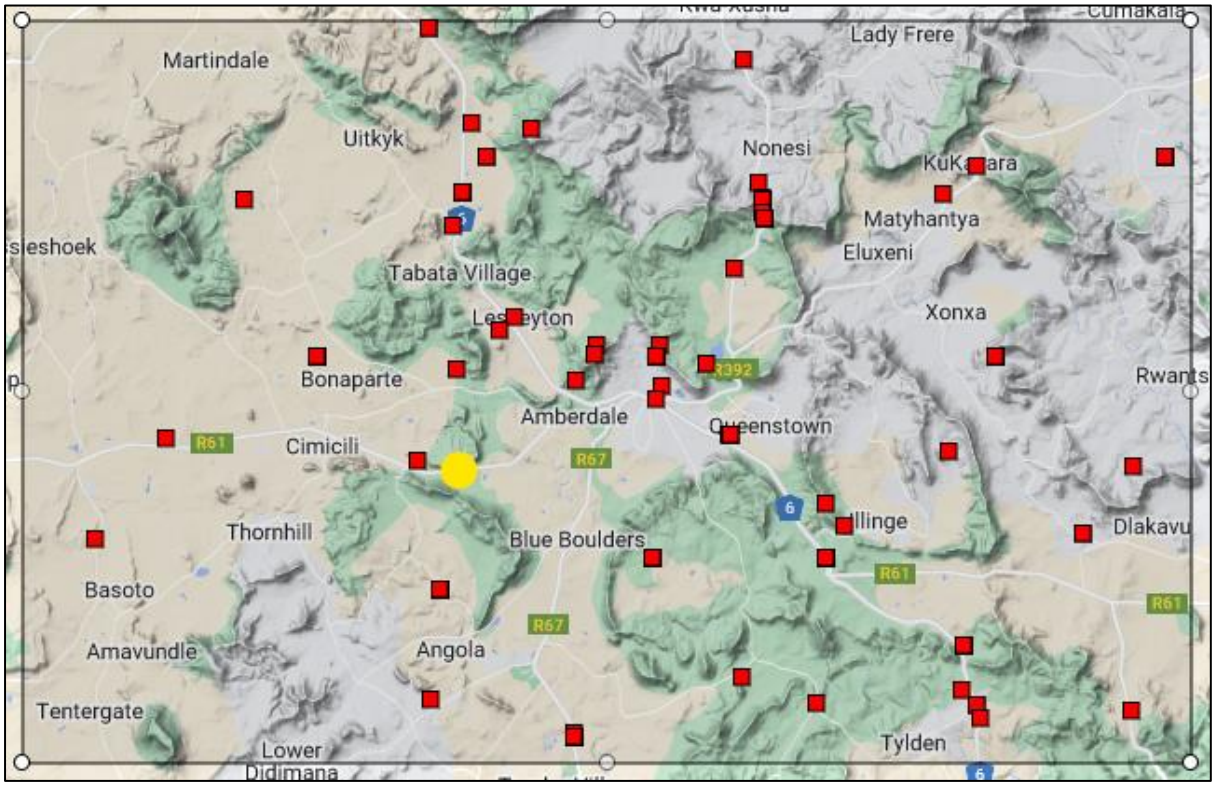


Figure 3-1 ***Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database. Yellow dot indicates approximate location of the project area. The red squares are cluster markers of botanical records as per POSA data.***

3.1.3 Desktop Faunal Assessment

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

- Amphibian list, generated from the IUCN spatial dataset (2017) and FrogMap database (Fitzpatrick Institute of African Ornithology, 2021a), using the 3126 quarter degree square;
- Reptile list, generated from the IUCN spatial dataset (2017) and ReptileMap database (Fitzpatrick Institute of African Ornithology, 2021b), using the 3126 quarter degree square;
- Avifauna list, generated from the SABAP2 dataset by looking at pentads 3150_2650; 3155_2645 and 3155_2640); and
- Mammal list from the IUCN spatial dataset (2017) and MammalMap database (Fitzpatrick Institute of African Ornithology, 2021c), using the 3126 quarter degree square.

3.2 Biodiversity Field Assessment

3.2.1 Flora Survey

The wet season fieldwork was completed during 10 October 2022 and sample sites were placed within targeted areas (i.e., target sites) perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation) and GIS analysis (which included the latest applicable biodiversity datasets) available prior to the fieldwork. The focus of the fieldwork was therefore

to maximise coverage and navigate to each target site in the field in order to perform a rapid vegetation and ecological assessment at each sample site. Emphasis was placed on sensitive habitats, especially those overlapping with the proposed project area.

Homogenous vegetation units were subjectively identified using satellite imagery and existing land cover maps. The floristic diversity and search for protected plants and flora SCC were conducted through timed meanders within representative habitat units delineated during the desktop assessment. Emphasis was placed on any sensitive habitats overlapping with the proposed project area.

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

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

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

- A field guide to Wild flowers (Pooley, 1998);
- Field Guide to the Wild Flowers of the Highveld (van Wyk & Malan, 1998);
- Orchids of South Africa (Johnson & Bytebier, 2015);
- Guide to the Aloes of South Africa (Van Wyk & Smith, 2014);
- Mesembs of the World (Smith *et al.,* 1998);
- Medicinal Plants of South Africa (Van Wyk *et al*., 2013);
- Freshwater Life: A field guide to the plants and animals of southern Africa (Griffiths & Day, 2016);
- Aquatic and Wetland Plants of Southern Africa (van Ginkel & Cilliers, 2020);
- Identification guide to southern African grasses. An identification manual with keys, descriptions and distributions (Fish *et al.,* 2015); and
- Field guide to trees of Southern Africa, Struik Publishers (Van Wyk & Van Wyk, 1997).

The field work methodology included the following survey techniques:

- Timed meanders;
- Sensitivity analysis based on structural and species diversity;
- Identification of protected floral species; and
- Identification of floral red-data or red-listed species (Species of Conservation Concern).

3.2.2 Fauna Survey

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

- *Visual and auditory searches* - This typically comprised of meandering and using binoculars to view species from a distance without them being disturbed; and listening to species calls;
- Active hand-searches - are used for species that shelter in or under particular micro-habitats (typically rocks, exfoliating rock outcrops, fallen trees, leaf litter, bark etc.); and
- Camera trapping as well as small mammal trapping.

Relevant field guides and texts 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);
- The Mammals of the Southern African Subregion (Skinnerand Chimimba 2005).
- A Field Guide to the Tracks and Signs of Southern and East African Wildlife (Stuart and Stuart, 2000).

3.3 Terrestrial Site Ecological Importance

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

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

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

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

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

	No natural habitat remaining.

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

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

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

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

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

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

Table 3-4 Summary of 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.

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

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

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

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

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

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

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

3.4 Aquatic Biodiversity Assessment

3.4.1 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 3-2. The outer edges of the wetland areas will be identified by considering the following four specific indicators, the:

- Terrain Unit Indicator helps to identify those parts of the landscape where wetlands are more likely to occur;
- Soil Form Indicator identifies the soil forms, as defined by the Soil Classification Working Group (1991), which are associated with prolonged and frequent saturation.
    - The soil forms (types of soil) found in the landscape were identified using the South African soil classification system namely; Soil Classification: A Taxonomic System for South Africa (Soil Classification Working Group, 1991);
- Soil Wetness Indicator identifies the morphological "signatures" developed in the soil profile due to prolonged and frequent saturation; and
- Vegetation Indicator identifies hydrophilic vegetation associated with frequently saturated soils.

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.

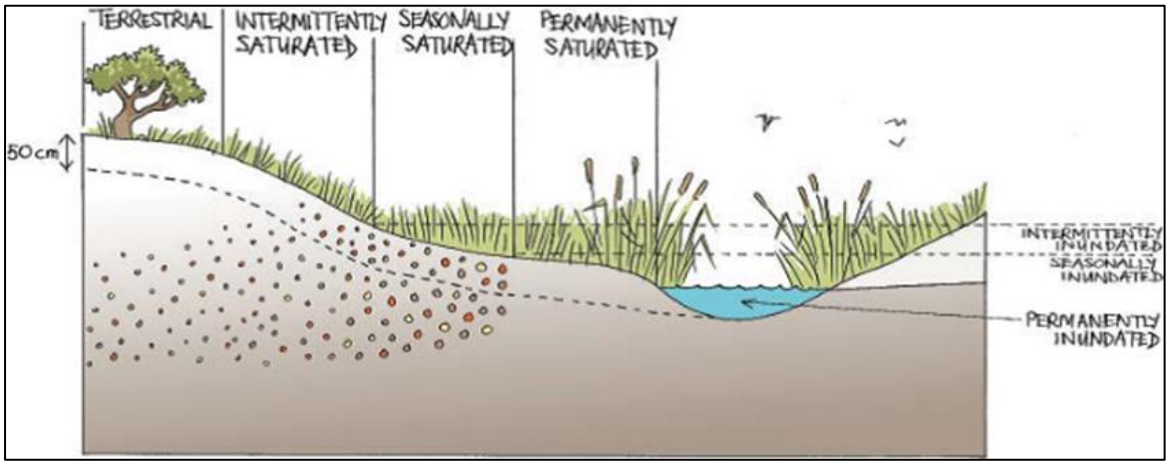


Figure 3-2 Cross section through a wetland, indicating how the soil wetness and vegetation indicators change (Ollis et al., 2013).

3.4.2 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 3-7).

Table 3-7 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

3.4.3 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 3-8.

Table 3-8 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

3.4.4 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 3-9 (Rountree and Kotze, 2013).

Table 3-9 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**

3.4.5 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.

3.4.6 Risk Assessment (DWS, 2015)

The Department of Water and Sanitation (DWS) risk matrix assesses impacts in terms of consequence and likelihood. The significance (product of the likelihood and consequence) of the impact is then rated according to Table 3-10.

Table 3-10 Significance ratings (DWS, 2015)

Rating	Class	Management Description
1 – 55	(L) Low Risk	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated. Wetlands may be excluded.
56 – 169	M) Moderate Risk	Risk and impact on watercourses are notably and require mitigation measures on a higher level, which costs more and require specialist input. Wetlands are excluded.
170 – 300	(H) High Risk	Always involves wetlands. Watercourse(s)impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve.

3.5 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The assessment area was changed after the initial field work (approximately 31,197 ha) and the additional areas (approximately 44,515 ha additional) were only assessed from a desktop basis.

4 Results & Discussion

4.1 Terrestrial Desktop Assessment

4.1.1 Ecologically Important Landscape Features

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features is summarised in Table 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.	4.1.1.1
Ecosystem Protection Level	Relevant – Overlaps with a Not Protected Ecosystem.	4.1.1.2
Protected Areas	Irrelevant – The project area lies approximately 10.22 km south-west of the nearest protected area; namely Longhill Nature Reserve.	4.1.1.4
National Protected Areas Expansion Strategy	Irrelevant – The project area lies approximately 38.33 km west of the nearest Priority Focus Area.	4.1.1.5
Critical Biodiversity Area	Relevant – The project area overlaps with a Terrestrial ESA 1 and is situated nearby an Aquatic ESA 1.	4.1.1.3
Important Bird and Biodiversity Areas	Irrelevant – The project area is situated approximately 52.38 km north of the nearest IBA; namely Amatola Katberg Mountain.	4.1.1.6
REDZ	Relevant – The project area overlaps with the Stormberg Phase 1 Renewable Energy Development Zone	-
Powerline Corridor	Relevant – The project area does overlap with the Eastern Transmission Corridor.	4.1.1.9
South African Inventory of Inland Aquatic Ecosystems	Irrelevant – The project area does not overlap with any NBA wetlands or rivers.	4.1.1.7
National Freshwater Priority Area	Relevant – The project area is situated adjacent to one FEPA wetland that is classified as an Artificial Wetland.	4.1.1.8
Strategic Water Source Areas	Irrelevant- The project area is 54 km from the closest SWSA.	-

4.1.1.1 Ecosystem Threat Status

The Red List of Ecosystems' 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) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset the proposed project overlaps with a LC ecosystem (Figure 4-1).

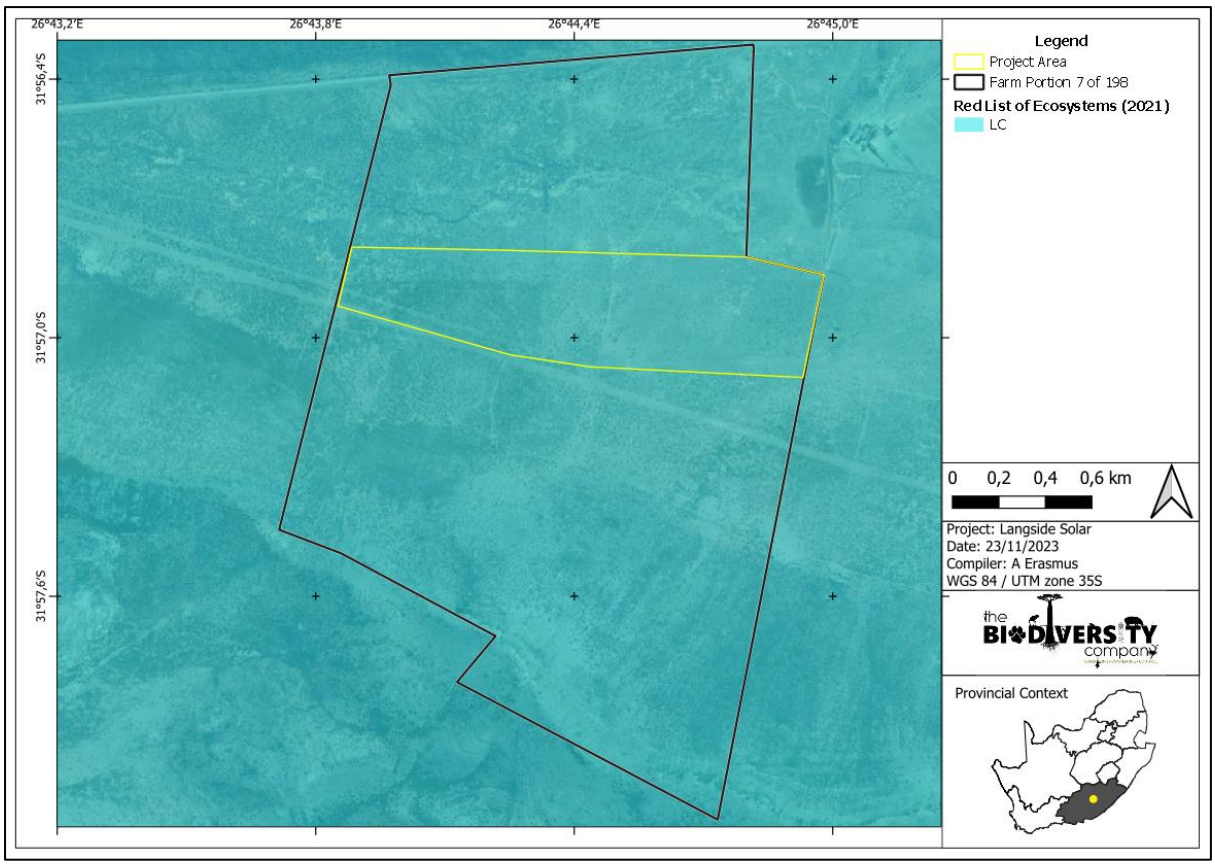


Figure 4-1 Map illustrating the ecosystem threat status associated with the project area

4.1.1.2 Ecosystem Protection Level

This is an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The proposed project area overlaps with a NP ecosystem, this is protected in the Tsolwana Game Reserve found 30 km from the protected area(Figure 4-2).

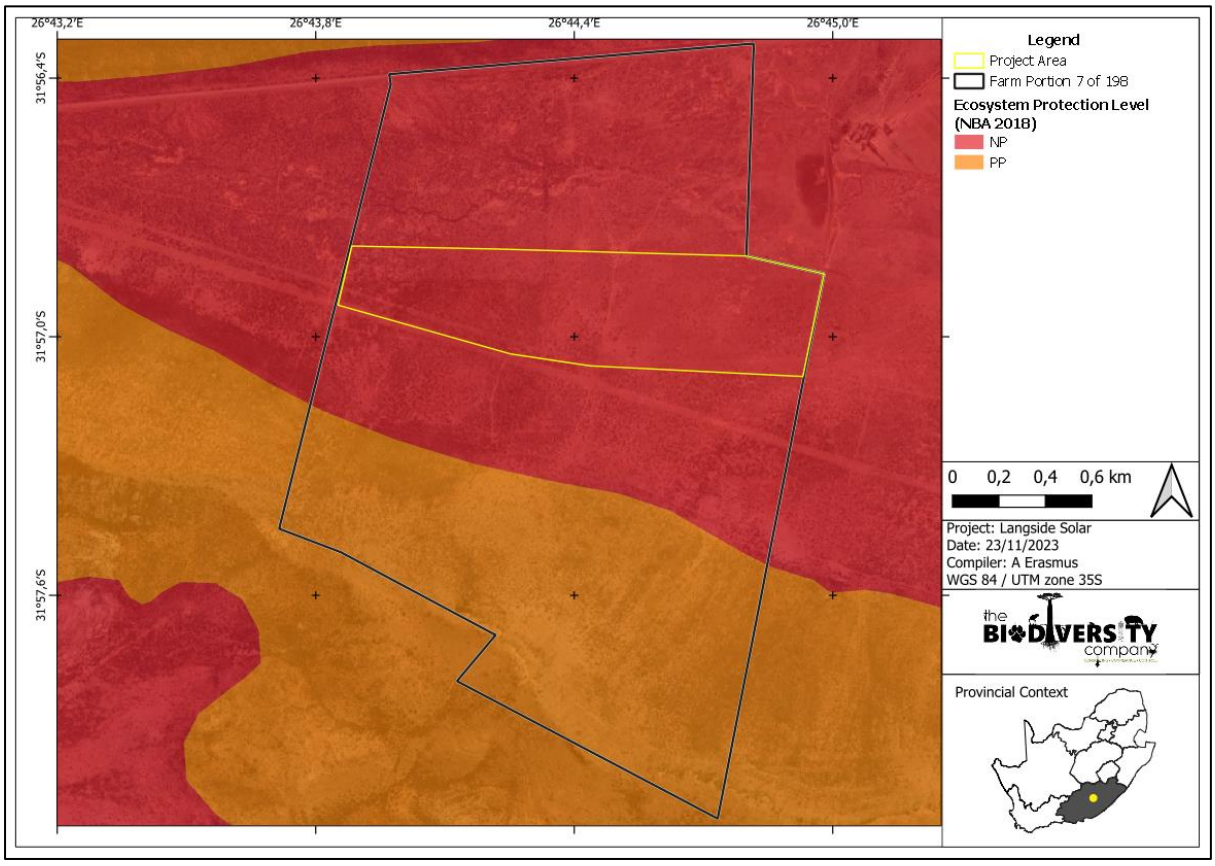


Figure 4-2 Map illustrating the ecosystem protection level associated with the project area

4.1.1.3 Critical Biodiversity Areas and Ecological Support Areas

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

The provincial CBA spatial data for the Eastern Cape province indicates that the project area overlaps with a Terrestrial ESA 1 and is situated near an Aquatic ESA 1 to the north of the project area.

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

Figure 4-3 shows the project area superimposed on the Terrestrial CBA and Aquatic CBA map. The project area overlaps with a Terrestrial ESA 1 area and is situated near an Aquatic ESA 1 to the north of the project area. The proposed access road crosses the Aquatic ESA 1.

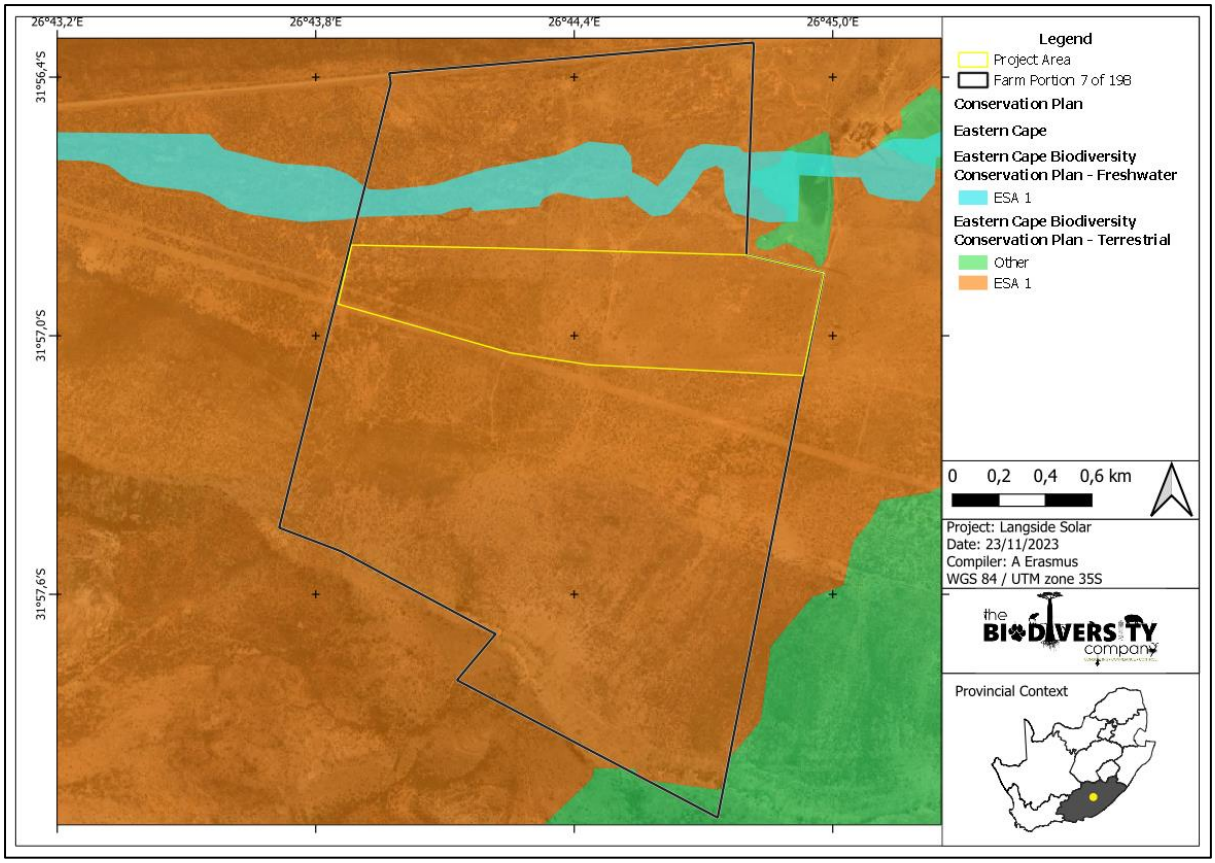


Figure 4-3 Map illustrating the locations of ESAs in the project area

4.1.1.4 Protected areas

According to the protected area spatial datasets from SAPAD (2021) and SACAD (2021), the project area does not overlap with any protected areas or conservation areas. The nearest protected area is the Lawrence De Lange Nature Reserve (Figure 4-4) located approximately 10.22 km south-west from the site.

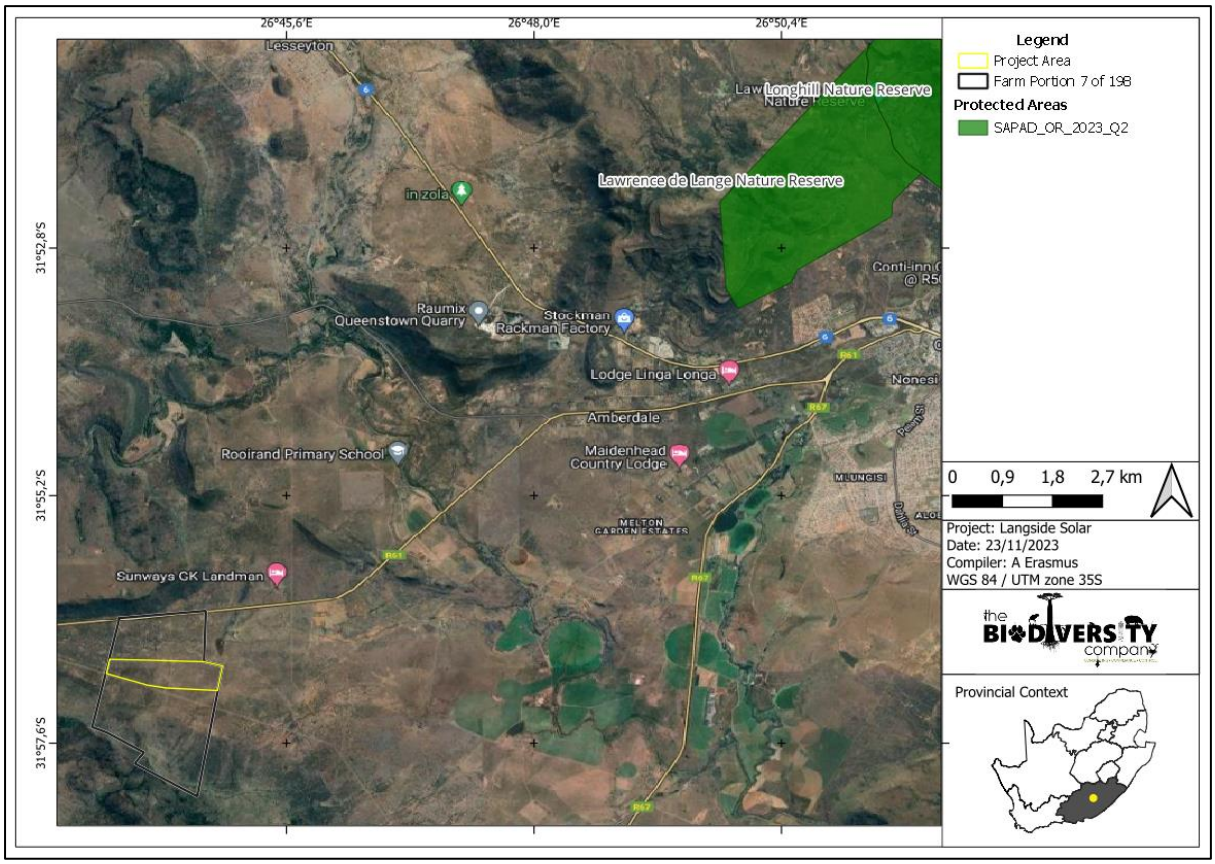


Figure 4-4 The project area in relation to the protected areas

4.1.1.5 National Protected Area Expansion Strategy

National Protected Area Expansion Strategy 2016 (NPAES) areas were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with a strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for 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 (Figure 4-5). The closest NPAES is 39 km from the PAOI.

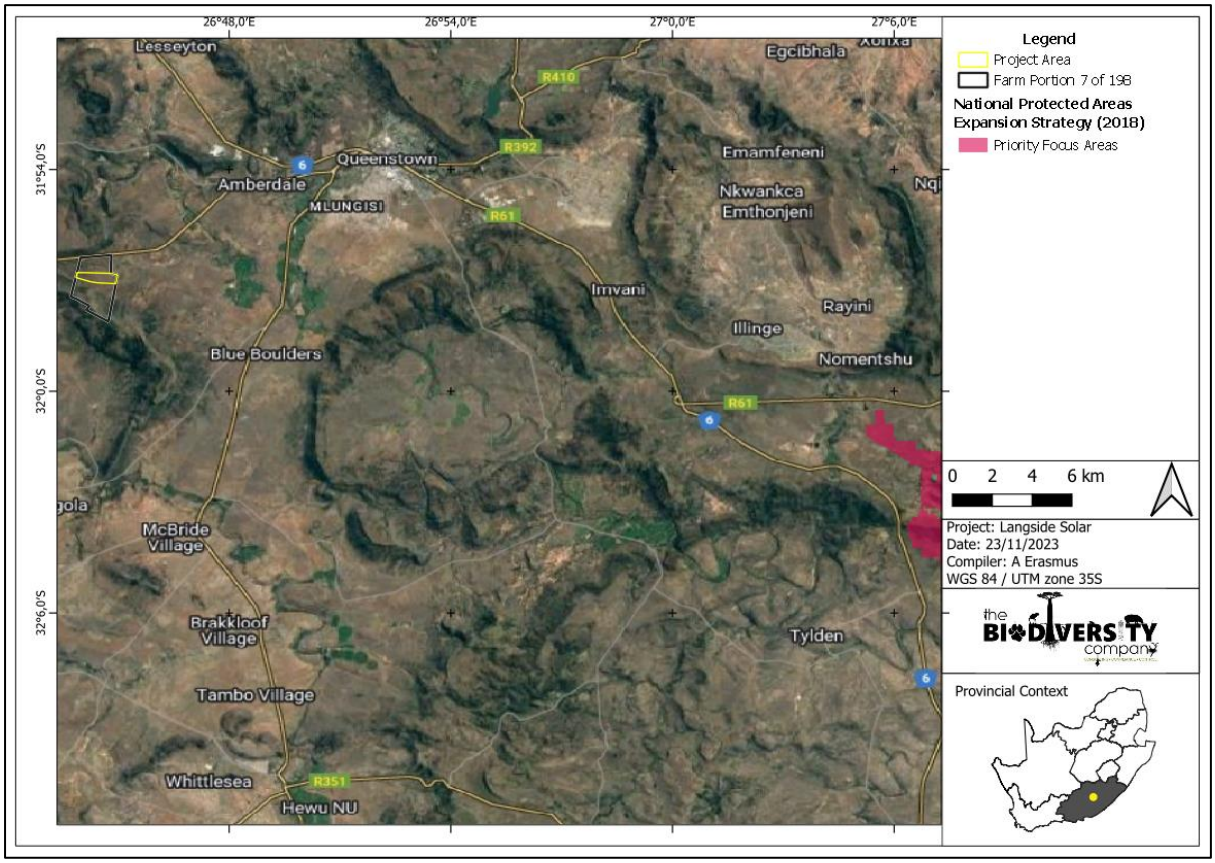


Figure 4-5 The project area in relation to the National Protected Area Expansion Strategy

4.1.1.6 Important Bird and Biodiversity Area

Important Bird & Biodiversity Areas (IBAs) are the sites of international significance for the conservation of the world's birds and other conservation significant species as identified by BirdLife International. These sites are also all Key Biodiversity Areas; sites that contribute significantly to the global persistence of biodiversity (Birdlife 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 the project area does not overlap with any IBA.

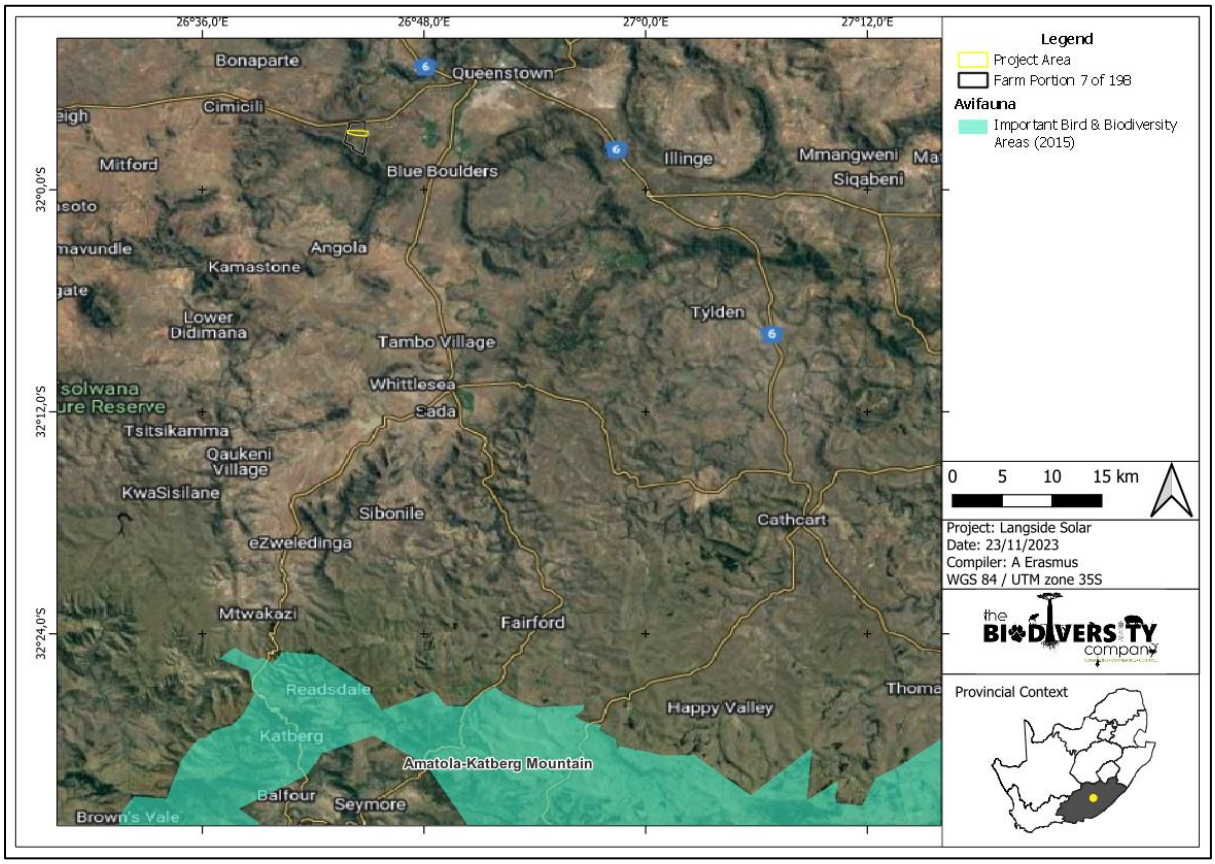


Figure 4-6 The project area in relation to the Amatola Katberg Mountain IBA

4.1.1.7 Hydrological Setting

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the NBA 2018. Ecosystem threat status (ETS) of river and wetland ecosystem types are based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT, with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer *et al.,* 2019; Skowno *et al.,* 2019).

The project area does not overlap with any NBA wetlands or rivers (Figure 4-7).

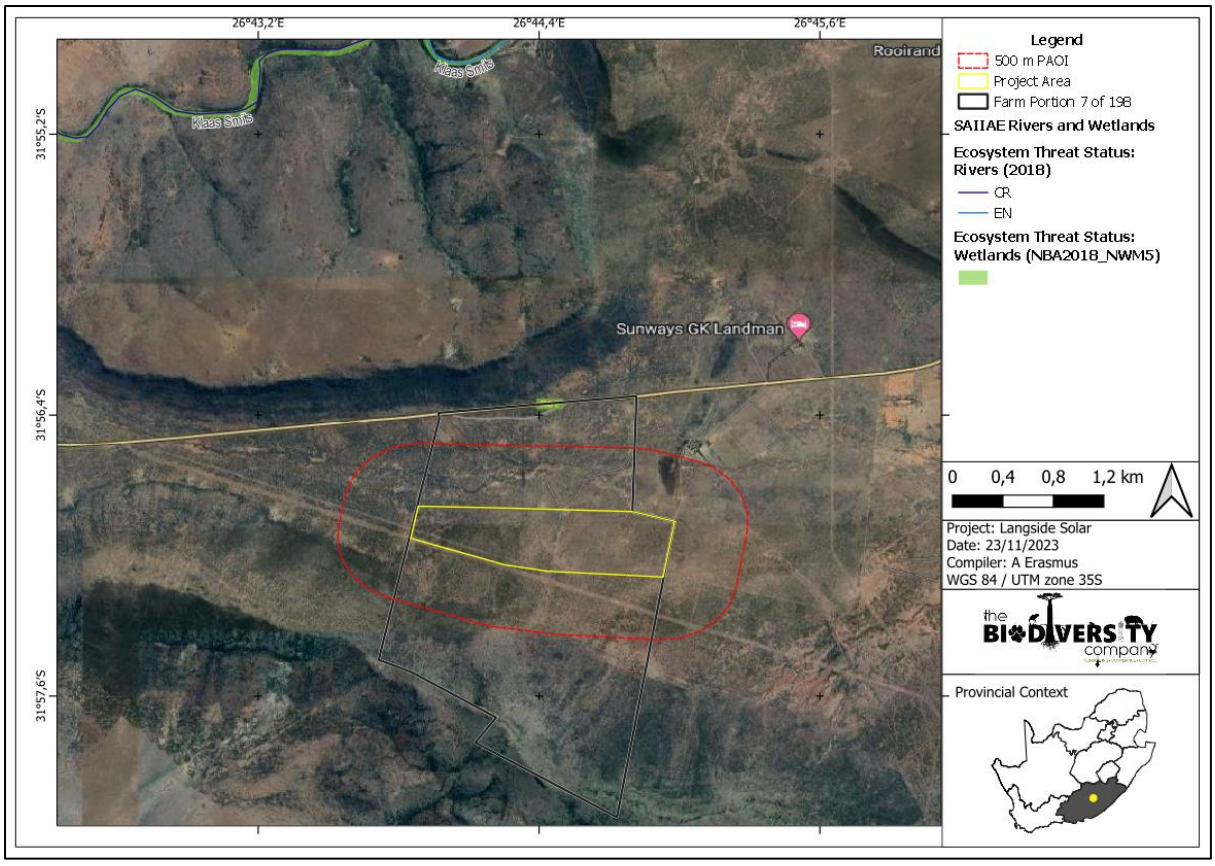


Figure 4-7 Map illustrating ecosystem threat status of rivers and wetland ecosystems in the project area

4.1.1.8 National Freshwater Ecosystem Priority Area Status

In an attempt to better conserve aquatic ecosystems, South Africa has categorised its river systems according to set ecological criteria (i.e., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs) (Driver *et al.,* 2011). The FEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's (NEM:BA) biodiversity goals (Nel *et al.,* 2011).

Error! Reference source not found. shows that the project area's 500 m regulated area (PAOI) o verlaps with two non-priority NFEPA wetlands, but the project area (development footprint) does not overlap with any NFEPAs.

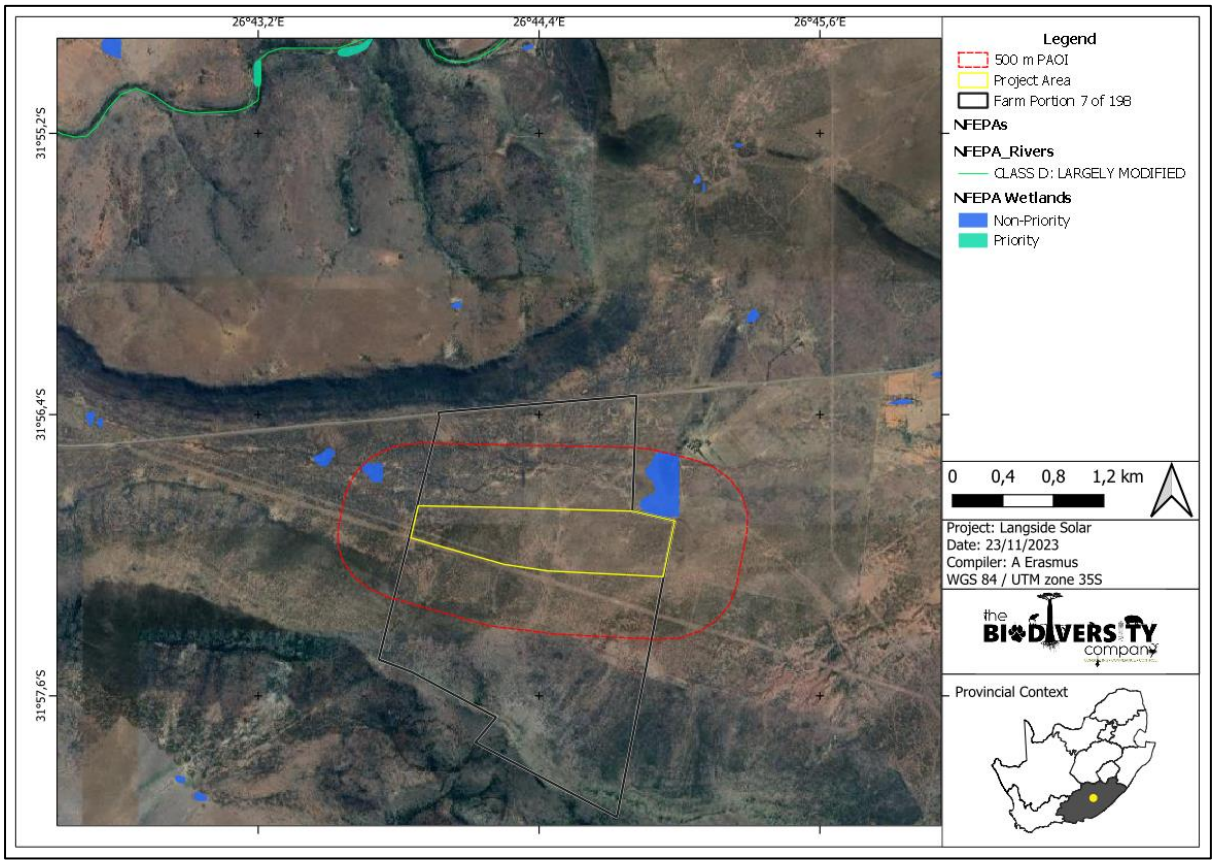


Figure 4-8 The project area in relation to the National Freshwater Ecosystem Priority Areas

4.1.1.9 Strategic Transmission Corridors (EGI)

On the 16th of 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 shows the project overlaps with the Eastern EGI corridor.

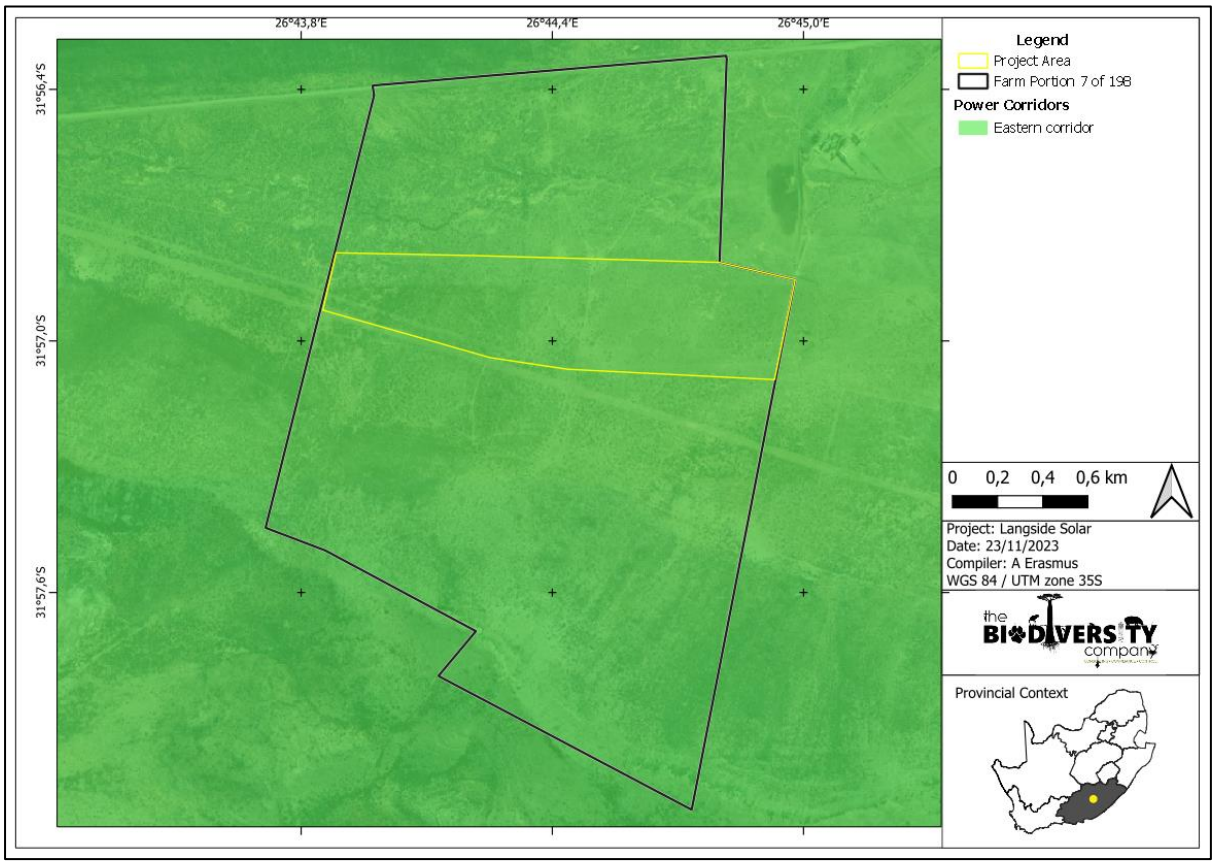


Figure 4-9 The project area in relation to the strategic transmission corridors

4.1.1.10 Renewable Energy Development Zones

In 2018 the Government Notice No. 114 in Government Gazette No. 41445 was published where 8 renewable energy development zones important for the development of largescale wind and solar photovoltaic facilities were identified. In 2021 an additional 3 sites were included. The REDZs were identified through the undertaking of 2 Strategic Environmental Assessments.

More detailed information can be obtained from https://egis.environment.gov.za/redz.

The project area overlaps with the Stormberg Wind Phase 1 Renewable Energy Development Zone (Figure 4-10).

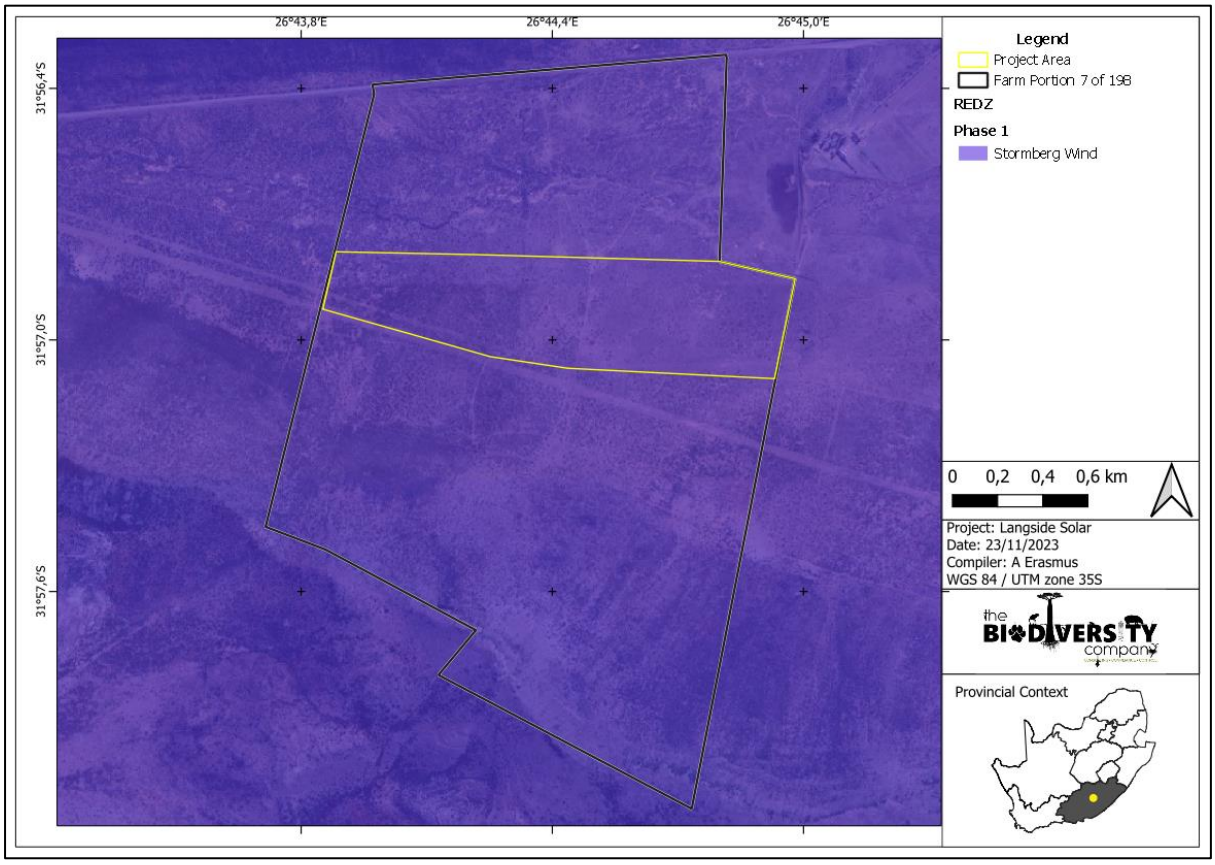


Figure 4-10 The project area in relation to the REDZ dataset

4.1.2 Flora Assessment

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

4.1.2.1 Vegetation Type

The project area is situated within the Grassland Biome. The Grassland Biome in South Africa occurs mainly on the Highveld, the inland areas of the eastern seaboard, the mountainous areas of KwaZulu-Natal and the central parts of the Eastern Cape. The topography is mainly flat to rolling, but also includes mountainous regions and the Escarpment (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the Grassland Biome include:

- Summer to strong summer rainfall and winter drought; and
- Frost is common, and fog is found on the upper slopes of the Great Escarpment and seaward scarps (Mucina & Rutherford, 2006).

Grasslands characteristically contain herbaceous vegetation of a relatively short and simple structure that is dominated by graminoids, usually of the family Poaceae. Woody plants are rare (usually made up of low or medium-sized shrubs), absent, or confined to specific habitats such as smaller escarpments or koppies. Core grassland areas usually have deep, fertile soils although a wide spectrum of soil types occurs (Mucina & Rutherford, 2006).

On a fine-scale vegetation type, the project area overlaps with the Queenstown Thornveld vegetation type (Figure 4-11).

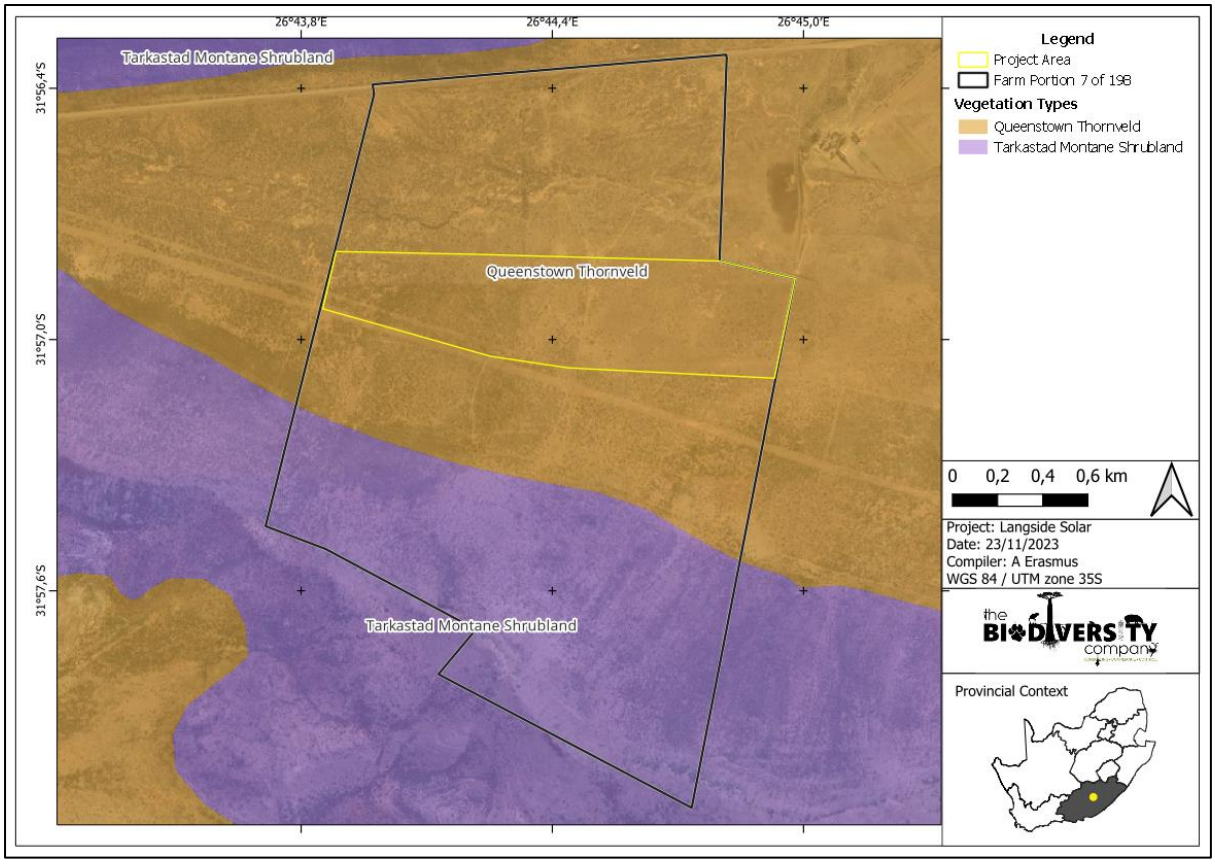


Figure 4-11 Map illustrating the vegetation type associated with the project area

4.1.2.1.1 Queenstown Thornveld

Queenstown Thornveld is restricted to, and is distributed in, the Eastern Cape Province near the vicinity of Queenstown in the east to the vicinity of Tarkastad in the west and Sterkstroom in the north (Mucina & Rutherford, 2006). It occurs at an altitude of 980 – 1500 m.a.s.l. Its main vegetation and landscape features include flat bottomlands of intramountain basins with adjacent slopes supporting a complex of *Vachellia natalitia* thornveld and grasslands with scattered shrubs and low *Vachellia* in places (Mucina & Rutherford, 2006).

Important Plant Taxa in Queenstown Thornveld

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

Small Tree: *Vachellia natalitia* (Mucina & Rutherford, 2006).

Tall Shrub: *Euryops floribundus* (Mucina & Rutherford, 2006).

Low Shrubs: *Asparagus laricinus*, *Atriplex semibaccata* var. *appendiculata*, *Felicia filifolia* subsp. *filifolia*, *F. muricata*, *Helichrysum asperum* var. *albidulum*, *H. dregeanum*, *Melolobium microphyllum*, *Pentzia globosa*, *Sutera pinnatifida*, *Tephrosia capensis* var. *acutifolia* (Mucina & Rutherford, 2006).

Succulent Shrub: *Hertia pallens* (Mucina & Rutherford, 2006).

Graminoids: *Aristida canescens*, *A. congesta*, *A. diffusa*, *Cymbopogon pospischilii*, *Cynodon incompletus*, *Digitaria argyrograpta*, *D. eriantha*, *Eragrostis chloromelas*, *E. curvula*, *E. lehmanniana*, *E. obtusa*, *E. trichophora*, *Heteropogon contortus*, *Microchloa caffra*, *Panicum stapfianum*, *Themeda triandra*, *Tragus koelerioides*, *Brachiaria serrata*, *Cynodon dactylon*, *Cyperus usitatus*, *Elionurus muticus*, *Eustachys paspaloides*, *Microchloa kunthii*, *Sporobolus fimbriatus*, *Tragus racemosus*. (Mucina & Rutherford, 2006).

Herbs: *Arctotis microcephala*, *Blepharis integrifolia* var. *clarkei*, *Commelina africana*, *Cyanotis speciosa*, *Gazania krebsiana* subsp. *krebsiana*, *Helichrysum pedunculatum*, *H. rugulosum*, *Hermannia depressa*, *Indigofera alternans*, *Salvia stenophylla*, *Senecio asperulus*, *Tribulus terrestris* (Mucina & Rutherford, 2006).

Herbaceous Climber: *Rhynchosia totta* (Mucina & Rutherford, 2006).

Geophytic Herbs: *Oxalis corniculata*, *O. depressa* (Mucina & Rutherford, 2006).

Conservation Status

According to Mucina and Rutherford (2006) Queenstown Thornveld is classified as Least Threatened. Although the target for conservation is 23%, only 1% of this vegetation type is currently under statutory conservation in the Tsolwana Nature Reserve. Urbanisation and to a lesser extend cultivation have resulted in the transformation of approximately 10% of Queenstown Thornveld. Overgrazing in this vegetation unit is serious, especially by goats near urban areas. Indices of erosion are moderate to low and very low (Mucina & Rutherford, 2006).

4.1.2.2 Expected Flora Species

The POSA database indicates that 1047 species of indigenous plants are expected to occur within the project area. One SCC based on its conservation status could be expected to occur within the project area and is provided in Table 4-2 below.

Table 4-2 Threatened flora species that may occur within the project area

Family	Taxon	Author	IUCN	Ecology
Euphorbiaceae	*Euphorbia flanaganii*	N.E.Br.	VU	Indigenous; Endemic

4.1.3 Faunal Assessment

This section pertains to herpetofauna and mammals, a separate avifauna report has been prepared.

4.1.3.1 Amphibians

Based on the IUCN Red List Spatial Data and FrogMap, 8 amphibian species are expected to occur within the area. One amphibian SCCs is expected to occur within the area, namely *Pyxicephalus adspersus* (Giant Bull Frog)

Table 4-3 Threatened amphibian species that are expected to occur within the project area

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

4.1.3.2 Reptiles

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 22 reptile species are expected to occur within the area. No species is regarded as threatened.

4.1.3.3 Mammals

The IUCN Red List Spatial Data lists 22 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. Two of these expected species are regarded as threatened (Table 4-4). Of these 2 SCCs, both have a low likelihood of occurrence based on the lack of suitable habitat in the project area.

Table 4-4 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)	
Otomys auratus	Southern African Vlei Rat	NT	NT	Low
Poecilogale albinucha	African Striped Weasel	NT	LC	Low

4.2 Aquatic Biodiversity Assessment

4.2.1 Soils and Geology

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Da 166 land type. The Da land type is characterised by prismacutanic and/or pedocutanic horizons with the possibility of red apedal B-horizons occurring.

The geology of this area is characterised by deposits of mudstones (Tarkastad Subgroup) and is found in flat areas with some undulating plains. No rivers or streams drain these plains thus all water drains into the salt pans. Dry, clayey, duplex soils are typically found within this geology (Mucina and Rutherford, 2006).

4.2.2 NFEPA Wetlands

Two wetland types have been identified within the project area of influence (PAOI), namely an unchanneled valley-bottom wetland and a channelled valley-bottom wetland (see Figure 4-12).

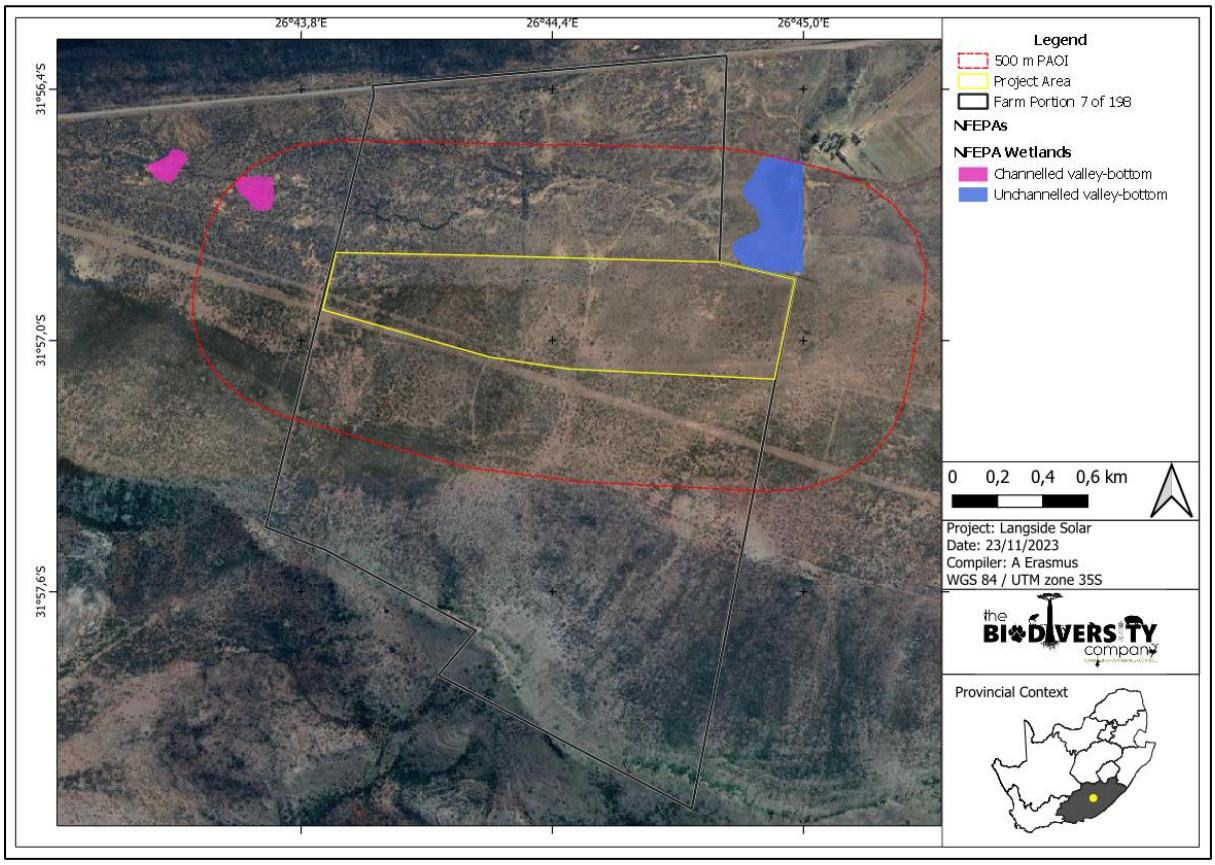


Figure 4-12 The wetland was classified as being artificial with some natural inputs.

4.2.3 Topographical Inland Water and River Lines

The topographical inland and river line data for “3126” quarter degree was used to identify potential wetland areas within the PAOI. This data set indicates a single inland water area which was classified as a dam as well as multiple non-perennial river lines located within the PAOI (see Figure 4-13).

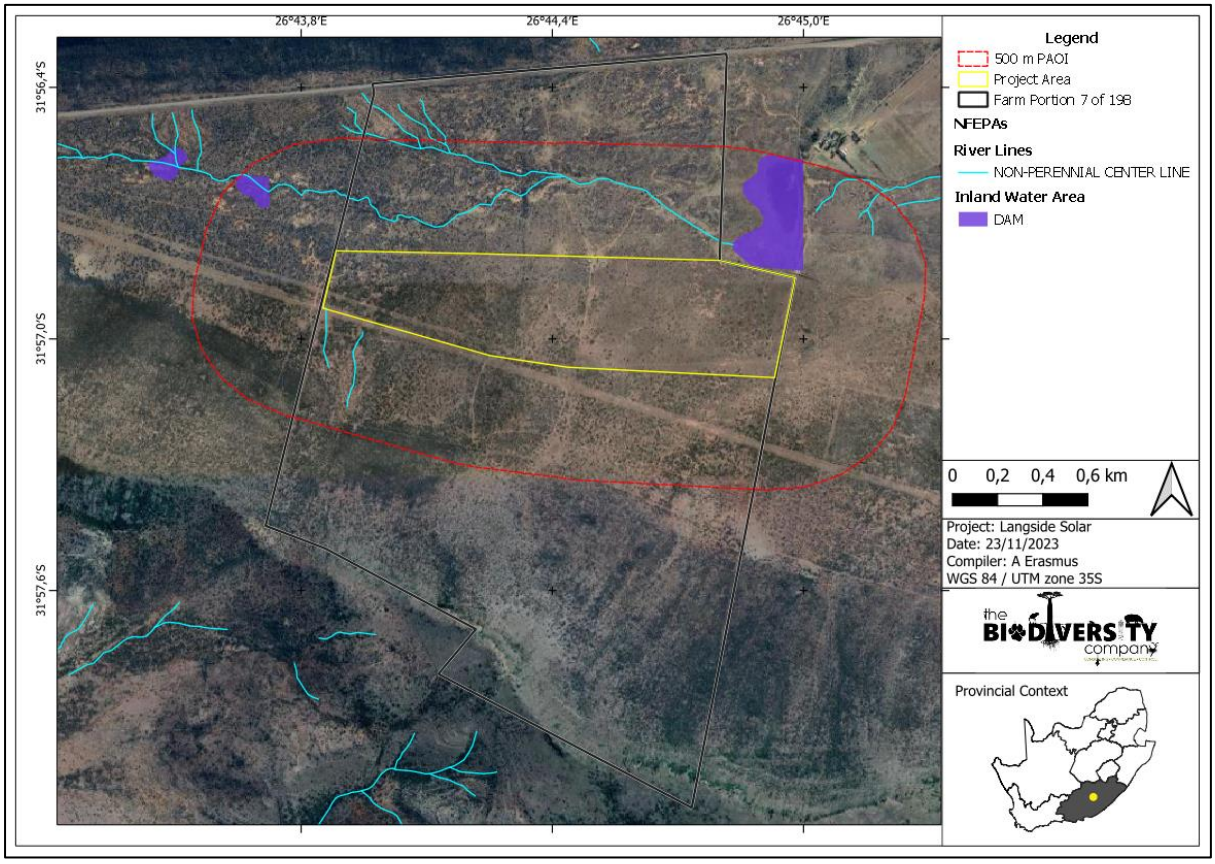


Figure 4-13 Topographical River line and inland water areas located within the Project Area

4.2.4 Terrain

The terrain of the PAOI has been analysed to determine potential areas where water is more likely to accumulate (due to convex topographical features, preferential pathways, or more gentle slopes).

4.2.4.1 Digital Elevation Model (DEM)

A Digital Elevation Model (DEM) has been created to identify lower laying regions as well as potential convex topographical features which could point towards preferential flow paths. The PAOI ranges from 1 086 to 1 306 metres above sea level (MASL). The lower laying areas (generally represented in dark blue) represent the area that will have the highest potential to be characterised as wetlands (see Figure 4-14).

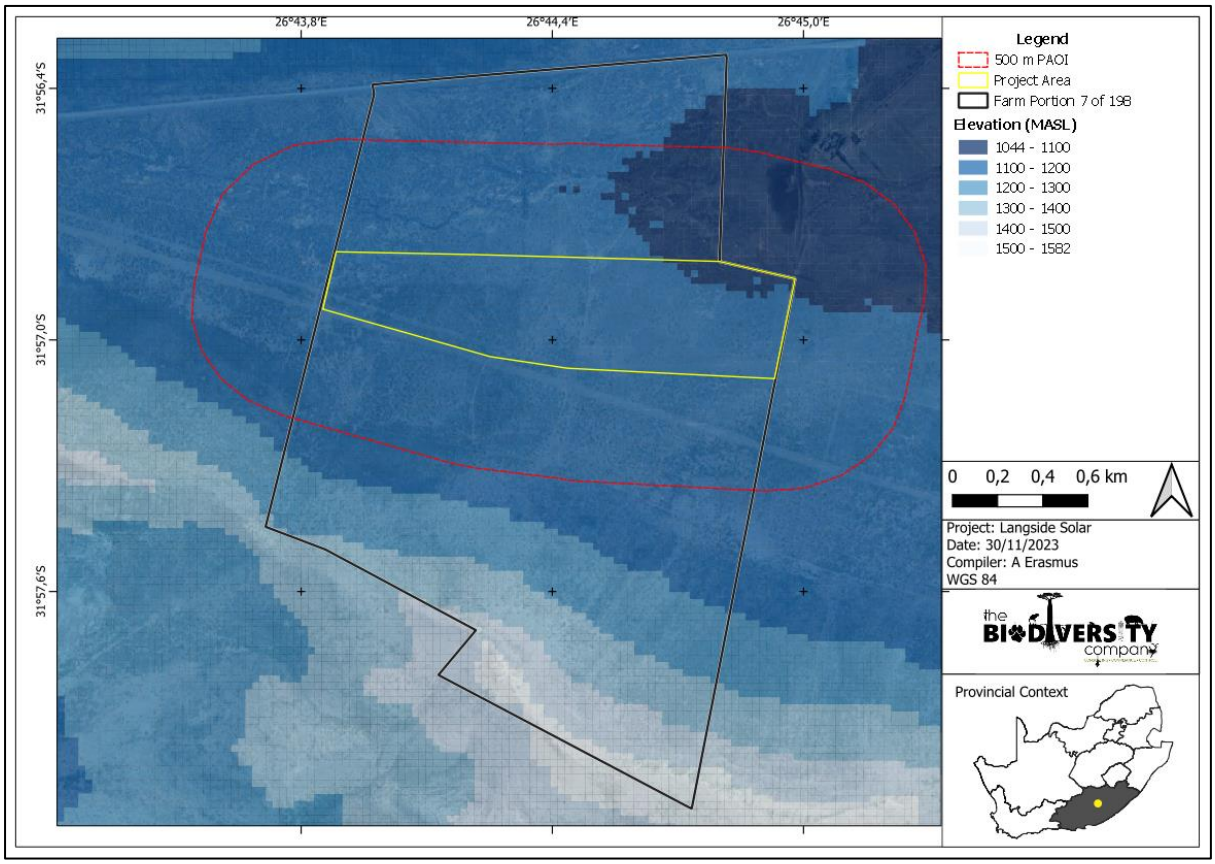


Figure 4-14 Digital Elevation Model of the project area

4.3 Land Capability

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.

4.3.1 Climate

The SVcb 1 vegetation type is characterised by a summer rainfall with a Mean Annual Precipitation (MAP) that ranges between 500 mm and 600 mm (see Figure 4-15). Of the savanna vegetation units that are located outside Kalahari bioregions, this unit has the highest mean annual potential evaporation. In the winter season frost is frequent (Mucina & Rutherford, 2006).

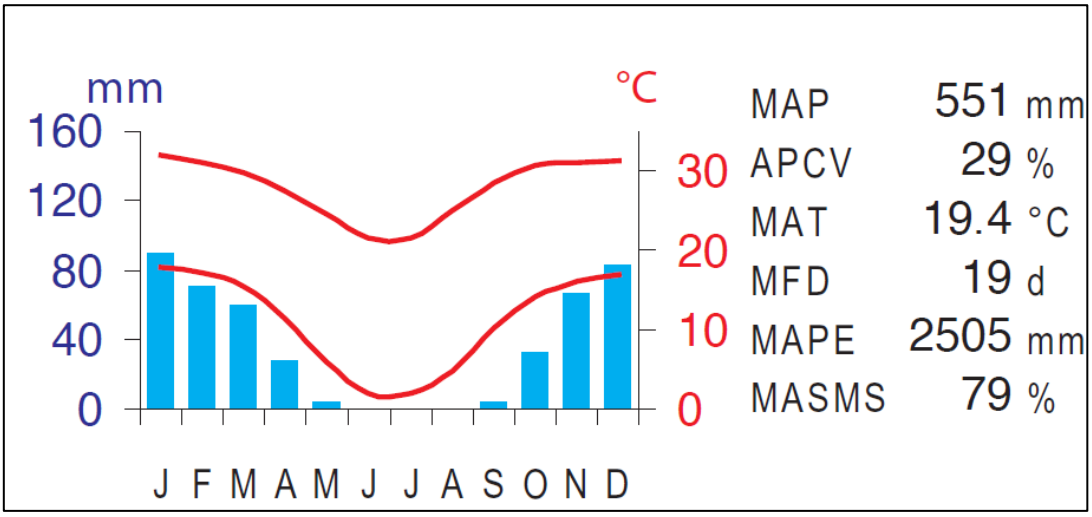


Figure 4-15 Climate for the Dwaalboom Thornveld (Mucina & Rutherford, 2006)

4.3.2 Geology and Soil

According to the land type database (Land Type Survey Staff, 1972 - 2006) the development falls within the Da 166 land type (Figure 4-16). The geology of the land type is described as brownish red and grey mudstone of the Burgersdorp Formation, Karoo Sequence with intrusives of dolerite.

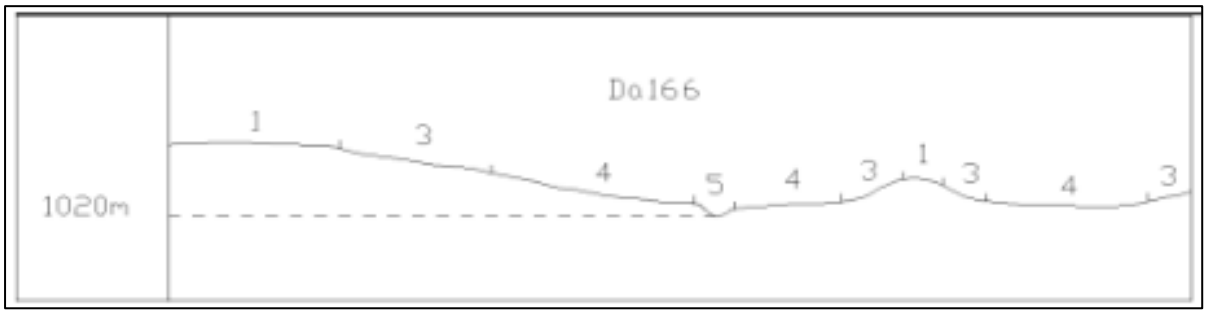


Figure 4-16 Illustration of land type Da 166 terrain units (Land Type Survey Staff, 1972 – 2006)

4.4 Field Survey

4.4.1 Wetland Assessment

4.4.1.1 Delineation

The wetland area was delineated in accordance with the (DWAF, 2005) guidelines. Three (3) HGM (hydrogeomorphic) units were identified within the 500 m PAOI, namely one (1) channelled valley bottom wetland, one (1) hillslope seepage, and numerous dams (classed as HGM 3; see Figure 4-17, and Figure 4-18).

An artificial cut-off drain was noted to the north-east of the project area. Pooling of water has occurred within this drain. No wetland features were identified within this system.

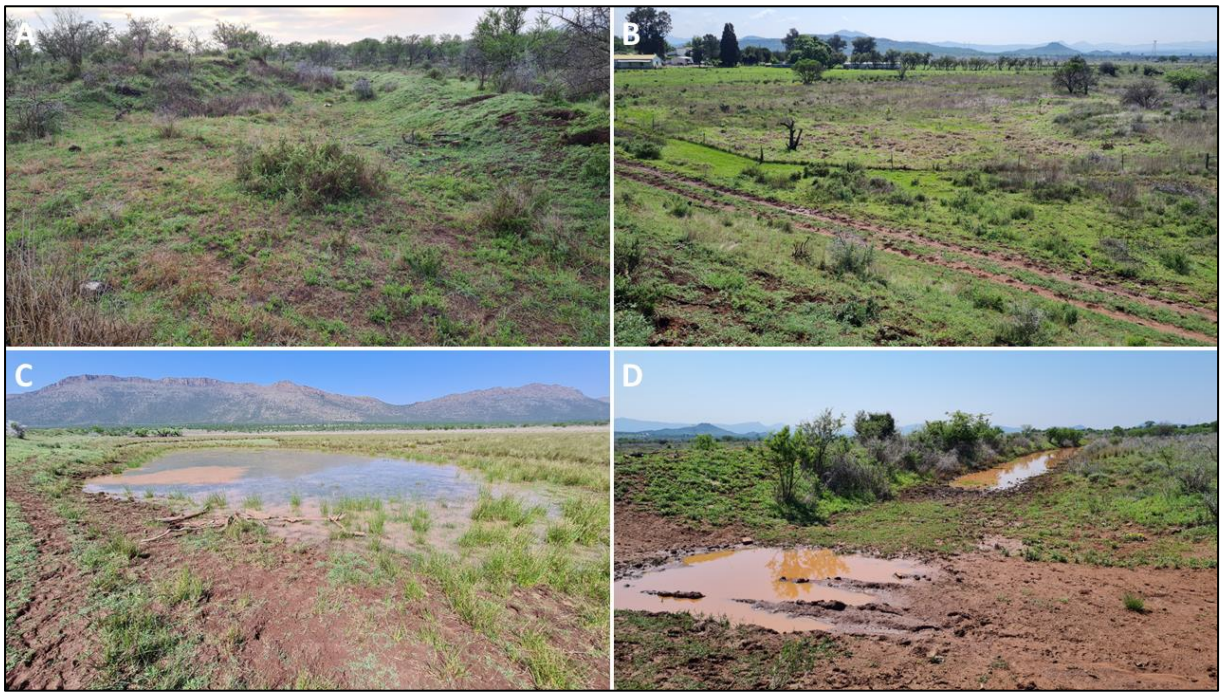


Figure 4-17 Examples of the different wetlands found within the project area. A) Channelled valley bottom (HGM 1); B) Hillslope Seep (HGM 2); C) Dam (HGM 3); D) Cut-off drain and inundation/ standing water within drain.

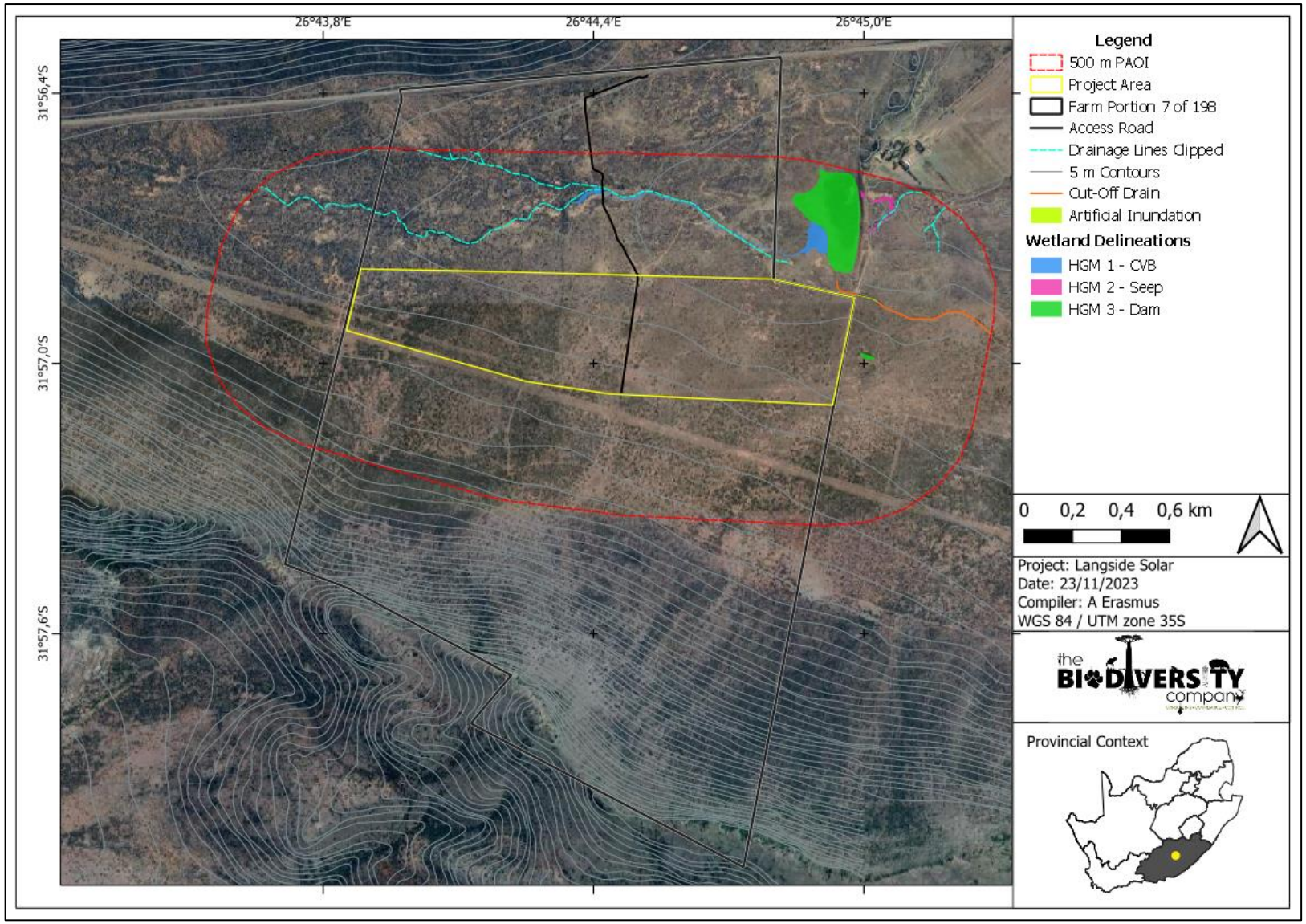


Figure 4-18 Delineation of all the water resources located throughout the 500 m PAOI

4.4.1.2 Buffer Requirements

It is worth noting that the scientific buffer calculation (Macfarlane *et al*., 2014) was used to determine the size of the buffer zones relevant to the proposed project. A pre-mitigation buffer of 32 m and a post-mitigation wetland and watercourse buffer of 15 m (Table 4-5) is recommended for the delineated wetlands in relation to the proposed development. This is attributed to pre-existing modifications of the land around the wetlands and the nature of the project which has the potential of minimally impacting on the wetland systems.

The suggested buffer in this report does not qualify as a relaxation to any other legislated buffers managed by the respective authorities (eg., DEA and DWS). Therefore, the relevant authorisations are still a requirement prior to project commencement.

Figure 4-19 further illustrates that identified wetland resources within the PAOI are avoided by the final layout of the proposed Solar PV facility.

Table 4-5 Calculated Buffers for the HGM units

Aspect	Pre-Mitigation	Post-Mitigation
PV Area and access road	32 m	15 m

4.4.1.3 Regulation Zone

Table 4-6 presents the legislated zones of regulation that would be applicable to the delineated drainage lines, drainage channels and depressions (or pans).

In accordance with General Notice (GN) 509 of 2016 as it relates to the NWA (1998), a regulated area of a watercourse for Section 21 (c) and 21 (i) of the NWA, 1998 means the outer edge of the 1 in 100 year flood or where no flood line has been determined it means 100 m from the edge of a watercourse or a 500 m radius from the delineated boundary (extent) of any wetland or pan.

Listed activities in terms of the NEMA (1998), (Act 107 of 1998) EIA Regulations as amended in April 2017 must be taken into consideration if any infrastructure is to be placed within the applicable zone of regulation, which in this case is a 32 m zone of regulation.

The proposed development is not located within the 32 m regulated area (NEMA), but is within the 100 m regulated area (NWA). However, the access road does cross the channelled valley bottom wetland (HGM 1), and therefore is also within the GA 509 and NEMA Act 107 regulated zones (Figure 4-19).

Table 4-6 The legislated zones of regulation

Regulatory authorisation required	Zone of applicability
Water Use License Application in terms of the National Water Act, 1998 (Act No. 36 of 1998). Department of Water and Sanitation (DWS)	Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998). In accordance with GN509 of 2016 as it relates to the National Water Act, 1998 (Act 36 of 1998), a regulated area of a watercourse in terms of water uses as listed in Section 21c and 21i is defined as: • the outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; • in the absence of a determined 1 in 100 year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or • a 500m radius from the delineated boundary (extent) of any wetland or pan in terms of this regulation.

Listed activities in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) EIA Regulations (2014), as amended.	Activity 12 of Listing Notice 1 (GN 327) of the National Environmental Management Act, 1998 (Act No.107 of 1998) EIA regulations, 2014 (as amended) states that: The development of: (xii) Infrastructure or structures with a physical footprint of 100 square meters or more; Where such development occurs— a) Within a watercourse; b) In front of a development setback; or c) If no development setback has been adopted, within 32 meters of a watercourse, measured from the edge of a watercourse. Excluding –
Department of Environmental Affairs and Development Planning (DEA&DP)	… (dd) where such development occurs within an urban area… Activity 19 of Listing Notice 1 (GN 327) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) EIA regulations, 2014 (as amended) states "The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse."

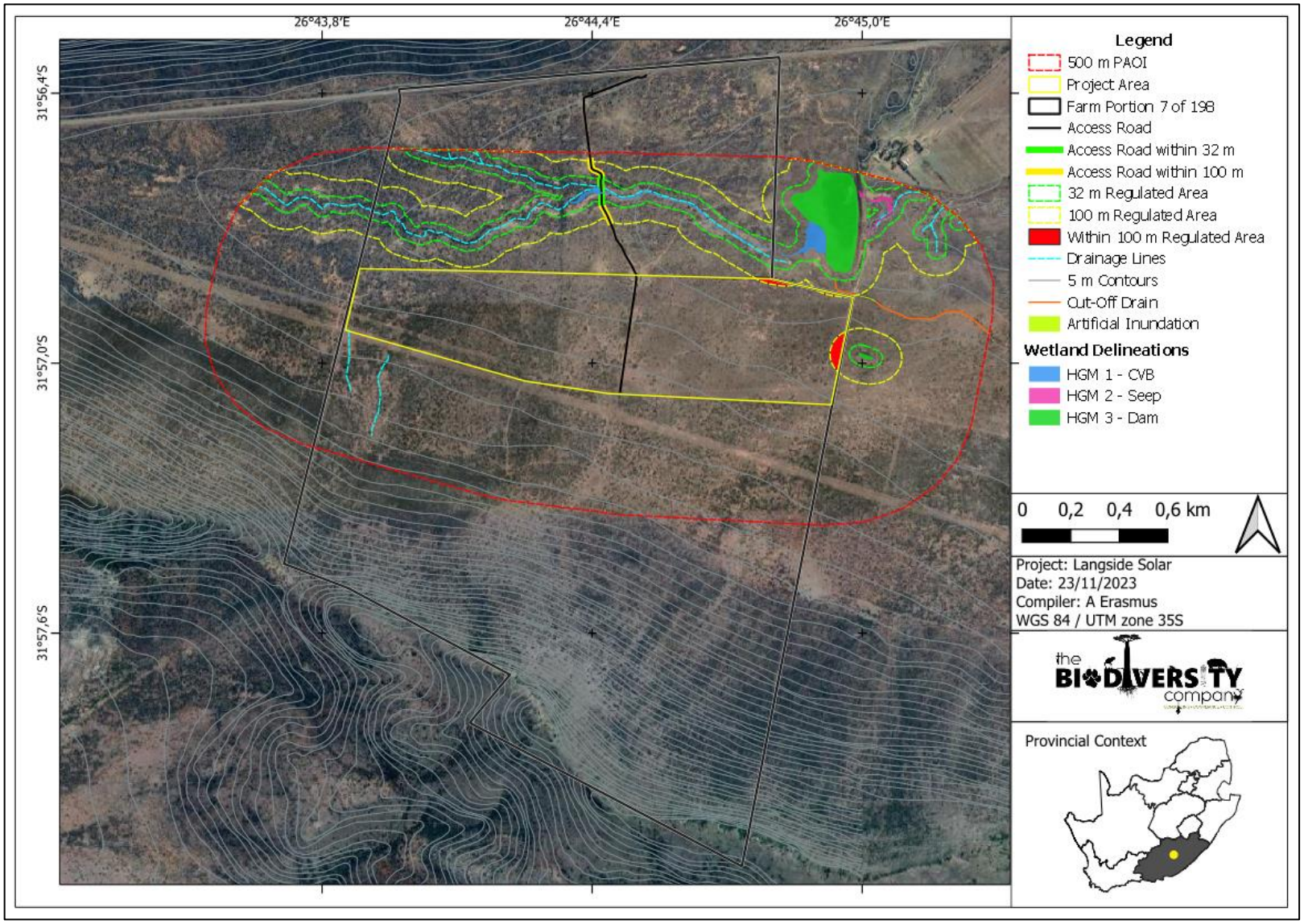


Figure 4-19 Extent of regulated areas

4.4.2 Flora

The vegetation assessment was conducted throughout the extent of the project area. A total of 17 tree, shrub, herbaceous and graminoid plant species were recorded in the project area during the field assessment (Table 4-7). Plants listed as Category 1 alien or invasive species under the NEMBA appear in green text.

The list of plant species recorded to is by no means comprehensive, a survey conducted under guard may likely yield up to 30% additional flora species for the project area. However, floristic analysis conducted to date is however regarded as a sound representation of the local flora for the project area. Some of the plants recorded can be seen in (Figure 4-20) below.

Table 4-7 Trees, shrub and herbaceous plant species recorded in the project area

Family	*Scientific Name*	Threat Status (SANBI, 2017)	SA Endemic	Alien Category
Asphodelaceae	*Bulbine abyssinica*	LC	Not Endemic	
Asteraceae	*Brachyscome ciliaris*	LC	Not Endemic	
Asteraceae	*Felicia muricata*	LC	Not Endemic	
Asteraceae	*Gazania krebsiana*	LC	Not Endemic	
Boraginaceae	*Ehretia rigida*	LC	Endemic	
Cactaceae	*Opuntia ficus-indica*			NEMBA Category 1b.
Celastraceae	*Gymnosporia buxifolia*	LC	Not Endemic	
Fabaceae	*Vachellia natalitia*	LC	Endemic	
Hyacinthaceae	*Drimia altissima*	LC	Not Endemic	
Hyacinthaceae	*Ledebouria revoluta*	LC	Not Endemic	
Poaceae	*Digitaria eriantha*	LC	Not Endemic	
Poaceae	*Eragrostis cilianensis*	LC	Not Endemic	
Poaceae	*Eragrostis curvula*	LC	Not Endemic	
Poaceae	*Hyparrhenia dregeana*	LC	Not Endemic	
Poaceae	*Panicum coloratum*	LC	Not Endemic	
Poaceae	*Themeda triandra*	LC	Not Endemic	
Solanaceae	*Solanum marginatum*			NEMBA Category 1b.

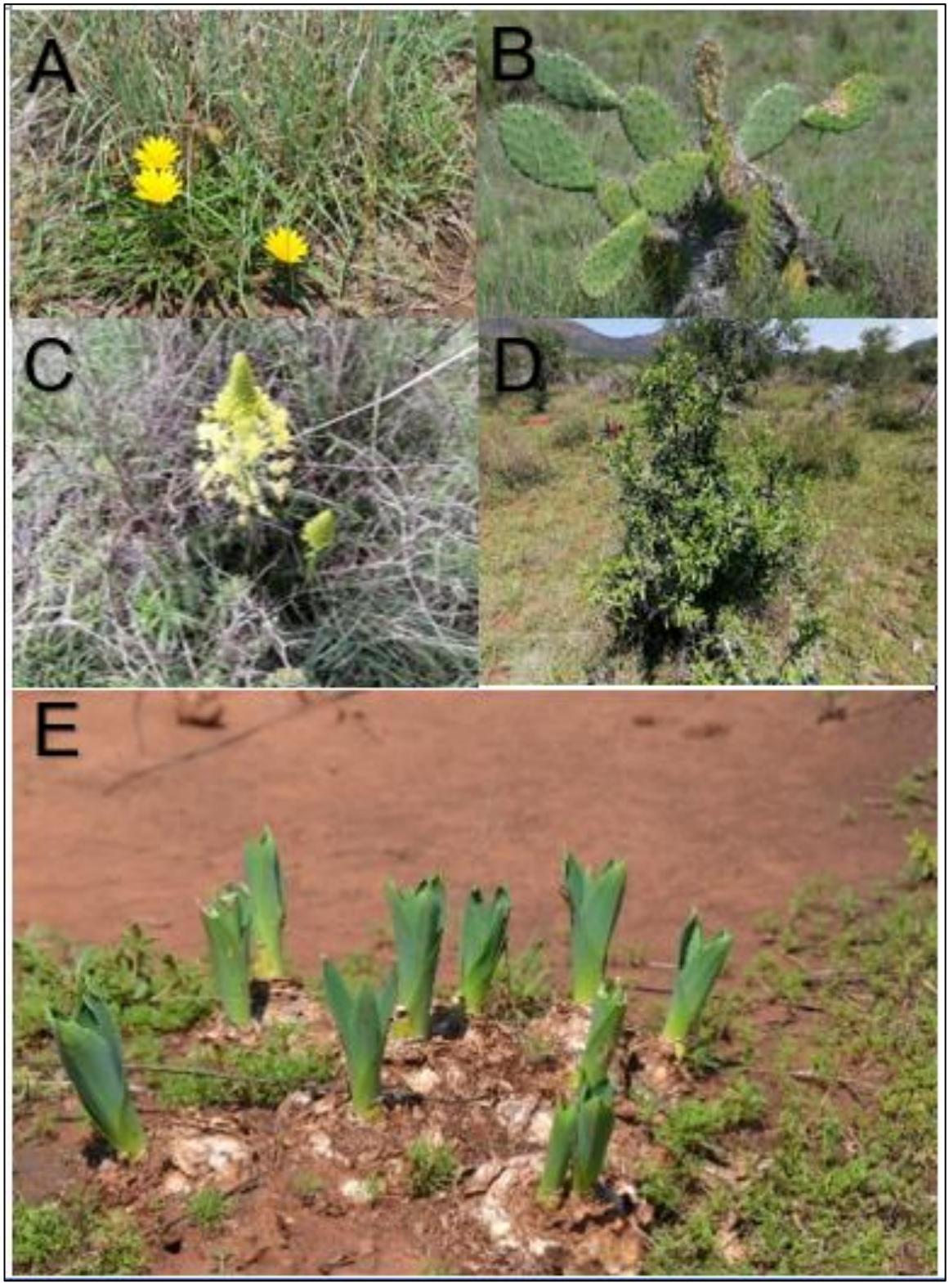


Figure 4-20 ***Some of the plant species recorded in the area: A) Gazania krebsiana, B) Opuntia ficus (NEMBA Category 1b), C) Bulbine abyssinica, D) Gymnosporia buxifolia, E) Drimia altissima.***

4.4.2.1 Invasive Alien Plants

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

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

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

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

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

Two (2) IAP species were recorded within the project area, they were *Opuntia ficus-indica* and *Solanum marginatum.* These species are listed under the Alien and Invasive Species List 2021, Government Gazette No. 44182 as Category 1b and Category 2. Category 1b species must be controlled by implementing an IAP Management Programme, in compliance of section 75 of the NEMBA, as stated above.

4.4.1 Fauna

Herpetofauna and mammal observations and recordings are addressed in this section. A separate Avifauna report was compiled (TBC, 2023).

4.4.1.1 Amphibians and Reptiles

No reptile or amphibian species were recorded during the site assessment.

4.4.1.2 Mammals

Seven (7) mammal species were observed that could naturally occur outside of protected areas. These observations were based on either direct observation or the presence of visual tracks and signs (Figure 4-20).

Table 4-8 Summary of mammal species recorded within the project area.

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Canis mesomelas	Black-backed Jackal	LC	LC
Damaliscus pygargus philipsi	Blesbok	LC	LC
Hystrix africaeaustralis	Cape Porcupine	LC	LC
Papio ursinus	Chacma Baboon	LC	LC
Pedetes capensis	Southern African Springhare	LC	LC
Raphicerus campestris	Steenbok	LC	LC
Sylvicapra grimmia	Common Duiker	LC	LC

Figure 4-21 Some of the mammal species recorded in the project area: A) Pedetes capensis, B) Hystrix africaeaustralis and C) Damaliscus pygargus phillipsi

5 Habitat Assessment and Site Ecological Importance

5.1 Habitat Assessment

The main habitat types identified across the project area were initially identified largely based on aerial imagery. These main habitat types were refined based on the field coverage and data collected during the survey; the delineated habitats can be seen in Figure 5-1. Emphasis was placed on limiting timed meander searches along the proposed project area within the natural habitats and therefore habitats with a higher potential of hosting SCC.

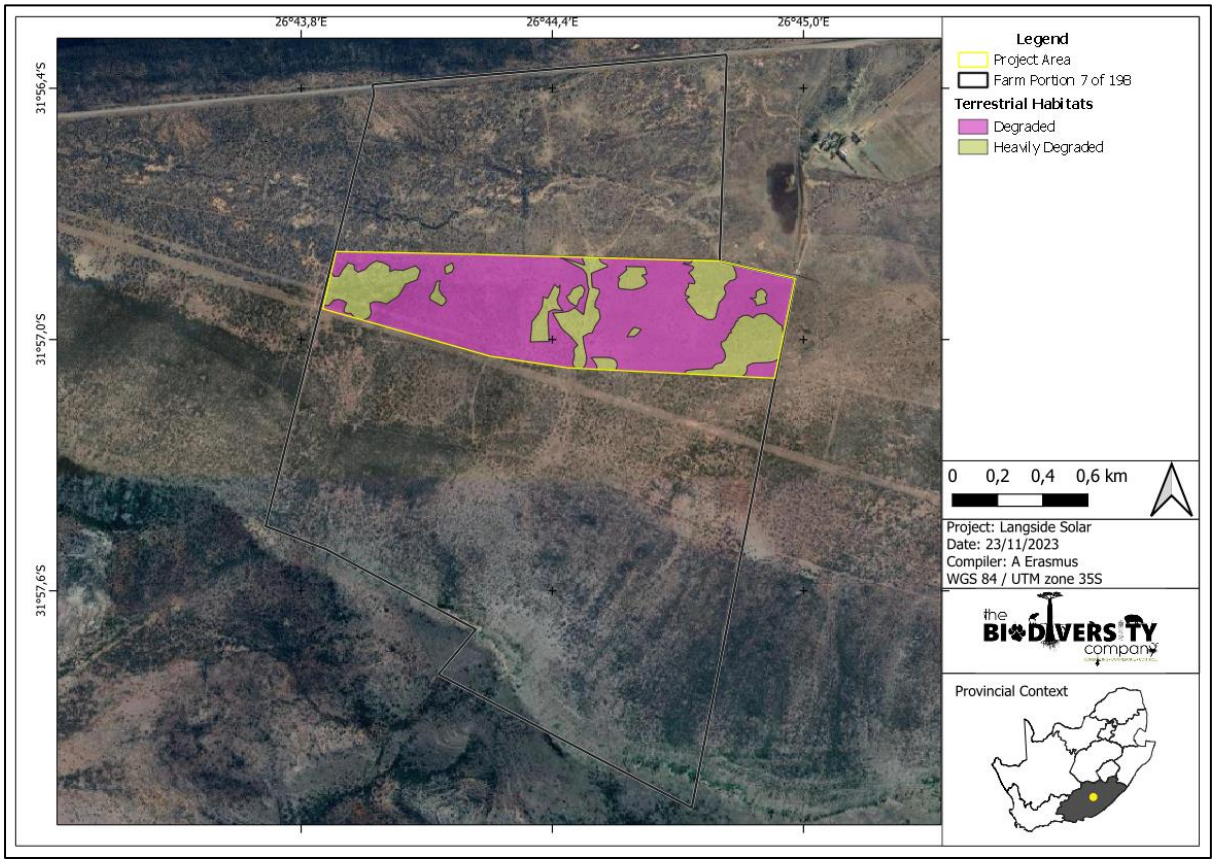


Figure 5-1 Habitats identified in the overall project area of interest

Degraded Habitat

This habitat type is regarded as degraded or semi-natural, it is the remainder of the habitat that has not been as disturbed by recent and historic grazing. This habitat represents an amalgamation of grassland-woodland vegetation resulting in a complex with slightly undulating landscape. The habitat is almost exclusively dominated by *Vachellia natalitia* trees. The habitat type was found to be more intact, although historical and ongoing grazing pressure and tree clearance has decreased the species diversity. The unit also serves as a movement corridor for fauna within a landscape. A medium sensitivity rating was given to this habitat.

Figure 5-2 Representative example of the degraded grassland-woodland vegetation unit identified on the project area.

Heavily Degraded Habitat

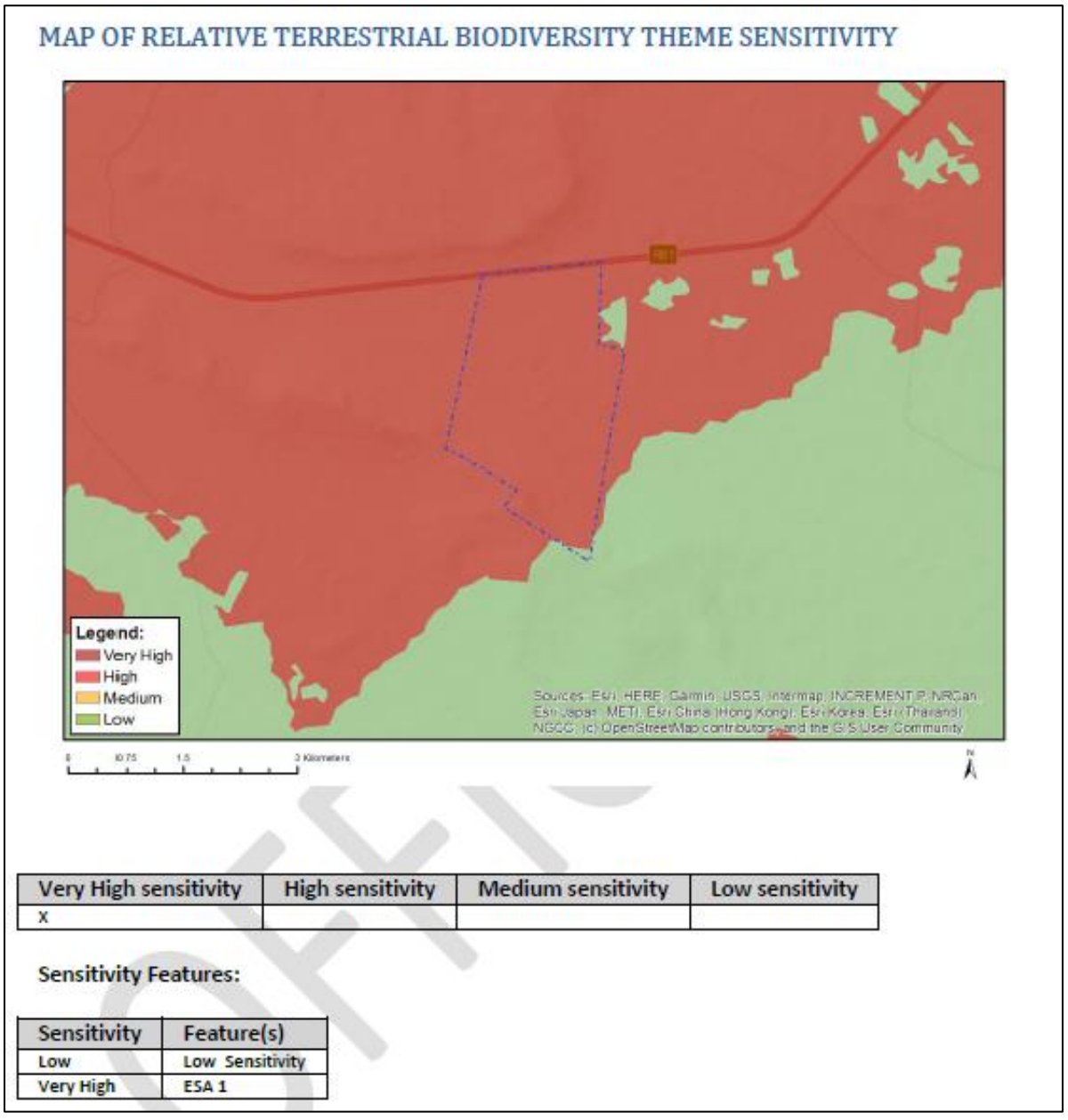
This area has been significantly disturbed and modified from its natural state, it represents habitat that is more disturbed than the 'degraded habitat' area. This habitat is linked to areas that have been impacted more by historic overgrazing (waterpoints), tree clearance and mismanagement. These habitats aren't entirely transformed but exist in a constant disturbed state as it can't recover to a more natural state due to ongoing disturbances and impacts it receives from grazing and mismanagement. These areas are considered to have a low sensitivity based on the overall functional integrity of the site that is low. The functional integrity is related to the habitat connectivity, the rehabilitation potential, and the current minor and major ecological impacts.

Figure 5-3 Representative example of the heavily degraded habitat units identified on the project area.

5.2 Site Ecological Importance

5.2.1 Terrestrial Assessment and Sensitivitites

The biodiversity theme sensitivity, as indicated in the DFFE screening report, was derived to be Very High, (Figure 5-5), while the animal and plant species theme sensitivity shows that majority of the area is classified as Medium.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Very High	ESA 1

Figure 5-4 Terrestrial Biodiversity Theme Sensitivity, DFFE Screening Report.

The allocated sensitivities for each of the relevant themes are either disputed or validated for the overall PAOI in Table 5-1 below. A summative explanation for each result is provided as relevant. The specialist-assigned sensitivity ratings are based largely on the SEI process followed in the previous section, and consideration is given to any observed or likely presence of SCC or protected species.

Table 5-1 Summary of the screening tool vs specialist assigned sensitivities

Screening Tool Theme	Screening Tool	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Animal Theme	**Medium**	**Medium**	Validated – Habitat is generally disturbed and adjacent to roads and development, thus the regular presence of SCC is unlikely. SCC may forage in specific areas.
Plant Theme	**Medium**	**Low**	Disputed- Although high species composition is present the state of the habitat has been disturbed by mainly cattle overgrazing. No SCC were recorded leading to a low sensitivity.
Terrestrial Theme	**Very High**	**Low**	Disputed –Habitat sensitivities are regarded as low sensitivity due to the habitat condition being more degraded.

Based on the criteria provided in section 3.2 of this report, the habitat types have each been allocated a sensitivity category, or SEI, and this breakdown is presented in below. In order to identify and spatially present sensitive features in terms of the relevant specialist discipline, the sensitivities of each of the habitat types delineated within the PAOI are mapped in Figure 5-5 below.

It is important to note that this map does not replace any local, provincial, or national government legislation relating to these areas or the land use capabilities or sensitivities of these environments.

Table 5-2 SEI Summary of habitat types delineated within field assessment area of project area.

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Degraded	Low	Medium	Low	Medium	Low
Heavily Degraded	Low	Low	Low	Very High	Very Low

Table 5-3 Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

Site Ecological Importance	Interpretation in relation to development 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.

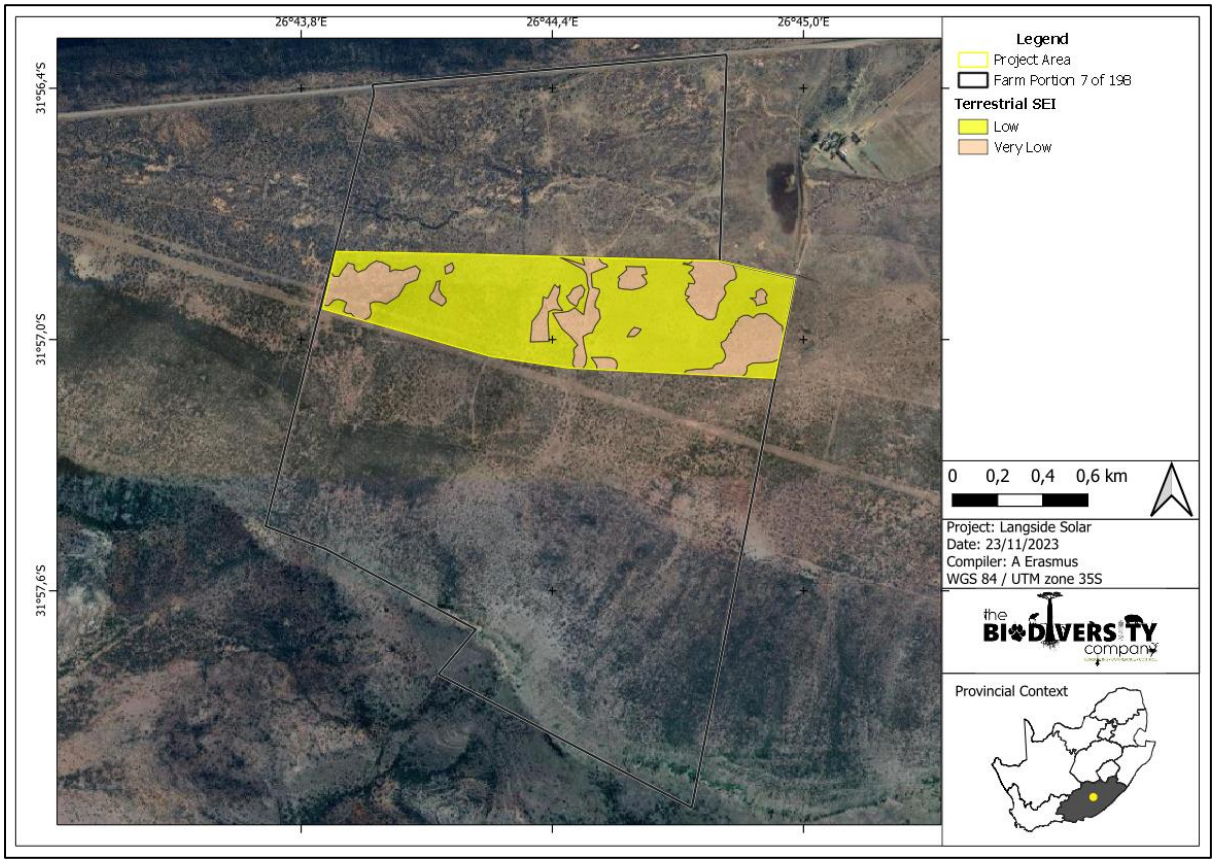


Figure 5-5 Map depicting the sensitivity of the habitats delineated for the project area.

5.2.2 Freshwater Assessment and Sensitivities

All wetland areas delineated have been classified as having a Low sensitivity, with the 32 m regulated area been allocated a moderate sensitivity. Only the road is foreseen to impact the wetland systems within the 500 m PAOI (see Figure 5-6).

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	ESA 1

Figure 5-6 Aquatic Biodiversity Theme Sensitivity (DEFF, 2023)

6 Aquatic Biodiversity Impact Assessments

6.1 Potential Impacts

The impact assessment considered the anticipated direct and indirect impacts to the wetland systems as a result of the proposed development (Table 5-1). The mitigation hierarchy as discussed by the Department of Environmental Affairs (2013) will be considered for this component of the assessment (

Figure 6-1). In accordance with the mitigation hierarchy, the preferred mitigatory measure is to avoid impacts by considering alternate options in project location, sitting, scale, layout, technology and implementing project/activity phasing to avoid impacts.

Should avoidance, minimisation of impact and rehabilitation of wetlands and watercourses be deemed impossible in terms of the project requirements, the formulation and implementation of a wetland offset plan will be required to compensate for the loss of the natural systems. This plan does not negate the rehabilitation requirements for other partially or indirectly impacted systems.

Figure 4-18 indicates that HGM 1, HGM 2, and HGM 3 fall beyond the proposed development footprint. The pre- and post- mitigation risks were therefore determined to be “Moderate” and “Low”, respectively.

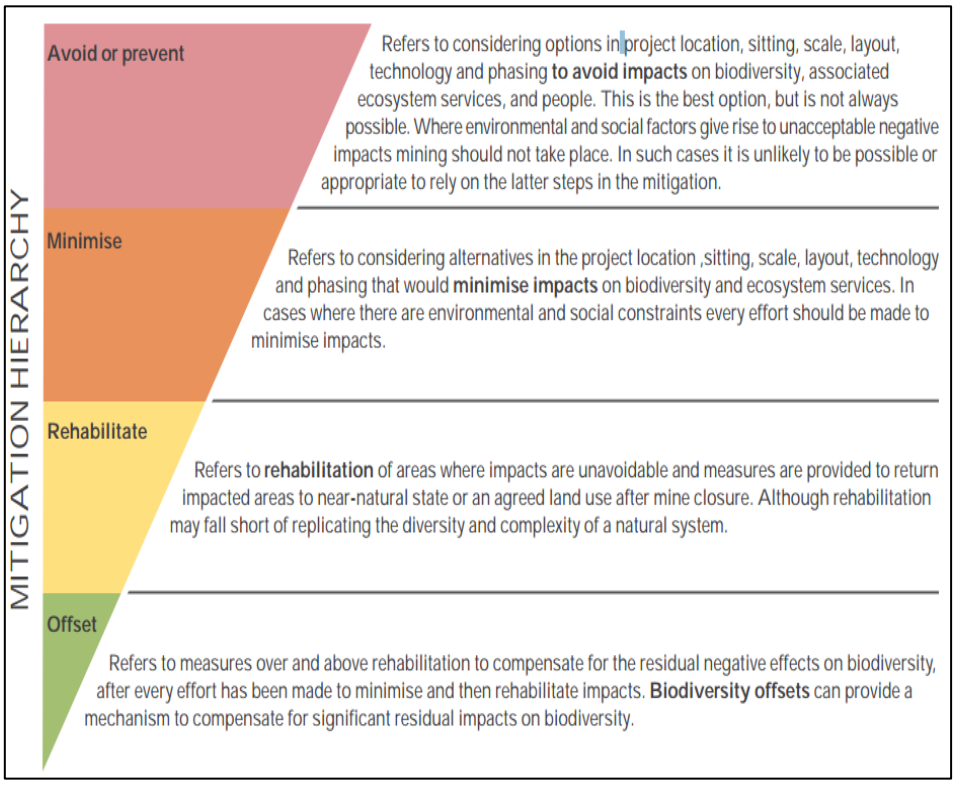


Figure 6-1 The mitigation hierarchy as described by the DEA (2013)

Table 6-1 Anticipated Impacts arising from the proposed development

Activity	Impacts
Clearing wetland vegetation	• Loss/degradation of wetland habitat • Potential erosion • Proliferation of alien invasive species
Minor excavations	• Potential erosion and subsequent sedimentation of downstream watercourses • Altered surface flow conditions
Establishment of ablution facilities, laydown areas and servitudes	• Disturbance of wetland habitat with altered surface flow conditions • Proliferation of alien invasive species
Operation of equipment and plant within or in near-proximity wetlands	• Disturbance within wetland habitat • Potential for the proliferation of species from inter-site movement of plant
Stochastic spills and leaks from plant and vehicles	• Loss/degradation of wetland vegetation/habitat • Soil contamination • Impaired water quality
Stripping and stockpiling excavated soil	• Potential proliferation of alien invasive species • Altered surface flow conditions • Sedimentation of downstream watercourses
Vehicle movement through wetlands	• Disturbance within wetland habitat • Dispersal of alien invasive species
Solid waste disposal	• Loss/degradation of wetland habitat • Pollution of watercourses • Impaired water quality within wetland • Altered surface flows

6.2 Risk Assessment

Table 6-2 DWS Risk Impact Matrix for wetlands in relation to the proposed development (Rowan Buhrmann Pr Sci Nat 136853)

Activity	Aspect	Impact	Mitigation Scenario	Severity: Flow Regime	Water Quality	Habitat	Biota	Average	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
Construction																			
Site clearing and preparation. Earthworks and Vehicle Movement. Road Construction. Civil Works. Transportation and Installation of PV Panels. Wiring to Central Inverters. Storage and Use of Hazardous substances and Equipment.	Wetland Habitat Disturbance/Loss (Vegetation and Soil)	Direct disturbance / degradation / loss to wetland soils or vegetation due to the construction of the solar facility.	Without	3	2	3	3	2.75	2	4	8.75	3	3	5	1	12	105	**M**	• Clearly demarcate the construction footprint and restrict all construction activities to within the proposed infrastructure area. • When clearing vegetation, allow for some vegetation cover as opposed to bare areas. • Minimize the disturbance footprint and the unnecessary clearing of vegetation outside of this area. • Use the wetland shapefiles to signpost the edge of the wetlands closest to site. Place the sign 32 m from the edge (this is the pre-mitigation buffer zone). Label these areas as "environmentally sensitive areas, keep out!". • Educate staff and relevant contractors on the location and importance of the identified wetlands through toolbox talks and by including them in site inductions as well as the overall master plan.
			With	2	2	2	2	2	1	2	5	1	2	1	1	5	25	**L**	
		Direct disturbance / degradation / loss to wetland soils or vegetation due to the construction of the access road.	Without	3	3	3	2	2.75	1	4	7.75	3	4	5	1	13	100.75	**M**	
			With	2	2	2	2	2	1	2	5	1	3	5	1	10	50	**L**	
		Proliferation of alien invasive species due to surrounding disturbances.	Without	2	2	3	3	2.5	3	3	8.5	3	4	1	2	10	85	**M**	

Activity	Aspect	Impact	Severity: Mitigation Scenario	Flow Regime	Water Quality	Habitat	Biota	Average	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
			With	2	2	2	2	2	2	3	7	3	2	1	1	7	49	L	• All activities (including driving) must adhere to the respective buffer areas (15m post- and 32m pre-mitigation). • Promptly remove / control all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs) must be removed. • All alien vegetation should be managed in terms of the Regulation GNR.1048 of 25 May 1984 (as amended) issued in terms of the Conservation of Agricultural Resources Act, Act 43 of 1983. • Landscape and re-vegetate all denuded areas as soon as possible. • Clearly demarcate waste disposal areas and ensure waste is appropriately and timeously managed. • Limit construction activities near (< 32m) wetlands to winter (as much as possible) when rain is least likely to wash concrete and sand into the wetland. • Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash. • Make sure all excess consumables and building materials / rubble is removed
		Pollution and littering through inappropriate management of domestic and Industrial waste.	Without	2	4	2	3	2.75	2	2	6.75	3	3	1	2	9	60.75	M	
			With	1	2	2	1	1.5	1	2	4..5	2	2	1	1	4	18	L	
	Hydrology and Water Quality (runoff from the construction site)	Altered hydrology due to hardened surfaces and stormwater channelling.	Without	4	2	2	2	2.5	3	4	9.5	3	3	5	3	14	133	M	
			With	2	2	1	1	1.5	2	2	5.5	2	2	5	1	10	55	L	
		Increased erosion and sedimentation.	Without	2	3	3	2	2.5	3	4	9.5	3	4	1	2	10	95	M	
			With	2	2	2	1	1.75	1	3	5.75	2	2	1	1	6	34,5	L	

Activity	Aspect	Impact	Severity														Control Measures
			Mitigation Scenario	Flow Regime	Water Quality	Habitat	Biota	Average	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	
		Potential contamination of wetlands with machine oils/pesticides/insecticides/herbicides and construction materials.	Without	2	4	3	3	3	3	3	9	3	3	1	3	10	90	M	from site and deposited at an appropriate waste facility. • Appropriately stockpile topsoil cleared from the project area. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering the wetlands. • Design and implement an effective stormwater management plan. • Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g. slabs of concrete with rocks cemented in and sediment traps if required).
			With	1	2	2	2	1.75	1	2	4.75	1	2	1	1	5	23,75	L	
Operational Phase																			
Operation of the solar facility; Established PV Facility. Vehicle Traffic (Security	Hydrology and Water Quality (runoff from the construction site)	Altered hydrology due to hardened surfaces and stormwater channelling.	Without	4	3	2	2	2.75	3	4	9.75	4	3	5	3	15	146.25	M	• Design and Implement an effective stormwater management plan. • Promote water infiltration into the ground beneath the solar panels. • Release only clean water into the environment.
			With	2	2	1	1	1.5	2	2	5.5	2	2	5	1	10	55	L	

Activity	Aspect	Impact	Severity: Mitigation Scenario	Flow Regime	Water Quality	Habitat	Biota	Average	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
Monitoring and Maintenance). Operation of on-site Stormwater Management.		Increased erosion and sedimentation.	Without	3	3	3	2	2.75	3	4	9.75	4	3	1	3	11	107.25	M	• Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g. slabs of concrete with rocks cemented in and sediment traps if required). • Regularly clear drains. • Minimise the extent of concreted / paved / gravel areas. • A covering of soil and grass (regularly cut and maintained) below the solar panels is ideal for infiltration. If not feasible then gravel is preferable over concrete or paving. • Re-vegetate denuded areas as soon as possible. • Avoid excessively compacting the ground beneath the solar panels. • Where possible minimise the use surfactants to clean solar panels and herbicides to control vegetation beneath the panels. If surfactants and herbicides must be used do so well prior to any significant predicted rainfall events. • See mitigation for the proliferation of Alien Invasive species. • Clearly demarcate waste disposal areas and ensure
			With	2	2	2	1	1.75	1	3	5.75	2	2	1	1	6	34,5	L	
		Potential contamination of wetlands with machine oils and pesticides/herbicides/insecticides used within the facility.	Without	3	4	2	3	3	3	3	9	3	3	1	3	10	90	M	
			With	1	2	2	2	1.75	1	2	4.75	1	2	1	1	5	23,75	L	
	Wetland Habitat Disturbance/Loss	Pollution and littering through inappropriate management of domestic and Industrial waste.	Without	2	3	2	2	2.25	2	2	6.25	4	3	1	2	10	62.5	M	
			With	1	2	2	1	1.5	1	2	4..5	2	2	1	1	4	18	L	
		Continued proliferation of Alien Invasive species.	Without	3	2	3	2	2.5	2	2	6.5	4	3	1	2	10	65	M	
			With	2	2	2	2	2	2	3	7	3	2	1	1	7	49	L	

			Severity															
Activity	Aspect	Impact	Mitigation Scenario	Flow Regime	Water Quality	Habitat	Biota	Average	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
																			waste is appropriately and timeously managed.
Decommissioning Phase																			
Removal and Dismantlement of infrastructure. Vehicles and Equipment on roads. Rehabilitation of biophysical environment	Hydrology and Water Quality (runoff from the construction site)	Altered hydrology due to changing surfaces which affect the quantity of stormwater runoff.	Without	3	3	2	2	2.5	3	3	8.5	3	3	5	3	14	119	M	• Adhere to the wetland buffers (pre-mitigation - 32m & post-mitigation 15m) • Develop and implement a rehabilitation and closure plan. • Clearly demarcate waste disposal areas and ensure waste is appropriately and timeously managed. • See mitigation for the proliferation of alien invasive species. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering the wetlands. • Appropriately rehabilitate the project area by ripping, landscaping and re-vegetating with locally indigenous species. • Ensure that alteration to the stormwater system does not create concentrated flows and erosion (Erosion control and sediment traps methods must be implemented wherever
			With	2	2	1	1	1.5	2	2	5.5	2	2	5	1	10	55	L	
		Increased erosion and sedimentation from altered hydrology and adjacent geomorphology.	Without	3	4	3	2	3	3	2	8	4	3	1	3	11	88	M	
			With	2	2	2	1	1.75	1	3	5.75	2	2	1	1	6	34,5	L	
		Potential contamination of wetlands with chemicals (machine oils/fuel/pesticides/herbicides/insecticides and other potentially harmful elements).	Without	2	4	3	3	3	3	2	8	4	3	1	3	11	88	M	
			With	1	2	2	2	1.75	1	2	4.75	1	2	1	1	5	23,75	L	
	Wetland Habitat Disturbance/Loss	Direct disturbance / degradation / loss to wetland soils or vegetation due to inappropriate management.	Without	2	3	3	3	2.75	2	3	7.75	4	4	5	2	15	116.25	M	
			With	2	2	2	2	2	1	2	5	1	2	1	1	5	25	L	
		Pollution and littering through inappropriate management of domestic and Industrial waste.	Without	2	4	2	2	2.5	3	2	7.5	3	2	1	2	8	60	M	

Activity	Aspect	Impact	Severity: Mitigation Scenario	Flow Regime	Water Quality	Habitat	Biota	Average	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
			With	1	2	2	1	1.5	1	2	4..5	2	2	1	1	4	18	L	signs of erosion and sedimentation are evident) • Where possible minimise the use of herbicides to control vegetation in the working spaces. If surfactants and herbicides must be used do so well prior to any significant predicted rainfall events. • Revegetate bare and denuded areas to prevent erosion, subsequent downstream sedimentation, and the proliferation of alien species. • Ensure that contractors or any staff involved in the project have undergone a training/induction to promote environmental consciousness.
		Continued proliferation of Alien Invasive species.	Without	3	2	3	2	2.5	2	3	7.5	3	3	1	2	9	67.5	M	
			With	2	2	2	2	2	2	3	7	3	2	1	1	7	49	L	

In accordance with General Notice 509 "Risk is determined after considering all listed control / mitigation measures. Borderline Low / Moderate risk scores can be manually adapted downwards up to a maximum of 25 points (from a score of 80) subject to listing of mitigation measures.

7 Impact Management and Mitigation Plan

In line with the protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity, as per Government Notice 320 published in terms of NEMA, dated 20 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, when applying for Environmental Authorisation” – section 3, subsection 1:

The information obtained from a site sensitivity verification, which involved both a desktop assessment as well as a field survey, confirmed that the proposed footprint area is of a ‘Low’ sensitivity a Terrestrial Biodiversity Compliance Statement was completed. Therefore, no impact assessment is required, however a management plan is provided below.

The aim of the management outcomes is to present mitigation actions in such a way that they can be incorporated into the Environmental Management Programme (EMPr), and possible biodiversity management programme, for the project, which should in turn allow for a more successful implementation and auditing of the mitigations and monitoring guidelines. **Error! Reference source n ot found.** presents the recommended mitigation measures and the respective time frames, targets, and performance indicators relative to the terrestrial assessment.

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

- Prevent the further loss and fragmentation of vegetation communities in the vicinity of the project area;
- Reduce the negative fragmentation effects of the development and enable the safe movement of fauna species;
- Prevent the direct and indirect loss and disturbance of flora and fauna species and communities; and
- Adequately follow the guidelines for interpreting the Site Ecological Importance ratings assigned to the project area.

Table 7-1 Project specific mitigation measures including requirements for timeframes, roles and responsibilities

Management outcome: Vegetation and Habitats				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Laydown and construction preparation activities (such as cement mixing, temporary toilets, etc.) must be limited to pre-defined areas	Construction Phase	Project manager, Environmental Officer	Development footprint	Ongoing
It is recommended that areas to be developed/disturbed be specifically demarcated so that during the construction/activity phase, only the demarcated areas be impacted upon.	Construction Phase	Project manager, Environmental Officer	Development footprint	Ongoing
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should not be fragmented or disturbed further.	Construction Phase	Project manager, Environmental Officer	Development footprint	Ongoing
All vehicles and personnel must make use of existing roads as far as possible and walking paths, especially construction/operational vehicles.	Construction Phase	Project manager, Environmental Officer	Development footprint	Ongoing
The clearing of vegetation must be minimised where possible. All activities must be restricted to within the authorised areas. It is recommended that areas to be developed be specifically and responsibly demarcated so that during the construction phase only the demarcated areas be impacted upon.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
Existing access routes, especially roads, must be made use of.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated laydown areas.	Construction and Operational Phase	Environmental Officer, Design Engineer, and Contractor	Laydown areas	Ongoing

Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by invasive alien plant species. All grazing mammals must be kept out of the areas that have recently been re-planted.	Operational phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. • **Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.** • **No servicing of equipment on site unless necessary.** • **All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers.** • **Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment.** • **Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem.** • **All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area.**	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing
It must be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	Life of operation	Project manager, Environmental Officer	Any instances	Ongoing
A fire management plan needs to be complied and implemented to restrict the impact fire would have on the surrounding areas.	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase
All construction waste must be removed from site at the closure of the construction phase.	Construction phase	Environmental Officer & Contractor	Construction waste	During Phase
Management outcome: Fauna				

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
A qualified environmental control officer must be on site for the duration of the construction phase. A site walk through is recommended by a suitably qualified ecologist prior to any activities taking place and any SSC or protected species should be noted. In situations where these species are observed and must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development and implementation of a search, rescue and recovery program is suggested for the protection of these species. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated.	Construction Phase	Environmental Officer, Contractor	Presence of any floral or faunal SCC	During phase
Clearing and disturbance activities must be conducted in a progressive linear manner, always outwards and away from the centre of the project area and over several days, so as to provide an easy escape route for all small mammals and herpetofauna.	Construction Phase	Environmental Officer & Contractor	Progressive land clearing operations and the movement of fauna	Ongoing
The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this.	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing
The duration of the activities should be minimised to as short a term as possible, to reduce the period of disturbance on fauna.	Construction	Project manager, Environmental Officer & Design Engineer	Construction/Closure Phase	Ongoing
Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals.	Construction/Operational Phase	Environmental Officer	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed and Signs must be put up to enforce this. Monitoring must take place in this regard.	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapour lighting should be avoided, and sodium vapour (green/red) lights or LED lighting with a light spectrum similar to sodium vapour lighting should be used wherever possible.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light	Ongoing

All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.	Life of operation	Health and Safety Officer	Compliance to the training	Ongoing
Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons.	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day	Ongoing
Any holes/deep excavations must be dug in a progressive manner and shouldn't be left open overnight. Should any holes remain open overnight they must be covered temporarily to ensure that no small fauna species fall in, this can be achieved with the placement of temporary covers such as cardboard or plastic over the holes. Holes must be subsequently inspected for fauna prior to backfilling.	Planning and Construction	Environmental Officer & Contractor, Engineer	Presence of trapped animals and open holes	Ongoing
Fencing mitigations: • **Top 2 strands must be smooth wire** • **Routinely re-tension loose wires** • **Minimum 30cm between wires** **Place markers on fences.**	Planning, construction, and operation	Environmental Officer & Contractor, Engineer	Fence construction. Limiting risk to large bird species and mammals	Ongoing
If fencing is required: wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area.	Planning and construction	Environmental Officer & Contractor, Engineer	Fauna movement corridor	Ongoing
Use environmentally friendly cleaning and dust suppressant products.	Construction and operation	Environmental Officer & Contractor, Engineer	Presence of chemicals in and around the project area	Ongoing
Once the development layout has been confirmed, the footprint area must be fenced off appropriately in segments pre-construction to allow animals to move or be moved out of these areas before breaking ground activities occur. Construction activities must take place systemically and the perimeter fence should not be completed if required (i.e., leaving sections unfenced to allow fauna to escape) until systematic clearing is completed. Drilling etc. should start one side of the site and progress towards the section of the site where fences are incomplete (away from the center of the PAOI).	Planning/Construction Phase	Environmental Officer & Design Engineer	Areas not to be developed and construction direction	Ongoing
Management outcome: Alien species				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency

An Invasive Alien Plant Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changed in IAP composition.	Life of operation	Project manager, Environmental Officer & Contractor	Manage and assess presence and encroachment of alien vegetation	Twice a year
The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths.	Construction/Operational Phase	Project manager, Environmental Officer & Contractor	Footprint Area	Life of operation
A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests.	Life of operation	Environmental Officer & Health and Safety Officer	Evidence or presence of pests	Life of operation
Management outcome: Dust				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes the wetting of exposed soft soil surfaces. **No non-environmentally friendly suppressants may be used as this could result in the pollution of water sources.**	Construction phase	Contractor	Dustfall	Dust monitoring program.
Management outcome: Waste management				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Waste management must be a priority and all waste must be collected and stored effectively and responsibly according to a site-specific waste management plan. Dangerous waste such as metal wires and glass must only be stored in fully sealed and secure containers, before being moved off site as soon as possible.	Life of operation	Environmental Officer & Contractor	Waste Removal	Weekly
Litter, spills, fuels, chemical and human waste in and around the project area must be minimised and controlled according to the waste management plan.	Construction/Closure Phase	Environmental Officer & Health and Safety Officer	Presence of Waste	Daily
Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site.	Construction Phase	Environmental Officer & Contractor	Cement mixing and spills	Every occurrence

A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Life of operation	Environmental Officer & Health and Safety Officer	Number of toilets per staff member. Waste levels	Daily
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility within every 10 days at least.	Life of operation	Environmental Officer & Health and Safety Officer	Availability of bins and the collection of the waste	Ongoing
Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site or buried on open pits.	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Collection/handling of the waste	Ongoing
Refuse bins will be responsibly emptied and secured. Temporary storage of domestic waste shall be in covered and secured waste skips. Maximum domestic waste storage period will be 10 days.	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Management of bins and collection of waste	Ongoing, every 10 days

Management outcome: Environmental awareness training				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
All personnel and contractors are to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. **Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of protected species, their identification, conservation status and importance, biology, habitat requirements and management requirements in line with the Environmental Authorisation and within the EMPr.** **Contractors and employees must all undergo the induction and must be made aware of any sensitive areas to be avoided.**	Pre-construction phase	Health and Safety Officer, Environmental Officer	Compliance to the training	Ongoing

Management outcome: Erosion				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency

Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds.	Life of operation	Project manager, Environmental Officer	Water Runoff from road surfaces	Ongoing
Only existing access routes and walking paths may be made use of.	Life of operation	Project manager, Environmental Officer	Routes used within the area	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events etc.	Life of operation	Project manager, Environmental Officer	Re-establishment of indigenous vegetation	Progressively
A stormwater management plan must be compiled and implemented.	Life of operation	Project manager, Environmental Officer	Management plan	Before construction phase: Ongoing

8 Conclusion

8.1 Terrestrial Ecology

The PAOI has been altered, both currently and historically. The present land use has had a direct impact on both the fauna and the flora in the area, which is evident in the heavily degraded habitats. Historically, grazing from livestock and mismanagement has led to (limited) deterioration of the area. Degraded are used for habitat, foraging and movement corridors for fauna within a landscape fragmented by development. This is especially true regarding the water resource habitats.

The screening tool assessments were validated for the animal theme and plant theme sensitivities, while the overall terrestrial sensitivities were disputed as shown below.

Screening Tool Theme	Screening Tool	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Animal Theme	**Medium**	**Medium**	Validated – Habitat is generally disturbed and adjacent to roads and development, thus the regular presence of SCC is unlikely. SCC may forage in specific areas.
Plant Theme	**Medium**	**Low**	Disputed- Although high species composition is present the state of the habitat has been disturbed by mainly cattle overgrazing. No SCC were recorded leading to a low sensitivity.
Terrestrial Theme	**Very High**	**Low**	Disputed –Habitat sensitivities are regarded as low sensitivity due to the habitat condition being more degraded.

8.2 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 also suggests the presence of features in proximity to the project area, with wetland systems expected for the 500 m regulation area.

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

The aquatic biodiversity theme sensitivity for the area is classified as “Low”, with no suggested presence of natural water resources for the area. The presence of these resources within the respective regulation zones was confirmed, and the aquatic biodiversity theme sensitivity is therefore confirmed to be “Low” sensitivity’. Based on this, a compliance statement is suitable for the development. A risk assessment has been conducted on the proposed development. As the wetlands occur outside the development footprint (excluding the road, which is existing and will be formalised), there will likely only be indirect and minor impacts to these systems. The risk assessment (DWS, 2015) concludes that the wetlands will be at “Moderate Risk” prior to mitigation which can be reduced to “Low Risk” with the implementation of the suggested mitigation measures.

8.3 Impact Statement

It is the opinion of the specialists that the project may be favourably considered, provided that the mitigation measures presented in this report be implemented. The location and size of the ecosystem means that it is unlikely that any functional habitat or SCCs will be lost as a result of the impacts arising from the proposed activities.

9 References

Animal Demography Unit (ADU). (2017). Virtual Museum. (Accessed: May 2022).

Apps, P. (2012). Smithers' Mammals of Southern Africa – A field guide. Struik Nature, Cape Town, South Africa.

Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J & de Villiers, M.S. (Eds). (2014). Atlas and Red List of Reptiles of South Africa, Lesotho and Swaziland. Suricata 1. South African Biodiversity Institute, Pretoria.

Bird Atlas Project (SABAP2). (2012). http://vmus.adu.org.za/ (Accessed: May 2022).

BirdLife South Africa. (2015). Northern Turf Thornveld. https://www.birdlife.org.za/iba-directory/northern-turf-thornveld/ (Accessed: May 2022).

BirdLife South Africa. (2017). Important Bird Areas Factsheet. http://www.birdlife.org (Accessed: May 2022).

BGIS (Biodiversity GIS). (2017). http://bgis.sanbi.org/

BODATSA-POSA. (2021). Plants of South Africa - an online checklist. POSA ver. 3.0. http://newposa.sanbi.org/. (Accessed: May 2022).

Driver, A., Nel, J.L., Snaddon, K., Murray, K., Roux, D.J., Hill, L., Swartz, E.R., Manuel, J. & Funke, N. (2011). Implementation Manual for Freshwater Ecosystem Priority Areas. Report to the Water Research Commission, Pretoria.

FrogMap. (2017). The Southern African Frog Atlas Project (SAFAP, now FrogMAP). http://vmus.adu.org.za (Accessed: May 2022).

IUCN. (2021). The IUCN Red List of Threatened Species. www.iucnredlist.org (Accessed: May 2022).

MammalMap. (2017). http://vmus.adu.org.za (Accessed: May 2022).

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

National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection. (2011). https://www.gov.za/documents/national-environmental-management-biodiversity-act-national-list-ecosystems-are-threatened (Accessed: May 2022)

National Environmental Screening Tool. (2017). https://screening.environment.gov.za/screeningtool/index.html#/pages/welcome) (Accessed: May 2022).

NBA. (2018). National Biodiversity Assessment spatial data. http://bgis.sanbi.org/ (Accessed: May 2022).

Nel JL, Murray KM, Maherry AM, Petersen CP, Roux DJ, Driver A, Hill L, Van Deventer H, Funke N, Swartz ER, Smith-Adao LB, Mbona N, Downsborough L and Nienaber S. (2011). Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

NWREAD. (2015). North-West Biodiversity Sector Plan 2015. Department of Rural, Environment and Agricultural Development: North-West Provincial Government. 124 pages.

Raimonde, D. (2009). Red list of South African Plants. SANBI, Pretoria.

ReptileMap. (2017). http://vmus.adu.org.za (Accessed: May 2022).

SADAP (South Africa Protected Areas Database) and SACAD (South Africa Conservation Areas Database). (2021). http://egis.environment.gov.za (Accessed: September 2023).

SANBI-BGIS. (2017). Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning.

Sinclair, I., Hockey, P. & Tarboton, W. (2002). Sasol Birds of Southern Africa – Third Edition. Struik Publishers, Cape Town.

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

Van Deventer, H., Smith-Adao, L., Collins, N.B., Grenfell, M., Grundling, A., Grundling, P-L., Impson, D., Job, N., Lötter, M., Ollis, D., Petersen, C., Scherman, P., Sieben, E., Snaddon, K., Tererai, F. and Van der Colff D. (2019). *South African National Biodiversity Assessment 2018: Technical Report.* Volume 2b: Inland Aquatic (Freshwater) Realm. CSIR report number CSIR/NRE/ECOS/IR/2019/0004/A. South African National Biodiversity Institute, Pretoria. http://hdl.handle.net/20.500.12143/6230.

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

10 Appendix Items

10.1 Appendix A – Specialist Declaration of Independence

DECLARATION

I, Andine Erasmus, 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.

Andine Erasmus

Ecologist (Awaiting SACNASP Candidacy)

The Biodiversity Company

October 2023

I, Rowan Buhrmann, 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.

Rowan Buhrmann

Ecologist (Pr Sci Nat Registered – 136853)

The Biodiversity Company

October 2023

I, Martinus Erasmus, 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.

Martinus Erasmus

Ecologist (Pr Sci Nat Registered – 118630)

The Biodiversity Company

October 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

Ecologist (Pr Sci Nat Registered – 400213/11)

The Biodiversity Company

October 2023