PROPOSED LIMESTONE PV1 AND LIMESTONE PV2 SOLAR PHOTOVOLTAIC FACILITY PROJECT – BIODIVERSITY AND FRESHWATER DESKTOP ASSESSMENT AND SENSITIVITY VERIFICATION

Z F Mgcawu District Municipality, Northern Cape

November 2022

CLIENT

Prepared by:

The Biodiversity Company

Cell: +27 81 319 1225

Fax: +27 86 527 1965

info@thebiodiversitycompany.com

www.thebiodiversitycompany.com

Report Name	**PROPOSED LIMESTONE PV1 AND LIMESTONE PV2 SOLAR PHOTOVOLTAIC FACILITY PROJECT – BIODIVERSITY AND FRESHWATER DESKTOP ASSESSMENT AND SENSITIVITY VERIFICATION**
Submitted to	savannah environmental
Report Writer	**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, basic assessments and assisting specialists in field during his studies since 2015. Martinus is Cand. Sci. Nat. registered (118630) is a specialist terrestrial ecologist and botanist which conducts floral surveys faunal surveys which include mammals, birds, amphibians and reptiles.
Report Writer / Reviewer	**Andrew Husted** 
	Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 13 years' experience in the environmental consulting field.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

Table of Contents

List of Tables

List of Figures

1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake a terrestrial and freshwater ecological site verification assessment for the proposed Limestone PV1 and Limestone PV2 Solar Photovoltaic (PV) project and associated infrastructure. The project is located on Portion 4 of the Farm Engeland 300, near Danielskuil, Northern Cape Province. (Figure 1-1). The extent of the project components is referred to as the Project Area of Influence (PAOI) and pertains to the project area.

Each project will have a contracted capacity of up to150MWp. A Project Site of 1842 ha and a Development Area with an extent of 300-400ha have been identified by AGV Projects (Pty) Ltd as technically suitable for the development of the PV facilities. Each facility is proposed to include the following infrastructure:

- PV modules mounted on either a single axis tracking & fixed structure, dependent on optimisation, technology available and cost.
- Inverters and transformers.
- Low voltage cabling between the PV modules to the inverters.
- Fence around the project development area with security and access control.
- Camera surveillance.
- Internet connection.
- 33kV cabling between the project components and the facility substation.
- 33/132kV onsite facility substation.
- Battery Energy Storage System (BESS) with a footprint of 3-5ha.
- Site offices and maintenance buildings, including workshop areas for maintenance and storage as well as parking for staff and visitors.
- Laydown/staging area on-site in front of mounting structures during installation. Temporary store area close to site entrance (Less than 2ha).
- Access roads (up to 6m wide) and internal distribution roads (up to 5m wide).
- Temporary concrete batching facility.
- Stormwater management infrastructure as required.

The proposed PAOI is in the Kgatelopele Local Municipality in the ZF Mgcawu District Municipality of the Northern Cape Province, South Africa. The area is approximately 9 km northeast of Lime Acres and 10 km northwest of the town of Witputs. The PAOI is also found approximately 8.3 km west of the R385 road and 6.4 km north of the R31 road. The surrounding land use includes limestone mining, watercourses, livestock, and game farming activities.

This desktop assessment and sensitivity verification was conducted in accordance with the amendments to 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 (GN) 320 (20 March 2020) and GN 1150 (30 October 2020) in terms of NEMA, dated 20 March and 30 October 2020: “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental

Authorisation" (Reporting Criteria). The National Web based Environmental Screening Tool has characterised the terrestrial and aquatic biodiversity sensitivity themes for the PAOI as "Very High".

Figure 1-1 The Project Area of Influence in proximity to the nearby towns

1.2 Scope of Work

The principle scope of work includes the following:

- Desktop assessment to identify the relevant ecologically important geographical features within the PAOI;
- Desktop assessment to compile an expected species list and possible threatened flora and fauna species that occur within the PAOI;
- Field survey to ascertain the species composition of the present flora and fauna community within the PAOI; and
- Delineate and map the habitats and their respective sensitivities that occur within the PAOI.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- For the purposes of this assessment, the results from the desktop evaluation and field survey considered the entire PAOI;
- Whilst every effort was made to cover as much of the site as possible, it is possible that some flora and fauna species that are present on site were not recorded during the field survey, especially secretive or rare species;
- With regards to the fauna species assessment, only amphibians, reptiles and non-volant mammal species were considered. The volant mammal impact assessment were undertaken by separate specialists;
- No passive sampling techniques for small non-volant mammals were utilised within the PAOI due to time constraints;
- Only a single scoping survey was undertaken in November (Summer) and hence there is a high probability that not all species of flora will be recorded. Due to time constraints no protected flora were geotagged;
- Any alterations and/or missing GIS information pertaining to the development layout subsequent to this assessment may affect the accuracy and/or outcomes of the assessment; and
- The GPS used in the assessment has an accuracy of 5 m and consequently any spatial features may be offset by 5 m.

1.4 Key Legislative Requirements

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

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	Northern Cape Planning and Development Act no. 7 of 1998	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,
	Northern Cape Nature Conservation act no. 9 of 2009	

1.4.1 National Environmental Management Act (NEMA, 1998)

The National Environmental Management Act (Act No. 107 of 1998) (NEMA) and the associated Environmental Impact Assessment (EIA) Regulations, as amended in April 2017, state that prior to certain listed activities taking place, an environmental authorisation application (EA) process needs to be followed. This could follow either the Basic Assessment (BA) process or the EIA process, depending on the scale of the impact. A BA process will be undertaken for the project.

GNR 1150 and a GNR 350 were gazetted on the 20 March and 30 October 2020, which have replaced the requirements of Appendix 6 of the EIA Regulations in respect of certain specialist reports. These regulations provide the criteria and minimum requirements for specialist's assessments, in order to consider the impacts on aquatic biodiversity for activities which require EA.

1.4.2 National Water Act (NWA, 1998)

The Department of Human Settlements Water and Sanitation (DHSWS) is the custodian of South Africa's water resources and therefore assumes public trusteeship of water resources, which includes watercourses, surface water, estuaries, or aquifers. The NWA allows for the protection of water resources, which includes the:

- Maintenance of the quality of the water resource to the extent that the water resources may be used in an ecologically sustainable way;

- Prevention of the degradation of the water resource; and
- Rehabilitation of the water resource.

A watercourse means;

- A river or spring;
- A natural channel in which water flows regularly or intermittently;
- A wetland, lake or dam into which, or from which, water flows; and
- Any collection of water which the minister may, by notice in the gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

The NWA recognises that the entire ecosystem and not just the water itself, and any given water resource constitutes the resource and as such needs to be conserved. No activity may therefore take place within a watercourse, unless it is authorised by the DHSWS. Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DHSWS in terms of Sections 21 (c) and (i) of the NWA.

2 Methods

2.1 Desktop Baseline

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

The PAOI was derived by using the property areas provided, as the project components will be planned within.

2.1.1 Ecologically Important Landscape Features

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

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

- *South Africa Protected Areas Database (SAPAD) (DEA, 2020)* – The (SAPAD) Database contains spatial data for the conservation of South Africa. 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, 2010)* – 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.

- Northern Cape Critical Biodiversity Areas (CBAs) (SANBI, 2016) - The identification of Critical Biodiversity Areas for the Northern Cape was undertaken using a Systematic Conservation Planning approach. Available data on biodiversity features (incorporating both pattern and process, and covering terrestrial and inland aquatic realms), their condition, current Protected Areas and Conservation Areas, and opportunities and constraints for effective conservation were collated. Priorities from existing plans such as the Namakwa District Biodiversity Plan, the Succulent Karoo Ecosystem Plan, National Estuary Priorities, and the National Freshwater Ecosystem Priority Areas were incorporated. Targets for terrestrial ecosystems were based on established national targets, while targets used for other features were aligned with those used in other provincial planning processes. CBA categories are based on their biodiversity characteristics, spatial configuration and requirement for meeting targets for both biodiversity pattern and ecological processes:
  - Critical Biodiversity Area (CBA) – An area that must be maintained in a good ecological condition (natural or near-natural state) in order to meet biodiversity targets. CBAs collectively meet biodiversity targets for all ecosystem types as well as for species and ecological processes that depend on natural or near-natural habitat, that have not already been met in the protected area network (SANBI, 2016).
  - Ecological Support Area (ESA) – An area that must be maintained in at least fair ecological condition (semi-natural/moderately modified state) in order to support the ecological functioning of a CBA or protected area, or to generate or deliver ecosystem services, or to meet remaining biodiversity targets for ecosystem types or species when it is not possible or no necessary to meet them in natural or near-natural areas (SANBI, 2016).
  - Other Natural Area (ONA) – An area in good or fair ecological condition (natural, near-natural or semi-natural) that is not required to meet biodiversity targets for ecosystem types, species or ecological processes (SANBI, 2016).
- Important Bird and Biodiversity Areas (IBAs) (BirdLife South Africa, 2015) – IBAs constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria; and
- Hydrological Setting:
  - South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al,* 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Impact Assessment of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types as well as pressures on these systems.

- Strategic Water Source Areas (SWSAs) (Le Maitre *et al*, 2021) – SWSAs are defined as areas of land that supply a quantity of mean annual surface water runoff in relation to their size and therefore, contribute considerably to the overall water supply of the country. These are key ecological infrastructure assets and the effective protection of surface water SWSAs areas is vital for national security because a lack of water security will compromise national security and human wellbeing.

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

2.1.2 Desktop Flora Baseline

The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) was used to identify the vegetation type that would have occurred under natural or pre-anthropogenically altered conditions. Furthermore, the Plants of Southern Africa (POSA) database was accessed to compile a list of expected flora species within the PAOI (Figure 2-1). 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.

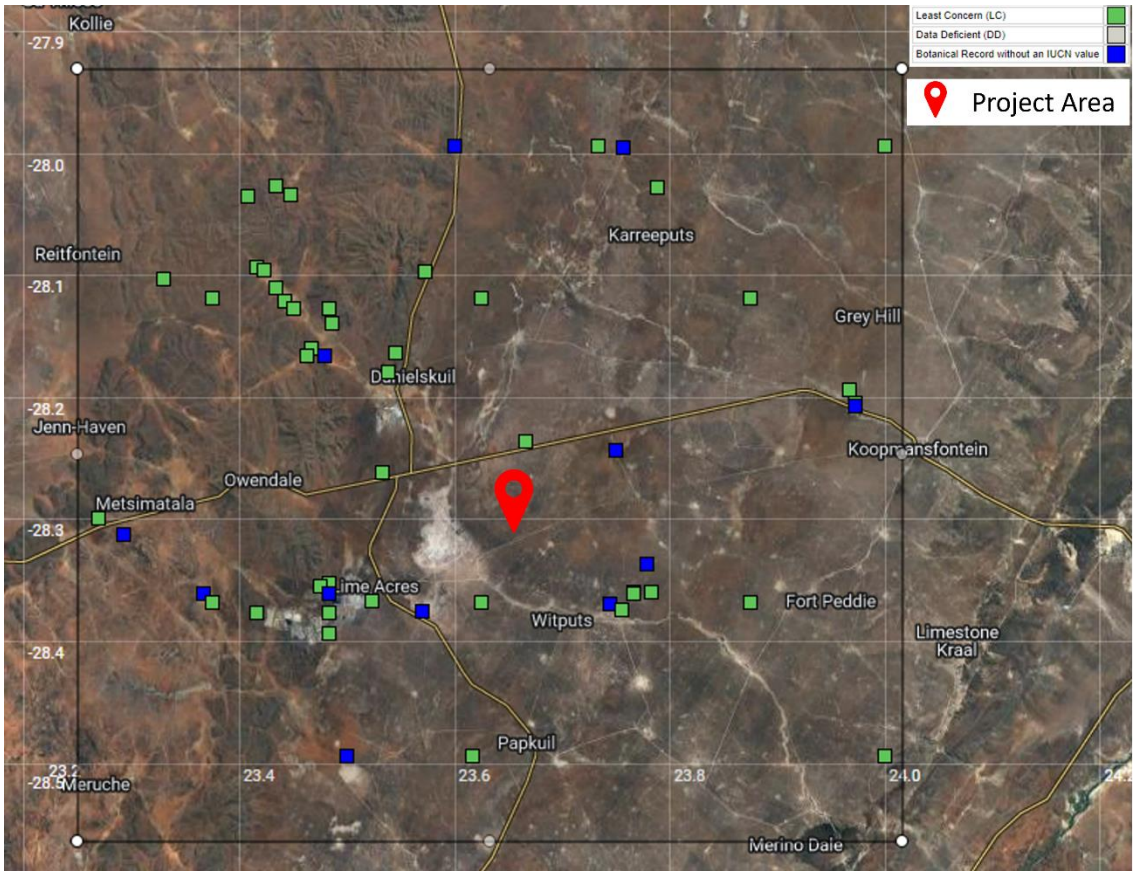


Figure 2-1 Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database.

2.1.3 Desktop Faunal Assessment

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

- Amphibian list, generated from the IUCN spatial dataset (2017) and ReptileMap database (FitzPatrick Institute of African Ornithology, 2021a), using the 2823 quarter degree square;

- Reptile list, generated from the IUCN spatial dataset (2017) and AmphibianMap database (FitzPatrick Institute of African Ornithology, 2021b), using the 2823 quarter degree square; and
- Mammal list from the IUCN spatial dataset (2017).

2.1.4 Desktop Freshwater Assessment

2.1.4.1 Desktop Research

The following spatial datasets were utilised:

- Aerial imagery (Google Earth Pro);
- Land Type Data (Land Type Survey Staff, 1972 - 2006);
- South African Inventory of Inland Aquatic Ecosystems (Van Deventer *et al*., 2019);
- The National Freshwater Ecosystem Priority Areas (Nel *et al*., 2011);
- Contour data (5m);
- NASA Shuttle Radar Topography Mission Global 1 arc second digital elevation data; and
- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer, H., *et al*., 2018).

2.2 Biodiversity Field Assessment

Field surveys for the area was undertaken from the 31st of October to the 3rd of November 2022 (summer), which is a wet-season survey, to determine the presence of Species of Conservation Concern (SCC). Effort was made to cover all the different habitat types, within the limits of time and access.

2.2.1 Flora Survey

The fieldwork and sample sites were placed within targeted areas (i.e. target sites) perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation) and GIS analysis (which included the latest applicable biodiversity datasets) available prior to the fieldwork. The focus of the fieldwork was therefore to maximise coverage and navigate to each target site in the field, to perform a rapid vegetation and ecological assessment at each sample site. Emphasis was placed on sensitive habitats, especially those overlapping with the proposed PAOI.

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

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

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

2.2.2 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.).

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);
- Smithers' Mammals of Southern Africa (Apps, 2000); and
- A Field Guide to the Tracks and Signs of Southern and East African Wildlife (Stuart and Stuart, 2000).

2.3 Terrestrial Site Ecological Importance (SEI)

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

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

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

Table 2-1 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 2-2 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 2-3.

Table 2-3 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 2-4.

Table 2-4 Summary of Resource Resilience (RR) criteria

Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.

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

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 2-5.

Table 2-5 Matrix used to derive Site Ecological Importance (SEI) from Receptor Resilience (RR) and Biodiversity Importance (BI)

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

Interpretation of the SEI in the context of the proposed project is provided in Table 2-6.

Table 2-6 Guidelines for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities

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

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

2.4 Wetland Assessment

2.4.1 Identification and Mapping

The National Wetland Classification Systems (NWCS) developed by the South African National Biodiversity Institute (SANBI) was considered for this assessment. This system comprises a hierarchical

classification process of defining a wetland based on the principles of the hydrogeomorphic (HGM) approach at higher levels. In addition, the method also includes the assessment of structural features at the lower levels of classification (Ollis *et al.,* 2013).

The wetland areas are delineated in accordance with the DWAF (2005) guidelines, a cross section is presented in Figure 2-2. The outer edges of the wetland areas were 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 is used as the primary wetland indicator. However, in practise the soil wetness indicator tends to be the most important, and the other three indicators are used in a confirmatory role.

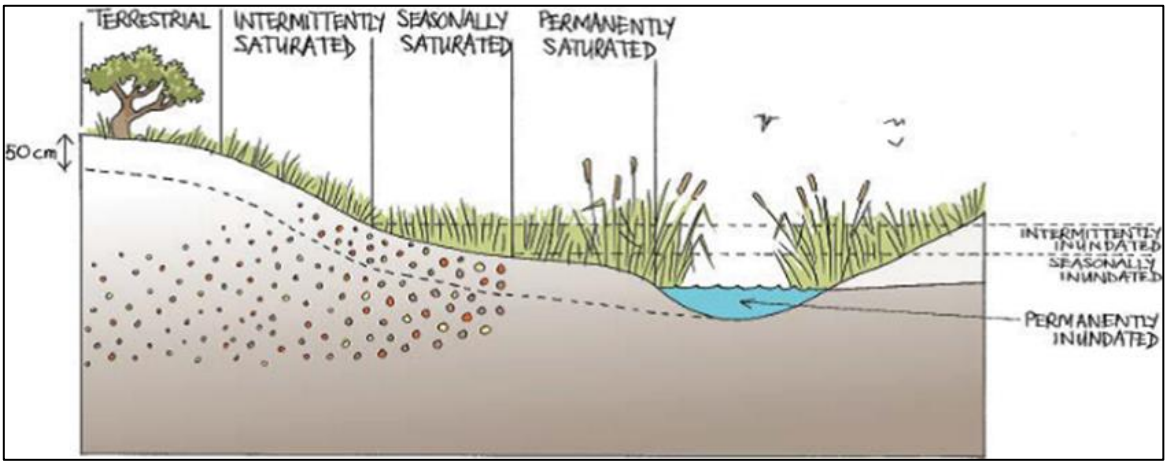


Figure 2-2 Cross section through a wetland, indicating how the soil wetness and vegetation indicators change (Ollis et al., 2013).

2.4.2 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. Eco Services serve as the main factor contributing to wetland functionality.

The assessment of the ecosystem services supplied by the identified wetlands was conducted per the guidelines as described in WET-EcoServices (Kotze *et al*. 2008). An assessment was undertaken that examines and rates the following services according to their degree of importance and the degree to which the services are provided (Table 2-7).

Table 2-7 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

2.4.3 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 2-8.

Table 2-8 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

2.4.4 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 2-9 (Rountree and Kotze, 2013).

Table 2-9 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**

2.4.5 Determining Buffer Requirements

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

2.4.6 Risk Assessment

The risk assessment was conducted in accordance with the DHSWS risk-based water use authorisation approach and delegation guidelines. The significance of the impact is calculated according to Table 2-10.

Table 2-10 Significance ratings matrix

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 notable 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 Results & Discussion

3.1 Desktop Baseline

3.1.1 Ecologically Important Landscape Features

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features are summarised in Table 3-1.

Table 3-1 Summary of relevance of the PAOI to ecologically important landscape features.

Desktop Information Considered	Relevant/Irrelevant	Section
Ecosystem Threat Status	Relevant – Overlaps with a Least Concern Ecosystem.	3.1.1.1
Ecosystem Protection Level	Relevant – The PAOI overlaps mainly with a MP ecosystem, with a small portion being NP	3.1.1.2
Critical Biodiversity Area	Relevant – the PAOI predominantly overlaps with areas classified as CBA; the majority of the area being CBA2	3.1.1.3
Renewable Energy EIA Application Database (REEA)	Relevant – An “approved” project occurs within the boundary of the PAOI.	3.1.1.4
South African Inventory of Inland Aquatic Ecosystems	Relevant – The PAOI overlaps with unclassified and LC wetlands and A CR River system	3.1.1.5.1
National Freshwater Priority Area	Relevant – The PAOI overlaps with several true NFEPA wetlands, as well as a FEPA River, classed as Freshwater Ecosystem Priority Area.	3.1.1.5.2
Strategic Water Source Areas	Irrelevant- The PAOI is more than 100 km from the closest SWSA.	
REDZ	Irrelevant – Does not overlap with any Renewable Energy Development Zones	
Powerline Corridor	Irrelevant – Does not overlap with any Powerline Corridor	
Important Bird and Biodiversity Areas	Irrelevant – Does not overlap with any IBA	
Protected Areas	Irrelevant – The PAOI is 29 km from the nearest Protected area.	
National Protected Areas Expansion Strategy	Irrelevant – The PAOI is 2.2 km from the nearest NPAES .	

3.1.1.1 Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem’s wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset the proposed project site overlaps with a LC ecosystem (Figure 3-1).

Figure 3-1 Map illustrating the ecosystem threat status associated with the PAOI.

3.1.1.2 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 PAOI overlaps mainly with a MP ecosystem, with a small portion being NP (Figure 3-2).

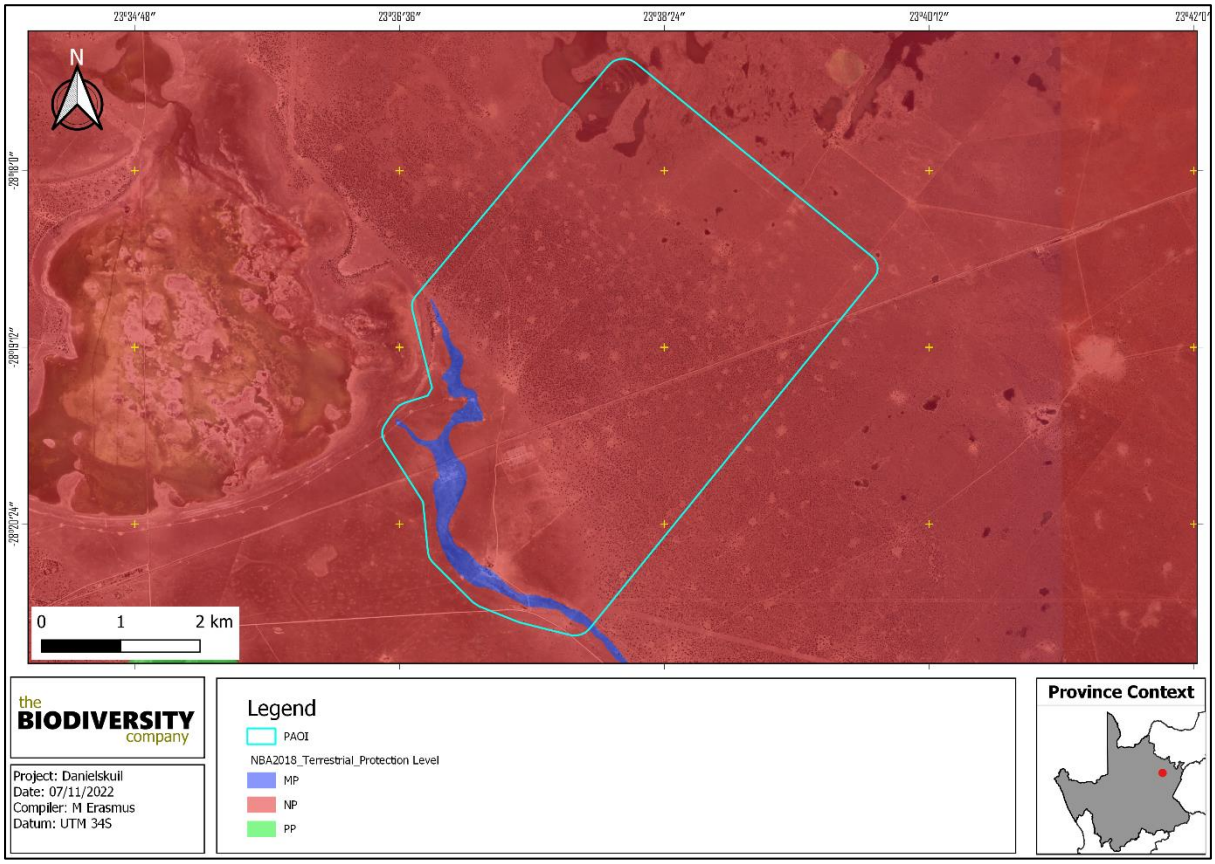


Figure 3-2 Map illustrating the ecosystem protection level associated with the PAOI

3.1.1.3 Critical Biodiversity Areas and Ecological Support Areas

Figure 3-3 illustrates that the PAOI predominantly overlaps with areas classified as CBA; most of the area being CBA2. CBAs are areas that must be maintained in a good ecological condition (natural or near-natural state) in order to meet biodiversity targets. CBAs collectively meet biodiversity targets for all ecosystem types as well as for species and ecological processes that depend on natural or near-natural habitat, that have not already been met in the protected area network (SANBI, 2016).

These areas are defined as their respective categories due to the presence of water resources and landscape structural elements.

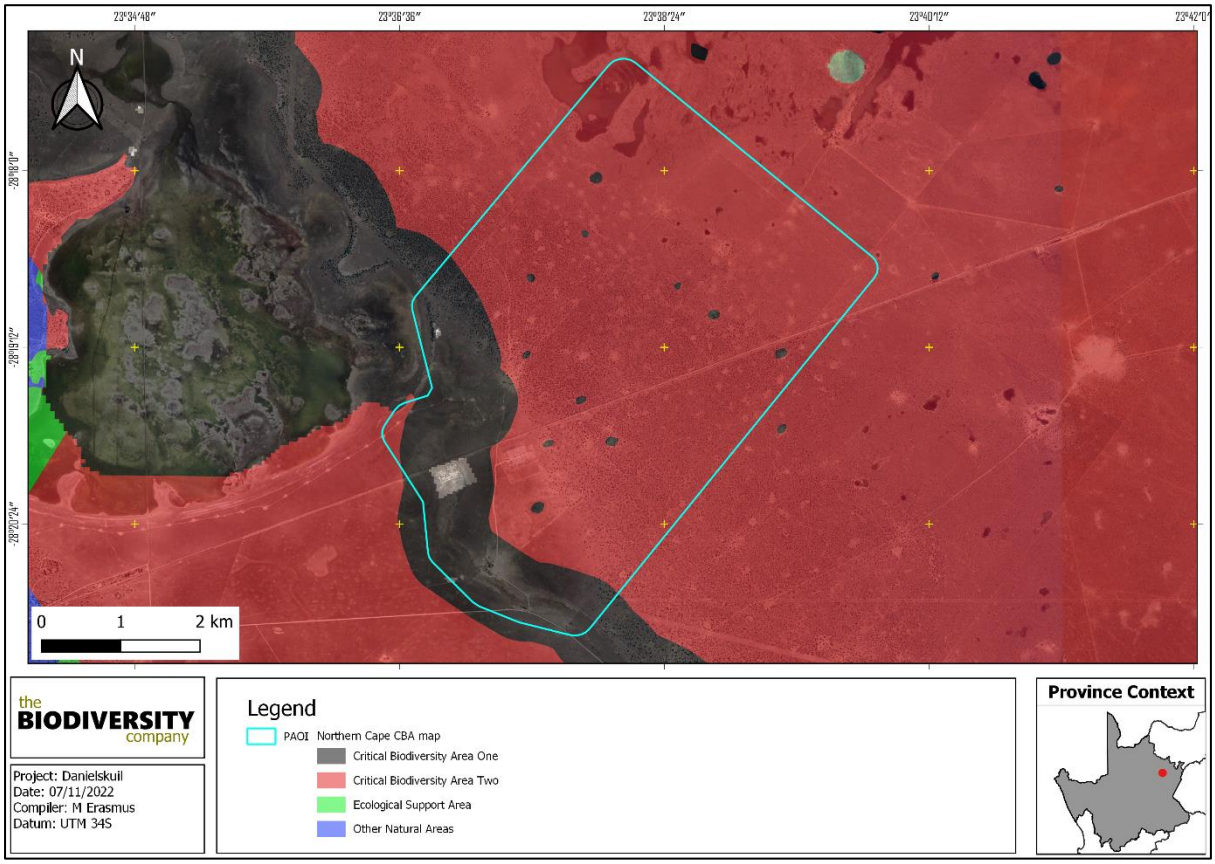


Figure 3-3 Map illustrating the locations of CBAs in the PAOI

3.1.1.4 Renewable Energy EIA Application Database

The Renewable Energy Database (http://egis.environment.gov.za/), shows that there several other projects in the near vicinity (Figure 3-4). This increases the overall impact on the habitats in the area. An “approved” project occurs within the boundary of the PAOI, however it is assumed that this EA has since lapsed.

Figure 3-4 The PAOI in relation to the renewable energy database projects in the area.

3.1.1.5 Hydrological Context

3.1.1.5.1 South African Inventory of Inland Aquatic Ecosystems (SAIIAE

The 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 PAOI overlaps with unclassified and LC wetlands and A CR River system, that were assessed as part of the SAIIAE (Figure 3-5).

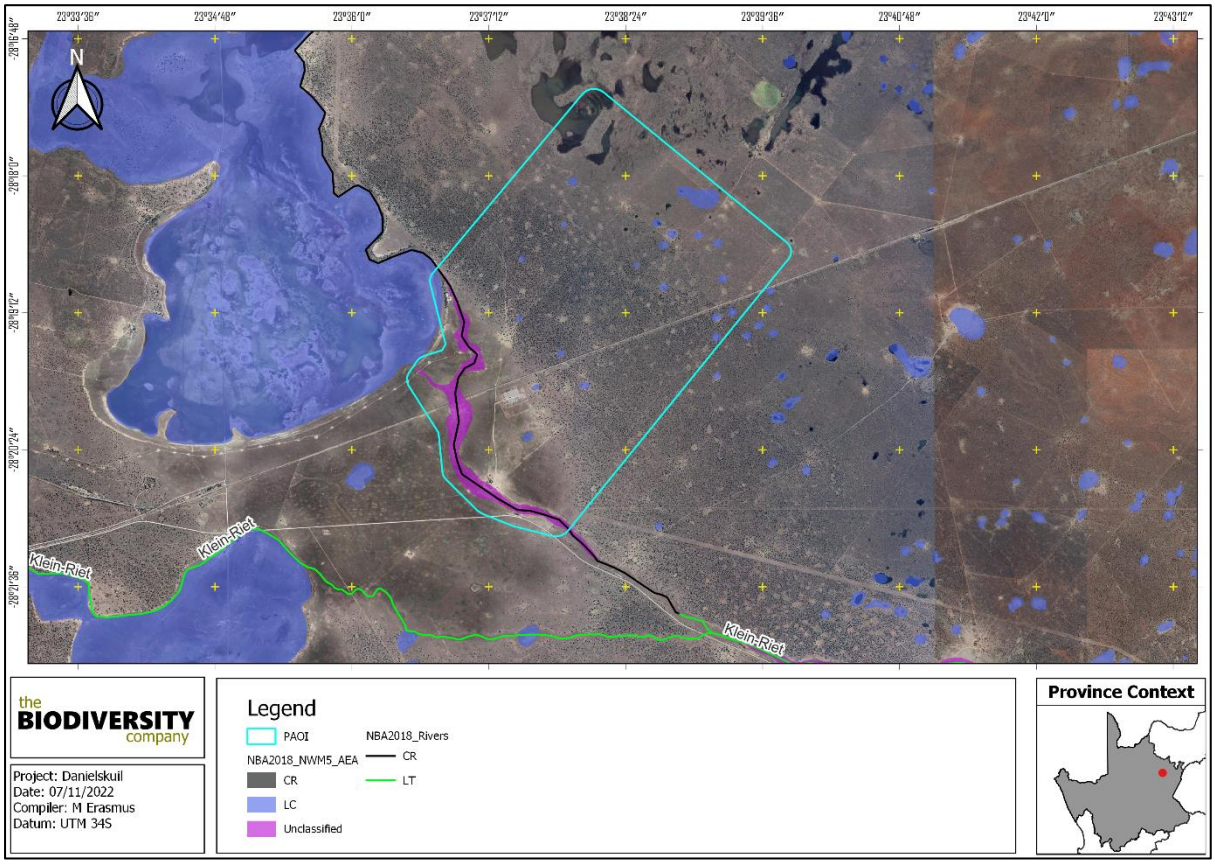


Figure 3-5 Map illustrating the hydrological context of the proposed PAOI

3.1.1.5.2 National Freshwater Ecosystem Priority Area Status

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

Figure 3-6 shows that the PAOI overlaps with several true NFEPA wetlands, as well as a FEPA River, classed as Freshwater Ecosystem Priority Area.

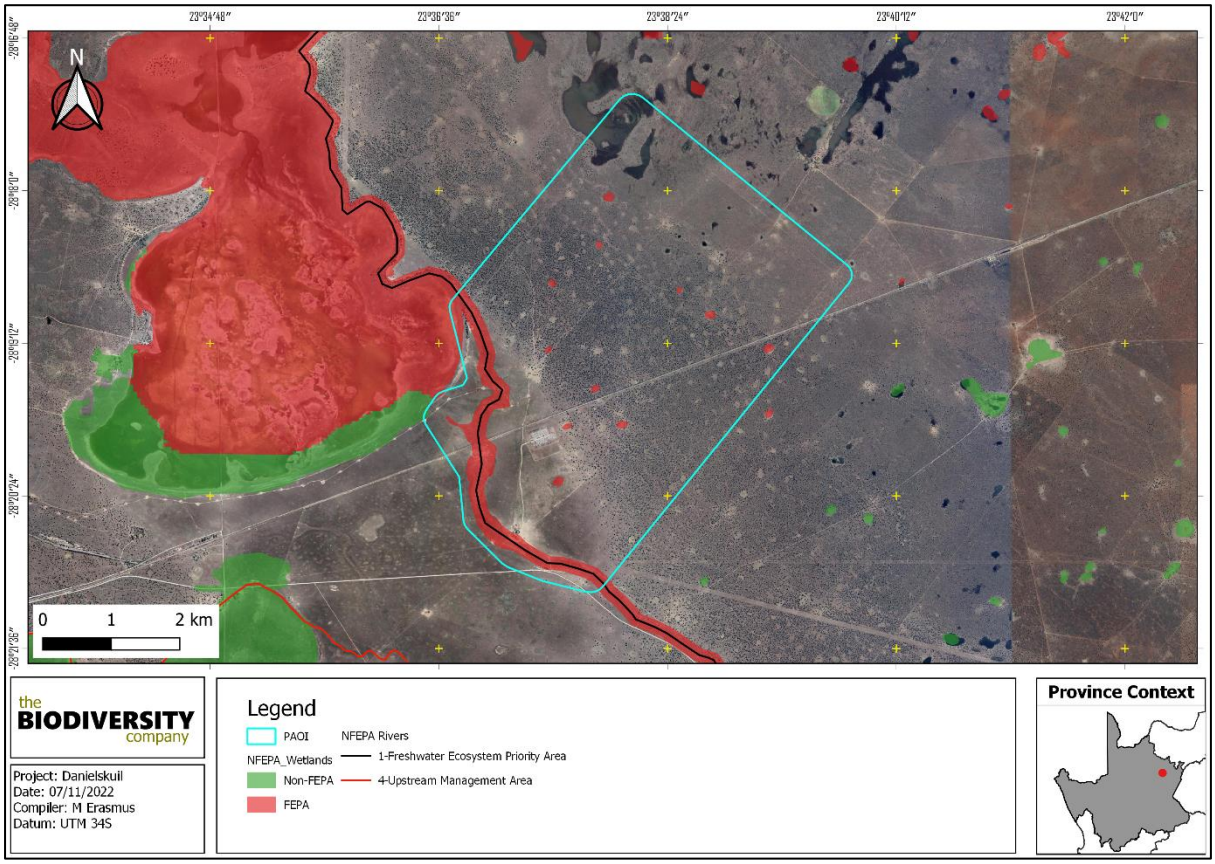


Figure 3-6 The PAOI in relation to the National Freshwater Ecosystem Priority Areas

3.1.2 Flora Assessment

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

3.1.2.1 Vegetation Type

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

a) seasonal precipitation; and

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

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

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

On a fine-scale vegetation type, the PAOI overlaps with two vegetation types: the Ghaap Plateau Vaalbosveld and the Southern Kalahari Mekgacha (Figure 3-7).

Figure 3-7 Map illustrating the vegetation type associated with the PAOI

3.1.2.1.1 Ghaap Plateau Vaalbosveld

The vegetation type is known for flat plateau areas with a well-developed shrub layer with *Tarchonanthus camphoratus* and *Vachellia karroo*. Areas may exhibit an open tree layer with *Olea europaea subsp. africana*, V. *tortilis, Ziziphus mucronata* and *Searsia lancea*. The presence of Olea is more important in the southern parts of the unit, while V. *tortilis, V. hebeclada* as well as *Senegalia mellifera* are more important in the north and part of the west of the unit. The south-central part of this unit has remarkably low cover of Thorn tree species for an arid savanna and is dominated by the nonthorny T. *camphoratus, s. lancea* and *O. europaea subsp. africana* (Mucina and Rutherford,2006).

Important Plant Taxa in Ghaap Plateau Vaalbosveld

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 Ghaap Plateau Vaalbosveld vegetation type:

Trees: *Vachellia erioloba*.

Small Trees: *Senegalia mellifera subsp. detinens, Searsia lancea, Vachellia karroo, V. tortilis subsp. heteracantha, Boscia albitrunca.*

Tall Shrubs: *Olea europaea subsp. cuspidata, Rhigozum trichotomum, Tarchonanthus camphoratus, Ziziphus mucronata, Diospyros austro-africana, D. pallens, Ehretia rigida subsp. rigida, Euclea crispa subsp. ovata, Grewia flava, Gymnosporia buxifolia, Lessertia frutescens, Searsia tridactyla*.

Low Shrubs: *Vachellia hebeclada subsp. hebeclada, Aptosimum procumbens, Chrysocoma ciliata, Helichrysum zeyheri, Hermannia comosa, Lantana rugosa, Leucas capensis, Melolobium microphyllum, Peliostomum leucorrhizum, Pentzia globosa, P. viridis, Zygophyllum pubescens*

Succulent Shrubs: *Hertia pallens, Lycium cinereum.*

Semiparasitic Shrub: *Thesium hystrix*

Woody Climber: *Asparagus africanus*

Graminoids: *Anthephora pubescens, Cenchrus ciliaris, Digitaria eriantha subsp. eriantha, Enneapogon scoparius, Eragrostis lehmanniana, Schmidtia pappophoroides, Themeda triandra, Aristida adscensionis, A. congesta, A. diffusa, Cymbopogon pospischilii, Enneapogon cenchroides, E. desvauxii, Eragrostis echinochloidea, E. obtusa, E. rigidior, E. superba, Fingerhuthia africana, Heteropogon contortus, Sporobolus fimbriatus, Stipagrostis uniplumis, Tragus racemosus*.

Herbs: *Barleria macrostegia, Geigeria filifolia, G. ornativa, Gisekia africana, Helichrysum cerastioides, Heliotropium ciliatum, Hermbstaedtia odorata, Hibiscus marlothianus, H. pusillus, Jamesbrittenia aurantiaca, Limeum fenestratum, Lippia scaberrima, Selago densiflora, Vahlia capensis subsp. vulgaris*.

Succulent Herb: *Aloe grandidentata.*

Conservation Status

Least threatened. Target 16%. None conserved in statutory conservation areas. Only about 1% already transformed. Erosion is very low. (Mucina & Rutherford, 2006).

3.1.2.1.2 Southern Kalahari Mekgacha

Sparse, patchy grasslands, sedgelands and low herblands dominated by C4 grasses on the bottom of (mostly) dry riverbeds. Low shrublands in places with patches of taller shrubland on the banks of the rivers.

Important Plant Taxa in Southern Kalahari Mekgacha

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 Southern Kalahari Mekgacha vegetation type:

Dry river-bottoms;

Tall Shrubs: *Lebeckia linearifolia, Sisyndite spartea, Deverra denudata subsp. aphylla.*

Herbs: *Amaranthus dinteri subsp. dinteri, A. praetermissus, A. schinzianus, Boerhavia repens, Chamaesyce inaequilatera, Cucumis africanus, Geigeria ornativa, G. pectidea, Heliotropium lineare, Indigofera alternans, I. argyroides, Kohautia cynanchica, Lotononis platycarpa, Osteospermum muricatum, Platycarpha carlinoides, Radyera urens, Stachys spathulata, Tribulus terrestris.*

Succulent Herb: *Zygophyllum simplex. Graminoids: Cenchrus ciliaris, Chloris virgata, Enneapogon desvauxii, Eragrostis annulata, E. bicolor, Odyssea paucinervis, Panicum coloratum, Eragrostis porosa, Panicum impeditum, Sporobolus nervosus.*

Rocky slopes of river canals

Tall Tree: *Vachellia erioloba.*

Low Shrubs: *Aptosimum lineare, Pechuel-Loeschea leubnitziae*.

Graminoids: *Setaria verticillata, Enneapogon scaber, Oropetium capense, Stipagrostis uniplumis, Tragus racemosus.*

Herb: *Dicoma capensis.*

Biogeographically Important Taxa ([GW] Griqualand West endemic, [K] Kalahari endemic)

Small Tree: *Senegalia luederitzii var. luederitzii*[K].

Tall Shrub: *Lebeckia macrantha*[GW].

Low Shrubs: *Hermannia burchellii*[K], *Justicia puberula*[GW], *Putterlickia saxatilis*[GW], *Tarchonanthus obovatus*[GW].

Graminoid: *Anthephora argenteaK*. Herb: *Sutera griquensis*[GW].

Conservation Status

Some 18% statutorily conserved in the Kgalagadi Transfrontier Park and Molopo Nature Reserve. About 2% has been transformed by road building. The mekgacha are under strong utilisation pressure by domestic animals (grazing, browsing and animal penning. Invasive *Prosopis* species have encroached in certain areas. (Mucina & Rutherford, 2006).

3.1.2.2 Expected Flora Species

The POSA database indicates that 470 species of indigenous plants are expected to occur within the PAOI. Appendix A provides the list of species and their respective conservation status and endemism. No SCC, based on their conservation status, are expected to occur within the PAOI – this does not include any potential protected tree species.

3.1.3 Faunal Assessment

3.1.3.1 Amphibians

Based on the IUCN Red List Spatial Data and AmphibianMap, 11 amphibian species are expected to occur within the area (Appendix B). One of these species are threatened (Table 3-2).

Table 3-2 Threatened amphibian species that are expected to occur within the PAOI

Family	Species	Common Name	Conservation Status		Likelihood of Occurrence
			Regional (SANBI)	IUCN)	
Pyxicephalidae	*Pyxicephalus adspersus*	Giant Bullfrog	NT	LC	Moderate

The Giant Bull Frog (*Pyxicephalus adspersus*) is listed as LC on a global scale (IUCN SSC Amphibian Specialist Group, 2013), but NT on a regional scale (Minter *et al*, 2004). The species is widely distributed in arid sub-saharan Africa, mainly at higher elevations. Within South Africa, it occurs in the north-eastern part of the Western Cape, central and southern Eastern Cape, northern, central and eastern parts of Northern Cape, northern KwaZulu-Natal (except the low-lying parts), Free State, North West, Gauteng and Limpopo provinces, and at only a few localities in Mpumalanga Province. It typically breeds in seasonal, shallow, grassy pans in flat, open areas but also utilises non-permanent vleis and shallow water on the margins of waterholes and dams. Although they sometimes inhabit clay soils, they prefer sandy substrates. Habitat loss due to crop agriculture and urbanisation is a major threat to this species. Due to the presence of suitable habitat, the likelihood is rated a moderate.

3.1.3.2 Reptiles

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 35 reptile species are expected to occur within the area (Appendix C). None of these species are threatened.

3.1.3.3 Mammals

The IUCN Red List Spatial Data lists 64 mammal species that could be expected to occur within the area (Appendix D). This list excludes large mammal species that are limited to protected areas. Six (6) of these expected species are regarded as threatened (Table 3-3), all but one of these have a low likelihood of occurrence based on the lack of suitable habitat in the PAOI.

Table 3-3 Threatened mammal species that are expected to occur within the PAOI.

Family	Species	Common Name	Conservation Status		Likelihood of Occurrence
			Regional (SANBI)	IUCN)	
Felidae	*Felis nigripes*	Black-footed Cat	VU	VU	Low

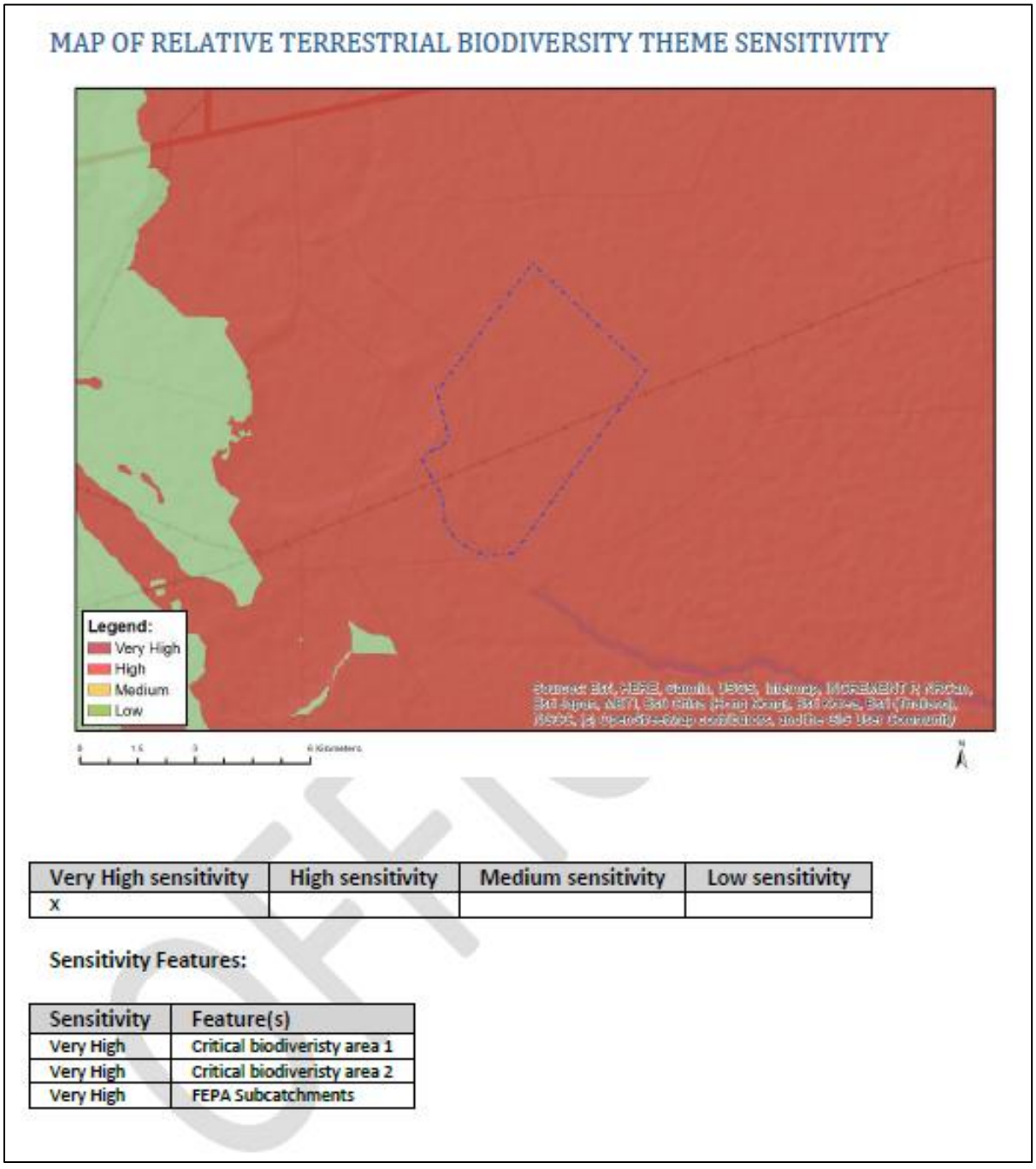
Felidae	*Panthera pardus pardus*	African Leopard	VU	VU	Low
Hyaenidae	*Parahyaena brunnea*	Brown Hyaena	NT	NT	Low
Manidae	*Smutsia temminckii*	Temminck's Pangolin	VU	VU	Moderate
Mustelidae	*Aonyx capensis*	Cape Clawless Otter	NT	NT	Low
Pteropodidae	*Eidolon helvum*	Straw-coloured Fruit Bat	NT	NT	Low

Smutsia temminckii (Temminck's Pangolin) inhabits mainly savannas and woodlands in low-lying regions with moderate to dense scrub where average annual rainfall is between 250 mm and 1 400 mm. It also occurs in floodplain grassland, rocky slopes and sandveld up to 1 700 m above sea level. The population in South Africa is estimated to be between 16 329–24 102 mature individuals (Pietersen *et al*, 2019). In the Northern Cape Province, densities have been calculated at 0.16 reproductively active individuals/km² and overall densities at 0.23 individuals/km². The species' is over-exploited for medicinal use and is increasingly focused on core conservation areas. There has been a sharp increase in the number of individuals that have been seized from illegal trade since 2010. Changes in farming practices are directly impacting the species through habitat loss and alteration, while the increased human presence in these previously undisturbed areas is resulting in increased levels of poaching. Nomadic grazing is also having a negative impact across their range due to increased levels of poaching. Additional threats include fences (electrified and not), mining and roadkills.

4 Site Sensitivity Verification

4.1 Screening Report

The terrestrial biodiversity theme sensitivity, as indicated in the screening report, was derived to be Very High, (Figure 4-1), while the animal and plant species theme sensitivity shows that majority of the area is classified as High and Medium sensitivity respectively. The Very High sensitivity is mainly attributed to the CBA status of the area, as well as the FEPA status of the subcatchments. The High animal species theme is mainly attributed to the avifauna.



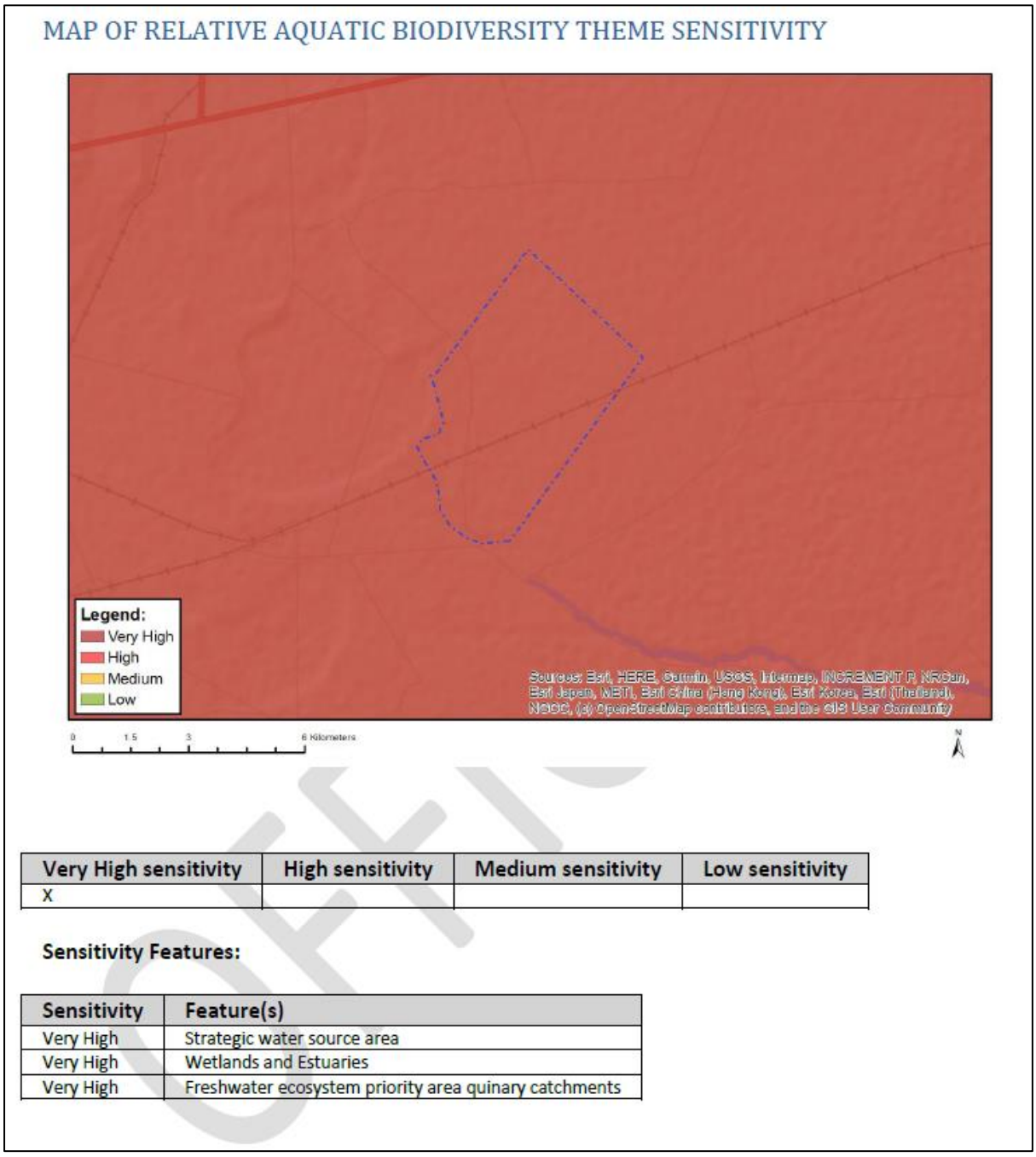
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 1
Very High	Critical biodiveristy area 2
Very High	FEPA Subcatchments

Figure 4-1 Terrestrial Biodiversity Theme Sensitivity

The aquatic biodiversity theme sensitivity, as indicated in the screening report, was derived to be Very High, (Figure 4-2). The Very High sensitivity is mainly attributed to the associated Strategic Water Source Area, presence of wetlands and the quinary catchments.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Strategic water source area
Very High	Wetlands and Estuaries
Very High	Freshwater ecosystem priority area quinary catchments

Figure 4-2 Aquatic Biodiversity Theme Sensitivity

4.2 Site Ecological Importance (SEI)

A site assessment was carried out in November 2022, which constitutes a wet season survey. The different habitat types within the PAOI were delineated and identified based on observations during the field assessment, and available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of species of conservation concern and their ecosystem processes. In relation to vegetation the sensitivity of the area related more to the structural vegetation component rather than diversity as such, due to the low diversity (which is expected) versus the large number of the provincially protected woody

species (*Olea europaea subsp. africana)*). Wild Olive (*Olea europaea subsp. africana)* is known to be as an extremely slow-growing and valuable tree in the arid regions.

Four (4) different terrestrial habitat types were delineated within the PAOI, which includes an assigned water resource habitat unit (Table 4-1). Based on the criteria provided in Section 2.3 of this report, all habitats within the PAOI were allocated a sensitivity category. The sensitivities of the habitat types delineated are illustrated in Figure 4-3.

The Site Sensitivity Verification indicates agreement with the terrestrial biodiversity theme sensitivity indicated in the Screening Tool for the delineated water resources, these being assigned an overall Very High sensitivity. The remaining habitat units with the exception of transformed areas were all assigned a High sensitivity. This is attributed to the fact the area is associated with intact and functional CBA areas.

Table 4-1 Summary of habitat types delineated within field assessment area of PAOI.

Habitat Type	Description	Ecosystem Processes and Services	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	Site Ecological Importance (SEI) Guidelines for interpreting SEI in the context of the proposed development activities
Watercourse Wet-Depression (Pan)	Channels/Areas through which surface and groundwater water naturally collates, flows and collects. An ephemeral system as well as a pan is relevant for this habitat type.	Provides surface water resources within the landscape. Aids in trapping sediment and nutrients carried by surface runoff. Corridor for fauna dispersion within the landscape and important foraging and nesting habitat.	**Very High** CBA 1 CR River FEPA Wetland Freshwater Ecosystem Priority Area River	**Medium** Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance.	**High**	**Very Low** Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring.	**Very High** Avoidance mitigation – no destructive development activities should be considered. Applicable buffer may be added to the habitats.
Wooded Vaalbosveld	Terrain consists of a low to zero slope Mainly consists of woody tree species interspersed with variable in the presence or absence of grass species and shrub density.	Provides grazing and foraging resources for indigenous fauna and livestock. Aids in the filtration of water permeating through the soil into the drainage areas. Important corridor for fauna dispersion within the landscape.	Intact CBA 2 **Medium** > 50% of receptor contains natural habitat with potential to support SCC.	**High** Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type. 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**	**Very Low** Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring. Especially in regard to the Wild Olive (*Olea europaea subsp. africana*) which is known to be as an extremely slow-growing tree.	**High** Avoidance mitigation as much as 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.
Open Shrubveld	Terrain consists of a low to zero slope Mainly consists of *Tarchonanthus* (Shrub) species interspersed with variable in the presence or absence of grass species and shrub density.	Provides grazing and foraging resources for indigenous fauna and livestock. Aids in the filtration of water permeating through the soil into the drainage areas. Important corridor for fauna dispersion within the landscape.	Intact CBA 2 **Medium** > 50% of receptor contains natural habitat with potential to support SCC.	**High** Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type. Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches.	**Medium**	**Low** Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality.	**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. Mitigations such as retaining vegetation and topsoil layers is

Habitat Type	Description	Ecosystem Processes and Services	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	Site Ecological Importance (SEI) Guidelines for interpreting SEI in the context of the proposed development activities
				Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.			applicable, as well as avoiding certain areas and planning infrastructure layouts accordingly.
Open Grassland	Terrain consists of a low to zero slope Mainly presence of grass species with small shrubs.	Provides grazing and foraging resources for indigenous fauna and livestock. Aids in the filtration of water permeating through the soil into the drainage areas.	CBA 2 **Low** < 50% of receptor contains natural habitat with limited potential to support SCC. CBA 2	**High** Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type. Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Buffer for Water resources. Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.	**Medium**	**Low** Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality.	**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. The nature of specific impacts to the topsoil is key in Karoo habitats. Mitigations such as retaining vegetation and topsoil layers is applicable, as well as avoiding certain areas and planning infrastructure layouts accordingly.
Water Resources (Depressions)	Depressions in the Calcrete that assist by collecting and storing runoff water from surrounding area. Important Surface Water Resource.	Provides surface water resources within the landscape. Aids in trapping sediment and nutrients carried by surface runoff. Water resource for fauna within the landscape and important foraging and nesting habitat.	**Medium** > 50% of receptor contains natural habitat with potential to support SCC. CBA 2	**Medium** Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status Only narrow corridors of good habitat connectivity. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance.	**Medium**	**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.	**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.
Transformed	Homesteads and associated infrastructure as well as prominent roads	N/A	**Very Low** No natural habitat remaining.	**Very Low** No habitat connectivity except for flying species or	**Very Low**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the	**Very Low** Minimisation mitigation – development activities of medium to

Habitat Type	Description	Ecosystem Processes and Services	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	Site Ecological Importance (SEI) Guidelines for interpreting SEI in the context of the proposed development activities
				flora with wind-dispersed seeds.		original species composition and functionality of the receptor functionality.	high impact acceptable and restoration activities may not be required.

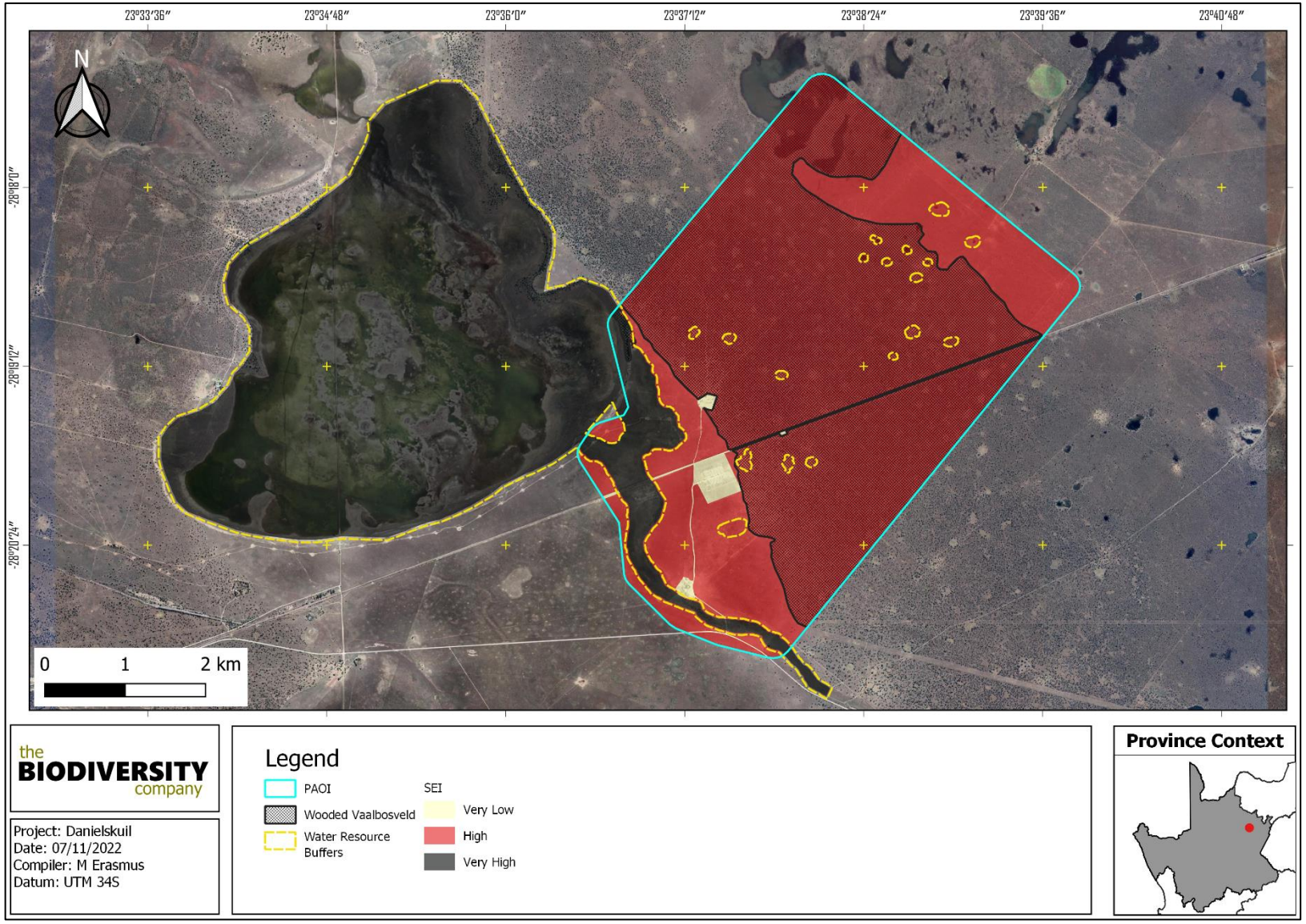


Figure 4-3 Terrestrial SEI of the PAOI

5 Impact Screening

5.1 Terrestrial Biodiversity Impact Assessment

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

Table 5-1 Scoping evaluation table summarising the impacts identified to terrestrial biodiversity

Impact **Biodiversity loss/disturbance**			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Destruction, fragmentation and degradation of habitats and ecosystems	Direct impacts: » Disturbance / degradation / loss to vegetation and habitats » Ecological corridors are disrupted » Habitat fragmentation » Loss of protected plant species Indirect impacts: » Erosion risk increases » Fire risk increases » Increase in invasive alien species	Regional	Watercourse and Wet-Depression (Pan) Habitats
Spread and/or establishment of alien and/or invasive species	Direct impacts: » Loss of vegetation and habitat due to increase in alien species Indirect impacts: » Creation of infrastructure suitable for breeding activities of alien and/or invasive species » Spreading of potentially dangerous diseases due to invasive and pest species	Local	Watercourse and Wet-Depression (Pan) Habitats
Direct mortality of fauna	Direct impacts: » Loss of SCC species » Loss of fauna diversity Indirect impacts: » Loss of diversity and species composition in the area. » Possible impact on the food chain	Regional	Watercourse and Wet-Depression (Pan) Habitats
Reduced dispersal/migration of fauna	Direct impacts: » Loss of genetic diversity » Isolation of species and groups leading to inbreeding Indirect impacts: » Reduced seed dispersal » Loss of ecosystem services	Regional/National	Watercourse and Wet-Depression (Pan) Habitats
Environmental pollution due to water runoff, spills from vehicles and erosion	Direct impacts: » Pollution in waterbodies and the surrounding environment » Faunal mortality (direct and indirectly) Indirect impacts: » Ground water pollution	Regional	Watercourse and Wet-Depression (Pan) Habitats

	» Loss of ecosystem services		
Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust, heat radiation and light pollution.	Direct impacts: » Disruption/alteration of ecological life cycles due to noise » Reduced pollination and growth of vegetation due to dust » Faunal mortality due to light pollution (nocturnal species becoming more visible to predators) » Heat radiation could lead to the displacement of species Indirect impacts: » Loss of ecosystem services	Local	Watercourse and Wet-Depression (Pan) Habitats
Collisions	Direct impacts: » Loss of SCCs or endemic species Indirect impacts: » Loss of migratory routes » Loss of genetic diversity	Regional/National	None identified at this stage
Staff and others interacting directly with fauna (potentially dangerous) or poaching of animals	Direct impacts: » Loss of SCCs or TOPS species Indirect impacts: » Loss of ecosystem service » Loss of genetic diversity	Local	Watercourse and Wet-Depression (Pan) Habitats
Description of expected significance of impact The development of the area could result in the loss or degradation of the habitat and vegetation, most of which is still in a natural condition and is expected to support a number of fauna species. The construction of the solar facility could also lead to the displacement/mortalities of the fauna. The operation of the facility could result in the disruption of ecological life cycles. This could be as a result of a number of things, but mainly due to dust, noise, light pollution and heat radiation. The disturbance of the soil/vegetation layer will allow for the establishment of flora alien invasive species. In turn, the new infrastructure will provide refuge for invasive/feral fauna species. Erosion is another possible impact that could result from the disturbance of the top soil and vegetation cover. A number of machines, vehicles and equipment will be required, aided by chemicals and concrete mixes for the project. Leaks, spillages or breakages from any of these could result in contamination of the receiving water resources. Contaminated water resources are likely to have an effect on the associated biota. Based on the number of avifauna SCCs with a high likelihood of occurrence the risk of collisions and electrocutions needs to be considered.			
Gaps in knowledge & recommendations for further study. » Determine a suitable buffer width for the identified features. » Possibility of offset areas for the loss of CBA as well as Wooded Vaalbosveld in situ, if necessary. **Recommendations with regards to general field surveys** » A search and rescue plan needs to be implemented for the proposed project for the provincially protected species, especially the old Olive Trees.			

5.2 Cumulative Impacts

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

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

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

Long-term cumulative impacts due to extensive solar development footprint, powerlines and substations can lead to the loss of endemic species and threatened species, loss of habitat and vegetation types and even degradation of well conserved areas (Table 5-2).

Table 5-2 Cumulative impact of the solar plant and battery system

The development of the proposed infrastructure will contribute to cumulative habitat loss within the ONA and thereby impact the ecological processes in the region.		
	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Low (2)	High (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	High (8)
Probability	Probable (3)	Highly probable (4)
Significance	**Medium**	**High**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No	
Mitigation:		
• This impact cannot be mitigated as the loss of vegetation is unavoidable.		
Residual Impacts:		
Will result in the loss of: » **An CBA 1 and CBA 2** » **Endemic species;** » **CR River;** » **FEPA Wetland; and** » **Freshwater Ecosystem Priority Area River**		

6 Conclusion

The PAOI has been altered, albeit limited, 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 transformed habitats. Historically, grazing from livestock and mismanagement has led to (limited) deterioration of the area. Most areas can be regarded as important, not only within the local landscape, but also regionally; as they 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 habitat sensitivity of these habitats is regarded as High to Very High, and the following aspects support this classification:

- Functions as CBA 1 and CBA 2 as per the Northern Cape Critical Biodiversity Areas spatial database;
- As true NFEPA wetlands, as well as a FEPA River (NBA CR River), classed as Freshwater Ecosystem Priority Area; and
- Support various organisms and may play an important role in the ecosystem, if left to recover from the superficial impacts.

It is the specialist's opinion that the proposed developability of the project area is as follows:

Avoidance: No destructive development activities should be considered for Very High SEI habitat units. Avoidance is also recommended for the delineated water resources and accompanying buffers, and also the Wooded Vaalbosveld habitat.

Avoidance and Minimisation (High SEI Areas): Any development in these areas will lead to the direct destruction and loss of portions of functional habitat. Guidelines for development in high sensitivity areas require avoidance mitigation as much as possible. This must include concerted efforts to avoid these sensitive areas where feasible, and disturbances must be kept to an absolute minimum. Changes must be made to project infrastructure design to limit the amount of area/habitat impacted in relation to the title deed area (for example 10%). Avoiding most of the Wooded Vaalbosveld habitat will be considered as avoidance, thus allowing development in the remaining High SEI areas. The minimisation of the disturbance footprint is also considered to be avoidance, this will include brush cutting beneath panels as opposed to the complete clearance of vegetation (applicable to the Wooded Vaalbosveld habitat as well).

Limited development activities of low-medium impact are acceptable, followed by appropriate restoration activities. The infrastructure layout should consider habitat connectivity to avoid fragmentation, and technology alternatives should opt to retain vegetation under the PV panels.

Note: It is recommended that the central core of the Wooded Vaalbosveld habitat be preserved. Some minor development creep into the edges of the habitat may be allowed – provided that the provincial authority issues a permit for the destruction of the protected Wild Olive (*Olea europaea* subsp. *africana*) trees that dominate these areas.

7 EIA Phase Plan of Study

7.1 Flora Survey

The fieldwork and sample sites will be placed within targeted areas (i.e., target sites) perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation) and GIS analysis (which will included the latest applicable biodiversity datasets) available prior to the fieldwork. The focus of the fieldwork will therefore be to maximise coverage and navigate to each target site in the field, to perform a rapid vegetation and ecological assessment at each sample site. Emphasis will be placed on sensitive habitats, especially those overlapping with the proposed project area.

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

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

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

7.2 Fauna Survey

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

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

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

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

8 References

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.

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

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

Boycott, R. and Bourquin, R. 2000. The Southern African Tortoise Book – A Guide to Southern African Tortoises, Terrapins and Turtles. Revised Edition. Hilton. 228 pages.

Branch, W.R. (1998). Field Guide to Snakes and Other Reptiles of Southern Africa. Struik, Cape Town.

CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). (1973). www.cites.org.

Department of Water Affairs and Forestry (DWS). 2005. A practical field procedure for identification and delineation of wetlands and riparian areas. Pretoria: Department of Water Affairs and Forestry.

Department of Forestry, Fisheries and the Environment (DFFE). 2021. SACAD (South Africa Conservation Areas Database) and SAPAD (South Africa Protected Areas Database). http://egis.environment.gov.za.

Department of Forestry, Fisheries and the Environment (DFFE). 2021. National Protected Areas Expansion Strategyhttp://egis.environment.gov.za.

Department of Forestry, Fisheries and the Environment (DFFE). 2021. Renewable Energy EIA Application Database. http://egis.environment.gov.za.

Du Preez, L. & Carruthers, V. (2009) A Complete Guide to the Frogs of Southern Africa. Struik Nature, Cape Town.

DWA (Department of Water Affairs). 2021. A Desktop Assessment of the Present Ecological State, Ecological Importance and Ecological Sensitivity per Sub Quaternary Reaches for Secondary Catchments in South Africa. Draft. Compiled by RQS-RDM.

EWT. (2016). Mammal Red List 2016. www.ewt.org.za

Fish, L., Mashau, A.C., Moeaha, M.J. & Nembudani, M.T. (2015). Identification Guide to Southern African Grasses: An Identification Manual with Keys, Descriptions, and Distributions. SANBI, Pretoria.

FitzPatrick Institute of African Ornithology. 2021a. FrogMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=FrogMAP on 2021-03-21

FitzPatrick Institute of African Ornithology. 2021b. ReptileMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=ReptileMAP on 2021-03-21

IUCN. (2017). The IUCN Red List of Threatened Species. www.iucnredlist.org (Accessed: November 2017).

IUCN SSC Amphibian Specialist Group. 2013. *Pyxicephalus adspersus*. The IUCN Red List of Threatened Species 2013: e.T58535A3070700. https://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T58535A3070700.en. Accessed on 28 February 2022.

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

Kotze, D.C., Marneweck, G.C., Batchelor, A.L., Lindley, D.C., and Collins, N.B. 2009. A Technique for rapidly assessing ecosystem services supplied by wetlands. Mondi Wetland Project.

Land Type Survey Staff. (1972 - 2006). Land Types of South Africa: Digital Map (1:250 000 Scale) and Soil Inventory Databases. Pretoria: ARC-Institute for Soil, Climate, and Water.

Macfarlane, D.M. & Bredin, I. 2017. Buffer zone guidelines for wetlands, rivers and estuaries. Part 1: Technical manual.

Macfarlane, D.M., Bredin, I.P., Adams, J.B., Zungu, M.M., Bate, G.C. and Dickens, C.W.S. 2014. Preliminary guideline for the determination of buffer zones for rivers, wetlands and estuaries. Final Consolidated Report. WRC Report No TT 610/14, Water Research Commission, Pretoria.

Macfarlane, D.M., Holness, S.D., von Hase, A., Brownlie, S., Dini, J. and Kilian, V. 2016. Wetland Offsets: A Best Practice Guideline for South Africa. WRC Report No. TT 660/16.

Macfarlane, D.M., Kotze, D.C., Ellery, W.N., Walters, D., Koopman, V., Goodman, P. and Goge, C. 2007. A technique for rapidly assessing wetland health: WET-Health. WRC Report TT 340/08.

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.

Mucina, L., Rutherford, M.C. & Powrie, L.W. (Eds.). 2007. Vegetation map of South Africa, Lesotho and Swaziland. 1:1 000 000 scale sheet maps. 2nd ed. South African National Biodiversity Institute, Pretoria.

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.

Ollis DJ, Snaddon CD, Job NM, and Mbona N. 2013. Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. SANBI Biodiversity Series 22. South African Biodiversity Institute, Pretoria.

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

Rountree, MW and Kotze, DM. 2013. Manual for the Rapid Ecological Reserve Determination of Inland Wetlands (Version 2.0). Joint Department of Water Affairs/Water Research Commission Study. Water Research Commission, Pretoria.

SADAP (South Africa Protected Areas Database) and SACAD (South Africa Conservation Areas Database) (2022). http://egis.environment.gov.za

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. and Tarboton, W. 2002. SASOL Birds of Southern Africa 3rd Edition. Struik Nature, 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.

9 Appendix Items

9.1 Appendix A – Flora species expected to occur in the PAOI.

Family	Species	Author1	Rank1	Sp2	IUCN	Ecology
Acanthaceae	*Blepharis marginata*	(Nees) C.B.Clarke			LC	Indigenous; Endemic
Acanthaceae	*Barleria macrostegia*	Nees			LC	Indigenous
Acanthaceae	*Barleria bechuanensis*	C.B.Clarke			LC	Indigenous; Endemic
Acanthaceae	*Glossochilus burchellii*	Nees			LC	Indigenous
Acanthaceae	*Justicia divaricata*	Licht. ex Roem. & Schult.				Indigenous
Acanthaceae	*Justicia puberula*	Immelman			LC	Indigenous; Endemic
Aizoaceae	*Trichodiadema densum*	(Haw.) Schwantes			LC	Indigenous; Endemic
Aizoaceae	*Nananthus aloides*	(Haw.) Schwantes			LC	Indigenous
Aizoaceae	*Ruschia sp.*					
Aizoaceae	*Galenia africana*	L.			LC	Indigenous
Amaranthaceae	*Atriplex semibaccata*	R.Br.				Not indigenous; Naturalised; Invasive
Amaranthaceae	*Dysphania schraderiana*	(Schult.) Mosyakin & Clemants				Indigenous
Amaranthaceae	*Sericorema sericea*	(Schinz) Lopr.			LC	Indigenous
Amaranthaceae	*Cyphocarpa angustifolia*	(Moq.) Lopr.			LC	Indigenous
Amaranthaceae	*Hermbstaedtia odorata*	(Burch.) T.Cooke	var.	aurantiaca	NE	Indigenous
Amaranthaceae	*Hermbstaedtia fleckii*	(Schinz) Baker & C.B.Clarke			LC	Indigenous
Amaranthaceae	*Hermbstaedtia odorata*	(Burch.) T.Cooke	var.	albi-rosea	NE	Indigenous
Amaranthaceae	*Salsola tuberculata*	(Moq.) Fenzl			LC	Indigenous
Amaranthaceae	*Chenopodium hederiforme*	(Murr) Aellen	var.	dentatum	LC	Indigenous
Anacampserotaceae	*Anacampseros filamentosa*	(Haw.) Sims	sub sp.	filamentosa		Indigenous; Endemic
Anacardiaceae	*Searsia ciliata*	(Licht. ex Schult.) A.J.Mill.			LC	Indigenous
Anacardiaceae	*Searsia lancea*	(L.f.) F.A.Barkley			LC	Indigenous
Anacardiaceae	*Searsia pendulina*	(Jacq.) Moffett			LC	Indigenous
Anacardiaceae	*Searsia tridactyla*	(Burch.) Moffett			LC	Indigenous; Endemic
Anacardiaceae	*Searsia burchellii*	(Sond. ex Engl.) Moffett			LC	Indigenous
Anacardiaceae	*Searsia pyroides*	(Burch.) Moffett	var.	pyroides	LC	Indigenous
Apiaceae	*Deverra burchellii*	(DC.) Eckl. & Zeyh.			LC	Indigenous
Apiaceae	*Deverra denudata*	(Viv.) Pfisterer & Podlech				Indigenous
Apiaceae	*Centella asiatica*	(L.) Urb.			LC	Indigenous
Apocynaceae	*Gomphocarpus fruticosus*	(L.) W.T.Aiton	sub sp.	fruticosus	LC	Indigenous
Apocynaceae	*Pentarrhinum insipidum*	E.Mey.			LC	Indigenous
Apocynaceae	*Pachypodium succulentum*	(L.f.) Sweet			LC	Indigenous; Endemic

Apocynaceae	*Microloma sp.*					
Apocynaceae	*Gomphocarpus tomentosus*	Burch.	sub sp.	tomentosus	LC	Indigenous
Apocynaceae	*Gomphocarpus fruticosus*	(L.) W.T.Aiton				Indigenous
Apocynaceae	*Fockea angustifolia*	K.Schum.			LC	Indigenous
Apocynaceae	*Orbea knobelii*	(E.Phillips) Bruyns			LC	Indigenous
Araliaceae	*Hydrocotyle verticillata*	Thunb.			LC	Indigenous
Asparagaceae	*Asparagus laricinus*	Burch.			LC	Indigenous
Asparagaceae	*Asparagus suaveolens*	Burch.			LC	Indigenous
Asparagaceae	*Asparagus exuvialis*	Burch.	forma	exuvialis	NE	Indigenous
Asphodelaceae	*Bulbine narcissifolia*	Salm-Dyck			LC	Indigenous
Aspleniaceae	*Asplenium cordatum*	(Thunb.) Sw.			LC	Indigenous
Asteraceae	*Oedera humilis*	(Less.) N.G.Bergh				Indigenous
Asteraceae	*Geigeria filifolia*	Mattf.			LC	Indigenous
Asteraceae	*Osteospermum microphyllum*	DC.			LC	Indigenous
Asteraceae	*Laggera decurrens*	(Vahl) Hepper & J.R.I.Wood			LC	Indigenous
Asteraceae	*Helichrysum nudifolium*	(L.) Less.	var.	nudifolium	LC	Indigenous
Asteraceae	*Lopholaena cneorifolia*	(DC.) S.Moore			LC	Indigenous
Asteraceae	*Flaveria bidentis*	(L.) Kuntze				Not indigenous; Naturalised; Invasive
Asteraceae	*Chrysocoma ciliata*	L.			LC	Indigenous
Asteraceae	*Cotula microglossa*	(DC.) O.Hoffm. & Kuntze ex Kuntze			LC	Indigenous; Endemic
Asteraceae	*Senecio reptans*	Turcz.			LC	Indigenous; Endemic
Asteraceae	*Gazania sp.*					
Asteraceae	*Pentzia calcarea*	Kies			LC	Indigenous
Asteraceae	*Helichrysum cerastioides*	DC.	var.	cerastioides	LC	Indigenous
Asteraceae	*Senecio intricatus*	S.Moore			LC	Indigenous; Endemic
Asteraceae	*Senecio inaequidens*	DC.			LC	Indigenous
Asteraceae	*Dicoma macrocephala*	DC.			LC	Indigenous
Asteraceae	*Sonchus asper*	(L.) Hill	sub sp.	asper		Not indigenous; Naturalised; Invasive
Asteraceae	*Pentzia stellata*	(P.P.J.Herman) Magee				Indigenous; Endemic
Asteraceae	*Lactuca inermis*	Forssk.			LC	Indigenous
Asteraceae	*Pentzia sp.*					
Asteraceae	*Amphiglossa triflora*	DC.			LC	Indigenous
Asteraceae	*Cineraria erosa*	(Thunb.) Harv.			LC	Indigenous; Endemic
Asteraceae	*Conyza sp.*					
Asteraceae	*Gazania krebsiana*	Less.	sub sp.	serrulata	LC	Indigenous
Asteraceae	*Helichrysum lucilioides*	Less.			LC	Indigenous
Asteraceae	*Pentzia viridis*	Kies			LC	Indigenous; Endemic

Asteraceae	*Phymaspermum aciculare*	(E.Mey. ex DC.) Benth. & Hook. ex B.D.Jacks.			LC	Indigenous
Asteraceae	*Geigeria brevifolia*	(DC.) Harv.			LC	Indigenous
Asteraceae	*Osteospermum sp.*					
Asteraceae	*Cirsium vulgare*	(Savi) Ten.				Not indigenous; Naturalised; Invasive
Asteraceae	*Ursinia nana*	DC.	sub sp.	leptophylla	LC	Indigenous
Asteraceae	*Felicia muricata*	(Thunb.) Nees	sub sp.	cinerascens	LC	Indigenous
Asteraceae	*Felicia fascicularis*	DC.			LC	Indigenous
Asteraceae	*Arctotheca calendula*	(L.) Levyns			LC	Indigenous
Asteraceae	*Eriocephalus ericoides*	(L.f.) Druce	sub sp.	griquensis	LC	Indigenous; Endemic
Asteraceae	*Tarchonanthus obovatus*	DC.			LC	Indigenous; Endemic
Asteraceae	*Nidorella resedifolia*	DC.	sub sp.	resedifolia	LC	Indigenous
Asteraceae	*Osteospermum spinescens*	Thunb.			LC	Indigenous
Asteraceae	*Tarchonanthus camphoratus*	L.			LC	Indigenous
Asteraceae	*Gazania krebsiana*	Less.	sub sp.	arctotoides	LC	Indigenous
Asteraceae	*Pentzia quinquefida*	(Thunb.) Less.			LC	Indigenous; Endemic
Asteraceae	*Zinnia peruviana*	(L.) L.				Not indigenous; Naturalised; Invasive
Asteraceae	*Platycarphella parvifolia*	(S.Moore) V.A.Funk & H.Rob.			LC	Indigenous; Endemic
Asteraceae	*Geigeria ornativa*	O.Hoffm.	sub sp.	ornativa	LC	Indigenous
Asteraceae	*Kleinia longiflora*	DC.			LC	Indigenous
Asteraceae	*Helichrysum zeyheri*	Less.			LC	Indigenous
Asteraceae	*Pteronia cylindracea*	DC.			LC	Indigenous
Asteraceae	*Senecio carnosus*	Thunb.			LC	Indigenous; Endemic
Asteraceae	*Helichrysum caespititium*	(DC.) Harv.			LC	Indigenous
Asteraceae	*Cineraria vallis-pacis*	Dinter ex Merxm.			LC	Indigenous
Asteraceae	*Hertia ciliata*	(Harv.) Kuntze			LC	Indigenous
Asteraceae	*Euryops subcarnosus*	DC.	sub sp.	vulgaris	LC	Indigenous
Asteraceae	*Helichrysum dregeanum*	Sond. & Harv.			LC	Indigenous
Asteraceae	*Pegolettia retrofracta*	(Thunb.) Kies			LC	Indigenous
Bignoniaceae	*Tecoma stans*	(L.) Juss. ex Kunth	var.	stans	NE	Not indigenous; Cultivated; Naturalised; Invasive
Boraginaceae	*Heliotropium lineare*	(A.DC.) Gurke			LC	Indigenous
Boraginaceae	*Ehretia alba*	Retief & A.E.van Wyk			LC	Indigenous
Boraginaceae	*Buglossoides arvensis*	(L.) I.M.Johnst.				Not indigenous; Naturalised
Boraginaceae	*Heliotropium ciliatum*	Kaplan			LC	Indigenous
Brassicaceae	*Brassica elongata*	Ehrh.	sub sp.	elongata		Not indigenous; Naturalised
Brassicaceae	*Erucastrum strigosum*	(Thunb.) O.E.Schulz			LC	Indigenous
Brassicaceae	*Heliophila suavissima*	Burch. ex DC.			LC	Indigenous

Brassicaceae	*Erucastrum austroafricanum*	Al-Shehbaz & Warwick			LC	Indigenous
Bryaceae	*Bryum argenteum*	Hedw.				Indigenous
Campanulaceae	*Wahlenbergia denticulata*	(Burch.) A.DC.	var.	denticulata	LC	Indigenous
Campanulaceae	*Wahlenbergia undulata*	(L.f.) A.DC.			LC	Indigenous
Campanulaceae	*Wahlenbergia sp.*					
Campanulaceae	*Wahlenbergia nodosa*	(H.Buek) Lammers			LC	Indigenous; Endemic
Campanulaceae	*Wahlenbergia androsacea*	A.DC.			LC	Indigenous
Capparaceae	*Boscia albitrunca*	(Burch.) Gilg & Gilg-Ben.			LC	Indigenous
Caryophyllaceae	*Pollichia campestris*	Aiton			LC	Indigenous
Caryophyllaceae	*Spergularia media*	(L.) C.Presl				Not indigenous; Naturalised
Celastraceae	*Gymnosporia buxifolia*	(L.) Szyszyl.			LC	Indigenous
Celastraceae	*Gymnosporia sp.*					
Celastraceae	*Maytenus undata*	(Thunb.) Blakelock			LC	Indigenous
Cleomaceae	*Cleome rubella*	Burch.			LC	Indigenous
Cleomaceae	*Cleome sp.*					
Cleomaceae	*Cleome angustifolia*	Forssk.	subsp.	diandra	LC	Indigenous
Colchicaceae	*Ornithoglossum dinteri*	K.Krause			LC	Indigenous
Colchicaceae	*Ornithoglossum vulgare*	B.Nord.			LC	Indigenous
Colchicaceae	*Colchicum melanthioides*	(Willd.) J.C.Manning & Vinn.	subsp.	melanthioides	LC	Indigenous
Commelinaceae	*Commelina africana*	L.	var.	krebsiana	LC	Indigenous
Commelinaceae	*Commelina livingstonii*	C.B.Clarke			LC	Indigenous
Convolvulaceae	*Convolvulus ocellatus*	Hook.				Indigenous
Convolvulaceae	*Convolvulus ocellatus*	Hook.	var.	ocellatus	LC	Indigenous
Convolvulaceae	*Evolvulus alsinoides*	(L.) L.			LC	Indigenous
Convolvulaceae	*Convolvulus boedeckerianus*	Peter			LC	Indigenous; Endemic
Convolvulaceae	*Ipomoea oenotheroides*	(L.f.) Raf. ex Hallier f.			LC	Indigenous
Cucurbitaceae	*Cucumis heptadactylus*	Naudin			LC	Indigenous; Endemic
Cucurbitaceae	*Coccinia sessilifolia*	(Sond.) Cogn.			LC	Indigenous
Cucurbitaceae	*Cucumis myriocarpus*	Naudin	subsp.	leptodermis	LC	Indigenous
Cucurbitaceae	*Cucumis myriocarpus*	Naudin	subsp.	myriocarpus	LC	Indigenous
Cucurbitaceae	*Kedrostis foetidissima*	(Jacq.) Cogn.			LC	Indigenous
Cyperaceae	*Kyllinga alba*	Nees			LC	Indigenous
Cyperaceae	*Cyperus difformis*	L.			LC	Indigenous
Cyperaceae	*Carex burchelliana*	Boeckeler			LC	Indigenous; Endemic
Cyperaceae	*Schoenoplectus pulchellus*	(Kunth) J.Raynal			LC	Indigenous

Cyperaceae	*Kyllinga pulchella*	Kunth			LC	Indigenous
Cyperaceae	*Cyperus marginatus*	Thunb.			LC	Indigenous
Cyperaceae	*Schoenoplectus tabernaemontani*	(C.C.Gmel.) Palla				Not indigenous; Naturalised
Cyperaceae	*Pycreus betschuanus*	(Boeckeler) C.B.Clarke			LC	Indigenous
Cyperaceae	*Cyperus margaritaceus*	Vahl	var.	margaritaceus	LC	Indigenous
Cyperaceae	*Fuirena pubescens*	(Poir.) Kunth	var.	pubescens	LC	Indigenous
Cyperaceae	*Afroscirpoides dioeca*	(Kunth) Garcia-Madr.				Indigenous
Cyperaceae	*Cyperus rupestris*	Kunth	var.	rupestris	LC	Indigenous
Cyperaceae	*Scirpoides burkei*	(C.B.Clarke) Goetgh., Muasya & D.A.Simpson			LC	Indigenous
Cyperaceae	*Cyperus laevigatus*	L.			LC	Indigenous
Cyperaceae	*Bulbostylis burchellii*	(Ficalho & Hiern) C.B.Clarke			LC	Indigenous
Dipsacaceae	*Scabiosa columbaria*	L.			LC	Indigenous
Ebenaceae	*Euclea crispa*	(Thunb.) Gurke	subsp.	ovata	LC	Indigenous
Ebenaceae	*Diospyros austroafricana*	De Winter	var.	microphylla	LC	Indigenous
Ebenaceae	*Diospyros lycioides*	Desf.	subsp.	guerkei	LC	Indigenous
Euphorbiaceae	*Seidelia triandra*	(E.Mey.) Pax			LC	Indigenous
Euphorbiaceae	*Euphorbia duseimata*	R.A.Dyer			LC	Indigenous
Euphorbiaceae	*Euphorbia mauritanica*	L.			LC	Indigenous
Euphorbiaceae	*Euphorbia inaequilatera*	Sond.			LC	Indigenous
Euphorbiaceae	*Euphorbia rhombifolia*	Boiss.			LC	Indigenous
Euphorbiaceae	*Euphorbia serpens*	Kunth			NE	Not indigenous; Naturalised
Fabaceae	*Indigofera cryptantha*	Benth. ex Harv.	var.	cryptantha	LC	Indigenous
Fabaceae	*Prosopis velutina*	Wooton			NE	Not indigenous; Naturalised; Invasive
Fabaceae	*Indigofera sp.*					
Fabaceae	*Indigofera sessilifolia*	DC.			LC	Indigenous
Fabaceae	*Indigofera daleoides*	Benth. ex Harv.			LC	Indigenous
Fabaceae	*Indigofera alternans*	DC.				Indigenous
Fabaceae	*Indigofera daleoides*	Benth. ex Harv.	var.	daleoides	NE	Indigenous
Fabaceae	*Melolobium candicans*	(E.Mey.) Eckl. & Zeyh.			LC	Indigenous
Fabaceae	*Melolobium canescens*	Benth.			LC	Indigenous
Fabaceae	*Calobota cuspidosa*	(Burch.) Boatwr. & B.-E.van Wyk			LC	Indigenous
Fabaceae	*Rhynchosia totta*	(Thunb.) DC.	var.	totta	LC	Indigenous
Fabaceae	*Melolobium microphyllum*	(L.f.) Eckl. & Zeyh.			LC	Indigenous
Fabaceae	*Styphnolobium japonicum*	(L.) Schott				Not indigenous; Cultivated; Naturalised; Invasive
Fabaceae	*Vachellia hebeclada*	(DC.) Kyal. & Boatwr.	subsp.	hebeclada	LC	Indigenous
Fabaceae	*Vachellia erioloba*	(E.Mey.) P.J.H.Hurter			LC	Indigenous
Fabaceae	*Tephrosia burchellii*	Burtt Davy			LC	Indigenous

Fabaceae	*Caesalpinia pulcherrima*	(L.) Sw.			NE	Not indigenous; Naturalised
Fabaceae	*Elephantorrhiza elephantina*	(Burch.) Skeels			LC	Indigenous
Fabaceae	*Vachellia karroo*	(Hayne) Banfi & Galasso			LC	Indigenous
Fabaceae	*Senna italica*	Mill.	sub sp.	arachoides	LC	Indigenous
Fabaceae	*Vachellia tortilis*	(Forssk.) Galasso & Banfi	sub sp.	heteracantha	LC	Indigenous
Fabaceae	*Lessertia depressa*	Harv.			LC	Indigenous
Fabaceae	*Argyrolobium pauciflorum*	Eckl. & Zeyh.			LC	Indigenous
Fabaceae	*Lotononis laxa*	Eckl. & Zeyh.			LC	Indigenous
Fabaceae	*Lessertia pauciflora*	Harv.	var.	pauciflora	LC	Indigenous
Fabaceae	*Prosopis glandulosa*	Torr.	var.	glandulosa	NE	Not indigenous; Naturalised
Fabaceae	*Lessertia affinis*	Burtt Davy			LC	Indigenous; Endemic
Fabaceae	*Parkinsonia aculeata*	L.			NE	Not indigenous; Naturalised; Invasive
Fabaceae	*Chamaecrista biensis*	(Steyaert) Lock			LC	Indigenous
Fabaceae	*Indigofera alternans*	DC.	var.	alternans	LC	Indigenous
Fabaceae	*Medicago sativa*	L.			NE	Not indigenous; Cultivated; Naturalised; Invasive
Fabaceae	*Indigofera filipes*	Benth. ex Harv.			LC	Indigenous
Fabaceae	*Rhynchosia confusa*	Burtt Davy			NE	Indigenous
Fabaceae	*Erythrostemon gilliesii*	(Hook.) Klotzsch				Not indigenous; Naturalised; Invasive
Fabaceae	*Melolobium macrocalyx*	Dummer	var.	macrocalyx	LC	Indigenous
Fabaceae	*Acacia sp.*					
Fabaceae	*Crotalaria griquensis*	L.Bolus			LC	Indigenous
Fabaceae	*Vachellia haematoxylon*	(Willd.) Seigler & Ebinger			LC	Indigenous
Gentianaceae	*Sebaea compacta*	A.W.Hill			LC	Indigenous; Endemic
Geraniaceae	*Pelargonium dolomiticum*	R.Knuth			LC	Indigenous
Geraniaceae	*Pelargonium multicaule*	Jacq.	sub sp.	multicaule	LC	Indigenous
Geraniaceae	*Monsonia angustifolia*	E.Mey. ex A.Rich.			LC	Indigenous
Gigaspermaceae	*Chamaebryum pottioides*	Ther. & Dixon				Indigenous
Hyacinthaceae	*Ledebouria glauca*	S.Venter			LC	Indigenous
Hyacinthaceae	*Albuca namaquensis*	Baker			LC	Indigenous
Hyacinthaceae	*Ledebouria undulata*	(Jacq.) Jessop ex Willd.			LC	Indigenous
Hyacinthaceae	*Massonia jasminiflora*	Burch. ex Baker			LC	Indigenous
Hyacinthaceae	*Albuca seineri*	(Engl. & K.Krause) J.C.Manning & Goldblatt			LC	Indigenous
Hyacinthaceae	*Ledebouria ensifolia*	(Eckl.) S.Venter & T.J.Edwards			LC	Indigenous
Hyacinthaceae	*Ledebouria minima*	(Baker) S.Venter			LC	Indigenous
Iridaceae	*Babiana hypogaea*	Burch.			LC	Indigenous
Iridaceae	*Moraea falcifolia*	Klatt			LC	Indigenous

Iridaceae	*Lapeirousia kalahariensis*	Goldblatt & J.C.Manning				Indigenous
Iridaceae	*Babiana bainesii*	Baker			LC	Indigenous
Iridaceae	*Freesia andersoniae*	L.Bolus			LC	Indigenous; Endemic
Iridaceae	*Lapeirousia plicata*	(Jacq.) Diels	sub sp.	foliosa		Indigenous
Iridaceae	*Gladiolus permeabilis*	D.Delaroche	sub sp.	edulis	LC	Indigenous
Juncaceae	*Juncus rigidus*	Desf.			LC	Indigenous
Juncaceae	*Juncus bufonius*	L.				Cryptogenic
Lamiaceae	*Salvia disermas*	L.			LC	Indigenous
Lamiaceae	*Leonotis pentadentata*	J.C.Manning & Goldblatt			LC	Indigenous
Lamiaceae	*Salvia stenophylla*	Burch. ex Benth.				Indigenous
Lamiaceae	*Stachys spathulata*	Burch. ex Benth.			LC	Indigenous
Lamiaceae	*Stachys burchelliana*	Launert			LC	Indigenous
Lamiaceae	*Salvia verbenaca*	L.			LC	Not indigenous; Naturalised; Invasive
Limeaceae	*Limeum argute-carinatum*	Wawra ex Wawra & Peyr.	var.	argute-carinatum	LC	Indigenous
Limeaceae	*Limeum fenestratum*	(Fenzl) Heimerl	var.	fenestratum	LC	Indigenous
Limeaceae	*Limeum aethiopicum*	Burm.f.	var.	intermedium	NE	Indigenous; Endemic
Lobeliaceae	*Lobelia thermalis*	Thunb.			LC	Indigenous
Malpighiaceae	*Triaspis sp.*					
Malvaceae	*Hermannia linearifolia*	Harv.			LC	Indigenous; Endemic
Malvaceae	*Hermannia sp.*					
Malvaceae	*Hermannia quartiniana*	A.Rich.			LC	Indigenous
Malvaceae	*Hermannia marginata*	(Turcz.) Pillans			LC	Indigenous; Endemic
Malvaceae	*Hermannia stellulata*	(Harv.) K.Schum.			LC	Indigenous
Malvaceae	*Sida chrysantha*	Ulbr.			LC	Indigenous
Malvaceae	*Hermannia jacobeifolia*	(Turcz.) R.A.Dyer			LC	Indigenous
Malvaceae	*Pavonia burchellii*	(DC.) R.A.Dyer			LC	Indigenous
Malvaceae	*Hibiscus marlothianus*	K.Schum.			LC	Indigenous; Endemic
Malvaceae	*Grewia flava*	DC.			LC	Indigenous
Malvaceae	*Hermannia tomentosa*	(Turcz.) Schinz ex Engl.			LC	Indigenous
Malvaceae	*Corchorus aspleniifolius*	Burch.			LC	Indigenous
Malvaceae	*Hermannia comosa*	Burch. ex DC.			LC	Indigenous
Malvaceae	*Hermannia erodioides*	(Burch. ex DC.) Kuntze			LC	Indigenous
Malvaceae	*Hermannia eenii*	Baker f.			LC	Indigenous
Marsileaceae	*Marsilea burchellii*	(Kunze) A.Braun			LC	Indigenous
Menispermaceae	*Antizoma angustifolia*	(Burch.) Miers ex Harv.			LC	Indigenous
Myrtaceae	*Eucalyptus camaldulensis*	Dehnh.				Not indigenous; Cultivated; Naturalised; Invasive
Myrtaceae	*Eucalyptus sp.*					

Nyctaginaceae	*Commicarpus pentandrus*	(Burch.) Heimerl			LC	Indigenous
Nyctaginaceae	*Mirabilis jalapa*	L.				Not indigenous; Naturalised; Invasive
Oleaceae	*Olea europaea*	L.	sub sp.	cuspidata		Indigenous
Oleaceae	*Menodora africana*	Hook.			LC	Indigenous
Oliniaceae	*Olinia emarginata*	Burtt Davy			LC	Indigenous
Onagraceae	*Oenothera indecora*	Cambess.				Not indigenous; Naturalised
Orobanchaceae	*Harveya huttonii*	Hiern			LC	Indigenous; Endemic
Oxalidaceae	*Oxalis depressa*	Eckl. & Zeyh.			LC	Indigenous
Oxalidaceae	*Oxalis lawsonii*	F.Bolus			LC	Indigenous
Passifloraceae	*Adenia repanda*	(Burch.) Engl.			LC	Indigenous
Pedaliaceae	*Sesamum triphyllum*	Welw. ex Asch.	var.	triphyllum	LC	Indigenous
Phyllanthaceae	*Phyllanthus parvulus*	Sond.	var.	parvulus	LC	Indigenous
Phyllanthaceae	*Phyllanthus parvulus*	Sond.	var.	garipensis	LC	Indigenous
Plantaginaceae	*Veronica anagallis-aquatica*	L.			LC	Indigenous
Plantaginaceae	*Plantago lanceolata*	L.			LC	Indigenous
Poaceae	*Sporobolus fimbriatus*	(Trin.) Nees			LC	Indigenous
Poaceae	*Schmidtia kalahariensis*	Stent			LC	Indigenous
Poaceae	*Aristida adscensionis*	L.			LC	Indigenous
Poaceae	*Aristida stipitata*	Hack.	sub sp.	graciliflora	LC	Indigenous
Poaceae	*Panicum schinzii*	Hack.			LC	Indigenous
Poaceae	*Eragrostis obtusa*	Munro ex Ficalho & Hiern			LC	Indigenous
Poaceae	*Cymbopogon caesius*	(Hook. & Arn.) Stapf			LC	Indigenous
Poaceae	*Digitaria polyphylla*	Henrard			LC	Indigenous
Poaceae	*Eragrostis cilianensis*	(All.) Vignolo ex Janch.			LC	Indigenous
Poaceae	*Tragus racemosus*	(L.) All.			LC	Indigenous
Poaceae	*Setaria sphacelata*	(Schumach.) Stapf & C.E.Hubb. ex M.B.Moss	var.	torta	LC	Indigenous
Poaceae	*Eragrostis nindensis*	Ficalho & Hiern			LC	Indigenous
Poaceae	*Chloris virgata*	Sw.			LC	Indigenous
Poaceae	*Eragrostis pallens*	Hack.			LC	Indigenous
Poaceae	*Brachiaria serrata*	(Thunb.) Stapf			LC	Indigenous
Poaceae	*Eragrostis mexicana*	(Hornem.) Link	sub sp.	virescens	NE	Not indigenous; Naturalised
Poaceae	*Stipagrostis sp.*					
Poaceae	*Stipagrostis hirtigluma*	(Steud.) De Winter	sub sp.	patula	LC	Indigenous
Poaceae	*Themeda triandra*	Forssk.			LC	Indigenous
Poaceae	*Brachiaria marlothii*	(Hack.) Stent			LC	Indigenous
Poaceae	*Eragrostis lehmanniana*	Nees	var.	lehmanniana	LC	Indigenous
Poaceae	*Aristida stipitata*	Hack.	sub sp.	spicata	LC	Indigenous
Poaceae	*Digitaria eriantha*	Steud.			LC	Indigenous

Poaceae	*Enneapogon cenchroides*	(Licht. ex Roem. & Schult.) C.E.Hubb.			LC	Indigenous
Poaceae	*Stipagrostis uniplumis*	(Licht.) De Winter	var.	uniplumis	LC	Indigenous
Poaceae	*Triraphis purpurea*	Hack.			LC	Indigenous
Poaceae	*Panicum coloratum*	L.			LC	Indigenous
Poaceae	*Enneapogon desvauxii*	P.Beauv.			LC	Indigenous
Poaceae	*Digitaria ternata*	(A.Rich.) Stapf			LC	Indigenous
Poaceae	*Eragrostis remotiflora*	De Winter			LC	Indigenous; Endemic
Poaceae	*Eragrostis micrantha*	Hack.			LC	Indigenous
Poaceae	*Eragrostis sp.*					
Poaceae	*Eragrostis bicolor*	Nees			LC	Indigenous
Poaceae	*Brachiaria nigropedata*	(Ficalho & Hiern) Stapf			LC	Indigenous
Poaceae	*Eragrostis homomalla*	Nees			LC	Indigenous
Poaceae	*Eragrostis pseudobtusa*	De Winter			NE	Indigenous; Endemic
Poaceae	*Anthephora pubescens*	Nees			LC	Indigenous
Poaceae	*Eragrostis chloromelas*	Steud.			LC	Indigenous
Poaceae	*Eragrostis procumbens*	Nees			LC	Indigenous
Poaceae	*Stipagrostis ciliata*	(Desf.) De Winter	var.	capensis	LC	Indigenous
Poaceae	*Panicum stapfianum*	Fourc.			LC	Indigenous
Poaceae	*Aristida congesta*	Roem. & Schult.	sub sp.	barbicollis	LC	Indigenous
Poaceae	*Melinis repens*	(Willd.) Zizka	sub sp.	repens	LC	Indigenous
Poaceae	*Cynodon transvaalensis*	Burtt Davy			LC	Indigenous
Poaceae	*Heteropogon contortus*	(L.) Roem. & Schult.			LC	Indigenous
Poaceae	*Eragrostis trichophora*	Coss. & Durieu			LC	Indigenous
Poaceae	*Aristida vestita*	Thunb.			LC	Indigenous
Poaceae	*Enneapogon scoparius*	Stapf			LC	Indigenous
Poaceae	*Triraphis andropogonoides*	(Steud.) E.Phillips			LC	Indigenous
Poaceae	*Cynodon incompletus*	Nees			LC	Indigenous; Endemic
Poaceae	*Oropetium capense*	Stapf			LC	Indigenous
Poaceae	*Aristida congesta*	Roem. & Schult.	sub sp.	congesta	LC	Indigenous
Poaceae	*Hyparrhenia hirta*	(L.) Stapf			LC	Indigenous
Poaceae	*Pogonarthria squarrosa*	(Roem. & Schult.) Pilg.			LC	Indigenous
Poaceae	*Setaria sphacelata*	(Schumach.) Stapf & C.E.Hubb. ex M.B.Moss	var.	sphacelata	LC	Indigenous
Poaceae	*Eragrostis stapfii*	De Winter			LC	Indigenous
Poaceae	*Eragrostis truncata*	Hack.			LC	Indigenous
Poaceae	*Stipagrostis obtusa*	(Delile) Nees			LC	Indigenous
Poaceae	*Tragus koelerioides*	Asch.			LC	Indigenous
Poaceae	*Eragrostis pilgeriana*	Dinter ex Pilg.			LC	Indigenous

Poaceae	*Eragrostis echinochloidea*	Stapf			LC	Indigenous
Poaceae	*Eragrostis curvula*	(Schrad.) Nees			LC	Indigenous
Poaceae	*Trichoneura grandiglumis*	(Nees) Ekman			LC	Indigenous
Poaceae	*Stipagrostis uniplumis*	(Licht.) De Winter	var.	neesii	LC	Indigenous
Poaceae	*Sporobolus acinifolius*	Stapf			LC	Indigenous
Poaceae	*Eragrostis porosa*	Nees			LC	Indigenous
Poaceae	*Cymbopogon pospischilii*	(K.Schum.) C.E.Hubb.			NE	Indigenous
Poaceae	*Eragrostis gummiflua*	Nees			LC	Indigenous
Poaceae	*Aristida stipitata*	Hack.	sub sp.	stipitata	LC	Indigenous
Poaceae	*Cynodon dactylon*	(L.) Pers.			LC	Indigenous
Poaceae	*Fingerhuthia africana*	Lehm.			LC	Indigenous
Poaceae	*Aristida meridionalis*	Henrard			LC	Indigenous
Polygalaceae	*Polygala leptophylla*	Burch.				Indigenous
Polygalaceae	*Polygala krumanina*	Burch. ex Ficalho & Hiern			LC	Indigenous; Endemic
Polygalaceae	*Polygala leptophylla*	Burch.	var.	leptophylla	LC	Indigenous
Polygalaceae	*Polygala hottentotta*	C.Presl			LC	Indigenous
Polygonaceae	*Oxygonum sp.*					
Polygonaceae	*Rumex lanceolatus*	Thunb.			LC	Indigenous
Polygonaceae	*Oxygonum dregeanum*	Meisn.	sub sp.	canescens	NE	Indigenous
Polygonaceae	*Persicaria hystricula*	(J.Schust.) Sojak			LC	Indigenous
Polygonaceae	*Polygonum bellardii*	All.				Not indigenous; Naturalised
Polygonaceae	*Rumex rhodesius*	Rech.f.			LC	Indigenous
Potamogetonaceae	*Potamogeton schweinfurthii*	A.Benn.			LC	Indigenous
Pottiaceae	*Aloina bifrons*	(De Not.) Delgad.				Indigenous
Pteridaceae	*Cheilanthes hirta*	Sw.	var.	hirta	LC	Indigenous
Pteridaceae	*Pellaea calomelanos*	(Sw.) Link				Indigenous
Pteridaceae	*Cheilanthes eckloniana*	(Kunze) Mett.			LC	Indigenous
Pteridaceae	*Cheilanthes hirta*	Sw.	var.	brevipilosa	LC	Indigenous
Pteridaceae	*Pellaea calomelanos*	(Sw.) Link	var.	calomelanos	LC	Indigenous
Ranunculaceae	*Ranunculus multifidus*	Forssk.			LC	Indigenous
Resedaceae	*Oligomeris dipetala*	(Aiton) Turcz.	var.	dipetala	LC	Indigenous
Rhamnaceae	*Ziziphus mucronata*	Willd.	sub sp.	mucronata	LC	Indigenous
Ricciaceae	*Riccia okahandjana*	S.W.Arnell				Indigenous
Ricciaceae	*Riccia albolimbata*	S.W.Arnell				Indigenous
Rosaceae	*Alchemilla elongata*	Eckl. & Zeyh.	var.	elongata	NE	Indigenous
Rubiaceae	*Nenax microphylla*	(Sond.) T.M.Salter			LC	Indigenous
Rubiaceae	*Kohautia cynanchica*	DC.			LC	Indigenous

Rubiaceae	*Anthospermum rigidum*	Eckl. & Zeyh.	sub sp.	rigidum	LC	Indigenous
Rubiaceae	*Anthospermum rigidum*	Eckl. & Zeyh.	sub sp.	pumilum	LC	Indigenous
Santalaceae	*Thesium hystrix*	A.W.Hill			LC	Indigenous
Santalaceae	*Viscum rotundifolium*	L.f.			LC	Indigenous
Santalaceae	*Thesium sp.*					
Santalaceae	*Thesium lacinulatum*	A.W.Hill			LC	Indigenous
Sapindaceae	*Acer negundo*	L.				Not indigenous; Naturalised; Invasive
Scrophulariaceae	*Jamesbrittenia aurantiaca*	(Burch.) Hilliard			LC	Indigenous
Scrophulariaceae	*Selago albida*	Choisy			LC	Indigenous
Scrophulariaceae	*Nemesia lilacina*	N.E.Br.			LC	Indigenous
Scrophulariaceae	*Jamesbrittenia tysonii*	(Hiern) Hilliard			LC	Indigenous; Endemic
Scrophulariaceae	*Selago paniculata*	Thunb.			LC	Indigenous; Endemic
Scrophulariaceae	*Aptosimum albomarginatum*	Marloth & Engl.			LC	Indigenous
Scrophulariaceae	*Selago sp.*					
Scrophulariaceae	*Peliostomum leucorrhizum*	E.Mey. ex Benth.			LC	Indigenous
Scrophulariaceae	*Sutera sp.*					
Scrophulariaceae	*Diclis petiolaris*	Benth.			LC	Indigenous
Scrophulariaceae	*Zaluzianskya pachyrrhiza*	Hilliard & B.L.Burtt			LC	Indigenous; Endemic
Scrophulariaceae	*Selago saxatilis*	E.Mey.			LC	Indigenous
Scrophulariaceae	*Chaenostoma halimifolium*	Benth.			LC	Indigenous
Scrophulariaceae	*Aptosimum elongatum*	(Hiern) Engl.			LC	Indigenous
Scrophulariaceae	*Jamesbrittenia sp.*					
Scrophulariaceae	*Jamesbrittenia atropurpurea*	(Benth.) Hilliard	sub sp.	atropurpurea	LC	Indigenous
Scrophulariaceae	*Jamesbrittenia integerrima*	(Benth.) Hilliard			LC	Indigenous
Scrophulariaceae	*Chaenostoma patrioticum*	(Hiern) Kornhall			LC	Indigenous
Scrophulariaceae	*Sutera griquensis*	Hiern			LC	Indigenous; Endemic
Scrophulariaceae	*Selago mixta*	Hilliard			LC	Indigenous; Endemic
Solanaceae	*Lycium horridum*	Thunb.			LC	Indigenous
Solanaceae	*Solanum capense*	L.			LC	Indigenous
Solanaceae	*Solanum lichtensteinii*	Willd.			LC	Indigenous
Solanaceae	*Lycium pumilum*	Dammer			LC	Indigenous
Solanaceae	*Datura innoxia*	Mill.				Not indigenous; Naturalised; Invasive
Solanaceae	*Withania somnifera*	(L.) Dunal			LC	Indigenous
Stilbaceae	*Nuxia gracilis*	Engl.			LC	Indigenous; Endemic
Theophrastaceae	*Samolus valerandi*	L.			LC	Indigenous

Thymelaeaceae	*Lasiosiphon polycephalus*	(E.Mey. ex Meisn.) H.Pearson			LC	Indigenous
Thymelaeaceae	*Lasiosiphon burchellii*	Meisn.			LC	Indigenous
Typhaceae	*Typha capensis*	(Rohrb.) N.E.Br.			LC	Indigenous
Vahliaceae	*Vahlia capensis*	(L.f.) Thunb.	sub sp.	vulgaris	NE	Indigenous
Verbenaceae	*Chascanum pinnatifidum*	(L.f.) E.Mey.	var.	pinnatifidum	LC	Indigenous
Verbenaceae	*Verbena bonariensis*	L.				Not indigenous; Naturalised; Invasive
Verbenaceae	*Lantana rugosa*	Thunb.			LC	Indigenous
Verbenaceae	*Verbena brasiliensis*	Vell.				Not indigenous; Naturalised; Invasive
Zygophyllaceae	*Roepera pubescens*	(Schinz) Beier & Thulin				Indigenous
Zygophyllaceae	*Tribulus zeyheri*	Sond.	sub sp.	zeyheri	LC	Indigenous

9.2 Appendix B – Amphibian species expected to occur in the PAOI

Family	Species	Conservation Status	
		Regional (SANBI)	IUCN
Brevicipitidae	*Breviceps adspersus*	LC	LC
Bufonidae	*Sclerophrys gutturalis*	LC	LC
Bufonidae	*Sclerophrys poweri*	LC	LC
Bufonidae	*Vandijkophrynus gariepensis*	LC	LC
Hyperoliidae	*Kassina senegalensis*	LC	LC
Pipidae	*Xenopus laevis*	LC	LC
Pyxicephalidae	*Amietia angolensis*	LC	LC
Pyxicephalidae	*Cacosternum boettgeri*	LC	LC
Pyxicephalidae	*Pyxicephalus adspersus*	NT	LC
Pyxicephalidae	*Tomopterna cryptotis*	LC	LC
Pyxicephalidae	*Tomopterna tandyi*	LC	LC

9.3 Appendix C – Reptile species expected to occur in the PAOI

Family	Species	Common Name	Conservation Status	
			Regional (SANBI)	IUCN
Agamidae	*Acanthocercus atricollis*	Southern Tree Agama	LC	LC
Agamidae	*Agama aculeata aculeata*	Common Ground Agama	LC	Unlisted
Amphisbaenidae	*Zygaspis quadrifrons*	Kalahari Dwarf Worm Lizard	LC	Unlisted
Chamaeleonidae	*Chamaeleo dilepis*	Common Flap-neck Chameleon	LC	LC
Colubridae	*Dasypeltis scabra*	Rhombic Egg-eater	LC	LC
Colubridae	*Dispholidus typus viridis*	Northern Boomslang	LC	LC
Colubridae	*Philothamnus semivariegatus*	Spotted Bush Snake	LC	Unlisted
Cordylidae	*Karusasaurus polyzonus*	Karoo Girdled Lizard	LC	LC
Elapidae	*Aspidelaps scutatus scutatus*	Speckled Shield Cobra	LC	Unlisted
Elapidae	*Naja nivea*	Cape Cobra	LC	Unlisted
Gekkonidae	*Hemidactylus mabouia*	Common Tropical House Gecko	LC	Unlisted
Gekkonidae	*Lygodactylus bradfieldi*	Bradfield's Dwarf Gecko	LC	Unlisted
Gekkonidae	*Lygodactylus capensis*	Common Dwarf Gecko	LC	Unlisted
Gekkonidae	*Pachydactylus capensis*	Cape Gecko	LC	Unlisted
Gerrhosauridae	*Gerrhosaurus flavigularis*	Yellow-throated Plated Lizard	LC	Unlisted
Lacertidae	*Pedioplanis lineoocellata lineoocellata*	Spotted Sand Lizard	LC	Unlisted
Lamprophiidae	*Boaedon capensis*	Brown House Snake	LC	LC
Lamprophiidae	*Lycophidion capense capense*	Cape Wolf Snake	LC	Unlisted
Lamprophiidae	*Psammophis brevirostris*	Short-snouted Grass Snake	LC	Unlisted
Lamprophiidae	*Psammophis notostictus*	Karoo Sand Snake	LC	Unlisted
Lamprophiidae	*Psammophis trinasalis*	Fork-marked Sand Snake	LC	Unlisted
Lamprophiidae	*Psammophylax tritaeniatus*	Striped Grass Snake	LC	LC
Lamprophiidae	*Pseudaspis cana*	Mole Snake	LC	Unlisted
Leptotyphlopidae	*Leptotyphlops scutifrons scutifrons*	Peters' Thread Snake	LC	Unlisted
Pelomedusidae	*Pelomedusa galeata*	South African Marsh Terrapin	LC	Unlisted
Scincidae	*Panaspis wahlbergii*	Wahlberg's Snake-eyed Skink	LC	Unlisted
Scincidae	*Trachylepis capensis*	Cape Skink	LC	Unlisted
Scincidae	*Trachylepis punctatissima*	Speckled Rock Skink	LC	LC
Scincidae	*Trachylepis spilogaster*	Kalahari Tree Skink	LC	Unlisted
Scincidae	*Trachylepis variegata*	Variegated Skink	LC	LC
Testudinidae	*Psammobates oculifer*	Serrated Tent Tortoise	LC	Unlisted
Testudinidae	*Stigmochelys pardalis*	Leopard Tortoise	LC	LC
Typhlopidae	*Rhinotyphlops lalandei*	Delalande's Beaked Blind Snake	LC	Unlisted
Varanidae	*Varanus albigularis albigularis*	Rock Monitor	LC	LC
Viperidae	*Bitis arietans arietans*	Puff Adder	LC	Unlisted

9.4 Appendix D – Mammal species expected to occur within the PAOI

Family	Species	Conservation Status	
		Regional (SANBI)	IUCN
Bovidae	*Alcelaphus buselaphus*	LC	LC
Bovidae	*Antidorcas marsupialis*	LC	LC
Bovidae	*Connochaetes gnou*	LC	LC
Bovidae	*Connochaetes taurinus*	LC	LC
Bovidae	*Oryx gazella*	LC	LC
Bovidae	*Raphicerus campestris*	LC	LC
Bovidae	*Sylvicapra grimmia*	LC	LC
Bovidae	*Syncerus caffer*	LC	LC
Bovidae	*Tragelaphus oryx*	LC	LC
Canidae	*Canis mesomelas*	LC	LC
Canidae	*Otocyon megalotis*	LC	LC
Canidae	*Vulpes chama*	LC	LC
Cercopithecidae	*Chlorocebus pygerythrus*	LC	LC
Cercopithecidae	*Papio ursinus*	LC	LC
Erinaceidae	*Atelerix frontalis*	NT	LC
Felidae	*Caracal caracal*	LC	LC
Felidae	*Felis nigripes*	VU	VU
Felidae	*Felis silvestris*	LC	LC
Felidae	*Panthera pardus*	VU	VU
Giraffidae	*Giraffa camelopardalis*	LC	VU
Herpestidae	*Cynictis penicillata*	LC	LC
Herpestidae	*Herpestes pulverulentus*	LC	LC
Herpestidae	*Herpestes sanguineus*	LC	LC
Herpestidae	*Suricata suricatta*	LC	LC
Hyaenidae	*Parahyaena brunnea*	NT	NT
Hyaenidae	*Proteles cristata*	LC	LC
Hystricidae	*Hystrix africaeaustralis*	LC	LC
Leporidae	*Lepus capensis*	LC	LC
Leporidae	*Lepus saxatilis*	LC	LC
Leporidae	*Pronolagus rupestris*	LC	LC
Manidae	*Smutsia temminckii*	VU	VU
Molossidae	*Tadarida aegyptiaca*	LC	LC
Muridae	*Aethomys ineptus*	LC	LC
Muridae	*Aethomys namaquensis*	LC	LC
Muridae	*Desmodillus auricularis*	LC	LC
Muridae	*Gerbilliscus brantsii*	LC	LC
Muridae	*Gerbilliscus leucogaster*	LC	LC
Muridae	*Gerbillurus paeba*	LC	LC
Muridae	*Mastomys coucha*	LC	LC
Muridae	*Mus musculus*	Unlisted	LC
Muridae	*Parotomys brantsii*	LC	LC
Muridae	*Parotomys littledalei*	NT	LC
Muridae	*Rattus rattus*	Exotic (Not listed)	LC
Muridae	*Rhabdomys pumilio*	LC	LC

Mustelidae	*Aonyx capensis*	NT	NT
Mustelidae	*Ictonyx striatus*	LC	LC
Mustelidae	*Mellivora capensis*	LC	LC
Mustelidae	*Poecilogale albinucha*	NT	LC
Nesomyidae	*Malacothrix typica*	LC	LC
Nesomyidae	*Saccostomus campestris*	LC	LC
Nesomyidae	*Steatomys krebsii*	LC	LC
Orycteropodidae	*Orycteropus afer*	LC	LC
Pedetidae	*Pedetes capensis*	LC	LC
Procaviidae	*Procavia capensis*	LC	LC
Pteropodidae	*Eidolon helvum*	LC	NT
Rhinolophidae	*Rhinolophus clivosus*	LC	LC
Rhinolophidae	*Rhinolophus darlingi*	LC	LC
Rhinolophidae	*Rhinolophus denti*	NT	LC
Sciuridae	*Xerus inauris*	LC	LC
Soricidae	*Suncus varilla*	LC	LC
Suidae	*Phacochoerus africanus*	LC	LC
Vespertilionidae	*Eptesicus hottentotus*	LC	LC
Vespertilionidae	*Neoromicia capensis*	LC	LC
Viverridae	*Genetta genetta*	LC	LC

9.5 Appendix D – Specialist Declaration

DECLARATION

I, Marnus 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.

Marnus Erasmus

Biodiversity Specialist

The Biodiversity Company

November 2022