Grid Connection Infrastructure, including 132 kV Overhead Power Line, Switching Station and Ancillaries, for the Great Karoo Wind Farm - Biodiversity Basic Assessment

Sutherland, Northern Cape

October 2020

CLIENT

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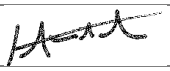
Report Name	**Grid Connection Infrastructure, including 132kV Overhead Power Line, Switching Station and Ancillaries, for the Great Karoo Wind Farm - Biodiversity Basic Assessment**
Reference	**Great Karoo Wind Farm OHL**
Submitted to	savannah environmental
Report Writer	**Mahomed Desai**  Dr. Mahomed Desai has extensive experience in assessing estuarine, freshwater and terrestrial biodiversity. He obtained his M.Sc. in Environmental Engineering and Ph.D. in Ecological Sciences, and has over 10 years of experience working with African fauna and flora as a researcher and consultant, through various projects.
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.

DECLARATION

I, Mahomed Desai, 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.

Mahomed Desai

Biodiversity and Aquatic Specialist

The Biodiversity Company

October 2020

Executive Summary

The authorised Great Karoo Wind Farm substation requires grid connection infrastructure to connect to the Hidden Valley substation, at the Karusa Wind Farm, currently under construction. The infrastructure required includes a switching station (up to 100 m x 100 m), 132 kV double- or single-circuit overhead powerline, with a length of up to 14 km. A grid connection corridor of 300 m has been identified for the power line and a 500 m assessment area for the switching station. The pylon structures of the power line will be up to 32 m high and the power line will be developed within the servitude of up to 40 m wide.

The Biodiversity Company was appointed to undertake a biodiversity basic assessment for the development of the specific grid connection infrastructure required. A review of the available ecological information and a field survey, undertaken in early Spring, was undertaken to inform on the impact of the proposed development on the receiving environment. The vegetation within the assessment corridor consists entirely of Central Mountains Shale Renosterveld, which is regarded as Least Threatened but is not formally protected. Furthermore, total extent of the vegetation type is relatively low and supports a relatively high diversity of plant Species of Conservation Concern (SCC). Moreover, the proposed development is located within areas that are classified as Critical Biodiversity Areas and a focus area for the National Protected Areas Expansion Strategy. Consequently, the vegetation type is considered to possess a moderate-high sensitivity. These areas are critical for maintaining biodiversity and ecological processes, and therefore development in these areas is generally not preferred. However, the footprint of the development is minimal and would also run adjacent to an existing power line, within the footprint of the authorised Great Karoo, Karusa and Soetwater Wind Farms (the latter two currently under construction), with the result that the additional extent of disturbance and habitat loss would be minimised and low. As a result, the low overall footprint of the power line would be very unlikely to compromise the ecological functioning of the affected CBAs in any way.

There are expected impacts on plant SCC due to habitat loss associated with the development, but with the appropriate mitigation (pre-construction walk-through and relocation), this is highly unlikely to compromise the local populations of any species. With regards to herpetofauna and mammals, there are species of conservation concern that are likely to be present or abundant at the site and the primary impact of the development on these particular faunal groups would be minor habitat loss. However, construction phase activities will be a higher threat and must be mitigated accordingly. No high long-term post-mitigation impacts on herpetofauna and mammals are expected to occur. Consequently, the impacts of the development on flora and fauna (herpetofauna and mammals) are considered acceptable and would be of low significance after mitigation. Cumulative impacts within the broader study area are of potential concern due to the proliferation of WEF energy development in the wider Roggeveld area. The contribution of the grid connection infrastructure is not considered to be a substantial contributor to cumulative impacts in the area. In consideration that the Great Karoo Wind Farm has already received authorisation, and the proposed grid connection infrastructure is a necessity for the distribution of energy. Development may proceed, but only with the implementation of mitigation measures provided in this report. Development of infrastructure can occur within any area of the corridor footprint, but pylons and the switching station are not be located in drainage lines. Formal crossings must be developed for the road to traverse these drainage lines. The location of the proposed infrastructure is not to exceed the boundary of the corridor.

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1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake a biodiversity assessment for the development of specific grid connection infrastructure required to connect and evacuate the generated power of the authorised Great Karoo Wind Farm to the national electricity grid. Following consultation with Eskom, it has been confirmed that the Great Karoo Wind Farm must connect to the Hidden Valley substation located at the Karusa Wind Farm (currently under construction to the west of Great Karoo Wind Farm). The project is located ~44 km south of Sutherland and ~50 km north of Matjiesfontein within the Northern Cape Province and falls within the Namakwa District Municipality and the Karoo Hoogland Local Municipality.

The grid connection infrastructure required includes a switching station (up to 100m x 100m) to be developed adjacent to the authorised Great Karoo Wind Farm substation. A 132 kV double- or single-circuit overhead powerline, with a length of up to 14 km, will connect the proposed switching station to the Eskom Hidden Valley substation. The proposed infrastructure will be appropriately placed within the respective corridors. The pylon structures of the power line will be up to 32 m high and the power line will be developed within the servitude of up to 40 m wide.

Other associated infrastructure includes a service track (“jeep track”) along the length of the power line servitude (6 m wide), and temporary laydown area/s that will be rehabilitated upon completion of the construction phase.

The grid connection infrastructure will be located within three affected properties:

- Farm Kentucky 206;
- Remainder of Portion 1 of the Farm Orange Fontein 203; and
- The Farm De Hoop 202.

The approach adopted for the assessments has taken cognisance of the recently published Government Notice 320 in terms of NEMA dated 20 March 2020: “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation”. The National Web based Environmental Screening Tool has characterised the terrestrial biodiversity for the project area/corridor as “very high sensitivity”.

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 project area/corridor. This was achieved through the following:

- Desktop assessment to identify the reference vegetation types within the landscape;
- Desktop assessment to identify possible threatened species that occur within the landscape;

- Field survey to record flora and fauna species within the surrounding landscape, especially Species of Conservation Concern (SCC), i.e. threatened or protected species;
- Delineate the habitat types that may be influenced by the proposed activity and allocate the respective habitat sensitivity based on the presence of SCC as well as ecosystem processes and services;
- A biodiversity risk assessment; and
- The prescription of mitigation measures and recommendations for identified risks.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The assessment area/corridor was based on the route provided by the client and any alterations to the route and/or missing GIS information pertaining to the assessment area would have affected the area surveyed;
- The fieldwork component of the assessment comprised one assessment only and therefore, this study has not assessed any long-term temporal trends. Moreover, the fieldwork could only be conducted for 1.5 days;
- The field survey was undertaken in early spring and therefore the probability of detection of certain species will be lowered as:
    - Not all angiosperm species will be flowering, which is generally required for identifying certain geophytes, epiphytes and lithophytes; and
    - Migratory species may not be present yet.
- Due to accessibility constraints, no night survey was undertaken and thus will limit the likelihood of observing nocturnal species, especially amphibians.

Despite these limitations, the timing and duration of the survey were deemed suitable due to the nature of the development.

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 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

2 Methods

2.1 Project Area

The proposed development area (i.e. affected properties) is situated approximately 44 km south of Sutherland in the Namakwa District Municipality, Northern Cape (Figure 2-1). The area is located south of the Great Escarpment and the Klein Roggeveldberge traverses in an approximately north-south trajectory. The corridor is located east of the R354 that connects Matjiesfontein to Sutherland. The affected land portions comprise of Kentucky 206, Portion 1 of

Orange Fontein 203 and De Hoop 202. The South African National Land-cover database indicates that the affected properties are predominantly shrubland (fynbos), with patches of natural grassland and fallow lands.

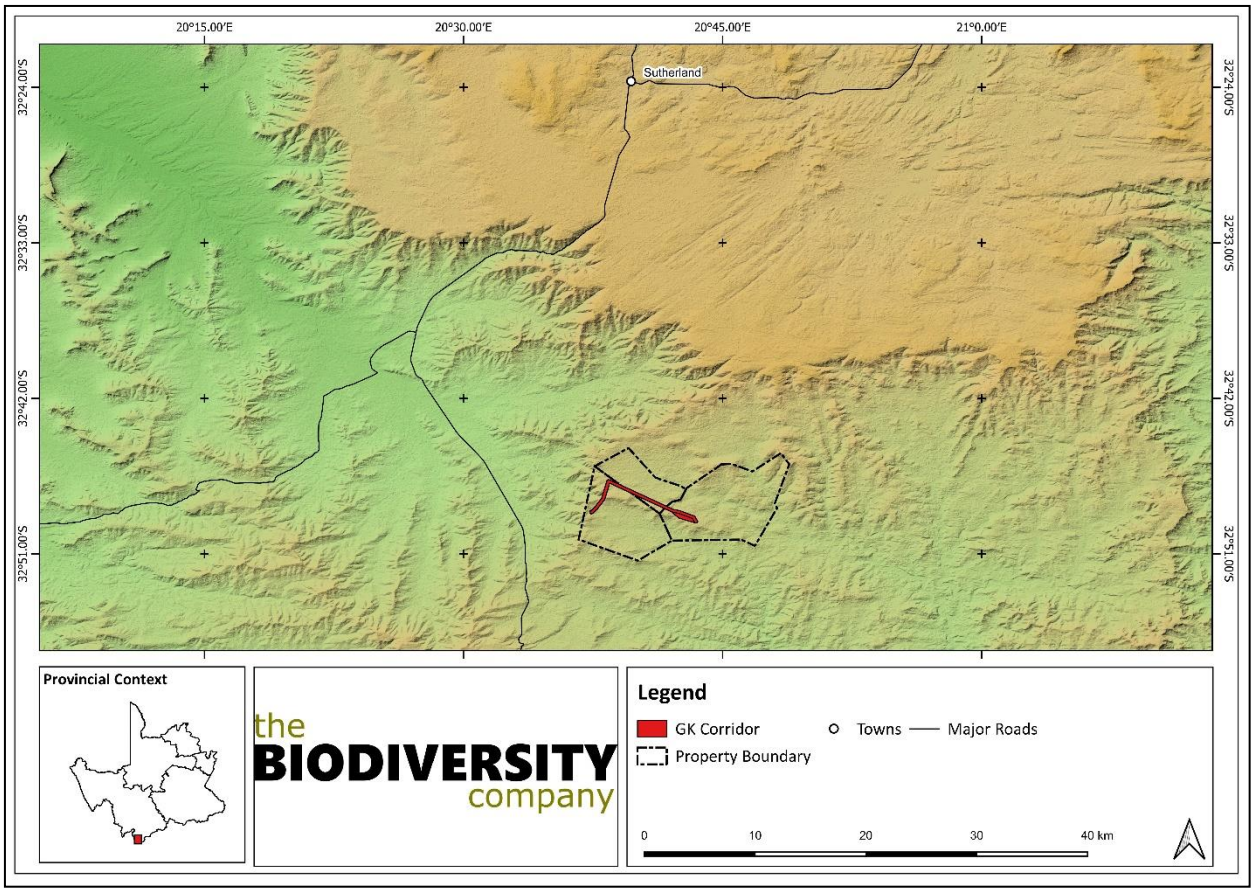

Figure 2-1 Map illustrating the location of the proposed Great Karoo OHL and Switching Station corridor, and the associated affected properties

2.2 Desktop Assessment

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

2.2.1 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) (DEA, 2020) – The South African Protected Areas Database (SAPAD) contains spatial data for the conservation of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.

  - National Protected Areas Expansion Strategy (NPAES) (SANBI, 2010) – The 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.

- Critical Biodiversity Areas (Northern Cape Department of Environment and Nature Conservation, 2016) – Critical Biodiversity Areas (CBAs) are natural or near-natural features, habitats or landscapes that include terrestrial, aquatic and marine areas that are considered critical for:

  - meeting national and provincial biodiversity targets and thresholds;

  - safeguarding areas required to ensure the persistence and functioning of species and ecosystems, including the delivery of ecosystem services; and/or

  - conserving important locations for biodiversity features or rare species.

  The identification of Critical Biodiversity Areas for the Northern Cape was undertaken using a Systematic Conservation Planning approach. Available data on biodiversity features (incorporating both pattern and process, and covering terrestrial and inland aquatic realms), their condition, current Protected Areas and Conservation Areas, and opportunities and constraints for effective conservation were collated. Priorities from existing plans such as the Namakwa District Biodiversity Plan, the Succulent Karoo Ecosystem Plan, National Estuary Priorities, and the National Freshwater Ecosystem Priority Areas were incorporated.

- 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

- 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.

2.2.2 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 2-2). The Red List of South African Plants (Raimondo *et al.,* 2009; SANBI, 2020) was utilized to provide the most current national conservation status of flora species.

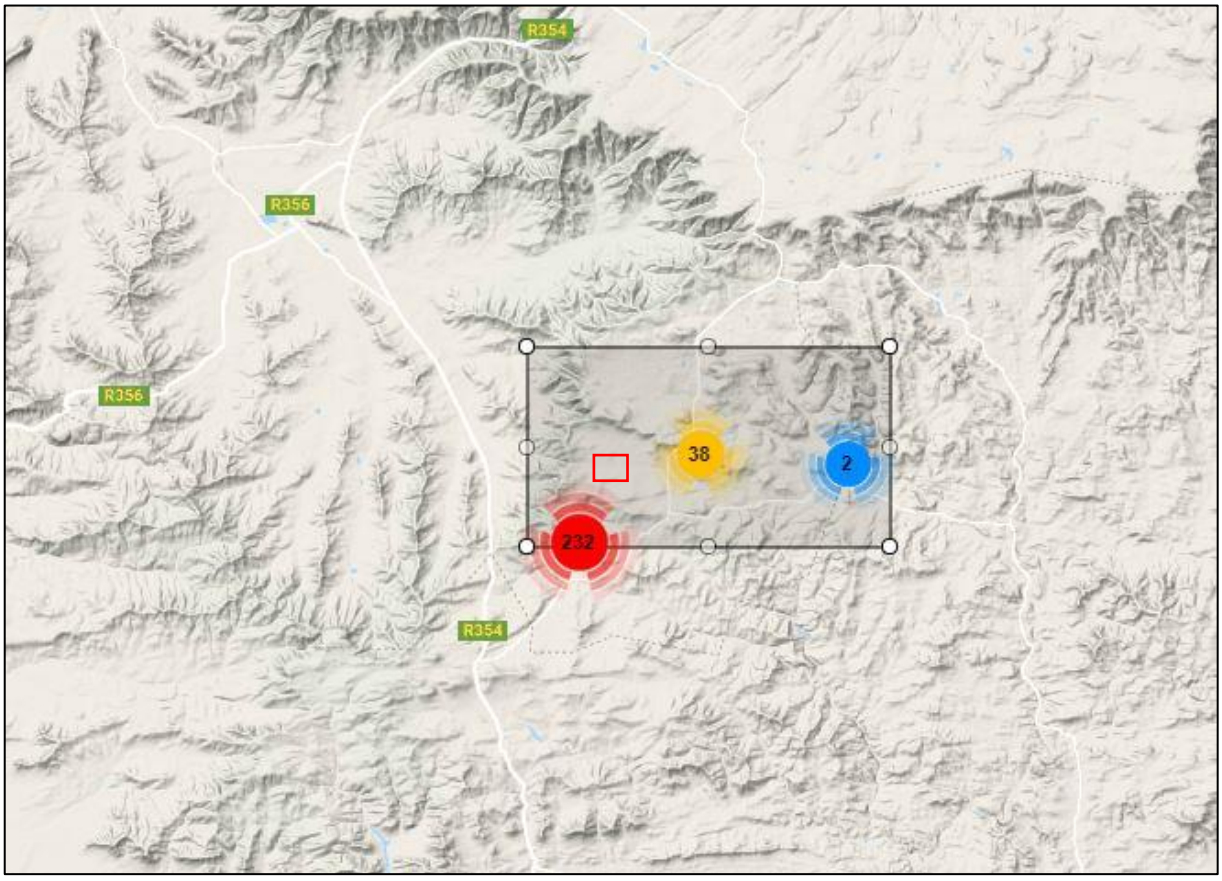

Figure 2-2 ***Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database. Red rectangle indicates approximate location of the project area***

2.2.3 Desktop Faunal Assessment

The faunal desktop assessment comprised of the following:

- Compiling an expected amphibian list generated from the IUCN spatial dataset (2017) and the Animal Demography Unit using the 3220 DC quarter degree square (2020);
- Compiling an expected reptile list generated from the IUCN spatial dataset (2017) and the Animal Demography Unit using the 3220 DC quarter degree square (2020); and
- Compiling an expected mammal list from the IUCN spatial dataset (2017) and Animal Demography Unit using the 3220 DC quarter degree square (2020).

2.3 Field Assessment

A single field survey was undertaken during the 15th – 16th September 2020 (Spring) to confirm the presence of SCC, as well as any sensitive habitat features. The extent of the fieldwork survey consisted of a 300 m wide corridor along the proposed OHL route, which widens to approximately 740 m on the eastern portion (Figure 2-3), as well as 500m assessment area around the wind farm substation. 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.).

Sightings and observations made during a previous survey of the area by the specialist (author of this report) within the Karusa and Soetwater WFs were also considered in this assessment. The previous survey occurred from the 18th – 25th August 2020 (late Winter). Although the survey focused on the Soetwater and Karusa WFs, the assessment area for the Great Karoo OHL overlaps with the Karusa and Soetwater WFs and the vegetation types are the same with no substantial barrier to flora dispersion and fauna movement. The outcomes of the assessments previously undertaken for the Great Karoo Battery Energy Storage System at the Great Karoo substation (3Foxes Biodiversity Solutions, 2020a) and extension of grid connection infrastructure for the Gunstfontein Wind Farm (3Foxes Biodiversity Solutions, 2020b) were also considered. The proposed Great Karoo OHL runs parallel to the Gunstfontein grid connection extension along the north-south section of the OHL.

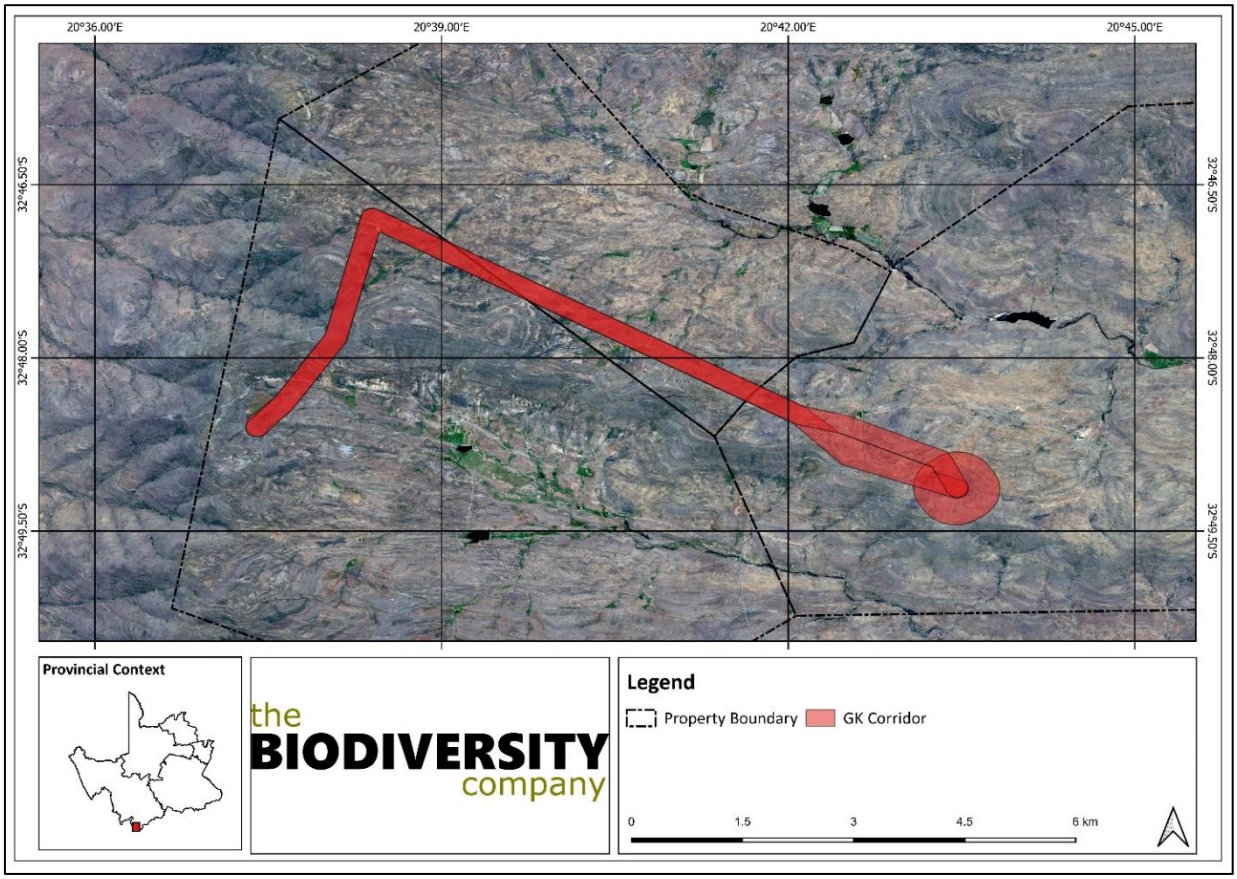

Figure 2-3 Map illustrating the field assessment area pertaining to the proposed Great Karoo OHL and Switching Station

2.3.1 Flora Assessment

The botanical study encompassed an assessment of an array of the vegetation units and habitat types within the project 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);
- Problem Plants and Alien Weeds of South Africa (Bromilow, 2010)
- Orchids of South Africa: A Field Guide (Johnson & Bytebier, 2015);
- Field Guide to Succulents in Southern Africa (Smith et al, 2017); and
- Field Guide to Wildflowers of South Africa (Manning, 2009).

2.3.2 Faunal Assessment

2.3.2.1 Invertebrate Assessment

To understand the ecological condition of the habitats within the assessment area, the Formicidae (Ants) community was considered in this assessment as they are reliable indicators of habitat condition (Andersen et al, 2002; Gollan et al, 2011). This is because each species or

group differ in their tolerance to anthropogenic drivers. Species were actively searched for in micro-habitats such as under rocks, under and in coarse woody debris, inflorescences, termite mounds and under peeling bark. In addition to being reliable bio-indicators, they are important in maintaining ecosystem functioning as they predate on other invertebrate species, turnover soil, control plant pathogens and distribute myrmecochorous (ant-dispersed) seeds.

2.3.2.2 Vertebrate Assessment

The vertebrate assessment within this report pertains to herpetofauna and mammals. Avifauna were assessed in a separate report. The vertebrate field survey comprised the following techniques:

- Camera traps – 2 camera traps were deployed in the area for 24 hours. The camera traps were baited with tinned sardines to improve sampling efficacy.
- Visual searches - This typically comprised of meandering or using binoculars to view species from a distance without them being disturbed; and
- Active hand-searches - are used for species that shelter in or under particular micro-habitats (typically rocks, exfoliating rock outcrops, fallen trees, leaf litter, bark etc.).

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

- Field Guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- A Complete Guide to the Snakes of Southern Africa (Marais, 2004);
- Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland (Bates et al, 2014);
- A Complete Guide to the Frogs of Southern Africa (du Preez and Carruthers, 2009);
- SASOL Birds of Southern Africa 3rd Edition (Sinclair et al, 2002);
- Roberts Birds of Southern Africa mobile app;
- Smithers' Mammals of Southern Africa (Apps, 2000); and
- A Field Guide to the Tracks and Signs of Southern and East African Wildlife (Stuart and Stuart, 2000).

2.3.3 Habitat Types and Sensitivity

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 sensitivity values based on their ecological integrity, conservation value, the presence of species of conservation concern and their ecosystem processes. The basis for the assigned sensitivity value is summarised in Table 2-1.

Table 2-1 Summary of criteria used for habitat sensitivity ratings

Sensitivity	Criteria
Very High	Critical and unique habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These areas are essentially no-go areas from a developmental perspective and should be avoided as much as possible.
High	Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity value, sensitivity, or important ecological role of the area. These areas may contain or be important habitat for faunal species or provide important ecological services such as water flow regulation or forage provision. Development within these areas is undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately.
Moderate	Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. These areas usually comprise the bulk of habitats within an area. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.
Low	Areas of natural or transformed habitat with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. Most types of development can proceed within these areas with little ecological impact.

3 Results & Discussion

3.1 Desktop Assessment

3.1.1 Ecologically Important Landscape Features

The GIS analysis pertaining to 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 Great Karoo OHL and Switching Station 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 in a Not Protected ecosystem	3.1.1.2
Protected Areas	Relevant – Located within a NPAES focus area	3.1.1.3
Critical Biodiversity Area	Relevant – Intersects CBAs	3.1.1.4
Important Bird and Biodiversity Areas	Irrelevant – More than 50 km to the closest IBA	3.1.1.5
South African Inventory of Inland Aquatic Ecosystems	Relevant – Least Threatened river systems within 500 m	3.1.1.6

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).

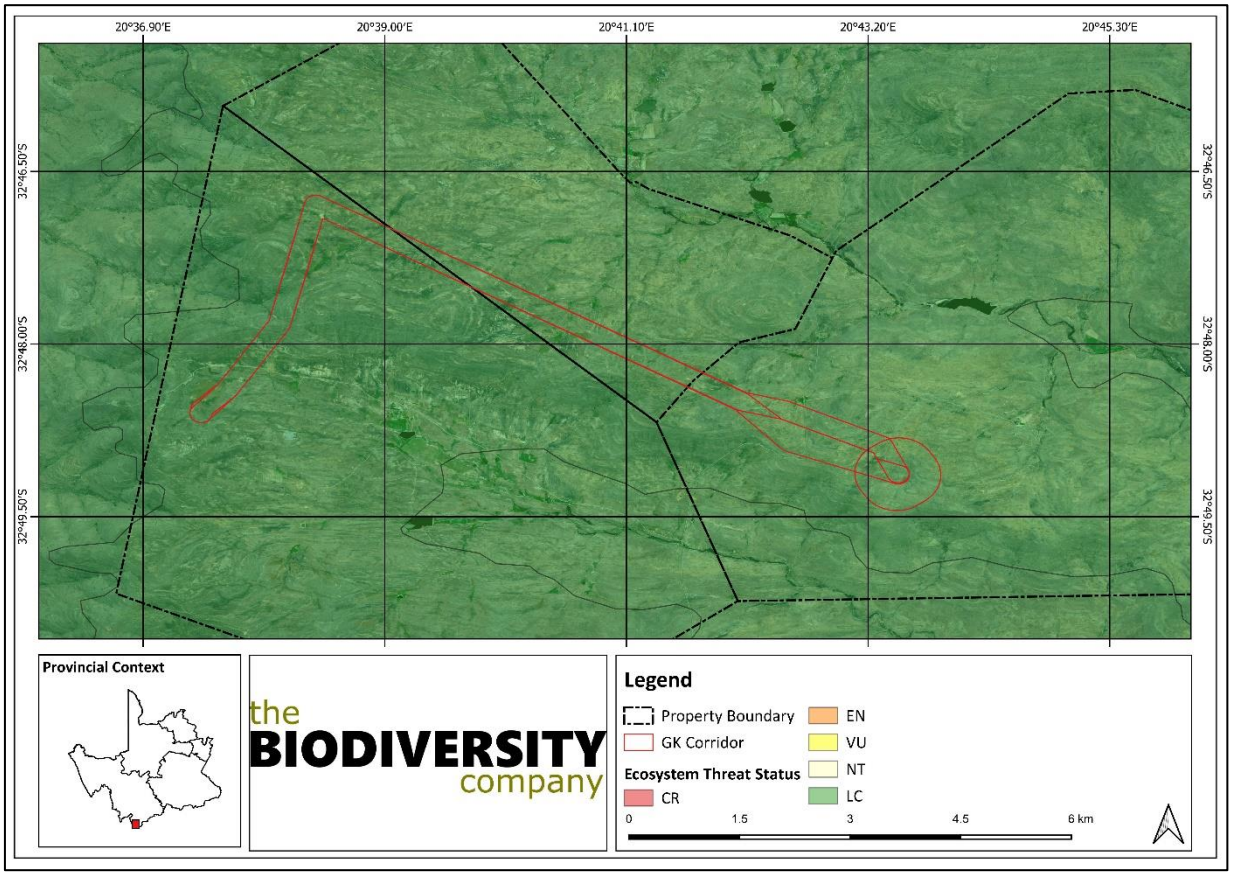

Figure 3-1 Map illustrating the ecosystem threat status associated with the proposed Great Karoo OHL and Switching Station

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, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems. The proposed development is located within a NP ecosystem (Figure 3-2).

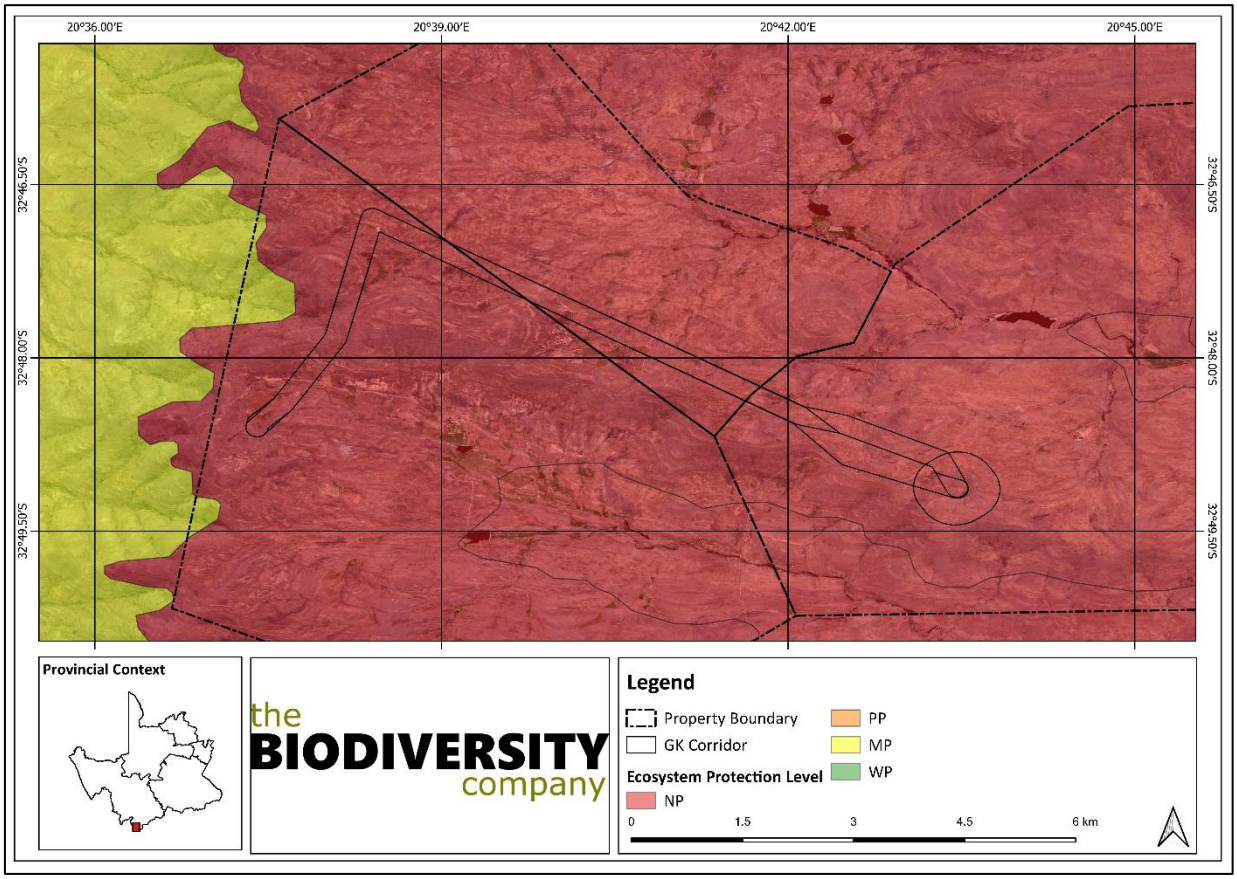

Figure 3-2 Map illustrating the ecosystem protection level associated with the proposed Great Karoo OHL and Switching Station

3.1.1.3 Protected Areas

According to the protected area spatial datasets from SAPAD (2019), the proposed development does not occur within any protected area (Figure 3-3). The Witteberg Nature Reserve, Anysberg Provincial Nature Reserve and Zuurkloof Private Nature Reserve are located approximately 50 km to the south of the proposed development and the Tankwa Karoo National Park occurs approximately 60 km to the north-west of the proposed development.

The proposed development is located within the Western Karoo focus area for the National Protected Area Expansion Strategy (NPAES) (Figure 3-3). Focus areas for land-based protected area expansion are large, intact and unfragmented areas of high importance, suitable for the creation or expansion of large protected areas. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. This suggests that development may occur within a portion of these areas, taking into consideration the nature of the development and the level of impact to the receiving environment.

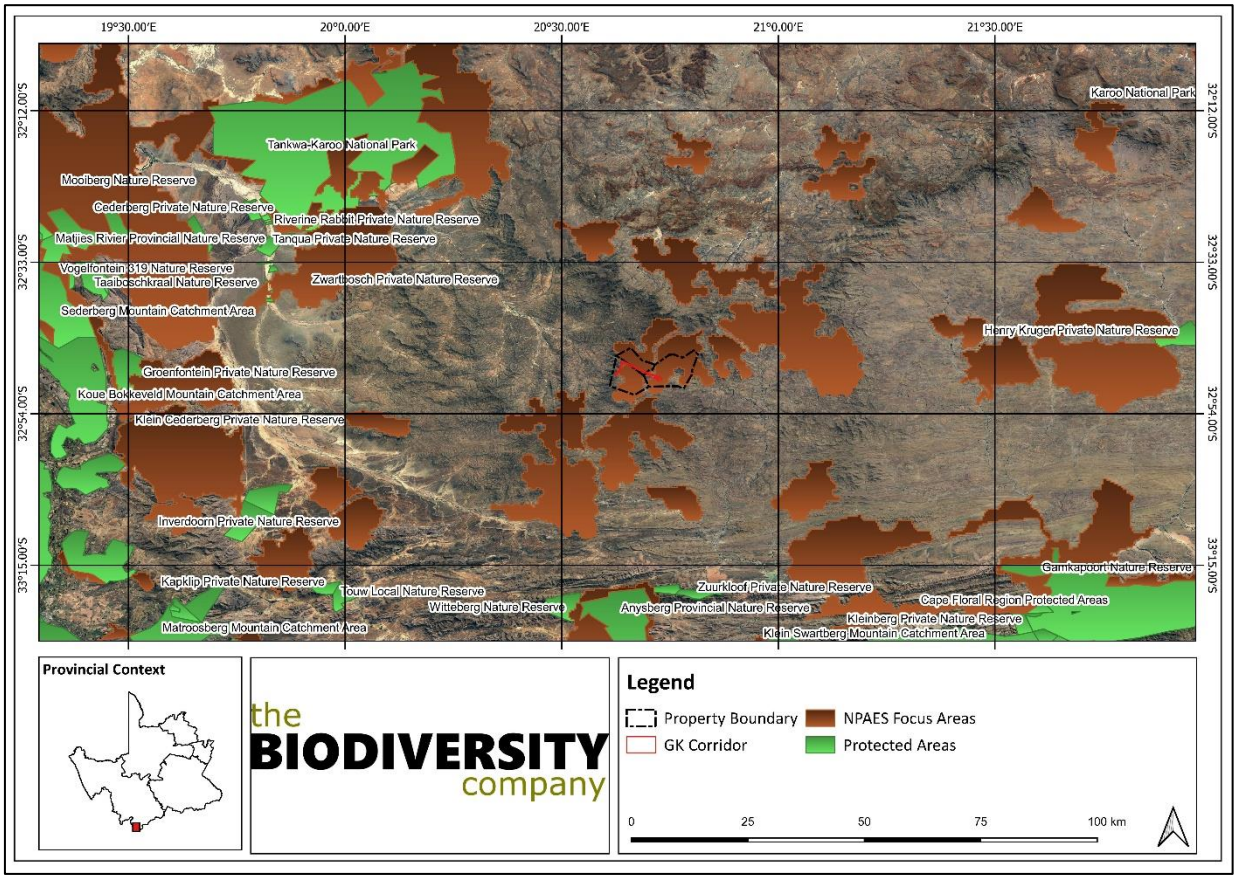

Figure 3-3 ***Map illustrating the location of protected areas and National Protected Area Expansion Strategy focus areas proximal to the proposed Great Karoo OHL and Switching Station***

3.1.1.4 Critical Biodiversity Areas (CBA)

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

The National CBA spatial data indicates that the proposed development overlaps with a CBA 1 and marginally with a CBA 2.

The Namakwa District Biodiversity Spatial Plan (NDBSP) categorises CBAs into the following types:

- T1 – Critically Endangered (CR) vegetation types and irreplaceable biodiversity areas (areas definitely required to meet conservation targets);
- T2 – Endangered (EN) and Vulnerable (VU) vegetation types and important terrestrial habitats; and
- ESA – Ecological Support Areas including corridors.

The proposed development traverses T2 CBAs that have been defined as such because they are slope habitats (Figure 3-4).

The Northern Cape Critical Biodiversity Area (CBA) Map updates, revises and replaces all older systematic biodiversity plans and associated products for the province. Therefore, the most relevant categorisation for the assessment area is CBA 1 and CBA 2

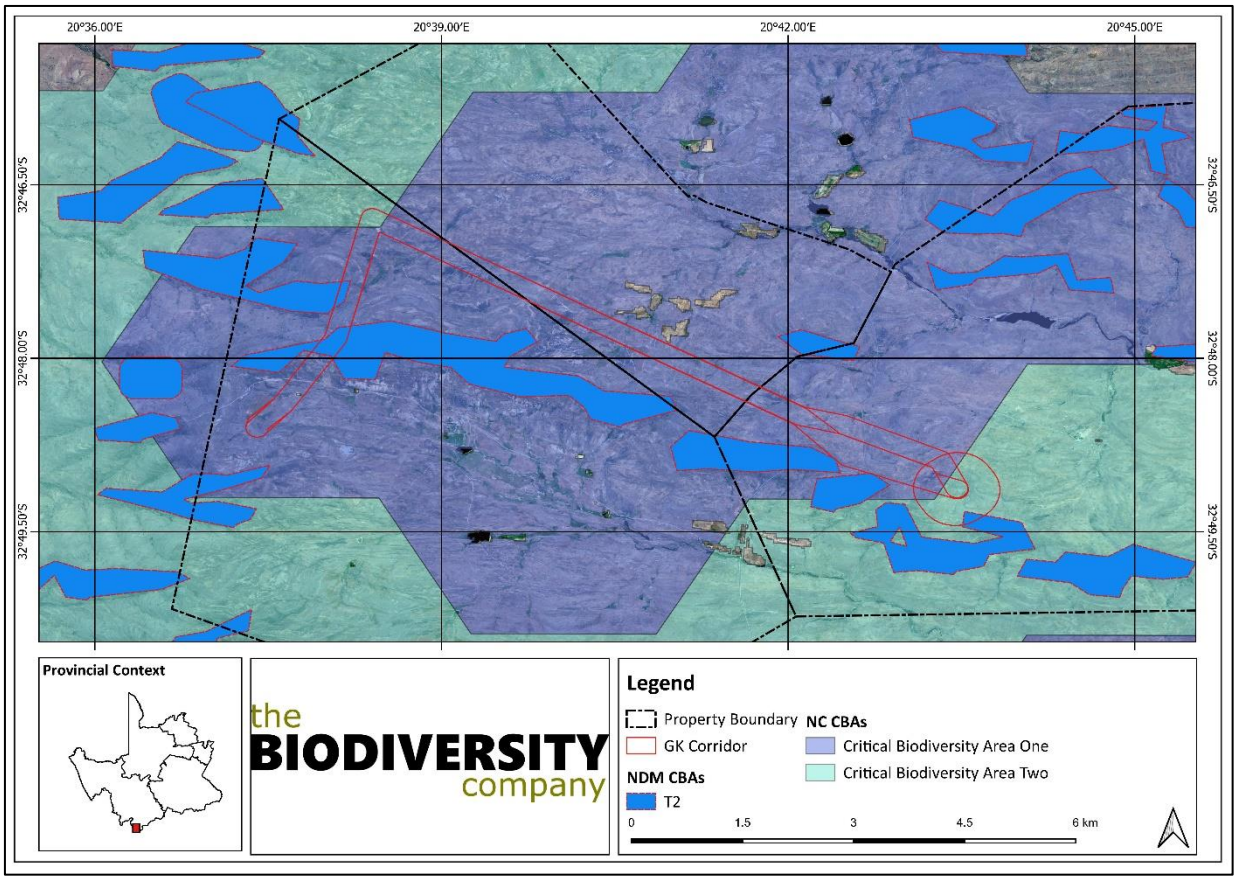

Figure 3-4 Map illustrating the locations of Critical Biodiversity Areas proximal to the Great Karoo OHL and Switching Station

3.1.1.5 Important Bird & Biodiversity Areas

The proposed development is not located within an IBA. The Anysberg Nature Reserve IBA is located approximately 50 km to the south of the proposed development and the Cedarberg-Koue Bokkeveld Complex IBA is located approximately 70 km to the west of the proposed development (Figure 3-5).

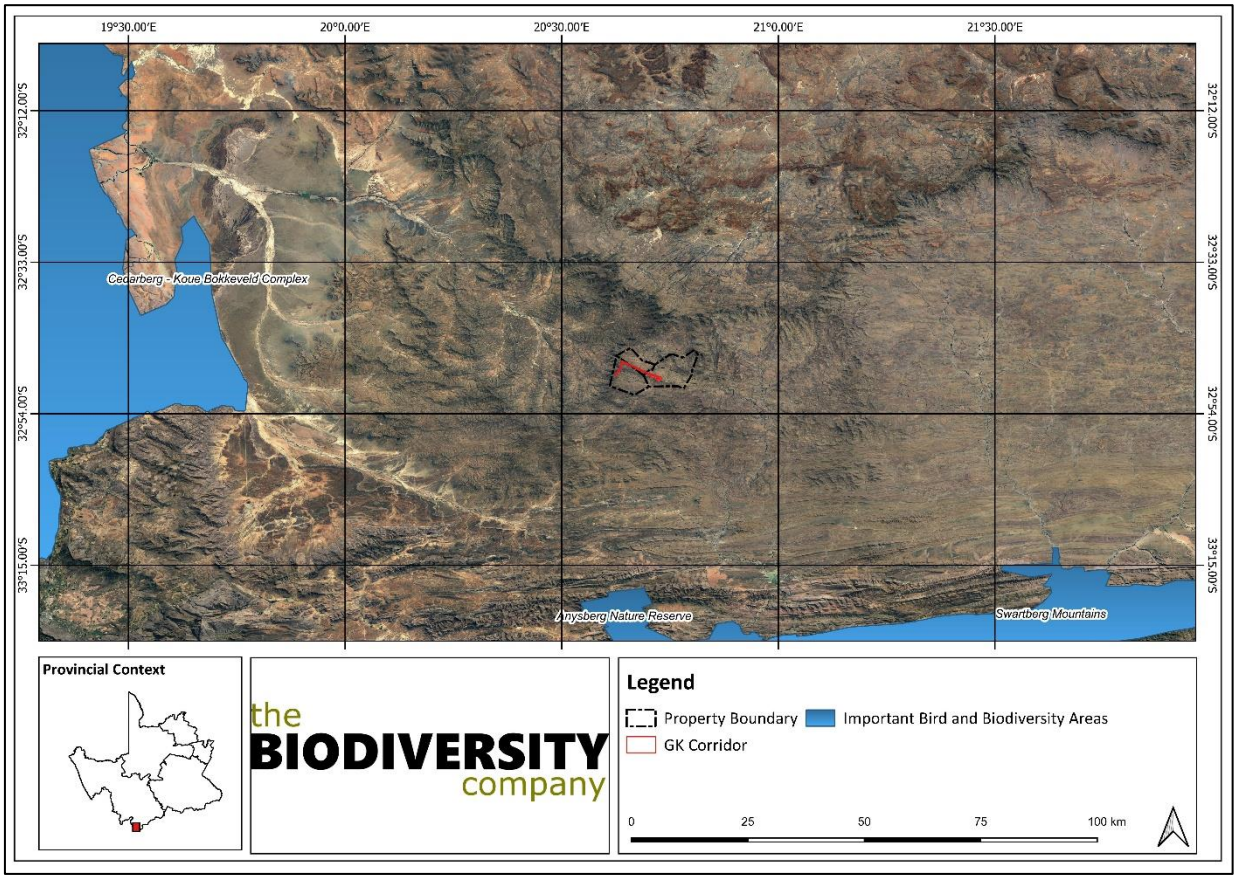

Figure 3-5 Map illustrating the location of the nearest Important Bird & Biodiversity Areas to the proposed Great Karoo OHL and Switching Station

3.1.1.6 Hydrological Setting

The proposed development is located predominantly within the Groot River catchment, specifically quaternary catchments J11A and J11D (Figure 3-6). There is minor overlap with the Doring River catchment, specifically quaternary E23A. There are no major river systems that overlap with the assessment area, but there are drainage lines that drain into the Meintjiesplaas River towards the south, and an unnamed system to the north (Figure 3-6).

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the National Biodiversity Assessment (NBA) 2018. Ecosystem threat status (ETS) of river 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 Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Threatened (LT), with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer *et al.,* 2019; Skowno *et al.,* 2019). The river systems proximal to the proposed development are regarded as LT (Figure 3-6).

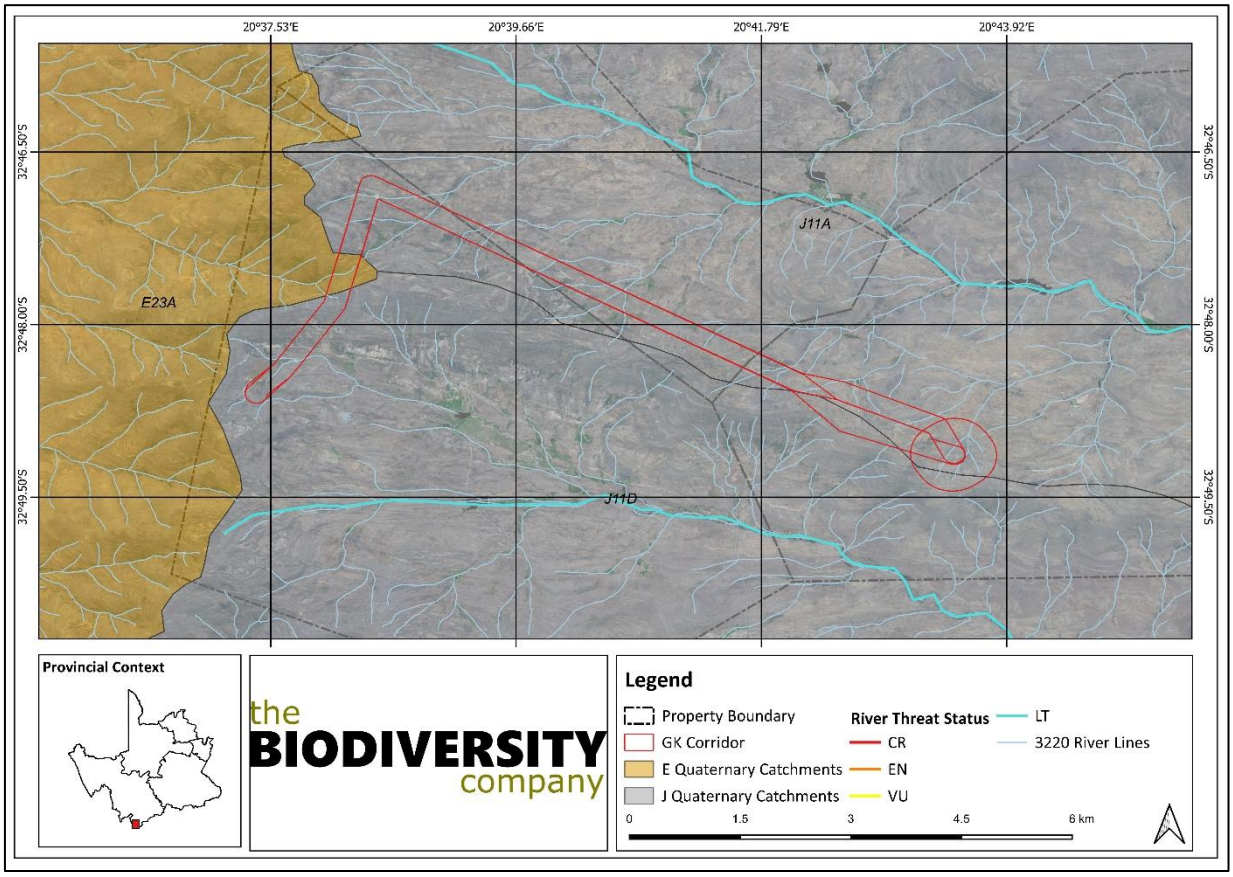

Figure 3-6 Map illustrating the hydrological setting of the proposed Great Karoo OHL and Switching Station

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 proposed Great Karoo OHL and Switching Station is situated within Renosterveld, which is an evergreen, fire-prone shrubland dominated by evergreen asteraceous shrubs, principally *Dicerothamnus rhinocerotis*, and possesses a high biomass and diversity of geophytes. The proposed development overlaps with Shale Renosterveld. This broad-scale vegetation type accounts for 86% of the total area of Renosterveld. Rainfall patterns permit a relatively high proportion of grass cover and abundance of non-succulent shrubs, and therefore, the structure of the vegetation is more congruent with proximal karoo types than other Renosterveld types.

A landscape-scale ecosystem process that is important for maintaining the wellbeing of Renosterveld is fire. Fire is a disturbance that creates gaps in plant communities which provide space for plant establishment. Disturbance by fire can contribute to the maintenance of diversity and spatial heterogeneity by impeding competitive exclusion. In addition, the ethylene gas produced from veld fires stimulates flowering and the karrikins within the smoke stimulates seed germination. Regarding the dynamics of Mountain Renosterveld, vegetation cover begins to re-establish within the first nine months following the fire and remains at a relatively high level from years 3 to 10 (van der Merwe & van Rooyen, 2011). There is a distinctive species composition

between the first two years (years 1 and 2) following the fire and the remaining years (year 3 to 10).

On a fine-scale vegetation type, the proposed Great Karoo OHL and Switching Station overlaps with Central Mountain Shale Renosterveld (Figure 3-7). Central Mountain Shale Renosterveld occurs in the Western and Northern Cape on the southern and south-eastern slopes of the Klein Roggeveldberge and Komsberg, below the Komsberg section of the Great Escarpment, as well as farther east below Besemgoedberg and Suurkop and in the west in the Karookop area.

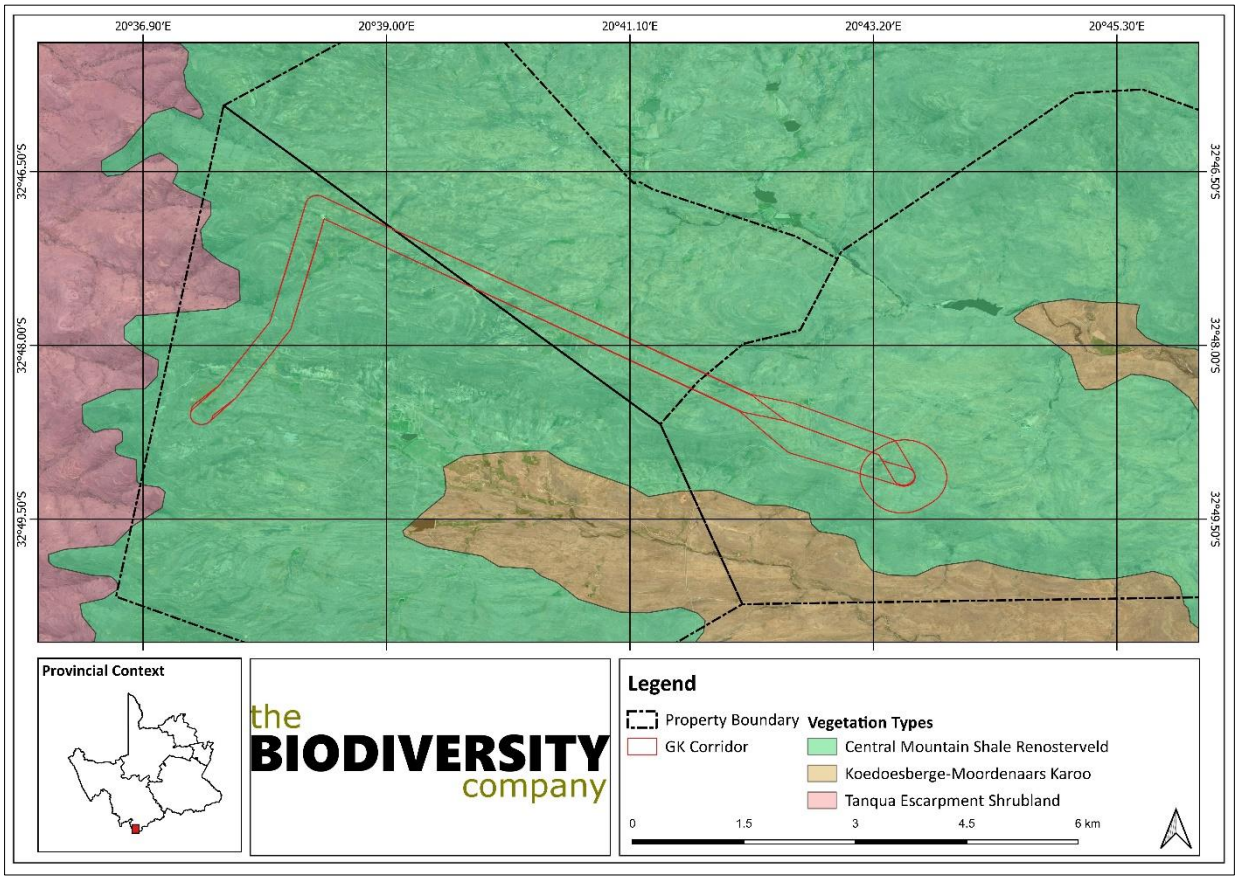

Figure 3-7 ***Map illustrating the vegetation type associated with the proposed Great Karoo OHL and Switching Station and surrounding landscape based on the Vegetation Map of South Africa, Lesotho & Swaziland***

The ecology of Central Mountain Shale Renosterveld type is poorly known. This vegetation type is described as follows:

- Topography – Slopes and broad ridges of low mountains and escarpments;
- Geology – Clayey soils overlying Adelaide Subgroup mudstones and subordinate sandstones. Glenrosa and Mispah forms are prominent;
- Climate – Arid to semi-arid climate. Mean Annual Precipitation (MAP) 180 – 410 mm, with relatively even rainfall throughout the seasons, albeit minimally elevated during Autumn-Winter. Mean daily maximum and minimum temperatures 29.9˚C and 0.9 ˚C for January and July, respectively; and

- Important Taxa – Low shrubs: *Elytropappus rhinocerotis, Diospyros austro-africana, Eriocephalus africanus* var. *africanus, E. ericoides* subsp. *ericoides, E. grandifloras, Felicia ovata, Pteronia glauca, P. incana, P. sordida, Zygophyllum spinosum*. Succulent shrubs: *Delosperma subincanum, Drosanthemum lique, Euphorbia stolonifera, Trichodiadema barbatum, Tylecodon reticulatus* subsp. *reticulatus, T. wallichi* subsp. *wallichi*. Geophytic herbs: *Bulbine asphodeloides, Drimia intricate, Othonna auriculifolia, Oxalis obtusa.* Succulent Herbs: *Crassula deceptor, C. muscosa, C. tomentosa* var. *glabrifolia, Senecio radicans.* There does not appear to be any species endemic to this vegetation type.

3.1.2.2 Expected Flora Species

The POSA database indicates that 160 species of indigenous plants are expected to occur within the assessment area and immediate landscape. Appendix A provides the list of species and their respective conservation status and endemism. Six SCC based on their conservation status are expected to occur within the assessment area and are provided in Table 3-2 below.

Table 3-2 Threatened flora species that are expected to occur within the assessment area associated with proposed Great Karoo OHL and Switching Station. AOO = Area Of Occurrence and EOO = Extent of Occurrence. DD = Data Deficient, VU = Vulnerable, EN = Endangered and NT = Near Threatened

Family	Species Name	Conservation Status	Endemism	Habitat	Likelihood of Occurrence
Aizoaceae	*Antimima pumila*	DD	Endemic	Rocky slopes, possibly favouring south-facing slopes.	High
Fabaceae	*Lotononis venosa*	EN	Endemic	Open karroid scrub on sandy clay alluvium. Known only from four locations. Extent of occurrence 84 km² and area of occupancy 16 km².	Moderate
Hyacinthaceae	*Lachenalia longituba*	VU	Endemic	Stony clay in seasonally wet, boggy sites that bake rock hard in summer. Known from five locations. EOO 350 km², AOO <20 km².	Moderate
Iridaceae	*Geissorhiza karooica*	NT	Endemic	Coarse shale slopes. Known from six locations. EOO 497 km²	High
Iridaceae	*Ixia mollis*	VU	Endemic	Among rocks on seasonally moist south-facing sandy or clay slopes. Known from only five locations in the Olifants River Valley between Clanwilliam and Citrusdal and the western Cederberg. EOO 74 km²	Low
Iridaceae	*Romulea eburnea*	VU	Endemic	Shale soils in the Klein Roggeveld. Rare and localised as it known from only two locations.	High

3.1.3 Faunal Assessment

3.1.3.1 Amphibians

Based on the IUCN Red List Spatial Data and the FrogMAP database, 8 amphibian species are expected to occur within the area (Appendix B). None of these expected species are threatened.

3.1.3.2 Reptiles

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 49 reptile species are expected to occur within the area (Appendix C). Three (3) are regarded as threatened (Table 3-3).

Table 3-3 Threatened reptile species that are expected to occur within the assessment area associated with the proposed Great Karoo OHL and Switching Station. EN = Endangered and NT = Near Threatened

Family	Scientific Name	Common Name	Conservation Status	Endemism	Habitat	Likelihood of Occurrence
Testudinidae	*Chersobius boulengeri*	Karoo Padloper	EN	Endemic	Rocky areas, particularly dolerite ridges. Secretive species sheltering under rock slabs.	Moderate
Testudinidae	*Psammobates tentorius tentorius*	Karoo Tent Tortoise	NT	Endemic	Shrubland habitats with summer- or all-year-rainfall and frequent frost	Low
Testudinidae	*Psammobates tentorius verroxii*	Verrox's Tent Tortoise	NT	Near-Endemic	Inland plateau above 900 m in summer-rainfall areas of open shrubland.	High

Chersobius boulengeri is a South African endemic, limited to the Great Karoo region at altitudes between 800 – 1500 m.a.s.l. Although the species has a relatively wide distribution, there are indications of considerable decline. Surveys conducted between 2005 and 2017 indicated that most localities (approximately 85%) where populations previously occurred no longer possess viable populations and is therefore listed as EN (Hofmeyer et al, 2018a). Threats include overgrazing by livestock, road kills and shale gas exploration. Climate change further exacerbates habitat loss.

Psammobates tentorius is widely distributed but has been exhibiting declines and is therefore regarded as NT (Hofmeyer et al, 2018b). Threats include overgrazing, destructive or illegal mining, and unsustainable land use involving ploughing of natural veld for fodder cropping, uncontrolled harvesting of natural products and irresponsible tourism activities in sensitive areas. Climate change further exacerbates habitat loss.

3.1.3.3 Mammals

The IUCN Red List Spatial Data lists 52 mammal species that could be expected to occur within the area (Appendix D). Five (5) of these expected species are regarded as threatened (Table 3-4).

Table 3-4 Threatened mammal species that are expected to occur within the assessment area associated with the proposed Great Karoo OHL and Switching Station. CR = Critically Endangered, NT= Near Threatened and VU = Vulnerable.

Family	Scientific Name	Common Name	Conservation Status	Likelihood of Occurrence	Habitat
Bovidae	*Pelea capreolus*	Grey Rhebok	NT	High	Rocky hills, rocky mountainsides, mountain plateaux with good grass cover.
Felidae	*Felis nigripes*	Black-footed cat	VU	High	Open habitat in arid areas with some cover in the form of tall stands of grass or scrub.
Felidae	*Panthera pardus*	Leopard	VU	Low-Moderate	Diverse. Rocky areas and forest.
Leporidae	*Bunolagus monticularis*	Riverine Rabbit	CR	Low	Confined to riparian bush on the narrow alluvial fringe of seasonally dry watercourses in the Central Karoo.
Mustelidae	*Aonyx capensis*	Cape Clawless Otter	NT	Low	Permanent water bodies with suitable abundance of prey items.

3.2 Field Assessment

The following sections provides the results from the field survey for the proposed development that was undertaken during September 2020.

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 species composition of the assessment area was congruent with typical Central Mountain Shale Renosterveld. Nevertheless, distinctive communities were observed and can be divided into ridges, rocky slopes, lowlands and drainage lines. The ridges and rocky slope floral community was typically dominated by *Dicerothamnus rhinocerotis*, *Euryops lateriflorus*, *Oedera genistifolia*, *Montinia caryophyllacea*, *Pteronia paniculata*, *P. aspalatha, Eriocephalus africanus* var. *paniculatus*. The lowland areas on deeper soils generally consisted of species such as *Dicerothamnus rhinocerotis*, *Euryops lateriflorus*, *Oedera genistifolia*, *Pteronia incana*, *Ruschia cradockensis, Eriocephalus ericoides* var. *ericoides*, *Hermannia cuneifolia*, and *Asparagus capensis*. The patches of disturbed grazing areas were dominated by pioneer species comprising of *Gazania rigida*, *Arctotheca calendula* and *Senecio arenarius*. The larger drainage lines of the assessment area were dominated by *Diospyros austroafricana*, *Galenia africana*, *Dimorphotheca cuneata*, *Euryops lateriflorus* and *Rupera spinosa*.

Geophytes and succulents were ubiquitous throughout the assessment area and occurred within all the communities described above. Geophytes were particularly abundant within the lowland areas. It is important to note that these growth forms, and their non-succulent relatives, are protected under the Northern Cape Legislation and include:

- All species of Amaryllidaceae;
- All species of Asphodelaceae;
- All species of Crassulaceae;
- All Iridaceae;
- All species of Mesembryanthemaceae:
- All *Colchicum* (Colchicaceae);
- All *Euphorbia* (Euphorbiaceae);
- All *Lachenalia* (Hyacinthaceae); and
- All *Oxalis* (Oxalidaceae).

Representatives of these protected flora are illustrated in Figure 3-8. In addition to the aforementioned protected flora, two (2) threatened plant species occur within the assessment area (Table 3-5). 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.

Table 3-5 Summary of threatened flora species recorded within the assessment area associated with the proposed Great Karoo OHL and Switching Station and their respective growth form and conservation status

Family	Species	Growth Form	Conservation Status	Endemism	Threats
Asteraceae	*Eriocephalus grandiflorus*	Shrub	Rare	Endemic	Habitat destruction due to development
Poaceae	*Ehrharta eburnea*	Graminoid	NT	Endemic	Livestock grazing

It is highly recommended that a pre-construction Walk-Through Survey is undertaken prior to construction to identify species that require relocation, and to support the permit application. The finalised route must be traversed to inform search-and-rescue efforts. The protected flora species should be tagged and may only be removed and transplanted after the necessary permit has been obtained from the relevant authority (Northern Cape Department of Environment and Nature Conservation). It is recommended that these species be relocated away from the development footprint, albeit in proximal areas with similar habitat conditions.

Figure 3-8 ***Photographs illustrating a portion of the protected flora recorded within the assessment area associated with the proposed development during the survey period. A) Bulbinella latifolia latifolia, B) Lachenalia violacea, C) Colchicum eucomoides, D) Trachyandra sanguinorhiza, E) Oxalis obtusa, F) Romulea citrina, G) Babiana cuneata, H) Gladiolus ceresianus, I) Lapeirousia montana and J) Massonia depressa***

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.

Invasive Alien Plants were scarce within the assessment area due to the limited disturbance from anthropogenic influences. Two (2) IAP species were recorded within the assessment area, *Erodium moschatum* and *Portulaca quadrifida.* These species are not listed under the Alien and Invasive Species List 2016, Government Gazette No. 40166. However, there were additional IAPs observed within the landscape along the larger river systems, in grazing pastures and at houses. Three (3) are categorised as Category 1b, one (1) as Category 2 and one (1) as Category 3 (Table 3-6). Photographs illustrating a portion of these species are provided in Figure 3-9 below.

Considering that IAPs primarily tend to encroach into disturbed areas, the disturbance generated from the activities associated with the proposed development, suggests that these species may invade the corridor. Considering the predominantly natural integrity of the vegetation within the assessment area, IAP species must be controlled by implementing an Invasive Alien Plant Management Programme in compliance of section 75 of the Act as stated above.

Table 3-6 Summary of Invasive Alien Plants (IAPs) recorded within the assessment area and surrounding landscape associated with the proposed Great Karoo OHL and Switching Station

Species	Growth Form	NEMBA Category	Control
Erodium moschatum	Herb	-	Physical removal ensuring root system is removed.
Sisymbrium orientale	Herb	-	Physical removal ensuring root system is removed.
Chrysanthemum segetum	Herb	-	Physical removal ensuring root system is removed.
Sonchus asper asper	Herb	-	Physical removal ensuring root system is removed.
Urtica urens	Herb	-	Physical removal ensuring root system is removed.
Eucalyptus camaldulensis	Large tree	1b	Physical removal of seedlings or felling and stump herbicide treatment for large specimens
Portulaca quadrifida	Herb	-	Physical removal ensuring root system is removed.
Malva parviflora	Herb	-	Physical removal ensuring root system is removed.
Schinus molle	Large tree	-	Physical removal of seedlings ensuring root system is removed. Large specimens to be felled and stump treated with herbicide.
Schinus terebinthifolius	Large tree	3 (NC)	Physical removal of seedlings ensuring root system is removed. Large specimens to be felled and stump treated with herbicide.
Casuarina cunninghamiana	Large tree	2 1b within 100 m of riparian areas or untransformed land	Physical removal of seedlings ensuring root system is removed. Large specimens to be felled and stump treated with herbicide.
Opuntia ficus indica	Succulent tree	1b	Physical removal of seedlings ensuring root system is removed. Large specimens to be treated with herbicide ensuring all plant material removed from site.
Atriplex nummularia nummularia	Woody shrub	2	Physical removal ensuring that the root system is removed.

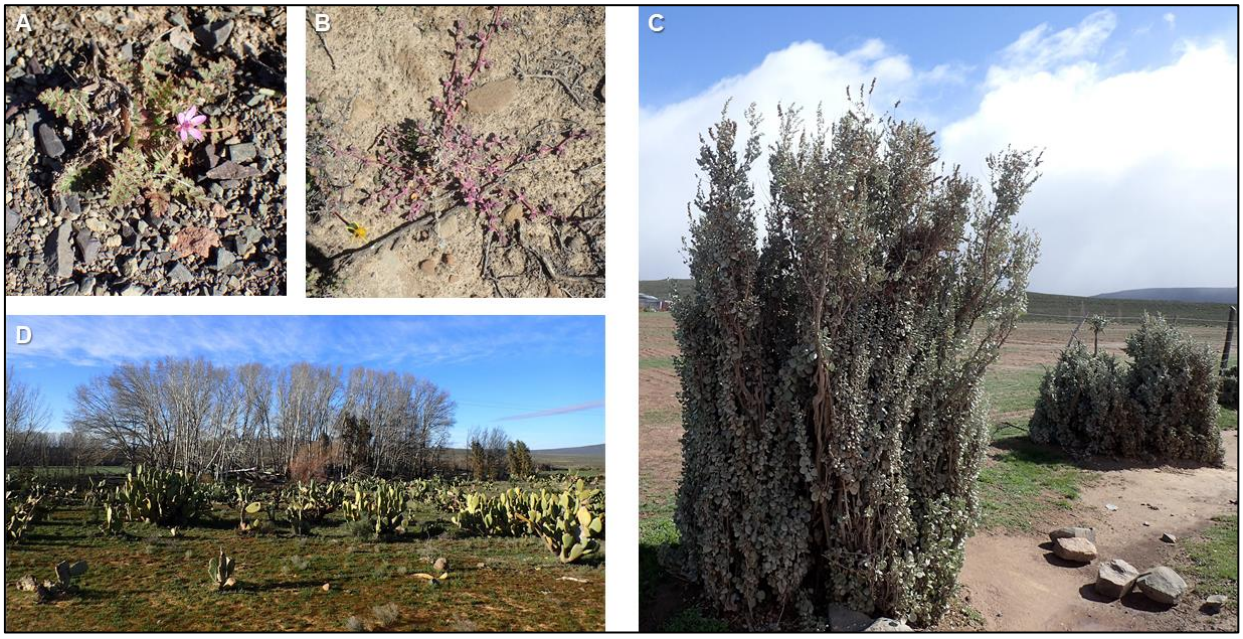

Figure 3-9 ***Photographs illustrating a portion of the Invasive Alien Plants (IAPs) recorded within the assessment area and surrounding landscape associated with the proposed Great Karoo OHL and Switching Station. A) Erodium moschatum, B) Portulaca quadrifida, C) Atriplex nummularia nummularia and D) Opuntia ficus-indica (foreground) and Eucalyptus camaldulensis (background)***

The following monitoring framework should be implemented to ensure that IAPs are continually monitored, and progress pertaining to their control is recorded (Table 3-7). 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.

Table 3-7 ***Proposed monitoring framework for the control of invasive alien plants within the assessment area associated with the proposed Great Karoo OHL and Switching Station***

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	If applicable. Job creation figures are useful when asking for assistance from Working for Water (WFW) or to demonstrate contributions to jobs and socio-economic conditions

Metric	Frequency	Method	Response
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 Formicidae

Nine (9) species of Formicidae, representing two sub-families, were recorded during the survey period (Table 3-8). The species recorded are regarded as those generally associated with Renosterveld vegetation. Considering that only active sampling was utilised and the inclement weather conditions during the survey period, it is highly likely that there are species present within the assessment area that would have not been recorded during the field survey. Nevertheless, the recorded Formicidae community denotes that the vegetation within the assessment area is largely natural. Furthermore, two Myrmicinae species, *Anoplolepis custodiens* and *Messor capensis* are critical for maintaining the wellbeing of the vegetation as they are distributors of myrmecochorous seeds. Moreover, significantly more seedlings germinate on *M. capensis* nest-mounds than in inter-mound spaces.

Table 3-8 Summary of Formicidae recorded within the assessment area associated with the proposed Great Karoo OHL and Switching Station during the survey period

Sub-family	Scientific Name	Common Name	Ecology
Formicinae	*Anoplolepis custodiens*	Large Pugnacious Ant	An aggressive and voracious predator consuming an array of prey items. Distributor of myrmecochorous seeds. Tend to homopterans.
Formicinae	*Camponotus maculatus*	Spotted Sugar Ant	Widely distributed with many subspecies but taxonomy needs to be revised. Nocturnal foragers.
Formicinae	*Camponotus mystaceus*	Moustached Sugar Ant	Found in a range of habitats. Limited ecological information known.
Formicinae	*Lepisiota capensis*	Small Black Sugar Ant	Widely distributed species. Tend to homopterans. There are several known super-colonies in southern Africa and have been known to displace the invasive *Linepithema humile* (Argentinian Ant).
Myrmicinae	*Meranoplus peringueyi*	Furry Cautious Ant	Based on locality and habitat data, it is postulated that this species requires natural habitats and is intolerant to heavily degraded and transformed areas. There is limited ecological information available.
Myrmicinae	*Messor capensis*	Common Harvester Ant	Granivorous species that is a distributor of myrmecochorous seeds. Nests are built directly into the ground with considerable mounds of sand excavated and may thus be important in capturing surface runoff in congruency with termite mounds.
Myrmicinae	*Monomorium* sp.	Timid Ant	The species within this genus are predators and general scavengers. Tend to homopterans.
Myrmicinae	*Pheidole capensis*	Brown House Ant	The genus is widespread and ecologically dominant. *Pheidole* are general scavengers and predators feeding on a wide range of prey. *P. capensis* are harvesters and granivorous and may play a role in the distribution of some small-seeded plants.
Myrmicinae	*Pheidole capensis modestior*	Brown House Ant	

Figure 3-10 ***Photographs illustrating a portion of the Formicidae species recorded within the assessment area associated with the proposed Great Karoo OHL and Switching Station during the survey period. A) Anoplolepis custodiens, B) Pheidole capensis, C) Meranoplus peringueyi, D) Pheidole capensis modestior, E) Messor capensis and F) Lepisiota capensis***

3.2.2.2 Amphibians

No amphibian species were recorded during the survey period. This was because no night survey was undertaken. The species expected to occur within the assessment area are provided in Appendix B. All eight (8) expected species are widely distributed and thus have a high likelihood of occurrence.

3.2.2.3 Reptiles

Seven (7) species of herpetofauna were recorded within the assessment area during the survey period (Table 3-9, Figure 3-11). However, there are several reptile species that are known to occur within the landscape based on communication with landowners and construction personnel at the Karusa Wind Farm such as *Psammobates tentorius*, *Naja nivea* (Cape Cobra), *Bitis arietans* (Puff Adder) and *Psammophis notostictus* (Karoo Sand Snake), but these were not recorded during the survey period. The lack of species richness was likely due to the combination of the inherent secretive nature of herpetofauna species, limited time available for fieldwork and no night survey was undertaken.

None of the seven species recorded are regarded as threatened, albeit five are protected under provincial legislation. The *Homopus* (Testudinidae) species recorded could not be identified to species level as only the carapace of a dead specimen was found.

Table 3-9 ***Summary of reptile species recorded within the assessment area associated with the proposed Great Karoo OHL and Switching Station during the survey period. Species highlighted in bold are of conservation concern as they are either threatened or protected. LC = Least Concern***

Family	Scientific Name	Common Name	Conservation Status	Endemism
Agamidae	*Agama atra*	Southern Rock Agama	LC	Near-Endemic
Cordylidae	***Cordylus minor***	**Western Dwarf Girdled Lizard**	**LC**	**Endemic**
Cordylidae	***Karusasaurus polyzonus***	**Karoo Girdled Lizard**	**LC**	**Near-Endemic**
Lacertidae	***Pedioplanis lineoocellata pulchella***	**Common Sand Lizard**	**LC**	**Near-Endemic**
Scincidae	*Trachylepis variegata*	Variegated Skink	LC	
Testudinidae	***Chersina angulata***	**Angulate Tortoise**	**LC**	
Testudinidae	***Homopus* sp.**	**Padloper**	**N/A**	**N/A**

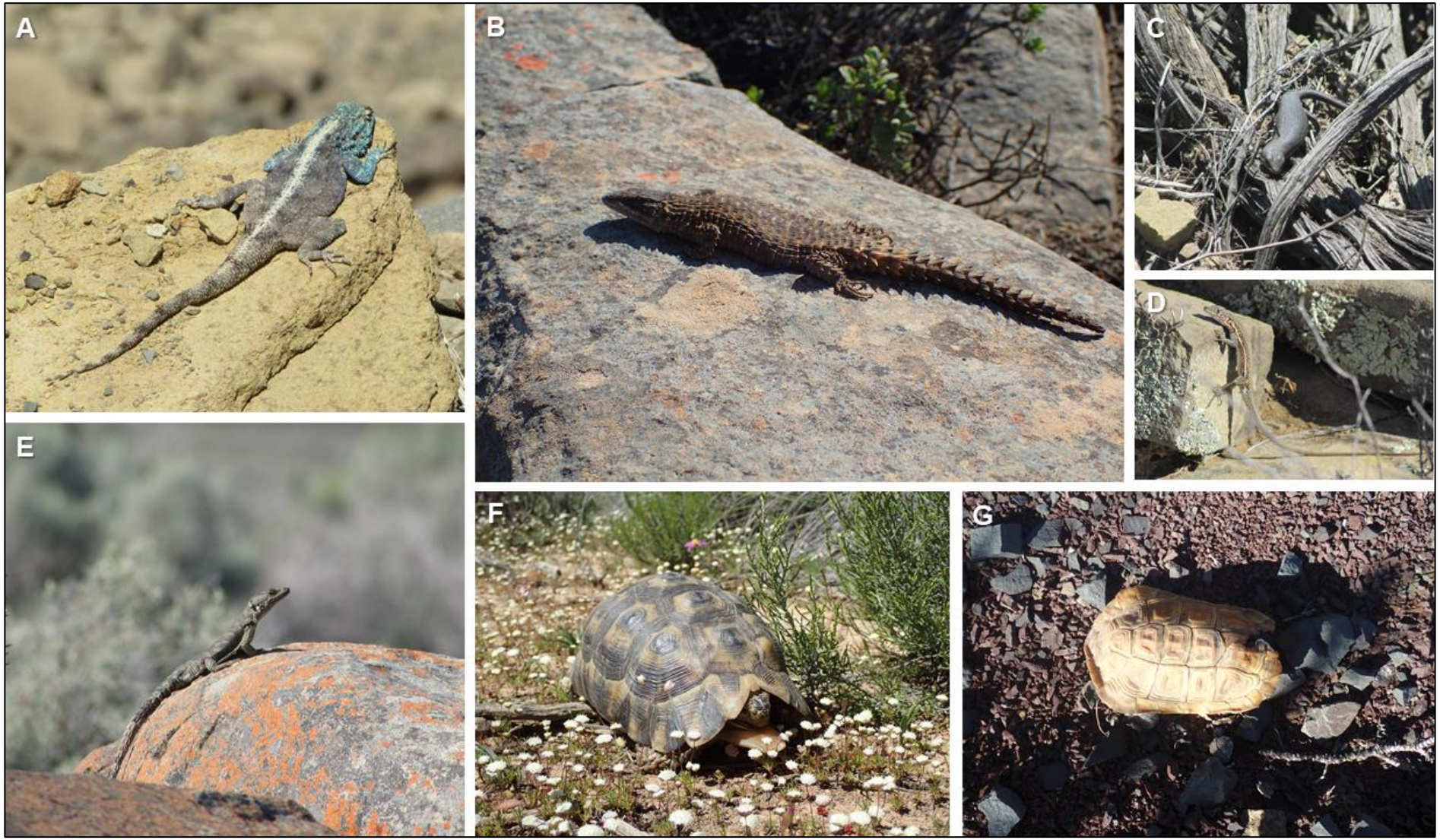

Figure 3-11 ***Photographs illustrating the reptile species recorded within the assessment area associated with the proposed Great Karoo OHL and Switching Staiton during the survey period. A) Agama atra, B) Cordylus minor, C) Trachylepis variegate, D) Pedioplanis lineoocellata pulchella, E) Karusasaurus polyzonus, F) Chersina angulata and G) Homopus sp.***

3.2.2.4 Mammals

Fourteen (14) mammal species were observed during the survey (Table 3-10) based on either direct observation or the presence of visual tracks and signs (Figure 3-12). The low number of species recorded was likely due to limited time available for fieldwork, as groups such as rodents and shrews require trapping over an extensive period. A single threatened species, *Palea capreolus* (Grey Rhebok), was recorded.

Table 3-10 ***Summary of mammal species recorded within the assessment area associated with the proposed Great Karoo OHL and Switching Station during the field survey. Species highlighted in bold are of conservation concern as they are either threatened or protected. LC = Least Concern and NT = Near-Threatened***

Family	Scientific Name	Common Name	Conservation Status	Endemism
Bathyergidae	***Cryptomys hottentotus***	**African Mole Rat**	**LC**	**Endemic**
Bovidae	***Antidorcas marsupialis***	**Springbok**	**LC**	
Bovidae	***Pelea capreolus***	**Grey Rhebok**	**NT**	**SLS**
Bovidae	***Oreotragus oreotragus***	**Klipspringer**	**LC**	
Bovidae	***Raphicerus campestris***	**Steenbok**	**LC**	
Canidae	*Canis mesomelas*	Black-backed Jackal	LC	
Cercopithecidae	*Papio ursinus*	Chacma Baboon	LC	
Herpestidae	***Cynictis penicillata***	**Yellow Mongoose**	**LC**	
Hystricidae	***Hystrix africaeaustralis***	**Cape Porcupine**	**LC**	
Leporidae	***Lepus capensis***	**Cape Hare**	**LC**	**Endemic**
Leporidae	***Pronolagus saundersiae***	**Hewitt's Red Rock Hare**	**LC**	**Endemic**
Muridae	***Micaelamys namaquensis***	**Namaqua Rock Mouse**	**LC**	
Orycteropodidae	***Orycteropus afer***	**Aardvark**	**LC**	
Procaviidae	***Procavia capensis***	**Rock Hyrax**	**LC**	

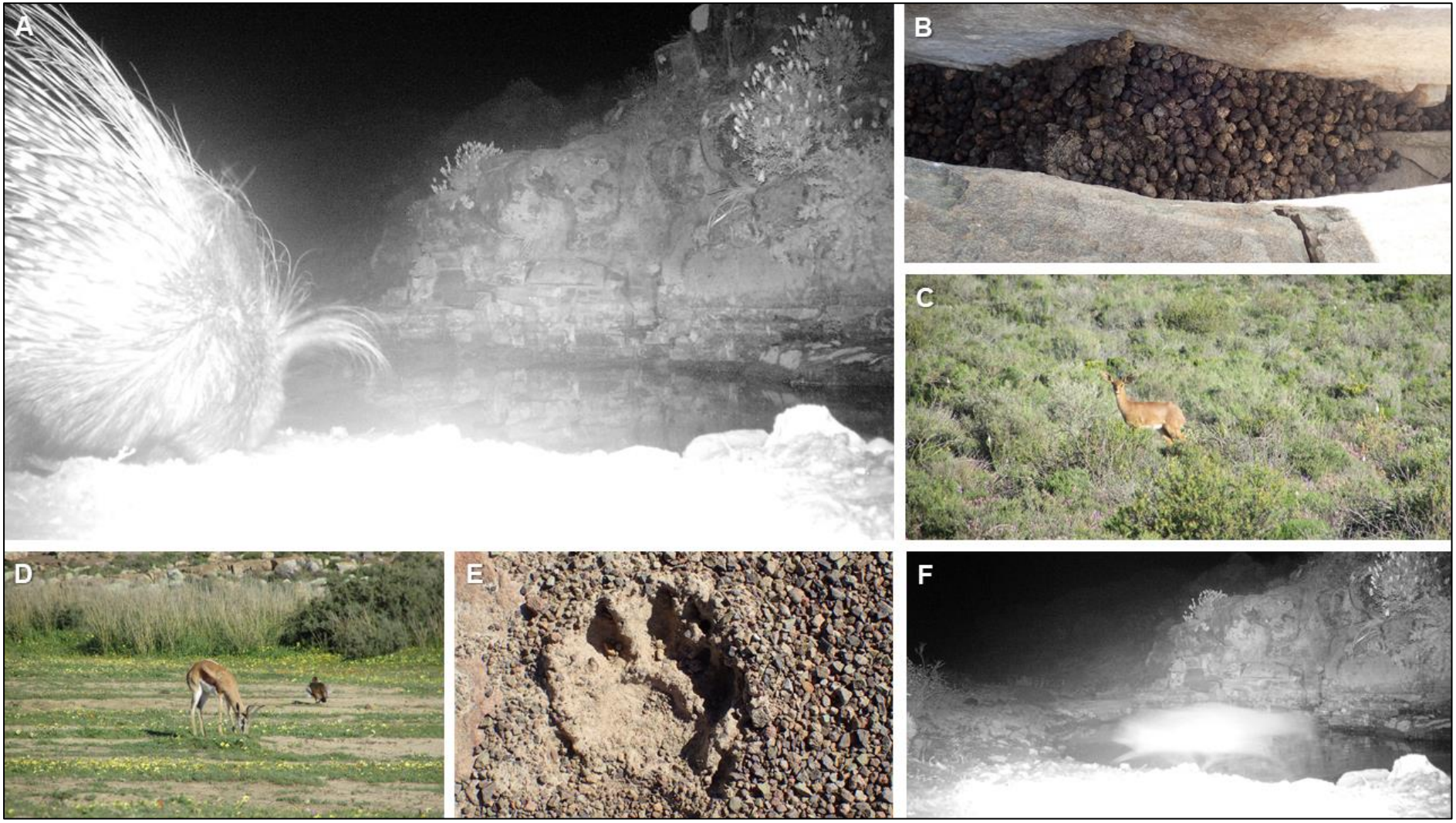

Figure 3-12 ***Photographs illustrating the mammal species recorded within the assessment area associated with the proposed Great Karoo OHL and Switching Station during the survey period. A) Hystrix africaeaustralis, B) Procavia capensis latrine, C) Raphicerus campestris, D) Antidorcas marsupialis, E) Canis mesomelas track and F) Cynictis penicillata***

Pelea capreolus (Grey Rhebok) is listed as NT globally (Taylor et al, 2017). The species is endemic to South Africa, Lesotho and Swaziland and occurs in rocky habitats with good grass cover for shelter and to hide from predators, and thereby exhibits a patchy distribution. They are predominantly browsers, with majority of their diet comprised of herbaceous shrubs. *P. capreolus* are largely water independent, obtaining most of their water requirements from food. They often use steep open areas with little cover when feeding. It is estimated there is a minimum of 2 000 individuals in formally protected areas, but further research is required to confirm whether there are over 10 000 individuals across its range. There are noted declines in the species population, including in protected areas. Although further research is required to identify the threats driving population declines, it is suspected that the main threat is increased levels of bushmeat and illegal sport hunting with dogs. Habitat degradation from climate change or poor land management may also play a role.

3.2.3 Habitat Types and Habitat Sensitivity

The biodiversity theme sensitivity as indicated in the screening report was derived to be Very High (Figure 3-13), it can be downloaded at (https://screening.environment.gov.za/screeningtool/#/pages/welcome).

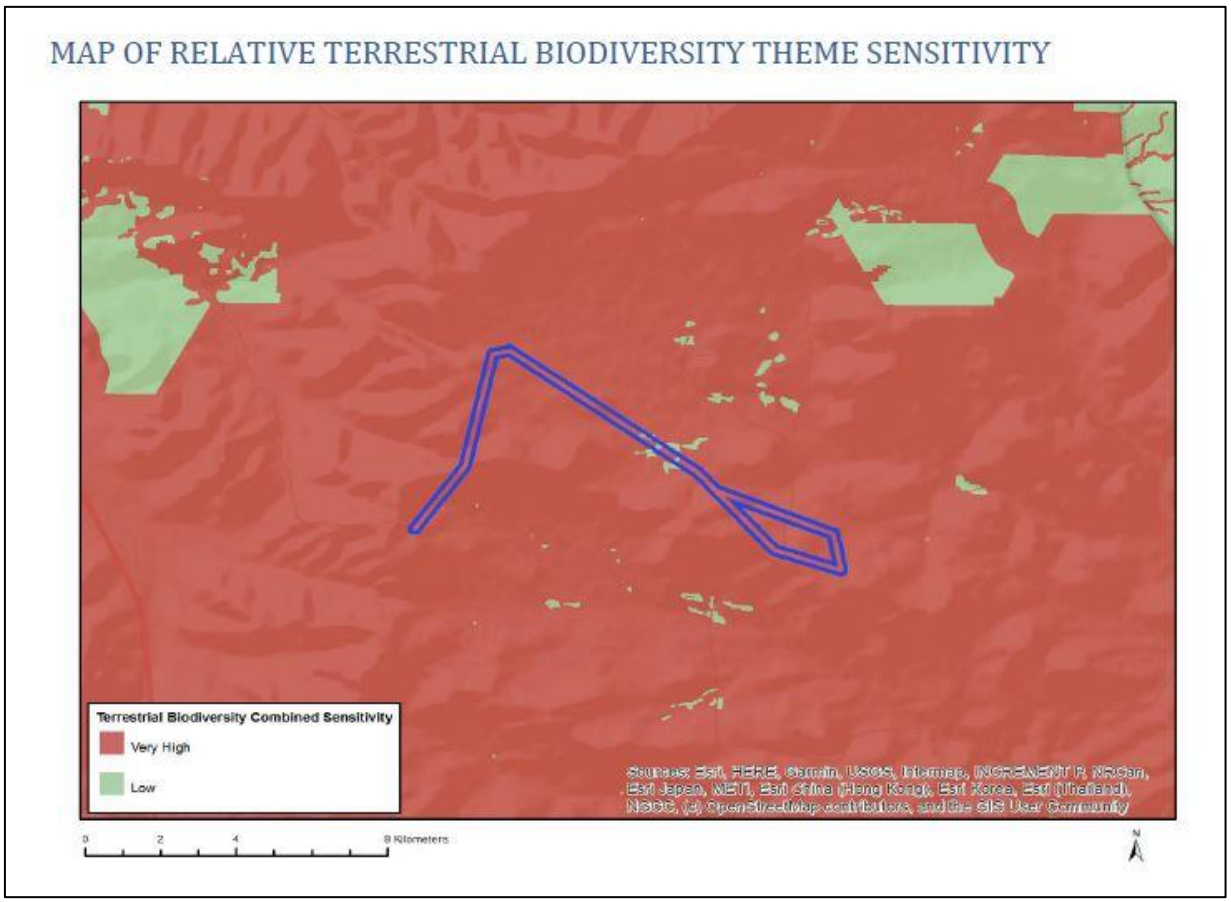

Figure 3-13 Biodiversity Sensitivity of the assessment area associated with the proposed Great Karoo OHL and Switching Station

Four different habitat types were delineated within the assessment area (Table 3-11). The location and extent of these habitats are illustrated in Figure 3-14. Based on the criteria provided in Section 2.3.3 of this report, all habitats within the assessment area of the proposed Great Karoo OHL were allocated a sensitivity category. Ridges and Rocky Slope spatially varied in their sensitivity. Ridges were allocated a 'high' sensitivity as they were the source points for drainage lines as well as their uniqueness within the landscape. Rocky slopes were generally assigned a 'moderate' sensitivity, except where they formed the source point of drainage lines and were accordingly assigned a 'high' sensitivity. The sensitivities of the habitat types delineated are illustrated in Figure 3-15. Figure 3-16 provides photographs illustrating examples of the different habitat types delineated within the assessment area.

Table 3-11 Summary of habitat types delineated within the assessment area of the proposed Great Karoo OHL and Switching Station

Habitat Type	Description	Dominant Flora	Ecosystem Processes and Services	Area (ha)	Habitat Sensitivity
Ridges and Rocky Slope	Steep to moderately slopes with shallow soils.	*Dicerothamnus rhinocerotis* *Oedera genistifolia* *Ixia thomasiae* *Eriocephalus punctulatus* *Pteronia incana*	Capture precipitation and run-off from melting snow. Rising air currents are used by raptor species to increase flight efficiency. Provides habitat for rupicolous species, including *Procavia capensis* which is a major component of the diet of *Aquila verreauxii*.	249.24	Moderate to High
Lowland	Low to no slope with deep soils.	*Euryops lateriflorus* *Ruschia intricata* *Romulea tortuosa* *Romulea citrina* *Drimia altissima* *Oxalis obtusa*	Provides grazing for livestock. Aids in filtration of water permeating through the soil into drainage lines. Relatively high abundance of pollinating monkey beetles.	274.06	Moderate
Drainage Line	Channel through which surface water naturally collates and flows. Perennial or ephemeral systems were both considered for this habitat type.	*Diospyros austro-africana* *Dimorphotheca cuneata* *Euryops lateriflorus* *Roepera spinosa*	Provides surface water within the landscape. Aids in trapping sediment and nutrients derived from land runoff. Corridor for fauna dispersion within the landscape.	9.96	High

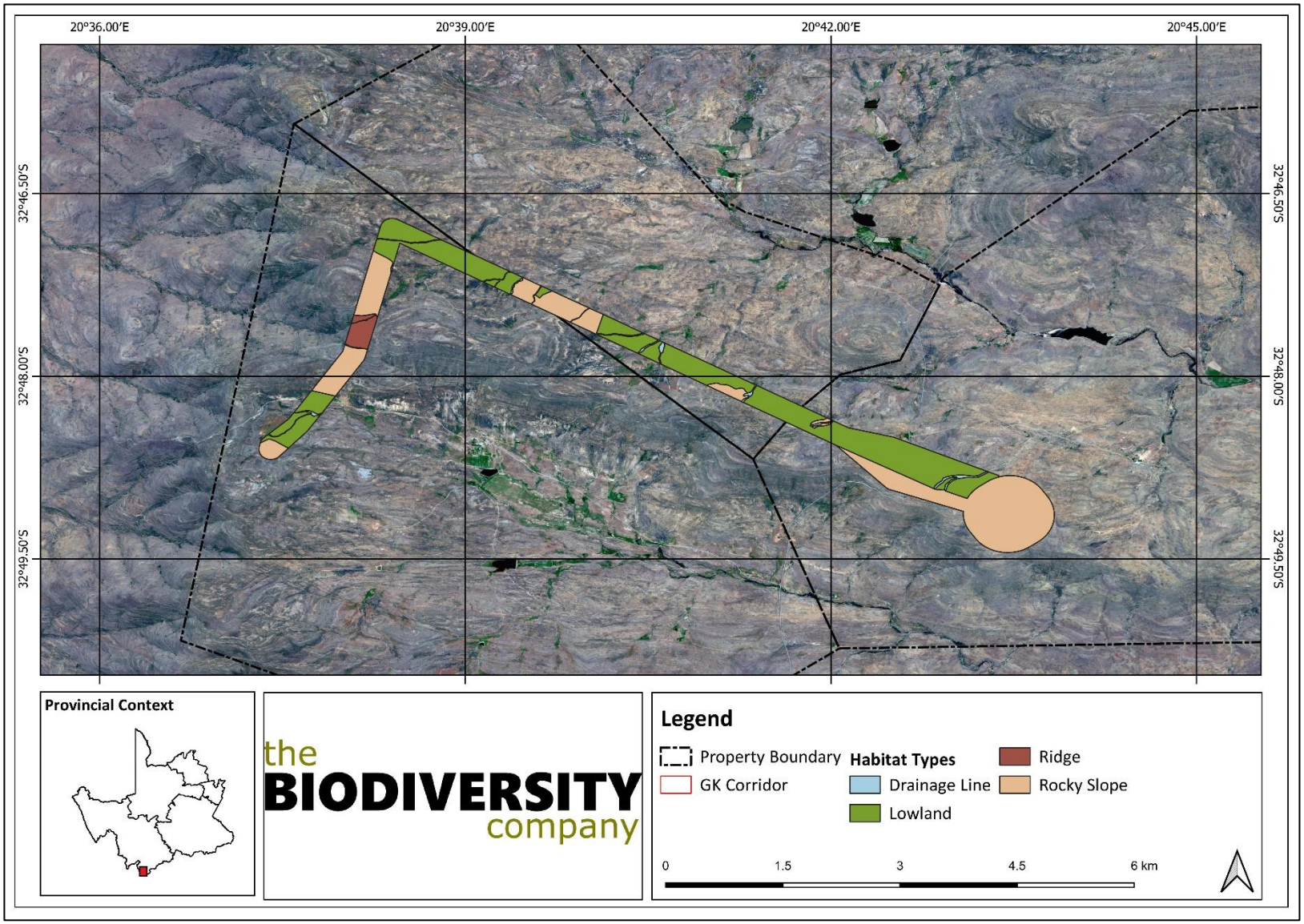

Figure 3-14 Map illustrating location and extent of habitat types within the assessment area associated with the proposed Great Karoo OHL and Switching Station

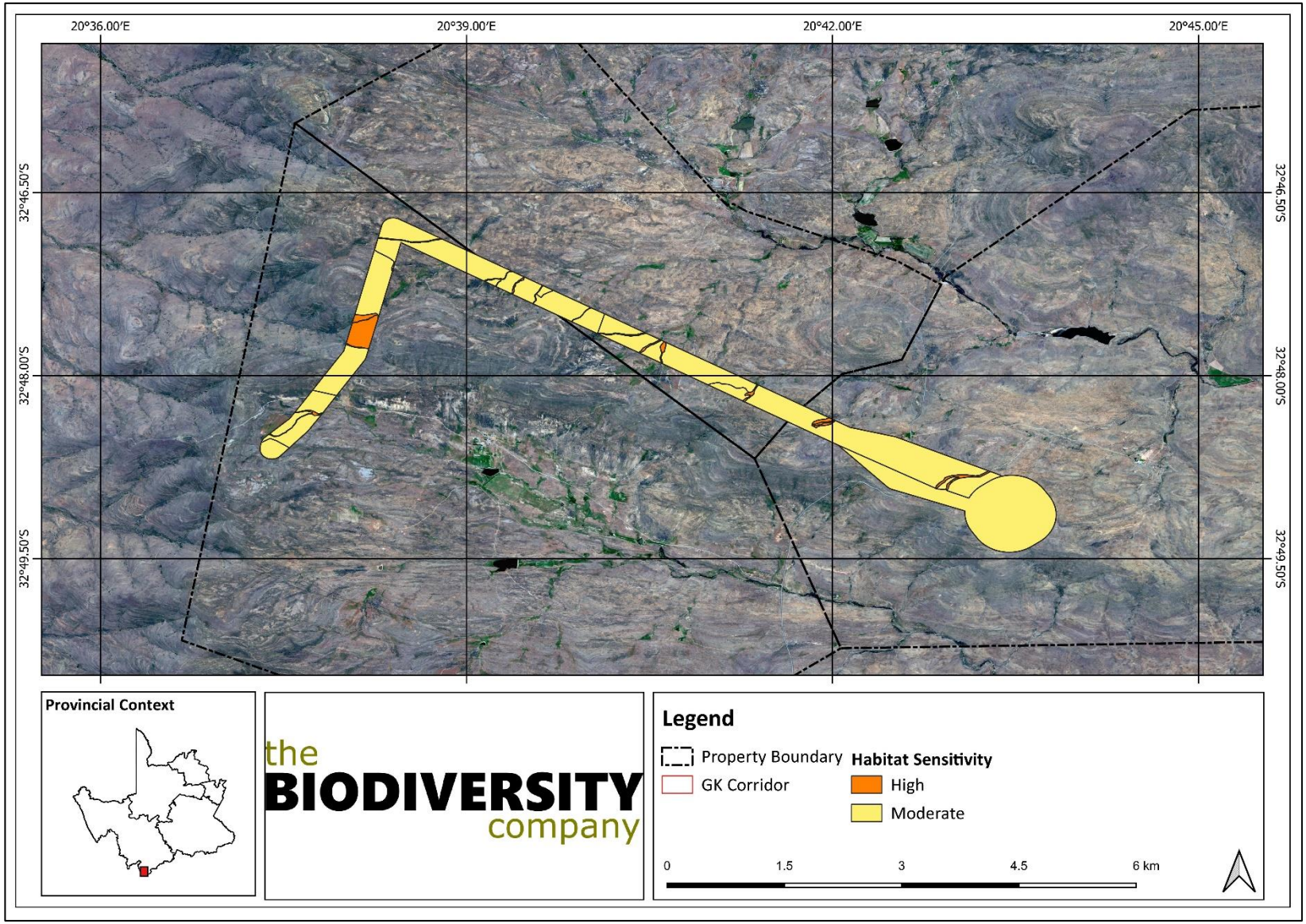

Figure 3-15 Map illustrating habitat sensitivity within the assessment area associated with the proposed Great Karoo OHL and Switching Station

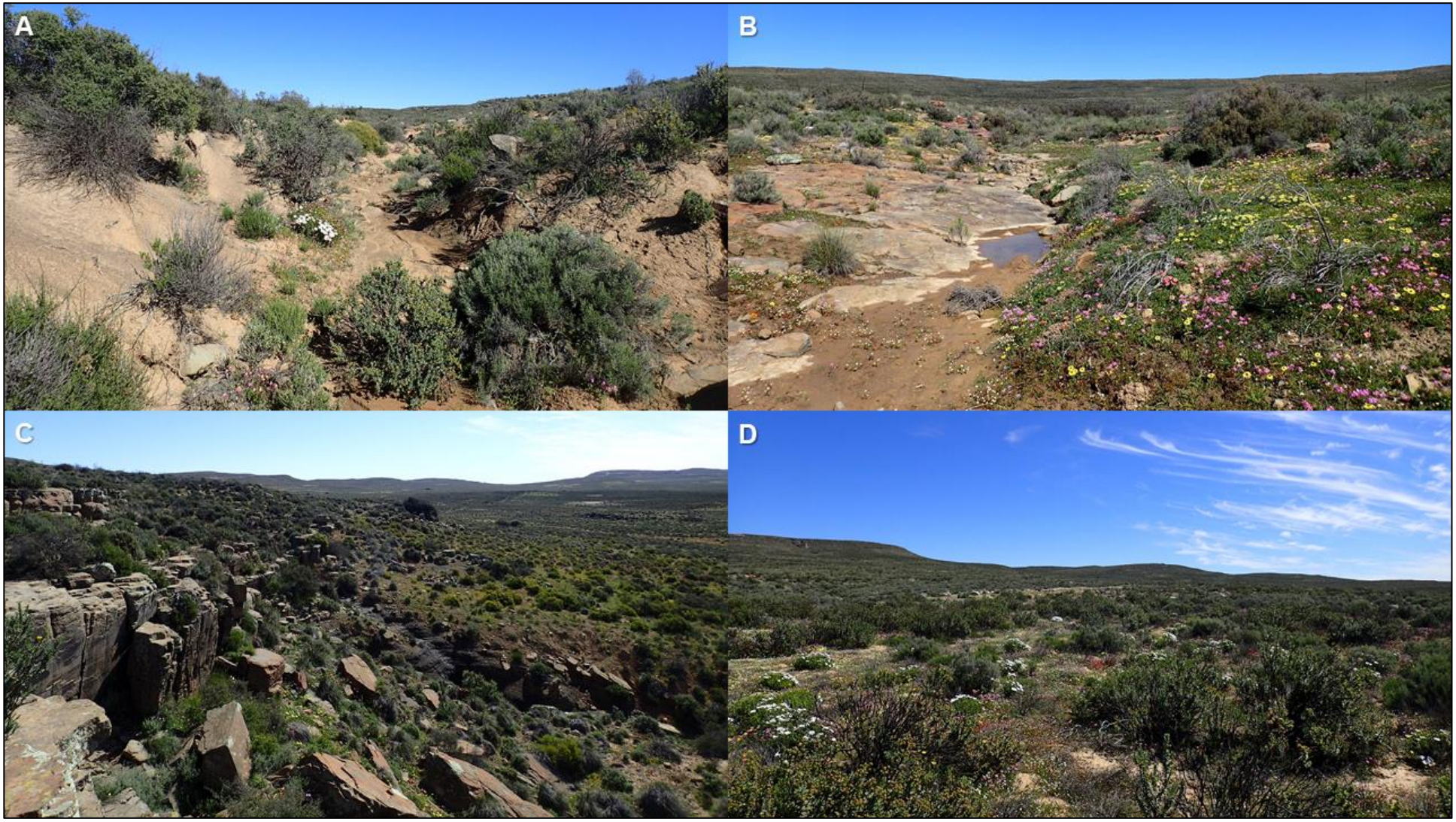

Figure 3-16 ***Photographs illustrating examples of the habitat types delineated within the assessment area associated with the proposed Great Karoo OHL and Switching Station. A) Drainage Line, B) Drainage Line, C) Ridges and Rocky Slopes and D) Lowlands***

Overall, fire and pollination are critical ecosystem processes for maintaining Renosterveld floral diversity. Consequently, any development that hinders these processes, will lead to a loss of species diversity. The proposed Great Karoo OHL and Switching Station may dictate that fires that occur within its footprint will not be allowed to occur or be extinguished in order to preserve infrastructure.

Renosterveld, in congruency with other biomes, has experienced, and is currently experiencing, fragmentation. Habitat fragmentation is a principle threat negatively influencing the survival of species. Donaldson et al (2002) demonstrated that the abundance of particular species of bees and Monkey Beetles (Scarabaeidae: Hopliini) was significantly affected by fragment size, synergistically with other factors such as vegetation cover. Fragment size and distance to large remnants of vegetation had a significant influence on seed or fruit set in four of the seven plant species that were examined. Furthermore, one of the study species failed to set any seed in the small- and medium- sized habitat fragments. Consequently, habitat fragmentation will lead to a loss in the floral diversity, potential recovery after fires and resilience to anthropogenic impacts. Monkey Beetles were observed to be important pollinators within the assessment area (Figure 3-17) and severe habitat fragmentation is likely to be detrimental to the wellbeing of the vegetation. However, the physical characteristics of the proposed development is unlikely to severely fragment habitat.

Figure 3-17 ***Photographs illustrating Monkey Beetles (Scarabaeidae: Hopliini) visiting flowering plants within the assessment area of the Great Karoo OHL and Switching Station***

4 Impact Risk Assessment

The proposed activity is for the development of a 132 kV OHL that will link the Great Karoo WF substation to the Hidden Valley substation on Karusa WF. The grid connection infrastructure required includes a switching station (up to 100 m x 100 m) to be developed adjacent to the authorised Great Karoo Wind Farm substation. A 132 kV double- or single-circuit overhead powerline, with a length of up to 14 km, will connect the proposed switching station to the Eskom Hidden Valley substation. A grid connection corridor of 300m has been identified for the power line and a 500 m assessment area for the switching station. The pylon structures of the power line will be up to 32m high and the power line will be developed within a servitude of up to 40 m wide.

Other associated infrastructure includes a service track along the length of the power line servitude (up to 6 m wide during construction), and temporary laydown area/s that will be rehabilitated upon completion of the construction phase.

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 study area. The relevant impacts associated with the proposed construction and operation of the development were then subjected to a prescribed impact assessment method.

4.1.1 Present Impacts to Biodiversity

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

- Construction of the Karusa and Soetwater WEFs;
- Erosion from livestock overgrazing and trampling;
- Invasive Alien Plants;
- Roads and associated vehicle traffic;
- Powerlines; and
- Fences.

4.1.2 Identification of Additional Potential Impacts

The potential impacts during the construction, operation and decommissioning phases of the proposed activity are presented in Table 4-1.

Table 4-1 Summary of potential impacts to biodiversity associated with the proposed activity

Phase	Main Impact	Project Activities	Secondary Impacts Anticipated
Construction Operational	Loss of vegetation within development footprint	• Physical removal of vegetation for access road, pylon and switching station installation	• Loss of flora (including SCC) • Increased potential for soil erosion • Habitat fragmentation • Increased potential for establishment of invasive alien vegetation
Construction	Degradation of surrounding habitats	• Dust precipitation • Spilling of hazardous waste • Water and wastewater leakages • Dumping of waste products • Random events such as fire (cooking fires or cigarettes)	• Loss of flora including SCC • Increased potential for soil erosion • Habitat fragmentation • Increased potential for establishment of invasive alien vegetation
Operational Decommissioning	Spread and/or establishment of invasive alien species	• Vegetation removal • Vehicles potentially spreading seed • Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive rodents	• Habitat loss for native flora & fauna (including SCC) • Spreading of potentially dangerous diseases due to pest species • Alteration of fauna assemblages due to habitat modification
Construction Opertaional Decommissioning	Direct mortality of fauna	• Clearing of vegetation • Roadkill due to vehicle collision • Pollution of water resources due to dust effects and chemical spills • Intentional killing of fauna for food (hunting) or persecution (especially with regards to herpetofauna)	• Loss of ecosystem services
Construction Decommissioning	Disruption/alteration of species activities (breeding, migration, feeding) due to noise and vibration	• Operation of machinery (Large earth moving machinery	• Loss of recruitment in the local fauna population (no/limited breeding success) • Loss of ecosystem services
Construction Decommissioning	Disruption/alteration of species activities (breeding, migration, feeding) due to dust	• Vehicles • Exposed stockpiles and/or dumps	• Loss of recruitment in the local fauna population (no/limited breeding success) • Loss of ecosystem services
Operational	Lack of suitable fire regime due to the OHL and Switching Station	• Final OHL development • Final switching station development	• Loss of biodiversity

4.1.3 Assessment of Impact Significance

The assessment of impact significance was undertaken in accordance with the method developed by Savannah Environmental (Pty) Ltd. The various identified impacts are assessed below for the different phases of the development.

4.1.3.1 Construction Phase

Impact Nature: Loss of vegetation within development footprint		
There will be a loss of natural vegetation due to construction of the switching station, pylon foundations and access road/ service track and watercourse crossings.		
	Without mitigation	**With mitigation**
Extent	Very low (1)	Very low (1)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Definite (5)
Significance	**Medium**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
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:		
• Pre-construction walk-through of the final layout and corridor in order to locate species of conservation concern that can be translocated. • Vegetation clearing to commence only after walk-through has been conducted and necessary permits obtained. • Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities within sensitive areas such as in/near the drainage lines. • Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to.		
Residual Impacts:		
The loss of currently intact vegetation is an unavoidable consequence of the development and cannot be entirely mitigated. The residual impact would however be low.		

Impact Nature: Degradation and loss of surrounding natural habitat including CBAs and NPAES areas		
Degradation and loss of surrounding natural vegetation, which includes CBAs and NPAES areas, arising from construction activities.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Very short term (1)
Magnitude	Very high (10)	Minor (2)
Probability	Definite (5)	Improbable (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Neutral
Reversibility	Low	High

Impact Nature: Degradation and loss of surrounding natural habitat including CBAs and NPAES areas		
Degradation and loss of surrounding natural vegetation, which includes CBAs and NPAES areas, arising from construction activities.		
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
• Pre-construction environmental induction and awareness training for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas etc. • All construction activity and roads to be within the clearly defined and demarcated areas. • Temporary laydown areas should be located within areas that have been identified as being of moderate sensitivity and to avoid high sensitivity areas. These areas should be rehabilitated after use. • Appropriate dust control measures to be implemented. • Suitable sanitary facilities to be provided for construction staff.		
Residual Impacts:		
It is unlikely that residual impacts are expected if the appropriate mitigation measures are implemented. However, there may still be minimal degradation due to dust precipitation.		

Impact Nature: Direct mortality or disturbance of fauna		
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, as well as vibration may disrupt behaviour.		
	Without mitigation	**With mitigation**
Extent	Low (2)	Low (2)
Duration	Short term (2)	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?	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:		
• All personnel should undergo environmental induction with regards to fauna and awareness about not harming or collecting species, especially tortoises and snakes. • Prior to commencing work each day, two individuals should traverse the working area in order to disturb (flush out) any fauna so they have a chance to vacate. • Any fauna threatened by the construction activities should be removed safely by an appropriately qualified environmental officer or removal specialist. • All construction vehicles should adhere to a speed limit of maximum 40 km/h on site to avoid collisions. • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner. • If holes or trenches need to be dug for pylons or electrical cabling, these should not be left open for extended periods of time as fauna may fall in and become trapped in them. Holes should only be dug when they are required and should be used and filled shortly thereafter. Alternately, open excavations must be monitored daily to release any fauna that become trapped.		
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.		

4.1.3.2 Operation Phase

Impact Nature: Continued habitat degradation		
Disturbance created during the construction phase will leave the development area vulnerable to erosion and Invasive Alien Plant (IAP) encroachment.		
	Without Mitigation	With Mitigation
Extent	Low (2)	Low (2)
Duration	Permanent (5)	Very short term (1)
Magnitude	High (8)	MIinor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status	Negative	Negative
Reversibility	Low	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:		
• A rehabilitation plan must be written for the development area and ensured that it be adhered to. • Access roads and crossings (if applicable) should have run-off control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. • All erosion observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. • There should be follow-up rehabilitation and re-vegetation of any remaining denuded areas with local indigenous perennial shrubs and succulents from the area. • An IAP management plan must be written and implemented for the development during operation. • Regular monitoring for IAP encroachment during the operation phase to ensure that no alien invasion problems have developed as result of the disturbance. This should be every 6 months during the first two years of the operation phase and annually for the life of the project. • All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management programme.		
Residual Risks	There is still the potential some potential for erosion and IAP encroachment even with the implementation of control measures but would have a low impact.	

Impact Nature: Disturbance or persecution of fauna		
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	Low (2)	Low (2)
Duration	Long term (4)	Very short term (1)
Magnitude	High (8)	Minor (2)
Probability	Probable (3)	Very improbable (1)
Significance	**Medium**	**Low**
Status	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes	
Mitigation:		

Impact Nature: Disturbance or persecution of fauna	
The operation and maintenance of the proposed development may lead to disturbance or persecution of fauna in the vicinity of the development.	
• Any fauna threatened by the maintenance and operational activities should be allowed to passively vacate the area or be removed to a safe location by an appropriate individual. • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner. • All vehicles accessing the site should adhere to a max 40 km/h on site to avoid collisions. • If any holes or trenches are to be dug these must not be left open for more than a few hours and must be filled at night. Alternately, open excavations must be monitored daily and any entrapped fauna must be freed.	
Residual Risks	Disturbance from maintenance activities will occur albeit at a low and infrequent level.

4.1.3.3 Decommissioning Phase

Impact Nature: Continued habitat degradation		
Disturbance created during decommissioning will leave the development area vulnerable to erosion and alien plant invasion for several years.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (3)
Magnitude	Medium (3)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium**	**Low**
Status	Negative	Negative
Reversibility	Low	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:		
• Rehabilitation in accordance with the Rehabilitation Plan for the development must be undertaken in areas disturbed during the decommissioning phase. • Monitoring of the rehabilitated area must be undertaken for a minimum of 3 years after the decommissioning phase. • All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. • There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous flora. • IAP management must occur annually for at least 2 years after decommissioning. A further 1-3 years of monitoring and control may be required, depending on the condition of the site at the end of year 2. Woody aliens should be controlled using the appropriate alien control techniques as determined by the species present. This might include use of herbicides where no practical manual means are feasible.		
Residual Risks	No significant residual risks are expected, although IAP encroachment and erosion might still occur but would have a negligible impact if effectively managed.	

4.1.4 Cumulative Impacts

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

Impact Nature: Cumulative habitat loss within the southern Roggeveld		
The development of the proposed Great Karoo Grid Connection Infrastructure will contribute to cumulative habitat loss within CBAs, NPAE Areas and other broad-scale cumulative impacts on ecological processes in the southern Roggeveld.		
	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Low (2)	Moderate (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	High (8)
Probability	Probable (3)	Probable (3)
Significance	**Medium**	**Medium**
Status	Negative	Negative
Reversibility	High	Low
Irreplaceable loss of resources	No	No
Can impacts be mitigated	To some degree, but the majority of the impact results from the presence of the various facilities which cannot be well mitigated.	
Mitigation:		
• Ensure that sensitive habitats such as drainage lines, pans and quartz patches are not within the development footprint. Where crossings of drainage lines are unavoidable, the disturbance footprint must be minimized and formal crossings be developed. • Ensure that a rehabilitation plan and IAP management plan be compiled for each development and are effectively implemented.		

4.2 Biodiversity Management Outcomes

The purpose of the management outcomes is to allow for the mitigations associated with the impact assessment to be incorporated into the EMPr. These are provided in Table 4-2.

Table 4-2 Summary of management outcomes pertaining to impacts to biodiversity associated with the proposed Great Karoo OHL and Switching Station

Management Action	Phase	Responsible Party for Implementation
Prior to construction activity a walk-through survey must be undertaken to tag/mark flora species to be relocated. Appropriate permits must be obtained prior to relocation of the identified species.	Pre-Construction	Project Manager Environmental Officer Undertaken by Specialist
The areas to be developed and access roads must be specifically demarcated to prevent movement of workers into sensitive surrounding environments, and so that during the construction phase, only the demarcated areas may be impacted upon.	Construction	Environmental Officer
Temporary areas that are denuded during construction needs to be re-vegetated with indigenous vegetation. This will also reduce the likelihood of encroachment by Invasive Alien Plant species.	Construction	Project Manager Environmental Officer
It should be made an offence for any staff to bring or plant any plant species into any portion of the project area, unless undertaken in line with the required/approved rehabilitation plan. No plant species whether indigenous (unless undertaken in accordance with the rehabilitation plan) or exotic should be brought into the project area (unless undertaken in accordance with the rehabilitation plan), to prevent the spread of exotic or invasive species.	Construction	Environmental Officer
An extensive alien plant management plan must be compiled to remove the alien vegetation from within the project footprint. The use of herbicides needs to be monitored and only be used by a qualified person.	Construction	Environmental Officer

Management Action	Phase	Responsible Party for Implementation
Temporary areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species.	Construction	Environmental Officer
A fire management plan must be in place for the areas surrounding the project area and the road to restrict the impact from fire on the natural flora and fauna communities. A fire expert should be consulted for suitable guidelines for the area and project requirements.	Construction	Project Manager Environmental Officer Health and Safety Officer
Staff should be educated about the sensitivity of faunal species and measures should be put in place to deal with any species that are encountered during the construction process. The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited.	Construction	Environmental Officer Health and Safety Officer
Where possible, work should be restricted to one area at a time. This will give the smaller birds, mammals and reptiles a chance to vacate the area.	Construction	Project Manager Environmental Officer
Prior to site activities, the area to be disturbed should be walked on foot by 1-2 individuals to create a disturbance for fauna to vacate the area. Sites should be disturbed on a needs basis only, and just prior to the activities on the site.	Construction	Project manager, Environmental Officer
A site plan of the area must be made available onsite for all contractors and personnel indicating parking & storage areas, site offices and placement of ablution facilities.	Construction	Project Manager Environmental Officer
The Contractor should inform all site staff to the use of supplied ablution facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities. Toilets must be provided in accordance with the relevant health & safety/ labour legislation and not placed within 50 m of a drainage line.	Construction	Health and Safety Officer Environmental Officer
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be recycled or disposed of at a licensed disposal facility.	Construction	Health and Safety Officer Environmental Officer
Where a registered disposal facility is not available close to the site, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site. Temporary storage of domestic waste shall be in covered waste skips.	Construction	Health and Safety Officer Environmental Officer
Any topsoil that is removed during construction must be appropriately removed and stored according to the national and provincial guidelines. This includes on-going maintenance of such topsoil piles so that they can be utilised during rehabilitation and re-vegetation.	Construction	Environmental Officer
All livestock must always be kept out of the project area, especially areas that have been recently re-planted	Construction	Environmental Officer
Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and dumps especially. This includes wetting of exposed soft soil surfaces and/or utilising biodegradable soil binding agents.	Construction	Environmental Officer
Stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised and be surrounded by bunds if required.	Construction	Environmental Officer
A pest control plan must be put in place and implemented. It is imperative that poisons not be used.	Construction	Health and Safety Officer
Construction activities and vehicles could cause spillages of lubricants, fuels and waste material potentially negatively affecting the functioning of the ecosystem. All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas within designated laydown areas.	Construction	Project Manager Environmental Officer
Have action plans on site, and training for contactors and employees in the event of sewage spills, leaks and hazardous chemical spills to the surrounding environment. A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise is not available on site.	Construction	Project Manager Environmental Officer
Appropriate measures must be implemented to prevent excessive noise and vibration. No construction is to occur at night to avoid disturbance to amphibians.	Construction	Project Manager Environmental Officer
Appropriate speed reducing measures, such as speed bumps and speed limit signs (40 km/h) or similar, should be incorporated into the road design to reduce the chance of road-kills on site.	Operational	Project Manager Contractor
Effective and sustainable stormwater designs must be incorporated into the road design – as appropriate - to prevent excessive runoff into the surrounding natural environment and thereby, causing erosion.	Operational	Project Manager Contractor
A fire management plan must be in place for the areas surrounding the project area to restrict the impact from fire on the natural flora and fauna communities. A fire expert should be consulted for suitable guidelines for the area and project requirements.	Operational	Project Manager Environmental Officer

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 high confidence in the information provided. The survey ensured that there was suitable ground-truth coverage of the assessment area and major habitats and ecosystems were assessed to obtain a general species (fauna and flora) overview and the major current impacts were observed.

The proposed development overlaps with a single vegetation type, the Central Mountain Shale Renosterveld. The Central Mountain Shale Renosterveld is a poorly studied vegetation type, although it possesses a high level of biodiversity. The conservation status is classified as Least Threatened albeit the protection level is regarded as 'Not Protected'. The assessment area possesses a high diversity and abundance of protected flora species as well as flora species that are threatened. Moreover, schedule 1 and schedule 2 protected fauna are ubiquitous within the assessment area and surrounding landscape. Overall, based on the observations made during the field survey, the assessment area/corridor is regarded as a 'moderate-high' sensitive environment.

The threatened mammal species recorded within the assessment area, *Pelea capreolus* (Grey Rhebok), is unlikely to be impacted by the OHL itself, but will be impacted by the disturbance created during the construction phase. However, the switching station will reduce the available habitat, albeit this will be minimal. Excessive noise will lead to displacement of the species and the vehicle traffic potentially will lead to direct mortality, and as such, speed reducing measures must be implemented.

Importantly, the proposed development overlaps with a CBA 1 and CBA 2, as well as a NPAES focus area. Development within these areas is undesirable and clearing of at least 300 m^2 of indigenous vegetation within these areas is a listed activity (Government Gazette No. 38282, 4 December 2014). Nevertheless, the relatively low overall footprint of the proposed development is unlikely to significantly compromise the ecological functioning of the affected area and is regarded as a 'Low' risk.

5.2 Impact Statement

The main expected impacts of the proposed OHL and Switching Station will include the following:

- habitat loss and fragmentation;
- degradation of surrounding habitat; and
- disturbance and displacement caused during the construction and maintenance phases.

Bearing in mind that the Great Karoo Wind Farm has already received authorisation, and the proposed grid connection infrastructure is a necessity for the distribution of energy, development may proceed. the OHL routing traverses the authorised Great Karoo, Karusa and Soewater Wind Farms. The latter two are under construction and therefore the OHL is not

a new disturbance in the landscape However, considering that the corridor has been identified as being of significance for biodiversity maintenance and ecological processes (CBAs and NPAES focus area), development may proceed only with the implementation of mitigation measures as described in this report. Development of infrastructure can occur within any area of the corridor footprint, but pylons and the switching station are not be located in drainage lines. Formal crossings must be developed for the road to traverse these drainage lines. The location of the proposed infrastructure is not to exceed the boundary of the corridor.

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7 Appendix Items

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

Family	Species Name	Conservation Status	Endemism
Aizoaceae	*Antimima pumila*	DD	Endemic
Aizoaceae	*Antimima stayneri*	LC	Endemic
Aizoaceae	*Cheiridopsis sp.*		
Aizoaceae	*Cleretum lyratifolium*	LC	Endemic
Aizoaceae	*Galenia pubescens*	LC	Endemic
Aizoaceae	*Hammeria gracilis*	LC	Endemic
Aizoaceae	*Mesembryanthemum grossum*		Endemic
Amaryllidaceae	*Gethyllis campanulata*	LC	Endemic
Amaryllidaceae	*Gethyllis sp.*		
Amaryllidaceae	*Gethyllis villosa*	LC	Endemic
Anacardiaceae	*Laurophyllus capensis*	LC	Endemic
Apiaceae	*Chamarea longipedicellata*	LC	
Asparagaceae	*Asparagus capensis var. capensis*	LC	
Asphodelaceae	*Bulbine alooides*	LC	Endemic
Asphodelaceae	*Bulbine capensis*	LC	
Asphodelaceae	*Bulbine succulenta*	LC	Endemic
Asphodelaceae	*Bulbinella elegans*	LC	Endemic
Asphodelaceae	*Bulbinella latifolia subsp. denticulata*	LC	Endemic
Asphodelaceae	*Bulbinella nutans subsp. nutans*	LC	Endemic
Asphodelaceae	*Gonialoe variegata*	LC	
Asphodelaceae	*Haworthia arachnoidea var. scabrispina*	NE	Endemic
Asphodelaceae	*Trachyandra patens*	LC	Endemic
Asphodelaceae	*Trachyandra sanguinorhiza*	LC	Endemic
Asphodelaceae	*Trachyandra thyrsoidea*	LC	Endemic
Asteraceae	*Dimorphotheca cuneata*	LC	
Asteraceae	*Eriocephalus ericoides subsp. ericoides*	LC	
Asteraceae	*Eriocephalus eximius*	LC	
Asteraceae	*Eriocephalus punctulatus*	LC	
Asteraceae	*Eriocephalus purpureus*	LC	Endemic
Asteraceae	*Euryops lateriflorus*	LC	
Asteraceae	*Euryops oligoglossus subsp. racemosus*	LC	Endemic
Asteraceae	*Felicia australis*	LC	Endemic
Asteraceae	*Felicia dregei*	LC	Endemic
Asteraceae	*Felicia filifolia subsp. schaeferi*	LC	
Asteraceae	*Felicia namaquana*	LC	

Family	Species Name	Conservation Status	Endemism
Asteraceae	*Gazania leiopoda*	LC	Endemic
Asteraceae	*Helichrysum leontonyx*	LC	
Asteraceae	*Lasiospermum pedunculare*	LC	Endemic
Asteraceae	*Leysera tenella*	LC	
Asteraceae	*Osteospermum scariosum var. scariosum*	NE	
Asteraceae	*Pteronia empetrifolia*	LC	Endemic
Asteraceae	*Pteronia incana*	LC	Endemic
Asteraceae	*Senecio arenarius*	LC	
Asteraceae	*Steirodiscus capillaceus*	LC	Endemic
Asteraceae	*Steirodiscus sp.*		
Asteraceae	*Ursinia anthemoides subsp. versicolor*	LC	
Asteraceae	*Ursinia nana subsp. nana*	LC	
Boraginaceae	*Anchusa capensis*	LC	
Brassicaceae	*Heliophila carnosa*	LC	
Brassicaceae	*Heliophila cornuta var. squamata*	NE	
Brassicaceae	*Heliophila crithmifolia*	LC	
Brassicaceae	*Heliophila seselifolia*	LC	
Brassicaceae	*Heliophila seselifolia var. seselifolia*	NE	
Brassicaceae	*Heliophila suborbicularis*	LC	Endemic
Cephaloziellaceae	*Cylindrocolea sp.*		
Colchicaceae	*Colchicum coloratum subsp. burchellii*	LC	Endemic
Colchicaceae	*Colchicum eucomoides*	LC	Endemic
Colchicaceae	*Colchicum hantamense*	LC	Endemic
Colchicaceae	*Colchicum sp.*		
Colchicaceae	*Ornithoglossum undulatum*	LC	
Colchicaceae	*Wurmbea variabilis*	LC	Endemic
Cyperaceae	*Ficinia argyropa*	LC	Endemic
Cyperaceae	*Pseudoschoenus inanis*	LC	
Encalyptaceae	*Encalypta vulgaris*		
Fabaceae	*Lessertia falciformis*	LC	
Fabaceae	*Lessertia frutescens subsp. frutescens*	LC	
Fabaceae	*Lotononis leptoloba*	LC	Endemic
Fabaceae	*Lotononis venosa*	VU	Endemic
Fabaceae	*Wiborgia sericea*	LC	Endemic
Fabaceae	*Wiborgia sp.*		
Geraniaceae	*Pelargonium leipoldtii*	LC	Endemic
Geraniaceae	*Pelargonium luteopetalum*		Endemic
Grimmiaceae	*Grimmia pulvinata*		

Family	Species Name	Conservation Status	Endemism
Hyacinthaceae	*Albuca sp.*		
Hyacinthaceae	*Drimia capensis*	LC	Endemic
Hyacinthaceae	*Lachenalia canaliculata*	LC	Endemic
Hyacinthaceae	*Lachenalia comptonii*	LC	Endemic
Hyacinthaceae	*Lachenalia juncifolia*		Endemic
Hyacinthaceae	*Lachenalia longituba*	VU	Endemic
Hyacinthaceae	*Lachenalia sp.*		
Hyacinthaceae	*Lachenalia violacea*		Endemic
Hyacinthaceae	*Ornithogalum hispidum subsp. hispidum*	LC	
Hyacinthaceae	*Ornithogalum sp.*		
Hypoxidaceae	*Pauridia capensis*	LC	Endemic
Hypoxidaceae	*Spiloxene sp.*		
Iridaceae	*Babiana cuneata*	LC	Endemic
Iridaceae	*Geissorhiza heterostyla*	LC	Endemic
Iridaceae	*Geissorhiza karooica*	NT	Endemic
Iridaceae	*Gladiolus ceresianus*	LC	Endemic
Iridaceae	*Gladiolus splendens*	LC	Endemic
Iridaceae	*Gladiolus uysiae*	LC	Endemic
Iridaceae	*Hesperantha bachmannii*	LC	Endemic
Iridaceae	*Hesperantha cucullata*	LC	Endemic
Iridaceae	*Hesperantha humilis*	LC	Endemic
Iridaceae	*Hesperantha marlothii*	LC	Endemic
Iridaceae	*Hesperantha pilosa*	LC	Endemic
Iridaceae	*Ixia lacerata*	LC	Endemic
Iridaceae	*Ixia linearifolia*	LC	Endemic
Iridaceae	*Ixia marginifolia*	LC	Endemic
Iridaceae	*Ixia mollis*	VU	Endemic
Iridaceae	*Ixia namaquana*	LC	Endemic
Iridaceae	*Ixia sp.*		
Iridaceae	*Ixia trifolia*	LC	Endemic
Iridaceae	*Lapeirousia montana*	LC	Endemic
Iridaceae	*Moraea amabilis*	LC	
Iridaceae	*Moraea ciliata*	LC	Endemic
Iridaceae	*Moraea cookii*	LC	
Iridaceae	*Moraea cuspidata*	LC	
Iridaceae	*Moraea flava*		Endemic
Iridaceae	*Moraea pritzeliana*	LC	Endemic
Iridaceae	*Romulea atrandra var. atrandra*	LC	Endemic

Family	Species Name	Conservation Status	Endemism
Iridaceae	*Romulea austinii*	LC	Endemic
Iridaceae	*Romulea diversiformis*	LC	Endemic
Iridaceae	*Romulea eburnea*	VU	Endemic
Iridaceae	*Romulea hirta*	LC	Endemic
Iridaceae	*Romulea tortuosa subsp. aurea*	LC	Endemic
Iridaceae	*Syringodea unifolia*		Endemic
Malvaceae	*Anisodontea anomala*	LC	Endemic
Malvaceae	*Anisodontea triloba*	LC	Endemic
Malvaceae	*Hermannia filifolia var. grandicalyx*	NE	Endemic
Molluginaceae	*Pharnaceum aurantium*	LC	
Orchidaceae	*Disperis purpurata subsp. purpurata*	LC	Endemic
Orchidaceae	*Holothrix aspera*	LC	Endemic
Orchidaceae	*Pterygodium crispum*	LC	Endemic
Orchidaceae	*Pterygodium deflexum*	LC	Endemic
Orchidaceae	*Pterygodium hallii*	LC	Endemic
Orchidaceae	*Pterygodium pentherianum*	LC	Endemic
Orchidaceae	*Pterygodium volucris*	LC	Endemic
Oxalidaceae	*Oxalis melanosticta*		
Oxalidaceae	*Oxalis obtusa*	LC	
Oxalidaceae	*Oxalis palmifrons*	LC	Endemic
Poaceae	*Ehrharta calycina*	LC	
Poaceae	*Poa bulbosa*	LC	
Polygalaceae	*Polygala scabra*	LC	
Pottiaceae	*Triquetrella tristicha*		
Pteridaceae	*Cheilanthes deltoidea subsp. deltoidea*	LC	
Pteridaceae	*Cheilanthes induta*	LC	Endemic
Pteridaceae	*Pellaea rufa*	LC	Endemic
Rubiaceae	*Nenax microphylla*	LC	
Scrophulariaceae	*Alonsoa unilabiata*	LC	Endemic
Scrophulariaceae	*Aptosimum indivisum*	LC	
Scrophulariaceae	*Diascia cardiosepala*	LC	Endemic
Scrophulariaceae	*Diascia hexensis*	LC	Endemic
Scrophulariaceae	*Diascia macrophylla*	LC	Endemic
Scrophulariaceae	*Diascia parviflora*	LC	Endemic
Scrophulariaceae	*Diascia sacculata*	LC	Endemic
Scrophulariaceae	*Diascia sp.*		
Scrophulariaceae	*Hebenstretia robusta*	LC	Endemic
Scrophulariaceae	*Manulea pusilla*	LC	Endemic

Family	Species Name	Conservation Status	Endemism
Scrophulariaceae	*Nemesia azurea*	LC	Endemic
Scrophulariaceae	*Nemesia sp.*		
Scrophulariaceae	*Polycarena aurea*	LC	Endemic
Scrophulariaceae	*Selago divaricata*	LC	
Scrophulariaceae	*Selago glabrata*	LC	Endemic
Scrophulariaceae	*Selago gloiodes*	LC	Endemic
Scrophulariaceae	*Zaluzianskya bella*	LC	Endemic
Scrophulariaceae	*Zaluzianskya mirabilis*	LC	Endemic
Scrophulariaceae	*Zaluzianskya sp.*		
Sphaerocarpaceae	*Sphaerocarpos stipitatus*		
Targioniaceae	*Targionia hypophylla*		

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

Family	Scientific Name	Common Name	Conservation Status
Bufonidae	*Sclerophrys capensis*	Raucous Toad	LC
Bufonidae	*Vandijkophrynus gariepensis*	Karoo Toad	LC
Pipidae	*Xenopus laevis*	Common Platanna	LC
Pyxicephalidae	*Amietia fuscigula*	Cape River Frog	LC
Pyxicephalidae	*Cacosternum boettgeri*	Common Caco	LC
Pyxicephalidae	*Cacosternum karooicum*	Karoo Caco	LC
Pyxicephalidae	*Tomopterna delalandii*	Cape Sand Frog	LC
Pyxicephalidae	*Tomopterna tandyi*	Tandy's Sand Frog	LC

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

Family	Scientific Name	Common Name	Conservation Status
Agamidae	*Agama atra*	Southern Rock Agama	LC
Agamidae	*Agama hispida*	Spiny Ground Agama	LC
Atractaspididae	*Homoroselaps lacteus*	Spotted Harlequin Snake	LC
Chamaeleonidae	*Bradypodion gutturale*	Little Karoo Dwarf Chameleon	LC
Chamaeleonidae	*Chamaeleo namaquensis*	Namaqua Chameleon	LC
Colubridae	*Dasypeltis scabra*	Rhombic Egg-eater	LC
Colubridae	*Dipsina multimaculata*	Dwarf Beaked Snake	LC
Colubridae	*Psammophis crucifer*	Cross-marked Grass Snake	LC
Colubridae	*Pseudaspis cana*	Mole Snake	LC
Cordylidae	*Cordylus minor*	Western Dwarf Girdled Lizard	LC
Cordylidae	*Hemicordylus capensis*	Graceful Crag Lizard	LC
Cordylidae	*Karusasaurus polyzonus*	Karoo Girdled Lizard	LC
Cordylidae	*Pseudocordylus microlepidotus namaquensis*	Nuweveldberg Crag Lizard	LC

Family	Scientific Name	Common Name	Conservation Status
Elapidae	*Aspidelaps lubricus lubricus*	Coral Shield Cobra	LC
Elapidae	*Hemachatus haemachatus*	Rinkhals	LC
Elapidae	*Naja nigricincta woodi*	Black Spitting Cobra	LC
Gekkonidae	*Chondrodactylus angulifer angulifer*	Common Giant Ground Gecko	LC
Gekkonidae	*Chondrodactylus bibronii*	Bibron's Gecko	LC
Gekkonidae	*Pachydactylus capensis*	Cape Gecko	LC
Gekkonidae	*Pachydactylus formosus*	Southern Rough Gecko	LC
Gekkonidae	*Pachydactylus geitje*	Ocellated Gecko	LC
Gekkonidae	*Pachydactylus kladaroderma*	Thin-skinned Gecko	LC
Gekkonidae	*Pachydactylus maculatus*	Spotted Gecko	LC
Gekkonidae	*Pachydactylus mariquensis*	Marico Gecko	LC
Gekkonidae	*Pachydactylus oculatus*	Golden Spotted Gecko	LC
Gekkonidae	*Pachydactylus purcelli*	Purcell's Gecko	LC
Gekkonidae	*Pachydactylus weberi*	Weber's Gecko	LC
Gerrhosauridae	*Cordylosaurus subtessellatus*	Dwarf Plated Lizard	LC
Gerrhosauridae	*Tetradactylus tetradactylus*	Cape Long-tailed Seps	LC
Lacertidae	*Nucras tessellata*	Western Sandveld Lizard	LC
Lacertidae	*Pedioplanis burchelli*	Burchell's Sand Lizard	LC
Lacertidae	*Pedioplanis laticeps*	Karoo Sand Lizard	LC
Lacertidae	*Pedioplanis lineoocellata pulchella*	Common Sand Lizard	LC
Lamprophiidae	*Boaedon capensis*	Brown House Snake	LC
Lamprophiidae	*Prosymna sundevallii*	Sundevall's Shovel-snout	LC
Lamprophiidae	*Psammophis notostictus*	Karoo Sand Snake	LC
Lamprophiidae	*Psammophylax rhombeatus rhombeatus*	Spotted Grass Snake	LC
Leptotyphlopidae	*Namibiana gracilior*	Slender Thread Snake	LC
Scincidae	*Trachylepis capensis*	Cape Skink	LC
Scincidae	*Trachylepis sulcata sulcata*	Western Rock Skink	LC
Scincidae	*Trachylepis variegata*	Variegated Skink	LC
Testudinidae	*Chersina angulata*	Angulate Tortoise	LC
Testudinidae	*Homopus areolatus*	Parrot-beaked Tortoise	LC
Testudinidae	*Homopus boulengeri*	Karoo Padloper	NT
Testudinidae	*Homopus femoralis*	Greater Padloper	LC
Testudinidae	*Psammobates tentorius tentorius*	Karoo Tent Tortoise	NT
Testudinidae	*Psammobates tentorius verroxii*	Verrox's Tent Tortoise	NT
Typhlopidae	*Rhinotyphlops lalandei*	Delalande's Beaked Blind Snake	LC
Viperidae	*Bitis arietans arietans*	Puff Adder	LC

7.4 Appendix D – Avifauna species expected to occur within the project area

Common Name	Scientific Name	Conservation Status
Barbet, Acacia Pied	*Tricholaema leucomelas*	LC
Batis, Pririt	*Batis pririt*	LC
Bee-eater, European	*Merops apiaster*	LC
Bishop, Southern Red	*Euplectes orix*	LC
Bokmakierie, Bokmakierie	*Telophorus zeylonus*	LC
Bulbul, Cape	*Pycnonotus capensis*	LC
Bunting, Cape	*Emberiza capensis*	LC
Bunting, Lark-like	*Emberiza impetuani*	LC
Buzzard, Jackal	*Buteo rufofuscus*	LC
Canary, Black-headed	*Serinus alario*	LC
Canary, Cape	*Serinus canicollis*	LC
Canary, White-throated	*Crithagra albogularis*	LC
Canary, Yellow	*Crithagra flaviventris*	LC
Chat, Familiar	*Cercomela familiaris*	LC
Chat, Karoo	*Cercomela schlegelii*	LC
Chat, Sickle-winged	*Cercomela sinuata*	LC
Cisticola, Grey-backed	*Cisticola subruficapilla*	LC
Cormorant, Reed	*Phalacrocorax africanus*	LC
Crombec, Long-billed	*Sylvietta rufescens*	LC
Crow, Cape	*Corvus capensis*	LC
Crow, Pied	*Corvus albus*	LC
Dove, Laughing	*Streptopelia senegalensis*	LC
Dove, Namaqua	*Oena capensis*	LC
Dove, Red-eyed	*Streptopelia semitorquata*	LC
Duck, African Black	*Anas sparsa*	LC
Duck, Yellow-billed	*Anas undulata*	LC
Eagle, Booted	*Aquila pennatus*	LC
Eagle, Verreaux's	*Aquila verreauxii*	VU
Eagle-owl, Spotted	*Bubo africanus*	LC
Eremomela, Yellow-bellied	*Eremomela icteropygialis*	LC
Fiscal, Common (Southern)	*Lanius collaris*	LC
Flycatcher, Fairy	*Stenostira scita*	LC
Flycatcher, Fiscal	*Sigelus silens*	LC
Francolin, Grey-winged	*Scleroptila africanus*	LC
Goose, Egyptian	*Alopochen aegyptiacus*	LC
Goose, Spur-winged	*Plectropterus gambensis*	LC
Goshawk, Southern Pale Chanting	*Melierax canorus*	LC

Common Name	Scientific Name	Conservation Status
Hamerkop, Hamerkop	*Scopus umbretta*	LC
Harrier, Black	*Circus maurus*	EN
Harrier-Hawk, African	*Polyboroides typus*	LC
Heron, Grey	*Ardea cinerea*	LC
Hoopoe, African	*Upupa africana*	LC
Ibis, African Sacred	*Threskiornis aethiopicus*	LC
Ibis, Hadeda	*Bostrychia hagedash*	LC
Kestrel, Rock	*Falco rupicolus*	LC
Korhaan, Karoo	*Eupodotis vigorsii*	NT
Lapwing, Blacksmith	*Vanellus armatus*	LC
Lark, Karoo	*Calendulauda albescens*	LC
Lark, Karoo Long-billed	*Certhilauda subcoronata*	LC
Lark, Large-billed	*Galerida magnirostris*	LC
Lark, Red-capped	*Calandrella cinerea*	LC
Lark, Spike-heeled	*Chersomanes albofasciata*	LC
Martin, Brown-throated	*Riparia paludicola*	LC
Martin, Rock	*Hirundo fuligula*	LC
Masked-weaver, Southern	*Ploceus velatus*	LC
Mousebird, Red-faced	*Urocolius indicus*	LC
Mousebird, White-backed	*Colius colius*	LC
Neddicky, Neddicky	*Cisticola fulvicapilla*	LC
Pigeon, Speckled	*Columba guinea*	LC
Plover, Three-banded	*Charadrius tricollaris*	LC
Prinia, Karoo	*Prinia maculosa*	LC
Raven, White-necked	*Corvus albicollis*	LC
Reed-warbler, African	*Acrocephalus baeticatus*	LC
Robin-chat, Cape	*Cossypha caffra*	LC
Sandgrouse, Namaqua	*Pterocles namaqua*	LC
Scrub-robin, Karoo	*Cercotrichas coryphoeus*	LC
Shelduck, South African	*Tadorna cana*	LC
Shoveler, Cape	*Anas smithii*	LC
Snake-eagle, Black-chested	*Circaetus pectoralis*	LC
Sparrow, Cape	*Passer melanurus*	LC
Sparrow, House	*Passer domesticus*	LC
Sparrow, Southern Grey-headed	*Passer diffusus*	LC
Spurfowl, Cape	*Pternistis capensis*	LC
Starling, Common	*Sturnus vulgaris*	LC
Starling, Pale-winged	*Onychognathus nabouroup*	LC

Common Name	Scientific Name	Conservation Status
Starling, Pied	*Spreo bicolor*	LC
Starling, Wattled	*Creatophora cinerea*	LC
Stilt, Black-winged	*Himantopus himantopus*	LC
Stork, Black	*Ciconia nigra*	VU
Sunbird, Dusky	*Cinnyris fuscus*	LC
Sunbird, Malachite	*Nectarinia famosa*	LC
Sunbird, Southern Double-collared	*Cinnyris chalybeus*	LC
Swallow, Barn	*Hirundo rustica*	LC
Swallow, Greater Striped	*Hirundo cucullata*	LC
Swift, Alpine	*Tachymarptis melba*	LC
Swift, Little	*Apus affinis*	LC
Swift, White-rumped	*Apus caffer*	LC
Teal, Cape	*Anas capensis*	LC
Thrush, Karoo	*Turdus smithi*	LC
Tit, Grey	*Parus afer*	LC
Tit-babbler, Chestnut-vented	*Parisoma subcaeruleum*	LC
Tit-babbler, Layard's	*Parisoma layardi*	LC
Turtle-dove, Cape	*Streptopelia capicola*	LC
Wagtail, Cape	*Motacilla capensis*	LC
Warbler, Namaqua	*Phragmacia substriata*	LC
Warbler, Rufous-eared	*Malcorus pectoralis*	LC
Waxbill, Common	*Estrilda astrild*	LC
Weaver, Cape	*Ploceus capensis*	LC
Wheatear, Mountain	*Oenanthe monticola*	LC
White-eye, Cape	*Zosterops virens*	LC
Woodpecker, Ground	*Geocolaptes olivaceus*	LC

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

Order	Scientific Name	Common Name	Conservation Status
Afrosoricida	*Chlorotalpa sclateri*	Sclater's Golden Mole	LC
Afrosoricida	*Chrysochloris asiatica*	Cape Golden Mole	LC
Carnivora	*Aonyx capensis*	Cape Clawless Otter	NT
Carnivora	*Canis mesomelas*	Black-backed Jackal	LC
Carnivora	*Caracal caracal*	Caracal	LC
Carnivora	*Cynictis penicillata*	Yellow Mongoose	LC
Carnivora	*Felis nigripes*	Black-footed cat	VU
Carnivora	*Felis silvestris*	African Wild Cat	LC
Carnivora	*Galerella pulverulenta*	Cape Grey Mongoose	LC

Order	Scientific Name	Common Name	Conservation Status
Carnivora	*Genetta genetta*	Small-spotted genet	LC
Carnivora	*Genetta tigrina*	Large-spotted genet	LC
Carnivora	*Ictonyx striatus*	Striped Polecat	LC
Carnivora	*Mellivora capensis*	Honey Badger	LC
Carnivora	*Otocyon megalotis*	Bat-eared Fox	LC
Carnivora	*Panthera pardus*	Leopard	VU
Carnivora	*Proteles cristatus*	Aardwolf	LC
Carnivora	*Suricata suricatta*	Meerkat	LC
Carnivora	*Vulpes chama*	Cape Fox	LC
Eulipotyphla	*Crocidura cyanea*	Reddish-Grey Musk Shrew	LC
Eulipotyphla	*Myosorex varius*	Forest Shrew	LC
Hyracoidea	*Procavia capensis*	Rock Hyrax	LC
Lagomorpha	*Bunolagus monticularis*	Riverine Rabbit	CR
Lagomorpha	*Lepus capensis*	Cape Hare	LC
Lagomorpha	*Lepus saxatilis*	Scrub Hare	LC
Lagomorpha	*Pronolagus saundersiae*	Hewitt's Red Rock Hare	LC
Macroscledidea	*Elephantulus edwardii*	Cape Rock Elephant Shrew	LC
Macroscledidea	*Macroscelides proboscideus*	Round-eared Elephant Shrew	LC
Primate	*Papio ursinus*	Chacma Baboon	LC
Rodentia	*Acomys subspinosus*	Cape Spiny Mouse	LC
Rodentia	*Cryptomys hottentotus*	African Mole Rat	LC
Rodentia	*Dendromus melanotis*	Grey Climbing Mouse	LC
Rodentia	*Desmodillus auricularis*	Cape Short-tailed Gerbil	LC
Rodentia	*Gerbillurus paeba*	Hairy-footed Gerbil	LC
Rodentia	*Graphiurus ocularis*	Spectacled Dormouse	LC
Rodentia	*Hystrix africaeaustralis*	Cape Porcupine	LC
Rodentia	*Malacothrix typica*	Gerbil Mouse	LC
Rodentia	*Micaelamys granti*	Grant's Rock Mouse	LC
Rodentia	*Micaelamys namaquensis*	Namaqua Rock Mouse	LC
Rodentia	*Mus minutoides*	Pygmy Mouse	LC
Rodentia	*Otomys unisulcatus*	Bush Vlei Rat	LC
Rodentia	*Parotomys brantsii*	Brants's Whistling Rat	LC
Rodentia	*Parotomys littledalei*	Littledale's Whistling Rat	LC
Rodentia	*Rhabdomys pumilio*	Four-striped Grass Mouse	LC
Rodentia	*Steatomys krebsii*	Kreb's African Fat Mouse	LC
Rodentia	*Tatera afra*	Cape Gerbil	LC
Rumanantia	*Antidorcas marsupialis*	Springbok	LC
Rumanantia	*Oreotragus oreotragus*	Klipspringer	LC

Order	Scientific Name	Common Name	Conservation Status
Rumanantia	*Pelea capreolus*	Grey Rhebok	NT
Rumanantia	*Raphicerus campestris*	Steenbok	LC
Rumanantia	*Raphicerus melanotis*	Cape Grysbok	LC
Rumanantia	*Sylvicapra grimmia*	Common Duiker	LC
Tubulentata	*Orycteropus afer*	Aardvark	LC