ECOLOGICAL IMPACT ASSESSMENT REPORT

REHABILITATION OF NATIONAL ROUTE R56 SECTION 8 FROM MATATIELE (KM 130,15) TO THE KWAZULU NATAL BORDER (KM 168,71) WITHIN THE MATATIELE LOCAL MUNICIPALITY OF THE ALFRED NZO DISTRICT MUNICIPALITY, EASTERN CAPE PROVINCE.

CES

ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

PROPOSED REHABILITATION OF NATIONAL ROUTE R56 SECTION 8 FROM MATATIELE (KM 130,15) TO THE KWAZULU NATAL BORDER (KM 168,71) WITHIN THE MATATIELE LOCAL MUNICIPALITY OF THE ALFRED NZO DISTRICT MUNICIPALITY, EASTERN CAPE PROVINCE.

ECOLOGICAL IMPACT ASSESSMENT

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REVISIONS TRACKING TABLE

CES Report Revision and Tracking Schedule

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ACRONYM LIST

ADU	Animal Demography Unit
BA	Basic Assessment
BI	Biodiversity Importance
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CES	Coastal and Environmental Services
CI	Conservation Importance
CR	Critically Endangered
DAFF	Department of Agriculture, Forestry and Fisheries
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
ECBCP	Eastern Cape Biodiversity Conservation Plan
EIA	Environmental Impact Assessment
EN	Endangered
EMPr	Environmental Management Programme
ESA	Ecological Support Area
EOO	Extent of Occupancy
FI	Functional Integrity
GIS	Geographical Information System
GN	Government Notice
IUCN	International Union for Conservation of Nature
LC	Least Concern
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act
NEM:BA	National Environmental Management Biodiversity Act
NFEPA	National Freshwater Ecosystem Priority Areas
NPAES	National Protected Areas Expansion Strategy
NT	Near Threatened

ONA	Other Natural Area
PA	Protected Area
PNCO	Provincial Nature Conservation Ordinance
POSA	Plants of Southern Africa
PPP	Public Participation Process
RR	Receptor Resilience
SCC	Species of Conservation Concern
SOTER	Soil and Terrain
QDS	Quarter Degree Square
VU	Vulnerable
SANBI	South African National Biodiversity Institute
SAPAD	South Africa Protected Areas Database
SEI	Site Ecological Importance
TOPS	Threatened and Protected Species

DEFINITIONS

Alien Invasive Species refers to an exotic species that can spread rapidly and displace native species causing damage to the environment

Biodiversity is the term that is used to describe the variety of life on Earth and is defined as "*the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems*" (Secretariat of the Convention on Biological Diversity, 2005).

Habitat Fragmentation occurs when large expanses of habitat are transformed into smaller patches of discontinuous habitat units isolated from each other by transformed habitats such as farmland.

Natural Habitat refers to habitats composed of viable assemblages of plant and/or animal species of largely native origin and/or where human activity has not essentially modified an area's primary ecological function and species composition.

Protected Area is a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values**.** *(IUCN Definition 2008).*

Sensitive Species are species that are sensitive to illegal harvesting. As such, their names are obscured and listed as "Sensitive species #". As per the best practice guideline that accompanies the protocol and screening tool, the name of the sensitive species may not appear in any BAR or EIA report, nor any specialist reports released into the public domain.

Species of Conservation Concern all species that are assessed according to the IUCN Red List Criteria as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Data Deficient (DD) or Near Threatened (NT), as well as range-restricted species which are not declining and are nationally listed as Rare or Extremely Rare [also referred to in some Red Lists as Critically Rare].

SPECIALIST CHECK LIST

The contents of this specialist report complies with the legislated requirements as described in the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant and Animal Species (GN R.1150).

SPECIALIST REPORT REQUIREMENTS ACCORDING TO GN R. 320			SECTION OF REPORT
3.1	The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:		
	3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Page iv – v, Appendix 6
	3.1.2	A signed statement of independence by the specialist;	Appendix 7
	3.1.3	A statement of the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 2.1
	3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Chapter 2
	3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 1.4
	3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Chapter 4 and Chapter 6
	3.1.7	Additional environmental impacts expected from the proposed development;	Chapter 5
	3.1.8	Any direct, indirect and cumulative impacts of the proposed development;	Chapter 5
	3.1.9	The degree to which the impacts and risks can be mitigated;	Chapter 5
	3.1.10	The degree to which the impacts and risks can be reversed;	
	3.1.11	The degree to which the impacts and risks can cause loss of irreplaceable resources;	
	3.1.12	Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Chapter 5 and Section 6.2
	3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a “low” terrestrial biodiversity sensitivity and that were not considered appropriate;	N/A
	3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Chapter 6
	3.1.15	Any conditions to which this statement is subjected.	Section 6.2
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.		✓
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.		✓

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1 INTRODUCTION AND PROJECT DESCRIPTION

1.1 PROJECT DESCRIPTION AND LOCALITY

The South African National Roads Agency SOC Limited, hereafter referred to as SANRAL, proposes to rehabilitate a 38.56 km section of National Route R56 Section 8 which is routed from Matatiele (KM 130.15), passing through Cedarville to the KwaZulu-Natal Border at KM 168.71 in the Matatiele Local Municipality in the Eastern Cape Province. The development was previously authorised (EC 14/12/16/3/3/1/1580), however the Environmental Authorisation (EA) has subsequently lapsed, therefore a new application for EA is required.

The proposed road improvement will entail the following:

- → Half of the 38.56 KM section of the R56 will be resealed or overlaid and the other half rehabilitated;
- → Rehabilitation of the existing R56 using the in-situ material as part of the new pavement by adding 3 metre shoulders (1.5 m on either side of the road) with a centreline offset of approximately 6 to 7 metres resulting in a two-way traffic scenario;
- → Rehabilitation of the existing R56 using the in-situ material as part of the new pavement by adding 1.5 metres shoulders with a centreline offset of approximately 3 metres resulting in a temporary Stop-Go scenario;
- → Reconstructing the R56 on a new off-set alignment (while traffic continues to use the existing R56); and the
- → The construction of a Hard Rock Quarry for material sources (authorised 21 June 2021 DMRE reference EC 30/5/1/3/3/3/00083BPEM).

Coastal and Environmental Services (Pty) Ltd, trading as ‘CES’ has been appointed as the Environmental Assessment Practitioner (EAP) to apply for EA by conducting a Basic Assessment (BA) Process inclusive of the relevant specialist studies. This report details the biophysical environment and assess the ecological impacts associated with the proposed Rehabilitation of the National Route R56 Section 8 From Matatiele (KM 130,15) to the Kwazulu-Natal Border (KM 168,71) within the Matatiele Local Municipality of the Alfred Nzo District Municipality, Eastern Cape Province (Figure 1.1).

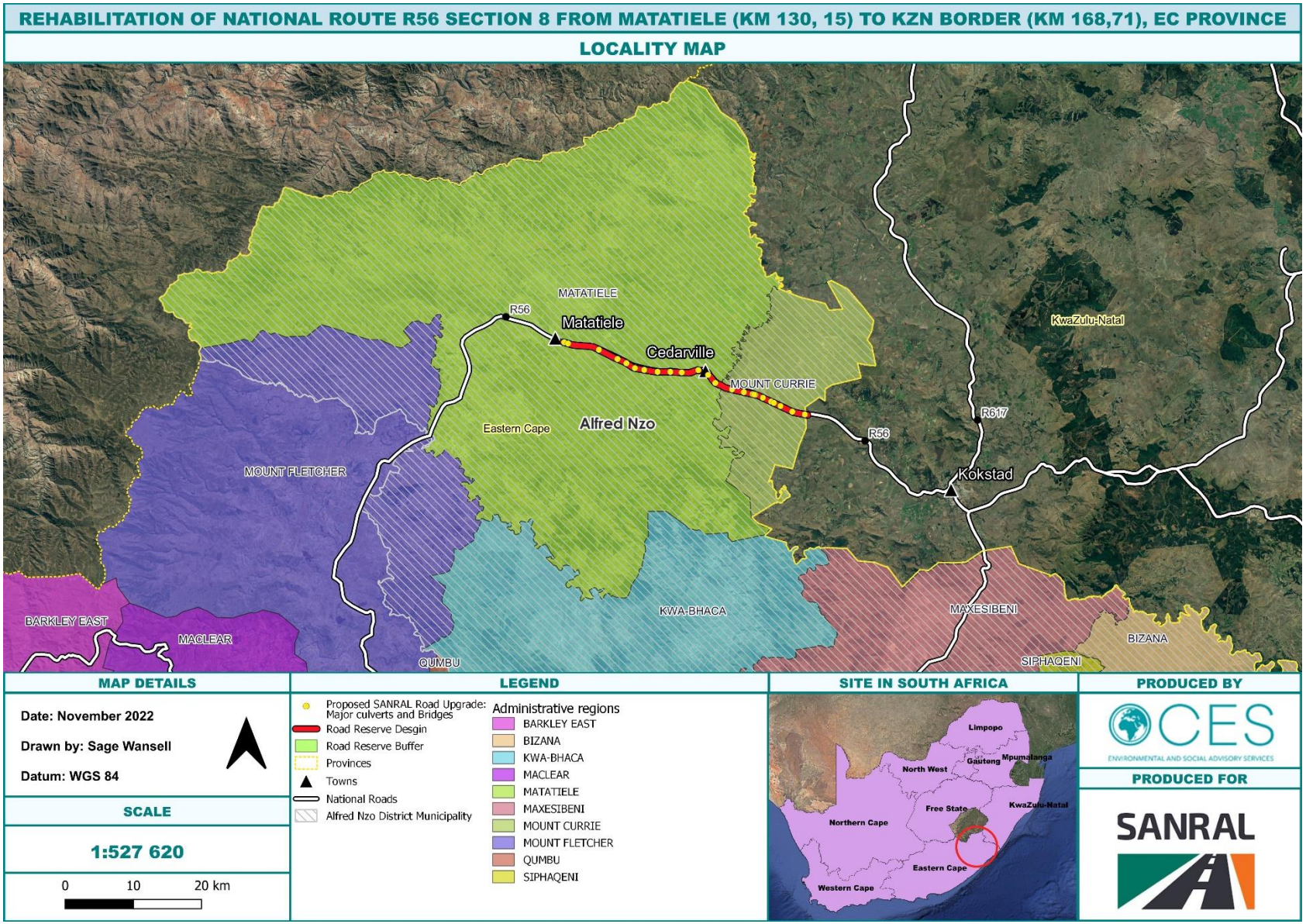


Figure 1.1: Locality Map of the proposed project.

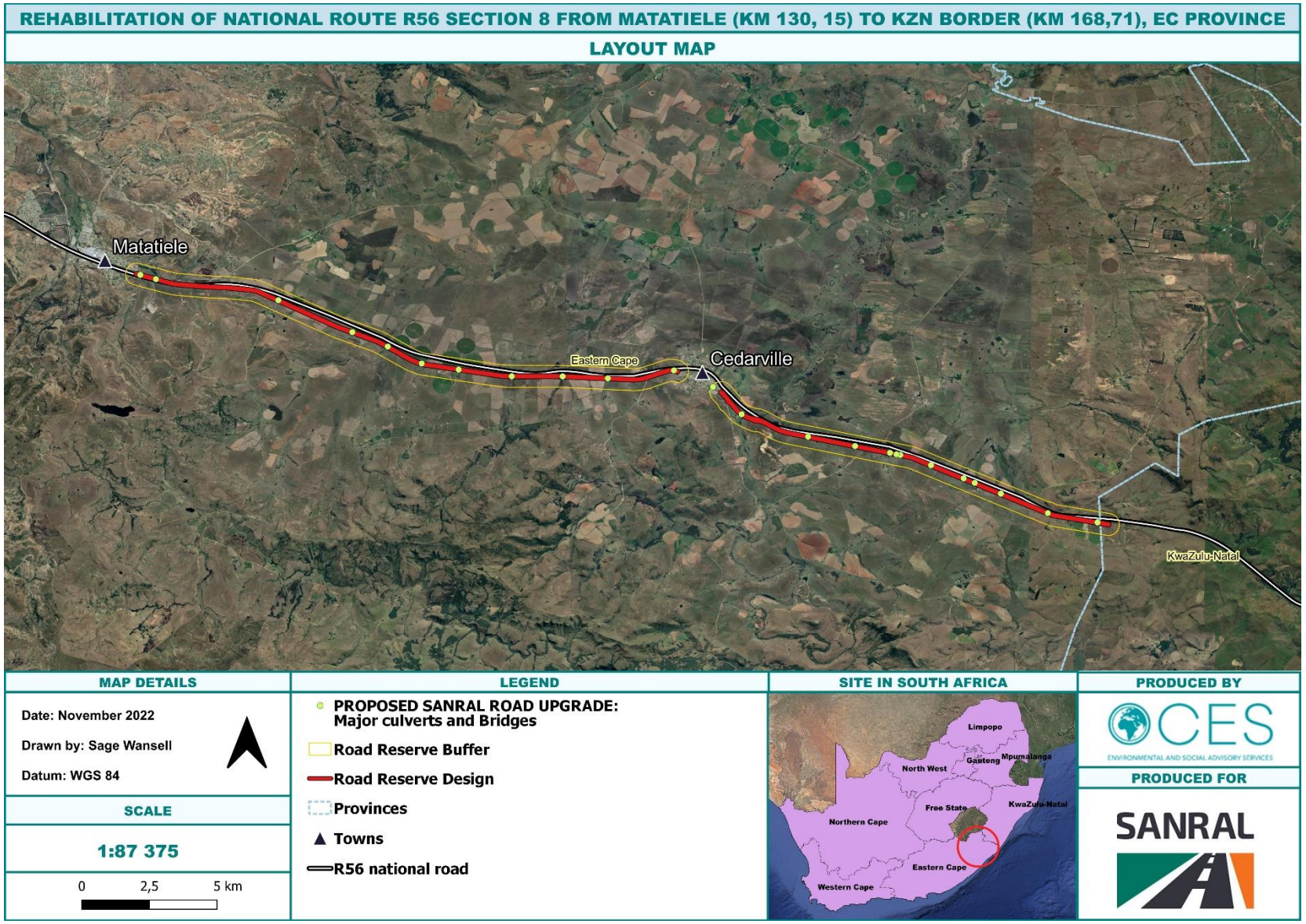


Figure 1.2: Layout Map of the proposed project.

1.2 Site Sensitivity Verification and Minimum Report Content Requirements

In terms of the Protocol for the Specialist Assessment and Minimum Reporting Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320 of 2020) and Terrestrial Animal and Plant Species (GN R. 1150), prior to the commencement of a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool, must be confirmed by undertaking a site sensitivity verification. The results of the screening tool, together with the site sensitivity verification, ultimately determines the minimum report content requirements.

According to the results of the Screening Report generated for the proposed development, the relative terrestrial biodiversity theme sensitivity is classified as **VERY HIGH** due to the development occurring within a Critical Biodiversity Area (CBA) 1 & 2, an Ecological Support Area (ESA) 1 & 2, a FEPA Sub-catchment, an area recognised by the Protected Areas Expansion Strategy, a Vulnerable Ecosystem, the Matatiele Nature Reserve, and the Cedarville Protected Environment. The Animal Species Theme is classified as **HIGH** due to the likely presence of sixteen (16) threatened faunal species, of which eleven (11) are bird species, while the Plant Species Theme is classified as **MEDIUM** due to the likely occurrence of eight (8) threatened plant species. According to Section 3 (1) of GN R. 320, '*an applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being of "very high sensitivity" for terrestrial biodiversity, must submit a Terrestrial Biodiversity* [Ecological] *Specialist Assessment'*.

Although the site sensitivity verification confirmed that a large portion of project area has been degraded/transformed, a full **Ecological Impact Assessment** (this report) has been undertaken as part of the BA Process for the proposed development due to the numerous biodiversity sensitivity features contributing to the VERY HIGH terrestrial biodiversity theme sensitivity rating for the project area. Despite the degradation of the existing road reserve, the project area still has the ability to support indigenous plant and animal species.

1.3 Objectives and Terms of Reference

The objectives for the ecological impact assessment are as follows:

- Describe and map the vegetation types in the study area.
- Describe the biodiversity and ecological state of each vegetation unit.
- Establish and map sensitive vegetation areas showing the suitability for development and no-go areas.
- Identify plant and animal species of conservation concern (Red Data List, PNCO and TOPS lists). In the case of the fauna, this was done at a desktop level.
- Identify alien plant species, assess the invasive potential, and recommend management procedures.
- Identify and assess the impacts of development on the site's natural vegetation and faunal species in terms of habitat loss, fragmentation, and degradation of key ecosystems and where feasible, provide mitigation measures to reduce these impacts.

1.4 LIMITATIONS AND ASSUMPTIONS

This report is based on current available information and, as a result, the following limitations and assumptions are implicit:

- The report is based on a project description received from the client.
- A detailed faunal survey was not conducted. The faunal survey was mainly a desktop study, using information from previous ecological surveys conducted in the area, supplemented by recording animal species and calls that were observed and heard during the site survey ad night drive.
- Species of Conservation Concern (SCC) are difficult to find and difficult to identify, however, every effort was made to identify SCC likely to occur on site.
- Sampling could only be carried out at one stage in the annual or seasonal cycle, in this case the survey was conducted in late November (late Spring), the optimal survey period for the Grassland Biome according to the Species Environmental Assessment Guideline (SANBI, 2020) (see Figure 1.3). Although the survey falls within the optimal survey period for the Grassland Biome, early and/or late flowering species could have been missed.
- The site survey was carried out over the course of one (1) day.
- Sampling could only be conducted from and within the road reserve and not on the neighbouring properties as the specialist did not have access/landowner consent to access to these farms.
- Despite the abovementioned assumptions and limitations, the time available in the field and information gathered during the survey was sufficient to provide enough information to determine the status of the affected area.

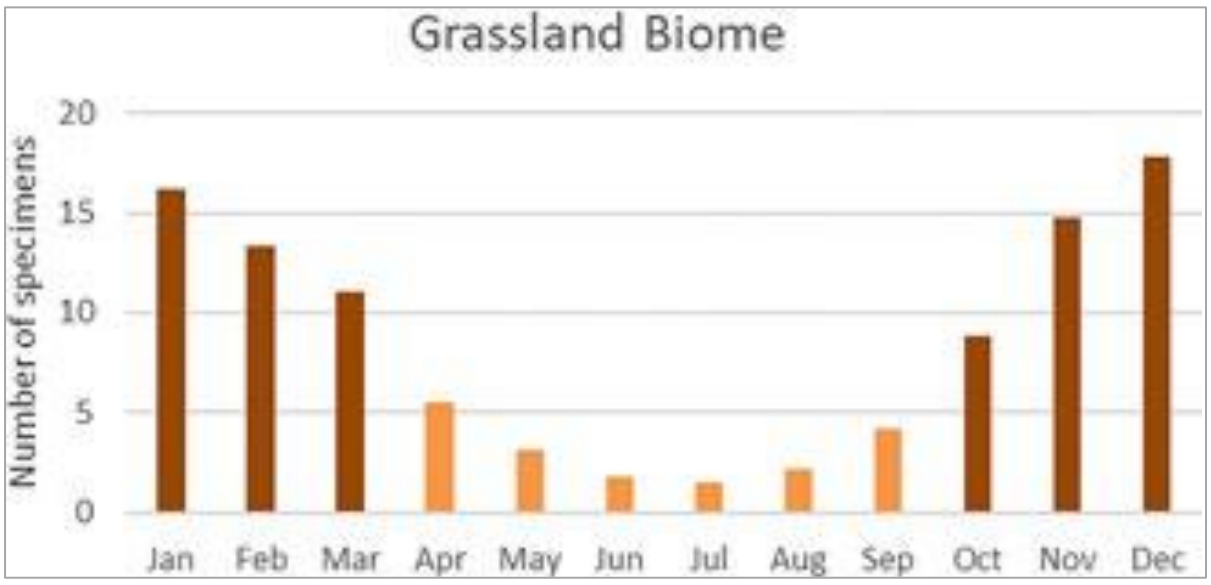


Figure 1.3: Optimal survey period for the Grassland Biome (SANBI, 2020).

2 METHODOLOGY

2.1 THE ASSESSMENT

A site visit was undertaken over the course of one (1) day, on the 24th of November 2022, to assess the site-specific ecological state, current land-use, identify potential sensitive ecosystems and identify plant species associated with the proposed project activities. The site visits also served to identify potential impacts of the proposed development, and its impact on the surrounding ecological environment.

In addition to the site visit, key resources that were consulted include the following:

- South African Vegetation Map (SA VEGMAP) (Mucina *et al*., 2018);
- Council for Geoscience (2013);
- Soil and Terrain (SOTER) Database of South Africa (2008);
- Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019);
- The National Freshwater Ecosystem Priority Areas (NFEPA, 2011/14);
- National Biodiversity Management: Biodiversity Act (NEMBA) List of Threatened or Protected Species (2005);
- The National Protected Areas Expansion Strategy (NPAES, 2010/18);
- Review of the SANBI Red Data List;
- Convention on International Trade in Endangered Species (CITES);
- South African National Land Cover (SA NLC, 2020);
- The National Biodiversity Assessment (NBA) (SANBI, 2018);
- The Animal Demography Unit (ADU);
- International Union for Conservation of Nature (IUCN);
- Eastern Cape Nature and Environmental Conservation Ordinance (NECO) No. 19 of 1974;
- South African Protected Areas Database (2022, Q3) and the South African Conservation Areas Data (2022,Q3);
- Red List of Terrestrial Ecosystems of South Africa (SANBI, 2021);
- Plants of Southern Africa (POSA) database;
- iNaturalist;
- National Biodiversity Management: Biodiversity Act (NEM:BA) Alien and Invasive Species Lists (2014); and
- Department of Agriculture, Forestry and Fisheries (DAFF) List of Protected Trees (2014).

2.2 SPECIES OF CONSERVATION CONCERN

Data on the known distribution and conservation status for each potential Species of Conservation Concern (SCC) has to be obtained to develop a list of SCC likely to occur within the project area. According to the Species Environmental Assessment Guideline (SANBI, 2020), the term ‘SCC’ refers to all species that are assessed according to the IUCN Red List Criteria as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Data Deficient (DD) or Near Threatened (NT), as well as range-restricted species which are not declining and

are nationally listed as Rare or Extremely Rare [also referred to in some Red Lists as Critically Rare]. These species may be impacted significantly by the proposed activity. Species that are afforded special protection, notably those that are protected by NEM:BA (Act No. 10 of 2004), PNCO (1975), the List of Protected Tree Species under the National Forest Act (Act No. 84 of 1998) or which occur on the South African Red Data List as SCC fall within this category.

2.3 SAMPLING PROTOCOL

According to the SA VEGMAP (2018), the proposed development footprint falls within two (2) vegetation types, namely Mabela Sandy Grassland (CR) and East Griqualand Grassland (EN). Prior to the site visit, the current remaining extent of the threatened ecosystems in South Africa spatial dataset (SANBI, 2021) was consulted in order to identify sampling locations which would be representative of the two vegetation types expected to occur within the project area. A total of seven (7) sample sites were selected and surveyed within the development footprint. Vegetation at each sample location was surveyed on foot by using a plotless sampling method to recorded data, including the plant species present, and to determine the floristic composition of each vegetation unit.

Although sampling was focused around the predetermined sampling sites, it should be noted that the entire section of road from Matatiele (KM 130.15), passing through Cedarville to the KwaZulu-Natal Border at KM 168.71, was also surveyed by driving and walking slowly along the route and noting changes in vegetation composition, particularly areas invaded by alien plant species.

Based on the findings from the field survey, vegetation communities were then described according to the dominant set of species recorded from each vegetation type. These were mapped and assigned a sensitivity score using the methodology outlined in the Species Environmental Assessment Guideline Document. All species recorded on site have been uploaded to iNaturalist (www.inaturalist.org).

The mammal survey relied on spoor and other signs as well as incidental observations, birds were identified based on sight and/or sound, while the herpetological survey was conducted using a visual encounter survey method based on area, where natural cover objects such as logs, rocks, and leaf litter were searched. A night drive (visual survey) was also conducted along the gravel road which runs perpendicularly to the R56 during which cryptic and nocturnal species where identified.

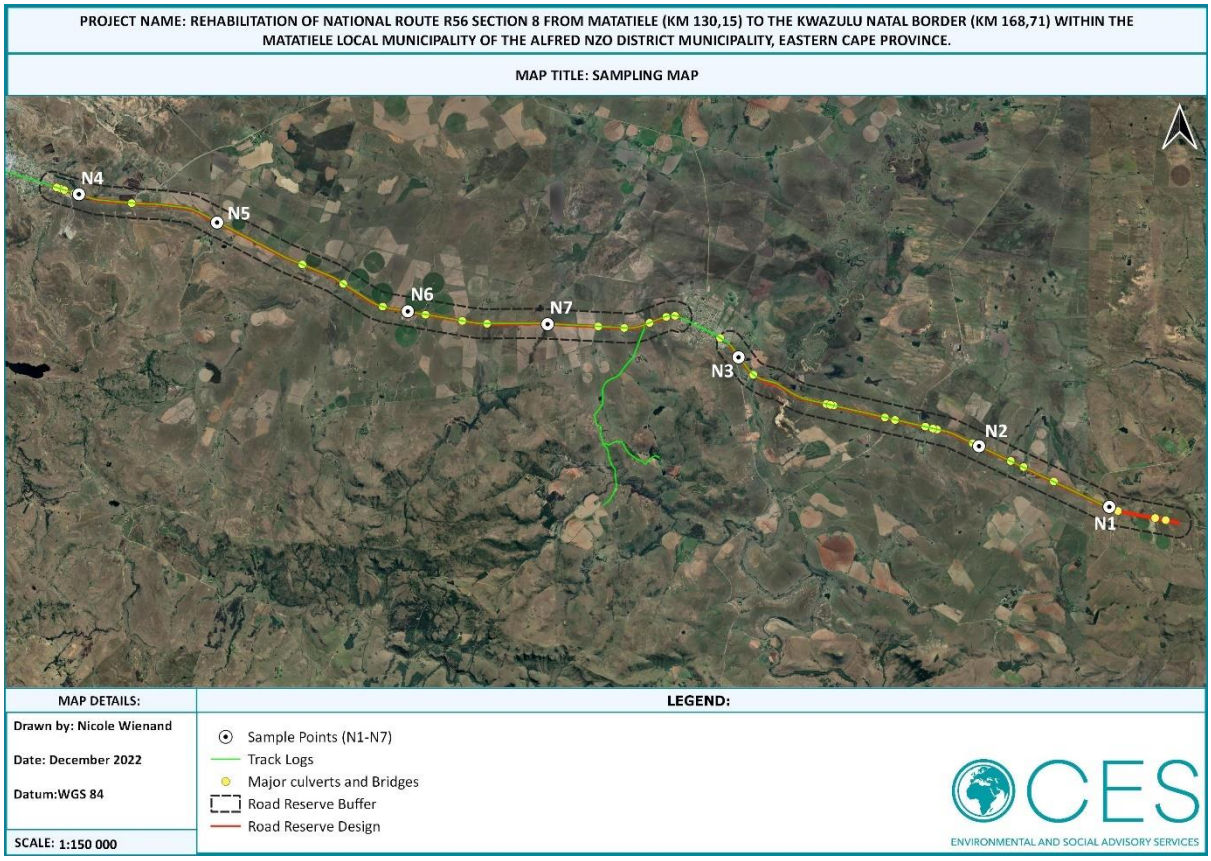


Figure 2.1: Sampling locations within the proposed development footprint.

2.4 VEGETATION MAPPING

The revised SA VEGMAP (2018) was established in order to "*provide floristically based vegetation units of South Africa, Lesotho and Swaziland at a greater level of detail than had been available before*." The map was developed using a wealth of data provided by a network of ecologists, biologists and conservation planners that make periodic contributions to the project. These contributions have allowed for the best national vegetation map to date, the last being that of Acocks developed over 50 years ago. The SANBI Vegetation map informs finer scale bioregional plans and includes an additional 47 new vegetation units since its refinement in 2012.

The SA VEGMAP project has two main aims:

1. To determine the variation in and units of Southern African vegetation based on the analysis and synthesis of data from vegetation studies throughout the region, and
2. To compile a vegetation map. The aim of the map was to accurately reflect the distribution and variation in the vegetation and indicate the relationship of the vegetation with the environment. For this reason, the collective expertise of vegetation scientists from various universities and state departments were harnessed to make this project as comprehensive as possible.

The map and accompanying book describes each vegetation type in detail, along with the most important species, including endemic species and those that are biogeographically important.

Another important resource is the current remaining extent of the threatened ecosystems in South Africa spatial dataset (SANBI, 2021) which maps the remaining extent of natural vegetation types. However, this dataset can be rather course and it is important to compare the mapping to actual conditions of vegetation observed on site, aerial imagery and the current land use.

In order to determine and map the actual current remaining extent of the threatened ecosystems within the project area, the current remaining extent of the threatened ecosystems in South Africa spatial dataset (SANBI, 2021) and the South African National Land Cover (2020) datasets were compared and referenced with Google Earth Aerial Imagery and conditions observed during the site visit. The different land uses and remaining extent of the threatened ecosystems were then digitised using GIS.

2.5 SENSITIVITY ASSESSMENT

The Species Environmental Assessment guideline (SANBI, 2020) was applied to assess the Site Ecological Importance (SEI) of the project area. The habitats and the species of conservation concern in the project area were assessed based on their conservation importance, functional integrity and receptor resilience (Table 2.1). The combination of these resulted in a rating of SEI and interpretation of mitigation requirements based on the ratings.

The sensitivity map was developed using available spatial planning tools as well as by applying the SEI sensitivity based on the field survey.

Table 2.1: Criteria for establishing Site Ecological importance and description of criteria.

Criteria	Description
Conservation Importance (CI)	*The importance of a site for supporting biodiversity features of conservation concern present e.g. populations of IUCN Threatened and Near-Threatened species (CR, EN, VU & NT), Rare, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.*
Functional Integrity (FI)	*A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.*
Biodiversity Importance (BI) is a function of Conservation Importance (CI) and the Functional Integrity (FI) of a receptor.	
Receptor Resilience (RR)	*The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.*

Site Ecological Importance (SEI) is a function of Biodiversity Importance (BI) and Receptor Resilience (RR)

2.6 ECOLOGICAL IMPACT ASSESSMENT

2.6.1 Impact rating methodology

To ensure a balanced and objective approach to assessing the significance of potential impacts, a standardized rating scale was adopted which allows for the direct comparison of specialist studies. This rating scale has been developed in accordance with the requirements outlined in Appendix 1 of the NEMA EIA Regulations (2014 and subsequent 2017 & 2021 amendments).

The details of this rating scale are included in Appendix 5.

3 DESCRIPTION OF THE ENVIRONMENT

3.1 DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

3.1.1 Climate

The information provided herewith is based on the climate data for Matatiele, the nearest urban area in close proximity to the study site. The climate of Matatiele is classified as 'Cwb' – Subtropical Highland Climate. The highest temperatures are recorded in January (~26°C) while the lowest temperatures are recorded in July (~5°C). Matatiele experiences extreme seasonal variations in rainfall (i.e., there is a distinct wet and dry season). The wet season typically occurs from October to March while the dry season occurs from April to September. The greatest precipitation occurs in February (155 mm) while the lowest precipitation occurs in June (25 mm) (Integrated Development Plan (IDP) Matatiele Local Municipality 2016/17 to 2021/22).

Rainfall has a major influence on the distribution and structure of grasslands. Studies have confirmed that grasslands are strongly seasonal with vegetation productivity reaching its maximum in summer and near complete termination of productivity during the winter months. The temperate eastern half of the Grassland Biome in which the project area is situated has a period of maximum vegetation productivity in January (Mucina *et al*., 2006).

3.1.2 Topography, Soils and Geology

Vegetation types are influenced by a range of biotic and/or abiotic factors at different spatial and temporal scales, which together influence the distribution, composition, structure, and diversity of plant communities (Rodrigues *et al*., 2016). Among the abiotic factors influencing vegetation types, topography (landform), geology, and soils are considered three of the major factors determining habitat heterogeneity and species diversity.

The topography of the broader area varies from very steep gradients of 1:1.5 to relatively gentle slopes of less than 1:7 at mountain foothills and river plains. The very steep gradients mainly occur in the western and south-eastern boundary of the Matatiele LM due to the extension of the Drakensberg Mountain Range (IDP Matatiele Local Municipality 2016/17 to 2021/22). However, the project area is relatively flat with the altitude ranging from 1450 m to 1537 m above sea-level (asl) (Figure 3.1 & Figure 3.2).

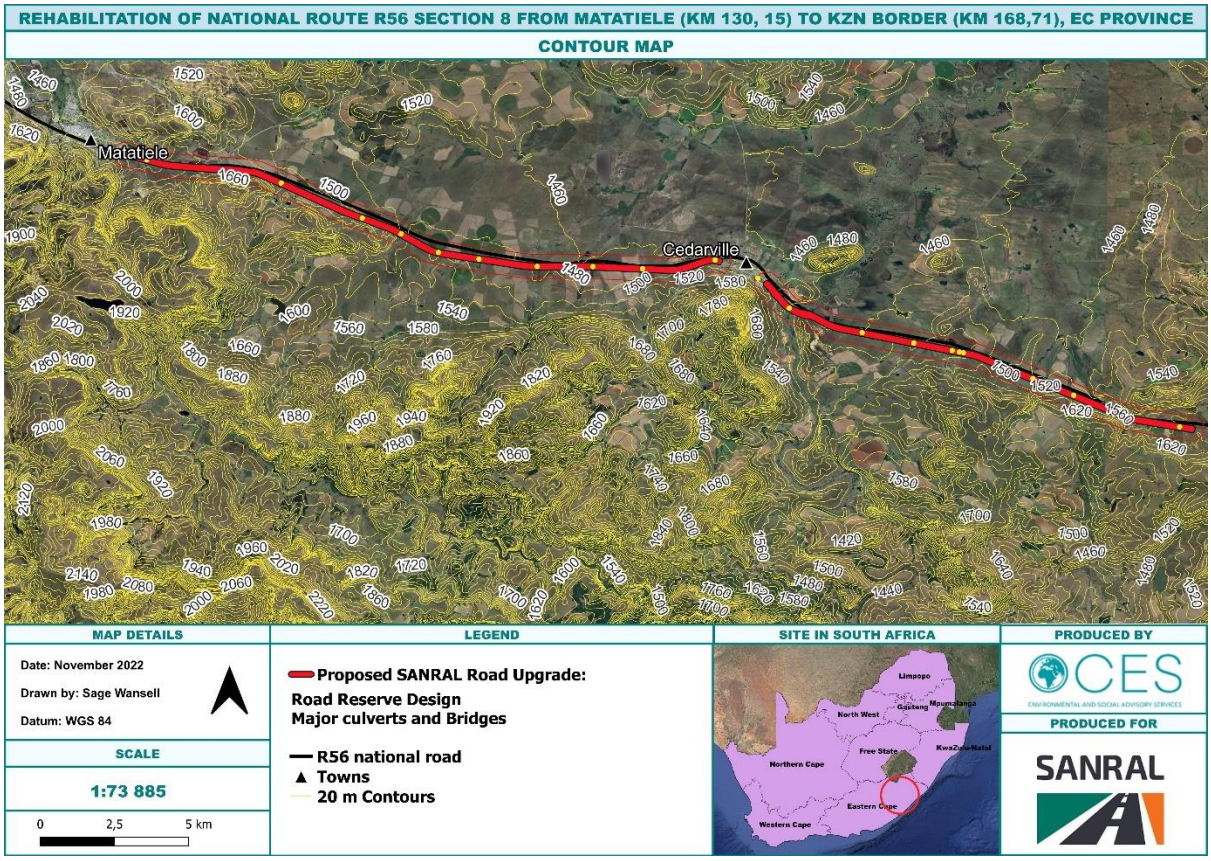


Figure 3.1: Contour Map of the study area.

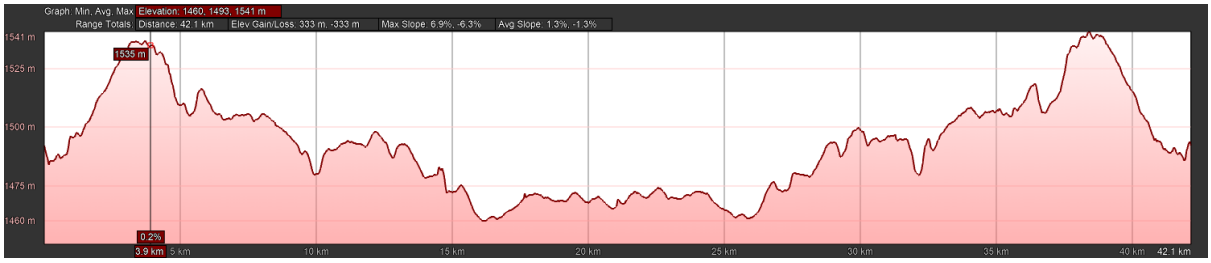


Figure 3.2: Elevation profile of the project area from Matatiele in the west to Cedarville in the East.

3.1.3 Geology and Soils

The vegetation types of the study site, East Griqualand Grassland and Mabela Sandy Grassland, are typically associated with mudstone and sandstone of the Beaufort Group (Karoo Supergroup), but sedimentary rocks of the Molteno, Elliot and Clarens Formation are also present. The soils are usually well drained, with a depth of 500-800 mm underlying East Griqualand Grassland and 200-300 mm underlying Mabela Sandy Grassland.

The broader Matatiele area is located on Karoo sediments (IDP Matatiele Local Municipality 2016/17 to 2021/22). This was confirmed by analysis of the South African Geology II Map, which indicates that the geology underlying the project area includes mudstone and arenite of the Beaufort Group (Karoo Supergroup) and sedimentary Quarternary Deposits (sand and calcrete) (Figure 3.3). According to SOTER (1995), the soils underlying the project area include Dystric Regosols, Eutric Gleysols, Haplic Lixisols, and Ferric Lixiols (Figure 3.4). The major soil types are defined below:

Regosols: *Regosols are characterized by shallow, medium- to fine-textured, unconsolidated parent material that may be of alluvial origin and by the lack of a significant soil horizon (layer) formation because of dry or cold climatic conditions (FAO).*

Gleysols: *Soils having gleyic properties (properties associated with prolonged wetness) within 50 cm from the soil surface. They have no diagnostic horizons other than an anthraquic, histic, mollic, ochric, takyric, or umbric horizon at the surface, or an andic, calcic, cambic, gypsic, plinthic, salic, sulfuric, or vitric horizon within 100 cm from the soil surface (ISRIC).*

Lixisols: *Lixisols are defined by the presence of a subsurface layer of accumulated kaolinitic clays, where at least half of the readily displaceable ions are calcium, magnesium, sodium, or potassium, but they are also identified by the absence of an extensively leached layer below the surface horizon (uppermost layer) (FAO).*

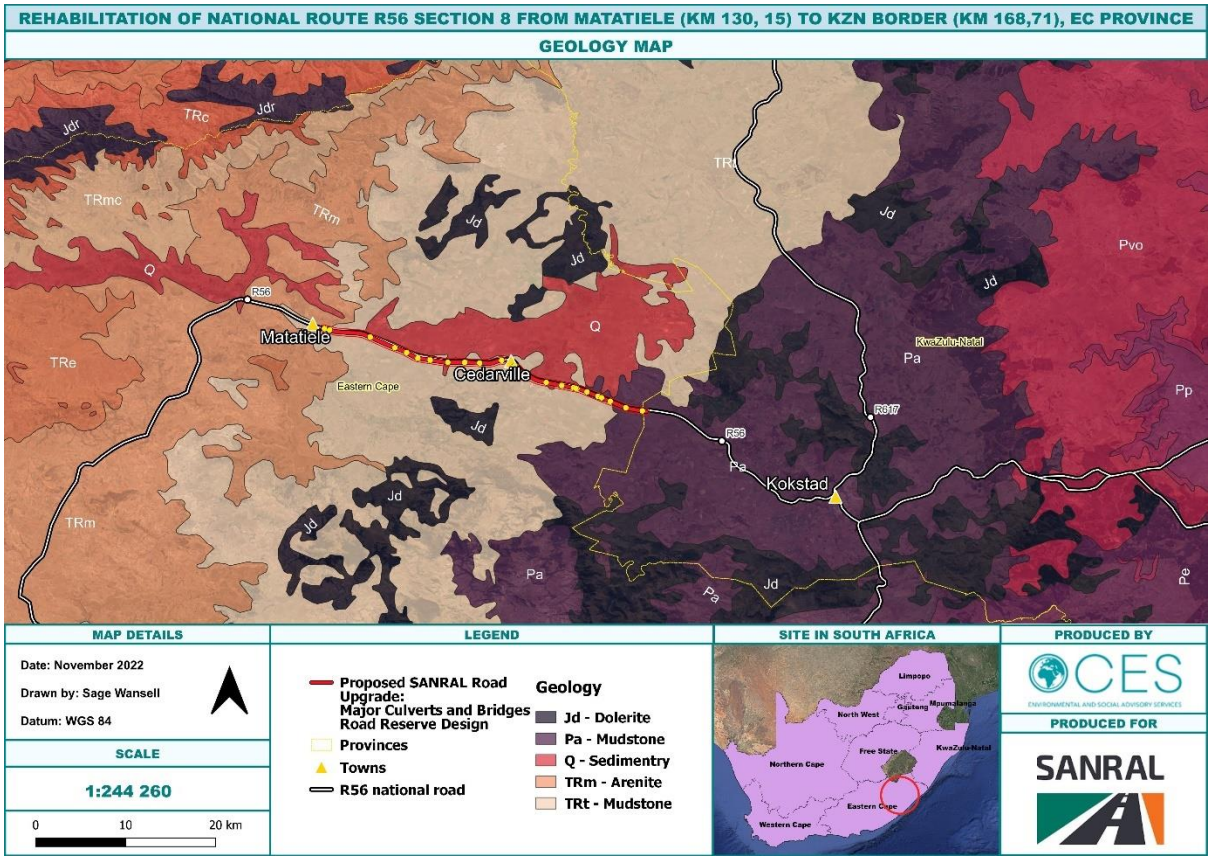


Figure 3.3: Geology Map of the study site.

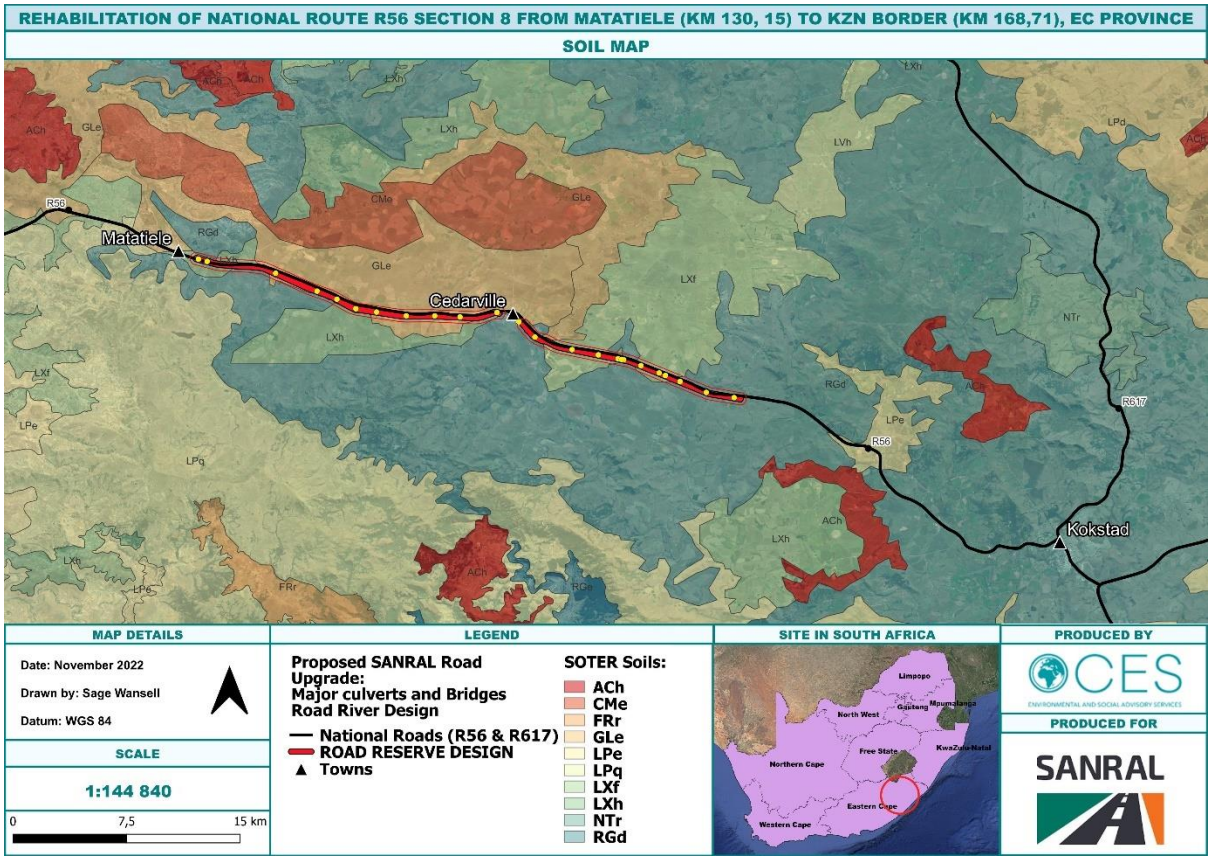


Figure 3.4: SOTER SAF Soil Map of the project area.

3.1.4 Surface water Features

The project area traverses two quartenary drainage areas: the T33A and the T31F quaternary drainage area of the Mzimvubu-Tsitsikamma Water Management Area (WMA 7). There are numerous large, channelled valley-bottom wetlands (NFEPA, 2014; NBA, 2018) within the project area that provides habitat for a range of floral and faunal species. The project area also traverses a tributary as well as the main branch of the Mzimvubu River (NBA, 2018) and numerous drainage lines (Figure 3.5). A number of large wetlands were also identified during the site visit which are not delineated by the NBA (2018) or NFEPA (2010/14).

Wetlands are specialised ecosystems that are responsible for the provision of a range of ecosystem services such as water filtration and flow regulation, flood attenuation, and the provision of habitat for a range of floral and faunal species, amongst others. Healthy wetlands are essential for the continued delivery of these ecosystem services and impacts on wetlands should be avoided. Outside of protected areas these habitats should be managed in support of biodiversity objectives, particularly if they have been mapped as Critical Biodiversity Areas or Ecological Support Areas. (SANBI, 2013).

It should be noted that a separate Aquatic Specialist Study has been undertaken for this project. As such, impacts of the proposed project on the surface water features of the project area are not dealt with in depth within this report.

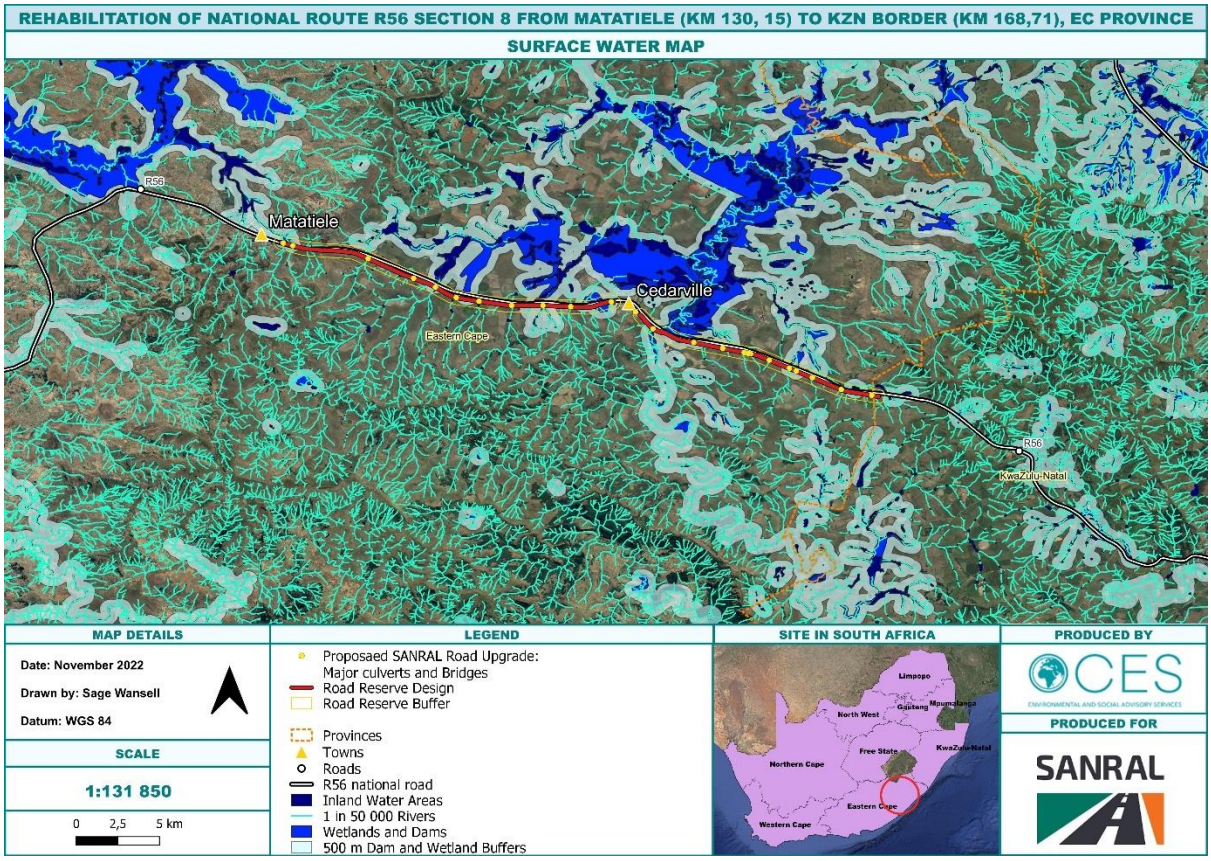


Figure 3.5: Surface water features affected by the proposed development.

3.2 LAND COVER

3.2.1 South African National Land-Cover Map (2020) and the Current Land Use

According to the SA NLC (2020), there are a number of land uses within the road reserve buffer including *Cultivated Commercial Annuals Non-Pivot/Non-Irrigated*, *Natural Grassland, Natural Rivers, Herbaceous Wetlands, Residential Formal (low veg / grass), Roads & Rail (Major Linear), Mines: Extraction Sites: Open Cast & Quarries combined, Fallow Land & Old Fields (Grass), Artificial Dams, Cultivated Commercial Annuals Pivot Irrigated*, and *Contiguous & Dense Planted Forest*. The most extensive land use within the road reserve buffer includes *Cultivated Commercial Annuals Non-Pivot/Non-Irrigated* and *Cultivated Commercial Annuals Pivot Irrigated* (Figure 3.6).

The site visit confirmed the findings of the SA NLC (2020). The project area includes the R56 and the surrounding road reserve and extends into neighbouring farms by approximately 10-20 m. Dumping and litter, as well as alien and weedy plant species, are prevalent within the existing road reserve. Surrounding land uses within the broader road reserve buffer largely includes agriculture/cultivation and livestock farming.

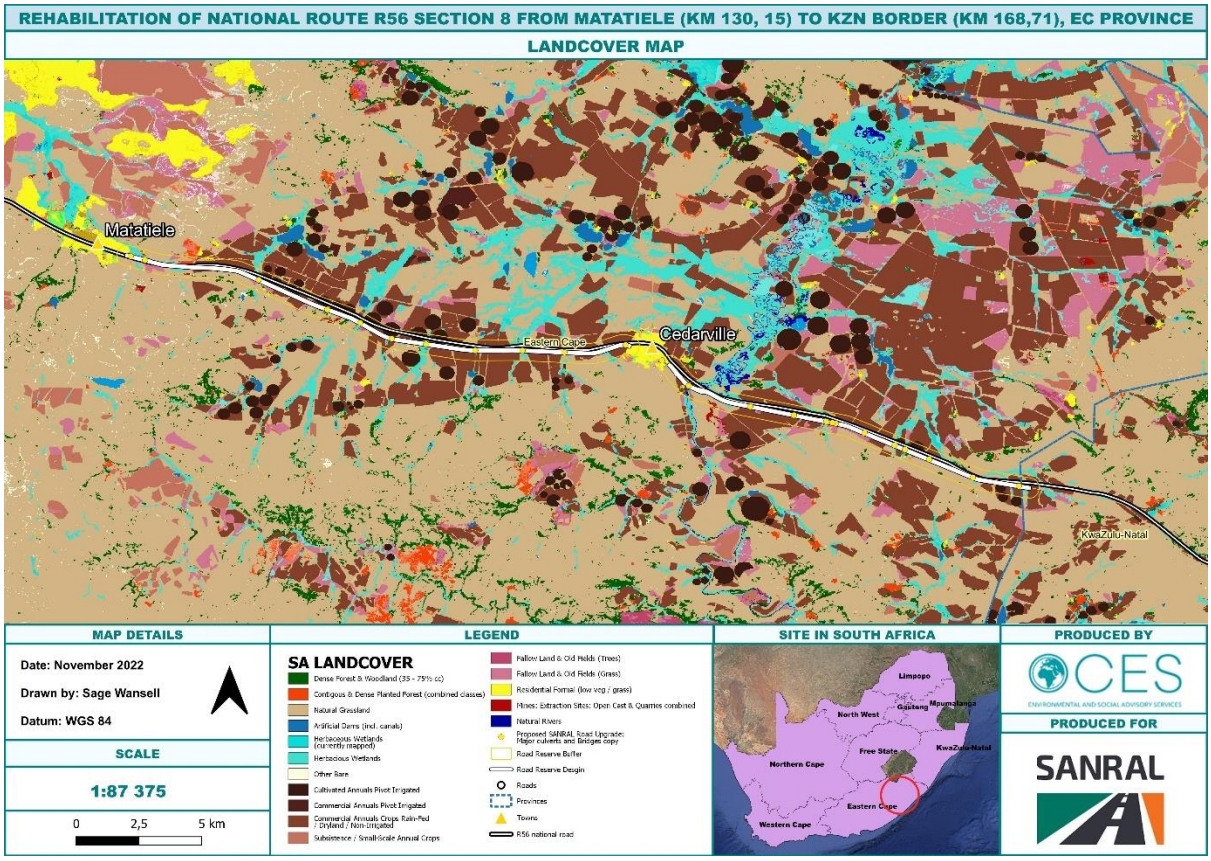


Figure 3.6: South African National Land-Cover (SANLC, 2020) Map of the project area.

3.3 DESCRIPTION OF THE VEGETATION AND FLORISTICS

The proposed project falls within the **Grassland Biome.** Grasslands in South Africa boast remarkable biodiversity and cover approximately one third of South Africa's total land surface area, stretching over the majority of the Eastern Cape and KwaZulu-Natal Provinces. These ecosystems provide important habitat for a range of the country's rare, endangered, and endemic animal and plant species, with plant diversity of the grassland biome only second to that of the fynbos biome. The incredible diversity and provision of ecosystem services has contributed to the classification of this ecosystem as an important biodiversity asset of global significance. Grasslands are considered important water production landscapes and provide various ecosystem services particularly for rural communities in South Africa (SANBI, 2013).

Approximately 40% of the grassland biome in South Africa has been transformed, while almost 60% of the remaining grassland areas are classified as threatened due to the loss of vital aspects of their composition, structure, and functioning. Only 3% of this valuable ecosystem is formally conserved. The fragmentation and degradation of grassland ecosystem severely affects the ecosystems' ability to provide valuable ecosystem services such as soil formation, water filtration, climate regulation, carbon sequestration, and erosion prevention. As such, development within the remaining natural grassland areas should be well informed and err on the side of caution (SANBI, 2013).

The two (2) key ecological drivers of grassland ecosystems include climate and fire which influences their character, community structure, composition, and primary productivity. In addition to climate and fire, other ecological drivers influencing these factors include grazing,

soil types and nutrient status. Due to their high biodiversity and their suitability for human habitation, these ecosystems are often negatively impacted by various anthropogenic activities including grazing by livestock, over harvesting of natural resources, misappropriation of fire, mining, agriculture, urban and industrial expansion, amongst others (SANBI, 2013).

3.3.1 National Vegetation Map (SA VEGMAP2018): Expected Vegetation Types

The South African Vegetation Map (SA VEGMAP) of 2018 is an important resource for biodiversity monitoring and conservation management in South Africa. Under the custodianship of the South African National Biodiversity Institute (SANBI) the SA VEGMAP, (2018) was updated in order to '*provide floristically based vegetation units of South Africa, Lesotho and Swaziland at a greater level of detail than had been available before*'. The map provides a detailed description of each of South Africa's unique vegetation types along with a comprehensive list of the important species associated with each, including endemic and biologically important species.

According to SANBI's National Vegetation Map (2018), the proposed development occurs within two vegetation types, namely Mabela Sandy Grassland and East Griqualand Grassland (Figure 3.7). These vegetation types fall within the Grassland Biome.

Grasslands in South Africa are arranged into five (5) main groups based on their species composition, community structure, abiotic environmental factors, ecological characteristics and management requirements. These ecosystem groups include:

- Dry Highveld Grassland
- Mesic Highveld Grassland
- High-Altitude Grassland
- Sub-Escarpment Grassland
- Coastal Grassland

Both Mabela Sandy Grassland and East Griqualand Grassland fall under the **Sub-Escarpment Grassland** Group. Sub-Escarpment Grasslands are mesic grasslands and occur on flat to gently rolling hills, cut by deep river valleys, at mid-altitudes (760-1800 masl). They are characterised by long-lived forbs that are adapted to frequent aboveground disturbance (such as fire) after which they are able to resprout due to the storage of carbohydrates in underground storage organs. Most species reproduce through vegetative reproduction. Reproduction through seedlings is infrequent and seedlings are generally only viable for a short period. Sub-Escarpment Grasslands are adapted to warm, wet summers with high rainfall and dry, temperate winters with moderate to heavy frost and soils depleted of nutrients.

Mabela Sandy Grassland occurs within flat valley basins (1440 – 1500 m) with poorly drained, low nutrient soils in the region of Cedarville to Matatiele and a small area in a basin of Simi and Ramohlakoana, Kinira River Valley, Transkei. This vegetation type is characterised by low species diversity and low tussock dominated, sour grasslands. Indigenous trees are absent. The major indicator species include *Sporobolus pyramidalis* and *Aristida junciformis* (Mucina *et al*., 2006).

Mabela Sandy Grassland is classified as **Critically Endangered** (CR). It has a narrow distribution with high rates of habitat loss over the past 28 years, placing this ecosystem at risk of collapse. Its historical extent amounted to 492.91 km^2 of which only 31% currently remains. The Conservation Target for this vegetation type is 23%. It is not protected, and the major threats include agriculture, overgrazing and erosion (SANBI, 2021).

East Griqualand Grassland occurs on hills and slopes (920-1740 m) within the Eastern Cape and KwaZulu-Natal Provinces, with a major portion of this vegetation type occurring within East Griqualand with Matatiele and Kokstad as centre. It is characterised by grassland with patches of bush clumps dominated by *Leucosidea sericea* in wet areas and *Diospyros lycioides, Vachellia karroo* and *Ziziphus mucronata* in low-lying and very dry areas (Mucina *et al*., 2006).

East Griqualand Grassland is classified as **Endangered (EN).** It has a narrow distribution with high rates of habitat loss over the past 28 years, placing this ecosystem at risk of collapse. Its historical extent amounted to 8727.99 km^2 of which only 54% currently remains. It is considered poorly protected and the major threats include agriculture, plantations, erosions and invasion by *Acacia dealbata* and *A. mearnsii* (SANBI, 2021).

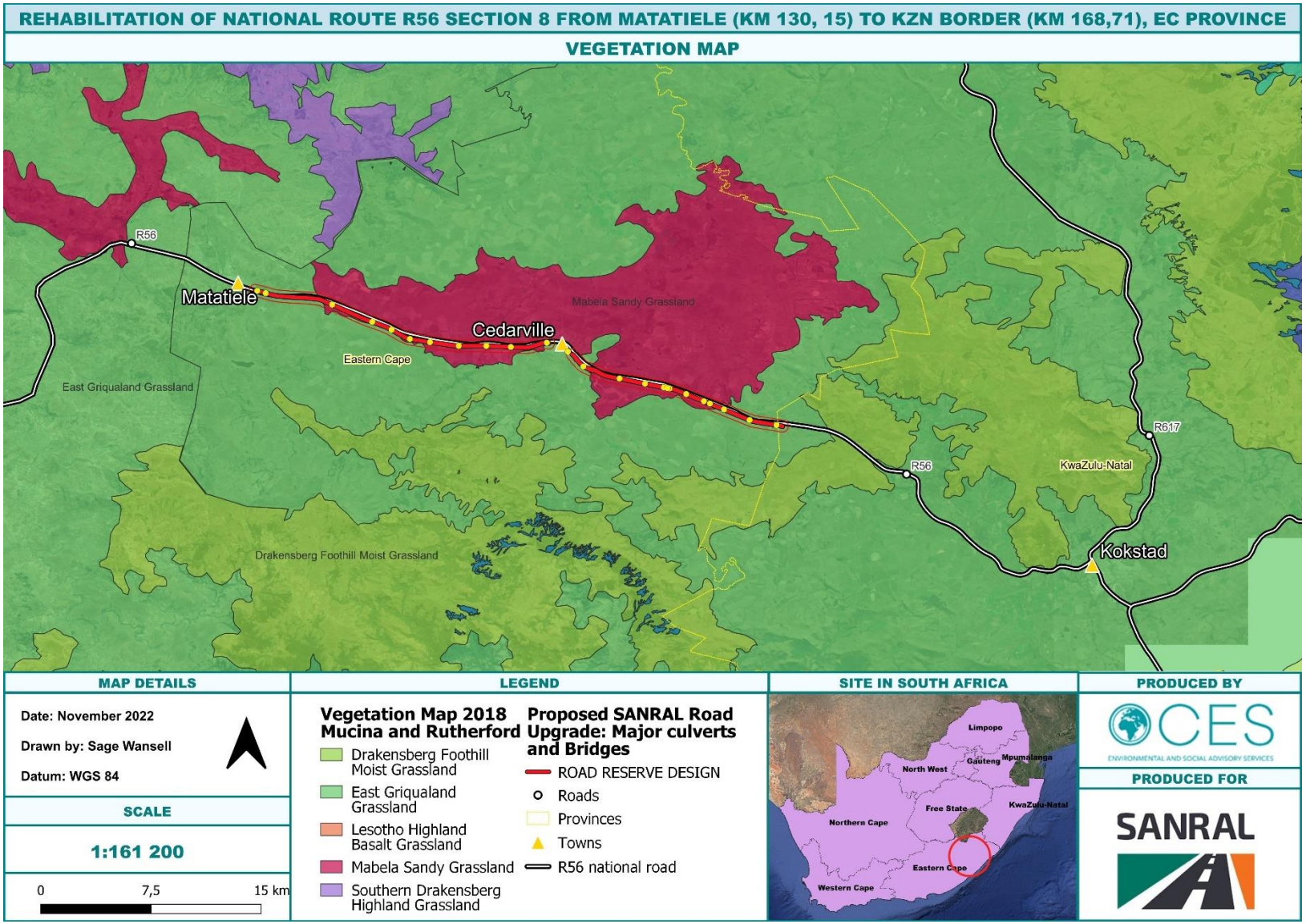


Figure 3.7: National Vegetation Map for the project site.

3.3.2 Vegetation types recorded on site

While National level vegetation maps have described broad vegetation types, local conditions, and micro-habitats (rainfall, soil structure, rocky outcrops, etc.) can result in variations in plant composition. As such, site surveys are critical for the verification of desktop findings and establishing the baseline ecological conditions of a site.

According to Grassland Ecosystem Guidelines (SANBI, 2013), the signs of healthy Sub-Escarpment Grassland include the following :

- **The presence of persisting populations of endemic and grassland specialist species**: These species are either rare or have a close connection with the health of the specific habitat in which they occur.
- **Absence, or low numbers of invasive alien species**: Wattle, pine and bramble as well as indigenous weedy species are of particular concern within these grassland ecosystems.
- **Grassland areas free of bush encroachment:** This does not include healthy patches of forest or woodland which can occur naturally in appropriate locations within the landscape.
- **Grassland that has the appearance of an even sward:** Tussocked veld is a sign of unhealthy Sub-Escarpment Grassland.
- **A high diversity of growth forms and species of grassland plants:** Complete dominance by one or a few species is a sign of degradation.
- **Absence of dongas or other signs of soil erosion.**

The majority of the proposed development footprint occurs within the existing road reserve. The proposed widening beyond the road reserve will largely be restricted to the southern side of the R56 road and will extend to approximately 20 m from the edge of the existing road reserve.

Analysis of the current remaining extent of the threatened ecosystems in South Africa spatial dataset (SANBI, 2021) suggests that the development footprint traverses' portions of intact Mabela Sandy Grassland (CR) and East Griqualand Grassland (EN). However, the site visit confirmed that the majority of the vegetation within and surrounding the road reserve has been severely degraded most likely due to previous road-related construction activities and frequent mowing. The species composition is largely dominated by weedy alien plant species such as *Melilotus albus, Cyclospermum leptophyllum, Cirsium vulgare, Cosmos bipinnatus, Oenothera spp., Paspalum dilatatum, Verbena spp., Dactylis glomerata*, amongst others, and indigenous pioneer species such as *Arctotis arctotoides, A. venusta, Berkheya spp., Senecio spp., Gazania linearis, Lobelia flaccida, Plantago lanceolata*, and *Hermannia spp*., amongst others.

There was no apparent differentiation between vegetation types within the road reserve. However, species composition and alien plant species density differed slightly in that the density of alien plant species to indigenous species was much higher in certain areas within the road reserve, the cause of which was not obvious but most likely attributed to previous road related construction activities, lawn mowing, and seed dispersal from adjacent agricultural lands. The indicator species for both Mabela Sandy Grassland, particularly *Sporobolus pyramidalis* and *Aristida junciformis*, and East Griqualand Grass was largely absent within the road reserve (Mucina et al., 2006).

Indigenous plant species diversity was relatively low within and surrounding the road reserve. Common indigenous plant species recorded within the road reserve includes *Albuca setosa, A.*

virens, Bulbine narcissifolia, Berkheya spp., Felicia muricata, Helichrysum rugulosum, H. ammitophilum, Nidorella podocephala, Wahlenbergia undulata, Convolvulus sagittatus, Cyperus spp., Diclis reptans, Elionurus muticus, Eragrostis capensis, *Hermannia althaeifolia, Hermannia depressa, Hypoxis rigidula, H. obtuse, H. angustifolia, Lactuca inermis, Ledebouria ovatifolia, Melinis repens, Monopsis decipiens, Pelargonium abrotanifolium, P. alchemilloides, P. luridum, Ranunculus multifidus*, and *Themeda triandra* (refer to Appendix 1 for the full list of species recorded within the road reserve).

Large, monospecific stands of *Bromus catharticus* and *Dactylis gomerata* (Plate 3.2) were also observed along the road reserve. Stands of woody alien plant species were also present, particularly around entrances to adjacent homesteads and farms. Evidence of erosion was observed, particularly along the hillside just northeast of Matatiele (Plate 3.3).

Very small portions of Mabela Sandy Grassland (approximately 11 ha) and East Griqualand Grassland (approximately 9.6 ha) occurs within the development footprint (see Figure 3.8 and Figure 3.9). However, even in most of these areas the grassland has been impacted to some extent by livestock grazing, alien plant species, and frequent access by vehicles.

The Mabela Sandy Grassland within the project area was largely dominated by *Bulbine narcissifolia*, *Monopsis decipiens, Diclis reptans, Pelargonium alchemilloides, P. abrotanifolium, Polygala hottentotta, Lobelia flaccida, Albuca virens, Helichrysum rugulosum, Rhynchosia caribaea, Ledebouria marginata, Felicia muricata, Vigna vexillata, Aristida junciformis, Themeda triandra, Sporobolus pyramidalis, Urochloa serrata, Cyperus esculentus*, *Aristida junciformis*, *Abildgaardia ovata*, *Setaria sphacelata*, *Andropogon eucomus*, *Paspalum distichum*, *Elionurus muticus*, *Cynodon incompletus*, *Brachiaria serrata*, amongst others, whilst the East Griqualad Grassland within the project area was dominated by *Senecio speciosus, Hermannia depressa, Gazania linearis, Hypoxis obtusa, H. rigidula, Convolvulus sagittatus, Helichrysum rugulosum, Centella asiatica, Arctotis arctotoides, Xysmalobium undulatum, Felicia muricata, Searsia pyroides, Pelargonium abrotanifolium, Nidorella podocephala, Ledebouria ovatifolia, Brachiaria serrata, Melinis repens, Aristida junciformis, Elionurus muticus, Setaria nigrirostris, Eragrostis capensis, E. curvula*, and *Themeda triandra*. Scattered bush clumps characteristic of East Griqualand Grassland was largely absent within the project area, except for a few scattered *Searsia pyroides* shurbs.

Only one (1) SCC, *Dierama tysonii*, was identified along the boundary of the road reserve. This species has an extent of occurrence (EOO) of 2024 km^2 and is classified as Vulnerable (VU) according to the Red List of South African Plants (see Section 3.3.3 below for more information).

Plate 3.1: Photographs of the sample sites and study area (from left to right, Top row: Sample Site N1, N2 and N3; Middle row: N4; N5; N6; Bottom Row: N7).

Plate 3.2: Monospecific stand of *Dactylis gomerata*.

There are numerous wetlands and drainage lines within the broader project area which provide important habitat for a range of faunal and floral species. These wetlands are also important in the broader landscape context as they provide important ecosystem services such as water filtration which influences water quality within the catchment area, maintenance of surface water flow, flood regulation, amongst others. Maintaining the health of wetlands is therefore important for ensuring the continued provision of ecosystem services and the health of the grassland ecosystem as a whole. As such, it is critically important that construction activities are managed and that the necessary mitigation measures are implemented to avoid impacts on these sensitive systems. [It should be noted that a separate Aquatic Specialist Assessment has been undertaken for this project hence why these systems are not dealt with in detail within this report].

Plate 3.3: Small patch of degraded East Griqualand Grassland on a hill side outside of Matatiele (note erosion at the foot of the slope).

Plate 3.4: Mowed grass within the road reserve at the time of the site visit.

Plate 3.5: Vegetation within the road reserve dominated by *Melilotus albus* bordered by a cattle farm.

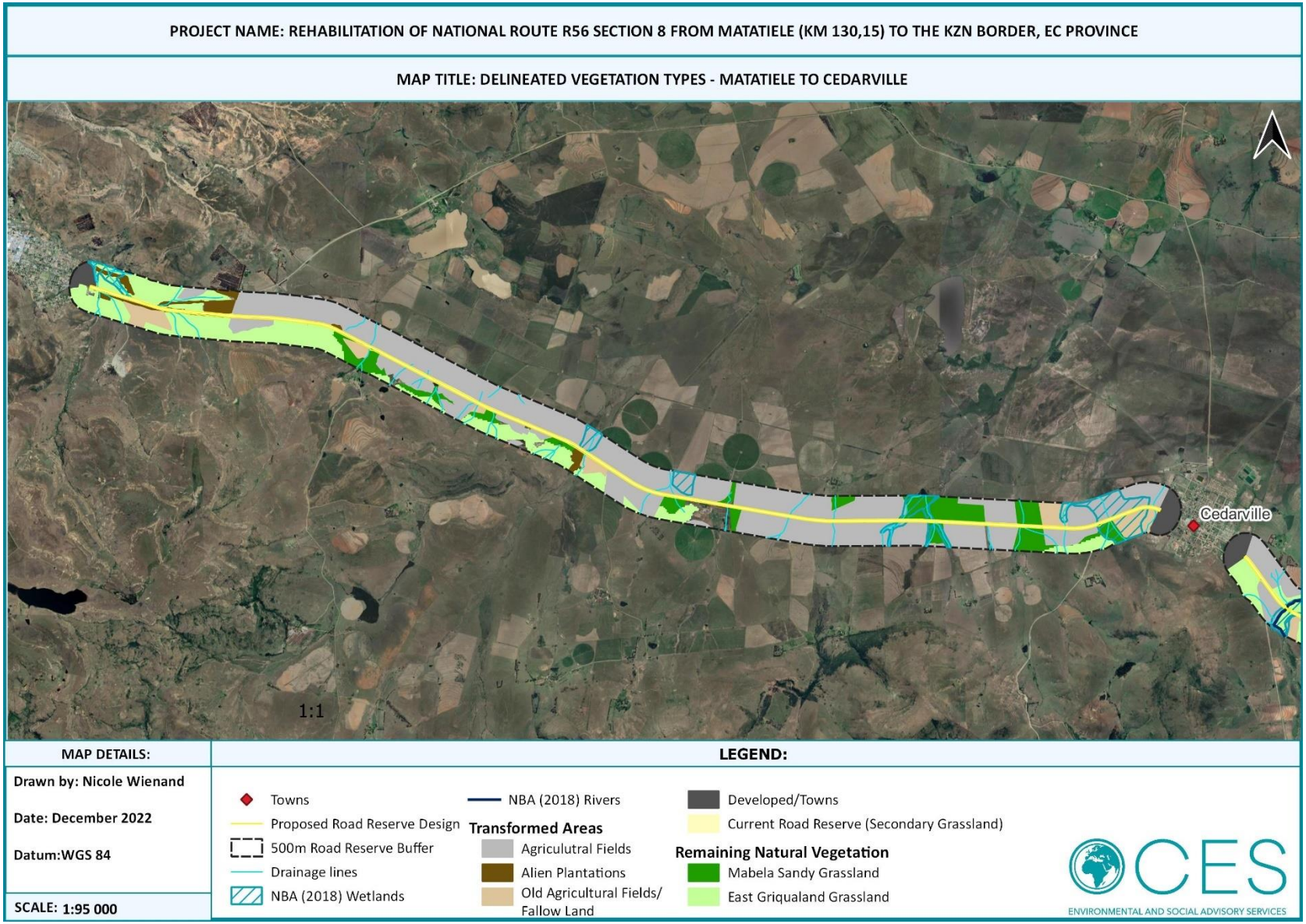


Figure 3.8: Delineated and refined vegetation types and land uses within the project area from Matatiele to Cedarville.

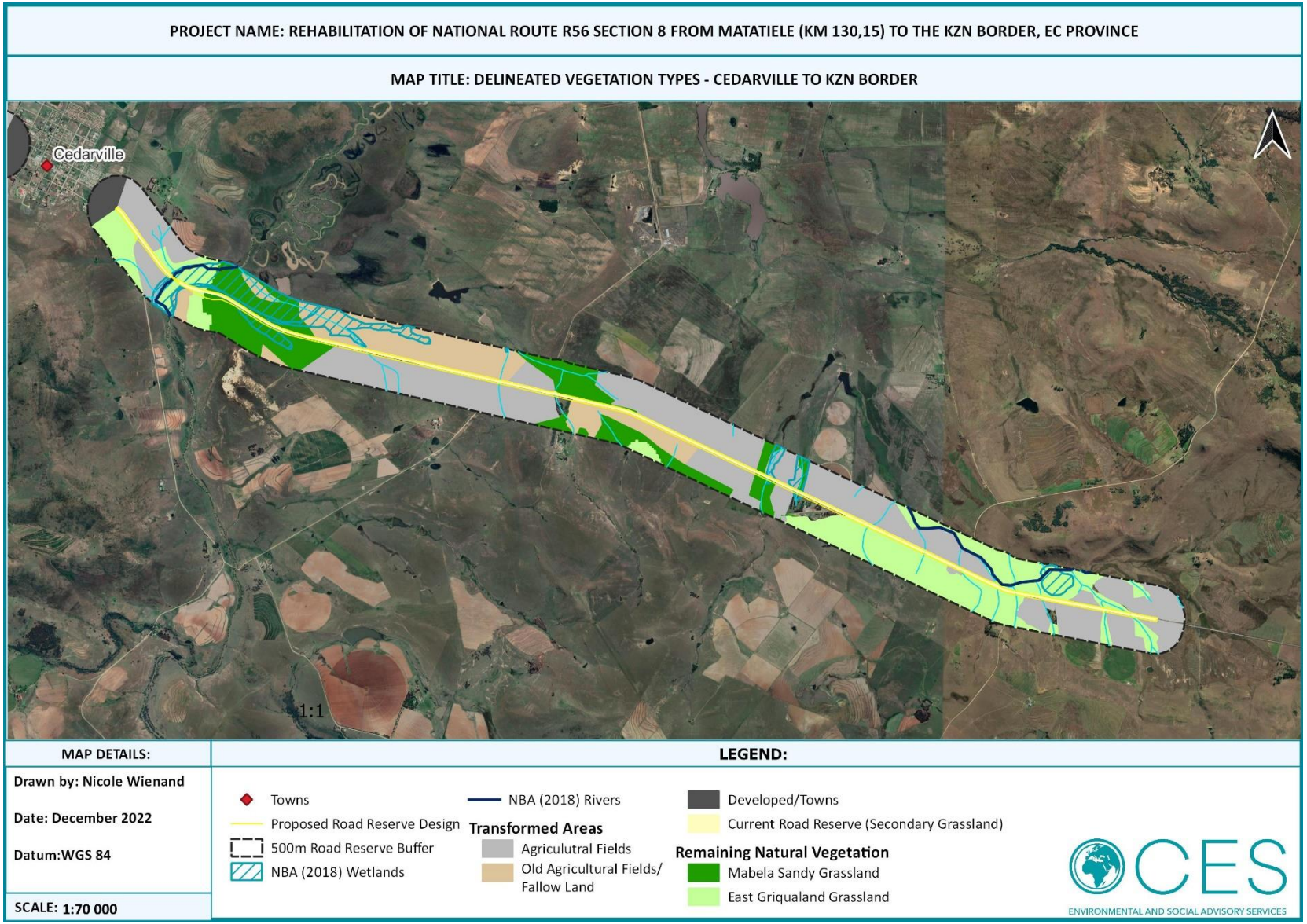


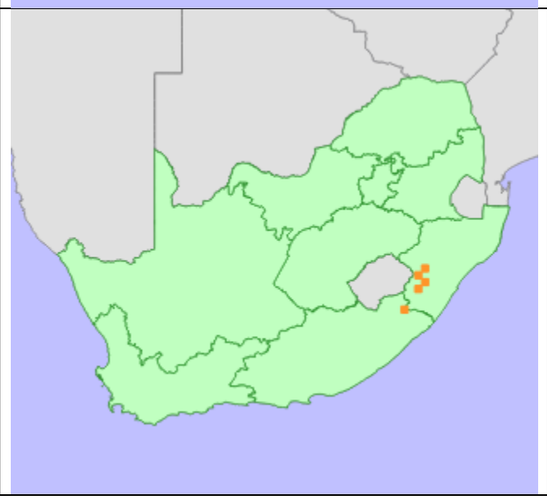
Figure 3.9: Delineated and refined vegetation types and land uses within the project area from Cedarville to the KZN Border.

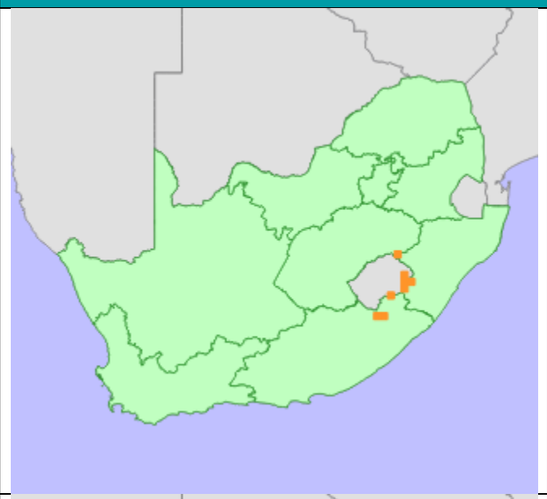
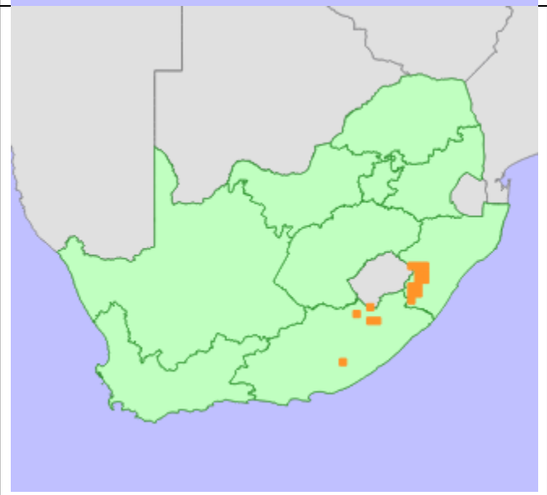
3.3.3 Plant Species of Conservation Concern

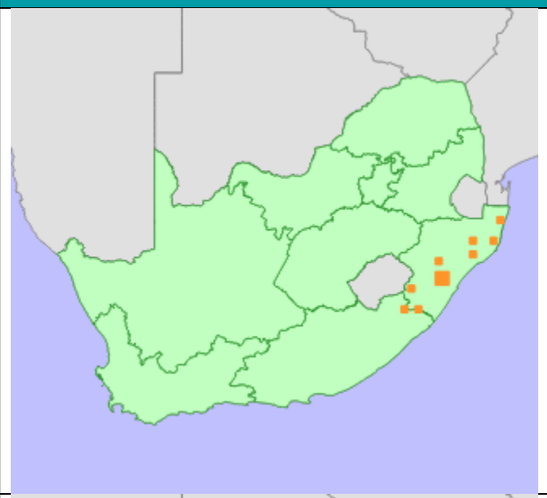
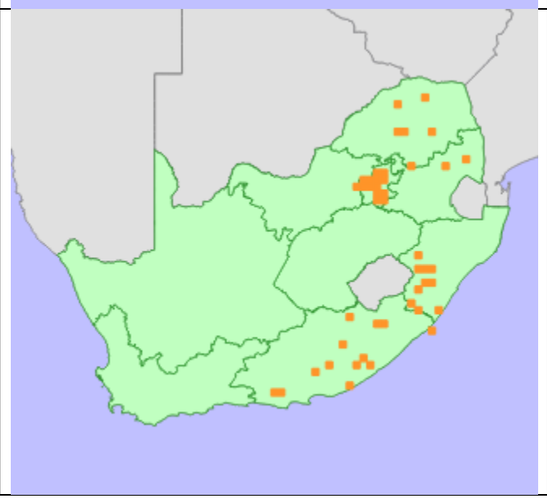
The below list of threatened SCC has been compiled using records obtained from the Plants of Southern Africa (POSA) website, iNaturalist, the National Screening Tool Report and the list of important taxa common to Mabela Sandy Grassland and East Griqualand Grassland (Mucina *et al.,* 2006). The likelihood of each species occurring within the project area is assessed in Table 3.1 below.

A list of twelve (12) threatened SCC was compiled for the project area, of which only one (1), *Dierama tysonii* (VU), was considered highly likely to occur on site and confirmed during the site survey. The probability of occurrence on site for three (3) of the SCC has been classified as moderate and the probability of occurrence on site for seven (7) of the SCC has been classified as low. *Alepidea duplidens* is classified as *Data Deficient – Taxonomically Problematic* and there is currently a lack of information regarding the distribution and habitat requirements for this species. According to Raimondo (2008), it has been recorded in the Eastern Cape and KwaZulu-Natal Provinces. Based on the lack of available information, the probability of occurrence of site for this species could not been classified.

Table 3.1: List of plant SCC likely to occur within the project area.

Family	Species	SA Red List	PNCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence on site based on habitat requirements	Confirmed during the site visit (Yes/No)
Asteraceae	*Gnaphalium griquense*	Rare				Although not endemic, this species is known from only four sites in South Africa. It occurs in damp grassland areas from Southern KwaZulu-Natal and Sehlabathebe (Lesotho) (Victor, 2009).		Although the site occurs within the known distributional range of this species and contains suitable habitat (i.e., damp areas within grassland), based on the rarity of this species the likelihood of occurrence on site is classified as **LOW**.	No
-	Sensitive species 606	Rare				This species is range restricted (EOO 2022 km^2) and a high-altitude (1100-1900 m) habitat specialist. It occurs near waterfalls and streams on cliffs in mountains grassland, from Loteni and Nzinga River Valleys to Kokstad (von Staden, 2011).		The project area (the R56 road reserve) is relatively flat. Based on the lack of suitable habitat (i.e. waterfalls and streams on cliffs), the likelihood of occurrence of this species on site is classified as **LOW**.	No

Family	Species	SA Red List	PNCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence on site based on habitat requirements	Confirmed during the site visit (Yes/No)
-	Sensitive species 148	Rare				Not endemic to South Africa. This species occurs on basalt or sandstone ridges and slopes in damp to dry grassland along the Drakensberg Mountain Range from the Eastern Cape through Lesotho and KwaZulu-Natal to the eastern Free State. Altitude: 2400 – 3000 m. Although it is widespread (EOO of 11 583 km^2), this is a rare and localised species that is not in danger of extinction (Mtshali and von Staden, 2015).		Although this species could occur within surrounding area, the project area (the R56 road reserve) is relatively flat. Based on the lack of suitable habitat (i.e. ridges and slopes), the likelihood of occurrence of this species on site is classified as **LOW**.	No
	Sensitive species 441	EN A2c; C2a(i)				Previously widespread, this species has experienced major population declines due to habitat destruction. Currently, there are only 3 known subpopulations remaining with less than a total of 1500 mature individuals. It is a habitat specialist which occurs within wetlands, seepages, and stream edges within high altitude grassland (1500-200 m) from the KwaZulu-Natal Midlands around Estcourt southwards along the KwaZulu-Natal and Eastern Cape Drakensberg foothills to the Amathole Mountains near Hogsback (von Staden et al., 2012).		Although the site includes the preferred habitat for this species, the majority of the wetland habitat within the project area has been disturbed and/or degraded. Based on the rarity of this species and the disturbed state of the majority of the wetlands, the probability of occurrence on site is classified as **MODERATE**.	No

Family	Species	SA Red List	PNCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence on site based on habitat requirements	Confirmed during the site visit (Yes/No)
EUPHORBIACEAE	Sensitive species 1076	VU A2cd				This species is endemic to South Africa and occurs from Port Shepstone to Mahlabatini in KwaZulu-Natal. Its habitat includes Savanna and Coastal Grassland at 100 – 800 m. East Griqualand Grassland is listed as one of the major habitat types of this species (Williams and Raimondo, 2013).		The project area includes the preferred habitat of this species however, it is located above the known/preferred altitudinal range. Furthermore, this species has only been recordedfrom Port Shepstone to Mahlabatini in KwaZulu-Natal. The majority of the development footprint occurs within the Eastern Cape Province. As such, the likelihood of occurrence is classified as **LOW**.	No
	Sensitive species 1248	VU A2ad				This species is widespread else where in southern and eastern Africa but under severe threat from medicinal plant harvesting in South Africa. In the Eastern Cape and KwaZulu-Natal Provinces, this species typically occurs at low to medium altitudes, under thick vegetation along mountain ranges, river valleys and kloofs. It tolerates wet and dry conditions (Raimondo et al., 2007).		Based on the lack of suitable habitat (i.e. thick vegetation along mountain ranges, river valleys or kloofs), , the probability of occurrence of this species on site is classified as **LOW**.	No

Family	Species	SA Red List	PNCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence on site based on habitat requirements	Confirmed during the site visit (Yes/No)
Asteraceae	*Berkheya griquana*	VU D2				This is a range restricted species, known from fewer than five locations (EOO < 100 km^2), and endemic to South Africa. It occurs within the Drakensberg Mountains near Kokstad (Eastern Cape and KwaZulu-Natal Provinces). Its major habitat includes mountain foothills within East Griqualand Grassland where it rapidly invades old fields and roadsides (Kamundi and Raimondo, 2008).		Although the site occurs within the known distributional range of this species and contains suitable habitat (i.e., East Griqualand Grassland), based on the rarity of this species the likelihood of occurrence on site is classified as **MODERATE**.	No
IRIDACEAE	*Dierama tysonii*	VU B1ab(ii,iii,iv,v)				This species has an EOO of 2024 km^2 and is known from only 10 locations in East Griqualand, between the Ngele and Swartberg Mountains. Its major habitats include Mabela Sandy Grassland and East Griqualand Grassland, amongst others, at altitudes of between 1300-1700 m (Mtshali *et al*., 2015).		The site occurs within the known distributional range and contains the preferred habitat of this species. As such, the likelihood of occurrence is classified as **HIGH**.	**Yes**
Amaryllidaceae	*Cyrtanthus mackenii* subsp. *cooperi*	NT A2c				This species is widespread (EOO 36 000 km^2) however, threatened due to habitat loss as a consequence of agriculture and plantations. It occurs in seasonally damp places within open grassland below the Amathole Mountains around King William's Town and Stutterheim and near East London.	Distribution map not available.	The project area occurs outside of the known distribution of this species. As such, the probability of occurrence is classified as **LOW**.	No
Hyacinthaceae	*Eucomis bicolor*	NT A2d				Not endemic to South Africa. This species occurs at higher altitudes (up to 2800 m) on well-drained, grassy mountain slopes, along watercourses and on rocky cliffs within forest and grassland. It is threatened	Distribution map not available.	Based on the known distribution and habitat requirements for this species, the probability of occurrence on site is classified as **MODERATE**.	No

Family	Species	SA Red List	PNCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence on site based on habitat requirements	Confirmed during the site visit (Yes/No)
						due to collection for the traditional medicinal trade (Williams *et al*., 2008).			
Zamiaceae	*Encephalartos friderici-guilielmi*	NT				This is a widespread and common species now declining due to over-harvesting for traditional medicinal trade. It occurs in montane grassland and open shrubland on rocky ridges within grassland from Queenstown to Kokstad. Endemic to South Africa (Donaldson, 2009).	Distribution map not available.	The project area (the R56 road reserve) is relatively flat. Based on the lack of suitable habitat (i.e. rocky ridges), the likelihood of occurrence of this species on site is classified as **LOW**.	No
Apiaceae	*Alepidea duplidens*	DDT				This species is classified as Data Deficient – Taxonomically Problematic and there is currently a lack of information regarding the distribution and habitat requirements for this species. According to Raimondo (2008), it has been recorded in the Eastern Cape and KwaZulu-Natal Provinces.	Distribution map not available.	Based on the lack of available information regarding the habitat requirements and distribution of this species, it is not possible to classify the probability of occurrence of this species on site.	No

3.3.4 Alien Invasive Species Present on site

An Alien Plant Species is *"(a) a species that is not an indigenous species;* or *(b) an indigenous species translocated or intended to be translocated to a place outside of its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention*" (SANBI, 2020).

It should be noted that not all introduced alien species are invasive and not all invasive species are necessarily alien.

South Africa's National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA) has defined 'Invasive Alien Plant Species' to mean any species whose establishment and spread outside of its natural distribution range:

(a) Threatens ecosystems, habitats or other species or has a demonstrable potential to threaten ecosystems, habitats or other species; and

(b) May result in economic or environmental harm or harm to human health. Invasive alien plant species are globally considered as one of the greatest threats to the environment, biodiversity, ecosystem integrity and the economy.

According to the Conservation of Agricultural Resources Act (No. 43 of 1983 - Regulation 15, 30 March 2001) (CARA), for agricultural land, and the National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA), for natural areas, invasive alien plant species should be controlled and eradicated with an emphasis on urgent action in biodiversity priority areas. NEM:BA published a list of Alien and Invasive Species (No 599) in 2014/1 which regulates the management of alien and invasive plants in natural environments.

During the site visit, the following alien plant species were recorded:

Table 3.2: Alien Invasive species recorded within the project area.

Family	Species	Common Name	CARA	NEMBA	Sample Site Number
Apiaceae	*Cyclospermum leptophyllum*		-	-	N1
Amaranthaceae	*Gomphrena celosioides*		-	-	All sites
Asteraceae	*Cichorium intybus*		-	-	N1
Asteraceae	*Cirsium vulgare*		1	1b	N1
Asteraceae	*Cosmos bipinnatus*		-	-	All sites
Asteraceae	*Lactuca serriola*		-	-	N4; N5
Asteraceae	*Taraxacum officinale*		-	-	N1
Asteraceae	*Tragopogon sp.*		-	-	N6
Asteraceae	*Senecio erubescens*		-	-	N1
Asteraceae	*Tagetes minuta*		-	-	N2
Cactaceae	*Opuntia ficus-indica*		1	1b	N5
Fabaceae	*Gleditsia triacanthos*		2	-	N5
Fabaceae	*Melilotus albus*		-	-	All sites
Fabaceae	*Trifolium pratense*		-	-	N1
Fabaceae	*Trifolium repens*		-	-	N2
Onagraceae	*Oenothera rosea*		-	-	N1; N2
Onagraceae	*Oenothera stricta*		-	-	N2
Onagraceae	*Oenothera tetraptera*		-	-	N2

Family	Species	Common Name	CARA	NEMBA	Sample Site Number
Poaceae	*Bromus catharticus*		-	-	N1; N2 (East Griqualand Grassland & Mabela Sandy Grassland)
Poaceae	*Dactylis glomerata*		-	-	N1 (East Griqualand Grassland)
Poaceae	*Paspalum dilatatum*		-	-	N1; N2 (East Griqualand Grassland & Mabela Sandy Grassland)
Polygonaceae	*Rumex sp.*		-	-	N2
Rubiaceae	*Richardia brasiliensis*		-	-	All sites
Salicaceae	*Populus sp.*		2	-	N4
Solanaceae	*Solanum nigrum*		-	-	N5
Verbenaceae	*Verbena aristigera*		-	-	N2; N4
Verbenaceae	*Verbena brasiliensis*		-	1b	N1; N2
Verbenaceae	*Verbena litoralis*		-	-	N5

NEM:BA Category 1b: Invasive Species

Plants classified under Category 1b alien invasive species of the NEMBA: National List of Invasive Species in Terms Sections 70(1), 71(3) and 71A are prohibited from:

- Being imported into the Republic;
- Growing or in any other way propagating any specimen;
- Conveying, moving, or otherwise translocating any specimen;
- Spreading or allowing the spread of any specimen; and
- Releasing any specimen.

CARA Category 1: Declared weeds

Plants classified as Category 1 in CARA are Declared Weeds. These are prohibited plants, which must be controlled or eradicated where possible (except in biocontrol reserves, which are areas designated for the breeding of biocontrol agents).

CARA Category 2: Invader Plants

Plants classified as Category 2 are declared Invader Plants and may only be grown under controlled conditions if a permit is acquired. No trade in these plants is permitted.

* All alien and invasive plant species must be controlled during all phases of development according to the recommendations outlined in the Environmental Management Programme (EMPr).

3.4 DESCRIPTION OF FAUNA

The town of Matatiele is situated in the north of the Eastern Cape, close to the border with Lesotho and KwaZulu-Natal. The Cedarville Flats, a key landscape feature, is a wide valley running from east to west that is flanked by the Drakensberg to the north and highlands above 2 000 a.s.l to the south. The natural and semi-natural habitats are mainly grassland, specifically Mabela Sandy Grassland and East Griqualand Grassland, with some sparse protea woodland cropping up on the higher ridges and spurs. Scrub grows in sheltered drainage lines and rocky areas that are protected from fire. This unique environment hosts a variety of endemic, rare and threatened botanical and faunal species. The town itself, including the town of Cedarville, is largely a farming community and the environment here is largely utilised for agricultural fields. This section provides a brief description of the fauna, specifically herpetofauna and mammals which could occur within the project area. It should be noted that birds and bats were not assessed as part of the faunal assessment.

The following databases were consulted to determine which species could occur within the project area based on the known distribution of species:

- The DFFE screening report for the site;
- ADU's FrogMAP (http://vmus.adu.org.za);
- ADU's ReptileMAP (https://vmus.adu.org.za);
- ADU's MammalMAP (https://vmus.adu.org.za);
- iNaturalist (https://www.inaturalist.org/places/south-africa); and
- IUCN Red List (https://www.iucnredlist.org/)
- EWT Red List (https://ewt.org.za/red-list/)
- Matatiele Local Municipality (www.matatiele.gov.za/2013/07/matatielenature-reserve)

The following sources were used to assess the Conservation/Threat Status of each species:

- Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland (Minter et al., 2004);
- Red Listing the Amphibians of South Africa (Measey, 2010);
- Ensuring a Future for South Africa's Frogs: A Strategy for Conservation Research (Measey, 2014);
- Atlas and Red List of Reptiles of South Africa, Lesotho and Swaziland (Minter et al., 2014);
- Red Data Book of Southern African Mammals: A Conservation Assessment (EWT, 2016 & 2020);
- Red Data Book of Birds of South Africa, Lesotho and Swaziland (Taylor et al., 2015);
- Provincial Nature Conservation Ordinance NO. 19 OF 1974;
- NEM:BA 10 OF 2004;
- TOPS (2007); and
- CITES Appendix I and II.

3.4.1 Mammals

According to Stuarts' Field Guide to Mammals of Southern Africa (2015), forty-eight (48) mammal species have a known distribution within the project area. Of the species listed, five (5) are considered Near Threatened, four (4) are considered Threatened, and one (1) is Data Deficient. Table 3.3 lists the mammal SCC identified in this report; a more comprehensive mammal list for the project area can be found in Appendix 2 (SCC highlighted in red). Seven (7) species are protected by PNCO (Act No. 15 1974) and five (5) by NEM:BA (2007). In addition, three (3) species are Endemic and two (2) are Near Endemic (please refer to Appendix 2 for species names).

Table 3.3: Mammal SCC which may occur within the study area.

NAME	CONSERVATION STATUS	HABITAT (SANBI & EWT, 2016)	PROBABILITY OF OCCURRENCE (High, Medium, Low, Confirmed)
African Clawless Otter (*Aonyx capensis*)	Near Threatened	Occurs in **forest, grassland, wetland (inland), and marine coastal areas and is predominantly aquatic** - seldom found far from water. There are several small to large inland water areas, including wetlands, and rivers that surround the affected areas, therefore it is possible for this species to occur within the project area.	Medium
Spotted-necked Otter (*Hydrictis maculicollis*)	Vulnerable	Inhabits **freshwater habitats where water is unsilted, unpolluted, and rich in small to medium sized fishes**. Suitable habitat includes **large lakes and open waters**. Elsewhere, it is found in **streams, rivers, and impoundments up to altitudes of 2,500m**. Wherever it occurs, this species prefers **shallow to deep waters**. Human presence negatively influences Spotted-necked Otter, but human presence alone cannot explain the absence of this species in an area, because other habitat features such as presence or absence of vegetation cover along the banks also determine the occurrence of this species. In riparian and lacustrine habitats, adequate vegetation in the form of long grass, reeds, dense bushes, overhanging trees, and large boulder piles are essential to provide cover during periods of inactivity and for denning. Based on the habitat requirements of this species, i.e., pristine habitat with dense vegetation cover along unpolluted streams and/or rivers, it is deemed to have a low probability of occurrence within the project area.	Low
African Striped Weasel (*Poecilogale albinucha*)	Near Threatened	Mainly found in **savannah and grassland habitats**, although it has been recorded in a wide range of other habitats including **lowland rainforest, semidesert grassland, fynbos, and pine plantations**. Based on its recurrence in grassland habitat and its wide environmental tolerances, this species is deemed to have a moderate probability of occurrence within the project area.	Medium
Serval (*Leptailurus serval*)	Near Threatened	Servals have very specific habitat requirements and may be locally restricted to smaller areas within their broad distribution range. For instance, they are not found in rainforest or desert like areas and prefer **well-watered savanna long-grass environments, where they are particularly associated with reedbeds and other riparian vegetation types**. The proposed development occurs along an existing road surrounded mostly by farms in low lying areas. Some of these areas contain tall grasses and cross numerous seepages. However, Servals are considered extinct in most of their historical range, including Matatiele, and only occur from Cedarville to the east. Based on the habitat requirements of this species and its current range, it is not entirely impossible for this species to occur within the project area, but the likelihood is low.	Low

NAME	CONSERVATION STATUS	HABITAT (SANBI & EWT, 2016)	PROBABILITY OF OCCURRENCE (High, Medium, Low, Confirmed)
Mountain Reedbuck (*Redunca fulvorufula fulvorufula*)	Endangered	Inhabits **grass-covered ridges and hillsides in broken rocky country and high-altitude grasslands often with some tree or bush cover**. They are predominantly grazers and eat the greenest, softest parts of grasses such as Red Grass (*Themeda triandra*) and Thatch Grass (*Hyparrhenia spp.*). This species tends to avoid very open areas with no cover and the availability of drinking water is crucial to their presence. As such, they are often associated with the lower slopes, making use of relatively moist, cool more southerly aspects. The proposed development occurs along an existing road surrounded mostly by farms. However, grassy hills and ridges with rocky outcrops and sparse tree cover do exist between Matatiele and Cedarville, which provide suitable habitat for this species. This species has been observed within the project area.	**Confirmed**. Occurs within the broader project area on neighbouring properties.
Grey Rhebok (*Pelea capreolus*)	Near Threatened	In the eastern extent of their distribution, this species is associated with **rocky hills, grassy mountain slopes, and plateau grasslands**. They require good grass cover within their home ranges for shelter and to hide from predators, but often use steep open areas with little cover when feeding. The proposed development occurs along an existing road surrounded mostly by farms. However, grassy hills and ridges with rocky outcrops and sparse tree cover do exist between Matatiele and Cedarville, which provide suitable habitat for this species. As such this species has a high likelihood of occurrence within the project area.	High
Vlei Rat (*Otomys auratus*)	Near Threatened	Associated with **mesic grasslands and wetlands within alpine, montane, and sub-montane regions, typically occurring in dense vegetation near water**. This species is associated with sedges and grasses adapted to densely vegetated wetlands with wet soils. Vlei rats are exclusively herbivorous, with a diet mainly comprised of grasses. Based on its habitat requirements, i.e., dense vegetation near water, this species is deemed to have a high probability of occurrence within the project area.	High
Mozambique Woodland Mouse (*Grammomys dolichurus*)	Data Deficient	This species prefers **thick vegetation and inhabits dry forest and moist lowland forest areas, dry, moist, and high altitude shrubland, and woodlands**. However, it has also been found in **anthropogenic habitats, such as arable land, pastureland, and urban areas**. Based on the habitat requirements of this species, i.e., dense tree cover, it is unlikely for this species to occur here.	Low
White-tailed Rat (*Mystromys albicaudatus*)	Vulnerable	Habitat requirements need further investigation, but this species is often associated with **calcrete soils within grasslands**. The soils within the study area are largely clayey and not calcrete. As such, this species is deemed to have a low probability of occurrence within the project area.	Low

NAME	CONSERVATION STATUS	HABITAT (SANBI & EWT, 2016)	PROBABILITY OF OCCURRENCE (High, Medium, Low, Confirmed)
African Marsh Rat (*Dasymys incomtus*)	Vulnerable	**Vegetation such as reedbeds and sedges, as well as semi-aquatic grass stands such as those associated with marshes, swamps, and streams**. Based on the proximity of water features such as streams, it is possible for this species to occur within the project area.	Medium

The mammal survey relied on spoor and other signs as well as incidental observations and calls. During the site survey, one (1) mammal SCC was observed, namely Mountain Reedbuck (*Rudinca fulvorufula*) (Plate 3.6). Additionally, calls of Black-backed Jackal (*Canis mesomelas*), classified as Least Concern, was also heard on neighbouring properties.

Although the proposed development consists of an existing road and is surrounded by mostly farmlands, areas of indigenous grassland and rocky outcrops within the broader project area still provide valuable habitat to a range of faunal species, including SCC such as *R. fulvorufula*.

Plate 3.6: Reedbuck observed within the broader project area.

3.4.2 Herpetofauna

The Eastern Cape Province is home to about one-hundred-and-seventy-seven (177) herpetofauna species, which includes fifty-seven (57) amphibian and one-hundred-and-twenty (120) reptile species (iNaturalist, 2022). Of these, approximately fifty-three (53) species potentially occur within the project area. This includes a total of eleven (11) amphibians and forty-six (46) reptiles. According to iNaturalist (2022), five (5) amphibian and four (4) reptile species have been observed within the wider project area. Of the amphibian species identified in this report, none are listed as Threatened, however one (1) species, namely Forest Thread Snake (*Leptotyphlops sylvicolus*) is Data Deficient. Please see Table 3.4 below for a list of herpetofauna SCC.

In addition, two (2) amphibian species are Endemic, while twelve (12) reptile species are Endemic and seven (7) are Near Endemic. While most of the herpetofauna identified in this report are classified as Least Concern, all amphibian, turtle, and lizard species, as well as ten (10) snake species, are protected by the PNCO (Act No. 15 of 1974). Please refer to Appendix 3 for all the amphibian and reptile species which may occur within the project area, their level

of endemism, as well as the relevant provincial legislation and CITES Listing pertaining to these species – Threatened/Near Threatened/Data Deficient species are highlighted in red.

Table 3.4: Herpetofauna SCC which may occur within the project area.

NAME	CONSERVATION STATUS	HABITAT (SANBI 2004 and 2014)	PROBABILITY OF OCCURRENCE (High, Medium, Low, Confirmed)
Forest Thread Snake (*L. sylvicolus*)	Data Deficient	Subterranean species found in **forest habitat**, but Matatiele specimens found in **montane grassland**. As specimens of this species have been found in the project area, it is highly likely to occur here.	High

The herpetological survey was conducted using a visual encounter survey method based on area, where natural cover objects such as logs, rocks, and leaf litter were searched. One reptile (1) reptile species, namely *Psammophis crucifer* (Cross-marked Sand Snake), was found seeking shelter in a discarded soda can along the road (Plate 3.7). There was also a flash sighting of Common River Frog (*Amietia delalandii*) in a shallow culvert (Plate 3.8). A vehicle based transect was also conducted at night which revealed Raucous (*Sclerophrys capensis*) and Guttural toad (*S. gutturalis*). Bubbling kassina (*Kassina senegalensis*) and Bronze Caco (*Cacosternum boettgeri*) were also heard. These species all are listed as Least Concern in South Africa. It is important to note that the site visit was largely restricted to daylight hours where herpetofauna activity is limited, as many species are nocturnal and/or sheltering from the heat. To obtain more representative estimates of species richness within the development footprint, a combination of terrestrial sampling techniques (e.g., nocturnal surveys, acoustic surveys) is required.

Plate 3.7: Herpetological survey revealed a Cross-marked Grass Snake (left), Raucous Toad (middle), and Guttural Toad (right), amongst others.

Plate 3.8: Culvert with Common River Frog inside.

3.4.3 Birds

According to Marnewick *et al*. (2015), the Matatiele Mountain hosts some rare high-altitude grassland birds, including threatened species such as Rudd's Lark (*Heteromirafra ruddi*) and Yellow-breasted Pipit (*Anthus chloris*). Other pipits include Short-tailed (*A. brachyurus*), African Rock (*A. crenatus*), and Mountain (*A. hoeschi*). Cape Eagle-Owl (*Bubo capensis*) can be found in some of the rocky gorges, while Buff-streaked Chat (*Campicoloides bifasciata*) and Drakensberg Rockjumper (*Chaetops aurantius*) occur above 2 000 m a.s.l. Gourney's Sugardbird (*Promerops gurneyi*) can be seen in sparse stands of *Protea roupelliae*.

Other key species which occur here include Grey-winged Francolin (*Scleroptila Africana*), Red-winged Francolin (*S. levaillantii*), Blue Crane (*Anthropoides paradiseus*), Denham's Bustard (*Neotis denhami*), Black-winged Lapwing (*Vanellus melanopterus*), and Black Harrier (*Circus maurus*). Sentinel Rock Thrush (*Monticola exploratory*) occurs around rocky outcrops in the grassland, while Rufous-breasted Sparrowhawk (*Accipiter rufiventris*) breeds in *Eucalyptus spp.* stands. Threatened Cape Vulture (*Gyps coprotheres*) and Bearded Vulture (*Gypaetus barbatus*) also regularly commute here.

It comes as no surprise then that the Matatiele Nature Reserve, which is approximately 4580 ha in size, is classified as an Important Bird Area (IBA) in the Eastern Cape Province, with qualifying criteria A1, A2, and A3 (BirdLife, 2015). A checklist of birds for Matatiele Nature Reserve can be found in Appendix 4 (https://gobirding.birdlife.org.za/southern-drakensburg-matatiele-nature-reserve/). This list can be used as a proxy for birds likely to occur within the project area. According to this list, approximately one-hundred-and-twenty-three (123) bird

species are likely to occur within the project area, of which thirteen (13) are considered SCC. Additionally, five (5) species are Near Endemic and one (1) is Endemic.

During the bird survey, sixty-seven (67) species were recorded based on sight and/or sound. Of the species observed, two (2) are Threatened, namely Grey Crowned Crane (*Balearica regulorum*) and Denham's Bustard (*Neotis denhami*), and one (1) is Near Threatened, namely Peregrine Falcon (*Falco perergrinus*).

3.5 BIODIVERSITY INDICATORS

3.5.1 Critical Biodiversity Areas

The ECBCP (2019) replaces the ECBCP (2007) in its entirety and provides a map of important biodiversity areas, outside of the Protected Areas network, which must be used to inform land use and resource-use planning and decision making. The objectives of the ECBCP (2019) are to:

1) Identify the minimum spatial requirements needed to maintain a living landscape that continues to support all aspects of biodiversity and retain/maintain essential ecological infrastructure. This is achieved through the selection of areas, based on achieving targets, which represent important biodiversity pattern AND ecological processes;
2) Serve as the primary source of biodiversity information for land use planning and decision-making; and
3) Inform conservation and restoration action in important biodiversity areas.

The aim of the ECBCP (2019) was to map biodiversity priority areas through a systematic conservation planning process. The main outputs of the ECBCP include Protected Areas (PA), Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA), Other Natural Areas (ONA) and No Natural Habitat Remaining (NNR) for both terrestrial and aquatic ecosystems.

According to the ECBCP (2019), the proposed project traverses a PA, a terrestrial CBA 1 and 2, a terrestrial ESA 1 and 2, as well as an aquatic CBA 1, CBA 2 and ESA 1 (refer to Figure 3.8 and Figure 3.9 below). The management requirements for each of these biodiversity priority areas is summarised in Table 3.5 below.

Table 3.5: Biodiversity priority areas affected by the proposed project.

Category	Sensitivity Features	Desired Management Objective	Recommendation

CBA 1	• CBAs are selected to meet biodiversity targets for species, ecosystems and ecological processes. These include:
	  • Critically Endangered and Endangered Ecosystem.
	  • Critical linkage points
		Maintain in a natural state (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes:
		For areas classified as CBA1, the following objectives must apply:
			Based on the desired management objective for areas classified as CBA 1, the study area should be maintained in a natural state. However, if areas classified as CBA 1 cannot be avoided then all infrastructure must avoid sensitive ecosystems such as wetlands, as far as practically and feasibly possible. All mitigations and recommendations as

	(bottlenecks or pinch-points) in the corridor network. • All areas required to meet biodiversity targets and to ensure future persistence of species, ecosystems, and habitats. CBAs are areas of high biodiversity value and should therefore be maintained in a natural state with no further loss of habitat.	• Ecosystem and species must remain intact and undisturbed; • Since these areas demonstrate high irreplaceability, if disturbed or lost, biodiversity targets will not be met; • Important: these biodiversity features are at, or beyond, their limits of acceptable change. If land use activities are unavoidable in these areas, and depending on expert opinion of the condition of the site, a Biodiversity Offset must be designed and implemented.	specified in this report must be implemented and adhered to. Additionally, the clearance of vegetation must be limited to that which is strictly necessary for the rehabilitation of the National Route 56.
CBA 2	These areas are considered as natural or near-natural landscapes and biodiversity must be managed for minimal loss of ecosystem integrity. No transformation of natural habitat should be permitted.	Maintain in natural (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes: For areas classified as CBA2, the following objectives apply: • Ecosystems and species must remain intact and undisturbed; • There is some flexibility in the landscape to achieve biodiversity targets in these areas. It must be noted that the loss of a CBA2 area may elevate other CBA 2 areas to a CBA 1 category. • These biodiversity features are at risk of reaching their limits of acceptable change. If land use activities are unavoidable in these areas, and depending on the condition of the site, set-aside areas must be	As development within the CBA 2 is not avoidable, all mitigations and recommendations as specified in this report must be implemented and adhered to. The development footprint must be limited to that which is strictly necessary for the rehabilitation of the National Route 56.

		designed in the layout and implemented. If site specific data confirms that biodiversity is significant, unique and/or highly threatened or that a Critically Endangered or Endangered species is present, Biodiversity Offsets must be implemented.	
ESA 1	ESAs are not essential for meeting biodiversity targets, but are essential in terms of: • Terrestrial landscape: Ensuring connectivity between CBAs, strengthening climate change resilience and proper function of ecosystem infrastructure for delivery of ecosystem services. From a terrestrial perspective, ESAs may include riparian areas, coastal corridors, ridges, etc. • Aquatic landscape: ESAs extend into catchments that are essential for the maintenance of CBA rivers and wetlands.	Maintain ecological function within the localised and broader landscape. A functional state in this context means that the area must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained. For areas classified as ESA1, the following objectives apply: • These areas are not required to meet biodiversity targets, but they still perform essential roles in terms of connectivity, ecosystem service delivery and climate change resilience. • These systems may vary in condition and maintaining function is the main objective, therefore: ○ Ecosystems still in natural, near natural state should be maintained. Ecosystems that are moderately disturbed/degraded should be restored.	As development within an area classified as an ESA 1 is not avoidable, sensitive ecosystems such as wetlands must be avoided as far as practically and feasibly possible. The clearance of vegetation for the development footprint must be strictly limited to that which is necessary. Mitigation measures as specified in this report must be implemented and adhered to in areas classified as ESA 1.

ESA 2		Maintain current land use with no intensification For areas classified as ESA2, the following objectives apply: • These areas have already been subjected to severe and/or irreversible modification • These areas are not required to meet biodiversity targets, but they may still perform some function with respect to connectivity, ecosystem service delivery and climate change resilience • Objective is to maintain remaining function, therefore: ○ Areas should not undergo any further deterioration in ecological function. ○ Opportunities to change land use practices to improve ecological function (i.e. cultivation agriculture to livestock grazing agriculture) are desirable in ESA 2 areas.	As above.

3.5.2 Ecosystem Threat Status

The National Environmental Management: Biodiversity Act, (Act No. 10 OF 2004) (NEM:BA) provides a National List of Ecosystems that are threatened and in need of protection – GN 1002 of 2011. However, the Red List of Ecosystems (RLE) (SANBI, 2021) provides an updated version of the threat status of terrestrial ecosystems within South Africa. According to this list, Mabela Sandy Grassland is classified as **Critically Endangered** while East Griqualand Grassland is classified as **Endangered**.

Analysis of the Current Remaining Natural Extent (SANBI, 2021) of each of these ecosystems suggests that large portions of these two threatened ecosystems has been transformed within the project area, most likely due to agricultural activities (see Figure 3.10). According to the spatial data, the development footprint only traverses small patches of intact Mabela Sandy Grassland and East Griqualand Grassland.

As discussed in Section 2.4 above, in order to determine, refine and map the actual current remaining extent of the threatened ecosystems within the project area, the current remaining extent of the threatened ecosystems in South Africa spatial dataset (SANBI, 2021) and the South African National Land Cover (2020) datasets were compared and referenced with Google Earth Aerial Imagery and conditions observed during the site visit. The different land uses and remaining extent of the threatened ecosystems were then digitised using GIS (see Figure 3.8 and 3.9 above).

3.5.3 Protected Areas

The National Protected Areas Expansion Strategy (NPAES, 2008) was developed to "*achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate change*." The NPAES originated as Government recognised the importance of protected areas in maintaining biodiversity and critical ecological processes. The NPAES sets targets for expanding South Africa's protected area network, placing emphasis on those ecosystems that are least protected. According to the NPAES (2010/18) as well as the Eastern Cape Protected Areas Expansion Strategy (ECPAES, 2012), the proposed project occurs less than 20 metres away from the Southern Berg Griqualand Focus Area.

The South African Protected Areas Database (SAPAD) and the South African Conservation Areas Database (SACAD) is a spatial dataset that includes all the protected areas (PA) and conservation areas (CA) within South Africa. Data on privately owned PAs are also included in the dataset which is maintained and updated on a quarterly basis. This dataset therefore provides the most up to date information on protected areas and conservation areas in South Africa. According to SACAD and SAPAD (2022, Q3), as well as the ECPAES (2012), the proposed project traverses the Cedarville Protected Environment. The following nature reserves are also located within 10 km of the development footprint (see Table 3.6 and Figure 3.11 below):

Table 3.6: Nature reserves surrounding the proposed project.

Name of Nature Reserve	Distance from development footprint
Matatiele Nature Reserve	660 m south
Wilfried Baur Nature Reserve	5.5 km northwest
Mountain Lake Nature Reserve	5.3 km south
Golden Fleece Nature Reserve	4.6 km north

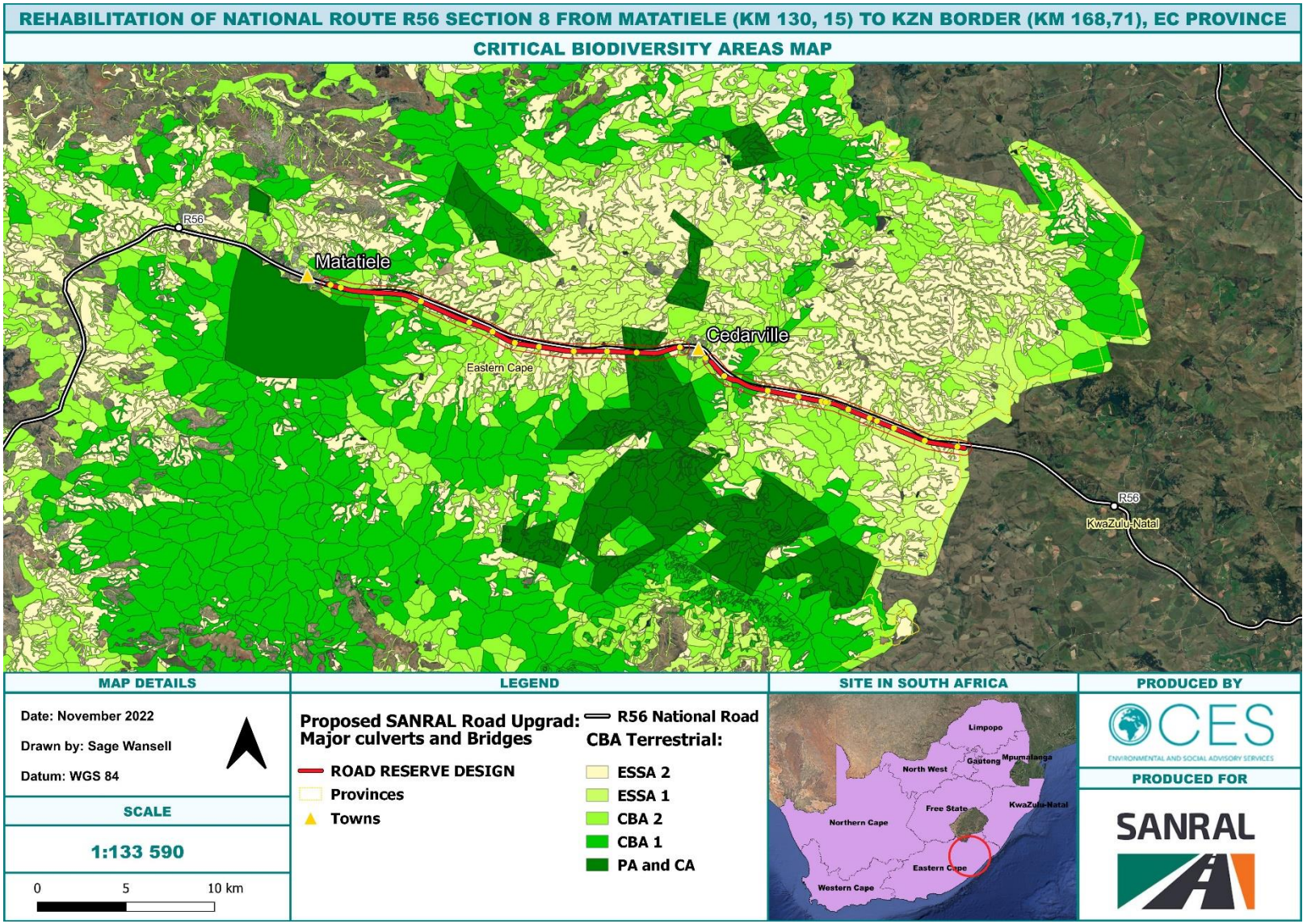


Figure 3.10: ECBCP (2019) terrestrial CBAs within the project area.

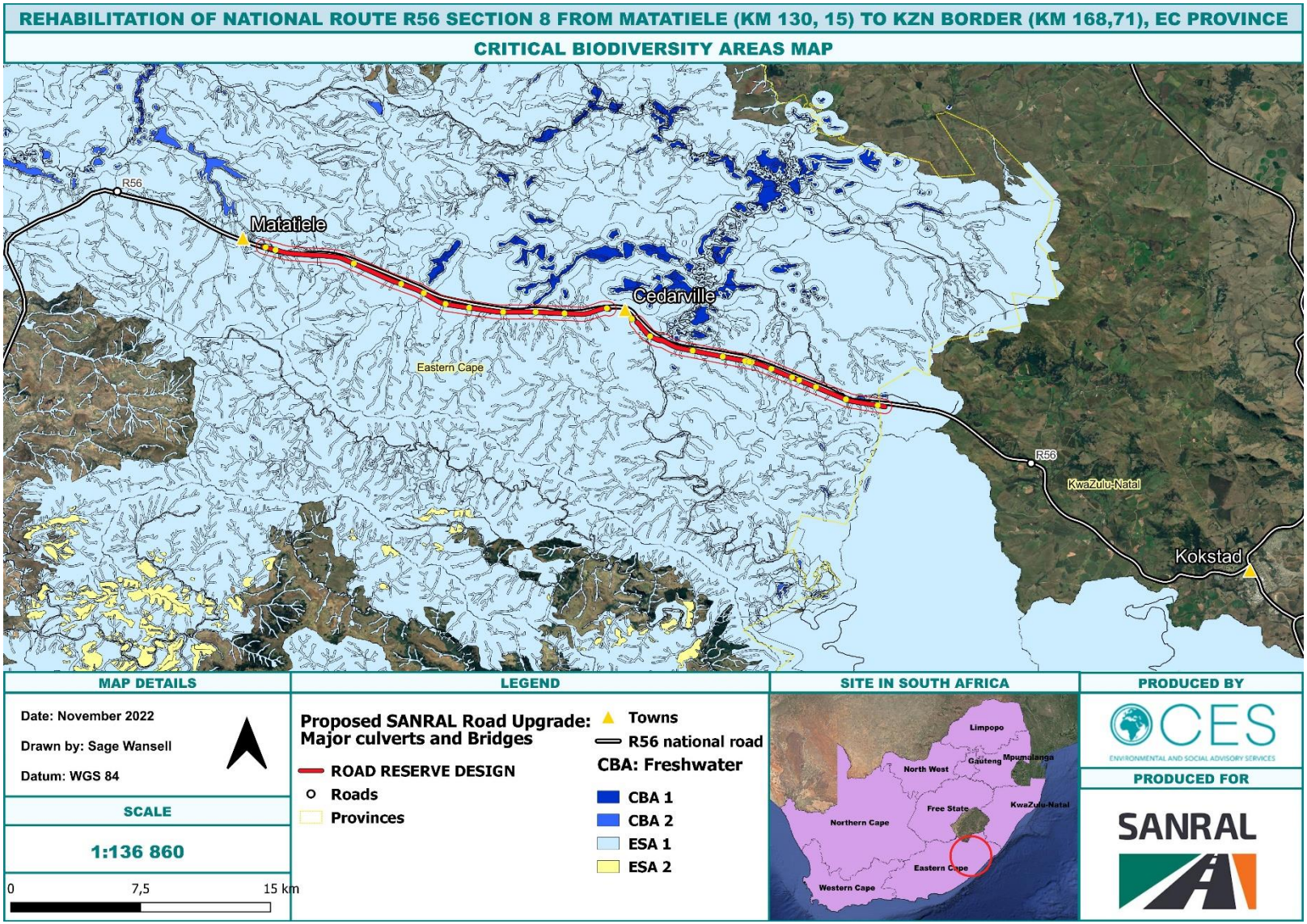


Figure 3.11: ECBCP (2019) aquatic CBAs within the project area.

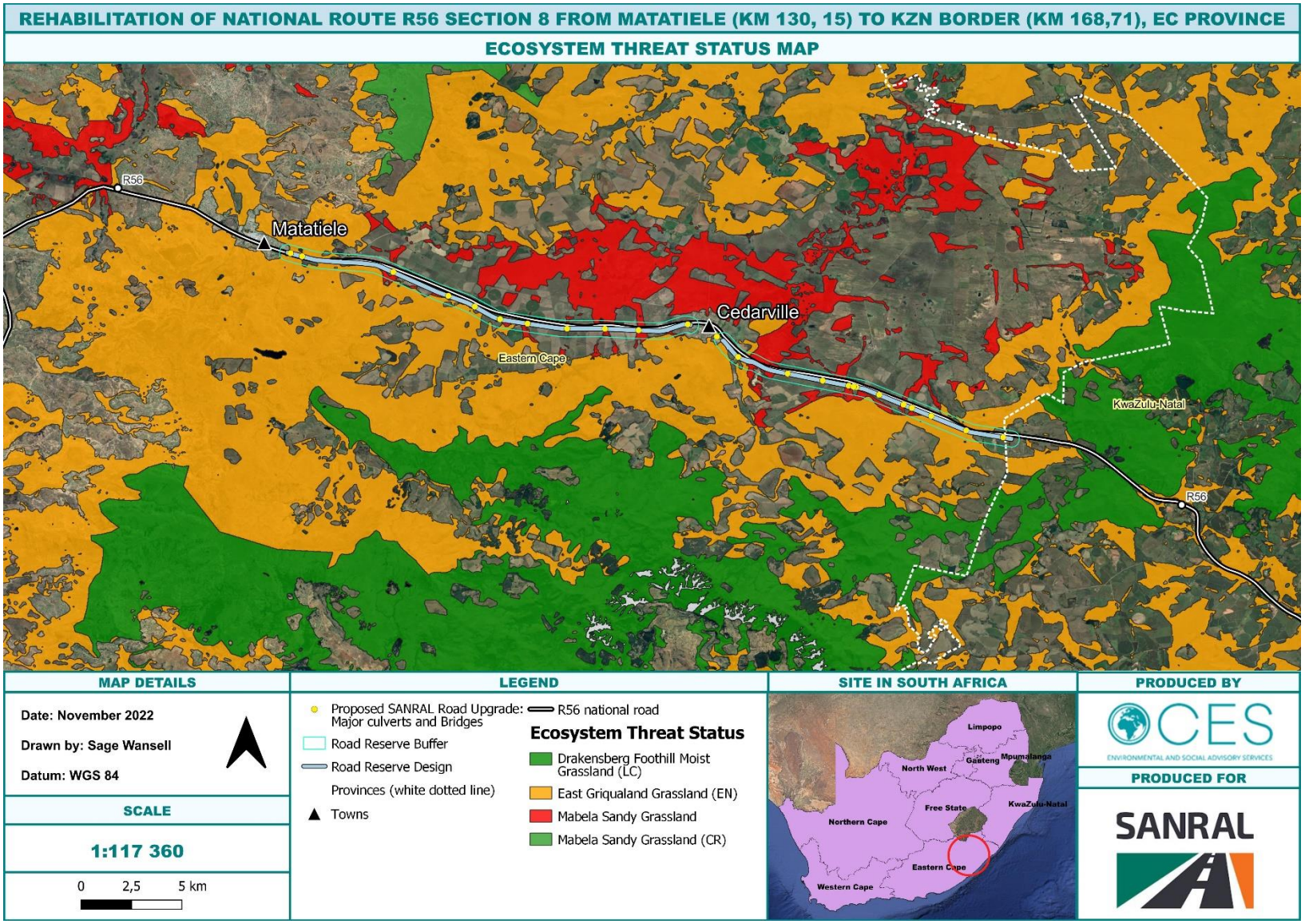


Figure 3.12: Current remaining extent of threatened ecosystems within the project area.

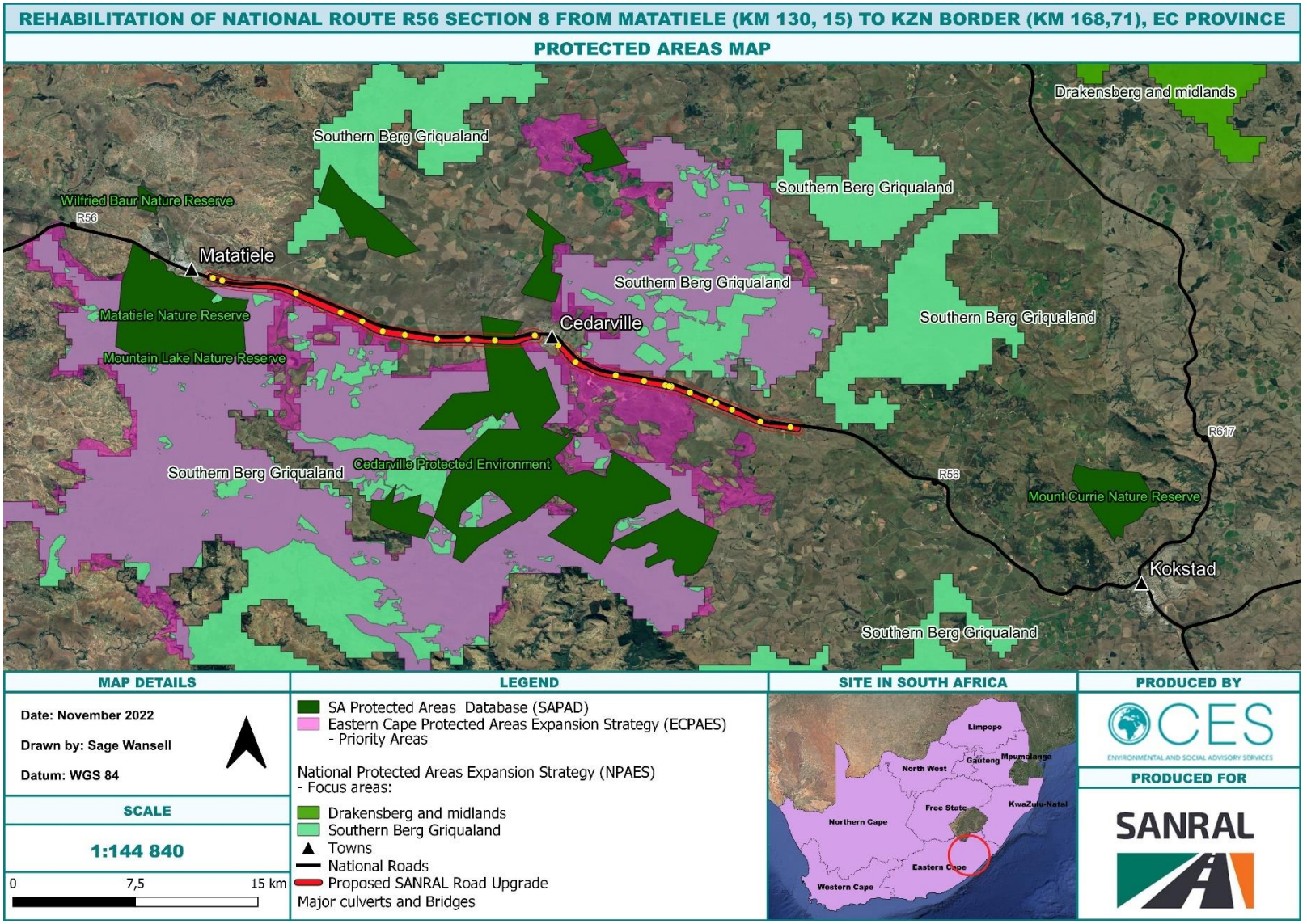


Figure 3.13: Protected areas within the project area.

4 SITE SENSITIVITY

The Species Environmental Assessment Guideline (SANBI, 2020) was applied to assess the Site Ecological Importance (SEI) of the project area. The habitats and the species of conservation concern in the project area were assessed based on their conservation importance, functional integrity and receptor resilience as described in Section 2.5 above. The combination of these resulted in a rating of SEI and interpretation of mitigation requirements based on the ratings.

Table 4.1 provides a summary of how the ecosystem type was assessed.

Based on the evaluation of SEI in terms of the Species Environmental Assessment Guideline (SANBI, 2020), the SEI of the road reserve is classified as very low. Interpretation of this classification in relation to proposed development activities, specifies **Minimisation mitigation** – development activities of medium to high impact acceptable and restoration activities may not be required. However, the SEI of the remaining portions of Mabela Sandy Grassland and the East Griqualand Grassland within the project area has been classified as high and medium, respectively. Interpretation of this classification in relation to proposed development activities, specifies the following:

→ **For areas of HIGH SEI (Mabela Sandy Grassland):** Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.

→ **For areas of MEDIUM SEI (East Griqualand Grassland):** Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.

As such, it is important that construction activities are confined to the approved development footprint. Intact patches of Mabela Sandy Grassland and East Griqualand Grassland must be avoided as far as practically and feasibly possible.

Table 4.1: Evaluation of Site Ecological Importance (SEI) of habitat and SCC.

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
Secondary Grassland within the Road Reserve i.e., Project Area (including Wetlands)	**Medium**	**Low**	**LOW**	High	**VERY LOW**
	The only plant SCC identified on site, includes *Dierama tysonii*, classified as VU (B1ab(ii,iii,iv,v)). This species is known from approximately 10 locations and has an EOO of 2024 km². However, this was an isolated population and was observed along the boundary of the road reserve. Faunal SCC likely to occur within the project area include Grey Rhebok (NT), Vlei Rat (NT), Mountain Reedbuck (EN), the Forest Thread Snake (DT) and a range of bird species. These species are unlikely to occur within the road reserve and rather likely occur on surrounding properties, however they are susceptible to	Small (>1 ha but <5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts (including alien plant species, dumping, erosion and impacts from previous road-related construction activities).		According to Lubke et al (1996) and Prober and Thiele (2005), in Zaloumis (2013), the restoration of grassland is difficult and often not successful. The study conducted by Zaloumis (2013) found that natural succession failed to restore the composition of the secondary grasslands, even after 40 years. The Grassland Ecosystem Guideline (SANBI, 2013) also states that the removal of the primary vegetation cover (i.e., through for example ploughing) is often irreversible, especially in mesic grasslands where recruitment is low. While active management may result in the restoration of ecosystem processes within five to ten years, the original species composition is unlikely to recover even over a long period (20-100 years). However, the possibility of restoration is also dependent on the nature and extent of the degradation or modification the grassland has suffered (SANBI, 2013). How quickly a grassland might recover is determined by (1) whether there is enough protective cover to allow seedlings to establish, (2) whether the topsoil (and therefore seedbank) is still in place or whether this has been eroded away, and (3) the dominance of alien invasive and woody plant species. It is important to consider the definition of RR: The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention). As such, the receptor resilience has been assessed based on the current condition of the vegetation within the road reserve i.e., degraded and transformed with a high proportion of alien, weedy, and pioneer plant species, and is therefore classified as HIGH.	

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
	road kill when crossing the R56. The habitat has been degraded and transformed and can no longer be refer to as "natural".				
Mabela Sandy Grassland	**Very High** ***Major fulfilling criteria triggered:*** Any area of natural habitat of a CR ecosystem type. ***Justification:*** Mabela Sandy Grassland is classified as Critically Endangered. It has a narrow distribution with high rates of habitat loss over the past 28 years, placing this ecosystem at risk of collapse. Its historical extent amounted to 492.91 km^2 of which only 31% currently remains. The Conservation Target for this vegetation type is	**Very High** ***Fulfilling criteria triggered:*** Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts with no signs of	**VERY HIGH**	**High** ***Fulfilling criteria triggered:*** Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed. ***Justification:*** According to Lubke *et al* (1996) and Prober and Thiele (2005), in Zaloumis (2013), the restoration of grassland is difficult and often not successful. The study conducted by Zaloumis (2013) found that natural succession failed to restore the composition of the secondary grasslands, even after 40 years. The Grassland Ecosystem Guideline (SANBI, 2013) also states that the removal of the primary vegetation cover (i.e., through for example ploughing) is often irreversible, especially in mesic grasslands where recruitment is low. While active management may result in the restoration of ecosystem processes within five to ten years, the original species composition is unlikely to recover	**HIGH**

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
	23%. It is not protected, and the major threats include agriculture, overgrazing and erosion. Mabela Sandy Grassland is also likely to host a range of floral and faunal SCC. The proposed development will result in the loss of approximately 11 ha (0.11 km^2) of Mabela Sandy Grassland which represents a total loss of **0.07%** of the current remaining extent of this CR ecosystem.	major past disturbance (e.g. ploughing). ***Justification:*** According to the current remaining extent of threatened ecosystems spatial dataset (SANBI, 2021), there are large portions (>100 ha) of intact Mabela Sandy Grassland within the broader project area surrounding the development footprint.		even over a long period (20-100 years). However, the possibility of restoration is also dependent on the nature and extent of the degradation or modification the grassland has suffered (SANBI, 2013). How quickly a grassland might recover is determined by (1) whether there is enough protective cover to allow seedlings to establish, (2) whether the topsoil (and therefore seedbank) is still in place or whether this has been eroded away, and (3) the dominance of alien invasive and woody plant species.	
Surrounding East Griqualand Grassland	**High** ***Major fulfilling criteria triggered:*** Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural	**Very High** ***As above.*** According to the current remaining extent of threatened ecosystems spatial dataset (SANBI,	**HIGH**	**High** ***As above.***	**MEDIUM**

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
	habitat of VU ecosystem type. ***Justification:*** East Griqualand Grassland is classified as Endangered (EN). It has a narrow distribution with high rates of habitat loss over the past 28 years, placing this ecosystem at risk of collapse. Its historical extent amounted to 8727.99 km^2 of which only 54% currently remains. It is considered poorly protected, and the major threats include agriculture, plantations, erosions and invasion by *Acacia dealbata* and *A. mearnsii* (SANBI, 2021). East Griqualand Grassland is also likely to host a range of floral and faunal SCC. The proposed development will result in the loss of approximately 9.6 ha (0.096 km^2) of East	2021), there are large portions (>100 ha) of intact East Griqualand Grassland within the broader project area surrounding the development footprint.			

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
	Griqualand Grassland which represents a a total loss of **0.002%** of the current remaining extent of this EN ecosystem.				

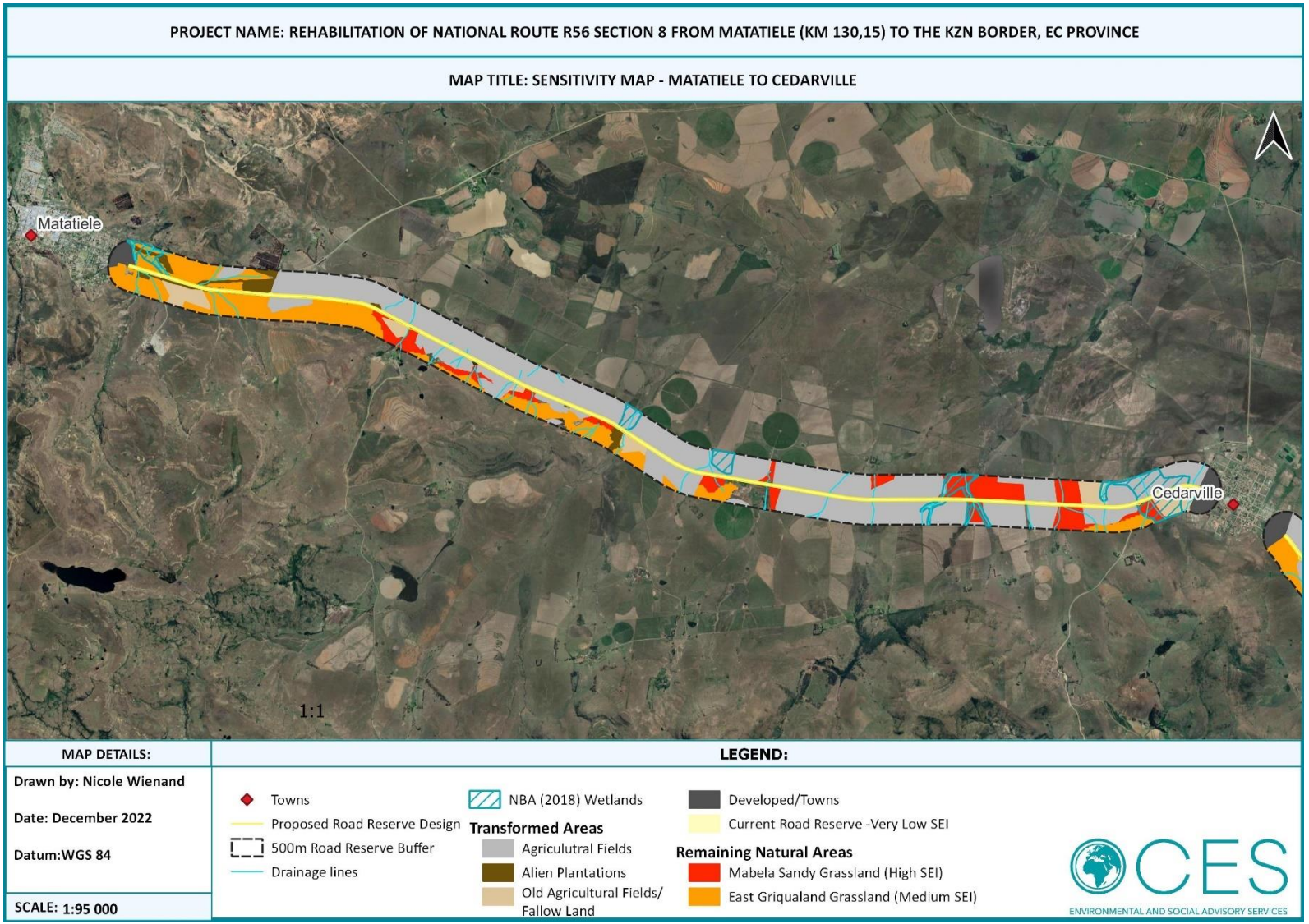


Figure 4.1: Sensitivity map indicating the SEI of the R56 from Matatiele to Cedarville.

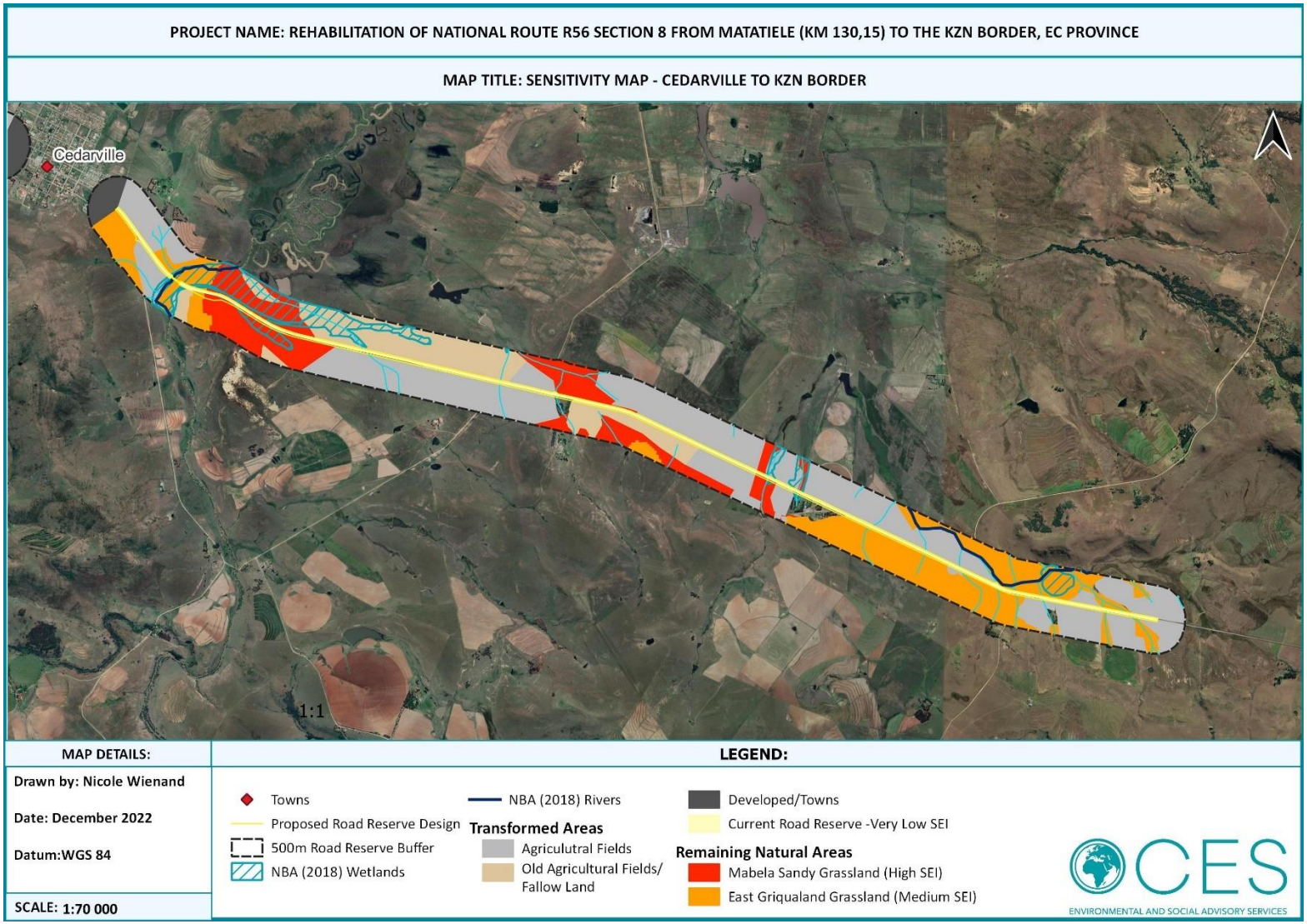


Figure 4.2: Sensitivity map indicating the SEI of the R56 from Cedarville to the KZN border.

5 IMPACT IDENTIFICATION AND ASSESSMENT

The study that has been undertaken provides the necessary information in order to assess the impacts of the proposed project on the ecology of the area at the appropriate spatial and temporal scales. The impacts identified and described in Table 5.1 below have been assessed in terms of the criteria described in Appendix 5 of this report.

Table 5.1: Assessment of impacts associated with the proposed Rehabilitation of National Route 56.

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	SEVERITY	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
CONSTRUCTION PHASE														
Loss of Mabela Sandy Grassland and East Griqualand Grassland	Preferred Alternative	Rehabilitation and widening of the National R56 will result in the direct loss of approximately 11 ha of Mabela Sandy Grassland (CR) and 9.6 ha of East Griqualand Grassland (EN) which represents a total loss of 0.07% and 0.002% of the total current remaining extent of these vegetation types. These vegetation types have narrow distributions with high rates of habitat loss over the past 28 years, placing these ecosystems at risk of collapse. Any further loss of these vegetation types would have a HIGH negative significance.	Negative	Direct	Severe	Study Area	Permanent	Definite	Irreversible	Resource will be partly lost	Achievable	**High (-)**	• Vegetation clearance must be strictly limited to that which is necessary for the rehabilitation of National Route 56. • Intact portions of Mabela Sandy Grassland and East Griqualand Grassland should be avoided as far as practically and feasibly possible. • Disturbed areas must be rehabilitated as soon as possible after construction. • Only indigenous species common to Mabela Sandy Grassland and East Griqualand Grassland must be used for rehabilitation. • Lay down areas should be located within previously disturbed areas. Laydown areas must not be located within sensitive areas such as wetlands or intact portions of Mabela Sandy Grassland/East Griqualand Grassland. • Employees must be prohibited from making open fires during the construction phase. • An Alien Plant Method Statement / Management Plan must be compiled and implemented during all phases of the proposed development. • The *Dierama tysonii* population should be avoided as far as possible. However, if avoidance is not possible, permits for the removal and translocation of this populations must be obtained. This population must be translocated within the same habitat type, on an adjacent property by a qualified botanist/horticulturalist. • A Botanical Search and Rescue of the development footprint must be undertaken prior to construction. • Permits must be obtained for the removal/translocation of SCC protected in terms of the PNCO. • Any translocated species must be planted in the nearest similar habitat on the same property.	**Moderate (-)**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	SEVERITY	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	According to SANBI (2021), 31% of the historical extent of Mabela Sandy Grassland currently remains while 54% of the historical extent of East Griqualand Grassland currently remains. This indicates that 69% Mabela Sandy Grassland and 46% of East Griqualand Grassland has already been transformed, largely due to agriculture (SANBI, 2021). Any further loss of this vegetation type as a consequence of the proposed project will contribute to the cumulative loss of these vegetation types, increasing the risk of ecosystem collapse.	Negative	Cumulative	Severe	Study Area	Permanent	Definite	Irreversible	Resource will be partly lost	Achievable	**High (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**
	No-go	If the rehabilitation of the National Route 56 does not go ahead then there will be no further loss of Mabela Sandy Grassland. However, the current impacts associated with surrounding land uses, such as agricultural activities, alien plant species, overgrazing, et cetera, will continue.	Negative	Existing	Slight	Study Area	Permanent	Probable	N/A	N/A	N/A	**Low (-)**	N/A	
Loss of indigenous plant species and biodiversity	Preferred Alternative	The vegetation within the road reserve has been severely degraded and invaded by alien and weedy plant species. However, there are still a number of indigenous plant species within the road reserve which will be lost as a consequence of road widening. Although the majority of these species are common and not protected, the loss of indigenous plant species contributes to the loss of biodiversity within the project area.	Negative	Direct	Moderate	Study Area	Permanent	Definite	Reversible	Resource will be partly lost	Achievable	**Moderate (-)**	• The same as the mitigation measures identified for the “Loss of Mabela Sandy Grassland and East Griqualand Grassland” above.	**Moderate (-)**
	Cumulative	Indigenous plant species and biodiversity has already been lost within the broader project area due to agriculture, development of infrastructure, housing, et cetera. The proposed project will result in the further loss of indigenous plant species, contributing to the cumulative loss of indigenous plant species and biodiversity within the project area.	Negative	Cumulative	Slight	Study Area	Permanent	Definite	Reversible	Resource will be partly lost	Achievable	**Moderate (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	SEVERITY	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-Go	If the rehabilitation of the National Route 56 does not go ahead then there will be no direct loss of indigenous plant species/ biodiversity. The no-go alternative is thus classified as negligible.	N/A									**Negligible**	**N/A**	
Loss of Plant Species of Conservation Concern (SCC)	Preferred Alternative	The clearance of vegetation and rehabilitation of the National Route 56 could result in the loss of *Dierama tysonii* individuals identified along the boundary of the road reserve. This species is classified as Vulnerable and protected in terms of the Eastern Cape Nature and Environmental Conservation Ordinance 19 of 1974. Loss of any individuals will have a high impact on the population of this species.	Negative	Direct	Severe	Localised	Permanent	Possible	Irreversible	Resource may be partly lost	Achievable	**High (-)**	• The *Dierama tysonii* subpopulation should be avoided as far as possible. However, if avoidance is not possible, permits for the removal and translocation of this populations must be obtained. This population must be translocated within the same habitat type, on an adjacent property by a qualified botanist/horticulturalist.	**Low (-)**
	Cumulative	The population of *D. tysonii* is currently declining due to ongoing habitat destruction, degradation and grazing by livestock (Mtshali *et al*., 2015). Should the rehabilitation of the National Route 56 lead to the loss of the subpopulation identified along the boundary of the road reserve, this will contribute to the cumulative loss of this species.	Negative	Cumulative	Severe	Localised	Permanent	Possible	Irreversible	Resource may be partly lost	Achievable	**High (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**
	No-Go	The No-go alternative will not require the clearance of vegetation and will therefore not result in the loss of *D. tysonii* individuals. The no-go alternative is therefore classified as negligible.	NA									**Negligible**	N/A	**Negligible**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	SEVERITY	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of area classified as CBA and ESA	Preferred Alternative	According to the ECBCP (2019), the proposed project traverses a PA (the Cedarville Protected Environment), a terrestrial CBA 1 and 2, a terrestrial ESA 1 and 2, as well as an aquatic CBA 1, CBA 2 and ESA 1. The rehabilitation of the National Route 56 will therefore result in the loss of a portion of these areas. The classification of these areas was driven by the vegetation type, threat status, and the established national conservation target. Even though the majority of the project area has been impacted by livestock grazing, alien plant species, agriculture, illegal dumping, and mining, amongst other land uses, a systematic biodiversity planning algorithm will still select a site to ensure that the target is satisfied, recommending that degraded areas of CBAs are rehabilitated. Construction within these areas would therefore affect national conservation targets.	Negative	Direct	Moderate	Localised	Permanent	Definite	Reversible	Resource may be partly lost	Achievable	**Moderate (-)**	• The relevant water use authorisation must be obtained for activities occurring within 100 m of a watercourse of 500 m of a wetland. • Laydown areas should be located within previously disturbed areas and not near wetlands and/or watercourses, or within intact portions of Mabela Sandy Grassland or East Griqualand Grassland. • Intact portions of Mabela Sandy Grassland and East Griqualand Grassland should be avoided as far as practically and feasibly possible. • Vegetation clearance must be strictly limited to that which is necessary for the rehabilitation of National Route 56. • Disturbed areas must be rehabilitated as soon as possible after construction. • Excess construction related material and rubble must be removed and disposed of accordingly and not left heaped within the road reserve.	**Moderate (-)**
	Cumulative	Portions of CBAs and ESAs have already been lost within the region due to other developments and activities. The rehabilitation and widening of the National Route 56 will therefore contribute to the cumulative loss of areas classified as CBAs and ESAs.	Negative	Direct	Moderate	Regional	Permanent	Definite	Reversible	Resource may be partly lost	Achievable	**Moderate (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**
	No-Go	The No-go alternative will not result in the loss of areas classified as CBA and ESA. However, it should be noted that the current impacts associated livestock grazing, alien plant species, agriculture, illegal dumping, and mining, amongst other land uses,. The no-go alternative is therefore classified as negligible.	N/A									**Negligible**	N/A	**Negligible**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	SEVERITY	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Impacts on wetlands	Preferred Alternative	A number of large wetlands surround the R56. Wetlands are specialised ecosystems that are responsible for the provision of a range of ecosystem services such as water filtration and flow regulation, flood attenuation, and the provision of habitat for a range of floral and faunal species, amongst others. Healthy wetlands are essential for the continued delivery of these ecosystem services and impacts on wetlands should be avoided. Outside of protected areas these habitats should be managed in support of biodiversity objectives, particularly if they have been mapped as Critical Biodiversity Areas or Ecological Support Areas. (SANBI, 2013). Encroachment of construction activities into these areas could impact surrounding wetlands through erosion, sedimentation, and runoff of tar/cement.	Negative	Direct	Moderate	Study Area	Medium Term	Possible	Reversible	Resource will not be lost	Achievable	**Moderate (-)**	• Construction should take place outside of the rainy season to avoid runoff from construction activities entering the surrounding wetlands and/or rivers. • The necessary water use authorisation must be obtained from the Department of Water and Sanitation for activities taking place within 100 m of a watercourse and 500 m of a wetland. • Laydown areas should be located within previously disturbed areas and not near wetlands and/or watercourses. • An Erosion Management Plan / Method Statement should be compiled and implemented during the Construction Phase. • Vegetation clearance must be kept to a minimum and retained where possible to avoid soil erosion. • Disturbed areas must be rehabilitated as soon as possible after construction. • The site must be monitored regularly for signs of erosion. Remedial action must be taken at the first signs of erosion.	**Low (-)**
	Cumulative	Many of the watercourse and wetlands within the broader project area have been impacted due to agricultural acitvities. According to the Baseline Aquatic Biodiversity Assessment conducted for the site (Eco-Pulse Environmental Consulting Services, 2022), the instream habitat and riparian habitat conditions of the watercourses within the project area was classified as moderately modified. Notable instream impacts include altered flow regime due to the establishment of dams along many of the watercourses, altered water quality due to runoff from agricultural lands, and channel scour (erosion) associated with altered catchment runoff processes. Encroachment of construction activities into these areas could further impact surrounding wetlands through erosion, sedimentation, and runoff of tar/cement.	Negative	Cumulative	Moderate	Study Area	Medium Term	Possible	Reversible	Resource will not be lost	Achievable	**Moderate (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	SEVERITY	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-Go	The no-go alternative will not result in any additional impacts on surrounding wetlands. However, the current impacts such as altered flow regime due to the establishment of dams, altered water quality due to runoff from agricultural lands, and channel scour will persist.	Negative	Existing	Moderate	Regional	Long Term	Definite	N/A	N/A	N/A	**Moderate (-)**	**N/A**	
Establishment of alien or weedy plant species	Preferred Alternative	There are a number of alien and weedy plant species that have already established within the project area. Construction activities and the removal of existing natural vegetation could create 'open' habitats which favours the establishment and spread of undesirable alien or weedy plant species. Alien and weedy plant species occupy habitat that would otherwise be available for indigenous species, thereby degrading and modifying grassland habitats.	Direct	Negative	Moderate	Study Area	Medium- to long-term	Possible	Reversible	Resource may be partly lost	Achievable	**Moderate (-)**	• The site must be checked regularly for the presence of alien invasive species. • All alien invasive species that establish as a result of the project must be removed and disposed of as per the Working for Water Guidelines. • An Alien Invasive Method Statement/ Management Plan must be compiled and implemented. This should extent into the operational phase.	**Low (-)**
	Cumulative	There are a number of alien and weedy plant species that have already established within the project area. Construction activities and the removal of existing natural vegetation could create 'open' habitats which favours the further establishment and spread of undesirable alien or weedy plant species, contributing the overall spread and infestation within the project area.	Cumulative	Negative	Moderate	Study Area	Medium- to long-term	Possible	Reversible	Resource may be partly lost	Achievable	**Moderate (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**
	Existing	Should the proposed project not receive authorisation, the alien and weedy plant species within the road reserve will continue to persist and could potentially spread to neighbouring properties.	Existing	Negative	Moderate	Study Area	Long-Term	Definite	N/A	N/A	N/A	**Moderate (-)**	**N/A**	

Loss and/or fragmentation of faunal habitat	Preferred Alternative	The proposed development will most likely have a severe negative impact on any remaining animal receptors residing or utilising the affected areas. Undisturbed roadside areas provide habitat for large numbers of small mammals and birds, especially for edge and generalist species, and in turn predator species. **The loss of vegetation associated with construction of the proposed development will result in the direct loss of faunal habitat**, thereby reducing potential breeding and rearing locales and/or foraging opportunities. As a result, **faunal populations could become locally extinct or diminish in size**. This will impact the smaller sedentary species adapted to their ground dwelling habitats more than larger, more agile species such as birds and antelope, which are likely to disperse to more suitable habitats away from the proposed development. Additionally, **habitat fragmentation due to road development may cause a simultaneous reduction in habitat quality and populati0on size**. When habitats and their associated faunal populations are fragmented, this can disrupt the interchange between species, thereby reducing the long-term persistence of vulnerable populations. Inevitably, road development will lead to habitat loss and fragmentation. Even in the absence of habitat loss, **the noise and disturbance associated with road development will impact significantly on more sensitive species which require an undisturbed habitat to breed, etc**. However, the ecological impacts will depend on the nature and extent of the existing road network, as well as the landscape matrix. Habitat loss beneath the road surface can be ecologically significant when considered in the context of the SEI (some habitats are irreplaceable) and the remaining extent of these sites within a human-modified landscape. In this case, the existing road network experiences high traffic volumes and the remaining grassland habitats are fragmented and isolated by farmland, gravel roads and fences. As such, this impact is rated high	Negative	Direct	Severe	Study Area	Permanent	Probable	Irreversible	Resource will be lost	Achievable	**High (-)**	• Please refer to the mitigation measures relating to the Loss of Mabela Sandy Grassland and East Griqualand Grassland and the loss of indigenous plant species and biodiversity. • The construction of infrastructure near permanent waterbodies must be avoided. Sometimes amphibian species breed in temporary waterbodies, it is therefore recommended that construction activities take place outside of the wet and rainy season. • Construction activities must not encroach into identified 'no-go' areas or areas outside the development footprint. • Natural and semi-natural grassland areas, specifically that of East Griqualand Grassland (EN) and Mabela Sandy Grassland, must be avoided as far as practically and feasibly possible. • Where possible, scheme enhancements (e.g., road verges) must be implemented for roadside habitat creation, or the relinking of severed patches and improvement of degraded habitat links.	**Moderate (-)**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	SEVERITY	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
		negative.												
	Cumulative	The proposed road development will exacerbate the current ecological impacts due to high traffic densities on the existing road network and the intensely within the landscape. The cumulative impact is thus rated moderate negative.	Negative	Direct	Moderate	Study Area	Permanent	Probable	Irreversible	Resource will be lost	Difficult	**Moderate (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**
	No-go	If the proposed development does not go ahead, the current ecological impacts associated with the existing road network and surrounding land uses will continue to pose a threat to faunal populations residing and utilising the affected areas. As such, the No-go Alternative is rated moderate negative.	Negative	Direct	Moderate	Study Area	Permanent	Probable	Irreversible	Resource will be lost	N/A	**Moderate (-)**	**N/A**	

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	SEVERITY	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of fauna and/or fauna SCC	Preferred Alternative	Construction activities associated with the proposed development (e.g., vegetation clearance, excavation of soil, and the movement of construction vehicles) could result in wildlife mortalities through road kills or accidental killing. If wildlife mortalities are high, they can impact at the population level. It is unlikely that wildlife mortalities because of construction activities will be high, especially if the relevant mitigation measures are implemented. As such, this impact is rated moderate negative.	Negative	Direct	Moderate	Localised	Permanent	Possible	Irreversible	Resource will be lost	Achievable	**Moderate (-)**	• It is illegal to remove or kill fauna within the EC listed as either Schedule I or II on the PNCO, unless the relevant permit is acquired. • All construction staff must be educated with regards to wildlife conservation, and all staff employed by the development must ensure that any wildlife encountered during construction are not harmed or killed. • Fauna encountered must be allowed to move away safely from the construction area. In the event they need to be relocated, amphibians must be released in the same catchment areas whereas reptiles must be relocated to directly adjacent areas. No faunal species may be removed off site without proper authorisation from the relevant authority. • A rescue plan must be developed to protect amphibians and reptiles which could fall into construction pits. • The appointed ECO should be trained in snake handling and removal techniques. • Fauna SCC that may die due to construction activities associated with the proposed development must be recorded (e.g., photographed and GPS coordinates taken) and reported to the relevant authorities (e.g., EWT). Where possible, the carcass should be donated to SANBI. • All individuals, including construction workers must sign a register prior to accessing the construction site. • Driving of construction vehicles within the project area must be restricted to day-light hours. • All reasonable and feasible measures should be implemented to reduce noise in ecologically sensitive areas.	**Low (-)**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	SEVERITY	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	The proposed road development may exacerbate the current ecological impacts due to wildlife mortalities. However, it is unlikely that wildlife mortalities because of construction activities will be high. As such, the cumulative impact is rated low negative.	Negative	Direct	Slight	Localised	Permanent	Possible	Irreversible	Resource will be lost	Difficult	**Low (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**
	No-go	If the proposed development does not go ahead, the ecological impacts associated with road mortalities will continue to pose a threat to fauna in the project area. As such, the No-go Alternative is rated moderate negative.	Negative	Direct	Moderate	Study Area	Permanent	Probable	Irreversible	Resource will be lost	N/A	**Moderate (-)**	**N/A**	
OPERATIONAL PHASE														
Establishment of alien or weedy plant species	Preferred Alternative	Failure to rehabilitate and monitor the establishment of alien plant species during the Construction (and Operation Phase) could lead to the spread and infestation of Alien Plant Species during the Operational Phase. Alien plant species often outcompete indigenous vegetation. Therefore, their establishment and spread could result in the loss of indigenous plant species.	Negative	Direct	Moderate	Study Area	Medium- to Long-term	May Occur	Reversible	Resource may be partly lost	Achievable	**Moderate (-)**	• The site must be checked regularly for the presence of alien invasive species. When alien invasive species are found, immediate action must be taken to remove them. • The ECO must create a list with accompanying photographs of possible alien invasive species that could occur on site prior to construction. This photo guide must be used to determine if any alien invasive species are present. • An Alien Invasive Method Statement/ Management Plan must be compiled and implemented during the Construction and Operational Phase of the proposed project.	**Low (-)**
	Cumulative	A number of alien and weedy plant species have already established within the project area. Therefore, should the operational phase lead to the further establishment of alien invasive species in the project area, the invasion by alien species will be exacerbated	Negative	Direct	Moderate	Study Area	Medium- to Long-term	May Occur	Reversible	Resource may be partly lost	Achievable	**Moderate (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	SEVERITY	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-Go	Alien Invasive Plant Species have already established within the project area. Under the no-go alternative these species are likely to continue multiplying if left unchecked. The current no-go alternative is therefore classified as moderate.	Negative	Direct	Moderate	Study Area	Medium- to Long-term	May Occur	N/A	N/A	N/A	**Moderate (-)**	**N/A**	
Disruption of ecological processes	Preferred Alternative	Sub-Escarpment grasslands are well-adapted to fire, and this is the most important ecosystem process that can be managed to maintain biodiversity and productivity in these ecosystems (SANBI, 2013). The development and expansion of infrastructure such as roads causes the fragmentation of habitats and the disruption of important ecological processes such as seed dispersal and fire as the management focus shifts to fire protection.	Negative	Direct	Moderate	Study Area	Long Term	Definite	Reversible	Resource may be partly lost	Difficult	**Moderate (-)**	None identified. The applicant only has jurisdiction over their development and not over other developments or activities in the area. As such, it is difficult to implement a fire management plan within the broader landscape to ensure the continuation of important ecological processes.	**Moderate (-)**
	Cumulative	The disruption of ecological processes has already taken place within the landscape due to the development of roads, agricultural developments, housing, et cetera. The R56 is an existing road. The cumulative impact of the operational phase on ecological processes is thus classified as moderate.	Negative	Direct	Moderate	Study Area	Long Term	Definite	Reversible	Resource may be partly lost	Difficult	**Moderate (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**
	No-Go	The disruption of ecological processes has already taken place within the landscape due to the development of roads, agricultural developments, housing, et cetera. The R56 is an existing road. As such, even if the proposed rehabilitation of the R56 does not take place, the existing road will still continue to impact of ecological processes within the landscape. As such, the no-go alternative is classified as moderate.	Negative	Direct	Moderate	Study Area	Long Term	Definite	N/A	N/A	N/A	**Moderate (-)**	**N/A**	

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	SEVERITY	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Dispersal barrier and/or road mortalities	Preferred Alternative	Operational activities associated with the proposed development (e.g., wider road and increased traffic) can act as a barrier to dispersal and/or result in increased road mortalities. The ecological impacts are dependant on, for example, the current land uses, body size, taxonomy, season etc. For example, amphibians and reptiles are relatively poor dispersers and are slower to move away from the affected areas, increasing their risk to road kills. Moreover, snakes are extremely susceptible to road kills because they are attracted to the heat absorbed by roads and thus lie stationary on them. The snake SCC identified in this report is subterranean in its habits, so it is unlikely to be severely affected by road kills. Medium and large sized mammals are particularly at risk, especially during the breeding season. In addition, birds which use the roadside as a food source (e.g., pipits and larks) and those which walk rather than fly across the road (e.g., spurfowl), as well as birds that scavenge on roadkill (e.g., raptors and corvids) are also susceptible. **If road mortalities are high, they can significantly reduce faunal populations.** Similarly, **when habitats and their associated faunal populations are fragmented, this can disrupt the interchange between species, thereby reducing the long-term persistence of vulnerable populations**. Wide roads with high traffic volume restrict the movement of fauna most severely, particularly in intensely used landscapes. As such, this impact is rated high negative.	Negative	Direct	Moderate	Study Area	Long-term	Probable	Irreversible	Resource may be partly lost	Difficult	**High (-)**	• Natural and semi-natural grassland areas, specifically that of East Griqualand Grassland (EN) and Mabela Sandy Grassland, must be avoided as far as feasibly possible during construction. • Where possible, scheme enhancements (e.g., road verges) must be implemented for roadside habitat creation, or the relinking of severed patches and improvement of degraded habitat links.	**Moderate (-)**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	SEVERITY	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	The proposed road development may exacerbate the current ecological impacts due to wildlife mortalities and habitat fragmentation. As such, the cumulative impact is rated high negative.	Negative	Cumulative	Severe	Study Area	Long-term	Probable	Reversible	Resource may be partly lost	Difficult	**High (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or road management in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**
	No-go	The existing road network will continue to experience high traffic volumes and act as a barrier to dispersal. As such the No-go alternative is rated moderate negative.	Negative	Direct	Moderate	Study Area	Long-term	Probable	Reversible	Resource may be lost	N/A	**Moderate (-)**	**N/A**	
DECOMMISSIONING PHASE														
It is unlikely that the R56 road will be decommissioned in the near future. However, should the infrastructure be decommissioned in the long-term, the impacts associated with the decommissioning phase could be similar to those for the construction phase and most of the mitigation measures stipulated for the construction phase will, therefore, be relevant. The decommissioning phase EMPr must include additional decommissioning phase recommendations and mitigation measures relating to the ecological environment based on case studies of road decommissioning and it must consider the relevant legislation, policies and guidelines at the time of decommissioning.														

6 IMPACT STATEMENT, CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

Eleven (11) ecological impacts were identified for the proposed rehabilitation and widening of the R56 road. The majority of these impacts are associated with the construction phase. Of the eleven impacts identified, four (4) impacts are of high significance and seven (7) are of moderate significance prior to mitigation. If the mitigation measures identified and specified in this report are implemented and adhered to, the significance of a number of these impacts could be reduced. Six (6) impacts are of moderate significance and five (5) impacts are of low significance after mitigation.

6.2 CONDITIONS OF EMPR, EA AND MONITORING

All management / mitigation measures identified for the impacts associated with the proposed project must be incorporated into the EMPr and implemented during the relevant phases of the proposed development (please refer to Chapter 5 above for the recommended mitigation measures associated with each impact identified). Specific mitigation measures and recommendations that should be incorporated into the EA (if granted) include:

- All necessary permitting and authorisations must be obtained prior to the commencement of any construction activities.
- A Botanical Search and Rescue should be undertaken prior to the commencement of construction.
- Vegetation clearance must be strictly limited to that which is necessary for the rehabilitation of National Route 56.
- The Dierama tysonii population should be avoided as far as possible. However, if avoidance is not possible, permits for the removal and translocation of this populations must be obtained. This population must be translocated within the same habitat type, on an adjacent property by a qualified botanist/horticulturalist.
- Permits must be obtained for the removal/translocation of SCC protected in terms of the PNCO.
- An Erosion Method Statement must be developed prior to the commencement of construction activities in order to mitigate the unnecessary loss of topsoil and runoff.
- An Alien Invasive Method Statement/ Management Plan should be compiled and implemented during all phases of the proposed development.
- Activities within 500 m of a wetland and 100 m of a watercourse must obtain the necessary Water Use Authorisation prior to the commencement of such activities.
- Lay down areas must be located within previously disturbed areas and not within sensitive ecosystems such as wetlands.
- Intact portions of Mabela Sandy Grassland and East Griqualand Grassland must be avoided.

- Fauna encountered must be allowed to move away safely from the construction area. In the event they need to be relocated, amphibians must be released in the same catchment areas whereas reptiles must be relocated to directly adjacent areas. No faunal species may be removed off site without proper authorisation from the relevant authority.

6.3 Ecological Statement and Opinion of the Specialist

Although analysis of the current remaining extent of the threatened ecosystems in South Africa spatial dataset (SANBI, 2021) suggests that the R56 road traverses' portions of intact Mabela Sandy Grassland and East Griqualand Grassland, the site visit confirmed that the majority of the vegetation within the existing road reserve has been severely degraded most likely due to previous road-related construction activities and frequent mowing. The species composition is largely dominated by weedy alien plant species. The SEI of the existing road reserve has thus been classified as very low. Interpretation of this classification in relation to proposed development activities, specifies **minimisation mitigation** – *development activities of medium to high impact acceptable and restoration activities may not be required*.

Very small portions of Mabela Sandy Grassland (approximately 11 ha) and East Griqualand Grassland (approximately 9.6 ha) occurs within the development footprint (see Figure 3.8 and Figure 3.9). However, even in most of these areas the grassland has been impacted to some extent by livestock grazing, alien plant species, and frequent access by vehicles. Based on the Species Environmental Assessment guideline (SANBI, 2020) methodology for the assessment of SEI, the SEI of the remaining portions of Mabela Sandy Grassland and the East Griqualand Grassland within the project area has been classified as high and medium, respectively. Interpretation of this classification in relation to proposed development activities, specifies the following:

- **For areas of HIGH SEI (Mabela Sandy Grassland):** Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.

- **For areas of MEDIUM SEI (East Griqualand Grassland):** Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.

As such, it is important that construction activities are confined to the approved development footprint (if the EA is granted). Intact patches of Mabela Sandy Grassland and East Griqualand Grassland must be avoided as far as practically and feasibly possible. Furthermore, there are a number of wetlands surrounding the project area and it is therefore recommended that construction take place outside of the rainy season.

It is the opinion of the specialist that there are no fatal flaws associated with the proposed rehabilitation of the R56. However, it is important that the mitigation measures identified and specified are incorporated into the EMPr and EA, if approved, for implementation during the relevant phases of the proposed project.

7 REFERENCE LIST

Avenant N, Wilson B, Power RJ, Palmer G, Child MF. 2016. A conservation assessment of *Mystromys albicaudatus*. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

Child MF, Rowe-Rowe D, Birss C, Wilson B, Palmer G, Stuart C, Stuart M, West S, Do Linh San E. 2016. A conservation assessment of *Poecilogale albinucha*. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

Donaldson, J.S. 2009. Encephalartos friderici-guilielmi Lehm. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2023/01/11.

ECBCP (2019) Eastern Cape Biodiversity Conservation Plan Handbook. Department of Economic Development and Environmental Affairs (King Williams Town). Compiled by G. Hawley, P. Desmet and D. Berliner.

ECBCP. 2019. Eastern Cape Biodiversity Conservation Plan Handbook. Department of Economic Development and Environmental Affairs (King Williams Town). Compiled by G. Hawley, P. Desmet and D. Berliner.

Kamundi, D.A. & Raimondo, D. 2008. Berkheya griquana Hilliard & B.L.Burtt. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/21.

Marnewick MD, Retief EF, Theron NT, Wright DR, Anderson TA. 2015. Important Bird and Biodiversity Areas of South Africa. Johannesburg: BirdLife South Africa.

Mtshali, H., Scott-Shaw, C.R. & Raimondo, D. 2015. Dierama tysonii N.E.Br. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/21.

Okes N, Ponsonby DW, Rowe-Rowe D, Avenant NL, Somers MJ. 2016. A conservation assessment of Aonyx capensis. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

Opdam, P. 1990. Dispersal in fragmented populations: the key to survival. Pages 3-17 in R.G.H. Bunce and D.C. Howard, editors. Species dispersal in agricultural habitats. Belhaven, London.

Pillay N, Taylor P, Baxter R, Jewitt D, Pence G, Child MF. 2016. A conservation assessment of Dasymys spp. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

Ponsonby DW, Rowe-Rowe D, Power RJ, Somers MJ. 2016. A conservation assessment of Hydrictis maculicollis. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

Raimondo, D. 2008. Alepidea duplidens Weim. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2023/01/11.

Ramesh T, Downs CT, Power RJ, Laurence S, Matthews W, Child MF. 2016. A conservation assessment of Leptailurus serval. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

Rodrigues, PMS., Gonçalves, CE., Schaefer, R., de Oliveira Silva, J., Ferreira Júnior, WG, Manoel dos Santos, R., and Neri, AV. 2018. The influence of soil on vegetation structure and plant diversity in different tropical savannic and forest habitats. Journal of Plant Ecology 11, 226-236.

Schoeman C, Relton C, Child MF. 2016. A conservation assessment of Grammomys dolichurus. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 1.2020.

Taylor MR, Peacock F, Wanless RM (eds). 2015. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. BirdLife South Africa. Johannesburg, South Africa.

Taylor A, Avenant N, Schulze E, Viljoen P, Child MF. 2016. A conservation assessment of Redunca fulvorufula fulvorufula. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

Taylor P, Baxter R, Child MF. 2016. A conservation assessment of Otomys auratus. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

Taylor A, Cowell C, Drouilly M, Schulze E, Avenant N, Birss C, Child MF. 2016. A conservation assessment of Pelea capreolus. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.APPEN

Victor, J.E. 2009. Gnaphalium griquense Hilliard & B.L.Burtt. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/21.

von Staden, L. 2011. Sensitive Species 606. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/23.

Williams, V.L., Raimondo, D., Crouch, N.R., Cunningham, A.B., Scott-Shaw, C.R., Lötter, M., Ngwenya, A.M. & von Staden, L. 2008. Eucomis bicolor Baker. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2023/01/11.

APPENDIX 1: LIST OF INDIGENOUS PLANT SPECIES OCCURRING WITHIN THE PROJECT AREA.

Table A1: Indigenous plant species occurring within the project area.

Family	Species	Red List Category	PNCO	TOPS	Protected Tree	Sample Site Number
Anacardiaceae	*Searsia pyroides*	LC	-	-	-	N1; N4
Apiaceae	*Notobubon laevigatum*	LC	-	-	-	N3; N7
Apiaceae	*Centella asiatica*	LC	-	-	-	N1; N2
Apocynaceae	*Xysmalobium undulatum*	LC	-	-	-	N1
Asphodelaceae	*Bulbine narcissifolia*	LC	-	-	-	N2; N4; N5; N7
Asteraceae	*Arctotis arctotoides*	LC	-	-	-	All sites
Asteraceae	*Arctotis venusta*	LC	-	-	-	N2
Asteraceae	*Berkheya umbellata*	LC	-	-	-	N1; N3; N7
Asteraceae	*Berkheya heterophylla*	LC	-	-	-	N1; N2
Asteraceae	*Berkheya bipinnatifida ssp. bipinnatifida*	LC	-	-	-	N1; N2
Asteraceae	*Berkheya setifera*	LC	-	-	-	N2; N4; N7
Asteraceae	*Felicia muricata*	LC	-	-	-	N2; N6; N7
Asteraceae	*Gazania linearis*	LC	-	-	-	N2; N4; N7
Asteraceae	*Helichrysum rugulosum*	LC	-	-	-	N1; N2; N4; N5; N6; N7
Asteraceae	*Helichrysum ammitophilum*	LC	-	-	-	N2; N3; N4; N7
Asteraceae	*Nidorella podocephala*	LC	-	-	-	N3, N4; N7
Asteraceae	*Senecio sp.*		-	-	-	All sites
Asteraceae	*Senecio speciosus*	LC	-	-	-	N1; N3
Asteraceae	*Lactuca inermis*	LC	-	-	-	N1, N4
Campanulaceae	*Wahlenbergia undulata*	LC	-	-	-	All sites
Convolvulaceae	*Convolvulus sagittatus*	LC	-	-	-	N1; N3; N5: N6
Cyperaceae	*Abildgaardia ovata*	LC	-	-	-	N5; N6; N7
Cyperaceae	*Fuirena pubescens*	LC	-	-	-	N2

Family	Species	Red List Category	PNCO	TOPS	Protected Tree	Sample Site Number
Cyperaceae	*Cyperus congestus*	LC	-	-	-	N2
Cyperaceae	*Cyperus semitrifidus*	LC	-	-	-	N2
Cyperaceae	*Cyperus esculentus*	LC	-	-	-	N2; N5
Cyperaceae	*Cyperus uitenhagensis*	LC	-	-	-	N6
Cyperaceae	*Cyperus macranthus*	LC	-	-	-	N5
Cyperaceae	*Schoenoplectus decipiens*	LC	-	-	-	N2
Euphorbiaceae	*Euphorbia striata*	LC	-	-	-	All sites
Fabaceae	*Rhynchosia caribaea*	LC	-	-	-	N6; N7
Fabaceae	*Vigna vexillata*	LC	-	-	-	N6
Geraniaceae	*Pelargonium abrotanifolium*	LC	-	-	-	N3; N6
Geraniaceae	*Pelargonium alchemilloides*	LC	-	-	-	N5
Geraniaceae	*Pelargonium luridum*	LC	-	-	-	N2
Gentianaceae	*Sebaea sp.*		-	-	-	N2
Hyacinthaceae	*Ledebouria marginata*	LC	-	-	-	N6
Hyacinthaceae	*Ledebouria ovatifolia*	LC	-	-	-	N2; N3; N4; N7
Hyacinthaceae	*Albuca setosa*	LC	-	-	-	N2; N4
Hyacinthaceae	*Albuca virens*	LC	-	-	-	N6
Hypoxidaceae	*Hypoxis rigidula*	LC	-	-	-	N1
Hypoxidaceae	*Hypoxis obtusa*	LC	-	-	-	N1; N4
Hypoxidaceae	*Hypoxis angustifolia*	LC	-	-	-	N2
Iridaceae	*Dierama tysonii*	VU	Schedule 4	-	-	N2
Lobeliaceae	*Lobelia flaccida*	LC	-	-	-	All sites
Lobeliaceae	*Monopsis decipiens*	LC	-	-	-	N2; N5
Malvaceae	*Hermannia althaeifolia*	LC	-	-	-	N2
Malvaceae	*Hermannia depressa*	LC	-	-	-	N1; N2; N3, N6
Malvaceae	*Hibiscus microcarpus*	LC	-	-	-	N6
Plantaginaceae	*Plantago lanceolata*	LC	-	-	-	All sites
Poaceae	*Aristida junciformis*	LC	-	-	-	N3; N5; N7
Poaceae	*Andropogon eucomus*	LC	-	-	-	N5; N7
Poaceae	*Digitaria eriantha*	LC	-	-	-	N2
Poaceae	*Brachiaria serrata*	LC	-	-	-	N3: N7
Poaceae	*Cynodon incompletus*	LC	-	-	-	N3; N5; N7

Family	Species	Red List Category	PNCO	TOPS	Protected Tree	Sample Site Number
Poaceae	*Elionurus muticus*	LC	-	-	-	N2; N3; N6
Poaceae	*Eragrostis capensis*	LC	-	-	-	N2; N3, N4
Poaceae	*Eragrostis curvula*	LC	-	-	-	N1; N2
Poaceae	*Helictotrichon turgidulum*	LC	-	-	-	N1; N2
Poaceae	*Melinis nerviglumis*	LC	-	-	-	N1; N3; N4; N7
Poaceae	*Pennisetum sphacelatum*	LC	-	-	-	N1; N3
Poaceae	*Setaria sphacelata*	LC	-	-	-	N2; N5; N6
Poaceae	*Setaria nigrirostris*		-	-	-	N3, N4
Poaceae	*Setaria sp.*		-	-	-	N2 (Mabela Sandy Grassland)
Poaceae	*Sporobolus pyramidalis*	LC	-	-	-	N5; N7
Poaceae	*Urochloa serrata*	LC	-	-	-	N6
Poaceae	*Themeda triandra*	LC	-	-	-	N2; N4; N5; N7
Polygalaceae	*Polygala hottentotta*	LC	-	-	-	N3
Ranunculaceae	*Ranunculus multifidus*	LC	-	-	-	N2; N3; N6
Scrophulariaceae	*Diclis reptans*	LC	-	-	-	N2; N5
Scrophulariaceae	*Manulea buchneroides*	LC	-	-	-	N2
Scrophulariaceae	*Nemesia fruticans*	LC	-	-	-	N2

APPENDIX 2: LIST OF MAMMAL SPECIES.

Table A2: List of mammal species likely to occur on site.

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENDEMIC	TOPS LISITNG (2007)	PNCO KZN	QDS CODE (ADU, 2011) 3028BD	CONFIRMED SIGHTINGS
CARNIVORA							
Striped Polecat	*Ictonyx striatus*	Least Concern	No	-	-	-	-
Aardwolf	*Proteles cristata*	Least Concern	No	-	-	-	-
Black-backed Jackal	*Canis mesomelas*	Least Concern	No	-	-	-	**Confirmed**
African Clawless Otter	*Aonyx capensis*	Near Threatened	No	Protected	-	-	-
Spotted-necked Otter	*Hydrictis maculicollis*	Vulnerable	No	Protected	-	-	-
White-tailed Mongoose	*Ichneumia albicauda*	Least Concern	No	-	-	-	-
Caracal	*Caracal caracal*	Least Concern	No	-	-	-	-
African Wildcat	*Felis silvestris*	Least Concern	No	-	-	-	-
African Striped Weasel	*Poecilogale albinucha*	Near Threatened	No	-	-	-	-
Serval	*Leptailurus serval*	Near Threatened	No	Protected	-	-	-
Cape genet	*Genetta tigris*	Least Concern	No	-	-	-	-
Water Mongoose	*Atilax paludinosus*	Least Concern	No	-	-	-	-
Slender Mongoose	*Herpestes ichneumon*	Least Concern	No	-	-	-	-
Honey Badger	*Mellivora capensis*	Least Concern	No	Protected	-	-	-
ARTIODACTYLA							
Mountain Reedbuck x	*Redunca fulvorufula fulvorufula*	Endangered	*Near*	-	Schedule 2	-	-

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENDEMIC	TOPS LISITNG (2007)	PNCO KZN	QDS CODE (ADU, 2011) 3028BD	CONFIRMED SIGHTINGS
Southern Reedbuck x	*Redunca arundinum*	Least Concern	No	Protected	Schedule 2	-	**Confirmed**
Grey Rhebok x	*Pelea capreolus*	Near Threatened	**Yes**	-	Schedule 2	-	-
Common Eland	*Tragelaphus oryx*	Least Concern	No	-	Schedule 2	-	-
Common Duiker	*Sylvicapra grimmia*	Least Concern	No	-	Schedule 1	-	-
Klipspringer	*Oreotragus oreotragus*	Least Concern	No	-	Schedule 3	-	-
PRIMATES							
Chacma Baboon	*Papio ursinus*	Least Concern	No	-	-	-	-
HYRACOIDEA							
Rock Hyrax	*Procavia capensis*	Least Concern	No	-	-	-	-
RODENTIA							
Cape Porcupine	*Hystrix africaeaustralis*	Least Concern	No	-	-	-	-
Chaka's Four-striped Grass Mouse	*Rhabdomys chakae*	Least Concern	No	-	-	-	-
Sloggett's Vlei Rat	*Otomys sloggetti*	Least Concern	No	-	-	-	-
Angoni Vlei Rat	*Otomys angoniensis*	Least Concern	No	-	-	-	-
Vlei Rat	*Otomys auratus*	Near Threatened	No	-	-	-	-
Woodland Doormouse	*Graphiurus murinus*	Least Concern	No	-	-	-	-
Namaqua Rock Mouse	*Micaelamys namaquensis*	Least Concern	No	-	-	-	-
Pygmy Mouse	*Mus minutoides*	Least Concern	No	-	-	-	-

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENDEMIC	TOPS LISITNG (2007)	PNCO KZN	QDS CODE (ADU, 2011) 3028BD	CONFIRMED SIGHTINGS
Highveld Gerbil	*Gerbilliscus brantsii*	Least Concern	No	-	-	-	-
Mozambique Woodland Mouse	*Grammomys dolichurus*	Data Deficient	No	-	-	-	-
Natal Multimammate Mouse	*Mastomys natalensis*	Least Concern	No	-	-	-	-
White-tailed Rat	*Mystromys albicaudatus*	Vulnerable	No	-	-	-	-
Gray Climbing Mouse	*Dendromus melanotis*	Least Concern	No	-	-	-	-
African Marsh Rat	*Dasymys incomtus*	Near Threatened	No	-	-	-	-
House Mouse	*Mus musculus*	Least Concern	No	-	-	-	-
House Rat	*Rattus rattus*	Least Concern	No	-	-	-	-
LAGOMORPHA							
Hewitt's Red Rock Hare	*Pronolagus saundersiae*	Least Concern	**Yes**	-	-	-	-
Natal Red Rock Hare	*Pronolagus crassicaudatus*	Least Concern	*Near*	-	-	-	-
African Savanna Hare	*Lepus victoriae*	Least Concern	No	-	-	-	-
Scrub Hare	*Lepus saxatilis*	Least Concern	**Yes**	-	-	-	-
TUBULIDENTATA							
Aardvark	*Orycteropus afer*	Least Concern	No	-	Schedule 2	-	-
SORICIDAE							
Lesser Dwarf Shrew	*Suncus varilla*	Least Concern	No	-	-	-	-
Forest Shrew	*Myosorex varius*	Least Concern	No	-	-	-	-
Reddish-grey Musk Shrew	*Crocidura cyanea*	Least Concern	No	-	-	-	-

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENDEMIC	TOPS LISITNG (2007)	PNCO KZN	QDS CODE (ADU, 2011) 3028BD	CONFIRMED SIGHTINGS
Greater Red Musk Shrew	*Crocidura flavescens*	Least Concern	No	-	-	-	-
MACROSCELIDIDAE							
Eastern Rock Sengi	*Elephantulus myurus*	Least Concern	No	-	-	-	-

APPENDIX 3: LIST OF HERPETOFAUNA.

Table A3: List of Herpetofauna likely to occur on site.

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	ECENCO	QDS CODE (ADU, 2011) 3028BD
AMPHIBIA (Amphibians) (SANBI 2004, Measey 2010 & 2014, IUCN 2021, ECNECO 1974)						
Boettger's Caco	*Cacosternum boettgeri*	Least Concern	No	-	Schedule II	-
Bubbling Kassina	*Kassina senegalensis*	Least Concern	No	-	Schedule II	**Confirmed**
African Clawed Frog	*Xenopus laevis*	Least Concern	No	-	Schedule II	-
Plaintive Rain Frog	*Breviceps verrucosus*	Least Concern	**Yes**	-	Schedule II	-
Rattling Frog	*Semnodactylus wealii*	Least Concern	No	-	Schedule II	-
Common River Frog	*Amietia delalandii*	Least Concern	No	-	Schedule II	**Confirmed**
Poynton's River Frog	*Amietia poyntoni*	Least Concern	No	-	Schedule II	-
Natal Sand Frog	*Tomopterna natalensis*	Least Concern	No	-	Schedule II	-
Guttural Toad	*Sclerophrys gutturalis*	Least Concern	No	-	Schedule II	-
Raucous Toad	*Bufo rangeri*	Least Concern	**Yes**	-	Schedule II	**Confirmed**
Karoo Toad	*Vandijkophrynus gariepensis*	Least Concern	No	-	Schedule II	-
TESTUDINES (Turtles & Tortoises) (SANBI 2014)						
Marsh Terrapin	*Pelomedusa subrufa*	Least Concern	No	-	Schedule II	-

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	ECENCO	QDS CODE (ADU, 2011) 3028BD
LACERTILIA (Lizards) (SANBI 2014)						
Short-headed Legless Skink	*Acontias breviceps*	Least Concern	**Yes**	-	Schedule II	-
Southern Rock Agama	*Agama atra*	Least Concern	*Near*	-	Schedule II	-
Cape Girdled Lizard	*Cordylus cordylus*	Least Concern	**Yes**	Appendix II	Schedule II	-
Yellow-throated Plated Lizard	*Gerrhosaurus flavigularis*	Least Concern	No	-	Schedule II	-
Delalande's Sandveld Lizard	*Nucras lalandii*	Least Concern	**Yes**	-	Schedule II	**X**
Spotted Gecko	*Pachydactylus maculatus*	Least Concern	*Near*	-	Schedule II	-
Burchell's Sand Lizard	*Pedioplanis burchelli*	Least Concern	**Yes**	-	Schedule II	-
Drakensburg Crag Lizard	*Pseudocordylus melanotus*	Least Concern	**Yes**	Appendix II	Schedule II	-
Variable Skink	*Trachylepis varia*	Least Concern	No	-	Schedule II	-
Cape Skink	*Trachylepis capensis*	Least Concern	No	-	Schedule II	-
Speckled Rock Skink	*Trachylepis punctatissima*	Least Concern	No	-	Schedule II	-
Rock Monitor	*Varanus albigularis*	Least Concern	No	Appendix II	Schedule II	-
Water Monitor	*Varanus niloticus*	Least Concern	No	Appendix II	Schedule II	**Confirmed**
SERPENTES (Snakes) (SANBI 2014)						
Many-spotted Snake	*Amplorhinus multimaculatus*	Least Concern	*Near*	-	-	-
Puff adder	*Bitis arietans*	Least Concern	No	-	-	-

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	ECENCO	QDS CODE (ADU, 2011)
						3028BD
Brown House Snake	*Boaedon Capensis*	Least Concern	No	-	-	-
Rhombic Night Adder	*Causus rhombeatus*	Least Concern	No	-	-	-
Red-lipped Herald Snake	*Crotaphopeltis hotamboeia*	Least Concern	No	-	-	-
Bibron's Blind Snake	*Afrotyphlops*	Least Concern	*Near*	-	-	-
Southern Brown Egg Eater	*Dasypeltis inornata*	Least Concern	**Yes**	-	Schedule II	-
Rhombic Egg Eater	*Dasypeltis scabra*	Least Concern	No	-	Schedule II	-
Common Slug Eater	*Duberria lutrix*	Least Concern	**Yes**	-	Schedule II	-
Rinkhals	*Hemachatus haemachatus*	Least Concern	*Near*	-	-	-
Spotted Harlequin Snake	*Homoroselaps lacteus*	Least Concern	**Yes**	-	-	-
Spotted Rock Snake	*Lamprophis guttatus*	Least Concern	*Near*	-	Schedule II	-
Peter's Thread Snake	*Leptotyphlops scutifrons conjunctus*	Least Concern	**Yes**	-	Schedule II	-
Forest Thread Snake	*Leptotyphlops sylvicolus*	Data Deficient	**Yes**	-	-	-
Dusky-bellied Water Snake	*Lycodonomorphus laev*	Least Concern	**Yes**	-	Schedule II	-
Brown Water Snake	*Lycodonomorphus rufulus*	Least Concern	No	-	Schedule II	-
Cape Wolf Snake	*Lycophidion capense capense*	Least Concern	No	-	Schedule II	-
Western Natal Green Snake	*Philothamnus natalensis occidentalis*	Least Concern	**Yes**	-	Schedule II	-
Cross-marked Grass Snake	*Psammophis crucifer*	Least Concern	*Near*	-	-	**Confirmed**
Mole Snake	*Pseudaspis cana*	Least Concern	No	-	Schedule II	-
Spotted Grass Snake	*Psammophylax rhombeatus*	Least Concern	No	-	-	-

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	ECENCO	QDS CODE (ADU, 2011)
						3028BD
Southern African Python	*Python natalensis*	Least Concern	No	Appendix II	-	-

APPENDIX 4: LIST OF BIRD SPECIES.

Table A4: Checklist of Birds for Matatiele Nature Reserve.

	SPECIES	
1	**Bishop, Southern Red** *Euplectes orix*	
2	**Bishop, Yellow** *Euplectes capensis*	
3	**Bishop, Yellow-crowned** *Euplectes afer*	
4	**Bokmakierie, Bokmakierie** *Telophorus zeylonus*	
5	**Boubou, Southern** *Laniarius ferrugineus*	
6	**Bulbul, Dark-capped** *Pycnonotus tricolor*	
7	**Bunting, Cape** *Emberiza capensis*	
8	**Bunting, Cinnamon-breasted** *Emberiza tahapisi*	
9	**Bustard, Denham's** *Neotis denhami* (VU, NT)	
10	**Buzzard, Common** *Buteo buteo*	
11	**Buzzard, Jackal** *Buteo rufofuscus* (NE)	
12	**Canary, Cape** *Serinus canicollis*	
13	**Chat, Ant-eating** *Myrmecocichla formicivora*	
14	**Chat, Buff-streaked** *Campicoloides bifasciatus* (SLS)	
15	**Cisticola, Lazy** *Cisticola aberrans*	
16	**Cisticola, Levaillant's** *Cisticola tinniens*	
17	**Cisticola, Pale-crowned** *Cisticola cinnamomeus*	
18	**Cisticola, Wailing** *Cisticola lais*	
19	**Cisticola, Wing-snapping** *Cisticola ayresii*	
20	**Cisticola, Zitting** *Cisticola juncidis*	
21	**Coot, Red-knobbed** *Fulica cristata*	
22	**Cormorant, Reed** *Microcarbo africanus*	
23	**Cormorant, White-breasted** *Phalacrocorax lucidus*	
24	**Crane, Blue** *Grus paradisea* (VU, NT)	
25	**Crane, Grey Crowned** *Balearica regulorum* (EN)	
26	**Crow, Cape** *Corvus capensis*	
27	**Crow, Pied** *Corvus albus*	
28	**Cuckoo, Diederik** *Chrysococcyx caprius*	
29	**Cuckoo, Red-chested** *Cuculus solitarius*	
30	**Darter, African** *Anhinga rufa*	
31	**Dove, Laughing** *Spilopelia senegalensis*	
32	**Dove, Red-eyed** *Streptopelia semitorquata*	
33	**Dove, Ring-necked** *Streptopelia capicola*	

	SPECIES	
34	**Dove, Rock** *Columba livia*	
35	**Drongo, Fork-tailed** *Dicrurus adsimilis*	
36	**Duck, White-faced Whistling** *Dendrocygna viduata*	
37	**Duck, Yellow-billed** *Anas undulata*	
38	**Eagle, Long-crested** *Lophaetus occipitalis*	
39	**Egret, Western Cattle** *Bubulcus ibis*	
40	**Falcon, Amur** *Falco amurensis*	
41	**Falcon, Lanner** *Falco biarmicus* (VU, LC)	
42	**Fiscal, Southern** *Lanius collaris*	
43	**Flycatcher, African Paradise** *Terpsiphone viridis*	
44	**Francolin, Grey-winged** *Scleroptila afra* (SLS)	
45	**Francolin, Red-winged** *Scleroptila levaillantii*	
46	**Goose, Egyptian** *Alopochen aegyptiaca*	
47	**Goose, Spur-winged** *Plectropterus gambensis*	
48	**Grassbird, Cape** *Sphenoeacus afer* (NE)	
49	**Grebe, Little** *Tachybaptus ruficollis*	
50	**Guineafowl, Helmeted** *Numida meleagris*	
51	**Hamerkop, Hamerkop** *Scopus umbretta*	
52	**Harrier, African Marsh** *Circus ranivorus* (EN, LC)	
53	**Heron, Black-headed** *Ardea melanocephala*	
54	**Heron, Grey** *Ardea cinerea*	
55	**Hoopoe, African** *Upupa africana*	
56	**Ibis, African Sacred** *Threskiornis aethiopicus*	
57	**Ibis, Hadada** *Bostrychia hagedash*	
58	**Kestrel, Rock** *Falco rupicolus*	
59	**Kite, Black-winged** *Elanus caeruleus*	
60	**Lapwing, Blacksmith** *Vanellus armatus*	
61	**Lark, Eastern Long-billed** *Certhilauda semitorquata* (SLS)	
62	**Lark, Red-capped** *Calandrella cinerea*	
63	**Longclaw, Cape** *Macronyx capensis*	
64	**Martin, Banded** *Riparia cincta*	
65	**Martin, Brown-throated** *Riparia paludicola*	
66	**Martin, Rock** *Ptyonoprogne fuligula*	

SPECIES		
67	**Moorhen, Common** *Gallinula chloropus*	
68	**Mousebird, Speckled** *Colius striatus*	
69	**Neddicky, Neddicky** *Cisticola fulvicapilla*	
70	**Oriole, Black-headed** *Oriolus larvatus*	
71	**Pigeon, African Olive** *Columba arquatrix*	
72	**Pigeon, Speckled** *Columba guinea*	
73	**Pipit, African** *Anthus cinnamomeus*	
74	**Pipit, Nicholson's** *Anthus nicholsoni*	
75	**Pipit, Yellow-breasted** *Anthus chloris* (VU, E)	
76	**Plover, Three-banded** *Charadrius tricollaris*	
77	**Pochard, Southern** *Netta erythrophthalma*	
78	**Quail, Common** *Coturnix coturnix*	
79	**Quailfinch, Quailfinch** *Ortygospiza atricollis*	
80	**Quelea, Red-billed** *Quelea quelea*	
81	**Raven, White-necked** *Corvus albicollis*	
82	**Robin-Chat, Cape** *Cossypha caffra*	
83	**Secretarybird, Secretarybird** *Sagittarius serpentarius* (EN, VU)	
84	**Seedeater, Streaky-headed** *Crithagra gularis*	
85	**Shelduck, South African** *Tadorna cana*	
86	**Snipe, African** *Gallinago nigripennis*	
87	**Sparrow, Cape** *Passer melanurus*	
88	**Sparrow, House** *Passer domesticus* (I)	
89	**Sparrow, Southern Grey-headed** *Passer diffusus*	
90	**Spoonbill, African** *Platalea alba*	
91	**Starling, Cape** *Lamprotornis nitens*	
92	**Starling, Common** *Sturnus vulgaris* (I)	
93	**Starling, Pied** *Lamprotornis bicolor* (SLS)	
94	**Starling, Red-winged** *Onychognathus morio*	
95	**Stilt, Black-winged** *Himantopus himantopus*	
96	**Stonechat, African** *Saxicola torquatus*	
97	**Sugarbird, Gurney's** *Promerops gurneyi* (NT, LC, NE)	
98	**Sunbird, Malachite** *Nectarinia famosa*	
99	**Swallow, Barn** *Hirundo rustica*	

SPECIES		
100	**Swallow, Greater Striped** *Cecropis cucullata*	
101	**Swallow, White-throated** *Hirundo albigularis*	
102	**Swift, African Black** *Apus barbatus*	
103	**Swift, Alpine** *Tachymarptis melba*	
104	**Swift, White-rumped** *Apus caffer*	
105	**Teal, Blue-billed** *Spatula hottentota*	
106	**Teal, Red-billed** *Anas erythrorhyncha*	
107	**Thrush, Cape Rock** *Monticola rupestris* (SLS)	
108	**Thrush, Olive** *Turdus olivaceus*	
109	**Thrush, Sentinel Rock** *Monticola explorator* (NT, LC, SLS)	
110	**Vulture, Cape** *Gyps coprotheres* (EN, VU)	
111	**Wagtail, Cape** *Motacilla capensis*	
112	**Warbler, Lesser Swamp** *Acrocephalus gracilirostris*	
113	**Warbler, Little Rush** *Bradypterus baboecala*	
114	**Waxbill, Common** *Estrilda astrild*	
115	**Weaver, Cape** *Ploceus capensis* (NE)	
116	**Weaver, Southern Masked** *Ploceus velatus*	
117	**Wheatear, Mountain** *Myrmecocichla monticola*	
118	**White-eye, Cape** *Zosterops virens* (NE)	
119	**Whydah, Pin-tailed** *Vidua macroura*	
120	**Widowbird, Fan-tailed** *Euplectes axillaris*	
121	**Widowbird, Long-tailed** *Euplectes progne*	
122	**Widowbird, Red-collared** *Euplectes ardens*	
123	**Woodpecker, Ground** *Geocolaptes olivaceus* (NT, LC, SLS)	

APPENDIX 5: CES ASSESSMENT METHODOLOGY

Pre-Mitigation Evaluation Criteria

This rating scale adopts four (4) key factors to determine the overall significance of the impact prior to mitigation:

1. **Temporal Scale**: This scale defines the duration of any given impact over time. This may extend from the short-term (less than 5 years, equivalent to the construction phase) to permanent. Generally, the longer the impact occurs the greater the significance of any given impact.
2. **Spatial Scale:** This scale defines the spatial extent of any given impact. This may extend from the local area to an impact that crosses international boundaries. The wider the impact extends, the more significant it is likely to be.
3. **Severity/Benefits Scale:** This scale defines how severe negative impacts would be, or how beneficial positive impacts would be. This negative/positive scale is critical in determining the overall significance of any impacts.
4. **Likelihood Scale:** This scale defines the risk or chance of any given impact occurring. While many impacts generally do occur, there is considerable uncertainty in terms of others. The scale varies from unlikely to definite, with the overall impact significance increasing as the likelihood increases.

Table A5: Pre-Mitigation Evaluation Criteria.

TEMPORAL SCALE		
Short term	Less than 5 years	
Medium term	Between 5-20 years	
Long term	Between 20 and 40 years (a generation) and from a human perspective also permanent	
Permanent	Over 40 years and resulting in a permanent and lasting change that will always be there	
SPATIAL SCALE		
Localised	At localised scale and a few hectares in extent	
Study Area	The proposed site and its immediate environs	
Regional	District and Provincial level	
National	Country	
International	Internationally	
SEVERITY SCALE	SEVERITY	BENEFIT
Slight	Slight impacts on the affected system(s) or party(ies)	Slightly beneficial to the affected system(s) and party(ies)
Moderate	Moderate impacts on the affected system(s) or party(ies)	Moderately beneficial to the affected system(s) and party(ies)
Severe/ Beneficial	Severe impacts on the affected system(s) or party(ies)	A substantial benefit to the affected system(s) and party(ies)

Very Severe/ Beneficial	Very severe change to the affected system(s) or party(ies)	A very substantial benefit to the affected system(s) and party(ies)
LIKELIHOOD SCALE		
Unlikely	The likelihood of these impacts occurring is slight	
May Occur	The likelihood of these impacts occurring is possible	
Probable	The likelihood of these impacts occurring is probable	
Definite	The likelihood is that this impact will definitely occur	

Table A6: Significance Descriptions.

SIGNIFICANCE RATE		DESCRIPTION
LOW NEGATIVE	LOW POSITIVE	*Impacts of low significance are typically acceptable impacts for which mitigation is desirable but not essential. The impact by itself is insufficient, even in combination with other low impacts, to prevent the development being approved. These impacts will result in negative medium to short term effects on the natural environment or on social systems.*
MODERATE NEGATIVE	MODERATE POSITIVE	*Impacts of moderate significance are impacts that require mitigation. The impact is insufficient by itself to prevent the implementation of the project but in conjunction with other impacts may prevent its implementation. These impacts will usually result in a negative medium to long-term effect on the natural environment or on social systems.*
HIGH NEGATIVE	HIGH POSITIVE	*Impacts that are rated as being high are serious impacts and may prevent the implementation of the project if no mitigation measures are implemented, or the impact is very difficult to mitigate. These impacts would be considered by society as constituting a major and usually long-term change to the environment or social systems and result in severe effects.*
VERY HIGH NEGATIVE	VERY HIGH POSITIVE	*Impacts that are rated as very high are very serious impact which may be sufficient by itself to prevent the implementation of the project. The impact may result in permanent change. Very often these impacts are unmitigable and usually result in very severe effects or very beneficial effects.*

Post-Mitigation Criteria

Once mitigation measures are proposed, the following three (3) factors are then considered to determine the overall significance of the impact after mitigation.

1. **Reversibility Scale**: This scale defines the degree to which an environment can be returned to its original/partially original state.
2. **Irreplaceable loss Scale:** This scale defines the degree of loss which an impact may cause.
3. **Mitigation potential Scale:** This scale defines the degree of difficulty of reversing and/or mitigating the various impacts ranges from very difficult to easily achievable. Both the practical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.

Table A7: Post-Mitigation Criteria.

REVERSIBILITY	
Reversible	*The activity will lead to an impact that can be reversed provided appropriate mitigation measures are implemented.*
Irreversible	*The activity will lead to an impact that is permanent regardless of the implementation of mitigation measures.*
IRREPLACEABLE LOSS	
Resource will not be lost	*The resource will not be lost/destroyed provided mitigation measures are implemented.*
Resource will be partly lost	*The resource will be partially destroyed even though mitigation measures are implemented.*
Resource will be lost	*The resource will be lost despite the implementation of mitigation measures.*
MITIGATION POTENTIAL	
Easily achievable	*The impact can be easily, effectively and cost effectively mitigated/reversed.*
Achievable	*The impact can be effectively mitigated/reversed without much difficulty or cost.*
Difficult	*The impact could be mitigated/reversed but there will be some difficultly in ensuring effectiveness and/or implementation, and significant costs.*
Very Difficult	*The impact could be mitigated/reversed but it would be very difficult to ensure effectiveness, technically very challenging and financially very costly.*

The following assumptions and limitations are inherent in the rating methodology:

- **Value Judgements**: Although this scale attempts to provide a balance and rigor to assessing the significance of impacts, the evaluation relies heavily on the values of the person making the judgment. For this reason, impacts of especially a social nature need to reflect the values of the affected society.
- **Cumulative Impacts**: These affect the significance rating of an impact because it considers the impact in terms of both on-site and off-site sources. This is particularly problematic in terms of impacts beyond the scope of the proposed development and the BA. For this reason, it is important to consider impacts in terms of their cumulative nature.
- **Seasonality**: Certain impacts will vary in significance based on seasonal change. Thus, it is difficult to provide a static assessment. Seasonality will need to be implicit in the temporal scale and, with management measures being imposed accordingly (e.g. dust suppression measures being implemented during the dry season).

APPENDIX 6: CURRICULUM VITAE OF PROJECT TEAM

APPENDIX 7: SPECIALIST DECLARATIONS