Proposed Development of the Karusa Battery Energy Storage System (BESS) and associated Infrastructure – Terrestrial & Freshwater Assessment

Sutherland, Northern Cape, South Africa

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CLIENT

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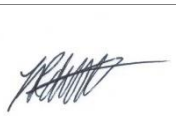
Report Name	**Proposed Development of the Karusa Battery Energy Storage System (BESS) and associated Infrastructure – Terrestrial & Freshwater Assessment**
Reference	**Karusa BESS**
Submitted to	savannah environmental
Report Writer	Leigh-Ann de Wet  Ms Leigh-Ann de Wet is Pr. Nat. Sci. registered (400233/12) and has extensive experience in assessing terrestrial biodiversity. She obtained her MSc in Botany from Rhodes University and is currently a PhD candidate at the University of KwaZulu-Natal studying forest ecosystems in coastal KZN. She has over 12 years' experience conducting terrestrial biodiversity assessments (including both flora and fauna as well as specialist avifauna) throughout Southern Africa, West and Central Africa and Madagascar. She has experience in all 9 provinces of South Africa with a particular interest in KZN flora, and avifauna.
Report Write / 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.

List of Abbreviations

BI	Biodiversity Importance
BSP	Biodiversity Spatial Plan
CBA	Critical Biodiversity Area
CI	Conservation Importance
CR	Critically Endangered
EN	Endangered
ESA	Ecological Support Area
FI	Functional Integrity
HGM	Hydro-geomorphic
IBA	Important Bird and Biodiversity Areas
IUCN	International Union for Conservation of Nature
LC	Least Concern
MASL	Metres Above Sea Level
MP	Moderately Protected
NBA	National Biodiversity Assessment
NEMBA	National Environmental Management Biodiversity Act
NFEPA	National Freshwater Ecosystem Priority Area
NP	Not Protected
NPAES	National Protected Areas Expansion Strategy
NT	Near Threatened
PES-EIES	Present Ecological State – Ecological Importance and Ecological Sensitivity
POSA	Plants of Southern Africa
PP	Poorly Protected
SABAP2	Southern African Bird Atlas Project 2
SACAD	South Africa Conservation Areas Database
SAIIAE	South African Inventory of Inland Aquatic Ecosystems
SAPAD	South Africa Protected Areas Database
SCC	Species of Conservation
SEI	Site Ecological Importance
SWSA	Strategic Water Source Area
VU	Vulnerable
WP	Well Protected

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1 Introduction

1.1 Background

Enel Green Power South Africa (Pty) Ltd proposes the construction and operation of a Battery Energy Storage System (BESS) and associated grid infrastructure ~45 km south of the town of Sutherland along the R354 and 47km north west of the town of Laingsburg along the R323 in the Northern Cape Province. The project will be located on Farm De Hoop 202 within the Karoo Hoogland Local Municipality which lies within the jurisdiction of the Namakwa District Municipality. The BESS will store and supply dispatchable energy as and when required by the off-taker.

The proposed project will include the following infrastructure:

- A BESS with a capacity of up to 2 000 MWh, inside containers with a footprint of up to 6ha in extent and a maximum height of 3m. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation;
- Access roads to the BESS (10m in width, approximately 70m long) branching off of the existing roads, and internal roads (up to 8m wide) to be located within the total BESS footprint area;
- 33kV MV cabling between the BESS and the MV/HV substation and up to 132kV HV cabling to the HV substation;
- Fencing around the BESS for increased security measures;
- Up to 132kV overhead or underground power line to be connected to the existing Hidden Valley Substation;
- Temporary laydown area to be located within the BESS footprint;
- Firebreak to be located within the BESS footprint; and
- A Substation with a maximum height of - HV bus-bar up to10 m max and an HV Building up to 4 m max

The general purpose and utilisation of a BESS is to save and store electricity from the network, allowing for a timed release of electricity to the grid as and when the capacity is required by the off-taker. BESS systems therefore provide flexibility in the efficient operation of the electricity grid through decoupling of the energy supply and demand. The following is being considered within the Basic Assessment process for this project:

- Buffer around the BESS site of 200m;
- Power line corridor (100m) with 50m either side of centre line; and
- Buffer around Hidden Valley Substation of 200m.

The Environmental Assessment Practitioner (EAP), has been appointed to undertake various environmental assessments required for the proposed developments. The Biodiversity Company was contracted to undertake specialist studies required to inform on the environmental assessments. This report is a component of the specialist assessments and comprises the Terrestrial (Fauna and Flora), Avifauna, and Freshwater Biodiversity Assessment which is a requirement of the environmental authorization.

The National Web based Environmental Screening Tool has characterised the Terrestrial Biodiversity Combined Sensitivity of the project area as “Very High”. Accordingly, 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) and GN 1150 (30 October 2020): “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation” (Reporting Criteria). See Appendix A for the protocol checklist and where they can be found within the report.

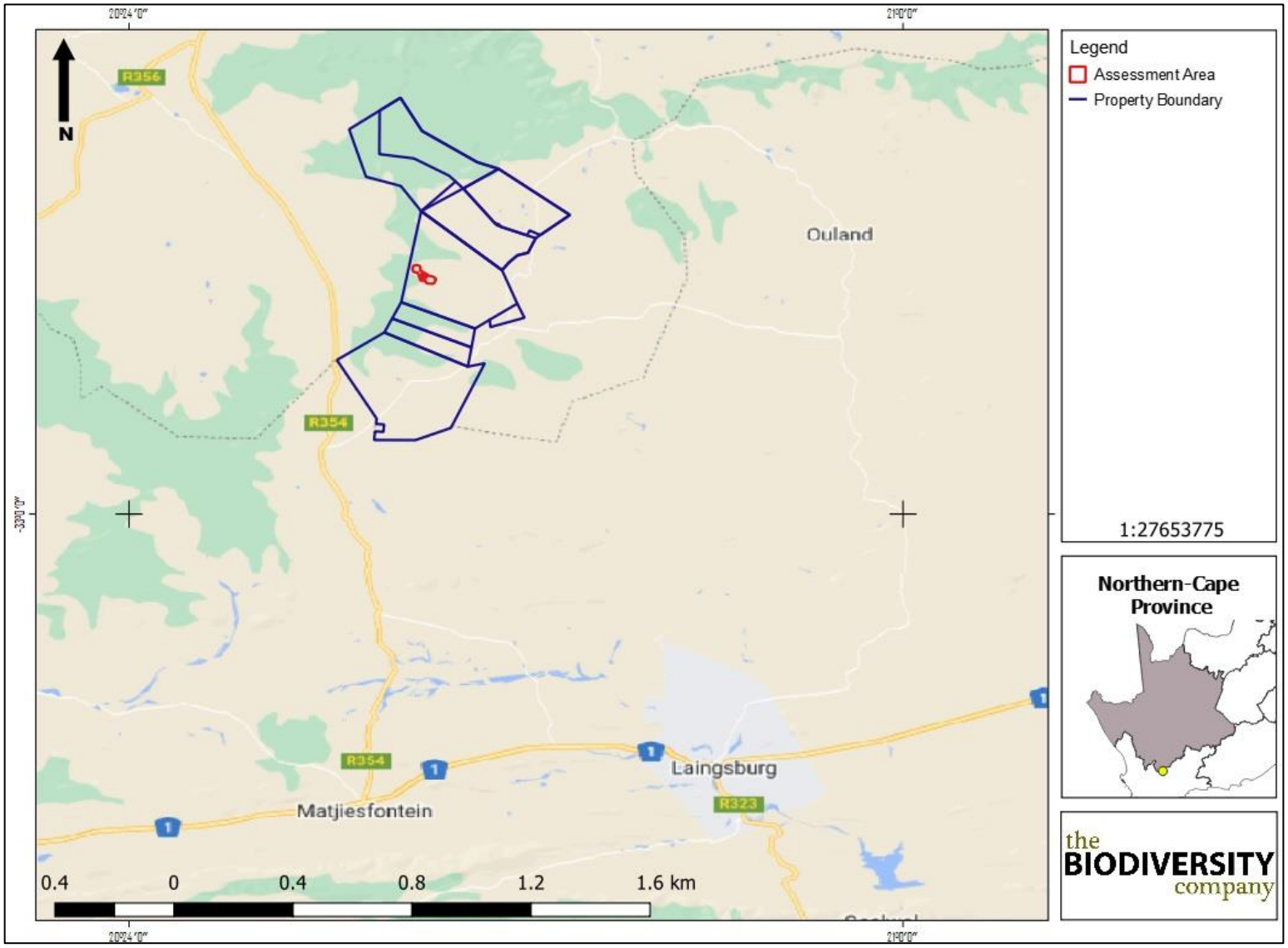


Figure 1-1 Map illustrating the location of the project area

1.2 Scope of Work

The aim of the biodiversity assessment was to provide information to guide the risk of the proposed activity to the current state of the associated ecosystems within the development area. This was achieved through the following:

- Desktop assessment to identify the ecologically important features within the landscape comprising of terrestrial & freshwater features;
- Desktop assessment to identify possible Species of Conservation Concern (SCC) that occur within the landscape;
- Field survey to record flora and fauna (including avifauna) species, especially Species of Conservation Concern (SCC);
- The delineation and characterisation of freshwater systems;
- Determination of the Site Ecological Importance (SEI), also commonly referred to as sensitivity;
- A biodiversity & freshwater risk assessment; and
- The prescription of mitigation measures for identified risks, including assigning buffer areas, were necessary.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The GPS used for the assessment is accurate to 5 metres and therefore any spatial features may be offset by this distance;
- The buffer areas defined by the client were designated as the Project Area of Influence (PAOI);
- The fieldwork component of the assessment comprised of one dry-season survey. The survey was conducted over two days (the 1st and 2nd of March 2022). Therefore, the probability of detection of certain faunal species will be lowered as certain species or groups of fauna are inherently secretive and require extensive sampling periods. Wet season flowering flora (particularly geophytes, which require an inflorescence for identification) may have been missed. It is assumed that some species likely to occur include those occurring within the footprint of the existing wind energy facility, which were rescued prior to construction of the facility (Colloty 2019). However, this cannot be stated with certainty, a site visit during the flowering time is required to confirm SCC for permitting purposes. A second site visit is not required for EIA submission.

1.4 Key Legislative Requirements

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

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

Region	Legislation
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 2006)
	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)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24 , No 42946 (January 2020)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24 , No 43110 (March 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations
	National Protected Areas Expansion Strategy (NPAES)
	Environmental Conservation Act (Act No. 73 of 1983)
	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 Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	National Heritage Resources Act, 1999 (Act 25 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations, 2014
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
Provincial	Northern Cape Nature Conservation act no. 9 of 2009
	Northern Cape Planning and Development Act no. 7 of 1998

2 Methods

2.1 Desktop Assessment

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

2.1.1 Ecologically Important Landscape Features

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

- National Biodiversity Assessment 2018 (Skowno *et al*, 2019) - The purpose of the National Biodiversity Assessment (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. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems.
- Protected areas:
    - South Africa Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) (DEA, 2021) – The South African Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) 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. The database 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 National Protected Area Expansion Strategy (NPAES) provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and are therefore, of high importance for biodiversity, climate resilience and freshwater protection.
- Northern Cape Critical Biodiversity Areas (2016): 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 (2008); and
    - Cape Fine-Scale Plan (only the extent of the areas in the Northern Cape i.e. Bokkeveld and Nieuwoudtville) (2008).

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

- Hydrological Setting:

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

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

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

2.1.2 Desktop Flora Assessment

The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) was used in order 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 proposed development area and surrounding landscape (Figure 2-1). The Red List of South African Plants

(Raimondo *et al.*, 2009; SANBI, 2020) was utilized to provide the most current national conservation status of flora species.

Previous reports for the site used to augment floral data included Colloty (2019) search and rescue documentation.

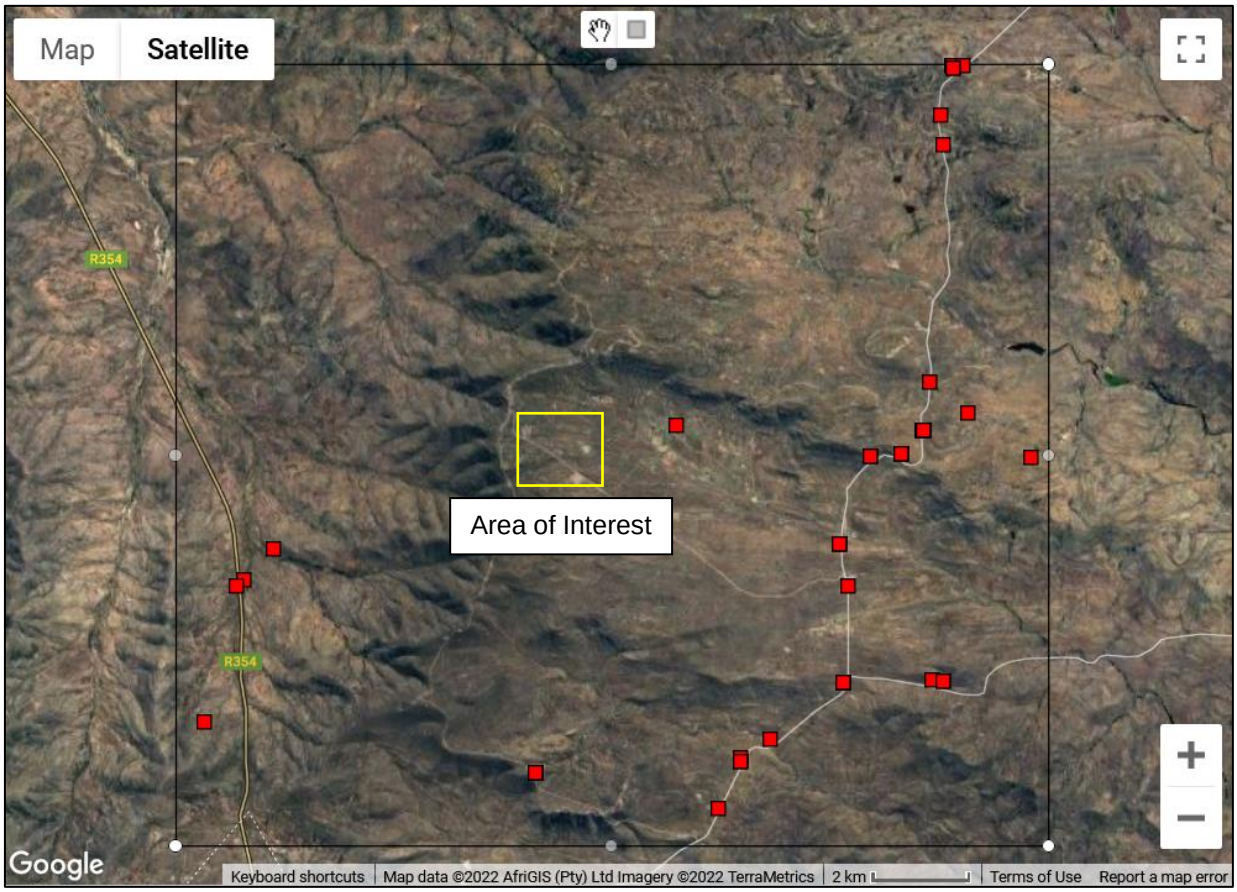


Figure 2-1 Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database

2.1.3 Desktop Faunal Assessment

The faunal desktop assessment comprised of the following:

- Compiling an expected amphibian list generated from the IUCN spatial dataset (2017) and the FrogMap database of the Animal Demography Unit (http://vmus.adu.org.za/) using the 3220DC quarter degree square;
- Compiling an expected reptile list generated from the IUCN spatial dataset (2017) and the ReptileMap database of the Animal Demography Unit (http://vmus.adu.org.za/) using the 3220DC quarter degree square;
- Compiling an expected avifauna list from the Southern African Bird Atlas Project 2 (SABAP2) using the 3245_2035 pentad; and
- Compiling an expected amphibian list generated from the IUCN spatial dataset (2017) and the MammalMap database of the Animal Demography Unit (http://vmus.adu.org.za/) using the 3220DC quarter degree square.

2.2 Field Assessment

One field survey was undertaken to confirm the presence of SCC, as well as any sensitive habitat features. Table 2-1 summarises the timing and period of the surveys undertaken

Table 2-1 Summary of surveys undertaken for the biodiversity assessment

Survey Number	Season	Date/s	Comments
1	Dry (Summer)	28 February – 3 March 2022	Survey to determine the presence of flora and fauna of the site, as well as likelihood of occurrence within the PAOI as well as the footprint of the proposed development. Vegetation and habitat units were also identified. This included the identification and characterisation of freshwater systems and habitats, where present.

Effort was made to cover all the different habitat types within the limits of time and access. During the survey, notes were made regarding current impacts, recording of dominant vegetation species and any sensitive or important features (e.g., drainage lines, rock outcrops, termite mounds etc.). Data was augmented using provided studies done in the past for the Wind Energy Facility including the search and rescue methodology and reports (Colloty 2019).

2.2.1 Flora Assessment

The flora assessment consisted of timed meanders of the survey area. This primarily involved meandering through habitat types and identifying all species observed and particularly locating any species of conservation concern.

Relevant field guides and texts consulted for identification purposes included, but was not limited, to the following:

- Identification Guide to Southern African Grasses: An Identification Manual with Keys, Descriptions, and Distributions (Fish *et al*, 2015);
- Karoo: South African Wild Flower Guide 6. (Shearing 2008);
- Problem Plants and Alien Weeds of South Africa (Bromilow, 2018);
- Field Guide to Succulents in Southern Africa (Smith *et al*, 2017);
- Field Guide to Wildflowers of South Africa (Manning, 2009); and
- iNaturalist. Available at https://www.inaturalist.org/home (the project specific data can be found at https://www.inaturalist.org/projects/karusa)

2.2.2 Faunal Assessment

The faunal assessment within this report pertains to herpetofauna, avifauna and mammals. The faunal field survey comprised of the following active and passive techniques:

- Visual and auditory searches - This typically comprised of meandering and using binoculars to view species from a distance without them being disturbed as well as listening to species calls or locating tracks and scat;
- Active hand-searches - are used for species that shelter in or under particular micro-habitats (typically under rocks, rocky crevices, coarse woody debris, etc.);

Diagnostic features of the individuals that were captured were photographed at site and released. The location of the site assessment meanders are illustrated in Figure 2-2 and Figure 2-3.

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);
- Roberts Bird Guide; A comprehensive field guide to over 950 bird species in southern Africa 1st Edition (Chittenden, 2007);
- Roberts Birds of Southern Africa mobile app;
- Stuarts' Field Guide to Mammals of Southern Africa including Angola, Zambia & Malawi (Stuart and Stuart, 2015); and
- A Field Guide to the Tracks and Signs of Southern and East African Wildlife (Stuart and Stuart, 2000).

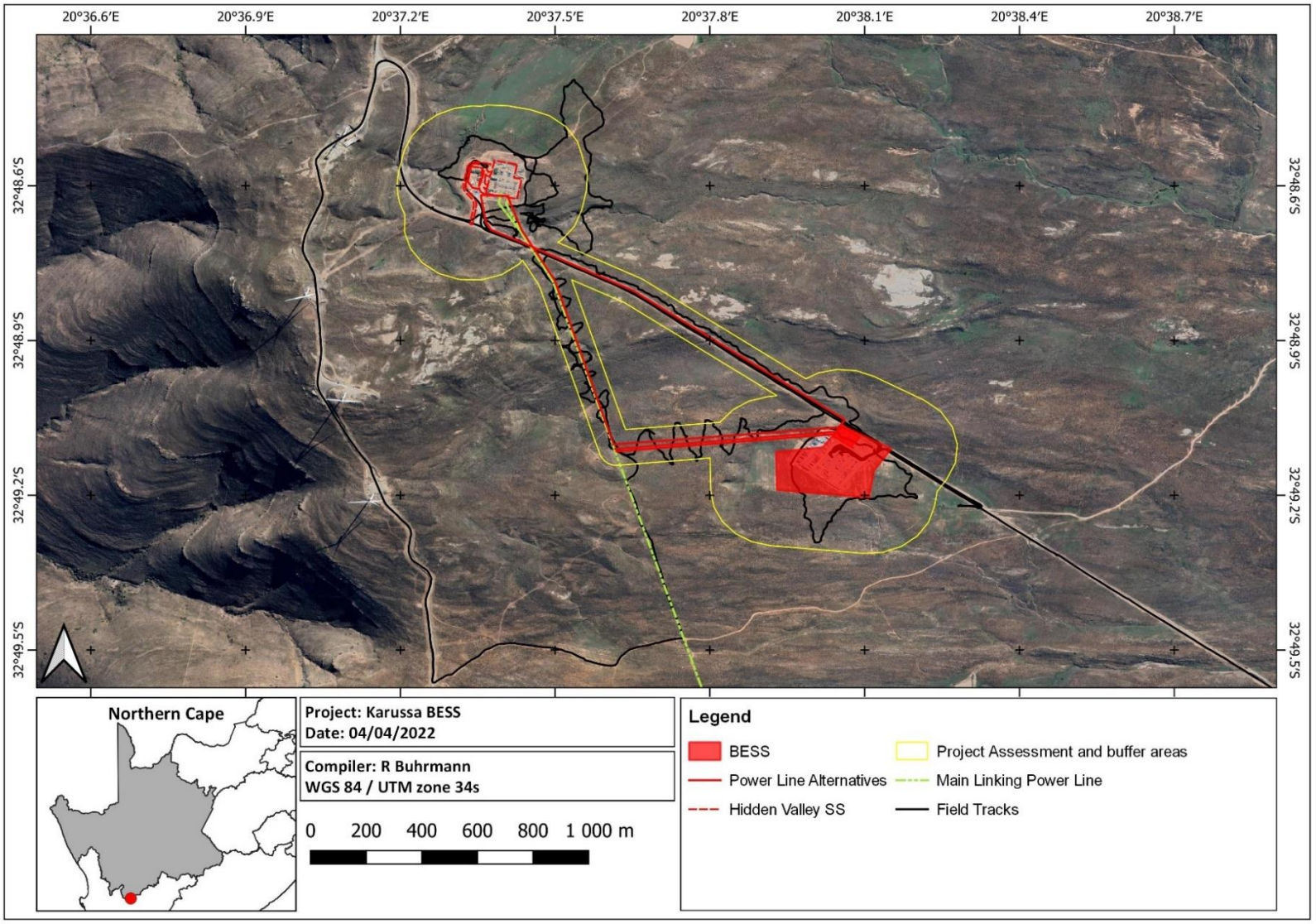


Figure 2-2 Map illustrating the location of the meanders utilised for the biodiversity impact assessment

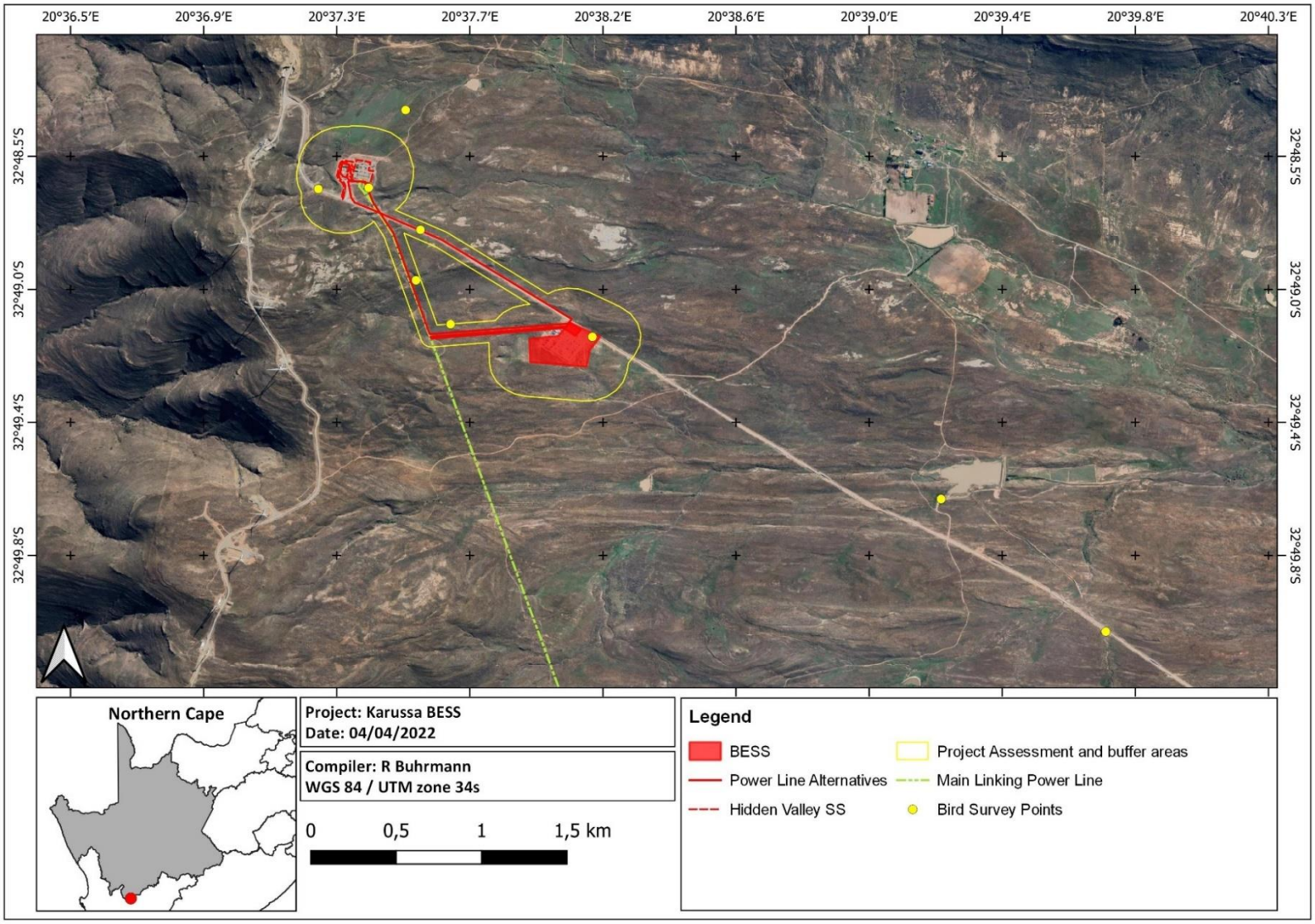


Figure 2-3 Map illustrating the location of the avifauna survey points utilised for the biodiversity impact assessment

2.2.3 Wetland Assessment

2.2.3.1 Wetland Identification and Mapping

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

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

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

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

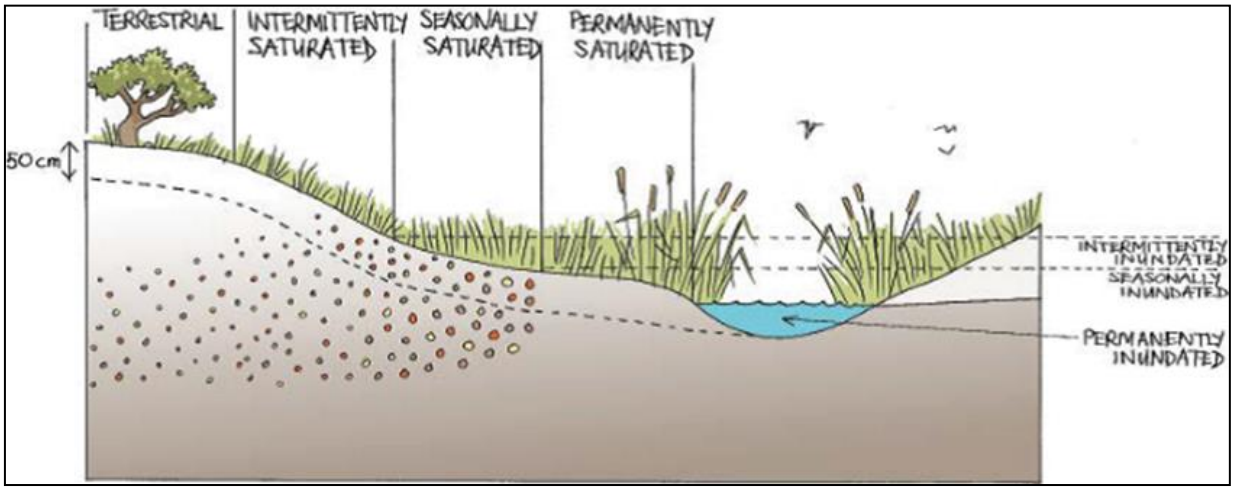


Figure 2-4 Cross section through a wetland, indicating how the soil wetness and vegetation indicators change (Ollis et al., 2013).

2.2.3.2 Functional Assessment

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

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

Table 2-2 Classes for determining the likely extent to which a benefit is being supplied

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

2.2.3.3 Present Ecological Status

The overall approach is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a Present Ecological Status (PES) score. This takes the form of assessing the spatial extent of impact of individual activities/occurrences and then separately assessing the intensity of impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact. The Present State categories are provided in Table 2-3.

Table 2-3 The Present Ecological Status categories (Macfarlane et al., 2009)

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

2.2.3.4 Ecological Importance and Sensitivity

The method used for the Importance and Sensitivity (IS) determination was adapted from the method as provided by DWS (1999) for floodplains. The method takes into consideration PES scores obtained for WET-Health as well as function and service provision to enable the assessor to determine the most representative ES category for the wetland feature or group being

assessed. A series of determinants for IS are assessed on a scale of 0 to 4, where 0 indicates no importance and 4 indicates very high importance. The mean of the determinants is used to assign the IS category as listed in Table 2-4 (Rountree and Kotze, 2013).

Table 2-4 Description of Ecological Importance and Sensitivity categories

EIS CATEGORY	RANGE OF MEAN	RECOMMENDED ECOLOGICAL MANAGEMENT CLASS
VERY HIGH	3.1 to 4.0	A
HIGH	2.1 to 3.0	B
MODERATE	1.1 to 2.0	C
LOW MARGINAL	< 1.0	D

2.2.3.5 Determining Buffer Requirements

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

2.2.3.6 Risk Assessment

The risk assessment was conducted in accordance with the DHSWS risk-based water use authorisation approach and delegation guidelines. The significance of the impact is calculated according to Table 2-5.

Table 2-5 Significance ratings matrix

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

2.3 Site Ecological Importance (SEI)

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

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

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows. The criteria for the CI and FI ratings are provided in Table 2-6 and Table 2-7, respectively.

Table 2-6 Summary of Conservation Importance (CI) criteria

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global 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 NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Table 2-7 Summary of Functional Integrity (FI) criteria

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

	used road network between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very Low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

BI can be derived from a simple matrix of CI and FI as provided in Table 2-8

Table 2-8 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

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

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor as summarised in Table 2-9.

Table 2-9 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 remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of 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 remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of 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 remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of 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 remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of 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 remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 2-10.

Table 2-10 Matrix used to derive Site Ecological Importance (SEI) from Receptor Resilience (RR) and Biodiversity Importance (BI)

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

Interpretation of the SEI in the context of the proposed development activities is provided in Table 2-11.

Table 2-11 Guidelines for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities

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

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

3 Results & Discussion

3.1 Desktop Assessment

3.1.1 Ecologically Important Landscape Features

The relevance of the proposed development to ecologically important landscape features are summarised in Table 3-1.

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

Desktop Information Considered	Relevant/Irrelevant	Section
Ecosystem Threat Status	Irrelevant – Located within a Least Concern ecosystem	3.1.1.1
Ecosystem Protection Level	Relevant – Located within a Not Protected ecosystem	3.1.1.2
Protected Areas	Irrelevant – Does not overlap, not is it near any Protected Areas	3.1.1.3
National Protected Area Expansion Strategy	Irrelevant – Does not overlap any NPAES areas	3.1.1.3
Important Bird and Biodiversity Areas	Irrelevant – Does not overlap any IBA	-
Critical Biodiversity Area	Relevant – Intersects CBA 1	3.1.1.4
South African Inventory of Inland Aquatic Ecosystems	Relevant - The regulatory area overlaps with depressions classified as LC and Not Protected.	3.1.1.5
Strategic Water Source Areas	Irrelevant – The project area does not occur within a SWSA	3.1.1.5
Freshwater Ecosystem Priority Areas	Relevant – Within 500 m of a wetland (however this wetland was determined to be a rocky outcrop.	3.1.1.5

3.1.1.1 Ecosystem Threat Status

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

3.1.1.2 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. Not Protected, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The proposed development is located within a NP ecosystem (Figure 3-1).

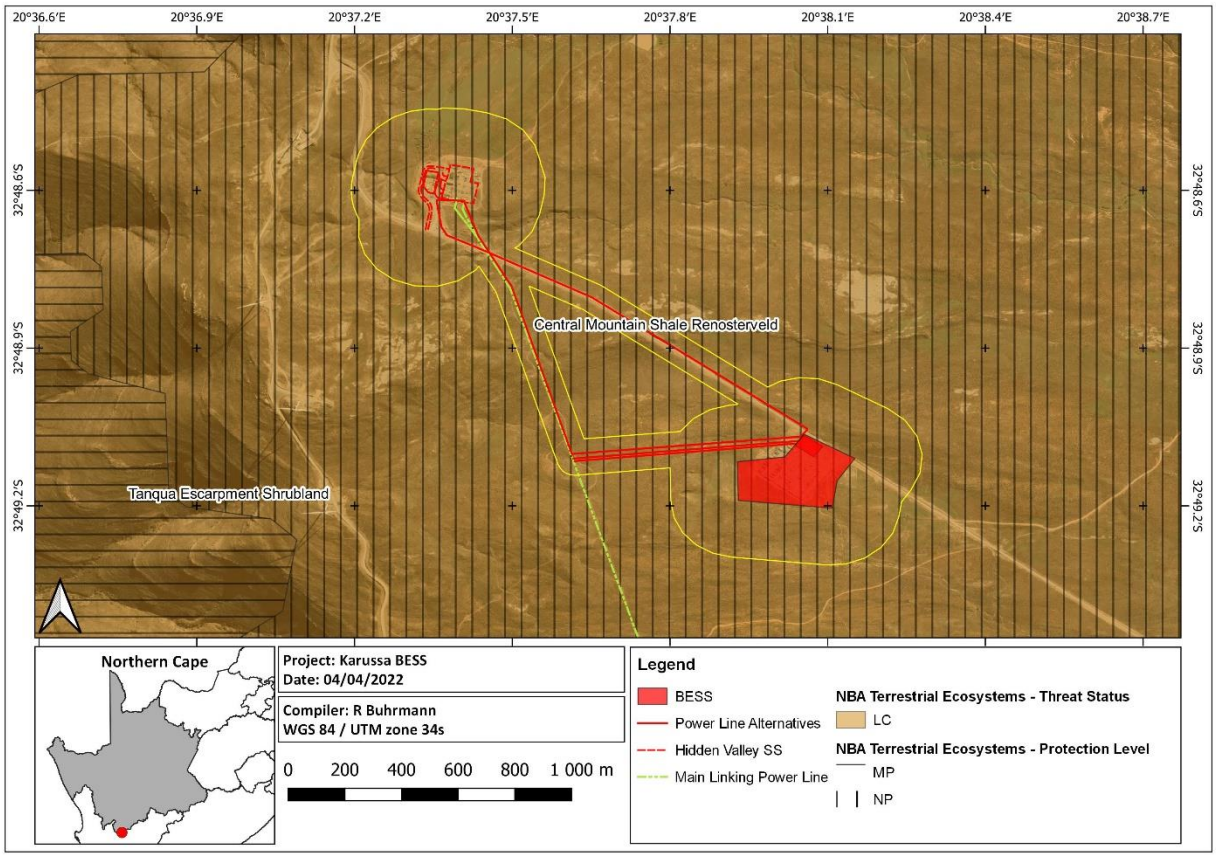


Figure 3-1 Map illustrating the ecosystem threat status and ecosystem protection level associated with the assessment area

3.1.1.3 Protected Areas

According to the protected area spatial datasets from SAPAD (2021), the proposed development does not occur within any protected area (Figure 3-2). The proposed development is not located within any focus area for the National Protected Area Expansion Strategy (NPAES) or IBA nor is there one in the surrounding landscape (Figure 3-2).

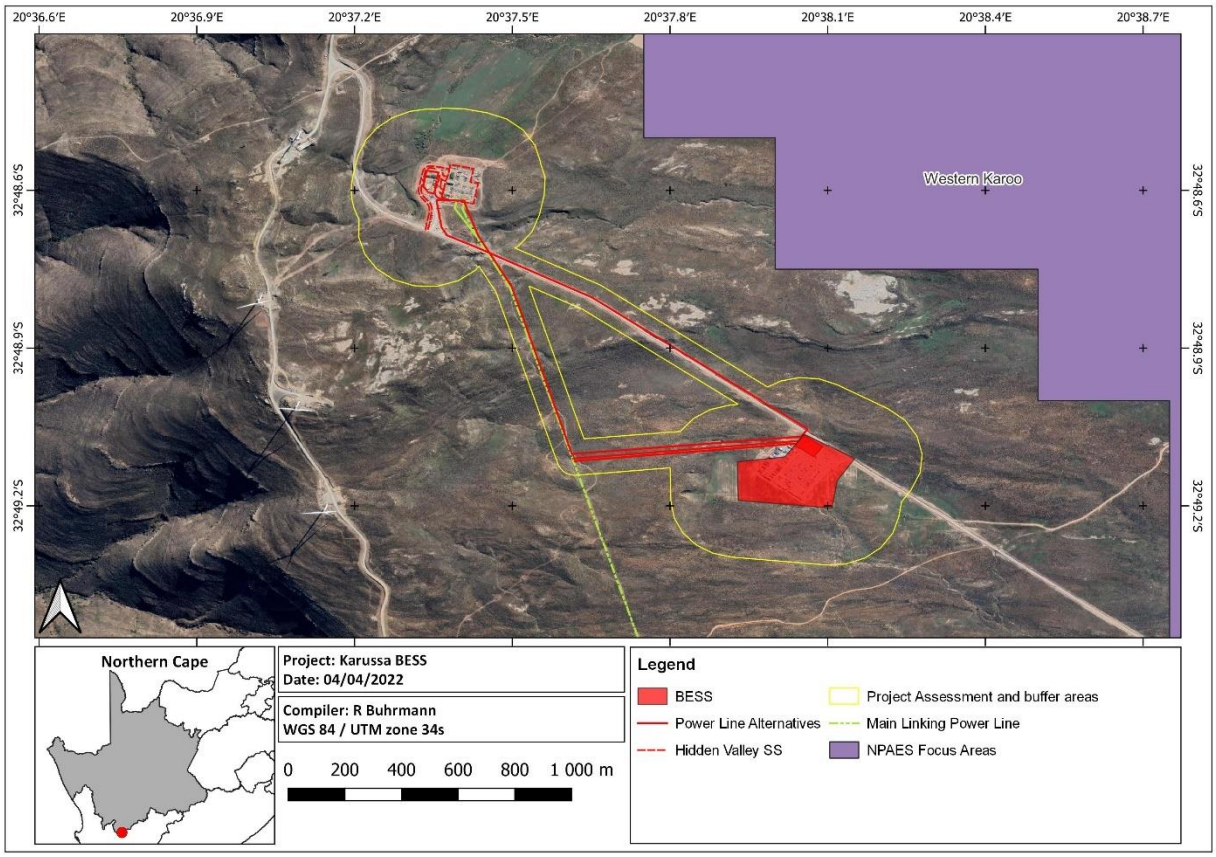


Figure 3-2 Map illustrating the location of protected areas proximal to the assessment area

3.1.1.4 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 (2008); and
- Cape Fine-Scale Plan (only the extent of the areas in the Northern Cape i.e. Bokkeveld and Nieuwoudtville) (2008)..

Figure 5-3 shows the project area superimposed on the Terrestrial CBA map. The project area overlaps with a CBA 1 area, with the buffer of the BESS located in a CBA 2 area.

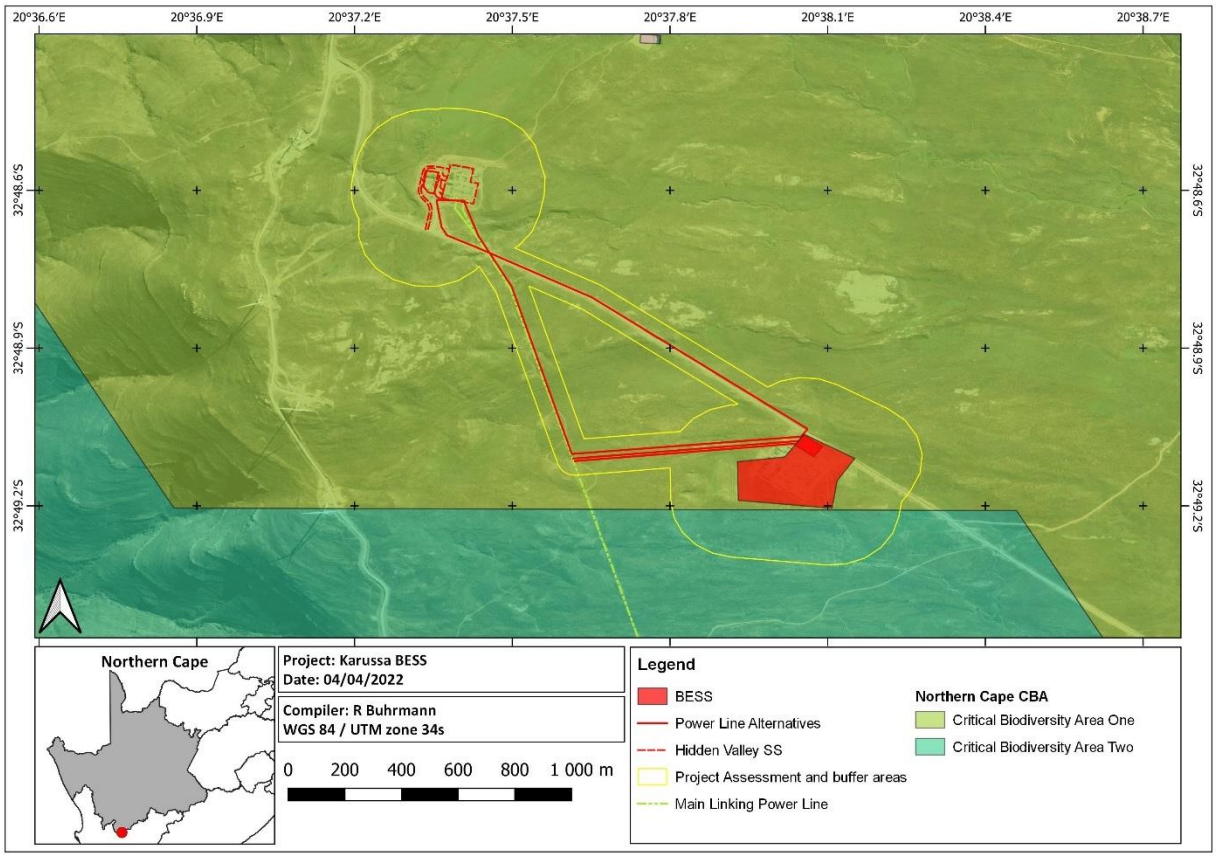


Figure 3-3 Map illustrating the location of Critical Biodiversity Areas proximal to the assessment area

3.1.1.5 Hydrological Setting

The proposed development is not located within a SWSA.

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the National Biodiversity Assessment (NBA) 2018. Ecosystem threat status (ETS) of ecosystem types is 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. Critically Endangered, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer *et al*., 2019; Skowno *et al*., 2019). Three (3) depressions, classified as Least Concern and Not Protected, are located within the regulatory area. These depressions were inspected during the site assessment and confirmed to be rocky areas (Figure 3-5).

The National Freshwater Ecosystem Priority Areas (NFEPAs) (Driver *et al*., 2011) spatial data has been incorporated in the above mentioned SAIIAE spatial data set. They are included here as the database is intended to be conservation support tools and are envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act (NEM:BA) biodiversity goals (Nel *et al.,* 2011). The NFEPA spatial layer indicates that the wetlands do not intersect with a Ramsar site and are not within 500 m of an IUCN threatened frog point locality. A NFEPA wetland within the buffer area of one powerline route option was shown to be a rocky outcrop (Figure 3-4).

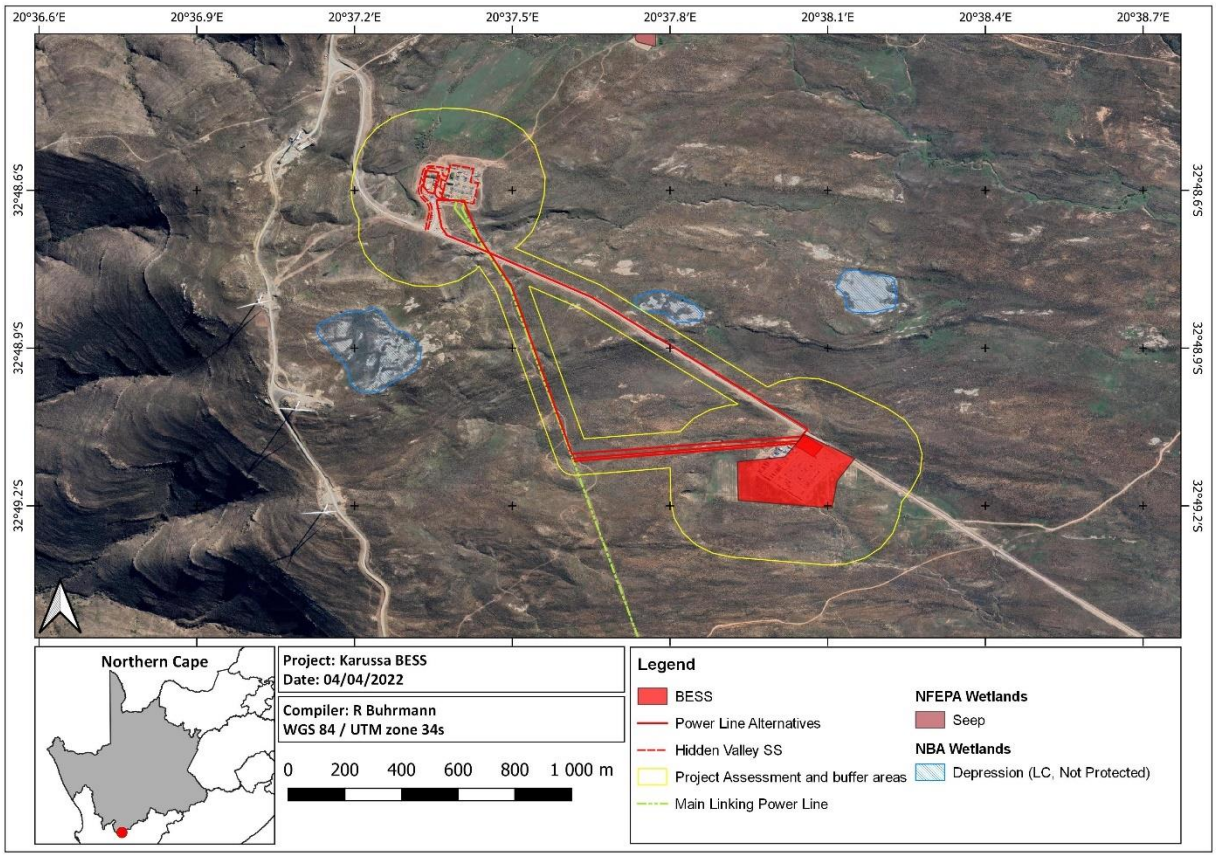


Figure 3-4 Map illustrating the NFEPA wetland and river systems associated with the assessment area

Figure 3-5 Photographs of the areas classified as NWM5 depressions

A review of river lines and water bodies for quarter degree squared (QDS) 3220 indicated the presence of a number of non-perennial watercourses within the regulatory area (Figure 3-6). Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) states a regulated area in the absence of a determined 1 in 100 year flood line or riparian area is the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench.

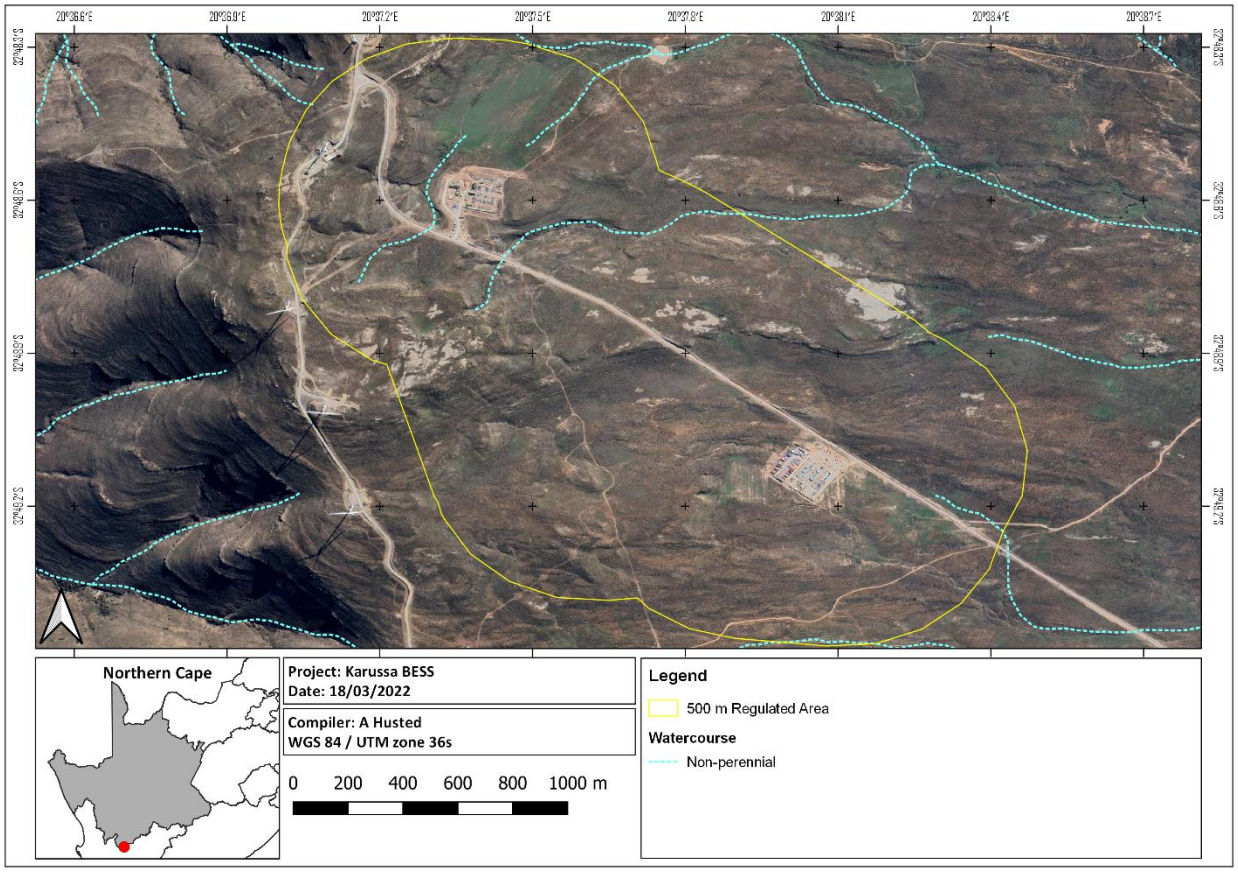


Figure 3-6 The inland water features associated with the project area

3.1.2 Flora Assessment

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

3.1.2.1 Vegetation Type

The area falls into the Shale Renosterveld vegetation types (within the Fynbos biome), forming the predominant renosterveld group, accounting for 86% of the extent of renosterveld (Mucina & Rutherford, 2006). This vegetation extends beyond the fynbos and into the karoo shales where a higher grass cover is observed as a result of rainfall patterns. On a fine-scale vegetation type, the proposed development overlaps with a single vegetation type, the Central Mountain Shale Renosterveld (Figure 3-7). This vegetation type occurs in the Northern and Western Cape provinces on the Southern and southeastern slopes of the Klein-Roggeveldberge ad Komsburg below the Roggeveld section of the Great Escarpment (facing the Moordenaars Karoo) as well as farther east below Besemgoedberg and Suurkop west of Merweville and in the west in the

Karookop area between Losper se Berg and high points around Thyshoogte. Altitude 1 050–1 500 m.

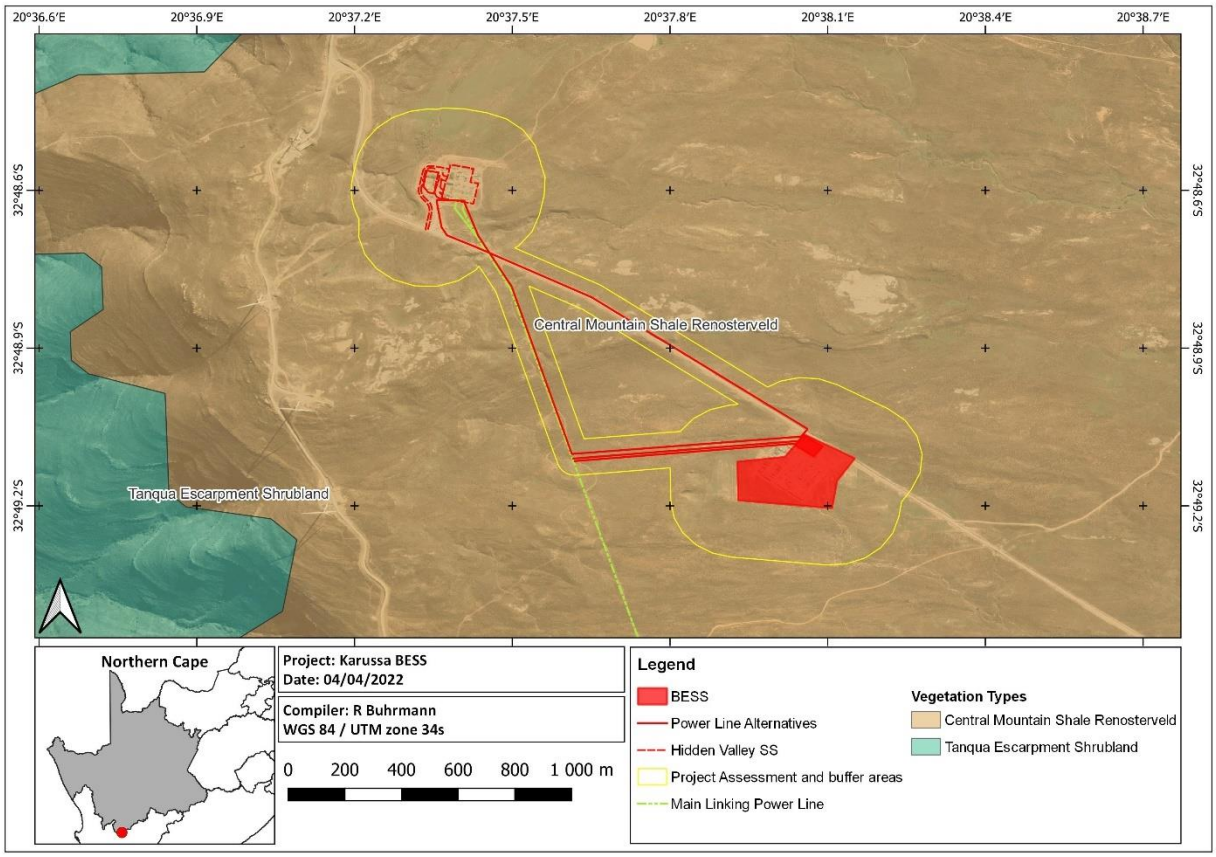


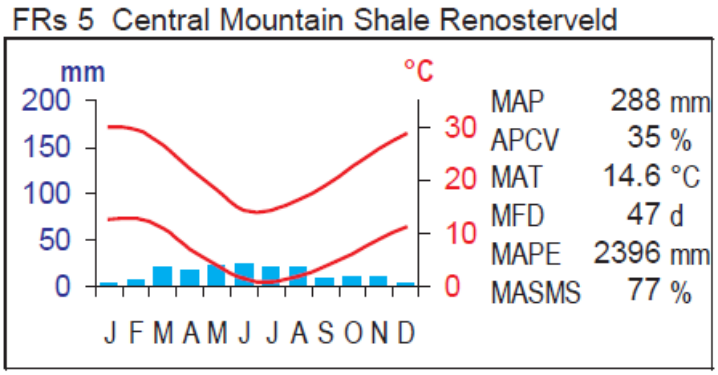
Figure 3-7 Map illustrating the vegetation types associated with the assessment area and surrounding landscape based on the Vegetation Map of South Africa, Lesotho & Swaziland

The **Central Mountain Shale Renosterveld** is described as follows:

i. Topography and Structure – Slopes and broad ridges of low mountains and escarpments.

ii. Geology and Soils – Clay soils overlying Adelaide Subgroup (Beufort Group of the Karoo Supergroup) mudstones and subordinate sandstones. Glenrosa and Mispah forms are prominent. Land types mainly iB and Fc.

iii. Climate – Arid to semi-arid climate. MAP 180–410 mm (mean: 290 mm), with relatively even rainfall, but still showing a slight high in autumn-winter. Mean daily maximum and minimum temperatures 29.9°C and 0.9°C for January and July, respectively. Frost incidence 20–50 days per year. See also climate diagram for FRs 5 Central Mountain Shale Renosterveld.



Source: Mucina and Rutherford (2006)

iv. Important Taxa – Low Shrubs: *Elytropappus rhinocerotis* (d), *Amphiglossa tomentosa*, *Asparagus capensis* var. *capensis*, *Chrysocoma ciliata*, *C. oblongifolia*, *Diospyros austro-africana*, *Eriocephalus africanus* var. *africanus*, *E. ericoides* subsp. *ericoides*, *E. eximius*, *E. grandiflorus*, *E. microphyllus* var. *pubescens*, *E. pauperrimus*, *E. purpureus*, *Euryops imbricatus*, *Exomis microphylla*, *Felicia filifolia* subsp. *filifolia*, *F. muricata* subsp. *muricata*, *F. ovata*, *Galenia africana*, *Helichrysum dregeanum*, *H. lucilioides*, *Hermannia multiflora*, *Lessertia fruticosa*, *Lycium cinereum*, *Nenax microphylla*, *Pelargonium abrotanifolium*, *Pentzia incana*, *Pteronia ambrariifolia*, *P. glauca*, *P. glomerata*, *P. incana*, *P. sordida*, *Rosenia glandulosa*, *R. humilis*, *R. oppositifolia*, *Selago albida*, *Tripteris sinuata*, *Zygophyllum spinosum*. Succulent Shrubs: *Delosperma subincanum*, *Drosanthemum lique*, *Euphorbia stolonifera*, *Trichodiadema barbatum*, *Tylecodon reticulatus* subsp. *reticulatus*, *T. wallichii* subsp. *wallichii*. Woody Climber: *Asparagus aethiopicus*. Herbs: *Dianthus caespitosus* subsp. *caespitosus*, *Heliophila pendula*, *Lepidium desertorum*, *Osteospermum acanthospermum*, *Senecio hastatus*. Geophytic Herbs: *Bulbine asphodeloides*, *Drimia intricata*, *Othonna auriculifolia*, *Oxalis obtusa*. Succulent Herbs: *Crassula deceptor*, *C. muscosa*, *C. tomentosa* var. *glabrifolia*, *Senecio radicans*. Graminoids: *Ehrharta calycina*, *Karroochloa purpurea*, *Merxmuellera stricta*.

v. Conservation – Least threatened. Target 27%. None conserved in statutory or private conservation areas. Only about 1% transformed. Erosion moderate.

3.1.2.2 Expected Flora Species

The POSA database indicates that 162 species of indigenous plants are expected to occur within the development area and surrounding landscape. Appendix B provides the list of species and their respective conservation status and endemism. The POSA database and the screening tool indicates that 19 threatened species are expected to occur within the assessment area and are provided in Table 3-2 below.

Please note that the Screening Tool report includes lists of bird, mammal, reptile, amphibian, butterfly and plant species of conservation concern known or expected to occur on the proposed development footprint. Some of these SCC are sensitive to illegal harvesting. Such species have had their names obscured and are listed as sensitive plant unique number / sensitive animal unique number. As per the best practise guideline that accompanies the protocol and screening tool, the **name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain**. It should be referred

to as *sensitive plant* or *sensitive animal* and its threat status may be included, e.g. *critically endangered sensitive plant* or *endangered sensitive animal*.

Table 3-2 Threatened flora species that are expected to occur within the assessment area associated with proposed project area. DD = Data Deficient, EN = Endangered, NT = Near Threatened and VU = Vulnerable

Family	Scientific name	Conservation Status	Endemism	Habitat	Likelihood of occurrence
Crassulaceae	*Adromischus phillipsiae*	Rare	Endemic	Sheltered rock crevices in loam soil	Low
Aizoaceae	*Antimima pumila*	DD	Endemic	Western Cape	Low
Asparagaceae	*Asparagus mollis*	VU	Endemic	Dwyka tillite, known only from four locations	Low
Asteraceae	*Eriocephalus grandiflorus*	Rare	Endemic	Lower foothills in quarts patches	Medium
Iridaceae	*Geissorhiza karooica*	NT	Endemic	Succulent karoo shrubland, on coarse shale slopes	High
Iridaceae	*Ixia linearifolia*	Rare	Endemic	Rocky south-facing slopes in renosterveld	High
Iridaceae	*Ixia mollis*	VU	Endemic	Among rocks on seasonally moist south-facing sandy or clay slopes. Known only from 4 locations.	Low
Hyacinthaceae	*Lachenalia longituba*	VU	Endemic	Stony clay in seasonally wet, boggy sites that bake rock hard in summer	Low
Fabaceae	*Lotononis venosa*	EN	Endemic	Open karroid scrub on sandy clay alluvium.	Low
Hypoxidaceae	*Pauridia breviscapa*	Rare	Endemic	Shaded or sheltered damp, shallow loamy soils on south-facing slopes and in seepages at the base of rocks	Medium
Iridaceae	*Romulea eburnea*	VU	Endemic	Shale soils. Known only from two locations.	Medium
	Sensitive species 1107	Rare	Endemic	Shallow pans on sandstone slabs	Medium
	Sensitive species 142	VU	Endemic	Heavy clay soils	Medium
	Sensitive species 338	Rare	Endemic	Known from less than 10 sites. Occurs in succulent karoo in shallow clay soils in seasonally damp depressions.	Low
	Sensitive species 620	Rare	Endemic	Occurring in shaded rock crevices, often on south-facing slopes	High
	Sensitive species 722	Rare	Endemic	Moist places usually associated with rocks and often under over-hanging rocks	Medium
	Sensitive species 886	Rare	Endemic	Steep or gentle slopes of a mainly southern aspect in low karroid scrub	Low
	Sensitive species 936	Rare	Endemic	Range-restricted occurring in a poorly explored area in Fynbos and succulent karoo in seasonally damp sandy loam or rocky flats in shale renosterveld.	High
Scrophulariaceae	*Zaluzianskya mirabilis*	Rare	Endemic	Gravely ground and dry river courses	High

3.1.3 Faunal Assessment

3.1.3.1 Amphibians

Based on the IUCN Red List Spatial Data and Frog Map database, 3 amphibian species are expected to occur within the assessment area (Appendix C). No species are regarded as threatened.

3.1.3.2 Reptiles

Based on the IUCN Red List Spatial Data and Reptile Map database, 10 reptile species are expected to occur within the assessment area (Appendix D). A single species is regarded as threatened (Table 3-3).

Table 3-3 Threatened reptile species that are expected to occur within the assessment area of the proposed development. NT = Near Threatened and VU = Vulnerable

Family	Scientific Name	Common Name	Conservation Status	Likelihood of Occurrence
			Regional	
Testudinidae	*Psammobates tentorius tentorius*	Karoo Tent Tortoise	NT	High

Psammobates tentorius tentorius (Karoo Tent Tortoise) is widespread and fairly common but the populations of this reptile are scattered and few and declining at approximately 10-20% on average over three generations (Hofmeyr *et al*. 2018). Impacts include overgrazing, destructive or illegal mining and unsustainable land use.

3.1.3.3 Avifauna

The SABAP2 data for the selected pentads indicate that 45 species of indigenous avifauna are expected to occur within the landscape (Appendix E). Of these expected species, none are regarded as threatened.

3.1.3.4 Mammals

The IUCN Red List Spatial Data lists 15 indigenous mammal species that could be expected to occur within the assessment area (Appendix E). Two of these expected species are regarded as threatened (Table 3-4). Species that were confirmed to occur within the assessment area or have a 'High' likelihood of occurrence are discussed further below.

Table 3-4 Threatened mammal species that are expected to occur within the assessment area associated with the proposed project area. EN = Endangered, NT= Near Threatened, VU = Vulnerable and LC = Least Concern

Family	Scientific name	Common name	Conservation Status	Likelihood of occurrence
Bovidae	*Pelea capreolus*	Grey Rhebok	NT	Confirmed
Mustelidae	*Aonyx capensis*	African Clawless Otter	NT	Low

Pelea capreolus (Grey Rhebok) is endemic to the region (South Africa, Lesotho and Swaziland) and occurs in rocky grassland habitats (Taylor *et al*. 2016). Threats include agricultural transformation and human settlement expansion. They are common in the karoo and fynbos regions in the Northern and Western Cape. There is estimated to be a total population of about 18 000 with more than 30% occurring on private land (Taylor *et al*. 2016).

3.2 Field Assessment

The following sections provides the results from the field survey for the proposed development that was undertaken during February/March 2022. Data from the search and rescue methodology report (Colloty 2019) was used to augment these data.

3.2.1 Flora Assessment

This section is divided into two sections:

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

3.2.1.1 Indigenous Flora

The list of flora species recorded within the assessment area provided in Table 3-5. Notably, this is not a complete list of indigenous flora within the area, but only species that were able to be recorded within the survey area within seasonality constraints and augmented by the search and rescue methodology statement for the Wind Energy Facility (Colloty 2019) and associated search and rescue reports. It should be noted that no statements confirming presence of certain species can be made for areas not previously assessed where the species was not visible and/or identifiable during the site visit. A total of 35 species, representing 11 families of flora species were recorded within the assessment area. Several of the species recorded are indicator taxa of the vegetation types described in section 3.1.2.1 of this report. None of the expected threatened flora species provided in section 3.1.2.2 of this report were recorded within the assessment area during the survey period. Photographs illustrating examples of the species recorded within the assessment area are provided in Figure 3-8 and Figure 3-9. Photographs of most species recorded can be found here: https://www.inaturalist.org/projects/karusa and it should be noted that the species list drawn from the site visit may change as identifications are finalised (based on scientific consensus) and as taxonomic nomenclature is refined. This online list (including photographs) will ensure that the list is up to date at all times as well as being fully accessible for reference.

Table 3-5 Summary of flora species recorded within the assessment area and their respective growth form and conservation status. Species in bold are protected by legislation. EN = Endangered, NT= Near Threatened, VU = Vulnerable and LC = Least Concern

Family	*Scientific name*	Growth form	Conservation Status
	Angiospermae indet		
	Angiospermae indet		
	Angiospermae indet		
	Indet 1		
Aizoaceae	*Antimima loganii*	succulent	VU
Aizoaceae	*Mesembryanthemum*	succulent	
Aizoaceae	*Ruschia intricata*	shrub; succulent	LC
Anacardiaceae	*Searsia longispina*	shrub;	LC
Asparagaceae	*Asparagus capensis*	shrub	LC
Asparagaceae	Asparagus sp. indet	shrub	
Asteraceae	Asteraceae sp. indet	shrub	
Asteraceae	Asteraceae sp. indet	shrub	
Asteraceae	*Berkheya rigida*	herb	LC
Asteraceae	*Chrysocoma ciliata*	shrub	LC

Asteraceae	*Dicerothamnus rhinocerotis*	shrub	LC
Asteraceae	*Dimorphotheca cuneata*	shrub;	LC
Asteraceae	*Euryops lateriflorus*	shrub;	LC
Asteraceae	*Macledium spinosum*	Succulent	LC
Asteraceae	*Oedera genistifolia*	shrub	LC
Asteraceae	*Pentzia incana*	shrub	LC
Asteraceae	*Pteronia incana*	shrub;	LC
Asteraceae	*Seriphium plumosum*	shrub;	LC
Crassulaceae	*Crassula deltoidea*	succulent	LC
Crassulaceae	*Crassula muscosa*	succulent	LC
Crassulaceae	*Crassultomentosa* var. *glabrifolia*	succulent	
Crassulaceae	*Tylecodon wallichii*	Succulent	LC
Ebenaceae	*Diospyros austro-africana*	shrub	LC
Fabaceae	Fabaceae sp. indet		
Hyacinthaceae	*Drimia capensis*	geophyte;	LC
Poaceae	Poaceae sp. indet	graminoid;	
Poaceae	Poaceae sp. indet	graminoid;	
Poaceae	*Tragus sp.*	graminoid;	
Santalaceae	*Thesium strictum*	succulent	LC
Santalaceae	*Viscum capense*	parasite	LC
Zygophyllaceae	*Roepera fulva*	shrub	

Seven (7) of the recorded flora species are protected by legislation and include *Crassula deltoides, Crassula muscosa, Crassula tomentosa* var. *glabrifolia*., *Tylecodon Wallichii*, *Antimima logonii, Mesembryanthemum* sp. and *Ruschia intricata*. Therefore, these species are not allowed to be collected, unless a permit from the Department of Environment and Nature Conservation, Kimberly (Northern Cape Province) is granted for their removal, and damage to these species by anthropogenic activities must be avoided.

Figure 3-8 ***Photographs illustrating a portion of the flora recorded within the assessment area during the survey period. A: Chrysocoma ciliate B: Oedera genistifolia C: Dimorphotheca cuneata D: Dicerothamnus rhonicerotis E: Searsia longispina F: Diospyros austro-africana G: Euryops laterifolius H: Ruschia intricate I: Chrysocoma ciliata***

Figure 3-9 ***Photographs illustrating a portion of the SCC flora of the Karusa site. A: Antimima loganii, B: Ruschia intricate, C: Crassula deltoides and D: Crassula tomentosa var. glabrifolia.***

3.2.1.2 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.

The National Environmental Management: Biodiversity Act (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 National Environmental Management: Biodiversity Act (Act 10 of 2004) (Government Gazette No 78 of 2014). The Alien and Invasive Species Regulations were published in the Government Gazette No. 43726, 18 September 2020. The legislation calls for the removal and / or control of alien invasive plant species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, 1998 (Act No. 36 of 1998), 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 National Environmental Management: Biodiversity Act (Act 10 of 2004) (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 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 Act;
    - The relevant invasive species management programme developed in terms of regulation 4; and

- Any directive issued in terms of section 73(3) of the Act.

No Invasive Alien Plants were present within the area.

Considering that the area is a CBA it is recommended that any IAP species that may colonize the area in the future be controlled by implementing an Invasive Alien Plant Management Programme in compliance of section 75 of the Act as stated above. This is also pertinent to the development as invasive species are linked to enhanced fire effects and risk (Aslan & Dickson, 2020). The IAP Management Programme must implement the following monitoring framework must be implemented to ensure that IAPs are continually monitored, and progress pertaining to their control is recorded (Table 3-6). The monitoring of the area throughout the process is crucial in order to prevent IAPs growing and spreading out of control, thereby threatening the wellbeing of indigenous flora and fauna. It is also important to note that while herbicide application has been recommended for control, herbicides should not be applied adjacent to the aquatic ecosystems within the site area and herbicide application should not be used during windy days to prevent drift.

Table 3-6 Proposed monitoring framework for the control of invasive alien plants within the property

Metric	Frequency	Method	Response
How effective are the control methods?	4-6 months after every operation	Survey the cleared areas and look for regrowth. Before and after photographs are effective for this. Observe for non-target effects of herbicide application.	If the survey reveals that the control methods are effective, e.g. low levels of re-sprouting, continue following the herbicide mixtures and control methods. If non-target plants are dying off where herbicides were applied, ensure appropriate training for herbicide applicators, demonstrate the off-target effects to herbicide applicators to ensure they are using the correct methods and herbicides. (If the results show that the control methods are not effective, adapt by e.g. cutting lower above ground or changing herbicides or timing of herbicide application.
Do the infestation levels decrease?	Annually	Survey the cleared areas and record species, densities and size. Before and after pictures are very effective.	If the infestation levels are not decreasing, reconsider clearing intervals and look at clearing methods. If infestation levels are decreasing, then continue current control method.
Quantity of herbicides used	During every operation	Keep track of cost and ensure no wastage. Record herbicide usage	Track usage over time, it will reveal a certain trend in quantities for different infestation levels. Less herbicides should be used when the infestation levels are lower. Record herbicide cost.
Does the indigenous vegetation recover in the cleared areas?	Annually	Survey the cleared areas and look out for indigenous species variety and presence. Before and after pictures are effective.	If there is recovery of indigenous vegetation, then continue current control method. If there is no recovery, consider rehabilitation with local indigenous species.
How many jobs were created?	After every operation	Timesheets	Job creation figures are useful when asking for landowner assistance from WFW or to demonstrate contributions to jobs and socio-economic conditions
How many person days (PD) were spent per operations?	After every operation	Timesheets	Keep track of cost and assist with planning and budgeting. Determine cost per person per day (PD)

3.2.2 Faunal Assessment

3.2.2.1 Amphibians

One (1) amphibian species was recorded during the survey period (Table 3-7), accounting for 33% of the expected species. The lack of species richness was attributed to the season of the site visit (dry season) and lack of suitable habitat within the study area. The species expected to occur within the assessment area are provided in Appendix B.

Table 3-7 Summary of amphibian species recorded within the assessment area during the survey period. LC = Least Concern

Family	Scientific Name	Common Name	Conservation Status	
			Regional	Global
Bufonidae	*Vandijkophrynus gariepensis gariepensis*	Karoo Toad (subsp. gariepensis)	LC	LC

3.2.2.2 Reptiles

Six reptile species, representing six families were recorded within the assessment area during the survey periods (Table 3-8 and Figure 3-10). This accounts for 50% of the total expected species. The lack of species richness was likely due to the combination of the inherent secretive nature of reptile species, and limited time available for fieldwork (a true representative sample requires an extensive sampling period over several surveys). The presence of suitable habitat suggests that the area supports a diverse reptile community.

Table 3-8 Summary of reptile species recorded within the assessment area during the survey period. LC = Least Concern

Family	Scientific Name	Common Name	Conservation Status	
			Regional	Global
Agamidae	*Agama atra*	Southern Rock Agama	LC	LC
Cordylidae	*Karusasaurus polyzonus*	Karoo Girdled Lizard	LC	LC
Lacertidae	*Pedioplanis lineoocellata pulchella*	Common Sand Lizard	LC	LC
Testudinidae	*Chersina angulata*	Angulate Tortoise	LC	LC
Viperidae	*Bitis arietans*	Puff Adder	LC	LC
Pelomedusidae	*Pelomedusa galeata*	Cape Terrapin	LC	LC

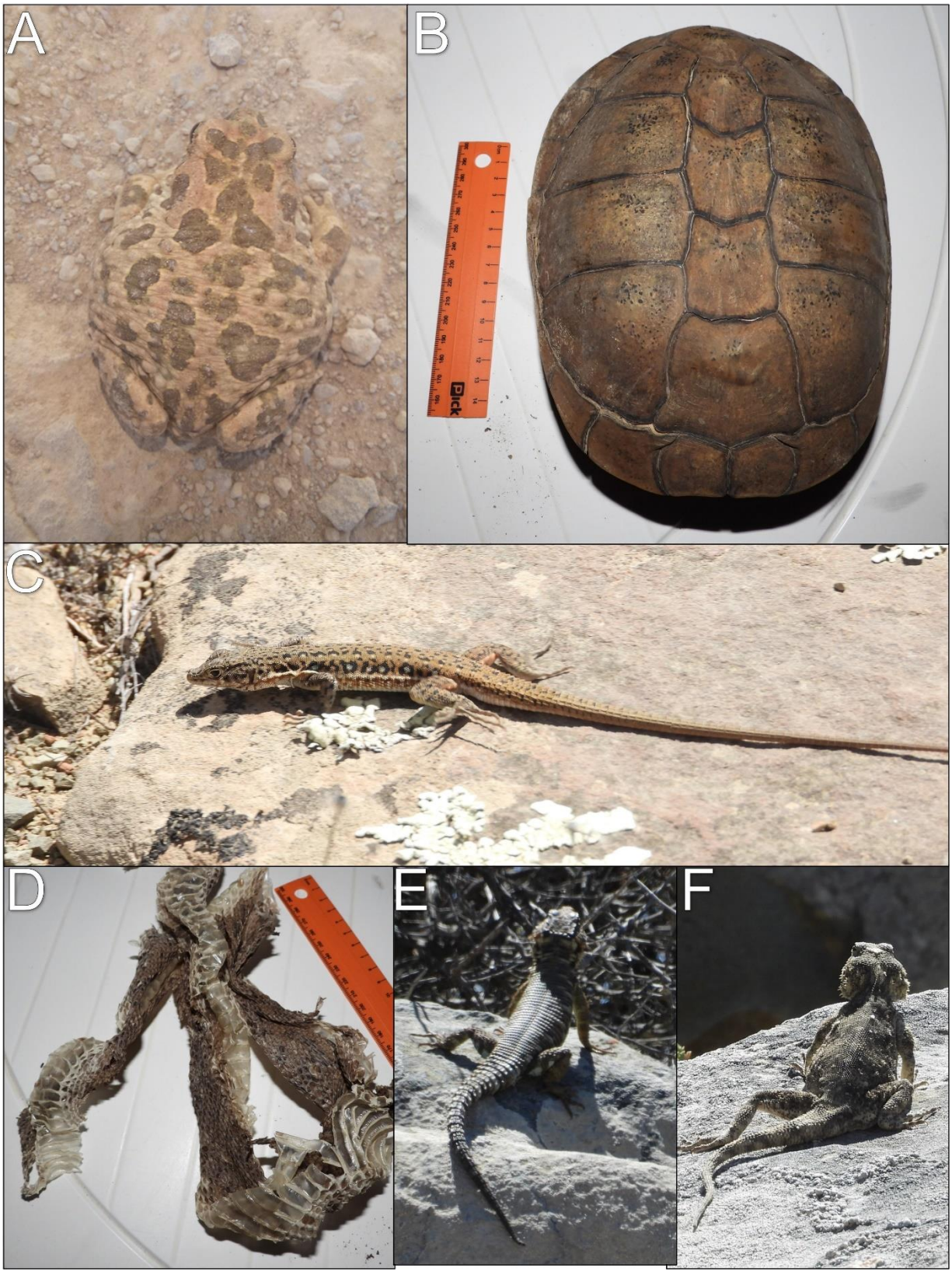


Figure 3-10 ***Photographs illustrating a portion of the herpetofauna recorded from the study area. A: Vandijkophrynus gariepensis, B: Pelomedusa galeata, C: Pedioplanis lineoocellata ssp. pulchella, D: Bitis arietans, E: Karusasaurus polyzonus and F: Agama atra.***

3.2.2.3 Avifauna

Forty-four (44) species of avifauna were recorded within the assessment area during the survey period, with none of the species regarded as being of conservation concern (Table 3-9 and Figure 3-11). A considerable portion of the species are regarded as typical karoo species, with some species associated with human settlements.

Table 3-9 Summary of avifauna species recorded within the assessment area during the survey period. Species of conservation concern are highlighted in bold. EN = Endangered, LC = Least Concern, NE = Not Evaluated, NT = Near Threatened and VU = Vulnerable

Scientific name	Common name	Conservation Status	
		Regional	Global
Ardea cinerea	Heron, Grey	LC	LC
Buteo buteo	Buzzard, Common	LC	LC
Calandrella cinerea	Lark, Red-capped	LC	LC
Calendulauda albescens	Lark, Karoo	LC	LC
Cercomela sinuata	Chat, Sickle-winged	LC	LC
Charadrius tricollaris	Plover, Three-banded	LC	LC
Charadrius tricollaris	Three-banded Plover	LC	LC
Cinnyris chalybeus	Sunbird, Southern Double-collared	LC	LC
Columba livia	Dove, Rock	LC	LC
Corvus albicollis	Raven, White-necked	LC	LC
Corvus albus	Crow, Pied	LC	LC
Crithagra albogularis	Canary, White-throated	LC	LC
Crithagra albogularis	White-throated Canary	LC	LC
Crithagra flaviventris	Canary, Yellow	LC	LC
Crithagra flaviventris	Yellow Canary	LC	LC
Emberiza capensis	Bunting, Cape	LC	LC
Emberiza capensis	Cape Bunting	LC	LC
Falco rupicolus	Kestrel, Rock	LC	LC
Falco rupicolus	Rock Kestrel	LC	LC
Galerida magnirostris	Lark, Large-billed	LC	LC
Galerida magnirostris	Large-billed Lark	LC	LC
Hirundo albiguaris	Swallow, White-throated	LC	LC
Lamprotornis bicolor	Starling, Pied	LC	LC
Lanius collaris	Fiscal, Southern	LC	LC
Melierax canorus	Goshawk, Pale Chanting	LC	LC
Mirafra apiata	Lark, Cape Clapper	LC	LC
Motacilla capensis	Wagtail, Cape	LC	LC
Myrmecocichla formicivora	Chat, Ant-eating	LC	LC
Myrmecocichla monticola	Mountain Wheatear	LC	LC

Oenanthe familiaris	Chat, Familiar	LC	LC
Oenanthe pileata	Wheatear, Capped	LC	LC
Oenanthe pileata	Capped Wheatear	LC	LC
Passer domesticus	Sparrow, House	LC	LC
Passer melanurus	Sparrow, Cape	LC	LC
Prinia maculosa	Prinia, Karoo	LC	LC
Pternistis capensis	Spurfowl, Cape	LC	LC
Ptyonoprogne fuligula	Martin, Rock	LC	LC
Streptopelia capicola	Dove, Cape Turtle	LC	LC
Tachybaptus ruficollis	Grebe, Little	LC	LC
Tadorna cana	Shelduck, South African	LC	LC
Tadorna cana	South African Shelduck	LC	LC
Telophorus zeylonus	Bokmakierie	LC	LC
Vanellus coronatus	Crowned Lapwing	LC	LC
Vanellus coronatus	Lapwing, Crowned	LC	LC

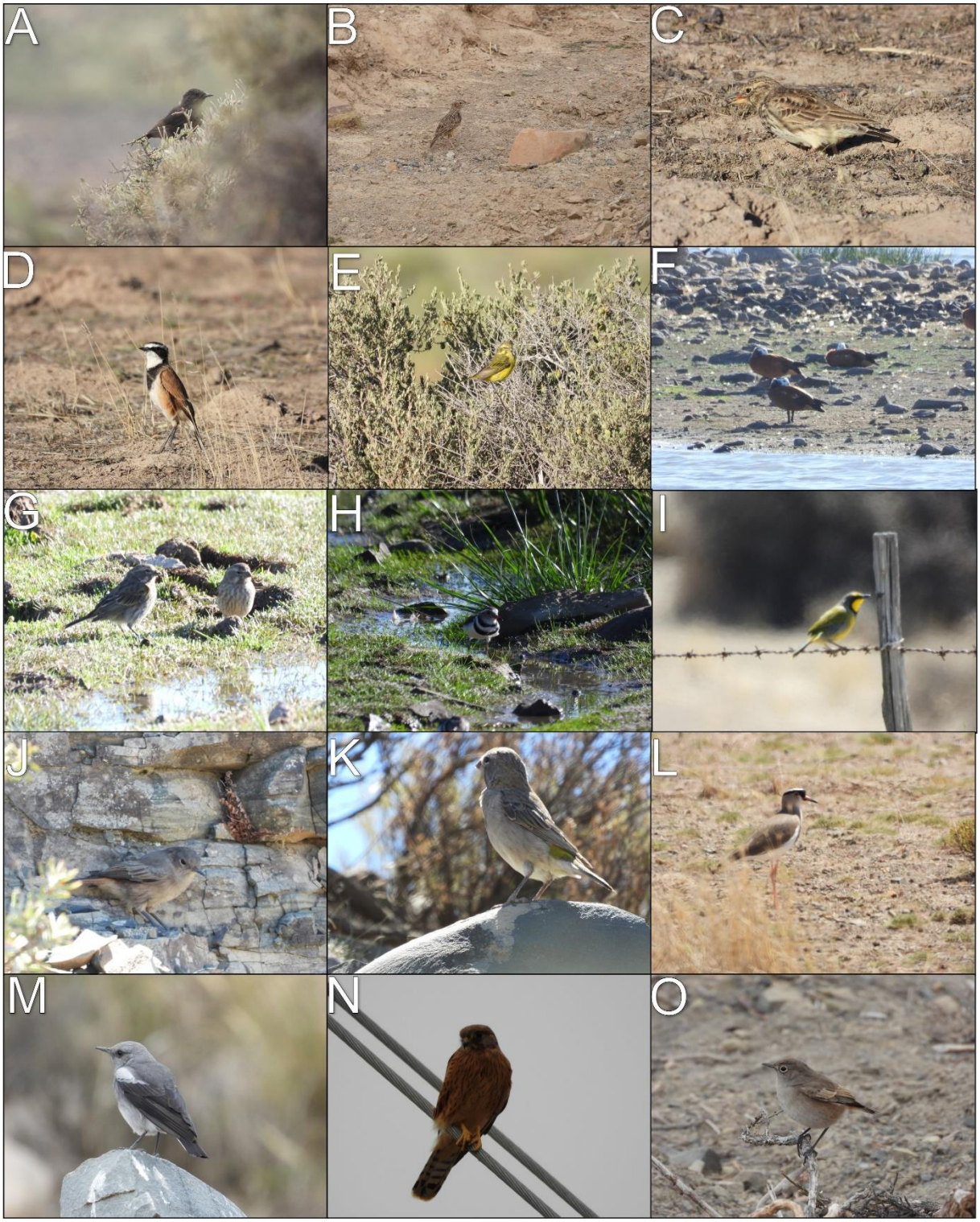


Figure 3-11 ***Photographs illustrating a portion of the avifauna recorded within the assessment area during the survey period. A: Mymecocichla formicivora B: Chersomanus albofasciata C: Galerida magnirostris D: Oenanthe pileata E: Crithagra flaviventris F: Tadorna cana G: Crithagra flaviventris H: Charadrium tricollaris I: Telophorus zeylonus J: Oenanthe familiaris K: Crithagra albogularis L: Vanellus coronatus M: Myrmecocichla monticola N: Falco rupicolis O: Oenanthe familiaris***

3.2.2.4 Mammals

A total of thirteen (13) mammal species were recorded within the assessment area during the survey period (Table 3-10 and Figure 3-12), accounting for 47% of the expected mammal species, and six (6) species not included on the expected mammal species list. It is considered highly likely that additional small mammal species would be recorded from the site with extensive sampling.

One (1) of the species recorded within the assessment area are regarded as SCC, namely the Grey Rhebok, which was recorded on site from scat observed.

Table 3-10 Mammal SCC recorded within the assessment area during the survey periods. NT = Near Threatened

Family	Scientific Name	Common Name	Conservation Status
			Regional
Bovidae	*Pelea capreolus*	Grey Rhebok	**NT**

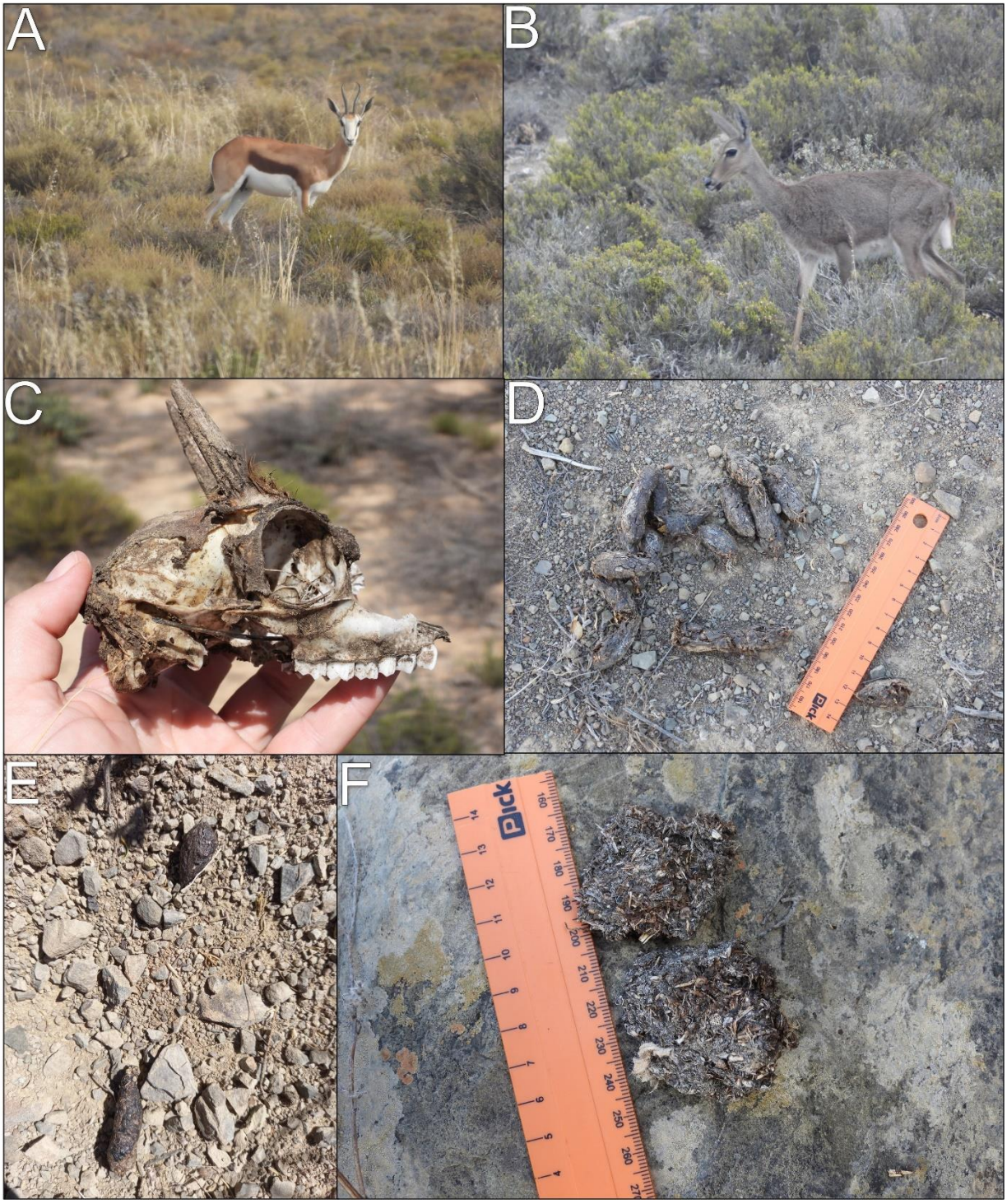


Figure 3-12 ***Photographs illustrating a portion of the mammals recorded within the assessment area during the survey period. A: Aepyceros melampus, B: Pelea capreolus, C: Raphicerus campestris, D: Hysteris africaeaustralis ssp. Africaeaustralis E: Herpestes pulverulentus, F: Papio ursinus ssp. Ursinus.***

3.3 Site Ecological Importance (SEI)

The combined Terrestrial Biodiversity Theme Sensitivity for the assessment area was derived to be Very High as indicated in the National Environmental Screening Tool (Figure 3-13), it can be downloaded at (https://screening.environment.gov.za/screeningtool/#/pages/welcome).

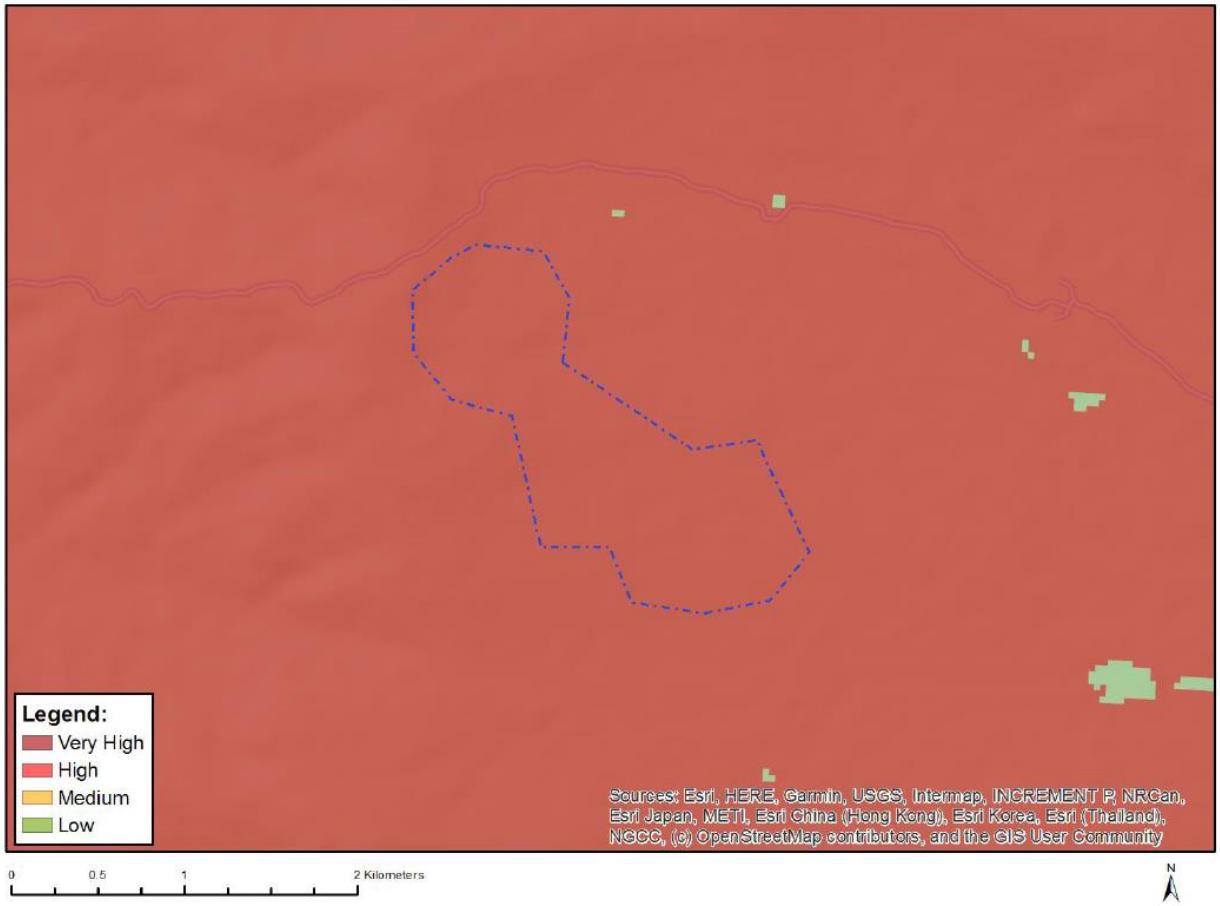


Figure 3-13 Combined Terrestrial Biodiversity Sensitivity of the assessment area

Four (4) different habitat types were delineated within the assessment area (Table 3-11,Figure 3-14 and Figure 3-16). Based on the criteria provided in Section 2.3 of this report, all habitats within the assessment area of the proposed development were allocated a sensitivity category or SEI. The sensitivities of the habitat types delineated are illustrated in Figure 3-14. Figure 3-16 provides photographs illustrating examples of the different habitat types delineated within the assessment area. The interpretations of the categories can be found in Table 2-11.

Habitats categorised as Transformed consisted of buildings, roads, and cleared areas and were determined to be a 'Very Low' SEI.

Table 3-11 Summary of habitat types delineated within the field assessment area of the proposed development

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Transformed	Very Low	Very Low	**Very Low**	Very High	**Very Low**
Karoo Scrub	Medium	High	**Medium**	Medium	**Medium**
Rocky outcrops	High	High	**High**	Low	**Very high**
Riparian thicket	Medium	High	**Medium**	Medium	**Medium**

The study area was split into 4 areas. The transformed area comprises of the site camp and associated infrastructure as well as existing roads, the existing substation and agricultural areas. These areas cannot be rehabilitated, and no longer comprise indigenous vegetation. It has no real ecological importance.

The small area of riparian thicket occurs between rocky outcrops and agricultural areas. This area of the site is well grazed but has an assemblage of species not recorded elsewhere on the site. It has an SEI of medium.

Some areas of the site form low cliff faces with corresponding niche habitats able to support a different assemblage of flora and fauna species from the surrounding habitat. It is here that the majority of provincially protected succulent species were recorded. It is also highly likely that the inaccessibility of these areas to grazers may result in them housing greater populations of conservation important geophytic flora species (this should be confirmed in the wet season). As such, these areas have a Very High SEI.

The remainder of the site comprises karoo shrubland (the Central Mountain Shale Renosterveld as described by Mucina and Rutherford (2006)). This habitat type is largely intact, with low levels of disturbance aside from impacts associated with grazing. High numbers of provincially protected succulent species occur in this vegetation type, as well as some geophytic species. It has a Medium SEI.

It is important to note that the non-perennial river systems and wetlands were delineated and assessed as part of the freshwater resource assessments.

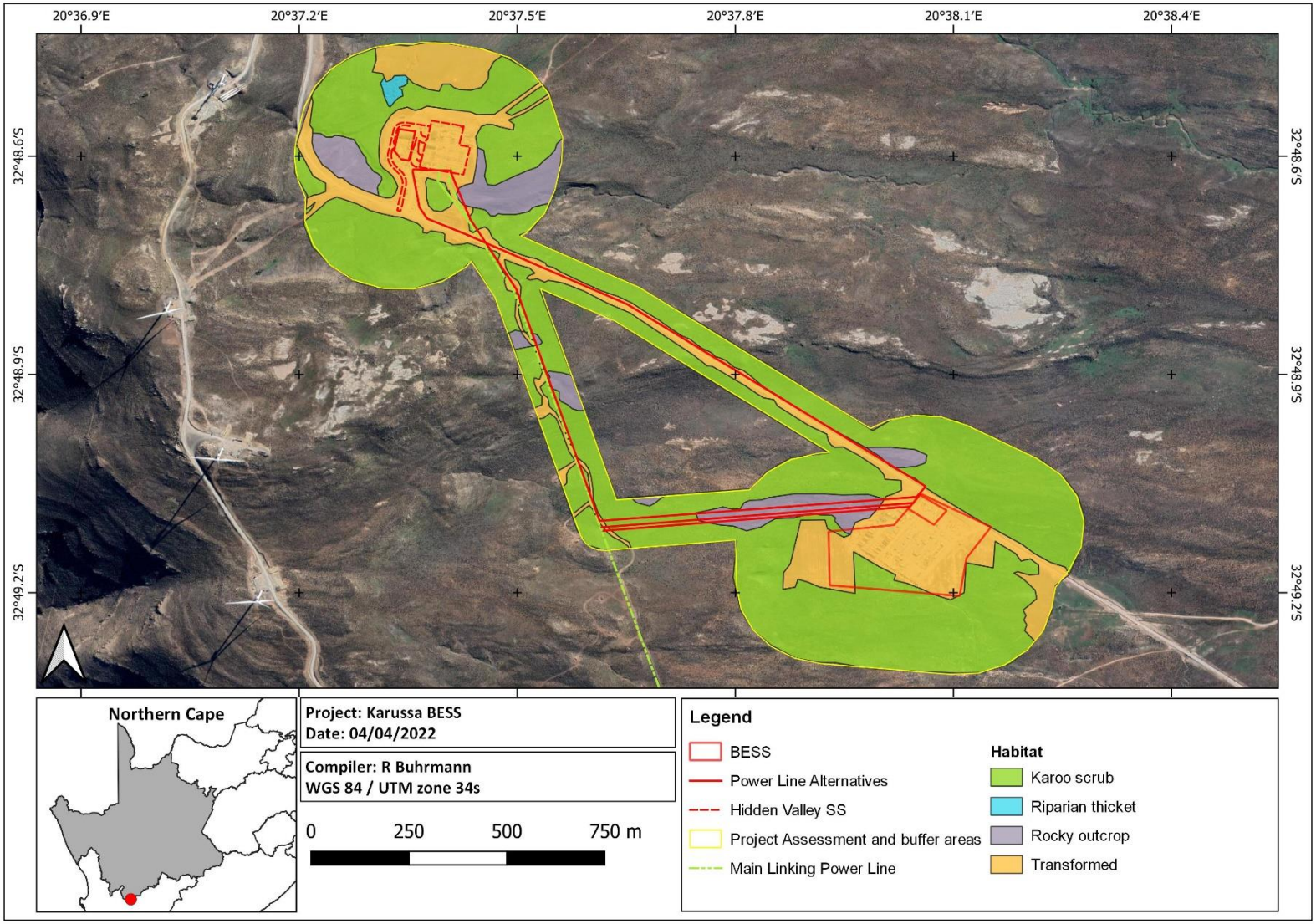


Figure 3-14 Map illustrating the habitats defined within the project area

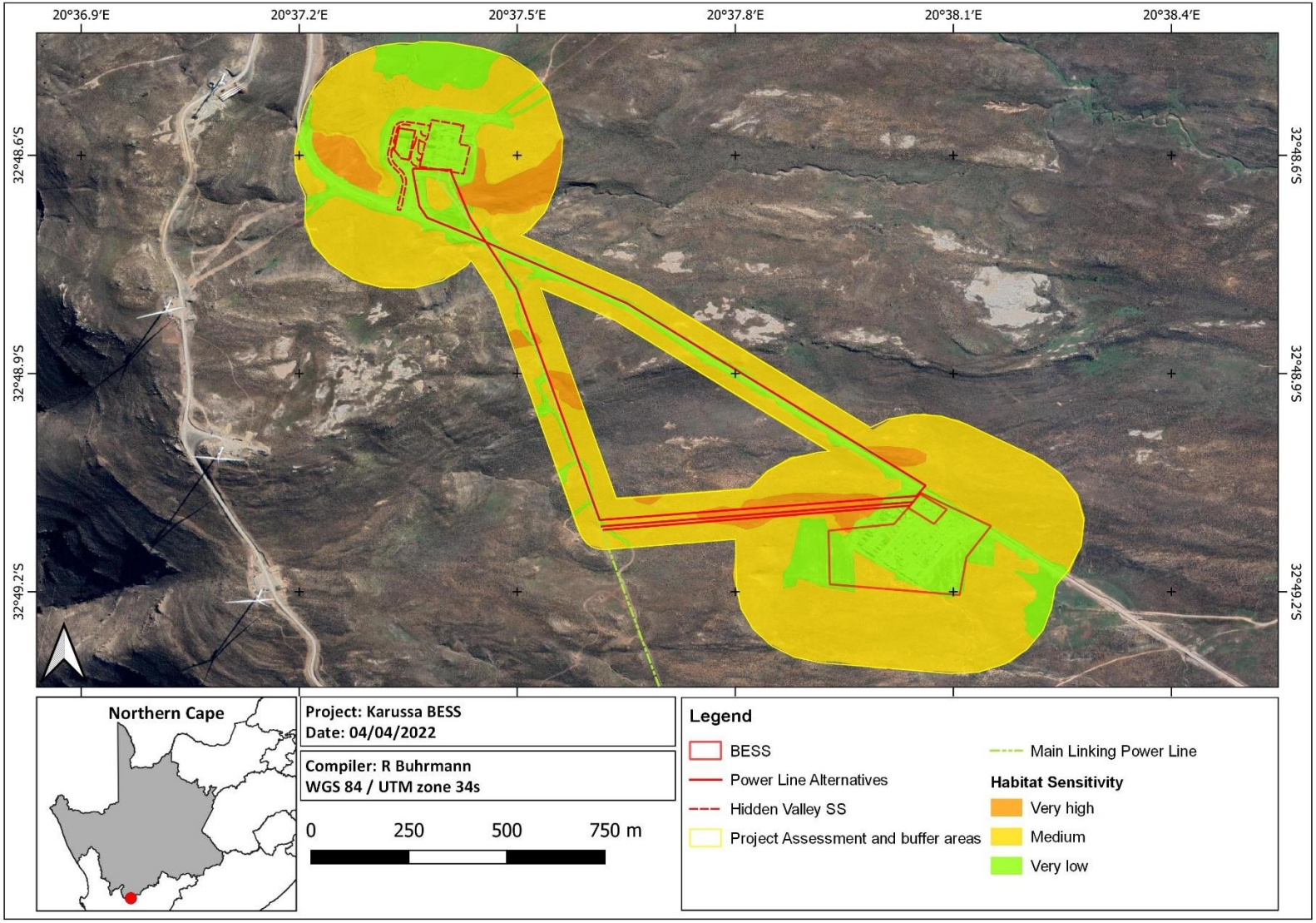


Figure 3-15 Map illustrating Site Ecological Importance (SEI) of the habitat types within the assessment area

Figure 3-16 Photographs illustrating examples of the habitat types delineated within the assessment area. A: Karoo scrub and B: Rocky outcrops

3.4 Wetland Assessment

3.4.1 Terrain Analysis and Drainage Features

In order to identify and delineate water resources, a terrain analysis was undertaken to better understand the slope and surface flow directions across the project area.

The slope percentage of the project area has been calculated and is illustrated in Figure 3-17. The majority of the regulated area is characterised by a slope percentage between 0 and 10%, with some smaller patches within the project area characterised by a slope percentage up to 35%. This illustration indicates a non-uniform area with undulating slopes, mountainous areas and ridges. The elevation of the project area (Figure 3-18) indicates an elevation of 1,125 to 1237 Metres Above Sea Level (MASL). The dominant surface flow direction in a south-easterly direction.

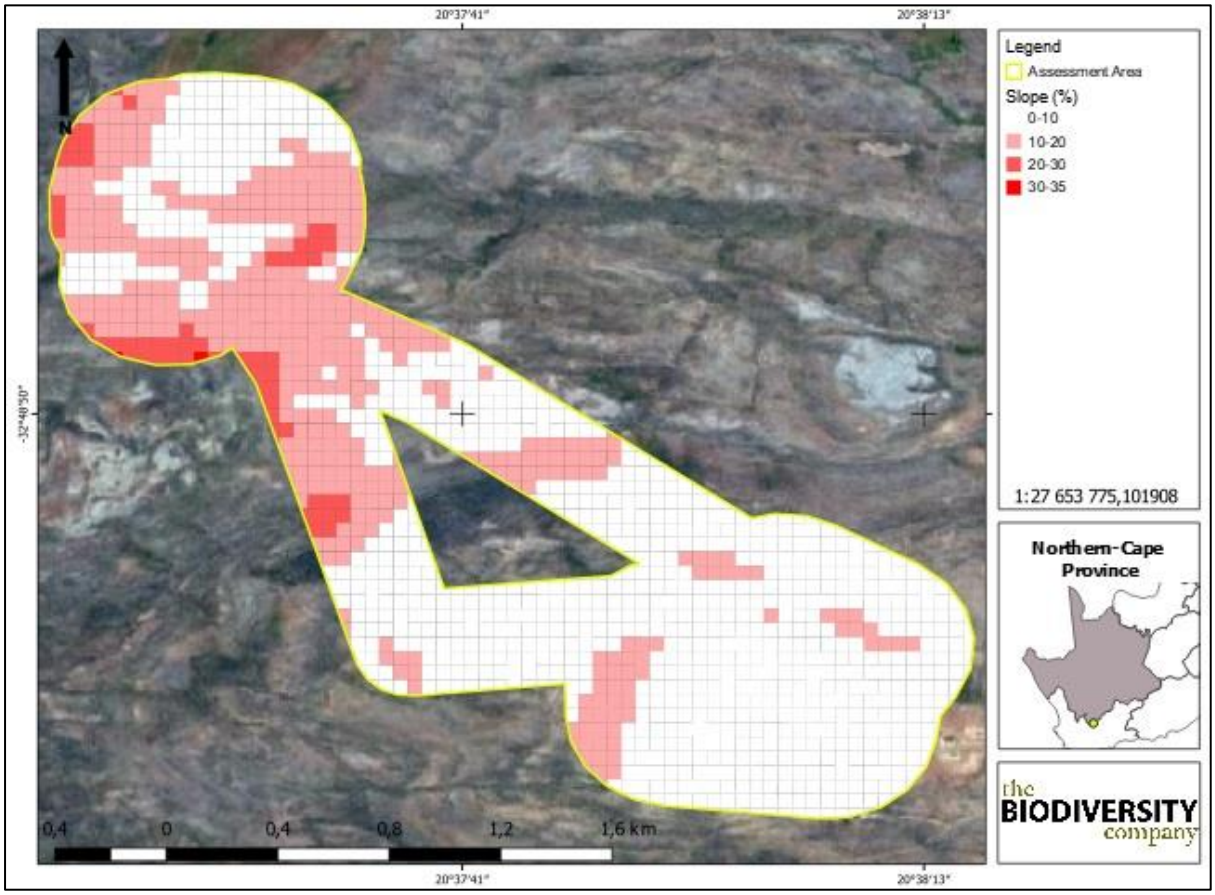


Figure 3-17 Slope percentage map for the project area

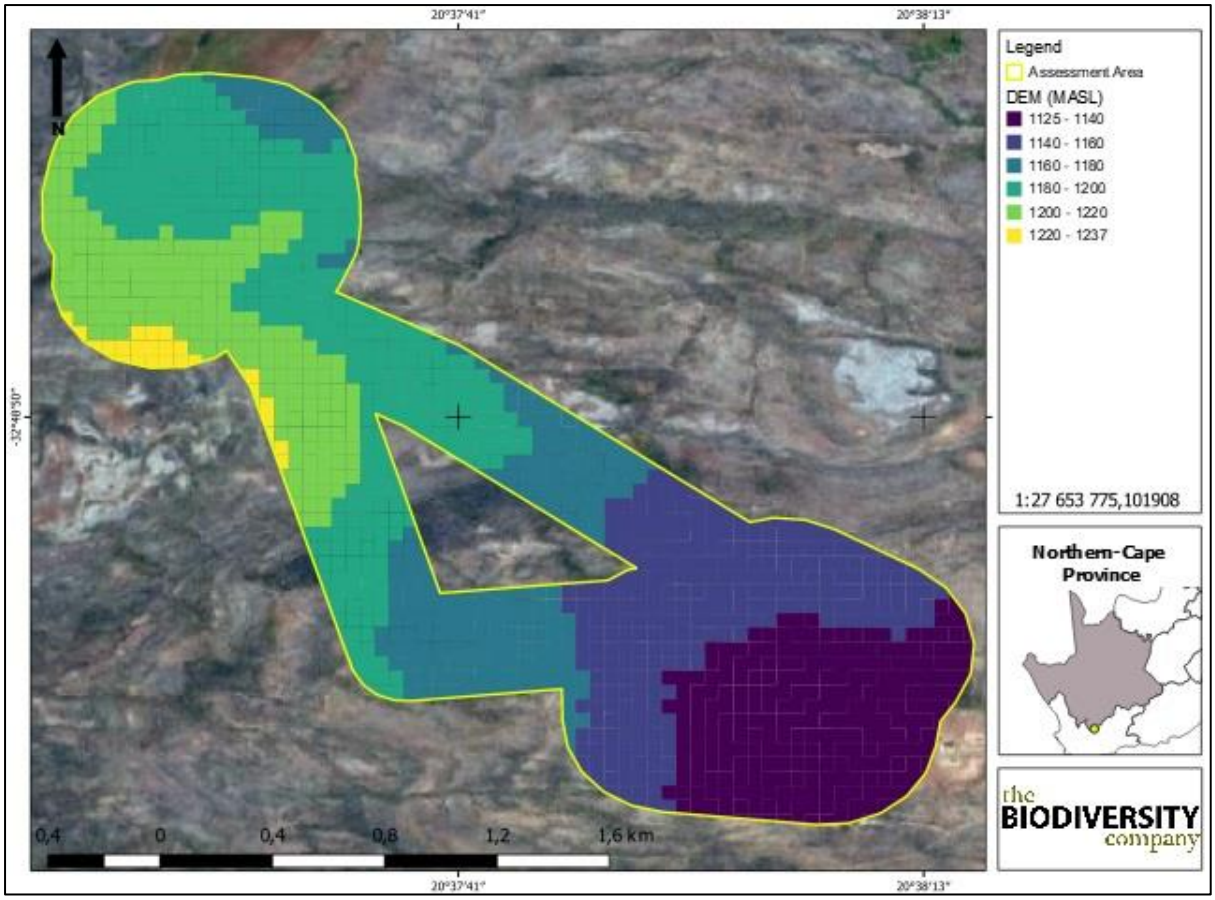


Figure 3-18 Elevation of the project area (metres above sea level).

3.4.2 Identification, Classification and Extent

Freshwater systems were delineated in accordance with the DWAF (2005) guidelines. Vegetation is used as the primary wetland indicator. However, whilst wetland vegetation is adapted to life in saturated soil under normal circumstances, such features are not always present in arid to semi-arid environments such as the Northern Cape (based on experience within the region) due to the typically arid conditions of the region, additional indicators, as provided by Day *et al* (2010) were utilised, relevant conclusions include:

- No one indicator provides adequate information about wetland presence, type, hydroperiod, biodiversity, function and principle ecological and hydrological drivers to be useful on its own – particularly with regard to actual or suspected cryptic and/or temporary wetlands;
- The absence of an indicator does not necessarily equate to the absence of a wetland;
- Indicators that a wetland is present are usually associated with a higher level of confidence than interpretation of indicators of specific wetland character/habitat type;
- Seasonally/ephemerally inundated wetlands may be identifiable to a higher level of confidence than seasonally saturated systems; and
- Detailed delineation of cryptic wetlands is unlikely to be achievable with any useful degree of confidence based on a dry season assessment only.

Based on a combination of desktop and in-field delineation, two (2) forms of a watercourse were identified and delineated within the 500 m regulated area applied. These include an artificial wetland area and episodic drainage lines/ features (Figure 3-21). No natural wetland systems, or even cryptic wetlands were identified for the project area. The artificial wetland has been 'formed' due to the adjacent water/drinking station and has only been delineated for this assessment, no further functional descriptions were undertaken. The drainage lines are classified as a river HGM type system (Table 3-12). The drainage lines are not characterised by riparian vegetation and grasses, these systems represent bare surfaces with evidence of surface run-off. A large number of small drainage features were identified within the assessment area. Photographs of the identified features are presented in Figure 3-20.

The following Zones of Regulation (ZoR) are applicable to the drainage line identified within the assessment area (Figure 3-19):

- A 32 m Zone of Regulation in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) should be assigned to the drainage lines; and
- A 100 m ZoR in accordance with the National Water Act, 1998 (Act No. 36 of 1998) should be assigned to the drainage lines.

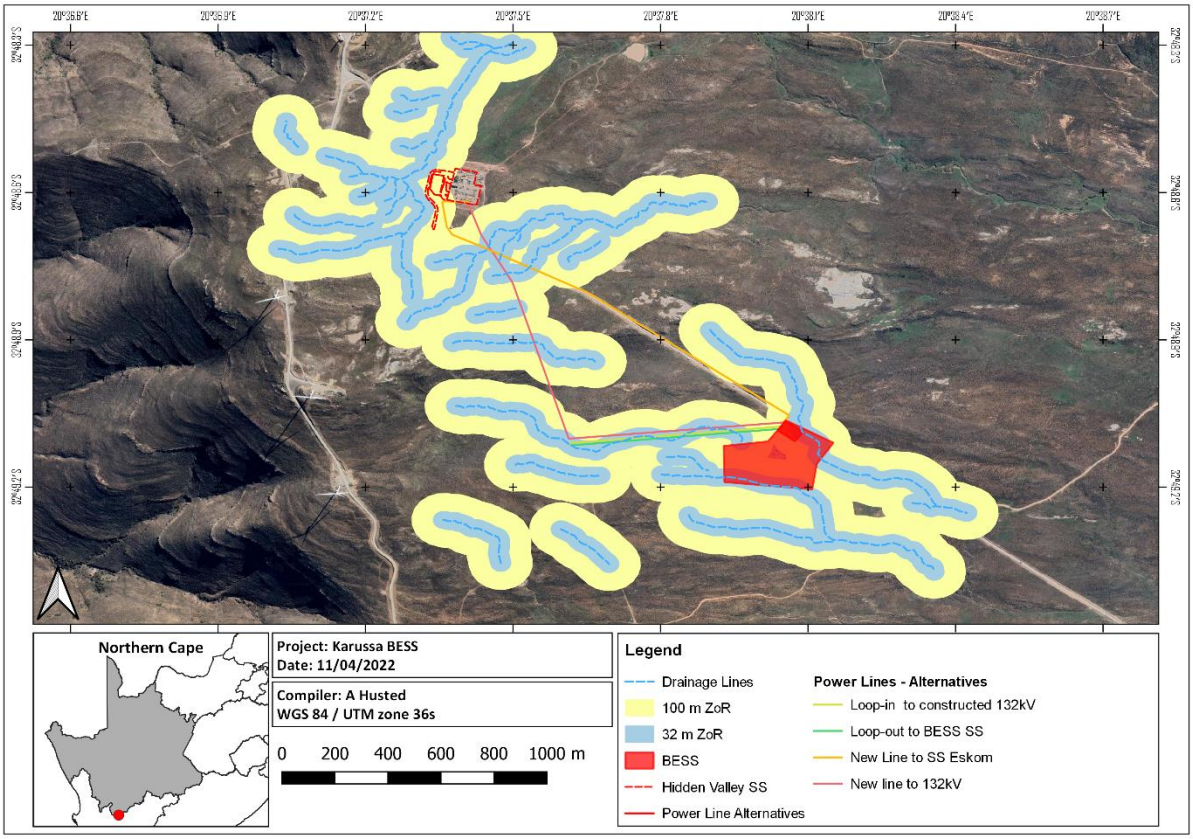


Figure 3-19 The applicable zones of regulation for the project

The level 1-4 classification of the HGM units as per the national classification system (Ollis *et al*., 2013) is presented in Table 3-12. The systems were classified as Inland Systems falling within the Namaqua Highlands Aquatic Ecoregion.

Table 3-12 Characterization of the watercourses for the project according to the Classification System (Ollis et al., 2013)

System	Level 3: Landscape unit	Level 4: Hydrogeomorphic Unit
		HGM Type
Drainage features	Valley floor: The base of a valley, situated between two distinct valley side-slopes.	River: a linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water.

Figure 3-20 Photographs of features within the project area: A) Drainage line that has been realigned around the existing site camp, B) Drainage Line directly south of the existing site camp and therefore proposed BESS, C) Drainage feature, D) A number of drainage lines were noted within the 500 m regulated area.

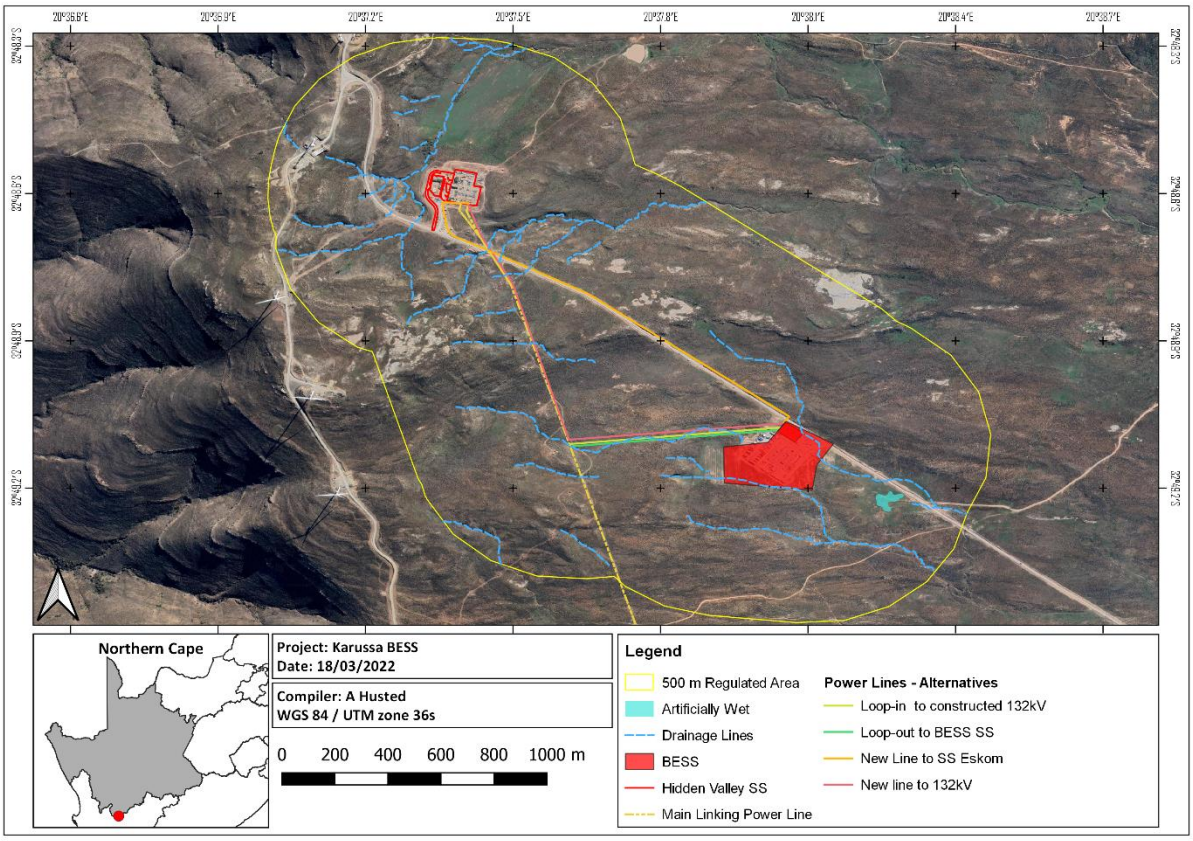


Figure 3-21 Drainage Features within the project area

3.4.3 Sensitivity and Buffer Analysis

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

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

Additionally in order to determine a more “site specific” buffer zone for the proposed activity the “Preliminary Guideline for the Determination of Buffer Zones for Rivers, Wetlands and Estuaries” (Macfarlane, *et al*., 2014) was used during this assessment.

The buffer guideline of Macfarlane *et al*. (2014) enables the user to take into account the level of assessment as well as the proposed development and then generate a preliminary threat rating and buffer. In order to improve the buffer to be more site specific the tool enables the user to describe the sensitivity of the system, the site-based modifiers and whether there is any species of conservation concern. Furthermore, it enables the application of additional mitigation measures before determining the outcome of the buffer model.

Other case studies completed by Macfarlane *et al*. (2009) focused on reviewing the functions, values and limitations of buffer zones. This study indicated that there are specific characteristics or variables that affect a buffer’s ability to perform various functions, in this case sediment trapping/removal. According to Macfarlane *et al*. (2009) sediment removal

begins with a reduction in the flow rate, mainly through the presence of vegetation which increases the surface roughness. The relationship between the length covered by the runoff (buffer width) and sediment removal is not linear, which indicated that most sediment are deposited in outer portions of a buffer. According to Macfarlane *et al*. (2009) based on a range of studies between 1973 and 2005 and according to various authors there are various proposed buffer zone widths for sediment removal. According to Ghaffarzadeh *et al*. (1992) 85% of sediment were removed in 9.1 m buffers. Several other authors also indicated a maximum buffer width of 15 m to be sufficient in removing/trapping sediment.

Based on the above-mentioned case studies it is, nevertheless, important to focus on the width of the buffer, but also imperative that the focus be shifted to the effectiveness of the buffer. Subsequently, it is important that when implementing the 15 m buffer in this development it be done in a proactive and consistent manner in order to continuously attain its purpose.

The expected risks were reduced to Low with the prescribed mitigation measures and therefore the recommended buffer was calculated to be 15 m for the drainage lines (Table 3-13), for the construction and operational phases.

Table 3-13 Post-mitigation buffer requirement

Required Buffer after mitigation measures have been applied	
Phase	**Drainage Line**
Construction Phase	**15 m**
Operational Phase	**15 m**

The buffer zone will not be applicable for infrastructure that is proposed to traverse the systems, however, for all secondary activities such as laydown yards and storage areas, the buffer zone must be implemented. The buffered areas and drainage features have been allocated as a medium sensitivity.

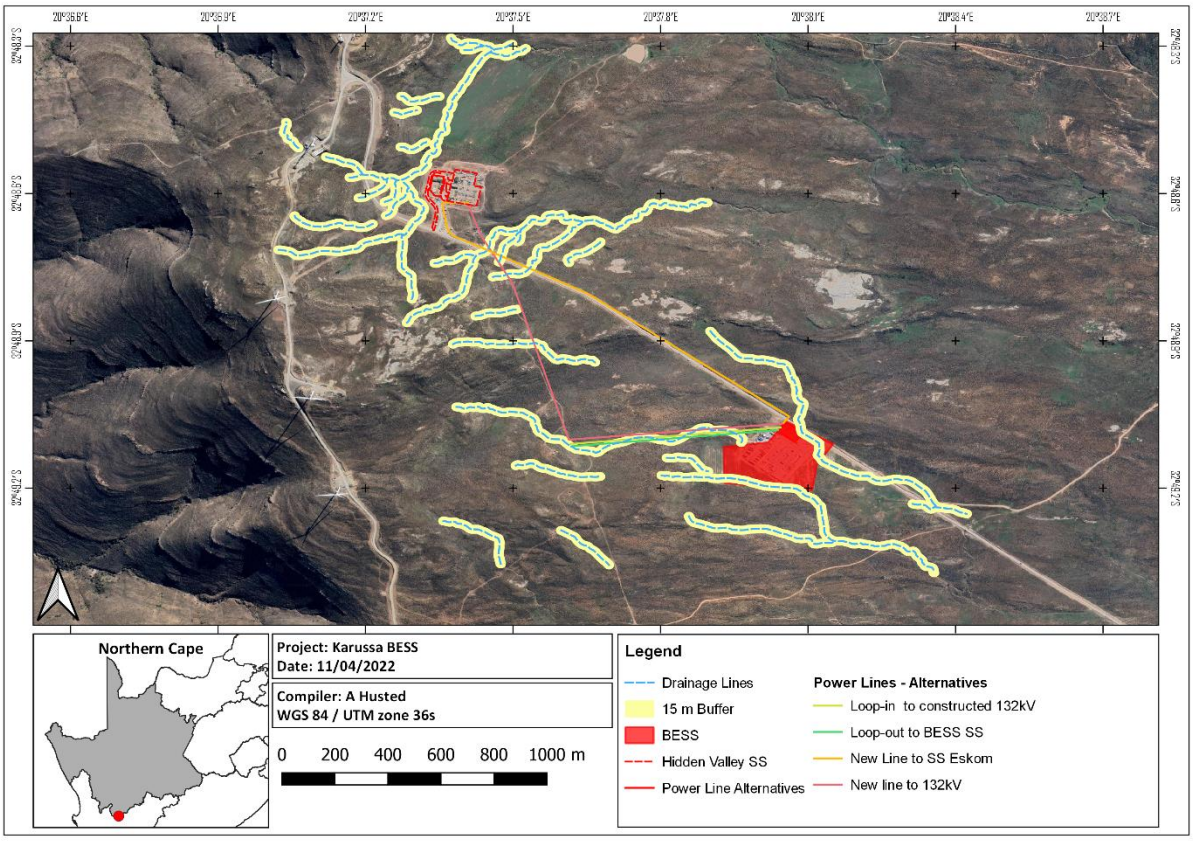


Figure 3-22 The 15 m buffer area in relation to the project components

3.4.4 Risk Assessment

Due to the presence of watercourses (non-perennial) within the 500 m regulatory area, a risk assessment was conducted in line with Section 21 (c) and (i) of the National Water Act, 1998, (Act 36 of 1998).

This assessment has been completed in accordance with the requirements of the published General Notice (GN) 509 by the Department of Water and Sanitation (DWS). This notice was published in the Government Gazette (no. 40229) under Section 39 of the National Water Act (Act no. 36 of 1998) in August 2016, for a Water Use Licence (WUL) in terms of Section 21(c) & (i) water uses. The GN 509 process provides an allowance to apply for a WUL for Section 21(c) & (i) under a General Authorisation (GA), as opposed to a full Water Use Licence Application (WULA). A water use (or potential) qualifies for a GA under GN 509 when the proposed water use/activity is subjected to analysis using the DWS Risk Assessment Matrix (RAM). This assessment will implement the RAM and provide a specialist opinion on the appropriate water use authorisation.

A number of moderate risks (without mitigation) were identified for the construction phase of the project, these are largely attributed to the direct impact of these aspects on the watercourses. Implementation of the prescribed mitigation measures will reduce the level of risk posed by these aspects to low. The duration of these aspects is also expected to be short in duration. Moderate risks without mitigation were identified for the operational phase of the project, but this is attributed to the longevity of this phase. However, based on the assumption that the prescribed mitigation measures will be implemented the level of risk is reduced to low for this phase of the project. Only low risks were identified for the decommissioning phase of

the project, which is also expected to have a short duration. This phase will also allow for the recovery of the system.

For the proposed power line alternatives, mitigation measures are largely associated with avoiding the delineated watercourse areas and implementing recommended buffer zones. Impacts are associated with the installation of pylons or installing an underground cable. The impact table for the power line construction are presented in Table 3-14 and DWS risk assessment presented in the subsequent tables. Risks associated with the proposed project range from moderate to low without mitigation measures (worst case scenario), and with the implementation of adequate mitigation measures, all post-mitigation risks to the watercourses are rated as Low.

Table 3-14 Impacts assessed for the proposed powerline crossings

Activity	Aspect	Impact
Andrew Husted (Pr Sci Nat 400213/11)		
Construction phase	Clearing of vegetation	The clearing of vegetation and stripping of topsoil will increase runoff and increase the potential of erosion and sedimentation of the watercourses. The operation of equipment, vehicles and machinery brings the risk of contaminants polluting the systems. Access routes change drainage.
	Stripping and stockpiling of topsoil	
	Establish working area	
	Digging of hole/trench	
	Vehicle access	
	Leaks and spillages from machinery, equipment & vehicles	
	Solid waste disposal	
	Human sanitation& ablutions	
	Re-fuelling of machinery and vehicles	
	Laydown & storage areas	
Operation phase	Standing mono-poles/backfilled trench	The placement of poles within the system may impact on the hydro-dynamics of the watercourse. The access route will alter drainage, and also be a potential source of sedimentation.
	Service route	
	Removal of poles	
	Vehicle access	
Decommissioning phase	Leaks and spillages from machinery, equipment & vehicles	The removal of the poles/underground cables and access route will restore the hydrodynamics to some extent. The operation of equipment, vehicles and machinery brings the risk of contaminants polluting the systems.
	Solid waste disposal	
	Human sanitation& ablutions	
	Re-fuelling of machinery and vehicles	
	Laydown & storage areas	

Table 3-15 DWS Risk Impact Matrix for the proposed project

Aspect	Flow Regime	Water Quality	Habitat	Biota	Severity	Spatial scale	Duration	Consequence
Construction Phase								
Clearing of vegetation	3	3	3	3	3	2	1	6
Stripping and stockpiling of topsoil	3	3	2	2	2.5	1	1	4.5
Establish working area	2	3	3	3	2.75	1	1	4.75
Digging of hole/trench	2	2	2	2	2	1	1	4
Vehicle access	2	3	2	3	2.5	1	1	4.5
Leaks and spillages from machinery, equipment & vehicles	1	3	2	2	2	1	1	4
Solid waste disposal	1	3	1	2	1.75	1	1	3.75
Human sanitation& ablutions	1	2	1	2	1.5	1	1	3.5
Re-fuelling of machinery and vehicles	1	3	2	2	2	1	1	4
Laydown & storage areas	2	3	2	2	2.25	1	1	4.25
Operational Phase								
Standing mono-poles/backfilled trench	2	1	1	2	1.5	1	4	6.5
Service route	2	3	2	2	2.25	2	4	8.25
Decommissioning Phase								
Removal of poles	2	2	2	2	2	1	1	4
Vehicle access	2	3	2	3	2.5	2	1	5.5
Leaks and spillages from machinery, equipment & vehicles	1	3	2	2	2	1	1	4
Solid waste disposal	1	3	1	2	1.75	1	1	3.75
Human sanitation& ablutions	1	2	1	2	1.5	1	1	3.5
Re-fuelling of machinery and vehicles	1	3	2	2	2	1	1	4
Laydown & storage areas	2	3	2	2	2.25	1	1	4.25

Table 3-16 DWS Risk Assessment Continued

Aspect	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Sig.	Without Mitigation	Confidence Level	Control Measures	With Mitigation
Construction Phase										
Clearing of vegetation	3	3	5	2	13	78	**Moderate***	80%	Section 3.4.4.1	Low
Stripping and stockpiling of topsoil	3	3	5	2	13	58.5	**Moderate***	80%	Section 3.4.4.1	Low
Establish working area	1	2	5	2	10	47.5	**Moderate***	80%	Section 3.4.4.1	Low
Digging of hole/trench	2	2	5	2	11	44	**Moderate***	80%	Section 3.4.4.1	Low
Vehicle access	2	2	5	2	11	49.5	**Moderate***	80%	Section 3.4.4.1	Low
Leaks and spillages from machinery, equipment & vehicles	2	2	1	3	8	32	**Low**	80%	Section 3.4.4.1	Low
Solid waste disposal	2	2	1	2	7	26.25	**Low**	80%	Section 3.4.4.1	Low
Human sanitation& ablutions	2	2	1	2	7	24.5	**Low**	80%	Section 3.4.4.1	Low
Re-fuelling of machinery and vehicles	2	2	1	2	7	28	**Low**	80%	Section 3.4.4.1	Low
Laydown & storage areas	2	2	1	2	7	29.75	**Low**	80%	Section 3.4.4.1	Low
Clearing of vegetation	3	3	5	2	13	78	**Moderate***	80%	Section 3.4.4.1	Low
Operational Phase										
Standing mono-poles/backfilled trench	3	2	1	2	8	52	**Moderate***	80%	Section 3.4.4.1	Low
Service route	3	2	1	2	8	66	**Moderate***	80%	Section 3.4.4.1	Low
Decommissioning Phase										
Removal of poles	2	2	1	2	7	28	**Low**	80%	Section 3.4.4.1	Low
Vehicle access	2	2	5	2	11	60.5	**Low**	80%	Section 3.4.4.1	Low
Leaks and spillages from machinery, equipment & vehicles	2	2	1	3	8	34	**Low**	80%	Section 3.4.4.1	Low
Solid waste disposal	2	2	1	2	7	28	**Low**	80%	Section 3.4.4.1	Low
Human sanitation& ablutions	2	2	1	2	7	26.25	**Low**	80%	Section 3.4.4.1	Low
Re-fuelling of machinery and vehicles	2	2	1	2	7	28	**Low**	80%	Section 3.4.4.1	Low
Laydown & storage areas	2	2	1	2	7	26.25	**Low**	80%	Section 3.4.4.1	Low

3.4.4.1 Mitigation Measures

The following mitigation measures are provided:

- Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering the environment;
- Mixing of concrete must under no circumstances take place within the drainage lines. No batching may be allowed on the bare ground, it must be readymix or batched on batching plates;
- The water resources outside of the specific development area must be avoided;
- Laydown yards, camps and storage areas must be beyond the watercourse areas. Where possible, the construction of the crossings must take place from the existing road and not from within the drainage line;
- The contractors used for the project should have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly;
- Prevent uncontrolled access of vehicles through the watercourse that can cause a significant adverse impact on the hydrology and alluvial soil structure of these areas;
- All chemicals and toxicants to be used for the construction must be stored outside the watercourses and in a bunded area within the site camp. Mobile refuelling must be done over a drip tray beyond of all watercourse and buffer areas;
- All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site;
- All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good “housekeeping”;
- Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the development area. These should not be placed near any water course or in buffer zones. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation);
- Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the watercourses;
- All removed soil and material must not be stockpiled within the watercourses. Stockpiling should take place outside of watercourses. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds;
- Erosion and sedimentation into the drainage lines must be minimised through the effective stabilisation in compliance with the stormwater and erosion management plan (e.g. gabions and Reno mattresses) and the re-vegetation of any disturbed areas;

- Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses that are drought tolerant) to protect the exposed soil;
- No dumping of construction material on-site may take place;
- All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported;
- Make sure all excess consumables and building materials / rubble are removed from site and deposited at an appropriate waste facility; and
- Landscape and re-vegetate all cleared areas as soon as possible to limit erosion potential.

4 Impact Risk Assessment

The proposed project will include the following infrastructure:

- A BESS with a capacity of up to 2 000 MWh, inside containers with a footprint of up to 6ha in extent and a maximum height of 3m. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation;
- Access roads to the BESS (10m in width, approximately 70m long) branching off of the existing roads, and internal roads (up to 8m wide) to be located within the total BESS footprint area;
- 33kV MV cabling between the BESS and the MV/HV substation and up to 132kV HV cabling to the HV substation;
- Fencing around the BESS for increased security measures;
- Up to 132kV overhead or underground power line to be connected to the existing Hidden Valley Substation;
- Temporary laydown area to be located within the BESS footprint;
- Firebreak to be located within the BESS footprint; and
- A Substation with a maximum height of - HV bus-bar up to10 m max and an HV Building up to 4 m max

4.1 Biodiversity Risk Assessment

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

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 and operation of the development were then subjected to a prescribed impact assessment method. Impacts were assessed in terms of the construction and operational phases. The operational phase refers to that phase of the project where the construction has been completed. The development is set to be long lasting, and a closure phase was not assessed for that reason. It should be noted that the impacts described are not exhaustive, and more impacts may be identified at a later stage. Mitigation measures were only applied to impacts deemed relevant based on the impact analysis.

Impacts were assessed for the following activities (Figure 4-1):

1) Construction Phase
    a. The BESS
    b. A substation (already constructed)
    c. Powerline
        i. Option A
            1. Overhead
            2. Underground
        ii. Option B
            1. Overhead
            2. Underground
        iii. Option C
            1. Overhead
            2. Underground
2) Operational Phase
    a. The BESS
    b. A substation (already constructed)
    c. Powerline
        i. Option A
            1. Overhead
            2. Underground
        ii. Option B
            1. Overhead
            2. Underground
        iii. Option C
            1. Overhead
            2. Underground

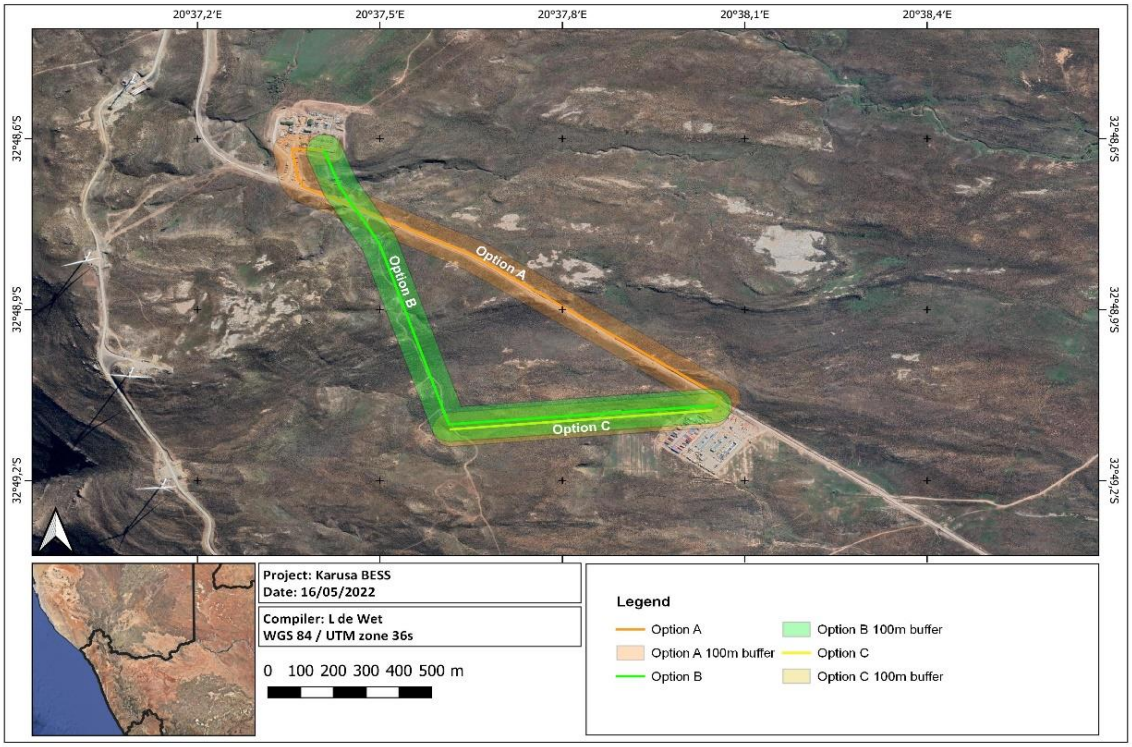


Figure 4-1 The project options considered for the assessment

4.2 Present Impacts to Biodiversity

Considering the anthropogenic activities and influences within the landscape, several negative impacts to biodiversity were observed within the assessment area. These include:

- Erosion and loss of habitat as a result of runoff;
- Overgrazing;
- Litter; and
- Loss of indigenous flora and associated edge effects from existing infrastructure.

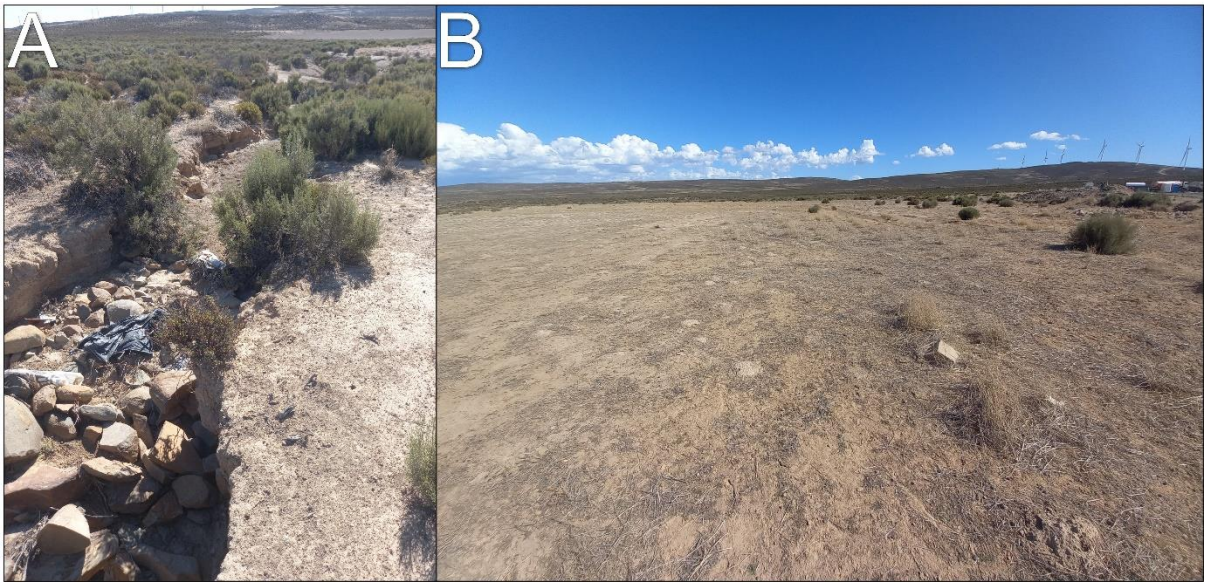


Figure 4-2 Photographs illustrating a portion of the present impacts to biodiversity within the assessment area, primarily erosion (A) and overgrazing (B).

4.3 Alternatives considered

Alternative routing of the kV line has been assessed including three possible routes, 2 aligned adjacent to one another across greenfields and the other lies adjacent to the existing WEF access road. In addition, both overhead and underground options were assessed for the powerlines.

No alternatives were provided for the BESS and substation.

4.4 Irreplaceable Loss

The current proposed layout of the activity will result in the irreplaceable loss of;

- A part of a Critical Biodiversity Area (CBA); and
- Protected plant species.

4.5 Identification of Additional Potential Impacts

A summary of the potential impacts during the construction and operational phases of the proposed activity are presented in Table 4-1. Impacts to water resources during the operational phase were undertaken as part of the water resources assessment.

Table 4-1 Summary of potential impacts to biodiversity associated with the proposed activity (including both underground and overhead powerlines).

Main Impact	Project Activities	Secondary Impacts Anticipated
Loss of karoo scrub habitat	• Direct loss as a result of construction and operation of the proposed kV line • Secondary impacts associated with noise, dust and influx of alien invasive plants into these areas	• Habitat fragmentation. • Loss of ecosystem services. • Emigration of fauna species including SCC.

Loss of rocky outcrop habitat	• Direct loss as a result of construction and operation of the proposed kV line • Secondary impacts associated with noise, dust and influx of alien invasive plants into these areas	• Habitat fragmentation. • Loss of ecosystem services. • Emigration of fauna species including SCC.
Loss of riparian thicket habitat	• Secondary impacts associated with noise, dust and influx of alien invasive plants into these areas	• Loss of ecosystem services
Degradation of surrounding highly sensitive habitats.	• Prevention of fires or incorrect fire regimes. • Removal of vegetation. • Improper solid waste disposal • Dust precipitation. • Spilling of hazardous chemicals from machinery. • Illegal hunting in sensitive areas.	• Loss of flora and fauna including SCC. • Increased potential for soil erosion. • Habitat fragmentation. • Increased potential for establishment of invasive alien vegetation.
Encroachment of invasive alien species in disturbed areas.	• Vegetation removal. • Soil disturbance • Vehicles potentially spreading seed.	• Habitat loss for native flora & fauna (including SCC). • Alteration of fauna assemblages due to habitat modification.
Direct mortality of fauna.	• Preparation of soil with heavy machinery • Intentional killing of fauna for food (hunting) or persecution (especially with regards to herpetofauna). • Pollution of water resources due to spilling of hazardous chemicals from heavy machinery during construction.	• Loss of ecosystem services.
Emigration of fauna	• Disturbance from construction activities. • Loss of habitat and degradation of surrounding habitats.	• Reduced population of SCC • Loss of ecosystem services.

4.6 Assessment of Impact Significance

The standard impact assessment methodology may be used in the capture of generic anticipated impacts and potential mitigation measures for Basic Assessment Reports and Environmental Impact Assessment (EIA) Reports. The methodology described herein complies with the requirements of the EIA Regulations (2014), promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

The purpose of the impact assessment is to:

- Assess impacts of proposed activities on biodiversity of the proposed development area;
- Assess whether proposed activities are likely to have significant impacts on biodiversity and specifically species of conservation concern; and
- Identify practically implementable mitigation measures to reduce the significance of proposed activities on biodiversity.

It is important to note that the ratings applied within the risk assessment model, considered impacts to open space or natural habitats within the development area and not for areas already transformed.

4.6.1 Construction Phase

The following potential main impacts on the biodiversity (including avifauna) (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 communities,
- Introduction of alien species, especially plants;
- Destruction of protected plant species;
- Displacement of the faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching);
- Collection of eggs, nest destruction and poaching.

Table 4-2 Impacts to biodiversity associated with the proposed construction phase: Loss of vegetation within the development footprint (Construction of BESS).

Impact Nature: Loss of vegetation within the development footprint		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
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 4-3 Impacts to biodiversity associated with the proposed construction phase Loss of vegetation within the development footprint (Construction of Substation – already constructed).

Impact Nature: Loss of vegetation within the development footprint
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.

	Without mitigation	With mitigation
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
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 4-4 Impacts to biodiversity associated with the proposed construction phase Loss of vegetation within the development footprint (Construction of Kv line – Option A - Overhead).

Impact Nature: Loss of vegetation within the development footprint		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
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 4-5 Impacts to biodiversity associated with the proposed construction phase Loss of vegetation within the development footprint (Construction of Kv line – Option A - Underground).

Impact Nature: Loss of vegetation within the development footprint		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
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 4-6 Impacts to biodiversity associated with the proposed construction phase Loss of vegetation within the development footprint (Construction of Kv line – Option B - Overhead).

Impact Nature: Loss of vegetation within the development footprint		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
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 4-7 Impacts to biodiversity associated with the proposed construction phase Loss of vegetation within the development footprint (Construction of Kv line – Option B - Underground).

Impact Nature: Loss of vegetation within the development footprint		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
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 4-8 Impacts to biodiversity associated with the proposed construction phase Loss of vegetation within the development footprint (Construction of Kv line – Option C - Overhead).

Impact Nature: Loss of vegetation within the development footprint		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
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 4-9 Impacts to biodiversity associated with the proposed construction phase Loss of vegetation within the development footprint (Construction of Kv line – Option C - Underground).

Impact Nature: Loss of vegetation within the development footprint		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
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 4-10 Impacts to biodiversity associated with the proposed construction phase: Introduction of alien species, especially plants (Construction of all infrastructure, all options).

Impact Nature: Introduction of alien species, especially plants		
Degradation and loss of surrounding natural vegetation arising from construction activities and dust precipitation		
	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
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 4-11 Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of the BESS)

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Low (4)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs require a permit for relocation.	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
The loss of some of the protected species are unavoidable.		

Table 4-12 Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of the Substation – already Constructed)

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**High (64)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs require a permit for relocation.	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		

The loss of some of the protected species are unavoidable.

Table 4-13 Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of the Kv Line - Option A - Overhead)

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs require a permit for relocation.	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
The loss of some of the protected species are unavoidable.		

Table 4-14 Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of the Kv Line - Option A - Underground)

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs require a permit for relocation.	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		

The loss of some of the protected species are unavoidable.

Table 4-15 Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of the Kv Line - Option B - Overhead)

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs require a permit for relocation.	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
The loss of some of the protected species are unavoidable.		

Table 4-16 Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of the Kv Line - Option B - Underground)

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs require a permit for relocation.	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		

The loss of some of the protected species are unavoidable.

Table 4-17 Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of the Kv Line - Option C - Overhead)

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs require a permit for relocation.	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
The loss of some of the protected species are unavoidable.		

Table 4-18 Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of the Kv Line - Option C - Underground)

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs require a permit for relocation.	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		

The loss of some of the protected species are unavoidable.

Table 4-19 Impacts to biodiversity associated with the proposed construction phase: Displacement of faunal community (Construction of all infrastructure, all options)

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	Moderate (3)	Low (2)
Duration	Moderate term (3)	Very short term (1)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (48)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
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.		

Table 4-20 Impacts to biodiversity associated with the proposed construction phase: Collection of eggs, nest destruction and poaching (Construction of all infrastructure, all options).

Nature:		
Collection of eggs, nest destruction and poaching		
	Without mitigation	With mitigation
Extent	High (4)	Low (2)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (60)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
• **All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting or hunting terrestrial species (e.g. guineafowl, francolin), and owls, which are often persecuted out of superstition.**		

• **Signs must be put up stating that should any person be found poaching any species they will be fined.** • **Construction must take place in the winter months as far as possible.**
Residual Impacts:
There is a possibility that the eggs to be poached could be that of an SCC with decreasing numbers

4.6.2 Operational Phase

It is anticipated that daily activities associated with the operation phase will lead to further spread the IAP, as well as 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 maintenance vehicles do not only cause sensory disturbances to fauna, affecting their life cycles and movement, but will lead to direct mortalities due to collisions.

The following potential impacts were considered:

- Continued fragmentation and degradation of habitats and ecosystems;
- Spread of alien and/or invasive species;
- Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration);
- Collisions with powerlines and connection lines and fences; and
- Electrocution by powerline.

Table 4-21 Impacts to biodiversity associated with the proposed operational phase: Continued fragmentation and degradation of habitats and ecosystems (Operation of all infrastructure, all options).

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	Moderate (3)	Low (2)
Duration	Long term (4)	Very short term (1)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (52)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
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 some potential for erosion and IAP encroachment even with the implementation of control measures. Impacts will however be low with the implementation of control measures.

Table 4-22 Impacts to biodiversity associated with the proposed operational phase: Spread of alone and/or invasive species (Operation of all infrastructure, all options).

Impact Nature: Spread of alien and/or invasive species			
Degradation and loss of surrounding natural vegetation			
	Without mitigation	**With mitigation**	
Extent	High (4)	Low (2)	
Duration	Long term (4)	Short term (2)	
Magnitude	Moderate (6)	Minor (2)	
Probability	Highly probable (4)	Improbable (2)	
Significance	**Medium (56)**	**Low (12)**	
Status (positive or negative)	Negative	Negative	
Reversibility	Moderate	High	
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 4-23 Impacts to biodiversity associated with the proposed operational phase: Ongoing displacement and direct mortalities of faunal community (Operation of BESS)

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**
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Low (4)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	**Low**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
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. Road killings are still a possibility. Migratory routes of fauna will change, fauna and flora species composition will change.

Table 4-24 Impacts to biodiversity associated with the proposed operational phase: Ongoing displacement and direct mortalities of faunal community (Operation of Substation)

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**
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (39)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
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. Road killings are still a possibility. Migratory routes of fauna will change, fauna and flora species composition will change.		

Table 4-25 Impacts to biodiversity associated with the proposed operational phase: Ongoing displacement and direct mortalities of faunal community (Operation of kV line – Option A – Overhead)

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**
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (39)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
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. Road killings are still a possibility. Migratory routes of fauna will change, fauna and flora species composition will change.	

Table 4-26 Impacts to biodiversity associated with the proposed operational phase: Ongoing displacement and direct mortalities of faunal community (Operation of kV line – Option B – Overhead)

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**
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (39)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
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. Road killings are still a possibility. Migratory routes of fauna will change, fauna and flora species composition will change.		

Table 4-27 Impacts to biodiversity associated with the proposed operational phase: Ongoing displacement and direct mortalities of faunal community (Operation of kV line – Option C – Overhead)

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**
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (39)**	**Low (12)**
Status (positive or negative)	Negative	Negative

Reversibility	Moderate	High
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. Road killings are still a possibility. Migratory routes of fauna will change, fauna and flora species composition will change.		

Table 4-28 Impacts to biodiversity associated with the proposed operational phase: Collisions with powerlines, connection lines and fences (Operation of BESS, Substation and Kv lines – Options A, B and C – Overhead).

Nature: **Collisions with powerlines and connection lines and fences**		
The powerlines and connections create a collision risk t avifauna.		
	Without mitigation	With mitigation
Extent	High (4)	High (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High (64)**	**Medium (42)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		

• **Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. This would involve using existing/approved pylons and associated infrastructure for the kV lines.**
• **Powerlines must be marked with industry standard (at the time of construction) bird flight diverters.**
• **Fencing mitigations:**
  • **Top 2 strands must be smooth wire**
  • **Routinely retention loose wires**
  • **Minimum 30cm between wires**
  • **Place markers on fences**		

Residual Impacts:		
Some collisions of avifauna might still occur regardless of mitigation		

Table 4-29 Impacts to biodiversity associated with the proposed operational phase: Electrocution by Powerline (Operation of Kv line – Options A, B and C – Overhead)

Nature: **Electrocution by powerline**		
	Without mitigation	With mitigation

Extent	High (4)	High (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Improbable (2)
Significance	**High (64)**	**Low (28)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

- **Perches (if in accordance with Eskom Standards) should be placed on pylons to allow for avifauna to perch on the pylons in positions safe from electrocution.**
- **Ensure that monitoring is sufficiently frequent (preferably monthly for the first year, followed by quarterly thereafter) to detect electrocutions reliably and that any areas where electrocutions occurred are repaired as soon as possible.**
- **During the first year of operation, quarterly reports summarizing interim findings should be complied by the owner of the powerlines and submitted to BirdLife South Africa. If the findings indicate that electrocutions have not occurred or are minimal with no red-listed species, an annual report can be submitted.**

Residual Impacts:

Electrocutions might still occur regardless of mitigations

4.7 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 (all activities, as required for assessment of cumulative impacts including surrounding wind energy facilities, powerlines and associated infrastructure in the region).

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, dust deposition, noise and vibration, disruption of corridors or habitat, groundwater drawdown, groundwater and surface water quality, and transport.

Table 4-30 Cumulative Impacts to biodiversity associated with the proposed project.

The development of the proposed infrastructure will contribute to cumulative habitat loss, thereby impacting 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	Moderate (3)	Moderate (3)
Duration	Short term (2)	Short term (2)

Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Medium (33)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation:		
Should the vegetation be removed, the impact cannot be mitigated.		
Residual Impacts:		
Will result in the loss of: • **Less migratory species will be found in the area.** • **Road killings are still a possibility.** • **Migratory routes of fauna will change.** • **Fauna and flora species composition will change.**		

4.8 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 4-31 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 4-31 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 vegetation..	An appropriate/adequate fire management plan needs 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.

4.9 Biodiversity Management Objectives

The purpose of the management Objectives is to inform on the mitigations required to lower the risk of the impacts associated with the proposed activity, provide measures for improving the conservation value of the property and to be able to be inserted into the Environmental Management Programme (EMPr). The mitigation actions required to reduce the significance of the impacts associated with the development are provided in Table 4-32. Please note that the construction phase activity measures are only implemented if there is a need for development.

Table 4-32 Summary of management objectives pertaining to impacts to biodiversity and ecosystems associated with the proposed development

Management Outcome: Vegetation and Habitats				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All development areas must be clearly demarcated. No development is to occur in areas possessing 'Very High' SEI. Only the 'High' SEI areas that have been authorised for development could be intruded into. These areas can be spanned, as long as no infrastructure, including construction phase access tracks are to be constructed or used. These areas must remain out of bounds.	Life of operation	Project Manager	Infringement into these areas	Ongoing
Areas of indigenous vegetation outside of the direct project footprint, should under no circumstances be fragmented or disturbed further.	Life of operation	Project Manager	Natural Areas (Karoo scrub, Rocky outcrops and Riparian thicket)	Ongoing
All activities must make use of existing roads and tracks as far as practically and feasibly possible.	Life of operation	Project Manager	Roads and paths used	Ongoing
Apply for a permit to relocate protected plant species into the on-site relocation areas already used for transplantation of rescued pants or if not available, then to similar habitat recommended by a specialist.	Construction	Project Manager	Relocation/destruction of protected plant species	Ongoing
All laydown areas, chemical toilets etc. should be restricted to 'Very Low' SEI 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. Use of re-usable/recyclable materials are recommended.	Construction	Project Manager Foreman	Laydown areas and material storage & placement.	Ongoing
Progressive rehabilitation of areas that have been cleared of invasive plants will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion.	Life of operation	Project Manager	Site footprint rehabilitation	During Phase

Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation.	Life of operation	Project Manager	Rehabilitated areas	Ongoing
A spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.	Life of operation	Project Manager Contractors Foreman	Spill events, Vehicles dripping.	Ongoing
Eroded areas must be rehabilitated using the appropriate techniques and re-vegetated using indigenous flora.	Life of operation	Project Manager Contractor	Erosion area	Annually
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 to identify fauna species that will be directly disturbed and to relocate protected fauna/flora that are found during the construction activities. The area must be walked though prior to construction to ensure no faunal species remain in the habitat and get killed. 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	Project Manager Contractor	Presence of any fauna	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	Project Manager Contractor Foreman	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed	Life of operation	Project Manager Contractor	Evidence of trapping or carcasses	Ongoing
The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna	Construction Phase	Project Manager Contractor	Construction	Ongoing
Management Outcome: Invasive Alien Plants				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
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 thereby causing further encroachment of invasive species.	Construction	Project Manager Contractor	Footprint Area	Bi-annually (twice a year)
Management Outcome: Dust Pollution				
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, for all areas of construction. This includes wetting of exposed soft soil surfaces.	Life of operation	Project Manager Contractor	Dustfall	As per the air quality report and the 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. All solid waste collected shall be disposed of at a licensed disposal facility	Life of operation	Project Manager Contractor	Waste Removal	Weekly
Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Life of operation	Health and Safety Officer Contractor	Number of toilets per staff member. Waste levels	Daily
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	Project Manager Health and Safety Officer Contractor	Collection/handling of the waste.	Ongoing
Refuse bins will be emptied and secured. Temporary storage of domestic waste shall be in covered waste skips. Domestic waste storage must be cleared at least monthly. Recycling is encouraged.	Life of operation	Project Manager Health and Safety Officer Contractor	Management of bins and collection of waste	Ongoing
Management Outcome: Environmental Awareness Training				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All personnel to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of species, their identification, conservation status and importance, biology, habitat requirements and management requirements within the Environmental Authorisation and the EMPr.	Life of operation	Project Manager Health and Safety Officer Contractor Environmental Officer	Compliance to the training.	As needed

5 Conclusion and Impact Statement

5.1 Conclusion

The completion of a comprehensive desktop study, in conjunction with the results from the field survey, suggest there is a medium-high confidence in the information provided. The survey ensured that there was suitable ground-truth coverage of the open-spaces or natural habitats, and ecosystems were assessed to obtain a general species (fauna and flora) overview and the major current impacts were observed.

The assessment area was identified with the screening as possessing a Very High sensitivity within a Terrestrial Biodiversity context, with the area and surrounding landscape regarded as part of a CBA. Presently, there are natural habitats within the assessment area that possess a High SEI. This is due to the combination of their functional integrity and conservation importance.

One (1) NT mammal species was recorded during the survey period. Based on the habitat present, there is also a high likelihood of select SCC occurring within the assessment area. Several plant Species of Conservation Concern that are provincially protected were recorded from the study area. Permits will be required for the trimming, removal or relocation of any such species from the provincial authorities.

The karoo scrub and rocky outcrop ecosystems were still natural to largely natural based on the diversity of species recorded, and the habitat physiognomy. The current natural ecosystems provide important ecosystem services including water regulation and pollination. However, certain areas are degraded due to overgrazing and erosion were still nevertheless functional. The findings of the field survey are therefore congruent with the DFFE screening tool.

Areas of rocky outcrops delineated as assigned an SEI of “Very High” sensitivity are considered no go areas. These may be spanned by overheard powerlines but no construction infrastructure is to be placed in these areas, including access tracks. Personnel are not to use these areas for any reason.

Based on the provided options for the proposed kV line:

1) Options A
    a. Overhead
    b. Underground
2) Option B
    a. Overhead
    b. Underground
3) Option c
    a. Overhead
    b. Underground

The option with the least impacts is Option A, adjacent to the existing constructed road. Use of this option would reduce further fragmentation as well as limiting loss of biodiversity and SCC to one area. The Overhead option would decrease the impacts to vegetation and allow for the avoidance of no-go areas (one such area is present along Option A) however, this would have a greater impact on avifauna. The underground option will increase impacts to

flora but decrease impacts to avifauna. Both are considered to have equal impacts overall and the decision on which option to use should be based on engineering, maintenance and cost considerations.

Based on a combination of desktop and in-field delineation, two (2) forms of a watercourse were identified and delineated within the 500 m regulated area applied. These include an artificial wetland system and episodic drainage lines/ features. No natural wetland systems were identified for the project area. The drainage lines are not characterised by riparian vegetation and grasses, these systems represent bare surfaces with evidence of surface run-off.

A 15 m buffer width was recommended for the project area (all drainage features) for the construction and operational phases. The buffered areas and drainage features have been allocated as a medium sensitivity.

5.2 Impact Statement

An impact statement is required as per the NEMA regulations with regards to the proposed development. The main impacts expected from the proposed activity are the loss of CBA areas, degradation and further fragmentation of surrounding natural habitats, the direct mortality of fauna species and the emigration of fauna SCC due to disturbance.

Considering the above-mentioned information, the proposed development will result in the in the destruction of some functional habitats. It is the opinion of the specialist that the proposed activities can go ahead provided areas of high SEI are avoided, and control of introduced alien invasive plants, as well as erosion mitigation is implemented. All Biodiversity Management Objectives provided in this report and mitigation measures provided in other supporting specialist reports must be implemented.

Due to the presence of non-perennial watercourses within the 500 m regulatory area, a risk assessment was completed in line with Section 21 (c) and (i) of the National Water Act, 1998, (Act 36 of 1998). Regarding the overhead or underground options, there are expected low post-mitigation risks, and a General Authorisation is permissible for the development..

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7 Appendix Items

7.1 Appendix A – Protocol Checklist

"Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity" gazetted 20 March 2020, published in Government Notice No. 320

Paragraph	Item	Pages	Comment
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.	i	
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	2-3	
2.3.1	A description of the ecological drivers or processes of the system and how the proposed development will impact these.	58	
2.3.2	Ecological functioning and ecological processes (e.g. fire, migration, pollination, etc.) that operate within the preferred site	58	
2.3.3	The ecological corridors that the proposed development would impede including migration and movement of flora and fauna.	18-20	
2.3.4	The description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments.	18-20	
2.3.5	A description of terrestrial biodiversity and ecosystems on the preferred site, including: (a) main vegetation types; (b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified.	16-17 21	
2.3.6	The assessment must identify any alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and	-	No "low" sensitivity areas were identified due to the ecological condition of the site.

	verified through the site sensitivity verification.		
2.3.7.1	Terrestrial Critical Biodiversity Areas (CBAs), including: (a) the reasons why an area has been identified as a CBA; (b) an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation; (c) the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s); (d) the impact on ecosystem threat status; (e) the impact on explicit subtypes in the vegetation; (f) the impact on overall species and ecosystem diversity of the site; and (g) the impact on any changes to threat status of populations of species of conservation concern in the CBA.	16-19 58-59	
2.3.7.2	Terrestrial ecological support areas (ESAs), including: (a) the impact on the ecological processes that operate within or across the site; (b) the extent the proposed development will impact on the functionality of the ESA; and (c) loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna.	-	No ESAs recorded within the assessment area
2.3.7.3	Protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including- (a) an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan.	17-18	

2.3.7.4	Priority areas for protected area expansion, including- (a) the way in which in which the proposed development will compromise or contribute to the expansion of the protected area network.		
2.3.7.5	SWSAs including: (a) the impact(s) on the terrestrial habitat of a SWSA; and (b) the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses)	19 59-60	
2.3.7.6	FEPA sub catchments, including- (a) the impacts of the proposed development on habitat condition and species in the FEPA sub catchment	21	
2.3.7.7	indigenous forests, including: (a) impact on the ecological integrity of the forest; and (b) percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.	-	No forest habitats within the area
3.1.1.	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae.	Cover page i	
3.1.2	A signed statement of independence by the specialist.	115	
3.1.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment.	3 8	
3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant.	8-15	
3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations.	3	

3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant).	50-52	
3.1.7	Additional environmental impacts expected from the proposed development.	58-60	
3.1.8	Any direct, indirect and cumulative impacts of the proposed development.		
3.1.9	The degree to which impacts and risks can be mitigated.	60-68	
3.1.10	The degree to which the impacts and risks can be reversed.	-	None
3.1.11	The degree to which the impacts and risks can cause loss of irreplaceable resources.	58 60-68	
3.1.12	Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr).	70-74	
3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate.	-	None
3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not;	75	
3.1.15	any conditions to which this statement is subjected	75	

7.2 Appendix B – Flora species expected to occur in the project area

Family	Scientific name	Growth form	POSA	Recorded	IUCN	Endemic
	Angiospermae indet			x		
	Angiospermae indet			x		
	Angiospermae indet			x		
	Indet 1			x		
Aizoaceae	*Antimima loganii*	succulent		x	VU	
Aizoaceae	*Antimima pumila*	succulent;	x		DD	x
Aizoaceae	*Antimima stayneri*	succulent;	x		LC	x
Aizoaceae	*Cleretum lyratifolium*	succulent;	x		LC	x
Aizoaceae	*Galenia pubescens*	dwarf shrub;	x		LC	x
Aizoaceae	*Hammeria gracilis*	succulent;	x		LC	x
Aizoaceae	*Mesembryanthemum*	succulent		x		
Aizoaceae	*Mesembryanthemum grossum*	succulent;	x		LC	x
Aizoaceae	*Ruschia intricata*	shrub; succulent		x	LC	
Amaryllidaceae	*Gethyllis campanulata*	geophyte;	x		LC	x
Amaryllidaceae	*Gethyllis villosa*	geophyte;	x		LC	x
Anacardiaceae	*Laurophyllus capensis*	tree;	x		LC	x
Anacardiaceae	*Searsia longispina*	shrub;		x	LC	
Apiaceae	*Chamarea longipedicellata*	herb;	x		LC	
Apiaceae	*Conium fontanum*	herb;	x		LC	
Asparagaceae	*Asparagus capensis*	shrub		x	LC	
Asparagaceae	*Asparagus capensis var. capensis*	shrub;	x		LC	
Asparagaceae	*Asparagus sp. indet*	shrub		x		
Asphodelaceae	*Bulbine alooides*	succulent; geophyte; herb;	x		LC	x
Asphodelaceae	*Bulbine capensis*	succulent; herb;	x		LC	x
Asphodelaceae	*Bulbine succulenta*	succulent; geophyte; herb;	x		LC	x
Asphodelaceae	*Bulbinella elegans*	geophyte; herb;	x		LC	x
Asphodelaceae	*Bulbinella latifolia subsp. denticulata*	geophyte; herb;	x		LC	x
Asphodelaceae	*Bulbinella nutans subsp. nutans*	geophyte; herb;	x		LC	x
Asphodelaceae	*Gonialoe variegata*	succulent; herb;	x		LC	
Asphodelaceae	*Haworthia arachnoidea var. scabrispina*	succulent;	x		NE	x
Asphodelaceae	*Kniphofia sarmentosa*	herb;	x		LC	x
Asphodelaceae	*Trachyandra patens*	succulent; geophyte;	x		LC	x
Asphodelaceae	*Trachyandra sanguinorhiza*	geophyte;	x		LC	x
Asphodelaceae	*Trachyandra thyrsoidea*	succulent; geophyte;	x		LC	x
Asteraceae	*Asteraceae sp. indet*	shrub		x		
Asteraceae	*Asteraceae sp. indet*	shrub		x		

Family	Scientific name	Growth form	POSA	Recorded	IUCN	Endemic
Asteraceae	*Berkheya rigida*	herb		x	LC	
Asteraceae	*Chrysocoma ciliata*	shrub		x	LC	
Asteraceae	*Dicerothamnus rhinocerotis*	shrub		x	LC	
Asteraceae	*Dimorphotheca cuneata*	shrub;	x	x	LC	
Asteraceae	*Eriocephalus ericoides subsp. ericoides*	shrub;	x		LC	
Asteraceae	*Eriocephalus eximius*	shrub;	x		LC	
Asteraceae	*Eriocephalus punctulatus*	shrub;	x		LC	
Asteraceae	*Eriocephalus purpureus*	shrub;	x		LC	x
Asteraceae	*Euryops lateriflorus*	shrub;	x	x	LC	
Asteraceae	*Euryops oligoglossus subsp. racemosus*	shrub;	x		LC	x
Asteraceae	*Felicia australis*	herb;	x		LC	x
Asteraceae	*Felicia dregei*	shrub;	x		LC	x
Asteraceae	*Felicia filifolia subsp. schaeferi*	shrub;	x		LC	
Asteraceae	*Felicia namaquana*	herb;	x		LC	
Asteraceae	*Gazania leiopoda*	herb;	x		LC	x
Asteraceae	*Helichrysum leontonyx*	herb;	x		LC	
Asteraceae	*Lasiospermum pedunculare*	herb;	x		LC	x
Asteraceae	*Leysera tenella*	herb;	x		LC	
Asteraceae	*Macledium spinosum*	Succulent		x	LC	
Asteraceae	*Oedera genistifolia*	shrub		x	LC	
Asteraceae	*Osteospermum scariosum var. scariosum*	succulent; herb;	x		NE	
Asteraceae	*Pentzia incana*	shrub		x	LC	
Asteraceae	*Pteronia empetrifolia*	shrub;	x		LC	x
Asteraceae	*Pteronia incana*	shrub;	x	x	LC	x
Asteraceae	*Senecio arenarius*	herb;	x		LC	
Asteraceae	*Seriphium plumosum*	shrub;		x	LC	
Asteraceae	*Steirodiscus capillaceus*	herb;	x		LC	x
Asteraceae	*Ursinia anthemoides subsp. versicolor*	herb;	x		LC	
Asteraceae	*Ursinia nana subsp. nana*	herb;	x		LC	
Boraginaceae	*Anchusa capensis*	herb;	x		LC	
Brassicaceae	*Heliophila carnosa*	succulent; dwarf shrub;	x		LC	
Brassicaceae	*Heliophila cornuta var. squamata*	shrub;	x		NE	
Brassicaceae	*Heliophila crithmifolia*	herb;	x		LC	
Brassicaceae	*Heliophila seselifolia*	herb	x		LC	
Brassicaceae	*Heliophila seselifolia var. seselifolia*	herb;	x		NE	
Brassicaceae	*Heliophila suborbicularis*	herb;	x		LC	x
Colchicaceae	*Colchicum coloratum subsp. burchellii*	geophyte;	x		LC	x
Colchicaceae	*Colchicum eucomoides*	geophyte	x		LC	x
Colchicaceae	*Colchicum hantamense*	geophyte;	x		LC	x
Colchicaceae	*Ornithoglossum undulatum*	geophyte;	x		LC	
Colchicaceae	*Wurmbea variabilis*	geophyte;	x		LC	x

Family	Scientific name	Growth form	POSA	Recorded	IUCN	Endemic
Crassulaceae	*Crassula deltoidea*	succulent		x	LC	
Crassulaceae	*Crassula muscosa*	succulent		x	LC	
Crassulaceae	*Crassula sp. indet*	succulent		x		
Crassulaceae	*Tylecodon wallichii*	Succulent		x	LC	
Cyperaceae	*Ficinia argyropa*	mesophyte; cyperoid; herb;	x		LC	x
Cyperaceae	*Pseudoschoenus inanis*	cyperoid; helophyte; herb;	x		LC	
Ebenaceae	*Diospyros austro-africana*	shrub		x	LC	
Encalyptaceae	*Encalypta vulgaris*	bryophyte;	x			
Fabaceae	*Fabaceae sp. indet*			x		
Fabaceae	*Lessertia falciformis*	dwarf shrub;	x		LC	
Fabaceae	*Lessertia frutescens subsp. frutescens*	shrub	x		LC	
Fabaceae	*Lotononis leptoloba*	herb;	x		LC	x
Fabaceae	*Lotononis venosa*	herb;	x		VU	x
Fabaceae	*Wiborgia sericea*	dwarf shrub; shrub;	x		LC	x
Geraniaceae	*Pelargonium leipoldtii*	succulent; geophyte;	x		LC	x
Geraniaceae	*Pelargonium luteopetalum*	geophyte;	x			x
Grimmiaceae	*Grimmia pulvinata*	bryophyte;	x			
Hyacinthaceae	*Drimia capensis*	geophyte;	x	x	LC	x
Hyacinthaceae	*Lachenalia canaliculata*	geophyte;	x		LC	x
Hyacinthaceae	*Lachenalia comptonii*	geophyte;	x		LC	x
Hyacinthaceae	*Lachenalia juncifolia*	geophyte;	x		LC	x
Hyacinthaceae	*Lachenalia longituba*	geophyte;	x		VU	x
Hyacinthaceae	*Lachenalia violacea*	geophyte;	x		LC	x
Hyacinthaceae	*Ornithogalum hispidum subsp. hispidum*	geophyte;	x		LC	
Hypoxidaceae	*Pauridia capensis*	geophyte;	x		LC	x
Iridaceae	*Babiana cuneata*	geophyte; herb;	x		LC	x
Iridaceae	*Geissorhiza heterostyla*	geophyte; herb;	x		LC	x
Iridaceae	*Geissorhiza karooica*	geophyte; herb;	x		NT	x
Iridaceae	*Gladiolus ceresianus*	geophyte; herb;	x		LC	x
Iridaceae	*Gladiolus splendens*	geophyte; herb;	x		LC	x
Iridaceae	*Gladiolus uysiae*	geophyte; herb;	x		LC	x
Iridaceae	*Hesperantha bachmannii*	geophyte; herb;	x		LC	x
Iridaceae	*Hesperantha cucullata*	geophyte; herb;	x		LC	x
Iridaceae	*Hesperantha humilis*	geophyte; herb;	x		LC	x
Iridaceae	*Hesperantha marlothii*	geophyte; herb;	x		LC	x
Iridaceae	*Hesperantha pilosa*	geophyte; herb;	x		LC	x
Iridaceae	*Ixia lacerata*	geophyte;	x		LC	x
Iridaceae	*Ixia linearifolia*	geophyte; herb;	x		LC	x
Iridaceae	*Ixia marginifolia*	geophyte; herb;	x		LC	x
Iridaceae	*Ixia mollis*	geophyte; herb;	x		VU	x

Family	Scientific name	Growth form	POSA	Recorded	IUCN	Endemic
Iridaceae	*Ixia namaquana*	geophyte; herb;	x		LC	x
Iridaceae	*Ixia trifolia*	geophyte; herb;	x		LC	x
Iridaceae	*Lapeirousia montana*	geophyte; herb;	x		LC	x
Iridaceae	*Moraea amabilis*	Geophyte	x		LC	
Iridaceae	*Moraea ciliata*	geophyte; herb;	x		LC	x
Iridaceae	*Moraea cookii*	geophyte; herb;	x		LC	
Iridaceae	*Moraea cuspidata*	geophyte	x		LC	
Iridaceae	*Moraea flava*	Geophyte	x			x
Iridaceae	*Moraea pritzeliana*	geophyte; herb;	x		LC	x
Iridaceae	*Romulea atrandra var. atrandra*	geophyte; herb;	x		LC	x
Iridaceae	*Romulea austinii*	geophyte; herb;	x		LC	x
Iridaceae	*Romulea diversiformis*	geophyte; herb;	x		LC	x
Iridaceae	*Romulea eburnea*	geophyte; herb;	x		VU	x
Iridaceae	*Romulea hirta*	geophyte; herb;	x		LC	x
Iridaceae	*Romulea tortuosa subsp. aurea*	geophyte; herb;	x		LC	x
Iridaceae	*Syringodea unifolia*	geophyte; herb;	x			x
Malvaceae	*Anisodontea anomala*	dwarf shrub; shrub;	x		LC	x
Malvaceae	*Anisodontea triloba*	shrub;	x		LC	x
Malvaceae	*Hermannia filifolia var. grandicalyx*	dwarf shrub;	x		NE	x
Molluginaceae	*Pharnaceum aurantium*	dwarf shrub;	x		LC	
Orchidaceae	*Disperis purpurata subsp. purpurata*	geophyte; herb;	x		LC	x
Orchidaceae	*Holothrix aspera*	herb; geophyte;	x		LC	x
Orchidaceae	*Pterygodium crispum*	geophyte	x		LC	x
Orchidaceae	*Pterygodium deflexum*	geophyte	x		LC	x
Orchidaceae	*Pterygodium hallii*	geophyte; herb;	x		LC	x
Orchidaceae	*Pterygodium schelpei*	geophyte; herb;	x		LC	x
Orchidaceae	*Pterygodium volucris*	geophyte; herb;	x		LC	x
Oxalidaceae	*Oxalis obtusa*	geophyte;	x		LC	
Oxalidaceae	*Oxalis palmifrons*	geophyte;	x		LC	x
Oxalidaceae	*Oxalis tenuipes var. tenuipes*	geophyte;	x		LC	x
Poaceae	*Ehrharta calycina*	graminoid;	x		LC	
Poaceae	*Poa bulbosa*	graminoid;	x		LC	
Poaceae	*Poaceae sp. indet*	graminoid;		x		
Poaceae	*Poaceae sp. indet*	graminoid;		x		
Poaceae	*Tragus sp.*	graminoid;		x		
Polygalaceae	*Polygala scabra*	shrub;	x		LC	
Pottiaceae	*Triquetrella tristicha*	bryophyte;	x			
Pteridaceae	*Cheilanthes deltoidea subsp. deltoidea*	geophyte; herb;	x		LC	
Pteridaceae	*Cheilanthes induta*	lithophyte; geophyte; herb;	x		LC	x
Rubiaceae	*Nenax cinerea*	dwarf shrub; shrub;	x		LC	
Rubiaceae	*Nenax microphylla*	dwarf shrub;	x		LC	
Santalaceae	*Thesium strictum*	succulent		x	LC	
Santalaceae	*Viscum capense*	parasite		x	LC	

Family	Scientific name	Growth form	POSA	Recorded	IUCN	Endemic
Scrophulariaceae	*Alonsoa unilabiata*	herb;	x		LC	x
Scrophulariaceae	*Aptosimum indivisum*	dwarf shrub;	x		LC	
Scrophulariaceae	*Diascia cardiosepala*	herb;	x		LC	x
Scrophulariaceae	*Diascia hexensis*	herb;	x		LC	x
Scrophulariaceae	*Diascia macrophylla*	herb;	x		LC	x
Scrophulariaceae	*Diascia parviflora*	herb;	x		LC	x
Scrophulariaceae	*Diascia sacculata*	herb;	x		LC	x
Scrophulariaceae	*Hebenstretia robusta*	dwarf shrub;	x		LC	x
Scrophulariaceae	*Manulea pusilla*	herb;	x		LC	x
Scrophulariaceae	*Nemesia azurea*	herb;	x		LC	x
Scrophulariaceae	*Polycarena aurea*	herb;	x		LC	x
Scrophulariaceae	*Selago divaricata*	dwarf shrub;	x		LC	
Scrophulariaceae	*Selago glabrata*	dwarf shrub;	x		LC	x
Scrophulariaceae	*Selago gloiodes*	herb; dwarf shrub;	x		LC	x
Scrophulariaceae	*Zaluzianskya bella*	herb;	x		LC	x
Scrophulariaceae	*Zaluzianskya mirabilis*	herb;	x		LC	x
Scrophulariaceae	*Zaluzianskya sp.*	herb	x			
Sphaerocarpaceae	*Sphaerocarpos stipitatus*	bryophyte;	x			
Targioniaceae	*Targionia hypophylla*	bryophyte;	x			
Zygophyllaceae	*Roepera fulva*	shrub		x		

7.3 Appendix C – Amphibian species expected to occur in the project area

Family	Scientific name	Common name	ADU-VM	Red List	Recorded
Bufonidae	*Vandijkophrynus gariepensis gariepensis*	Karoo Toad (subsp. gariepensis)		LC	x
Pyxicephalidae	*Amietia fuscigula*	Cape River Frog	x	LC	
Pyxicephalidae	*Tomopterna delalandii*	Cape Sand Frog	x	LC	

7.4 Appendix D – Reptile species expected to occur in the project area

Family	Scientific name	Common name	ADU	Red List	Recorded
Agamidae	*Agama atra*	Southern Rock Agama	x	LC	x
Cordylidae	*Cordylus minor*	Western Dwarf Girdled Lizard	x	LC	
Cordylidae	*Karusasaurus polyzonus*	Karoo Girdled Lizard	x	LC	x
Elapidae	*Aspidelaps lubricus lubricus*	Coral Shield Cobra	x	LC	
Gerrhosauridae	*Cordylosaurus subtessellatus*	Dwarf Plated Lizard	x	LC	
Lacertidae	*Pedioplanis lineoocellata pulchella*	Common Sand Lizard	x	LC	x
Lamprophiidae	*Boaedon capensis*	Brown House Snake	x	LC	
Testudinidae	*Chersina angulata*	Angulate Tortoise	x	LC	x
Testudinidae	*Psammobates tentorius tentorius*	Karoo Tent Tortoise	x	NT	
Viperidae	*Bitis arietans*	Puff Adder		LC	x

7.5 Appendix E – Avifauna species expected to occur within the project area

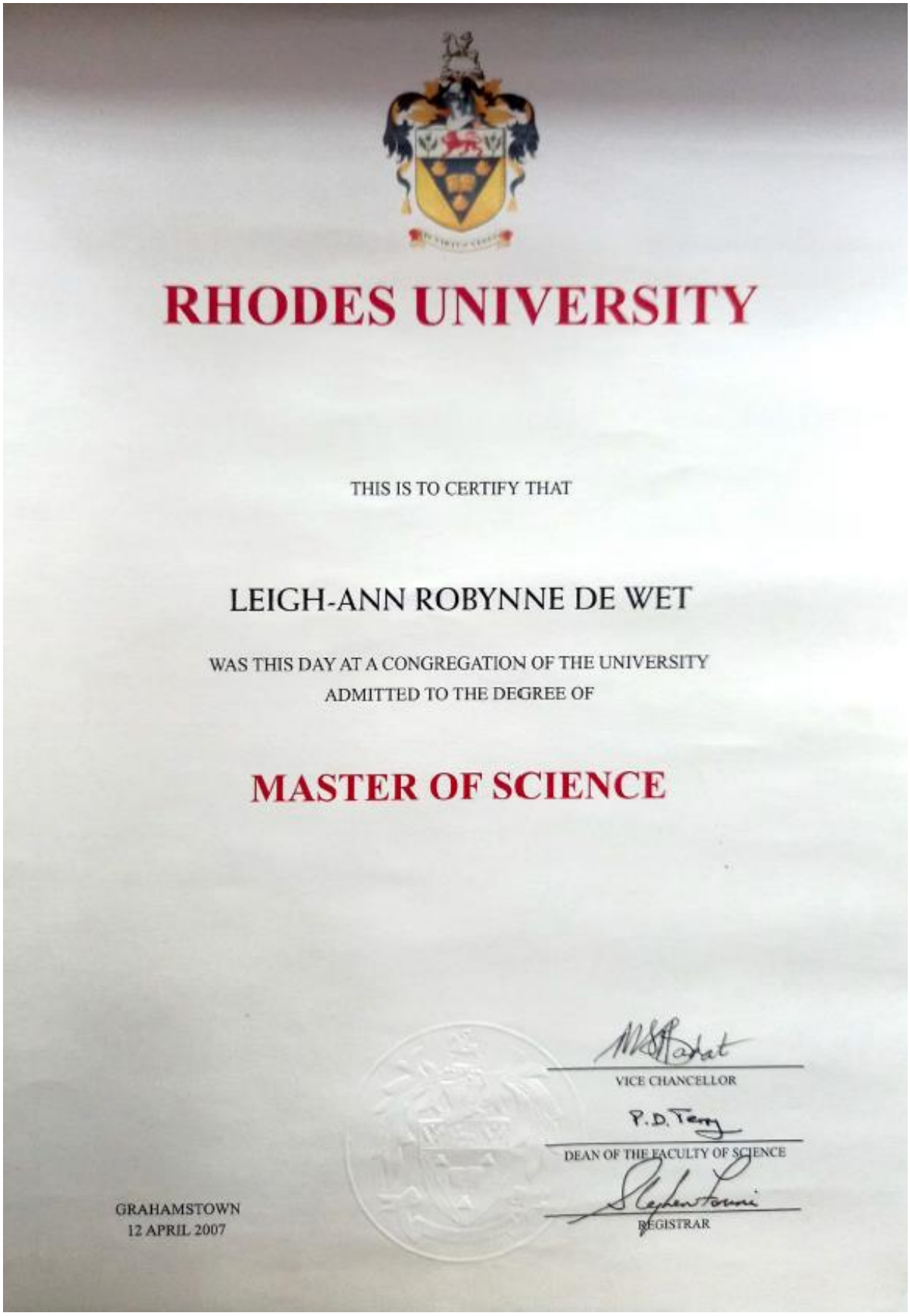
Scientific name	Common name	Red List	SABAP2	Recorded
Alopochen aegyptiaca	Goose, Egyptian	LC	x	
Anas capensis	Teal, Cape	LC	x	
Anas undulata	Duck, Yellow-billed	LC	x	
Apus barbatus	Swift, African Black	LC	x	
Ardea cinerea	Heron, Grey	LC	x	x
Bostrychia hagedash	Ibis, Hadada	LC	x	
Buteo buteo	Buzzard, Common	LC		x
Calandrella cinerea	Lark, Red-capped	LC	x	x
Calendulauda albescens	Lark, Karoo	LC		x
Calidris minuta	Stint, Little	LC	x	
Cercomela sinuata	Chat, Sickle-winged	LC		x
Cercotrichas coryphoeus	Scrub Robin, Karoo	LC	x	
Charadrius pecuarius	Plover, Kittlitz's	LC	x	
Charadrius tricollaris	Plover, Three-banded	LC	x	x
Charadrius tricollaris	Three-banded Plover	LC		x
Cinnyris chalybeus	Sunbird, Southern Double-collared	LC		x
Cisticola subruficapilla	Cisticola, Grey-backed	LC	x	
Colius colius	Mousebird, White-backed	LC	x	
Columba guinea	Pigeon, Speckled	LC	x	
Columba livia	Dove, Rock	LC		x
Corvus albicollis	Raven, White-necked	LC		x
Corvus albus	Crow, Pied	LC		x
Crithagra albogularis	Canary, White-throated	LC	x	x
Crithagra albogularis	White-throated Canary	LC		x
Crithagra flaviventris	Canary, Yellow	LC	x	x
Crithagra flaviventris	Yellow Canary	LC		x
Emberiza capensis	Bunting, Cape	LC	x	x
Emberiza capensis	Cape Bunting	LC		x
Falco rupicolus	Kestrel, Rock	LC		x
Falco rupicolus	Rock Kestrel	LC		x
Fulica cristata	Coot, Red-knobbed	LC	x	
Galerida magnirostris	Large-billed Lark	LC		x
Galerida magnirostris	Lark, Large-billed	LC	x	x
Hirundo albiguaris	Swallow, White-throated	LC		x
Lamprotornis bicolor	Starling, Pied	LC	x	x
Lanius collaris	Fiscal, Southern	LC	x	x
Melaenornis silens	Flycatcher, Fiscal	LC	x	
Melierax canorus	Goshawk, Pale Chanting	LC		x
Microcarbo africanus	Cormorant, Reed	LC	x	
Mirafra apiata	Lark, Cape Clapper	LC		x
Motacilla capensis	Wagtail, Cape	LC	x	x
Myrmecocichla formicivora	Chat, Ant-eating	LC	x	x
Myrmecocichla monticola	Mountain Wheatear	LC		x
Oenanthe familiaris	Chat, Familiar	LC	x	x

Scientific name	Common name	Red List	SABAP2	Recorded
Oenanthe pileata	Capped Wheatear	LC		x
Oenanthe pileata	Wheatear, Capped	LC	x	x
Passer domesticus	Sparrow, House	LC	x	x
Passer melanurus	Sparrow, Cape	LC	x	x
Phalacrocorax lucidus	Cormorant, White-breasted	LC	x	
Platalea alba	Spoonbill, African	LC	x	
Plectropterus gambensis	Goose, Spur-winged	LC	x	
Prinia maculosa	Prinia, Karoo	LC		x
Pternistis capensis	Spurfowl, Cape	LC		x
Pterocles namaqua	Sandgrouse, Namaqua	LC	x	
Ptyonoprogne fuligula	Martin, Rock	LC	x	x
Riparia paludicola	Martin, Brown-throated	LC	x	
Serinus alario	Canary, Black-headed	LC	x	
Spatula smithii	Shoveler, Cape	LC	x	
Streptopelia capicola	Dove, Cape Turtle	LC	x	x
Sturnus vulgaris	Starling, Common	LC	x	
Tachybaptus ruficollis	Grebe, Little	LC	x	x
Tachymarptis melba	Swift, Alpine	LC	x	
Tadorna cana	Shelduck, South African	LC	x	x
Tadorna cana	South African Shelduck	LC		x
Telophorus zeylonus	Bokmakierie	LC	x	x
Threskiornis aethiopicus	Ibis, African Sacred	LC	x	
Vanellus armatus	Lapwing, Blacksmith	LC	x	
Vanellus coronatus	Crowned Lapwing	LC		x
Vanellus coronatus	Lapwing, Crowned	LC		x

7.6 Appendix F – Mammal species expected to occur within the project area

Family	Scientific name	Common name	Red List	ADU-VM	Recorded
Bathyergidae	*Bathyergidae*	African Molerats			x
Bovidae	*Antidorcas marsupialis*	Springbok	LC	x	x
Bovidae	*Oreotragus oreotragus*	Klipspringer	LC	x	
Bovidae	*Ovis aries*	Domestic Sheep			x
Bovidae	*Pelea capreolus*	Vaal Rhebok	NT	x	x
Bovidae	*Raphicerus campestris*	Steenbok	LC	x	x
Bovidae	*Sylvicapra grimmia*	Bush Duiker	LC		x
Cercopithecidae	*Chlorocebus pygerythrus*	Vervet Monkey	LC	x	
Cercopithecidae	*Papio ursinus*	Chacma Baboon	LC	x	x
Cervidae	*Dama dama*	European Fallow Deer			x
Herpestidae	*Cynictis penicillata*	Yellow Mongoose	LC	x	
Herpestidae	*Herpestes pulverulentus*	Cape Gray Mongoose	LC	x	x
Herpestidae	*Herpestidae*	Mongooses			x
Hystricidae	*Hystrix africaeaustralis africaeaustralis*	Southern Porcupine	LC		x
Muridae	*Aethomys namaquensis*	Namaqua Rock Mouse	LC	x	x
Mustelidae	*Aonyx capensis*	African Clawless Otter	NT	x	
Mustelidae	*Ictonyx striatus*	Striped Polecat	LC	x	
Orycteropodidae	*Orycteropus afer*	Aardvark	LC	x	
Procaviidae	*Procavia capensis*	Cape Rock Hyrax	LC	x	x
Soricidae	*Crocidura cyanea*	Reddish-gray Musk Shrew	LC	x	
Viverridae	*Genetta genetta*	Common Genet	LC	x	

7.7 Appendix G – Specialists Qualifications



RHODES UNIVERSITY

THIS IS TO CERTIFY THAT

LEIGH-ANN ROBYNNE DE WET

WAS THIS DAY AT A CONGREGATION OF THE UNIVERSITY
ADMITTED TO THE DEGREE OF

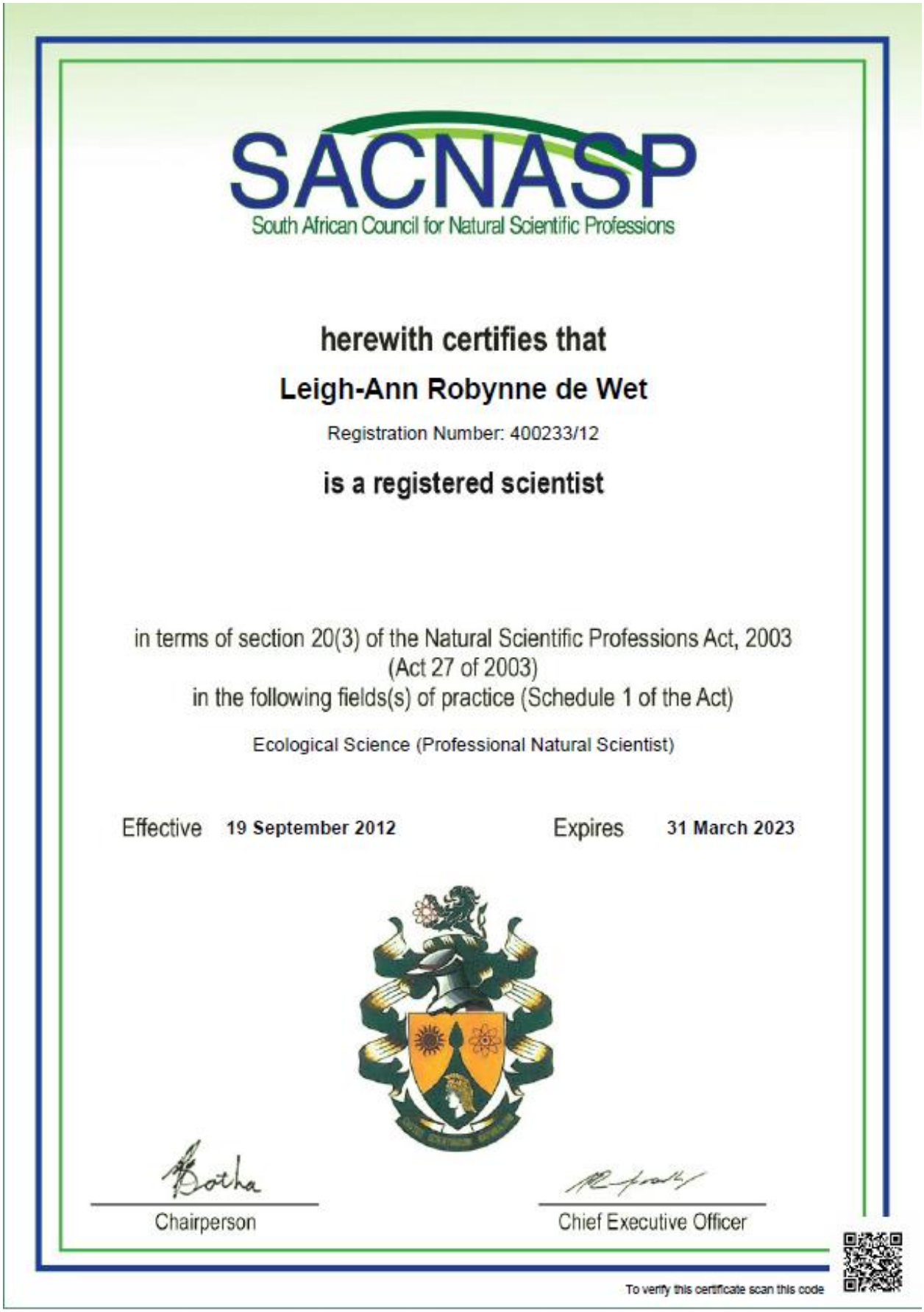
MASTER OF SCIENCE

VICE CHANCELLOR

DEAN OF THE FACULTY OF SCIENCE

REGISTRAR

GRAHAMSTOWN
12 APRIL 2007



SACNASP
South African Council for Natural Scientific Professions

herewith certifies that

Leigh-Ann Robynne de Wet

Registration Number: 400233/12

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Ecological Science (Professional Natural Scientist)

Effective **19 September 2012** Expires **31 March 2023**

Chairperson

Chief Executive Officer

To verify this certificate scan this code

7.8 Appendix H – Specialists Declaration of Independence

I, Leigh-Ann de Wet, 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.

Leigh-Ann de Wet

Biodiversity Specialist

The Biodiversity Company

March 2022