THE TERRESTRIAL ECOLOGY BASELINE & IMPACT ASSESSMENT FOR THE PROPOSED MULILO STRUISBULT PV2 GRID CONNECTION

Copperton, Siyathemba, Pixley ka Seme District Municipality, Province of Northern Cape, South Africa

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1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake a fauna and flora baseline for the Mulilo Struisbult PV2 Grid Connection. The project is found in Copperton in the Pixley ka Seme District Municipality, Province of Northern Cape, South Africa. The extent of the grid connection and PV2 area is presented in Figure 1-1. A 300 m corridor was assigned to the Cuprum-Kronos servitude, access road, and the Struisbult Loop-in and Loop-out (LILO) line, this corridor is referred to as the project area from hereon.

This assessment 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): “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 sensitivity of the solar plant as “Very High”.

The purpose of the specialist studies is to provide relevant input into the basic assessment process and provide a report for the proposed activities associated with the project. This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Registered Environmental Assessment Practitioner (REAP) and regulatory authorities, enabling informed decision making, as to the ecological viability of the proposed project.

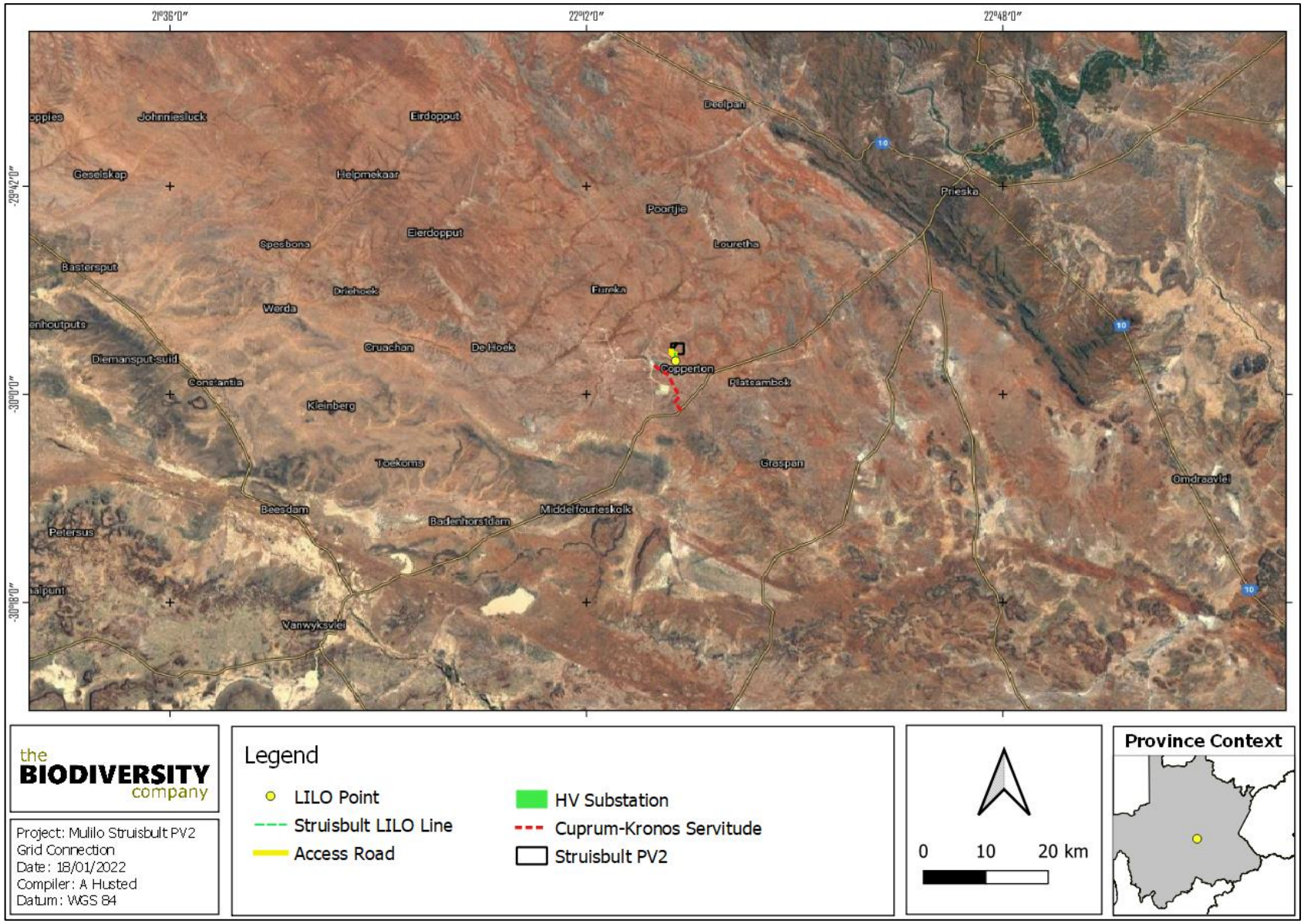


Figure 1-1 Proposed location of the project area in relation to the nearby towns.

1.2 Specialist Details

Report Name	**THE TERRESTRIAL ECOLOGY BASELINE & IMPACT ASSESSMENT FOR THE PROPOSED MULILO STRUISBULT PV2 GRID CONNECTION**
Applicant	MULILO RENEWABLE PROJECT DEVELOPMENTS
Submitted to	EIMS ENVIRONMENTAL IMPACT MANAGEMENT SERVICES
Fieldwork / Report Writer	**Rudolph Greffrath** 
	Rudolph is a terrestrial ecology specialist with 14 years of experience in biodiversity baseline assessments, biodiversity action planning design and development, biodiversity off-set design and implementation, biodiversity strategy design, conservation management planning and implementation, IFC performance standards best practice, ecological restoration, ecosystems services and environmental impact assessments, across Africa. Rudolph is Pr Sci Nat registered (400018/17) in the Conservation Science field of practice.
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 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

1.3 Scope of Work

The principle aim of the assessment was to provide information to guide the risk of the proposed activity to the flora and fauna communities of the associated ecosystems within the project area/corridor. This was achieved through the following:

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

2 Key Legislative Requirements

The legislation, policies and guidelines listed below in Table 2-1 are applicable to the current project. The list below, although extensive, may not be complete and other legislation, policies and guidelines may apply in addition to those listed below.

Table 2-1 A list of key legislative requirements relevant to biodiversity and conservation in the Northern Cape Province

Region	Legislation / Guideline
International	Convention on Biological Diversity (CBD, 1993)
	The Convention on Wetlands (RAMSAR Convention, 1971)
	The United Nations Framework Convention on Climate Change (UNFCC,1994)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
National	Constitution of the Republic of South Africa (Act No. 108 of 1996)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management: Biodiversity Act (Act No. 10 of 2004), Threatened or Protected Species Regulations
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 320 of Government Gazette 43310 (March 2020)
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 1150 of Government Gazette 43855 (October 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989)
	National Protected Areas Expansion Strategy (NPAES)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)

	National Water Act (NWA) (Act No. 36 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations and, Alien and Invasive Species List 20142020, published under NEMBA
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
Provincial	Northern Cape Planning and Development Act no. 7 of 1998
	Northern Cape Nature Conservation act no. 9 of 2009

2.1 National Environmental Management Act (NEMA, 1998)

The National Environmental Management Act (Act No. 107 of 1998 – NEMA) and the associated Regulations as amended in April 2017, states that prior to any development taking place within a wetland or riparian area, an environmental authorisation application process needs to be followed. This could follow either the Basic Assessment (BA) process or the Environmental Impact Assessment (EIA) process depending on the scale of the impact.

New regulations were gazetted (43110) on the 20 March 2020 which have replaced the requirements of Appendix 6 of the Environmental Impact Assessment Regulations. 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 Environmental Authorisation (EA).

3 Receiving Environment

3.1 Project Area

The project area is situated in the vicinity of Copperton near Prieska, Pixley Ka Seme District Municipality, Northern Cape Province. The grid connection is located on portion 1 of 104 of the farm Vogelstruis Bult.

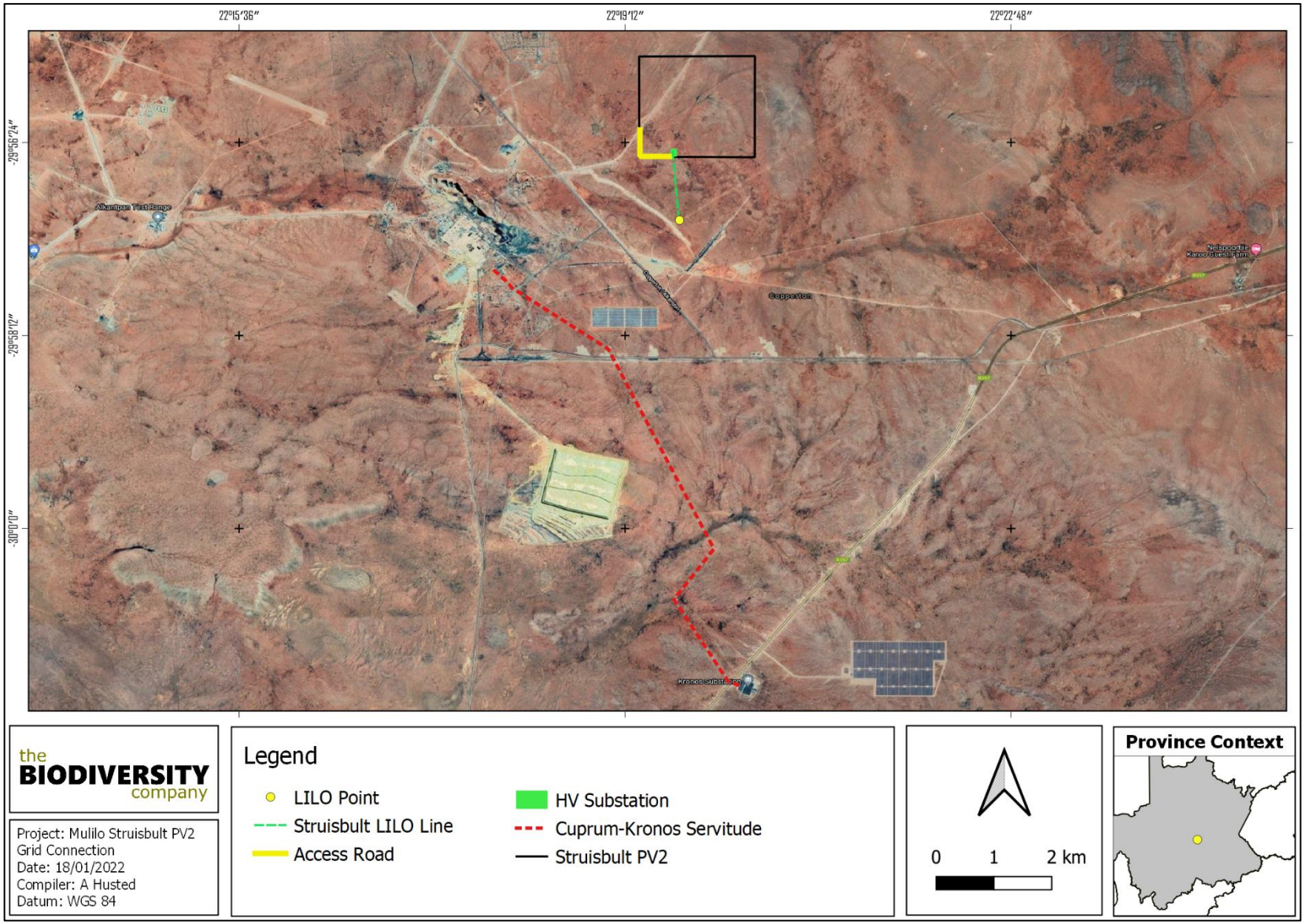


Figure 3-1 Map illustrating the location of the proposed project area

3.2 Desktop Assessment

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

3.2.1 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 Biodiversity Sector Plan

The Northern Cape Department of Environment and Nature Conservation has developed the Northern Cape CBA Map which identifies biodiversity priority areas for the province, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected

areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole.

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.

The Northern Cape Critical Biodiversity Area (CBA) Map updates, revises and replaces all older systematic biodiversity plans and associated products for the province. These include the:

- Namakwa District Biodiversity Sector Plan;
- Cape Fine-Scale Plan (only the extent of the areas in the Northern Cape i.e., Bokkeveld and Nieuwoudtville); and
- Richtersveld Municipality Biodiversity Assessment.

- Important Bird and Biodiversity Areas (IBAs) (BirdLife South Africa, 2015) – IBAs constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria; and
- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al.,* 2018) – A SAIIAE was established during the NBA of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types and pressures on these systems.

3.2.2 Desktop Flora Assessment

The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) and SANBI (2019) was used to identify the vegetation type that would have occurred under natural or pre-anthropogenically altered conditions. Furthermore, the Plants of Southern Africa (POSA) database was accessed to compile a list of expected flora species within the project area (Figure 3-2). The Red List of South African Plants (Raimondo *et al.,* 2009; SANBI, 2020) was utilized to provide the most current national conservation status of flora species.

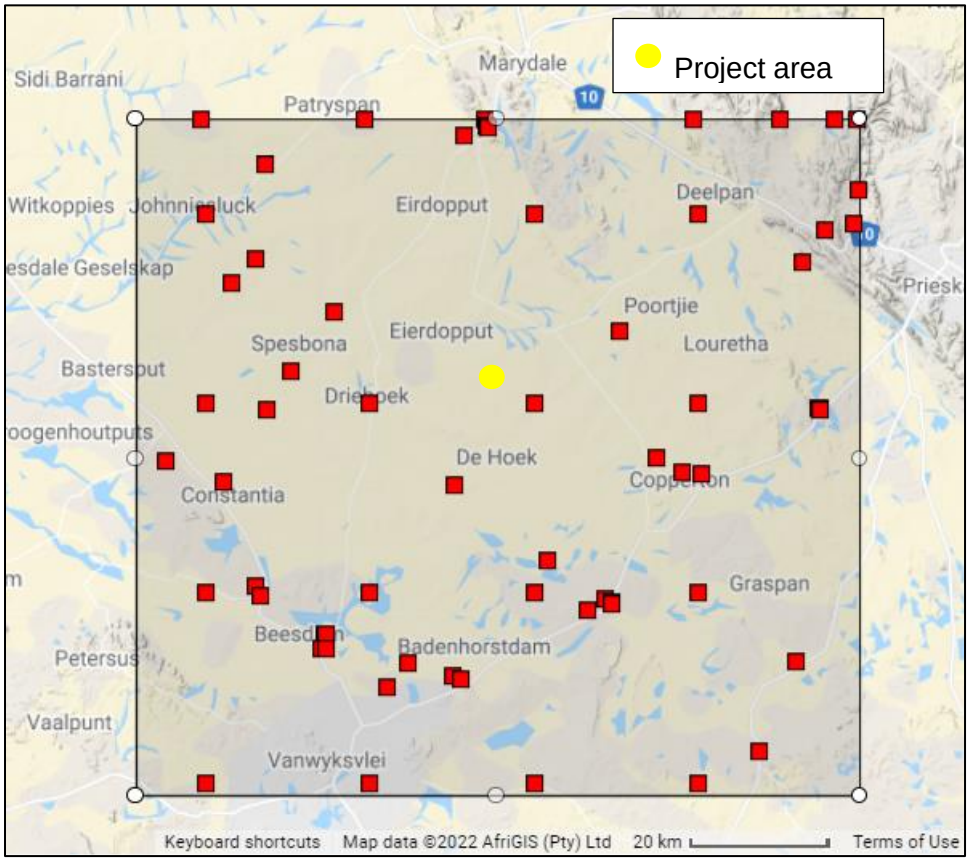


Figure 3-2 ***Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database. Yellow dot indicates approximate location of the project area. The red squares are cluster markers of botanical records as per POSA data.***

3.2.3 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 2917 quarter degree square;
- Reptile list, generated from the IUCN spatial dataset (2017) and AmphibianMap database (Fitzpatrick Institute of African Ornithology, 2021b), using the 2917 quarter degree square;
- Avifauna list, generated for the SABAP2 dataset by looking at pentads 3000_2215 and 2955_2115;
- Mammal list from the IUCN spatial dataset (2017).

3.2.4 Desktop Wetland Assessment

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 *et al*., 2018).

4 Methodology

4.1 Biodiversity Field Assessment

A single field survey was undertaken from 17 – 19 January 2022, 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.

4.1.1 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 project area.

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 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 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 project area.

4.1.2 Fauna Survey

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

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

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

- Roberts – Birds of Southern Africa (Hockey *et al.,* 2005).

4.2 Terrestrial Site Ecological Importance

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

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

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows. The criteria for the CI and FI ratings are provided in Table 4-1 and Table 4-2, respectively.

Table 4-1 Summary of Conservation Importance (CI) criteria

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

Table 4-2 Summary of Functional Integrity (FI) criteria

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

	Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very Low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

BI can be derived from a simple matrix of CI and FI as provided in Table 4-3.

Table 4-3 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

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

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

Table 4-4 Summary of 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.

After the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 4-5.

Table 4-5 Matrix used to derive Site Ecological Importance from Receptor Resilience (RR) and Biodiversity Importance (BI)

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

Interpretation of the SEI in the context of the proposed project is provided in Table 4-6.

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

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

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

5 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The assessment area was based on the area provided by the client and any alterations to the route and/or missing GIS information pertaining to the assessment area would have affected the area surveyed;
- The area was only surveyed during a single site visit and therefore, this assessment does not consider temporal trends;
- It must be noted that during the survey, only a fraction of the expected geophytes were visible due to their variable emergence patterns;
- Whilst every effort is made to cover as much of the site as possible, representative sampling is completed and by its nature, it is possible that some plant and animal species that are present on site were not recorded during the field investigations; and
- The GPS used in the assessment has an accuracy of 5 m and consequently any spatial features may be offset by 5 m.

6 Results & Discussion

6.1 Desktop Assessment

6.1.1 Ecologically Important Landscape Features

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features are summarised in Table 6-1.

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

Desktop Information Considered	Relevant/Irrelevant	Section
Ecosystem Threat Status	Relevant – Overlaps with a Least Concern ecosystem	6.1.1.1
Ecosystem Protection Level	Relevant – Overlaps with a Not Protected ecosystem	6.1.1.2

Protected Areas	Irrelevant – The nearest protected area, Meerkat National Park is > 80 km south-west of the project area.	-
National Protected Areas Expansion Strategy	Irrelevant – The project area is located > 100 km south of the nearest area.	-
Critical Biodiversity Area	Relevant – The project area overlaps with ONA.	6.1.1.4
Important Bird and Biodiversity Areas	Irrelevant – Located 146 km from the Platberg-Karoo Conservancy .	-

6.1.1.1 Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset the proposed project overlaps with a LC ecosystem (Figure 6-1).

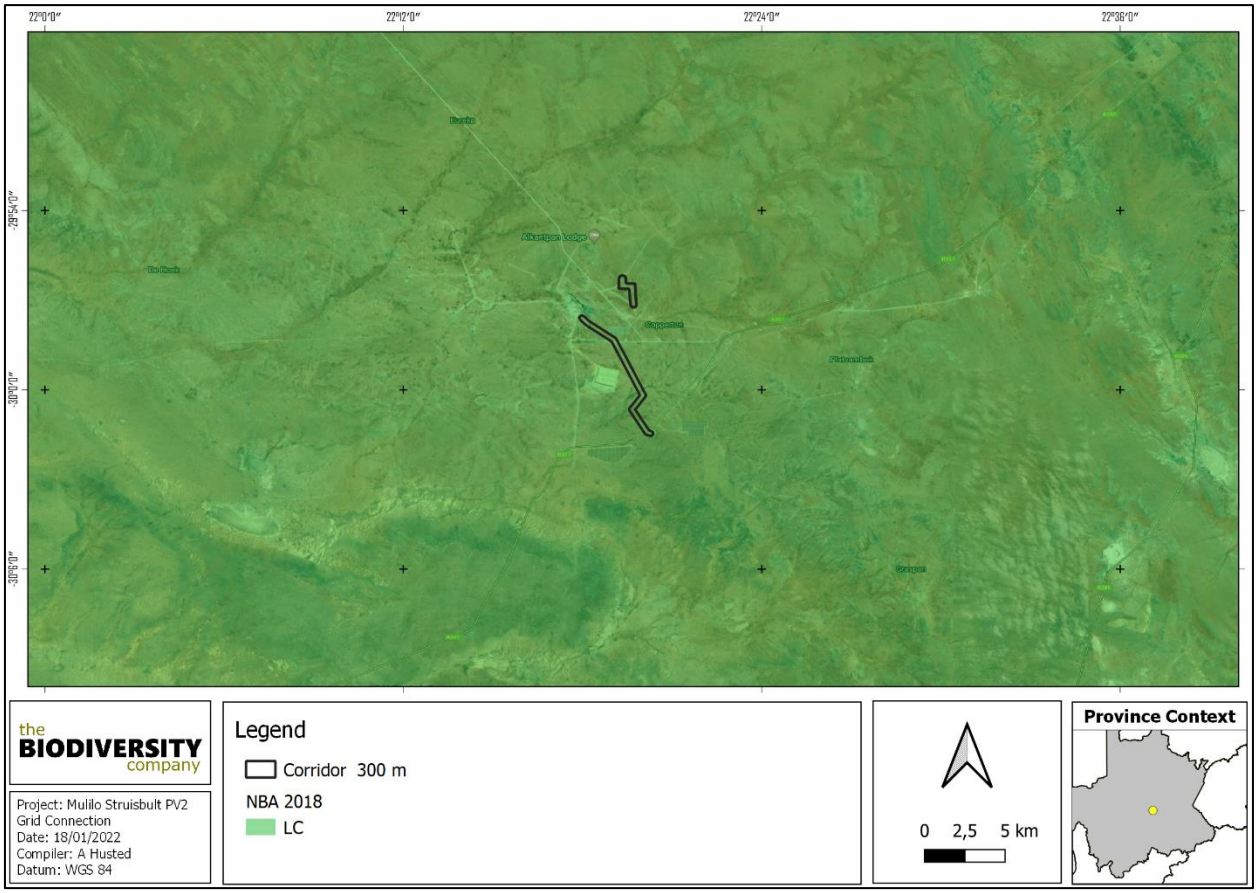


Figure 6-1 Map illustrating the ecosystem threat status associated with the project area.

6.1.1.2 Ecosystem Protection Level

This is an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The proposed project overlaps with a NP ecosystem (Figure 6-2).

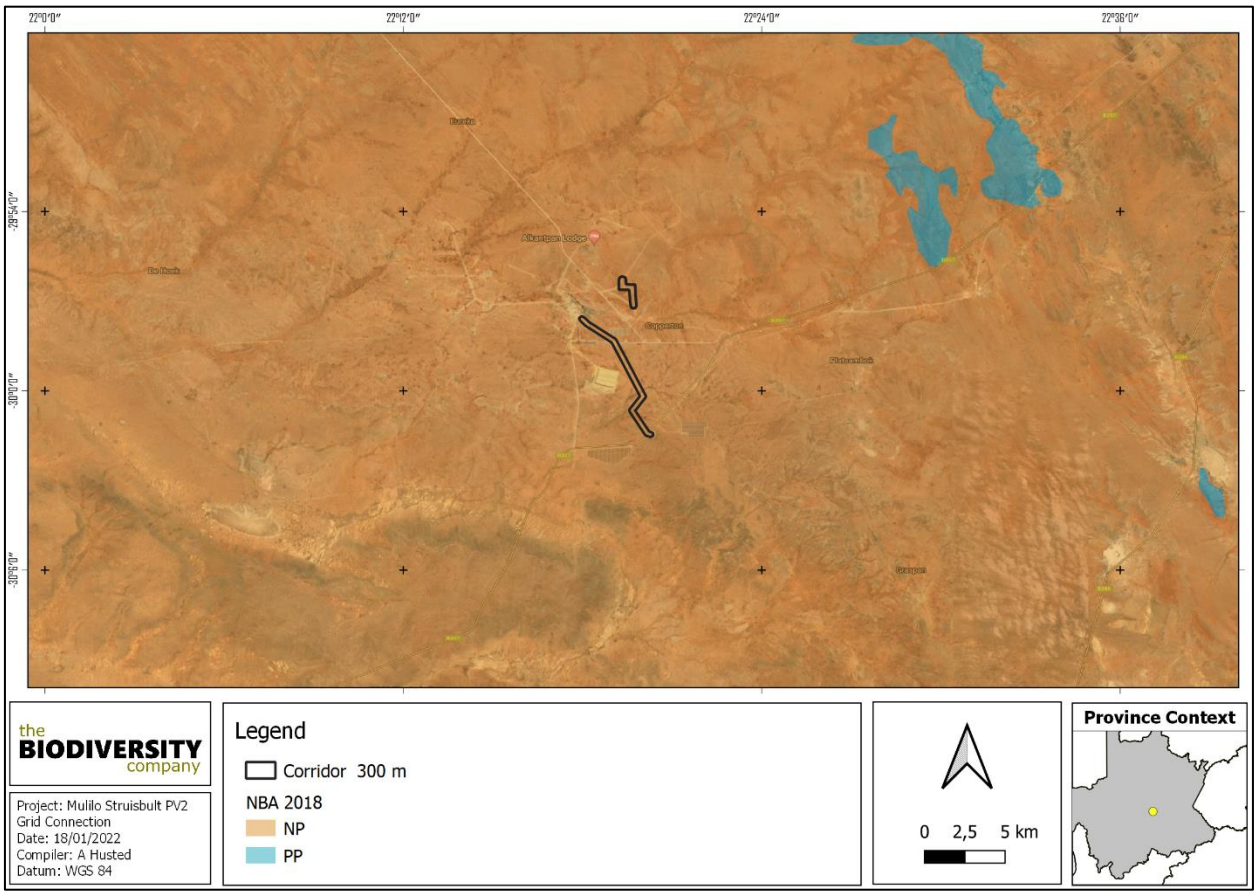


Figure 6-2 Map illustrating the ecosystem protection level associated with the project area

6.1.1.3 Critical Biodiversity Areas and Ecological Support Areas

The key output of a systematic biodiversity plan is a map of biodiversity priority areas. The CBA map delineates Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), Other Natural Areas (ONAs), Protected Areas (PAs), and areas that have been irreversibly modified from their natural state.

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. CBAs are areas of high biodiversity value and need to be kept in a natural state, with no further loss of habitat or species. Thus, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (SANBI-BGIS, 2017).

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

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

Figure 6-3 shows the project area superimposed on the Terrestrial CBA map.

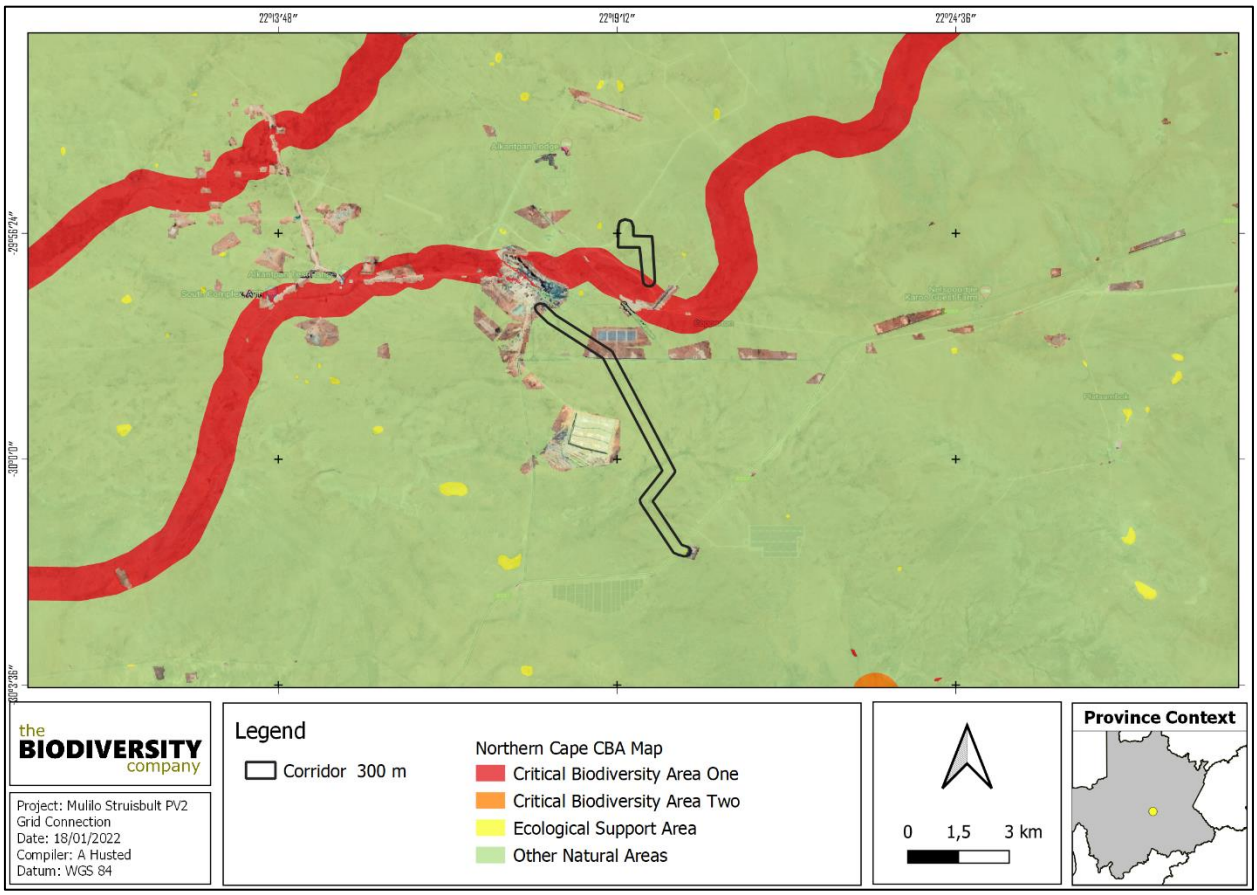


Figure 6-3 Map illustrating the locations of CBAs in the project area

6.1.1.4 Hydrological Setting

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the NBA 2018. Ecosystem threat status (ETS) of river and wetland ecosystem types are based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT, with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer *et al.,* 2019; Skowno *et al.,* 2019). The project area does not overlap a wetland system (Figure 6-4), but the area does overlap with a EN river (Figure 6-5).

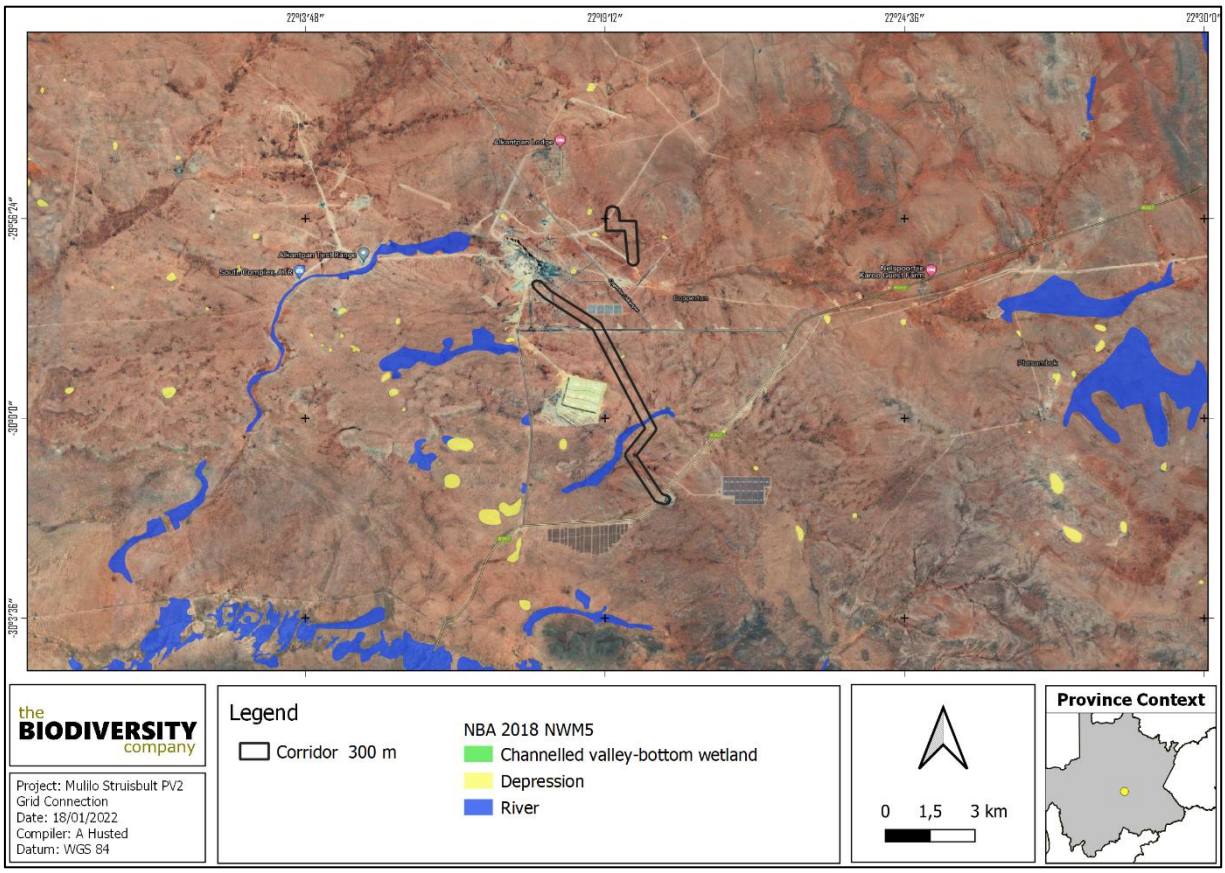


Figure 6-4 Map illustrating ecosystem threat status of wetland ecosystems in the project area

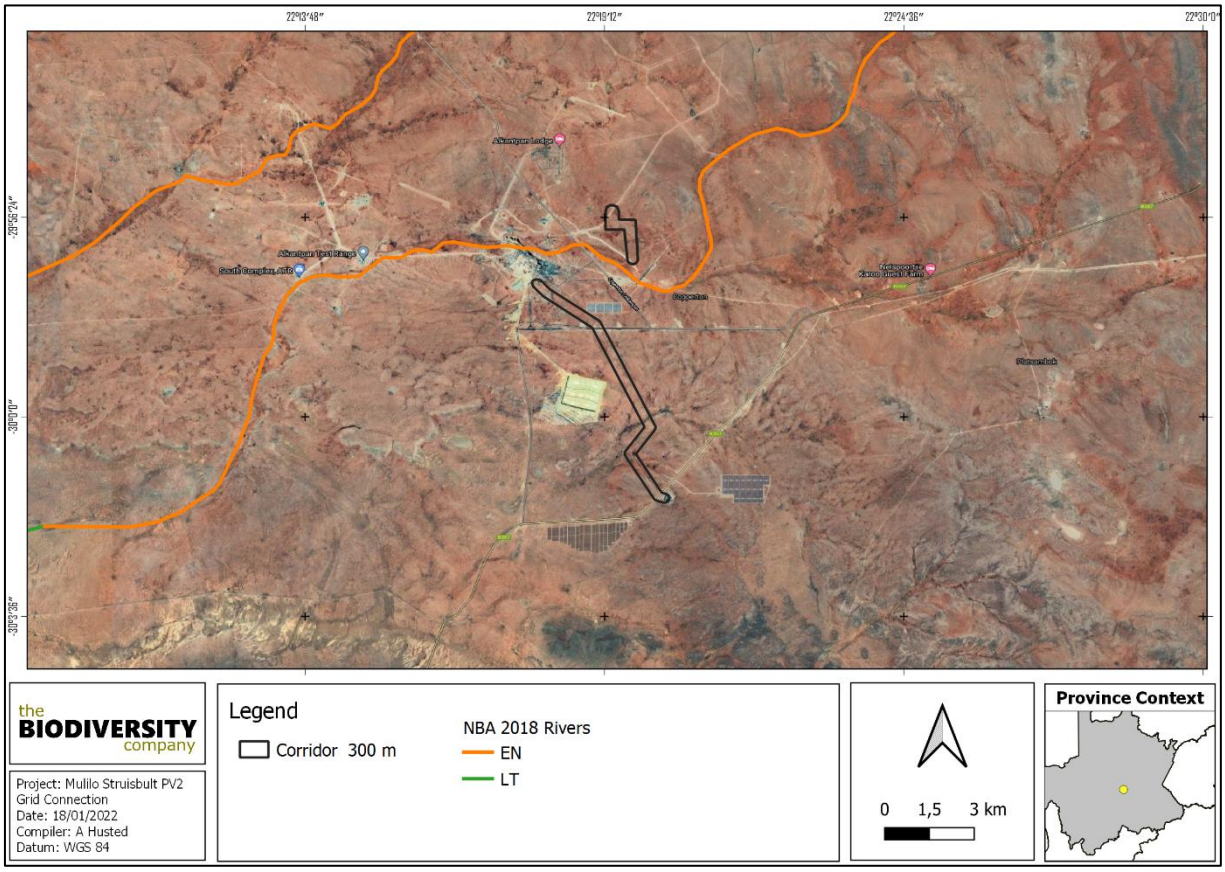


Figure 6-5 Map illustrating ecosystem threat status of river ecosystems in the project area

6.1.1.5 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 6-6 shows the project area overlaps with an Upstream Management Area, with no wetlands within the project area.

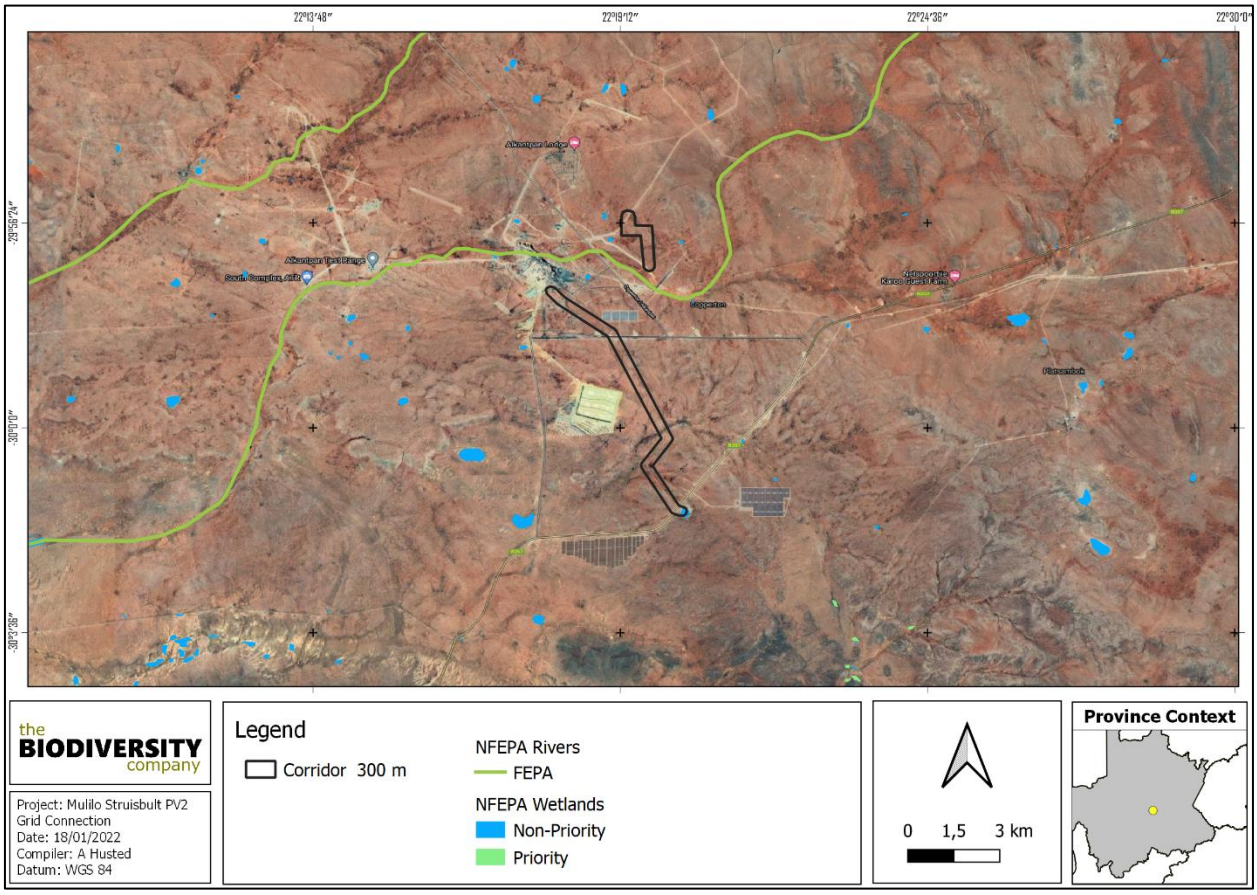


Figure 6-6 The project area in relation to the National Freshwater Ecosystem Priority Areas

6.1.2 Flora Assessment

This section is divided into a description of the vegetation type expected under natural conditions and the expected flora species. The project area is located within the Name Karoo Biome, which is a large, landlocked region on the central plateau of the western half of South Africa and extends into south-eastern Namibia. This is an arid biome with majority of the river systems being non-perennial. Apart from the Orange River and the few permanent streams in the southwest that originate in higher-rainfall neighbouring areas, the limited number of perennial streams that originate in the Nama-Karoo are restricted to the more mesic east. The low precipitation is unreliable (coefficient of variation of annual rainfall up to 40%) and droughts are unpredictable and prolonged. The unpredictable rainfall impedes the dominance of leaf succulents and is too dry in summer for dominance by perennial grasses alone, and the soils are generally too shallow, and the rainfall is too low for trees. Unlike other biomes of southern Africa, local endemism is very low and consequently, the Nama-Karoo Biome does not contain any centre of endemism

6.1.2.1 Vegetation Type

The project area is situated within the Azonal vegetation and the Nama-Karoo vegetation types.

Azonal vegetation

This habitat is formed in and around flowing and stagnant freshwater bodies. Habitats with high levels of salt concentration form a highly stressed environment for most plants and often markedly affect the composition of plant communities. Invariably, both waterlogged and salt-laden habitats appear as 'special', deviating strongly from the typical surrounding zonal vegetation. They are considered to be of azonal character.

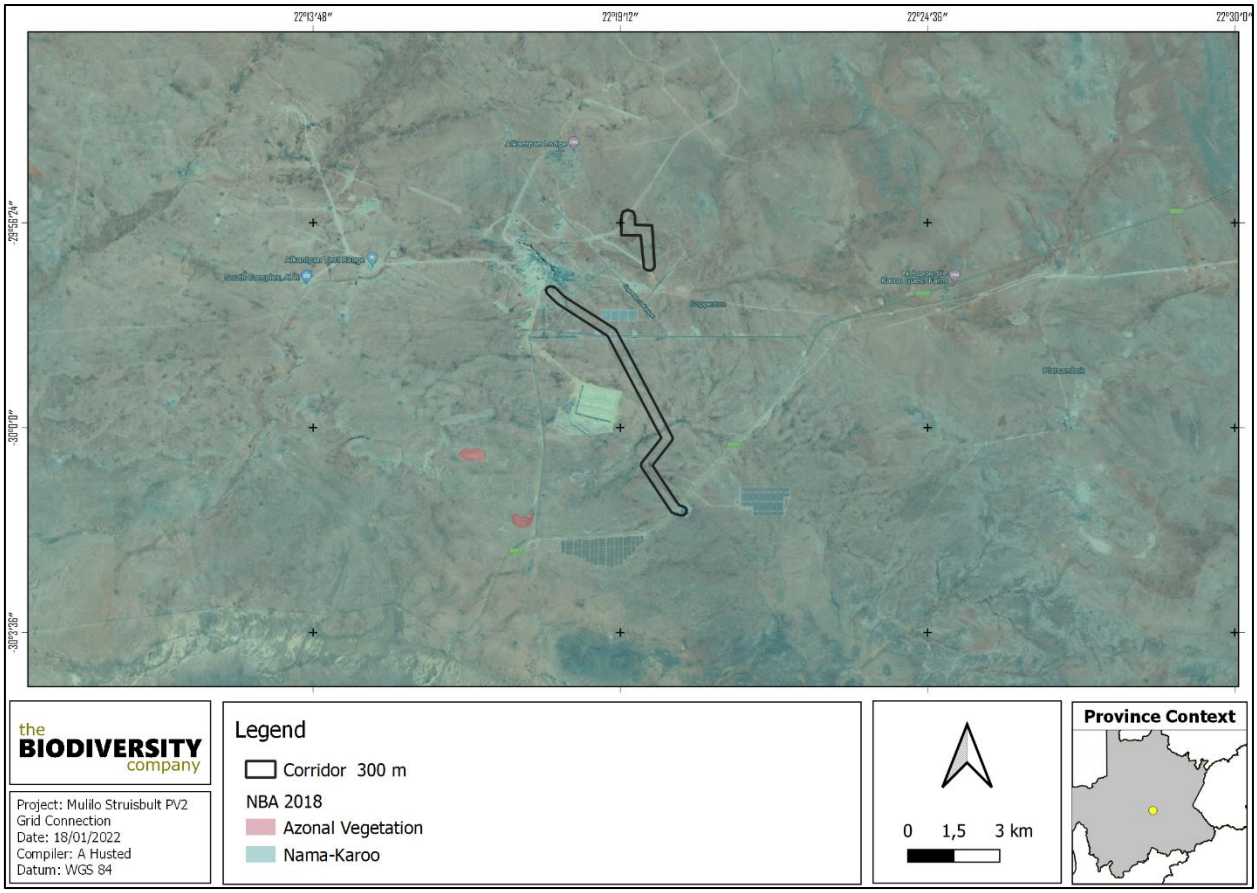


Figure 6-7 Map illustrating the vegetation type associated with the project area

6.1.2.1.1 Nama-Karoo

The Nama-Karoo Biome occurs on the central plateau of the western half of South Africa, at altitudes between 500 and 2000m, with most of the biome failing between 1000 and 1400m. It is the second-largest biome in the region. The geology underlying the biome is varied, as the distribution of this biome is determined primarily by rainfall. The rain falls in summer and varies between 100 and 520mm per year. This also determines the predominant soil type - over 80% of the area is covered by a lime-rich, weakly developed soil over rock. Although less than 5% of rain reaches the rivers, the high erodibility of soils poses a major problem where overgrazing occurs. The dominant vegetation is a grassy, dwarf shrubland. Grasses tend to be more common in depressions and on sandy soils, and less abundant on clayey soils. Grazing rapidly increases the relative abundance of shrubs.

Most of the grasses are of the C4 type and, like the shrubs, are deciduous in response to rainfall events. The amount and nature of the fuel load is insufficient to carry fires and fires are rare within the biome. The large historical herds of Springbok and other game no longer exist. Like the many bird species in the area (mainly larks) the game was probably nomadic between patches of rainfall events within the biome. The Brown Locust and Karoo Caterpillar exhibit eruptions under similarly favorable, local rainfall events, and attract large numbers of bird and mammal predators.

Less than 1% of the biome is conserved in formal areas. The Prickly Pear (*Opuntia aurantiaca*) and Mesquite (*Prosopis glandulosa*) are the major alien invader species. Urbanization and agriculture are minimal, and irrigation is confined to the Orange River valley and some pans. Most of the land is used for grazing, by sheep (for mutton, wool and pelts) and goats, which can be commensurate with conservation. However, under conditions of overgrazing, many indigenous species may proliferate, including Threethorn (*Rhigozum trichotomum*), Bitterbos (*Chrysocoma ciliate*) and Sweet Thorn (*Vachellia karroo*), and many grasses and other palatable species may be lost. There are very few rare or Red Data Book plant species in the Nama Karoo Biome.

6.1.2.1.2 Bushmanland Arid Grassland

VT 29 Arid Karoo and Desert False Grassveld (36%), VT 32 Orange River Broken Veld (36%) (Acocks 1953). LR 51 Orange River Nama Karoo (51%) (Low & Rebelo 1996).

Distribution Northern Cape Province: Spanning about one degree of latitude from around Aggeneys in the west to Prieska in the east. The southern border of the unit is formed by edges of the Bushmanland Basin while in the northwest this vegetation unit borders on desert vegetation (northwest of Aggeneys and Pofadder). The northern border (in the vicinity of Upington) and the eastern border (between Upington and Prieska) are formed with often intermingling units of Lower Gariep Broken Veld, Kalahari Karroid Shrubland and Gordonia Duneveld. Most of the western border is formed by the edge of the Namaqualand hills. Altitude varies mostly from 600–1 200 m.

Vegetation & Landscape Features Extensive to irregular plains on a slightly sloping plateau sparsely vegetated by grassland dominated by white grasses (Stipagrostis species) giving this vegetation type the character of semidesert ‘steppe’. In places low shrubs of Salsola change the vegetation structure. In years of abundant rainfall rich displays of annual herbs can be expected.

Geology & Soils A third of the area is covered by recent (Quaternary) alluvium and calcrete. Superficial deposits of the Kalahari Group are also present in the east. The extensive Palaeozoic diamictites of the Dwyka Group also outcrop in the area as do gneisses and metasediments of Mokolian age. The soils of most of the area are red-yellow apedal soils, freely drained, with a high base status and <300 mm deep, with about one fifth of the area deeper than 300 mm, typical of Ag and Ae land types.

Climate: Rainfall occurs largely in late summer/early autumn (major peak) and very variable from year to year. MAP ranges from about 70 mm in the west to 200 mm in the east. Mean maximum and minimum monthly temperatures for Kenhardt are 40.6°C and –3.7°C for January and July respectively. Corresponding values for Pofadder are 38.3°C and –0.6°C. Frost incidence ranges from around 10 frost days per year in the northwest to about 35 days in the east. Whirl winds (dust devils) are common on hot summer days.

Important Taxa (WWestern and EEastern regions of the unit only)

Graminoids: *Aristida adscensionis (d), A. congesta (d), Enneapogon desvauxii (d), Eragrostis nindensis (d), Schmidtia kalahariensis (d), Stipagrostis ciliata (d), S. obtusa (d), Cenchrus ciliaris, Enneapogon scaber, Eragrostis annulataE, E. porosaE, E. procumbens, Panicum lanipesE, Setaria verticillataE, Sporobolus nervosus, Stipagrostis brevifoliaW, S. uniplumis, Tragus berte¬ronianus, T. racemosusE.*

Small Trees: Acacia mellifera subsp. detinensE, Boscia foetida subsp. foetida.

Tall Shrubs: Lycium cinereum (d), Rhigozum trichotomum (d), Cadaba aphylla, Parkinsonia africana.

Low Shrubs: Aptosimum spinescens (d), Hermannia spinosa (d), Pentzia spinescens (d), Aizoon asbestinumE, A. schellenbergiiE, Aptosimum elongatum, A. lineareE, A. marlothiiE, Barleria rigida, Berkheya annectens, Blepharis mitrata, Eriocephalus ambiguus, E. spinescens, Limeum aethiopicum, Lophiocarpus poly¬stachyus, Monechma incanum, M. spartioides, Pentzia pinnatisecta, Phaeoptilum spinosum E, Polygala seminuda, Pteronia leucoclada, P. mucronata, P. sordida, Rosenia humilis, Senecio niveus, Sericocoma avolans, Solanum capense, Talinum arnotiiE, Tetragonia arbuscula, Zygophyllum

microphyllum. Succulent Shrubs: Kleinia longiflora, Lycium bosciifolium, Salsola tuberculata, S. glabrescens. Herbs: Acanthopsis hoffmannseggiana, Aizoon canariense, Amaranthus praetermissus, Barleria lichtensteinianaE, Chamaesyce inaequilatera, Dicoma capensis, Indigastrum argyraeum, Lotononis platycarpa, Sesamum capense, Tribulus pterophorus, T. terrestris, Vahlia capensis.

Succulent Herbs: Gisekia pharnacioidesE, Psilocaulon coriarium, Trianthema parvifolia.

Geophytic Herb: Moraea venenata.

Biogeographically Important Taxon (Bushmanland endemic) Succulent Herb: Tridentea dwequensis.

Endemic Taxa Succulent Shrubs: Dinteranthus pole-evansii, Larryleachia dinteri, L. marlothii, Ruschia kenhardtensis.

Herbs: Lotononis oligocephala, Nemesia maxii.

Conservation Least threatened. Target 21%. Only small patches statutorily conserved in Augrabies Falls National Park and Goegab Nature Reserve. Very little of the area has been transformed. Erosion is very low (60%) and low (33%).

6.1.2.1.3 Bushmanland Basin Shrubland

VT 29 Arid Karoo and Desert False Grassveld (88%) (Acocks 1953). LR 49 Bushmanland Nama Karoo (92%) (Low & Rebelo 1996).

Distribution Northern Cape Province: Large Bushmanland Basin centred on Brandvlei and Van Wyksvlei area, spanning Granaatboskolk in the west to Copperton in the east, and Kenhardt vicinity in the north to Williston vicinity in the south. Altitude ranges mostly from 800–1 200 m.

Vegetation & Landscape Features Slightly irregular plains with dwarf shrubland dominated by a mixture of low sturdy and spiny (and sometimes also succulent) shrubs (Rhigozum, Salsola, Pentzia, Eriocephalus), 'white' grasses (Stipagrostis) and in years of high rainfall also by abundant annuals such as

species of Gazania and Leysera.

Geology & Soils Mudstones and shales of Ecca Group (Prince Albert and Volksrust Formations) and Dwyka tillites, both of early Karoo age, dominate. About 20% of rock outcrop is formed by Jurassic intrusive dolerite sheets and dykes. Soils are shallow Glenrosa and Mispah forms, with lime generally present in the entire landscape (Fc land type) and, to a lesser extent, red-yellow apedal, freely drained soils with a high base status and usually <15% clay (Ah and Ai land types) are also found. The salt content in these soils is very high.

Climate Rainfall occurs in late summer and early autumn. MAP ranges from about 100–200 mm. Mean maximum and minimum monthly temperatures in Brandvlei are 39.6°C and –2.2°C for January and July, respectively. Corresponding values for Van Wyksvlei are 39.5°C and –4.6°C. See also climate diagram for NKb 6 Bushmanland Basin Shrubland (Figure 7.2).

Important Taxa

Tall Shrubs: *Lycium cinereum (d), Rhigozum trichotomum (d).*

Low Shrubs: Aptosimum spinescens (d), Hermannia spinosa (d), Pentzia spinescens (d), Zygophyllum microphyllum (d), Aptosimum elongatum, A. marlothii, Berkheya annectens, Eriocephalus microphyllus var. pubescens, E. pauperrimus, E. spinescens, Felicia clavipilosa subsp. clavipilosa, Limeum aethiopicum, Osteospermum armatum, O. spinescens, Pegolettia retrofracta, Phaeoptilum spinosum, Plinthus karooicus, Polygala seminuda, Pteronia glauca, P. inflexa, P. leucoclada, P. mucronata, P. sordida, Rosenia humilis, Selago albida, Senecio niveus, Tetragonia arbuscula, Zygophyllum lichtensteinianum.

Succulent Shrubs: Salsola tuberculata (d), Aridaria noctiflora subsp. straminea, Brownanthus ciliatus subsp. ciliatus, Galenia sarcophy¬lla, Lycium bosciifolium, Ruschia intricata, Salsola namibica,

Sarcocaulon patersonii, S. salmoniflorum, Tripteris sinu¬ata var. linearis, Zygophyllum flexuosum. Semiparasitic

Shrub: Thesium hystrix.

Herbs: Gazania lichtensteinii (d), Leysera tenella (d), Amaranthus praetermissus, Chamaesyce inaequilatera, Dicoma capensis, Indigastrum argyraeum, Lepidium desertorum, Monsonia umbellata, Radyera urens, Sesamum capense, Tribulus terrestris, T. zeyheri.

Succulent Herbs: Mesembryanthemum crystallinum, M. stenandrum, Trianthema parvifolia, Zygophyllum simplex.

Graminoids: Aristida adscensionis (d), Enneapogon desvauxii (d), Stipagrostis ciliata (d), S. obtusa (d), Aristida congesta, Enneapogon scaber, Stipagrostis anomala, Tragus berteronianus, T. racemosus.

Biogeographically Important Taxon (Bushmanland endemic) Succulent Herb: Tridentea dwequensis.

Endemic Taxa Herb: Cromidon minutum.

Geophytic Herbs: Ornithogalum bicornutum, O. ovatum subsp. oliverorum.

Conservation Least threatened. Target 21%. None of the unit is conserved in statutory conservation areas. No signs of serious transformation, but scattered individuals of Prosopis sp. occur in some areas (e.g. in the vicinity of the Sak River drainage system), and some localised dense infestations form closed 'woodlands' along the eastern border of the unit with Northern Upper Karoo (east of Van Wyksvlei). Erosion is moderate (56%) and low (34%).

Remarks: The Bushmanland Basin forms an environment for several endorheic pans (vloere) and extensive systems of intermittent river channels (including that of the Sak River). In comparison to the bordering Bushmanland Arid Grassland in the north, the vegetation of the Bushmanland Basin shows increased presence of shrubs (especially succulents) and plant indicators of high salt status of soil.

6.1.2.2 Expected Flora Species

The POSA database indicates that 321 species of indigenous plants are expected to occur within the project area. Appendix A provides the list of species and their respective conservation status and endemism. Six (6) SCC based on their conservation status could be expected to occur within the project area and are provided in Table 6-2 below.

Table 6-2 Threatened flora species that may occur within the project area.

Family	Taxon	Author	IUCN	Ecology
Cyperaceae	*Cyperus indecorus var. namaquensis*	Kunth	NE	Indigenous
Pedaliaceae	*Harpagophytum procumbens subsp. procumbens*	(Burch.) DC. ex Meisn.	NE	Indigenous
Brassicaceae	*Heliophila seselifolia var. nigellifolia*	Burch. ex DC.	NE	Indigenous; Endemic
Limeaceae	*Limeum aethiopicum var. aethiopicum*	Burm.f.	NE	Indigenous; Endemic
Limeaceae	*Limeum aethiopicum var. lanceolatum*	Burm.f.	NE	Indigenous
Vahliaceae	*Vahlia capensis subsp. vulgaris*	(L.f.) Thunb.	NE	Indigenous

6.1.3 Faunal Assessment

6.1.3.1 Amphibians

Based on the IUCN Red List Spatial Data and AmphibianMap, one amphibian species is expected to occur within the area (Table 6-3).

Table 6-3 Expected amphibian species within the project area

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Cacosternum boettgeri	Common Caco	LC	LC	Medium

6.1.3.2 Reptiles

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 11 reptile species are expected to occur within the area (Appendix C). None are regarded as threatened.

6.1.3.3 Mammals

The IUCN Red List Spatial Data lists 50 mammal species, and 12 bat species that could be expected to occur within the area. This list excludes large mammal species that are limited to protected areas. Five (5) of these expected species are regarded as threatened (Table 6-4).

Table 6-4 Mammal species that are expected to occur within the project area

Family	Scientific name	Conservation Status			
		Common Name	Regional (SANBI, 2016)	IUCN (2021)	Likelihood of occurrence
Canidae	*Otocyon megalotis*	Bat-eared Fox	LC	LC	Confirmed
Felidae	*Felis nigripes*	Black-footed Cat	VU	VU	High
Leporidae	*Lepus capensis*	Cape Hare	LC	LC	Confirmed
Muridae	*Gerbilliscus sp.*	Gerbils			High
Muridae	*Mus (Nannomys) minutoides*	Southern African Pygmy Mouse	LC	LC	High
Mustelidae	*Mellivora capensis*	Honey Badger	LC	LC	Confirmed

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

Species Name	Common Name	Probability of Occurrence	Conservation status	Possible Roosting Sites Occupied in Study Area
Rhinolophus clivosus	Geoffroy's horseshoe bat	Low	LC	Caves and mine adits (an almost horizontal entrance to a mine) in arid savanna, woodland, riparian forest and mountainous areas.
Rhinolophus darlingi	Darling's horseshoe bat	Low	LC	Caves and mine adits, culverts or in cavities in piles of boulders, is associated with arid savanna in the west and broken, hilly terrain.
Rhinolophus denti	Dent's horseshoe bat	Low	Data deficient	Caves, semi-dark caverns and crevices in rocky outcrops. Roost under the thatched roofs and in a road culvert. Is associated with arid habitats, typically restricted tobroken country with rocky outcrops or suitable caves.
Nycteris thebaica	Egyptian slit- faced bat	High	LC	Tree trunks, caves, culverts. It appears to occur throughout the savanna and karoo biomes, but avoids open grasslands.

Sauromys petrophilus	Roberts's flat- headed bat	**Previously Confirmed**	LC	Roosts in narrow cracks and under slabs of exfoliating rock. Closely associated with rocky habitats in dry woodland, mountain fynbos or arid scrub.
Tadarida aegyptiaca	Egyptian free- tailed bat	**Previously Confirmed**	LC	Caves, rock crevices, under exfoliating rocks, in hollow trees, and behind the bark of dead trees.
Miniopterus natalensis	Natal long- fingered bat	Low	LC	Savannas and grasslands, cave dependent.
Cistugo seabrae	Angolan wing- gland bat	Medium	NT	Typically, in desert and semi-desert conditions.
Eptesicus hottentotus	Long-tailed serotine bat	Low - medium	LC	Caves and rock crevices, may require suitable roosting sites in rocky outcrops.
Myotis tricolor	Temmink'smyotis bat	Low	LC	Roosts gregariously in caves, close association with mountainous areas.
Neoromicia capensis	Cape serotine bat	**Previously Confirmed**	LC	Under the bark of trees, at the base of aloe leaves, tolerates arid semi-desert areas to montane grasslands.
Chaerephon nigeriae	Nigerian free- tailed bat	Low	LC	Roosts beneath the bark of dead trees, in small caves and buildings.

6.1.3.4 Avifauna

The SABAP2 Data lists 158 avifauna species that could be expected to occur within the area (Appendix E). 11 of these expected species are regarded as SCC (Table 6-6).

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

Scientific name		Conservation Status	
	Common Name	**Regional (SANBI, 2016)**	**IUCN (2021)**
Neotis ludwigii	Ludwig's Bustard	EN	EN
Ardeotis kori	Kori Bustard	NT	NT
Afrotis afraoides	Northern Black Korhaan	-	
Eupodotis vigorsii	Karoo Korhaan	NT	LC
Anthropoides paradiseus	Blue Crane	NT	VU
Polemaetus bellicosus	Martial Eagle	EN	VU
Aquila rapax	Tawny Eagle	EN	VU
Sagittarius serpentarius	Secretarybird	VU	VU
Falco biarmicus	Lanner Falcon	VU	LC
Calendulauda burra	Red Lark	VU	VU
Spizocorys sclateri	Sclater's Lark	NT	NT

6.2 Field Assessment

The following sections provide the results from the field survey for the proposed development that was undertaken during the 17 to 20 January 2022.

6.2.1 Flora Assessment

This section is divided into two sections:

- Indigenous flora; and
- Invasive Alien Plants (IAPs).

6.2.1.1 Indigenous Flora

The species composition of the assessment area was consistent with typical Bushmanland Basin Shrubland and Bushman Arid Grassland vegetation types. Distinctive vegetation communities were observed within these vegetation types and can be classified into shrubland, grassland and drainage lines. The grassland vegetation type occurred in small patches within the shrubland vegetation community and is therefore not mapped separately. The plant species recorded by no means forms a comprehensive list, and repeated surveys during different phenological periods not covered, may likely yield up to 40% additional flora species for the project area. However, floristic analysis conducted to date is however regarded as a sound representation of the local flora for the project area, with specific focus on SCC. Photographs of some of the recorded plants species are presented in the subsequent collages (Figure 6-8, Figure 6-9, and Figure 6-10).

The two dominant vegetation types of the region, Bushmanland Basin Shrubland and Bushman Arid Grassland, were each further divided up into two fine-scale habitats occurring within the project area, as according to Bergwind (2011). These vegetation descriptions relevant to the project area remain largely applicable to the current state of the fine-scale habitats and as such they are adapted and updated for the purposes of this report.

Figure 6-8 Salsola tuberculate, Ledebouria revulata

Figure 6-9 Rhigozum trichotomum, Stipagrostis ciliate

Figure 6-10 Pentzia incana, Atriplex vistita, Lycium cinereum, Geigeria filifolia

6.2.1.1.1 Bushmanland Basin Shrubland

This vegetation type was divided into two fine-scale shrubland forms, *Rhigozum trichotomum* Shrubland and Asteraceous Shrubland, both of which are described below. The shrubland is characteristically dense with small to medium Nama-Karoo shrubs of the Bignoniaceae and Asteraceae plant families, with only scattered clumps of grass, herb, and geophyte species – the latter of which are considered plants of interest within this region and should be used for rehabilitation purposes.

Rhigozum trichotomum Shrubland

Rhigozum trichotomum (Trithorn) is a small to medium sized tough, woody shrub. The species was found extensively throughout the project area but tends to be dominant and widespread in portions where there are slight depressions and an accumulation of deep red sand. Additional small shrubs were found only in low numbers whereas Stipagrostis spp. and other Poaceae grasses tend to be co-dominant with the Trithorn (Figure 6-11).

Figure 6-11 Rhigozum trichotomum shrubland

Asteraceous Shrubland

The Asteraceous Shrubland community was found to be the dominant vegetation type within the project area. The species composition consisted mainly of scattered low shrubs - but grasses occur in sparse patches, and some herbaceous species are also present. The vegetation is typically low (< 0.4 m) and thick, with hard bare soils interlacing between the shrub community. This vegetation occurs on shallow sandy-loam soils that are expected to be well drained with some clay or silt content and is the most extensive vegetation type in the project area (Figure 6-12).

Figure 6-12: Asteraceous shrubland

The most common plants found in the asteraceous shrubland community were: Berkheya annectens, *Enneapogon desvauxii*, *Eriocephalus microphyllus* var. *pubescens*, *Lycium cinereum*, *Zygophyllum microphyllum*. *Plinthus karooicus*, *Ruschia intricata*, *Salsola tuberculate*, and *Stipagrostis ciliate.*

6.2.1.1.2 Bushmanland Arid Grassland

This vegetation type was divided up into two further fine-scale plant communities that were delineated for the project area, namely *Stipagrostis* Grassland and the minor *Lycium cinereum – Galenia africana* Watercourse Shrub Community. In contrast to the shrubland, the grassland community was dominated by white grasses of the Poaceae family, with Asteraceae flora only occurring in sparse to dense patches within the grassland.

Stipagrostis Grassland

The *Stipagrostis* Grassland was dominated by the *Stipagrostis ciliata* and *Stipagrostis obtuse* white grasses, with scattered low shrubs and herbs occuring (Figure 6-13). The soil mainly consists of deep red sand of the Kalahari Group. The key species recorded in this plant community include: *Galenia africana, Lycium horridum, Pentzia incana, Stipagrostis obtuse, Pteronia incana, Rhigozum trichotomum, Ruschia intricata,* and *Stipagrostis ciliate.*

Figure 6-13 Stipagrostis Grassland

Lycium cinereum – Galenia africana Watercourse Shrub Community

Drainage lines and some scattered depressions have formed in low-lying areas and areas with very gentle slopes, and these are characterised by dense stands of taller shrubs co-dominating with a high cover of grasses. Two dominant species were recorded: *Lycium cinereum* and *Galenia Africana* (Figure 6-14). These areas are likely selectively grazed by cattle and sheep, which may account for the presence of *Galenia africana* which can become more abundant in disturbed or overgrazed areas.

The drainage lines and depressions, or watercourses, with a higher plant biomass also provide cover and a more hospitable habitat for small mammals and birds, compared with the open, exposed shrubland and grasslands. For this reason, these habitats, although not floristically important, are more ecologically sensitive and should be observed as 'No Go' areas.

Figure 6-14 Watercourse shrub community

6.2.1.2 Invasive Alien Plants

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

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

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

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

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

One (1) IAP species were recorded within the project area, namely *Prosopis glandulosa.* These species are listed under the Alien and Invasive Species List 2020, Government Gazette No. GN1003 as Category 1b. Category 1b species must be controlled by implementing an IAP Management Programme, in compliance of section 75 of the NEMBA, as stated above.

6.2.2 Faunal Assessment

Herpetofauna and mammal observations and recordings fall under this section.

6.2.2.1 Amphibians and Reptiles

One (1) species of reptiles was recorded in the project area during survey period (Table 6-7). However, there is the possibility of more species being present, as certain reptile species are secretive and require

long-term surveys to ensure capture. No amphibian species were recorded during the survey period, this was largely due to the season in which the field survey was carried out as well as the fact that no pitfall trapping was done, surveys relied on opportunistic sightings as opposed to intensive and appropriate sampling methods. The only other method utilised was refuge examinations using visual scanning of terrains to record smaller herpetofauna species that often conceal themselves under rocks, in fallen logs, rotten tree stumps, in leaf litter, rodent burrows, ponds, old termite mounds, this method was also not intensively applied in the field. None of the herpetofauna species recorded are regarded as threatened, albeit the Common Sand Lizard is protected under provincial legislation.

Table 6-7 Summary of herpetofauna species recorded within the project area.

Family	Species	Common Name	Conservation Status		NC Nature Conservation Act No. 9 Of 2009
			Regional (SANBI, 2016)	IUCN (2021)	
Squamata	*Pedioplanis lineoocellata pulchella*	Common sand lizard	LC	LC	Schedule 2

6.2.2.2 Mammals

Six (6) mammal species were observed during the survey of the project area (Table 6-8) based on either direct observation or the presence of visual tracks and signs (Table 6-8). None of the species recorded are regarded as a SCC, all mammal species are additionally protected provincially. Figure 6-15 presents evidence of mammal species active in the area.

Table 6-8 Summary of mammal species recorded within the project area

Species	Common Name	Conservation Status		NC Nature Conservation Act No. 9 Of 2009
		Regional (SANBI, 2016)	IUCN (2021)	
Lepus saxatilis	Scrub Hare	LC	LC	Schedule 2
Orycteropus afer	Aardvark	LC	LC	Schedule 1
Otocyon megalotis)	Bat eared Fox	LC	LC	Schedule 2
Raphicerus campestris	Steenbok	LC	LC	Schedule 2
Rhabdomys pumilio	Xeric Four-striped Mouse	LC	LC	Schedule 2
Ictonyx striatus	Striped Polecat	LC	LC	Schedule 1

Figure 6-15 Striped Polecat, Bat eared Fox

6.2.2.3 Avifauna

Fifteen (15) species were recorded in the project area during the survey based on either direct observation, vocalisations, or the presence of visual tracks & signs, (Table 6-9). All species were listed as protected provincially, with the Abdims stork regionally regarded as Threatened. Figure 6-16 presents Abdims stork recorded for the project.

Table 6-9 A list of avifaunal species recorded for the project area

Species	Common Name	Conservation Status		NC Nature Conservation Act No. 9 Of 2009
		Regional (SANBI, 2016)	IUCN (2021)	
Ciconia ciconia	White Stork	LC	LC	Schedule 2
Ciconia abdimii	Abdims stork	NT	LC	Schedule 1
Charadrius tricollaris	Plover, Three-banded	Unlisted	LC	Schedule 2
Chersomanes albofasciata	Lark, Spike-heeled	Unlisted	LC	Schedule 2
Cinnyris fuscus	Sunbird, Dusky	Unlisted	LC	Schedule 2
Cisticola subruficapilla	Cisticola, Grey-backed	Unlisted	LC	Schedule 2
Corvus albus	Crow, Pied	Unlisted	LC	Schedule 3
Lanius collaris	Fiscal, Common (Southern)	Unlisted	LC	Schedule 2
Melierax canorus	Goshawk, Southern Pale Chanting	Unlisted	LC	Schedule 1
Merops apiaster	Bee-eater, European	Unlisted	LC	Schedule 2
Myrmecocichla formicivora	Chat, Anteating	Unlisted	LC	Schedule 2
Oena capensis	Dove, Namaqua	Unlisted	LC	Schedule 2
Pterocles namaqua	Sandgrouse, Namaqua	Unlisted	LC	Schedule 2
Spilopelia senegalensis	Dove, Laughing	Unlisted	LC	Schedule 2
Streptopelia capicola	Turtle-dove, Cape	Unlisted	LC	Schedule 2
Streptopelia semitorquata	Dove, Red-eyed	Unlisted	LC	Schedule 2
Sylvietta rufescens	Crombec, Long-billed	Unlisted	LC	Schedule 2

Figure 6-16 Abdims stork

7 Habitat Assessment and Site Ecological Importance

7.1 Habitat Assessment

The main habitat types identified across the project area were initially identified largely based on aerial imagery. These main habitat types were refined based on the field coverage and data collected during the survey; the delineated habitats can be seen in Figure 7-1. Emphasis was placed on limiting timed meander searches along the proposed project area within the natural habitats and therefore habitats with a higher potential of hosting SCC. The habitats observed, coincide with the vegetation types as described by Mucina & Rutherford in 2006 and SANBI (2019) due to the lack of large-scale transformation, these are discussed in detail in the sections that follow. A summary of habitat types delineated within the project area can be seen in Table 7-1.

Table 7-1 Summary of habitat types delineated within the project area

Habitat Type	Description	Ecosystem Processes and Services	Habitat Sensitivity
Rhigozum trichotomum Shrubland	Shrubland consisting g of predominantly *R. trichotatum*	Taller and denser microhabitat that provides cover to larger mammal species	Medium
Stipagrostis grassland		Grass dominated shrubland that provides grazing to herbivores.	Medium
Asteraceous Shrubland	Widespread shrubland consisting mostly of Asteraceous species	Low shrubland that provides habitat for smaller mammals and reptiles	Medium
Drainage features	Channel through which surface water naturally collates and flows. Ephemeral systems were both considered for this habitat type.	Water Paths, functions as important Water resources. Provides refuge and grazing areas, especially during the dry seasons	High

		Provides surface water within the landscape. Aids in trapping sediment and nutrients derived from land runoff.	

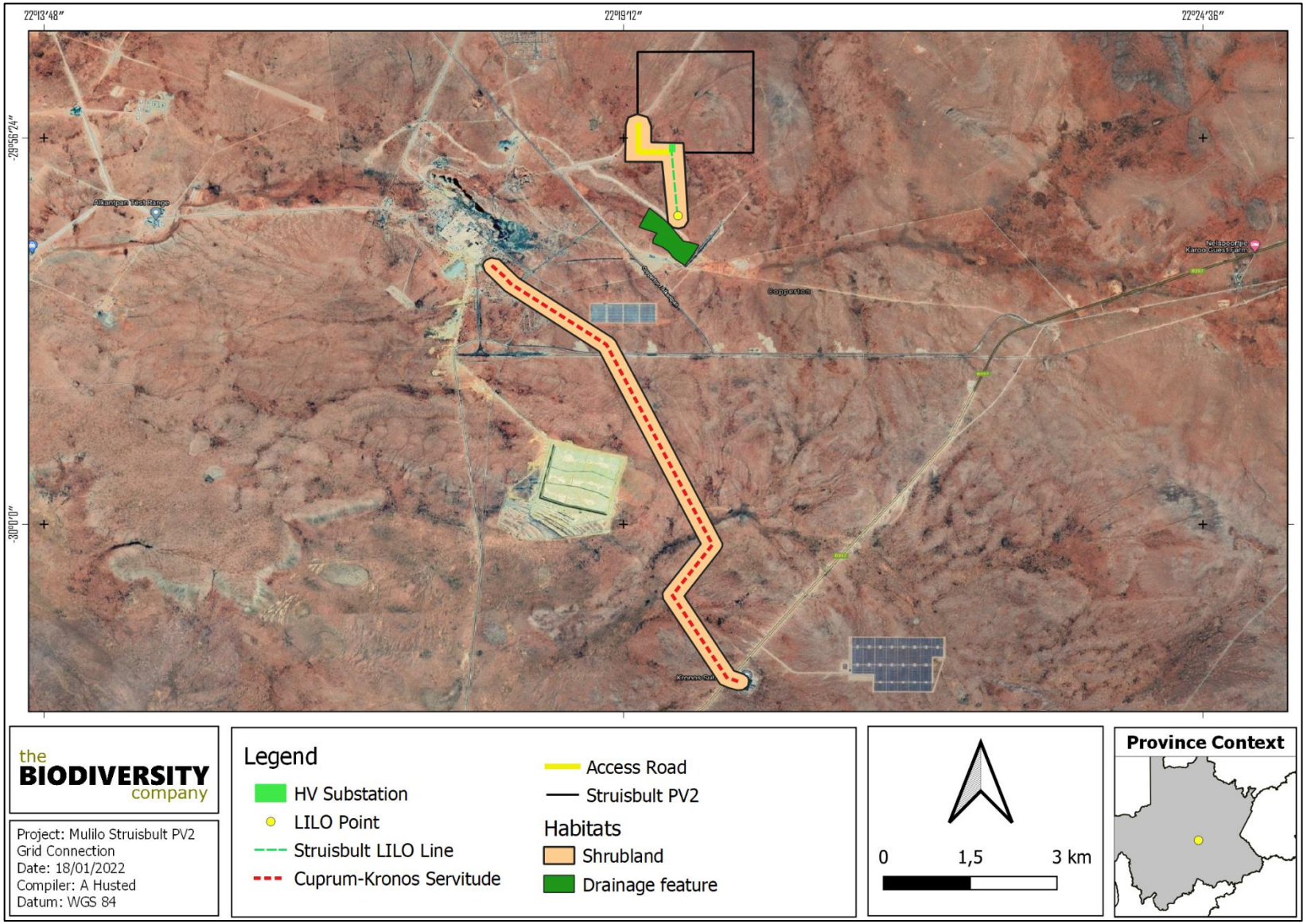
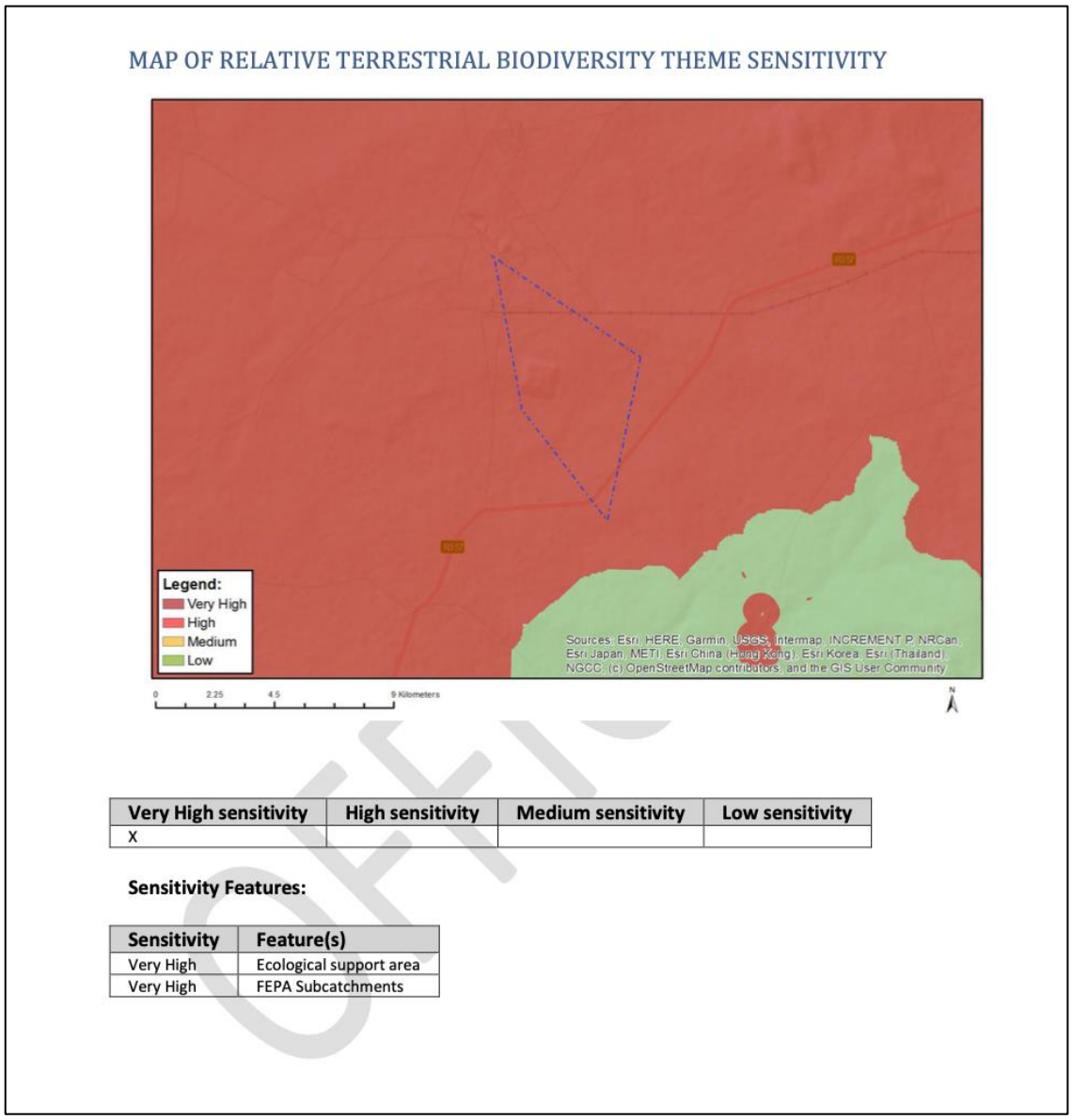


Figure 7-1 Habitats identified in the project area.

7.2 Site Ecological Importance

The biodiversity theme sensitivity, as indicated in the screening report, was derived to be Very High, mainly due to the project area being in proximity to CBA 1 and 2 (Figure 7-2).



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Ecological support area
Very High	FEPA Subcatchments

Figure 7-2 Terrestrial Biodiversity Theme Sensitivity, National Web based Environmental Screening Tool.

The location and extent of these habitats are illustrated in Figure 7-1. Based on the criteria provided in Section 4.2 of this report, all habitats within the assessment area of the proposed project were allocated a sensitivity category (Table 7-2). The sensitivities of the habitat types delineated are illustrated in Figure 7-3. 'Very High-High Sensitivity' areas are due to the following and the guidelines can be seen in Table 7-3:

- Ecological Support Area; and
- FEPA Sub catchment.

Table 7-2 SEI Summary of habitat types delineated within field assessment area of project area

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Drainage Features	Medium	High	Medium	Low	High
Shrubland	Medium	Medium	Medium	Medium	Medium

Table 7-3 Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

Site Ecological Importance	Interpretation in relation to proposed development activities
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.

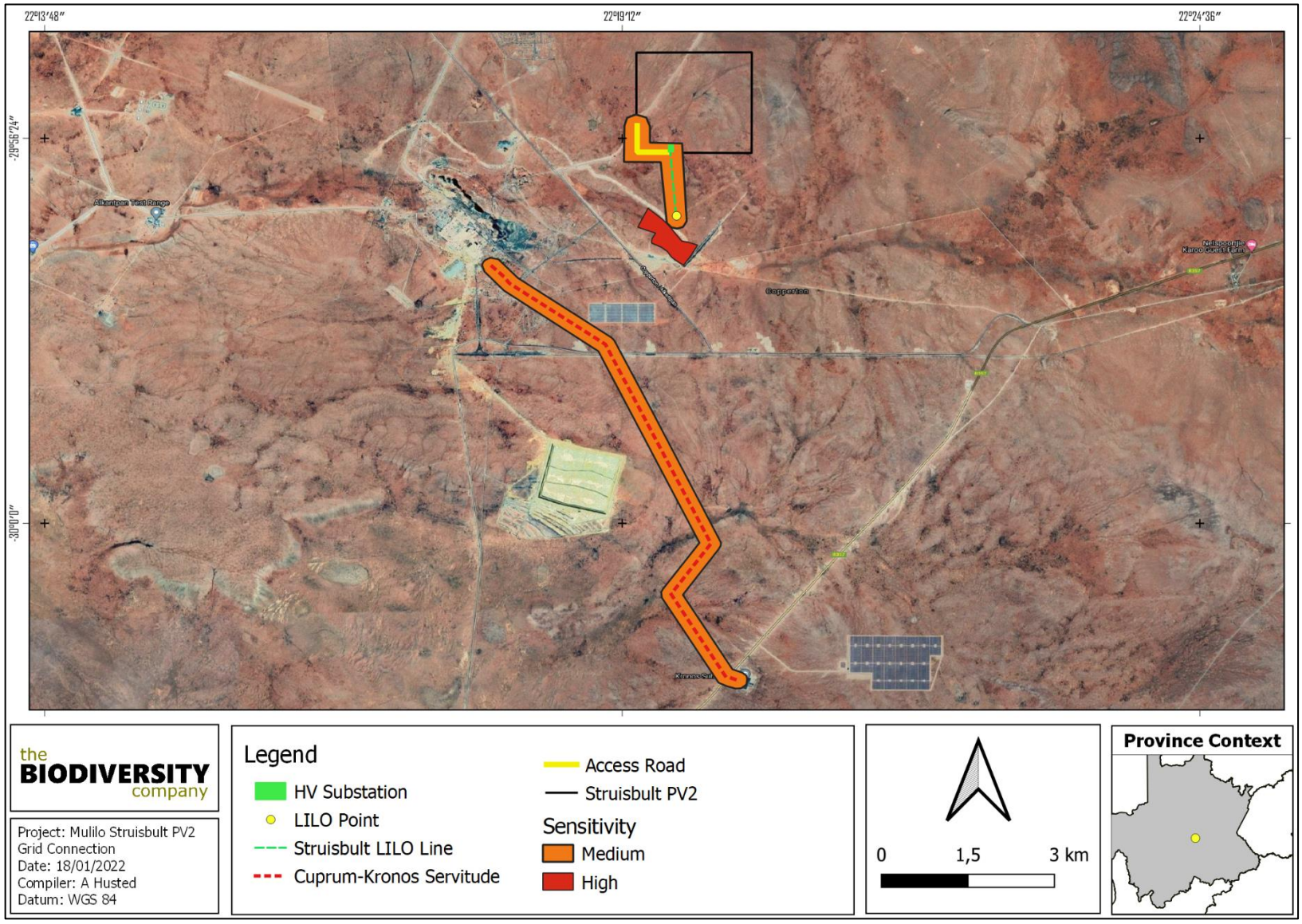


Figure 7-3 Sensitivity of the project area

8 Impact Assessment

The section below and associated tables serve to indicate and summarise the significance of perceived impacts on the terrestrial ecology of the project area. Potential impacts were evaluated against the data captured during the desktop and field assessment to identify relevance to the project area. The relevant impacts associated with the proposed construction of the development were then subjected to a prescribed impact assessment methodology which were provided by EIMS and is available on request.

8.1 Biodiversity Risk Assessment

8.1.1 Present Impacts to Biodiversity

Considering the anthropogenic activities and influences within the landscape, several negative impacts to biodiversity were observed within the project area, however limited (Figure 8-1). These include:

- Historic land modification;
- Farm roads and main roads (and associated traffic and wildlife road mortalities);
- Grazing and trampling of natural vegetation by livestock in certain areas; and
- Fences and associated maintenance.

Figure 8-1 Some of the identified impacts within the project area: existing powerlines and fencing

8.1.2 Terrestrial Impact Assessment

Potential impacts were evaluated against the data captured during the desktop and field assessments to identify relevance to the project area. The relevant impacts associated with the proposed development were then subjected to a prescribed impact assessment methodology and is available on request. No decommissioning phase was considered based on the nature of the development.

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.

8.1.3 Alternatives considered.

No alternatives were provided for the development.

The current proposed route crosses low lying and isolated high sensitivity areas, these areas are low lying and are prone to water accumulation also have moderate slopes which will make construction troublesome and lead to erosion in the operational phase. It was observed during the site visit, that there is an existing roads within the transmission line corridor that would suffice. It's the specialist opinion that existing servitude should be used for all construction. Restricting activity to within the existing servitudes will not only result in a less significant environmental and cumulative impact but will most likely save money due to already existing roads.

8.1.4 Loss of Irreplaceable Resources

- No will be lost.

8.1.5 Anticipated Impacts

The impacts anticipated for the proposed activities are considered in order to predict and quantify these impacts and assess & evaluate the magnitude on the identified terrestrial biodiversity (Table 8-1).

Table 8-1 Anticipated impacts for the proposed activities on terrestrial biodiversity

Main Impact	Project activities that can cause loss/impacts to habitat	Secondary impacts anticipated
1. Destruction, fragmentation and degradation of habitats and ecosystems	Physical removal of vegetation, including protected species.	Displacement/loss of flora & fauna (including possible SCC)
	Access roads and servitudes	Increased potential for soil erosion
	Soil dust precipitation	Habitat fragmentation
	Dumping of waste products	Increased potential for establishment of alien & invasive vegetation
	Random events such as fire (cooking fires or cigarettes)	Erosion
Main Impact	**Project activities that can cause the spread and/or establishment of alien and/or invasive species**	**Secondary impacts anticipated**
2. Spread and/or establishment of alien and/or invasive species	Vegetation removal	Habitat loss for native flora & fauna (including SCC)
	Vehicles potentially spreading seed	Spreading of potentially dangerous diseases due to invasive and pest species
	Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive rodents	Alteration of fauna assemblages due to habitat modification
	Creation of infrastructure suitable for breeding activities of alien and/or invasive birds	

Main Impact	Project activities that can cause direct mortality of fauna	Secondary impacts anticipated
3. Direct mortality of fauna	Clearing of vegetation	Loss of habitat
		Loss of ecosystem services
	Roadkill due to vehicle collision	
	Pollution of water resources due to dust effects, chemical spills, etc.	Increase in rodent populations and associated disease risk
	Intentional killing of fauna for food (hunting)	
Main Impact	**Project activities that can cause reduced dispersal/migration of fauna**	**Secondary impacts anticipated**
4. Reduced dispersal/migration of fauna	Loss of landscape used as corridor	Reduced dispersal/migration of fauna
		Loss of ecosystem services
	Compacted roads	Reduced plant seed dispersal
	Removal of vegetation	
Main Impact	**Project activities that can cause pollution in watercourses and the surrounding environment**	**Secondary impacts anticipated**
5. Environmental pollution due to water runoff, spills from vehicles and erosion	Chemical (organic/inorganic) spills	Pollution in watercourses and the surrounding environment
	Erosion	Faunal mortality (direct and indirectly)
		Groundwater pollution
		Loss of ecosystem services
Main Impact	**Project activities that can cause disruption/alteration of ecological life cycles due to sensory disturbance.**	**Secondary impacts anticipated**
6. Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust and light pollution.	Operation of machinery (Large earth moving machinery, vehicles)	Disruption/alteration of ecological life cycles due to noise
		Loss of ecosystem services
	Project activities that can cause disruption/alteration of ecological life cycles due to dust	Secondary impacts associated with disruption/alteration of ecological life cycles due to dust
	Vehicles	Loss of ecosystem services
Main Impact	**Project activities that can cause staff to interact directly with potentially dangerous fauna**	**Secondary impacts anticipated**
8. Staff and others interacting directly with fauna (potentially dangerous) or poaching of animals	All unregulated/supervised activities outdoors	Loss of SCCs

8.1.6 Unplanned Events

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

Table 8-2 is a summary of the findings of an unplanned event assessment from a terrestrial ecology perspective. Note, not all potential unplanned events may be captured herein, and this must therefore be managed throughout all phases according to recorded events.

Table 8-2 Summary of unplanned events for terrestrial biodiversity

Unplanned Event	Potential Impact	Mitigation
Spills into the surrounding environment	Contamination of habitat as well as water resources associated with a spillage.	A spill response kit must be available at all times. The incident must be reported on and if necessary, a biodiversity specialist must investigate the extent of the impact and provide rehabilitation recommendations.

Fire	Uncontrolled/unmanaged fire that spreads to the surrounding natural Bushveld and ridge.	Appropriate/Adequate fire management plan need to be implemented.
Erosion caused by water runoff from the surface	Erosion on the side of the road	Storm water management plan must be compiled and implemented.

8.1.7 Identification of Additional Potential Impacts

8.1.7.1 Assessment of Impact Significance

The assessment of impact significance considers pre-mitigation as well as implemented of post-mitigation scenarios. The mitigation actions required to lower the risk of the impact are provided in Section 8.1.8 of this report.

Due to the nature of the project, the actual footprint of the pylon infrastructure has a small, localised, impact. It is the creation of access and service roads that is a more important aspect to consider and will be considered in relation to the powerline. The method of connection and spanning of the powerlines between poles have not been received and thus no impact assessment regarding that can be conducted.

8.1.7.2 Construction Phase

The following potential main impacts on biodiversity (based on the framework above) were considered for the construction phase of the proposed development. This phase refers to the period during construction when the proposed features are constructed; and is considered to have the largest direct impact on biodiversity. The following potential impacts to terrestrial biodiversity were considered:

- Destruction, further loss and fragmentation of habitats, ecosystems and vegetation community (Table 8-3),
- Introduction of alien species, especially plants (Table 8-4;
- Destruction of protected plant species (Table 8-5); and
- Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching) (Table 8-6).

Table 8-3 Impacts to biodiversity associated with the proposed construction phase.

Impact Nature: Loss of vegetation within development footprint		
Destruction, further loss and fragmentation of habitats, ecosystems and vegetation community		
	Without mitigation	**With mitigation**
Extent	Local (3)	Activity (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (4)	Low (2)
Probability	Highly probable (4)	Low probability (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate (3)	High (2)
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable.	
Mitigation:		

See Biodiversity Management Outcomes
Residual Impacts:
The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.

Table 8-4 Impacts to biodiversity associated with the proposed construction phase.

Impact Nature: Introduction of alien species, especially plants		
Degradation and loss of surrounding natural vegetation		
	Without mitigation	**With mitigation**
Extent	Regional (4)	Site (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (3)	Low (2)
Probability	Highly probable (4)	Low probability (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate (3)	High (2)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
Long-term broad scale. IAP infestation if not mitigated.		

Table 8-5 Impacts to biodiversity associated with the proposed construction phase.

Impact Nature: Destruction of protected plant species		
Construction activity will likely lead to direct loss of protected plant species		
	Without mitigation	**With mitigation**
Extent	Local (3)	Site (2)
Duration	Permanent (5)	Short term (2)
Magnitude	High (4)	Low (2)
Probability	Highly probable (4)	Medium probability (3)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate (3)	High (2)
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		

• Habitat will be altered and the ecosystems functioning would have changed, this will result in a different species composition with more adaptable and general species becoming more common; • Relocation of plant species can be done but it does not guarantee that it will be successful. • Some Plant SCCs could still be lost

Table 8-6 Impacts to biodiversity associated with the proposed construction phase.

Impact Nature: Displacement of faunal community due to habitat loss, direct mortalities and disturbance		
Construction activity will likely lead to direct mortality of fauna due to earthworks, vehicle collisions, accidental hazardous chemical spills and persecution. Disturbance due to dust and noise pollution and vibration may disrupt behaviour.		
	Without mitigation	**With mitigation**
Extent	Local (3)	Activity (1)
Duration	Medium term (3)	Immediate (1)
Magnitude	High (4)	Low (2)
Probability	Highly probable (4)	Low probability (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate (3)	High (2)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, to some extent. Noise and disturbance cannot be well mitigated, impacts on fauna due to human presence, such as vehicle collisions, poaching, and persecution can be mitigated.	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.		

8.1.7.3 Operation Phase

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

The following potential impacts were considered:

- Continued fragmentation and degradation of habitats and ecosystems (Table 8-7);
- Spread of alien and/or invasive species (Table 8-8);
- Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration) (Table 8-9).

Table 8-7 Impacts to biodiversity associated with the proposed operational phase

Impact Nature: Continued fragmentation and degradation of habitats and ecosystems		
Disturbance created during the construction phase will leave the project area vulnerable to erosion and IAP encroachment.		
	Without Mitigation	With Mitigation
Extent	Local (3)	Site (2)
Duration	Permanent (5)	Immediate (1)

Impact Nature: Continued fragmentation and degradation of habitats and ecosystems		
Disturbance created during the construction phase will leave the project area vulnerable to erosion and IAP encroachment.		
Magnitude	High (4)	Low (2)
Probability	Highly probable (4)	Low probability (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate (3)	High (2)
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts		
There is still the potential some potential for erosion and IAP encroachment even with the implementation of control measures but would have a low impact. Will result in the loss of: Niche habitats		

Table 8-8 Impacts to biodiversity associated with the proposed operational phase.

Impact Nature: Spread of alien and/or invasive species		
Degradation and loss of surrounding natural vegetation		
	Without mitigation	**With mitigation**
Extent	Regional (4)	Site (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (3)	Low (2)
Probability	Highly probable (4)	Low probability (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate (3)	High (2)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
Long term broad scale IAP infestation if not mitigated.		

Table 8-9 Impacts to biodiversity associated with the proposed operational phase

Impact Nature: Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration		
The operation and maintenance of the proposed development may lead to disturbance or persecution of fauna in the vicinity of the development.		
	Without Mitigation	**With Mitigation**

Impact Nature: Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration		
The operation and maintenance of the proposed development may lead to disturbance or persecution of fauna in the vicinity of the development.		
Extent	Local (3)	Site (2)
Duration	Long term (4)	Short term (2)
Magnitude	High (4)	Low (2)
Probability	Probable (3)	Low probability (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate (3)	High (2)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts		
Disturbance from maintenance activities will occur albeit at a low and infrequent level. Less migratory species will be found in the area, SCC species will likely not breed in the area anymore. Road killings are still a possibility. Migratory routes of fauna will change, fauna and flora species composition will change. Vibrations can still lead to species abandoning their burrows;		

8.1.7.4 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 farm 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 8-10 Cumulative Impacts to biodiversity associated with the proposed project.

The development of the proposed infrastructure will contribute to cumulative habitat loss close to CBAs and thereby impact the ecological processes in the region.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (3)	Site (2)

Duration	Short term (2)	Medium term (3)
Magnitude	Moderate (3)	High (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate (3)	Moderate (3)
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	

8.1.8 Biodiversity Management Plan

The aim of the management outcomes is to present the mitigations in such a way that the can be incorporated into the Environmental Management Programme (EMPr), allowing for more successful implementation and auditing of the mitigations and monitoring guidelines Table 8-11 presents the recommended mitigation measures and the respective timeframes, targets and performance indicators for the terrestrial study.

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

- Prevent the further loss and fragmentation of vegetation communities and the CBA areas in the vicinity of the project area;
- As far as possible, reduce the negative fragmentation effects of the development and enable safe movement of faunal species;
- Prevent the direct and indirect loss and disturbance of faunal species and community (including occurring and potentially occurring species of conservation concern); and
- Follow the guidelines for interpreting Site Ecological Importance (SEI).

Table 8-11 Mitigation measures including requirements for timeframes, roles and responsibilities for the terrestrial study

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Vegetation and Habitats				
All high sensitivity areas should be avoided (if feasible), and development must be prioritised in medium sensitivity areas.	Construction Phase	Project manager, Environmental Officer	Development footprint	Ongoing
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. All activities must be restricted to within the low/medium sensitivity areas. No further loss of high sensitivity areas should be permitted. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
Existing servitudes, access routes, especially roads must be made use of.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
All laydown, chemical toilets etc. should be restricted to medium or low sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated project areas.	Construction/Operational Phase	Environmental Officer & Design Engineer	Laydown areas	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species. All livestock must always be kept out of the project area, especially areas that have been recently re-planted	Operational phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment. Construction activities and vehicles could cause spillages of lubricants, fuels and waste material potentially negatively affecting the	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing

functioning of the ecosystem. All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas.				
It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	Life of operation	Project manager, Environmental Officer	Any instances	Ongoing
A fire management plan needs to be compiled and implemented to restrict the impact fire might have on the surrounding areas.	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase
Any individual of the protected plants that are present needs a relocation or destruction permit in order for any individual to be removed or destroyed due to the development. High visibility flags must be placed near any threatened/protected plants not being removed or destroyed in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. All protected and red-data plants should be relocated where reasonably practicable, and as many other geophytic and succulent species as possible, to similar habitats where they should be able to resprout and flourish again.	Life of operation	Project manager, Environmental Officer	Protected Tree/Plant species	Ongoing
A pre-construction survey **by a suitably qualified ecologist** in the flowering season (July-September) should be conducted to ensure that a more comprehensive floral presence confirmation. For the threatened species that may not be destroyed, it is recommended that professional service providers that deal with plant search and rescue be used to remove such plants and use them either for later rehabilitation work or other conservation projects.	Planning Phase, Pre-Construction	Project manager, Environmental Officer & Contractor	Flora species	During Phase
Management outcome: Fauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
A qualified environmental control officer must be on site when construction begins. In situations where the threatened and protected plants must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development of a search, rescue and recovery program is suggested for the protection of these species. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated.	Construction Phase	Environmental Officer, Contractor	Presence of any floral or faunal species.	During phase
The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments. Signs must be put up to enforce this	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing

The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna.	Construction	Project manager, Environmental Officer & Design Engineer	Construction/Closure Phase	Ongoing
Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals	Construction/Operational Phase	Environmental Officer	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed. Signs must be put up to enforce this;	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (green/red) lights should be used wherever possible.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light.	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
Schedule activities and operations during least sensitive periods where possible, to avoid migration, nesting and breeding seasons.	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day in the case.	Ongoing
All areas to be developed must be walked through prior to any activity to ensure no nests or fauna species are found in the area. Should any Species of Conservation Concern not move out of the area or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.	Construction and Operational phase	Project manager, Environmental Officer	Presence of Nests and faunal species	Planning, Construction and Rehabilitation
Any holes/deep excavations must be dug and planted in a progressive manner and shouldn't be left open overnight. Should the holes remain overnight they must be restricted temporarily to ensure no small fauna species fall in.	Planning and Construction	Environmental Officer & Contractor, Engineer	Presence of trapped animals and open holes	Ongoing
Ensure that cables and connections are insulated successfully to reduce electrocution risk.	Life of project	Environmental Officer & Contractor, Engineer	Presence of electrocuted fauna	Ongoing
Any exposed parts must be covered (insulated) to reduce electrocution risk.	Life of project	Environmental Officer & Contractor, Engineer	Presence of electrocuted fauna	Ongoing
Management outcome: Alien species				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Compilation of and implementation of an alien vegetation management plan.	Life of operation	Project manager, Environmental Officer & Contractor	Assess presence and encroachment of alien vegetation	Twice a year
The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprint of the roads must be kept to prescribed widths.	Construction/Operational Phase	Project manager, Environmental Officer & Contractor	Footprint Area	Life of operation

Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site	Life of operation	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation
A pest control plan must be put in place and implemented; it is imperative that poisons not be used due to the likely presence of SCCs.	Life of operation	Environmental Officer & Health and Safety Officer	Evidence or presence of pests	Life of operation
Management outcome: Dust				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces. • No non environmentally friendly suppressants may be used as this could result in pollution of water sources.	Life of operation	Contractor	Dustfall	Dust monitoring program.
Management outcome: Waste management				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Waste management must be a priority and all waste must be collected and stored effectively.	Life of operation	Environmental Officer & Contractor	Waste Removal	Weekly
Litter, spills, fuels, chemicals and human waste in and around the project area.	Construction/Closure Phase	Environmental Officer & Health and Safety Officer	Presence of Waste	Daily
A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Life of operation	Environmental Officer & Health and Safety Officer	Number of toilets per staff member. Waste levels	Daily
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility	Life of operation	Environmental Officer & Health and Safety Officer	Availability of bins and the collection of the waste.	Ongoing
Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Collection/handling of the waste.	Ongoing
Refuse bins will be emptied and secured Temporary storage of domestic waste shall be in covered waste skips. Maximum domestic waste storage period will be 10 days.	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Management of bins and collection of waste	Ongoing, every 10 days
Management outcome: Environmental awareness training				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing

are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of Red / Orange List species, their identification, conservation status and importance, biology, habitat requirements and management requirements of the EA and EMPr. The avoidance and protection of the wetland areas must be included in the site induction. Contractors and employees must all undergo the induction and be made aware of "no-go" areas to be avoided.				
Management outcome: Erosion				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Where possible, existing access routes and walking paths must be made use of.	Life of operation	Project manager, Environmental Officer	Routes used within the area	Ongoing
Areas that are temporarily denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events and strong winds.	Life of operation	Project manager, Environmental Officer	Re-establishment of indigenous vegetation	Progressively
A stormwater management plan must be compiled and implemented.	Life of operation	Project manager, Environmental Officer	Management plan	Before construction phase: Ongoing

9 Conclusion and Impact Statement

The completion of a comprehensive desktop study, in conjunction with the results from the field survey, suggest there is a good confidence in the information provided. The survey ensured that there was a suitable groundtruth coverage of the assessment area and most habitats and ecosystems were assessed to obtain a general species (fauna and flora) overview and the major current impacts were observed. The conservation status is classified as Least Concern albeit the protection level is regarded as 'Not Protected and Poorly Protected' Ecosystem. Moreover, the proposed activity is directly adjacent to a CBA 1 and No Natural Areas remaining.

The current layout is located adjacent to sensitive habitats and other areas of high biodiversity potential. Portions of the current layout specifically the low-lying portions of the servitude would be considered to have a high negative impact as it would directly affect the habitat of potential threatened/protected plant species and expected listed faunal species that use these ecosystems;

- The assessment area possesses a low diversity and density of protected flora and fauna species.

Historically, overgrazing from livestock (Sheep, donkeys and cattle) and mismanagement has led to the deterioration of habitats present. However, the high sensitivity areas can be regarded as important, not only within the local landscape, but also regionally; as they are used for habitat, foraging, water resource and movement corridors for fauna within the landscape.

The habitat existence and importance of these habitats is regarded as crucial, due to the role of this intact unique habitat to biodiversity within the local landscape, not to mention the sensitivity according to various ecological datasets.

Development of the powerline is not considered a destructive development, with priority being the use of existing servitudes and access routes. Based on this, development of the powerline is likely to be permissible along the proposed route, but disturbances must be kept to a minimum. The high sensitivity habitat area adjacent to the LILO line still:

- Serves as and represent CBA 1 as per the Conservation Plan;
- Serves as a water resource for the region;
- Supports and protects possible fauna and flora; and
- Support various organisms and may play a more important role in the ecosystem if left to recover from the superficial impacts.

The ecological integrity, importance and functioning of these terrestrial biodiversity areas provide a variety of ecological services considered beneficial, with one key service being the maintenance of biodiversity and water resources. The preservation of these systems is the most important aspect to consider for the proposed project. The mitigations, management and associated monitoring regarding these operational impacts will be the most important factor of this project and must be considered by the issuing authority.

It's the specialist opinion that existing servitude should be used.

9.1 Impact Statement

The main expected impacts of the proposed grid infrastructure will include the following:

- habitat loss and fragmentation;
- degradation of surrounding habitat;
- direct loss of drainage areas;

- disturbance and displacement caused during the construction and maintenance phases; and
- direct mortality during the construction phase.

Mitigation measures as described in this report can be implemented to reduce the significance of the risk but there is still a possibility of impacts. Considering that this area that has been identified as being close to some areas of significance for biodiversity maintenance and ecological processes (CBAs), development may proceed but with caution and only with the implementation of mitigation measures.

Development (specifically the nature of the current development) crossing the Drainage lines (High sensitivity) is not regarded as a fatal flaw. Development within the remaining Medium sensitivity areas is permissible, but suitable avoidance and mitigatory measures must be prescribed. It is the opinions of the specialists that the project, may be favourably considered, should on condition all prescribed mitigation measures and supporting recommendations be implemented.

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11 Appendix Items

11.1 Appendix A – Flora species expected to occur in the project area.

Family	*Taxon*	IUCN	Ecology
Malvaceae	*Abutilon austro-africanum*	LC	Indigenous
Passifloraceae	*Adenia repanda*	LC	Indigenous
Crassulaceae	*Adromischus trigynus*	LC	Indigenous
Aizoaceae	*Aizoon burchellii*		Indigenous
Aizoaceae	*Aizoon canariense*	LC	Indigenous
Aizoaceae	*Aizoon schellenbergii*	LC	Indigenous
Asphodelaceae	*Aloe karasbergensis*	LC	Indigenous
Malvaceae	*Althaea ludwigii*	LC	Indigenous
Amaranthaceae	*Amaranthus schinzianus*	LC	Indigenous
Poaceae	*Anthephora pubescens*	LC	Indigenous
Scrophulariaceae	*Aptosimum albomarginatum*	LC	Indigenous
Scrophulariaceae	*Aptosimum marlothii*	LC	Indigenous
Scrophulariaceae	*Aptosimum procumbens*	LC	Indigenous
Asteraceae	*Arctotis leiocarpa*	LC	Indigenous
Aizoaceae	*Aridaria sp.*		
Poaceae	*Aristida adscensionis*	LC	Indigenous
Poaceae	*Aristida congesta subsp. congesta*	LC	Indigenous
Poaceae	*Aristida vestita*	LC	Indigenous
Asparagaceae	*Asparagus bechuanicus*	LC	Indigenous
Asparagaceae	*Asparagus glaucus*	LC	Indigenous
Aspleniaceae	*Asplenium cordatum*	LC	Indigenous
Asteraceae	*Athanasia minuta subsp. minuta*	LC	Indigenous
Amaranthaceae	*Atriplex lindleyi subsp. inflata*		Not indigenous; Naturalised; Invasive
Amaranthaceae	*Atriplex semibaccata*		Not indigenous; Naturalised; Invasive
Iridaceae	*Babiana hypogaea*	LC	Indigenous
Acanthaceae	*Barleria lichtensteiniana*	LC	Indigenous
Acanthaceae	*Barleria rigida*	LC	Indigenous
Asteraceae	*Berkheya annectens*	LC	Indigenous
Asteraceae	*Berkheya pinnatifida subsp. pinnatifida*	LC	Indigenous; Endemic
Acanthaceae	*Blepharis mitrata*	LC	Indigenous
Capparaceae	*Boscia foetida subsp. foetida*	LC	Indigenous
Brassicaceae	*Brassica tournefortii*		Not indigenous; Naturalised; Invasive
Asphodelaceae	*Bulbine frutescens*	LC	Indigenous
Fabaceae	*Calobota spinescens*	LC	Indigenous
Poaceae	*Cenchrus ciliaris*	LC	Indigenous
Verbenaceae	*Chascanum pinnatifidum var. pinnatifidum*	LC	Indigenous
Verbenaceae	*Chascanum pumilum*	LC	Indigenous
Pteridaceae	*Cheilanthes eckloniana*	LC	Indigenous
Amaranthaceae	*Chenopodium mucronatum*	LC	Indigenous
Poaceae	*Chloris virgata*	LC	Indigenous
Asteraceae	*Chrysocoma ciliata*	LC	Indigenous
Asteraceae	*Chrysocoma obtusata*	LC	Indigenous
Cleomaceae	*Cleome angustifolia subsp. diandra*	LC	Indigenous

Cleomaceae	*Cleome rubella*	LC	Indigenous
Cucurbitaceae	*Coccinia rehmannii*	LC	Indigenous
Colchicaceae	*Colchicum bellum*		Indigenous
Colchicaceae	*Colchicum praeirroratum*	LC	Indigenous; Endemic
Malvaceae	*Corchorus asplenifolius*	LC	Indigenous
Brassicaceae	*Coronopus sp.*		
Asteraceae	*Cotula anthemoides*	LC	Indigenous
Crassulaceae	*Crassula capitella subsp. thyrsiflora*	LC	Indigenous
Crassulaceae	*Crassula corallina subsp. corallina*	LC	Indigenous
Amaryllidaceae	*Crinum lugardiae*	LC	Indigenous
Cucurbitaceae	*Cucumis africanus*	LC	Indigenous
Cucurbitaceae	*Cucumis myriocarpus subsp. leptodermis*	LC	Indigenous
Cucurbitaceae	*Cucumis sp.*		
Fabaceae	*Cullen tomentosum*	LC	Indigenous
Asteraceae	*Cuspidia cernua subsp. annua*	LC	Indigenous; Endemic
Apocynaceae	*Cynanchum orangeanum*	LC	Indigenous
Cyperaceae	*Cyperus indecorus var. namaquensis*	NE	Indigenous
Scrophulariaceae	*Diascia runcinata*	LC	Indigenous
Asteraceae	*Dicoma capensis*	LC	Indigenous
Poaceae	*Digitaria eriantha*	LC	Indigenous
Poaceae	*Digitaria sp.*		
Asteraceae	*Dimorphotheca polyptera*	LC	Indigenous
Hyacinthaceae	*Dipcadi gracillimum*	LC	Indigenous
Hyacinthaceae	*Dipcadi papillatum*	LC	Indigenous
Hyacinthaceae	*Dipcadi viride*	LC	Indigenous
Hyacinthaceae	*Drimia intricata*	LC	Indigenous
Poaceae	*Enneapogon cenchroides*	LC	Indigenous
Poaceae	*Enneapogon desvauxii*	LC	Indigenous
Poaceae	*Enneapogon scaber*	LC	Indigenous
Poaceae	*Eragrostis annulata*	LC	Indigenous
Poaceae	*Eragrostis bicolor*	LC	Indigenous
Poaceae	*Eragrostis biflora*	LC	Indigenous
Poaceae	*Eragrostis brizantha*	LC	Indigenous
Poaceae	*Eragrostis echinochloidea*	LC	Indigenous
Poaceae	*Eragrostis homomalla*	LC	Indigenous
Poaceae	*Eragrostis lehmanniana var. lehmanniana*	LC	Indigenous
Poaceae	*Eragrostis nindensis*	LC	Indigenous
Poaceae	*Eragrostis obtusa*	LC	Indigenous
Poaceae	*Eragrostis porosa*	LC	Indigenous
Poaceae	*Eragrostis procumbens*	LC	Indigenous
Poaceae	*Eragrostis rotifer*	LC	Indigenous
Poaceae	*Eragrostis sp.*		
Poaceae	*Eragrostis truncata*	LC	Indigenous
Asteraceae	*Eriocephalus ambiguus*	LC	Indigenous
Asteraceae	*Eriocephalus pauperrimus*	LC	Indigenous
Euphorbiaceae	*Euphorbia braunsii*	LC	Indigenous
Euphorbiaceae	*Euphorbia inaequilatera*	LC	Indigenous

Euphorbiaceae	*Euphorbia juttae*	LC	Indigenous
Euphorbiaceae	*Euphorbia spinea*	LC	Indigenous
Zygophyllaceae	*Fagonia isotricha var. isotricha*		Indigenous
Asteraceae	*Felicia clavipilosa subsp. clavipilosa*	LC	Indigenous
Poaceae	*Fingerhuthia africana*	LC	Indigenous
Asteraceae	*Foveolina dichotoma*	LC	Indigenous
Iridaceae	*Freesia andersoniae*	LC	Indigenous; Endemic
Aizoaceae	*Galenia africana*	LC	Indigenous
Aizoaceae	*Galenia collina*	LC	Indigenous; Endemic
Aizoaceae	*Galenia pubescens*	LC	Indigenous; Endemic
Aizoaceae	*Galenia sarcophylla*	LC	Indigenous
Aizoaceae	*Galenia secunda*	LC	Indigenous
Aizoaceae	*Galenia sp.*		
Asteraceae	*Garuleum schinzii subsp. schinzii*	LC	Indigenous
Asteraceae	*Gazania jurineifolia subsp. scabra*	LC	Indigenous
Asteraceae	*Gazania krebsiana subsp. arctotoides*	LC	Indigenous
Asteraceae	*Gazania lichtensteinii*	LC	Indigenous
Asteraceae	*Geigeria acaulis*	LC	Indigenous
Asteraceae	*Geigeria filifolia*	LC	Indigenous
Asteraceae	*Geigeria ornativa subsp. ornativa*	LC	Indigenous
Gisekiaceae	*Gisekia pharnaceoides var. pharnaceoides*	LC	Indigenous
Apocynaceae	*Gomphocarpus fruticosus subsp. fruticosus*	LC	Indigenous
Funariaceae	*Goniomitrium africanum*		Indigenous
Neuradaceae	*Grielum humifusum var. humifusum*	LC	Indigenous
Neuradaceae	*Grielum humifusum var. parviflorum*	LC	Indigenous
Amaryllidaceae	*Haemanthus humilis subsp. hirsutus*	LC	Indigenous
Pedaliaceae	*Harpagophytum procumbens subsp. procumbens*	NE	Indigenous
Asteraceae	*Helichrysum gariepinum*	LC	Indigenous
Asteraceae	*Helichrysum herniarioides*	LC	Indigenous
Asteraceae	*Helichrysum lucilioides*	LC	Indigenous
Asteraceae	*Helichrysum subglomeratum*	LC	Indigenous
Brassicaceae	*Heliophila deserticola var. deserticola*	LC	Indigenous
Brassicaceae	*Heliophila seselifolia var. nigellifolia*	NE	Indigenous; Endemic
Malvaceae	*Hermannia abrotanoides*	LC	Indigenous
Malvaceae	*Hermannia bicolor*	LC	Indigenous
Malvaceae	*Hermannia comosa*	LC	Indigenous
Malvaceae	*Hermannia erodioides*	LC	Indigenous
Malvaceae	*Hermannia gariepina*	LC	Indigenous
Malvaceae	*Hermannia marginata*	LC	Indigenous; Endemic
Malvaceae	*Hermannia pulverata*	LC	Indigenous; Endemic
Malvaceae	*Hermannia sp.*		
Malvaceae	*Hermannia spinosa*	LC	Indigenous
Poaceae	*Heteropogon contortus*	LC	Indigenous
Apocynaceae	*Hoodia flava*	LC	Indigenous
Asteraceae	*Ifloga candida*	LC	Indigenous; Endemic
Asteraceae	*Ifloga molluginoides*	LC	Indigenous
Fabaceae	*Indigastrum niveum*		Indigenous

Fabaceae	*Indigofera alternans var. alternans*	LC	Indigenous
Fabaceae	*Indigofera auricoma*	LC	Indigenous
Fabaceae	*Indigofera heterotricha*	LC	Indigenous
Fabaceae	*Indigofera sessilifolia*	LC	Indigenous
Scrophulariaceae	*Jamesbrittenia atropurpurea*		Indigenous
Scrophulariaceae	*Jamesbrittenia canescens var. canescens*	LC	Indigenous
Scrophulariaceae	*Jamesbrittenia integerrima*	LC	Indigenous
Scrophulariaceae	*Jamesbrittenia tysonii*	LC	Indigenous; Endemic
Acanthaceae	*Justicia divaricata*		Indigenous
Acanthaceae	*Justicia incana*		Indigenous
Acanthaceae	*Justicia spartioides*		Indigenous
Cucurbitaceae	*Kedrostis africana*	LC	Indigenous
Rubiaceae	*Kohautia cynanchica*	LC	Indigenous
Santalaceae	*Lacomucinaea lineata*		Indigenous
Iridaceae	*Lapeirousia plicata*		Indigenous
Iridaceae	*Lapeirousia plicata subsp. foliosa*		Indigenous
Apocynaceae	*Larryleachia marlothii*	LC	Indigenous
Asteraceae	*Lasiopogon glomerulatus*	LC	Indigenous
Asteraceae	*Lasiospermum bipinnatum*	LC	Indigenous
Fabaceae	*Leobordea platycarpa*	LC	Indigenous
Brassicaceae	*Lepidium englerianum*		Indigenous
Poaceae	*Leptochloa fusca*	LC	Indigenous
Fabaceae	*Lessertia annularis*	LC	Indigenous
Fabaceae	*Lessertia frutescens subsp. frutescens*	LC	Indigenous
Fabaceae	*Lessertia pauciflora var. pauciflora*	LC	Indigenous
Limeaceae	*Limeum aethiopicum var. aethiopicum*	NE	Indigenous; Endemic
Limeaceae	*Limeum aethiopicum var. lanceolatum*	NE	Indigenous
Limeaceae	*Limeum argute-carinatum var. argute-carinatum*	LC	Indigenous
Limeaceae	*Limeum argute-carinatum var. kwebense*		Indigenous
Limeaceae	*Limeum myosotis var. confusum*	LC	Indigenous
Limeaceae	*Limeum myosotis var. myosotis*	LC	Indigenous
Lophiocarpaceae	*Lophiocarpus polystachyus*	LC	Indigenous
Fabaceae	*Lotononis leptoloba*	LC	Indigenous; Endemic
Fabaceae	*Lotononis rabenaviana*	LC	Indigenous
Solanaceae	*Lycium bosciifolium*	LC	Indigenous
Solanaceae	*Lycium cinereum*	LC	Indigenous
Solanaceae	*Lycium horridum*	LC	Indigenous
Solanaceae	*Lycium oxycarpum*	LC	Indigenous; Endemic
Solanaceae	*Lycium pilifolium*	LC	Indigenous
Solanaceae	*Lycium pumilum*	LC	Indigenous
Solanaceae	*Lycium schizocalyx*	LC	Indigenous
Scrophulariaceae	*Lyperia tristis*	LC	Indigenous
Malvaceae	*Malva aegyptia*		Not indigenous; Naturalised
Scrophulariaceae	*Manulea fragrans*	LC	Indigenous; Endemic
Scrophulariaceae	*Manulea schaeferi*	LC	Indigenous
Marsileaceae	*Marsilea capensis*	LC	Indigenous
Fabaceae	*Medicago laciniata*		Not indigenous; Naturalised

Fabaceae	*Medicago laciniata var. laciniata*	NE	Not indigenous; Naturalised
Fabaceae	*Melolobium calycinum*	LC	Indigenous
Fabaceae	*Melolobium candicans*	LC	Indigenous
Fabaceae	*Melolobium canescens*	LC	Indigenous
Aizoaceae	*Mesembryanthemum coriarium*		Indigenous
Aizoaceae	*Mesembryanthemum geniculiflorum*		Indigenous
Aizoaceae	*Mesembryanthemum granulicaule*		Indigenous
Aizoaceae	*Mesembryanthemum guerichianum*	LC	Indigenous
Aizoaceae	*Mesembryanthemum tetragonum*		Indigenous
Aizoaceae	*Mestoklema arboriforme*	LC	Indigenous; Endemic
Apocynaceae	*Microloma incanum*	LC	Indigenous
Apocynaceae	*Microloma longitubum*	LC	Indigenous
Acanthaceae	*Monechma sp.*		
Geraniaceae	*Monsonia angustifolia*	LC	Indigenous
Geraniaceae	*Monsonia glauca*	LC	Indigenous
Geraniaceae	*Monsonia luederitziana*	LC	Indigenous
Iridaceae	*Moraea falcifolia*	LC	Indigenous
Amaryllidaceae	*Nerine laticoma*	LC	Indigenous
Asteraceae	*Nidorella resedifolia subsp. resedifolia*	LC	Indigenous
Asteraceae	*Nolletia gariepina*	LC	Indigenous
Meliaceae	*Nymania capensis*	LC	Indigenous
Lamiaceae	*Ocimum americanum var. americanum*	LC	Indigenous
Asteraceae	*Oedera humilis*		Indigenous
Oleaceae	*Olea europaea subsp. cuspidata*		Indigenous
Poaceae	*Oropetium capense*	LC	Indigenous
Asteraceae	*Osteospermum armatum*	LC	Indigenous
Asteraceae	*Osteospermum calendulaceum*	LC	Indigenous; Endemic
Asteraceae	*Osteospermum rigidum var. rigidum*	LC	Indigenous; Endemic
Asteraceae	*Osteospermum sinuatum var. sinuatum*	LC	Indigenous
Oxalidaceae	*Oxalis haedulipes*	LC	Indigenous
Oxalidaceae	*Oxalis pulchella var. beneprotecta*		Indigenous
Oxalidaceae	*Oxalis sp.*		
Apocynaceae	*Pachypodium succulentum*	LC	Indigenous; Endemic
Poaceae	*Panicum coloratum*	LC	Indigenous
Poaceae	*Panicum impeditum*	LC	Indigenous
Poaceae	*Panicum lanipes*	LC	Indigenous
Poaceae	*Panicum maximum*	LC	Indigenous
Poaceae	*Paspalum distichum*	LC	Not indigenous; Naturalised; Invasive
Asteraceae	*Pegolettia retrofracta*	LC	Indigenous
Geraniaceae	*Pelargonium malacoides*		Indigenous
Scrophulariaceae	*Peliostomum leucorrhizum*	LC	Indigenous
Pteridaceae	*Pellaea calomelanos var. calomelanos*	LC	Indigenous
Asteraceae	*Pentzia calva*	LC	Indigenous
Asteraceae	*Pentzia incana*	LC	Indigenous
Asteraceae	*Pentzia lanata*	LC	Indigenous
Asteraceae	*Pentzia pinnatisecta*	LC	Indigenous
Nyctaginaceae	*Phaeoptilum spinosum*	LC	Indigenous

Asteraceae	*Phymaspermum aciculare*	LC	Indigenous
Asteraceae	*Phymaspermum parvifolium*	LC	Indigenous; Endemic
Polygalaceae	*Polygala leptophylla*		Indigenous
Polygalaceae	*Polygala leptophylla var. armata*	LC	Indigenous
Polygalaceae	*Polygala leptophylla var. leptophylla*	LC	Indigenous
Polygalaceae	*Polygala pungens*	LC	Indigenous; Endemic
Polygalaceae	*Polygala seminuda*	LC	Indigenous
Polygalaceae	*Polygala sp.*		
Fabaceae	*Prosopis glandulosa var. glandulosa*	NE	Not indigenous; Naturalised
Fabaceae	*Prosopis pubescens*	NE	Not indigenous; Naturalised
Fabaceae	*Prosopis sp.*		
Fabaceae	*Prosopis velutina*	NE	Not indigenous; Naturalised; Invasive
Aizoaceae	*Psilocaulon sp.*		
Pedaliaceae	*Pterodiscus sp.*		
Pedaliaceae	*Pterodiscus speciosus*	LC	Indigenous
Asteraceae	*Pteronia mucronata*	LC	Indigenous
Asteraceae	*Pteronia sp.*		
Fabaceae	*Ptycholobium biflorum subsp. biflorum*	LC	Indigenous
Celastraceae	*Putterlickia saxatilis*	LC	Indigenous; Endemic
Malvaceae	*Radyera urens*	LC	Indigenous
Bignoniaceae	*Rhigozum trichotomum*	LC	Indigenous
Fabaceae	*Rhynchosia totta var. rigidula*		Indigenous
Ricciaceae	*Riccia albornata*		Indigenous; Endemic
Zygophyllaceae	*Roepera flexuosa*		Indigenous
Zygophyllaceae	*Roepera lichtensteiniana*		Indigenous
Aizoaceae	*Ruschia intricata*	LC	Indigenous; Endemic
Aizoaceae	*Ruschia sp.*		
Amaranthaceae	*Salsola apterygea*	LC	Indigenous; Endemic
Amaranthaceae	*Salsola calluna*	LC	Indigenous; Endemic
Amaranthaceae	*Salsola geminiflora*	LC	Indigenous; Endemic
Amaranthaceae	*Salsola glabrescens*	LC	Indigenous
Amaranthaceae	*Salsola kalaharica*	LC	Indigenous; Endemic
Amaranthaceae	*Salsola kali*		Not indigenous; Naturalised; Invasive
Lamiaceae	*Salvia verbenaca*	LC	Not indigenous; Naturalised; Invasive
Poaceae	*Schmidtia kalahariensis*	LC	Indigenous
Cyperaceae	*Schoenoplectus leucanthus*	LC	Indigenous
Cyperaceae	*Schoenoplectus muricinux*	LC	Indigenous
Anacardiaceae	*Searsia burchellii*	LC	Indigenous
Scrophulariaceae	*Selago sp.*		
Asteraceae	*Senecio angustifolius*	LC	Indigenous
Asteraceae	*Senecio consanguineus*	LC	Indigenous
Asteraceae	*Senecio glutinosus*	LC	Indigenous
Asteraceae	*Senecio niveus*	LC	Indigenous
Fabaceae	*Senegalia mellifera subsp. detinens*	LC	Indigenous
Amaranthaceae	*Sericocoma avolans*	LC	Indigenous
Amaranthaceae	*Sericocoma pungens*	LC	Indigenous
Amaranthaceae	*Sericorema remotiflora*	LC	Indigenous

Pedaliaceae	*Sesamum capense*	LC	Indigenous
Poaceae	*Setaria verticillata*	LC	Indigenous
Brassicaceae	*Sisymbrium burchellii var. burchellii*	LC	Indigenous
Solanaceae	*Solanum capense*	LC	Indigenous
Poaceae	*Sorghum halepense*	NE	Not indigenous; Naturalised; Invasive
Poaceae	*Sporobolus coromandelianus*	LC	Indigenous
Poaceae	*Sporobolus ioclados*	LC	Indigenous
Poaceae	*Sporobolus nervosus*	LC	Indigenous
Poaceae	*Stipagrostis anomala*	LC	Indigenous
Poaceae	*Stipagrostis ciliata var. capensis*	LC	Indigenous
Poaceae	*Stipagrostis namaquensis*	LC	Indigenous
Poaceae	*Stipagrostis obtusa*	LC	Indigenous
Poaceae	*Stipagrostis uniplumis var. uniplumis*	LC	Indigenous
Iridaceae	*Syringodea concolor*	LC	Indigenous; Endemic
Talinaceae	*Talinum sp.*		
Talinaceae	*Talinum tenuissimum*	LC	Indigenous
Loranthaceae	*Tapinanthus oleifolius*	LC	Indigenous
Fabaceae	*Tephrosia dregeana var. dregeana*	LC	Indigenous
Zygophyllaceae	*Tetraena chrysopteron*		Indigenous
Zygophyllaceae	*Tetraena microcarpa*		Indigenous
Zygophyllaceae	*Tetraena simplex*		Indigenous
Aizoaceae	*Tetragonia arbuscula*	LC	Indigenous
Aizoaceae	*Tetragonia calycina*	LC	Indigenous
Aizoaceae	*Tetragonia reduplicata*	LC	Indigenous
Santalaceae	*Thesium hystricoides*	LC	Indigenous
Aizoaceae	*Titanopsis calcarea*	LC	Indigenous; Endemic
Pottiaceae	*Tortula atrovirens*		Indigenous
Asphodelaceae	*Trachyandra karrooica*	LC	Indigenous
Poaceae	*Tragus berteronianus*	LC	Indigenous
Poaceae	*Tragus racemosus*	LC	Indigenous
Aizoaceae	*Trianthema parvifolia var. parvifolia*	LC	Indigenous
Zygophyllaceae	*Tribulus cristatus*	LC	Indigenous
Zygophyllaceae	*Tribulus terrestris*	LC	Indigenous
Poaceae	*Triraphis purpurea*	LC	Indigenous
Iridaceae	*Tritonia karooica*	LC	Indigenous; Endemic
Asteraceae	*Troglophyton capillaceum subsp. capillaceum*	LC	Indigenous
Asteraceae	*Ursinia nana subsp. nana*	LC	Indigenous
Vahliaceae	*Vahlia capensis subsp. vulgaris*	NE	Indigenous
Fabaceae	*Wiborgia monoptera*	LC	Indigenous; Endemic
Fabaceae	*Xerocladia viridiramis*	LC	Indigenous
Scrophulariaceae	*Zaluzianskya diandra*	LC	Indigenous
Rhamnaceae	*Ziziphus mucronata subsp. mucronata*	LC	Indigenous
Zygophyllaceae	*Zygophyllum sp.*		

11.2 Appendix B – Amphibian species expected to occur in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Amietia delalandii	Delalande's River Frog	LC	Unlisted
Amietia fuscigula	Cape River Frog	LC	LC
Amietia poyntoni	Poynton's River Frog	LC	LC
Breviceps adspersus	Bushveld Rain Frog	LC	LC
Cacosternum boettgeri	Common Caco	LC	LC
Kassina senegalensis	Bubbling Kassina	LC	LC
Poyntonophrynus vertebralis	Southern Pygmy Toad	LC	LC
Pyxicephalus adspersus	Giant Bullfrog	NT	LC
Sclerophrys capensis	Raucous Toad	LC	LC
Sclerophrys gutturalis	Guttural Toad	LC	LC
Sclerophrys poweri	Power's Toad	LC	LC
Tomopterna cryptotis	Tremelo Sand Frog	LC	LC
Tomopterna tandyi	Tandy's Sand Frog	LC	LC
Vandijkophrynus gariepensis gariepensis	Karoo Toad	Not listed	Not listed
Xenopus laevis	Common Platanna	LC	LC

11.3 Appendix C – Reptile species expected to occur in the project area

Scientific name	Common name	Red list category	Number of QDSs
Agamidae	*Agama aculeata aculeata*	Common Ground Agama	Least Concern (SARCA 2014)
Colubridae	*Dipsina multimaculata*	Dwarf Beaked Snake	Least Concern (SARCA 2014)
Gekkonidae	*Chondrodactylus angulifer angulifer*	Common Giant Ground Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Chondrodactylus bibronii*	Bibron's Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Pachydactylus latirostris*	Quartz Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Ptenopus garrulus maculatus*	Spotted Barking Gecko	Least Concern (SARCA 2014)
Lacertidae	*Pedioplanis sp.*		
Lacertidae	*Pedioplanis namaquensis*	Namaqua Sand Lizard	Least Concern (SARCA 2014)
Lamprophiidae	*Boaedon capensis*	Brown House Snake	Least Concern (SARCA 2014)
Testudinidae	*Psammobates tentorius verroxii*	Verrox's Tent Tortoise	
Testudinidae	*Stigmochelys pardalis*	Leopard Tortoise	Least Concern (SARCA 2014)

11.4 Appendix D – Mammal species expected to occur within the project area

Family	Scientific name	Common Name	Conservation Status	
			Regional (SANBI, 2016)	IUCN (2021)
Canidae	*Otocyon megalotis*	Bat-eared Fox	LC	LC
Felidae	*Felis nigripes*	Black-footed Cat	VU	VU
Leporidae	*Lepus capensis*	Cape Hare	LC	LC
Muridae	*Gerbilliscus sp.*	Gerbils		
Muridae	*Mus (Nannomys) minutoides*	Southern African Pygmy Mouse	LC	LC
Mustelidae	*Mellivora capensis*	Honey Badger	LC	LC

11.5 Appendix E - Avifauna Species expected to occur within the project area

Common_group	Common_species	*Genus*	*Species*
	Bokmakierie	*Telophorus*	*zeylonus*
	Secretarybird	*Sagittarius*	*serpentarius*
Barbet	Acacia Pied	*Tricholaema*	*leucomelas*
Bunting	Lark-like	*Emberiza*	*impetuani*
Bustard	Ludwig's	*Neotis*	*ludwigii*
Buzzard	Jackal	*Buteo*	*rufofuscus*
Canary	Black-headed	*Serinus*	*alario*
Canary	Black-throated	*Crithagra*	*atrogularis*
Canary	White-throated	*Crithagra*	*albogularis*
Canary	Yellow	*Crithagra*	*flaviventris*
Chat	Ant-eating	*Myrmecocichla*	*formicivora*
Chat	Familiar	*Oenanthe*	*familiaris*
Cisticola	Desert	*Cisticola*	*aridulus*
Crombec	Long-billed	*Sylvietta*	*rufescens*
Crow	Pied	*Corvus*	*albus*
Dove	Cape Turtle	*Streptopelia*	*capicola*
Dove	Namaqua	*Oena*	*capensis*
Eagle	Black-chested Snake	*Circaetus*	*pectoralis*
Eagle-Owl	Spotted	*Bubo*	*africanus*
Eremomela	Yellow-bellied	*Eremomela*	*icteropygialis*
Falcon	Lanner	*Falco*	*biarmicus*
Falcon	Pygmy	*Polihierax*	*semitorquatus*
Finch	Red-headed	*Amadina*	*erythrocephala*
Fiscal	Southern	*Lanius*	*collaris*
Flycatcher	Chat	*Melaenornis*	*infuscatus*
Flycatcher	Fiscal	*Melaenornis*	*silens*
Goose	Egyptian	*Alopochen*	*aegyptiaca*
Goshawk	Pale Chanting	*Melierax*	*canorus*
Guineafowl	Helmeted	*Numida*	*meleagris*
Ibis	Hadada	*Bostrychia*	*hagedash*
Kestrel	Greater	*Falco*	*rupicoloides*
Kestrel	Lesser	*Falco*	*naumanni*
Kestrel	Rock	*Falco*	*rupicolus*
Kite	Black-winged	*Elanus*	*caeruleus*
Korhaan	Karoo	*Eupodotis*	*vigorsii*
Korhaan	Northern Black	*Afrotis*	*afraoides*
Lapwing	Blacksmith	*Vanellus*	*armatus*
Lark	Eastern Clapper	*Mirafra*	*fasciolata*
Lark	Large-billed	*Galerida*	*magnirostris*
Lark	Red-capped	*Calandrella*	*cinerea*

Lark	Sabota	*Calendulauda*	*sabota*
Lark	Sclater's	*Spizocorys*	*sclateri*
Lark	Spike-heeled	*Chersomanes*	*albofasciata*
Martin	Rock	*Ptyonoprogne*	*fuligula*
Ostrich	Common	*Struthio*	*camelus*
Pigeon	Speckled	*Columba*	*guinea*
Pipit	Buffy	*Anthus*	*vaalensis*
Prinia	Black-chested	*Prinia*	*flavicans*
Quelea	Red-billed	*Quelea*	*quelea*
Scrub Robin	Kalahari	*Cercotrichas*	*paena*
Scrub Robin	Karoo	*Cercotrichas*	*coryphoeus*
Shelduck	South African	*Tadorna*	*cana*
Sparrow	Cape	*Passer*	*melanurus*
Sparrow	House	*Passer*	*domesticus*
Sparrow-Lark	Grey-backed	*Eremopterix*	*verticalis*
Stilt	Black-winged	*Himantopus*	*himantopus*
Swallow	Barn	*Hirundo*	*rustica*
Swallow	Greater Striped	*Cecropis*	*cucullata*
Swift	Little	*Apus*	*affinis*
Thick-knee	Spotted	*Burhinus*	*capensis*
Tit	Cape Penduline	*Anthoscopus*	*minutus*
Wagtail	Cape	*Motacilla*	*capensis*
Warbler	Rufous-eared	*Malcorus*	*pectoralis*
Weaver	Scaly-feathered	*Sporopipes*	*squamifrons*
Weaver	Sociable	*Philetairus*	*socius*
Weaver	Southern Masked	*Ploceus*	*velatus*
Wheatear	Capped	*Oenanthe*	*pileata*

Common_group	Common_species	*Genus*	*Species*
	Bokmakierie	*Telophorus*	*zeylonus*
Barbet	Acacia Pied	*Tricholaema*	*leucomelas*
Barbet	Crested	*Trachyphonus*	*vaillantii*
Batis	Pririt	*Batis*	*pririt*
Bulbul	African Red-eyed	*Pycnonotus*	*nigricans*
Bunting	Lark-like	*Emberiza*	*impetuani*
Bustard	Kori	*Ardeotis*	*kori*
Buzzard	Common	*Buteo*	*buteo*
Buzzard	Jackal	*Buteo*	*rufofuscus*
Canary	Black-headed	*Serinus*	*alario*
Canary	Black-throated	*Crithagra*	*atrogularis*
Canary	White-throated	*Crithagra*	*albogularis*
Canary	Yellow	*Crithagra*	*flaviventris*

Chat	Ant-eating	*Myrmecocichla*	*formicivora*
Chat	Familiar	*Oenanthe*	*familiaris*
Chat	Sickle-winged	*Emarginata*	*sinuata*
Cisticola	Desert	*Cisticola*	*aridulus*
Cisticola	Grey-backed	*Cisticola*	*subruficapilla*
Courser	Double-banded	*Rhinoptilus*	*africanus*
Crombec	Long-billed	*Sylvietta*	*rufescens*
Crow	Pied	*Corvus*	*albus*
Cuckoo	Diederik	*Chrysococcyx*	*caprius*
Dove	Cape Turtle	*Streptopelia*	*capicola*
Dove	Laughing	*Spilopelia*	*senegalensis*
Dove	Namaqua	*Oena*	*capensis*
Dove	Red-eyed	*Streptopelia*	*semitorquata*
Dove	Rock	*Columba*	*livia*
Eagle	Black-chested Snake	*Circaetus*	*pectoralis*
Eagle	Booted	*Hieraaetus*	*pennatus*
Eagle	Verreaux's	*Aquila*	*verreauxii*
Eagle-Owl	Spotted	*Bubo*	*africanus*
Eremomela	Yellow-bellied	*Eremomela*	*icteropygialis*
Falcon	Pygmy	*Polihierax*	*semitorquatus*
Finch	Red-headed	*Amadina*	*erythrocephala*
Fiscal	Southern	*Lanius*	*collaris*
Flycatcher	Chat	*Melaenornis*	*infuscatus*
Flycatcher	Fiscal	*Melaenornis*	*silens*
Flycatcher	Spotted	*Muscicapa*	*striata*
Goose	Egyptian	*Alopochen*	*aegyptiaca*
Goshawk	Pale Chanting	*Melierax*	*canorus*
Guineafowl	Helmeted	*Numida*	*meleagris*
Hoopoe	African	*Upupa*	*africana*
Kestrel	Greater	*Falco*	*rupicoloides*
Kestrel	Rock	*Falco*	*rupicolus*
Korhaan	Karoo	*Eupodotis*	*vigorsii*
Korhaan	Northern Black	*Afrotis*	*afraoides*
Lapwing	Crowned	*Vanellus*	*coronatus*
Lark	Eastern Clapper	*Mirafra*	*fasciolata*
Lark	Fawn-colored	*Calendulauda*	*africanoides*
Lark	Karoo Long-billed	*Certhilauda*	*subcoronata*
Lark	Large-billed	*Galerida*	*magnirostris*
Lark	Sabota	*Calendulauda*	*sabota*
Lark	Sclater's	*Spizocorys*	*sclateri*
Lark	Spike-heeled	*Chersomanes*	*albofasciata*
Lark	Stark's	*Spizocorys*	*starki*

Martin	Rock	*Ptyonoprogne*	*fuligula*
Mousebird	Red-faced	*Urocolius*	*indicus*
Mousebird	White-backed	*Colius*	*colius*
Nightjar	Rufous-cheeked	*Caprimulgus*	*rufigena*
Owl	Western Barn	*Tyto*	*alba*
Pigeon	Speckled	*Columba*	*guinea*
Pipit	African	*Anthus*	*cinnamomeus*
Plover	Three-banded	*Charadrius*	*tricollaris*
Prinia	Black-chested	*Prinia*	*flavicans*
Quelea	Red-billed	*Quelea*	*quelea*
Robin-Chat	Cape	*Cossypha*	*caffra*
Sandgrouse	Namaqua	*Pterocles*	*namaqua*
Scrub Robin	Kalahari	*Cercotrichas*	*paena*
Scrub Robin	Karoo	*Cercotrichas*	*coryphoeus*
Shrike	Lesser Grey	*Lanius*	*minor*
Sparrow	Cape	*Passer*	*melanurus*
Sparrow	House	*Passer*	*domesticus*
Sparrow	Southern Grey-headed	*Passer*	*diffusus*
Sparrow-Lark	Black-eared	*Eremopterix*	*australis*
Sparrow-Lark	Grey-backed	*Eremopterix*	*verticalis*
Sparrow-Weaver	White-browed	*Plocepasser*	*mahali*
Starling	Pale-winged	*Onychognathus*	*nabouroup*
Sunbird	Dusky	*Cinnyris*	*fuscus*
Sunbird	White-bellied	*Cinnyris*	*talatala*
Swallow	Barn	*Hirundo*	*rustica*
Swallow	Greater Striped	*Cecropis*	*cucullata*
Swift	African Palm	*Cypsiurus*	*parvus*
Swift	Bradfield's	*Apus*	*bradfieldi*
Swift	Common	*Apus*	*apus*
Swift	Little	*Apus*	*affinis*
Swift	White-rumped	*Apus*	*caffer*
Thick-knee	Spotted	*Burhinus*	*capensis*
Thrush	Karoo	*Turdus*	*smithi*
Tit	Cape Penduline	*Anthoscopus*	*minutus*
Wagtail	Cape	*Motacilla*	*capensis*
Warbler	Chestnut-vented	*Curruca*	*subcoerulea*
Warbler	Rufous-eared	*Malcorus*	*pectoralis*
Weaver	Sociable	*Philetairus*	*socius*
Wheatear	Capped	*Oenanthe*	*pileata*
Wheatear	Mountain	*Myrmecocichla*	*monticola*
White-eye	Cape	*Zosterops*	*virens*
White-eye	Orange River	*Zosterops*	*pallidus*

11.6 Appendix F – Specialist Declarations

DECLARATION

I, Rudolph Greffrath, 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.

Rudolph Greffrath

Terrestrial Ecologist

The Biodiversity Company

January 2022

DECLARATION

I, Andrew Husted, declare that:

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

Andrew Husted

Terrestrial Ecologist

The Biodiversity Company

January 2022