

**TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT FOR THE PROPOSED 132kV D/C
TOUWSRIVIER-LAINSBURG LINE REPAIRS, WITHIN BREEDE VALLEY LOCAL MUNICIPALITY
OF CAPEWINELADS DISTRICT AND LAINGSBURG LOCAL MUNICIPALITY OF CENTRAL KAROO
DISTRICT, WESTERN CAPE PROVINCE.**




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CONDITIONS RELATING TO THIS REPORT

DECLARATION OF INTEREST

Ntumbuluko Consulting Pty (Ltd) has no vested interest in the property studied nor is it affiliated with any other person/body involved with the property and/or proposed development. Ntumbuluko Consulting Pty (Ltd) is not a subsidiary, legally or financially of the proponent. The study was undertaken by Mr Tshuxekani Maluleke, he is a registered Natural Scientists with the following details:

Specialist Name	Tshuxekani Maluleke (Wetland and Biodiversity Specialist)
Declaration of Independence	<p>I declare, as a specialist appointed in terms of the National Environmental Management Act (Act No 108 of 1998) and the associated 2017 Environmental Impact Assessment (EIA) Regulations, that:</p> <ul style="list-style-type: none">• I act as the independent specialist in this application;• I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;• I declare that there are no circumstances that may compromise my objectivity in performing such work;• I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;• I will comply with the Act, regulations and all other applicable legislation;• I have no, and will not engage in, conflicting interests in the undertaking of the activity;• I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;

• All the particulars furnished by me in this form are true and correct;
and

• I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Signature



Date

2025/08/05

EXPERTISE OF THE SPECIALIST

Specialist	Role	Details
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Selected Project Experience		
<ul style="list-style-type: none"> • Avian and Ecology Impact Assessment Report For The Proposed Expansion of the Eskom Carolina Customer Network Center (CNC), located in the Chief Albert Luthuli Local Municipality, Gert Sibande District of Mpumalanga Province. 2024 • Animal Species Impact Assessment Report For The Proposed Development Of A 160 Megawatts Leano Alpha Energy Solar Project, in Steelpoort, Fetakgomo Tubatse Local Municipality, Sekhukhune District Municipality Limpopo Province. 2024 • Terrestrial Biodiversity Impact Assessment: Proposed Manyeleti Nature Reserve Bush Camp, Bushbuckridge Local Municipality, Mpumalanga Province. (2022) • Terrestrial Biodiversity Assessment for the Proposed upgrade of the R40 Road, in the Bushbuckridge Local Municipality, Mpumalanga Province. (2022) • The Proposed Maholisi Borrow Pit and Upgrading of the National Road R578 Section 1 From N1 to Maholisi in the Makhado Local Municipality Within Magisterial District of Vhembe District in Limpopo Province.2023 		

TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT FOR THE PROPOSED 132KV D/C TOWNSRIVIER-LAINSBURG LINE REPAIRS, WITHIN BREEDE VALLEY LOCAL MUNICIPALITY OF CAPEWINELANDS DISTRICT AND LAINGSBURG LOCAL MUNICIPALITY OF CENTRAL KAROO DISTRICT, WESTERN CAPE PROVINCE.

- Terrestrial Biodiversity Impact Assessment: The Proposed Construction of the Umflozi-Mbewu (Theta) Transmission Line, Kwazulu-Natal Province.2023
- Biodiversity Impact Assessment: Doornbosch-Steelpoort Mine, Fetakgomo Tubatse Local Municipality, Sekhukhune District Municipality of Limpopo Province (2020).
- Ecological Assessments Report -Propose development of a poultry farm Magalies-2 in Magaliesburg, Gauteng Province (GDARDREF.NO: GAUT 002/17-18/E0050) January 2018
- Botanical Walkthrough Report as per condition 34 of the of the Environmental authorization for the proposed construction of a 100m×100m 88/22kv Dam switching station, three 88kv interconnector power lines and dismantling of the T-off arrangement within Rustenburg and Madibeng Municipalities, in the North West Province (2017).

QUALIFICATIONS

SPECIALIST	QUALIFICATION
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INDEMNITY

Although Ntumbuluko Consulting Pty (Ltd) exercises due care and diligence in rendering services and preparing documents, the client takes full responsibility for this report and its implementation in terms of the National Environmental Management Act of 1998, and exempt Ntumbuluko Consulting Pty (Ltd) and its associates and their sub-contractors from any legal responsibility based on the timing of the assessment, the result and the duration thereof, which has an influence on the credibility and accuracy of this report. Ntumbuluko Consulting Pty (Ltd) accepts no liability, and the client indemnifies Ntumbuluko Consulting Pty (Ltd) and its directors, managers, agents, and employees against all actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from or in connection with services rendered, directly or indirectly, by Ntumbuluko Consulting Pty (Ltd) and by the use of this document.

EXECUTIVE SUMMARY

Ntumbuluko Consulting (Pty) Ltd was appointed by Ufele Development Consultants (Pty) Ltd, acting on behalf of Eskom Distribution Cape Coastal Cluster, to undertake a Terrestrial Biodiversity Impact Assessment for the proposed repairs to the 132kV double-circuit Touwsrivier–Laingsburg powerline. The study area spans the Breede Valley (Cape Winelands District) and Laingsburg (Central Karoo District) local municipalities in the Western Cape Province. The objective of the assessment is to describe and characterise the terrestrial habitats, species, and ecological features present in the project footprint. A wet season biodiversity survey was conducted on 28 June 2025 to inform the findings. The following Observations were made:

- The proposed site consists of eight (8) vegetation units, majority of which are classified as Least Threatened, one Endangered and one Vulnerable.
- The proposed 132kv D/C Touwsrivier-Lainsburg line repairs touches a few Ecological Support Areas (ESA), this implies that these areas should be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services.
- The area consists of slightly undulating to hilly landscape covered by low succulent scrub and dotted by scattered tall shrubs, patches of 'white' grass visible on plains, the most conspicuous dominants being dwarf shrubs of *Pteronia*, *Drosanthemum* and *Galenia*.
- The powerline servitude has been disturbed to some extent, especially around the winelands. The most sensitive areas are linked to the nature reserves and the mountainous areas.
- The proposed development is deemed environmentally acceptable, provided the mitigation measures and recommendations specified in this report are implemented and adhered to. Based on the size of the site, the site will require a significant amount of vegetation clearing. The site has a Flora Species diversity, and SCC's, A botanical micro-siting investigation of the development footprint is necessary.
- If populations of Critically Endangered as listed in Table 6-3, or Endangered SCC (i.e. *Eriocephalus grandiflorus* *Lotononis venosa*, *Cleretum lyratifolium* etc) are found consider relocating them to the areas outside of the development footprint, and where this is not feasible, permits for their removal must be obtained from the relevant competent authority. Species that are known to survive translocation should be translocated to the nearest similar habitat type (adjacent areas that are

outside of the development footprint. The ECO will be able to guide this process).

Where possible avoid the rocky outcrops that are located outside of the development footprint, and extra caution will be required when cutting through the mountainous area because they are aligned to the Critical Biodiversity Areas.

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DEFINITIONS

Alien animal	<p>(a) Any live vertebrate, including a bird and a reptile, but excluding a fish, belonging to a species or subspecies that is not a recognised domestic species and the natural habitat of which is not in the Republic; or</p> <p>(b) The egg of such vertebrate.</p>
Biodiversity	<p>Means the diversity of animals, plants or other organisms, including the diversity of animals, plants or other organisms found within and between—</p> <p>(a) Ecosystems;</p> <p>(b) Habitats;</p> <p>(c) The ecological complexes of which these systems and habitats are part; and</p> <p>(d) Species.</p>
CITES	<p>Means the Convention on International Trade in Endangered Species of Wild Fauna and Flora;</p>
Endangered Species	<p>Means a species is endangered when it is facing a very high risk of extinction in the wild in the near future and includes—</p> <p>(a) Any living or dead specimen of such a species; or</p> <p>(b) Any egg, skin, bone, feather, seed, flower or any other part or derivative of such a species.</p>
Environment	<p>Means the surroundings within which humans exist and that are made up of—</p> <p>(a) The land, water and atmosphere of the earth;</p> <p>(b) Microorganisms, plant and animal life;</p> <p>(c) Any part or combination of (a) and (b) and the interrelationships amongst and between them; and</p> <p>(d) The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing;</p>
Indigenous plant	<p>(a) Means any living or dead plant which is indigenous to the Republic, whether artificially propagated or in its wild state; and</p> <p>(b) Includes the flower, pollen, seed, cone, fruit, bulb, tuber, stem or root or any other part or derivative of such plant but does not include a plant declared a weed in terms of any legislation.</p>
Protected area	<p>Means—</p> <p>(a) A provincial nature reserves;</p> <p>(b) A site of ecological importance;</p> <p>(c) A protected environment;</p> <p>(d) A private nature reserves; or</p> <p>(e) A resource use area.</p>

Protected environment	Means an area declared a Protected Environment or Private Nature Reserve in terms of section 21 (1) (a).
Rare species	Means a species of fauna and flora referred to in section 68 (a) (ii), and includes— (a) any living or dead specimen of such a species; or (e) any egg, skin, bone, feather, seed, flower or any other part or derivative of such a species.

1. INTRODUCTION AND PROJECT DESCRIPTION

1.1 INTRODUCTION

Ntumbuluko Consulting (Pty) Ltd, was appointed by Ufefe Development Consultants (Pty) Ltd on behalf of Eskom Distribution Cape Coastal Cluster to conduct a terrestrial Biodiversity Impact Assessment for the proposed 132kv d/c Touwsrivier-Lainsburg line repairs, within Breede Valley local municipality of Cape Winelands District and Laingsburg local municipality of central karoo district, western cape province.

The purpose of this study is to describe and characterise the terrestrial environment, habitats, species present on site. A wet season terrestrial biodiversity survey was conducted on the **28 of June 2025**. The survey covered the entirety of the proposed development, with a stratified sampling methodology.

Identification and description of habitats and sensitive receptors were recorded across the project area and potential impacts on terrestrial biodiversity receptors were assessed. 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), 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. As per the results of the Screening Report generated for the proposed powerline repairs the terrestrial biodiversity theme sensitivity is classified as “**Very High**”.

Due to the “Very High” sensitivity rating of the site, a full Terrestrial Biodiversity Specialist Assessment (this report) has been undertaken as part of the Environmental Basic Assessment Process for the proposed powerline repairs. The findings and recommendations of this report should inform the Environmental Assessment Practitioner (EAP) and regulatory authorities to make informed decisions as to the ecological viability of the proposed development.

1.2 PROJECT BACKGROUND

A fault occurred when 7 suspension lattice towers fell on the section of the 132Kv double circuit line between Boskloof and Laingsburg Sub-Stations. The towers collapsed due to a

high northern wind that occurred during a major local storm event which took place late in February of 2024. Eskom restored the power by installing temporal wood pole structures. Currently Eskom is planning to normalize the network on the 132kV Touwsrivier-Laingsburg line by constructing new monopole towers and reconnecting the line.

1.3 PROJECT DESCRIPTION

ESKOM proposes to repair 132KV Line between Touwsrivier and Laingsburg. The project will also include replacement of current Lattice Towers with Monopoles Towers:

- Restore the section of the double circuit 132kV Touwsrivier-Laingsburg powerline that fell by constructing 8 new monopole towers on the same servitude and line route to normalize the supply.
- Install 10kA OPGW between towers T270 and T278, connect to the newly installed joint boxes.
- Replace the damaged earth peak on T278 (1LAI-TOU 178).
- Decommission and remove existing temporary wood pole structures from the site.

The project will include replacement of current Lattice Towers with monopoles towers. The entire powerline covers a distance of 143.6km in length.

1.4 STUDY AREA

The proposed line repairs start from Boskloof Substation which is situated near Worcester, passing through Quarry Traction Substation at Touwsriver both under Breede Valley Local Municipality, Pietermeinties Traction Substation at Matjiesfontein and end point at Laingsburg Substation both under Laingsburg Local Municipality (Refer to details on table below). (**Figure 1-1**).

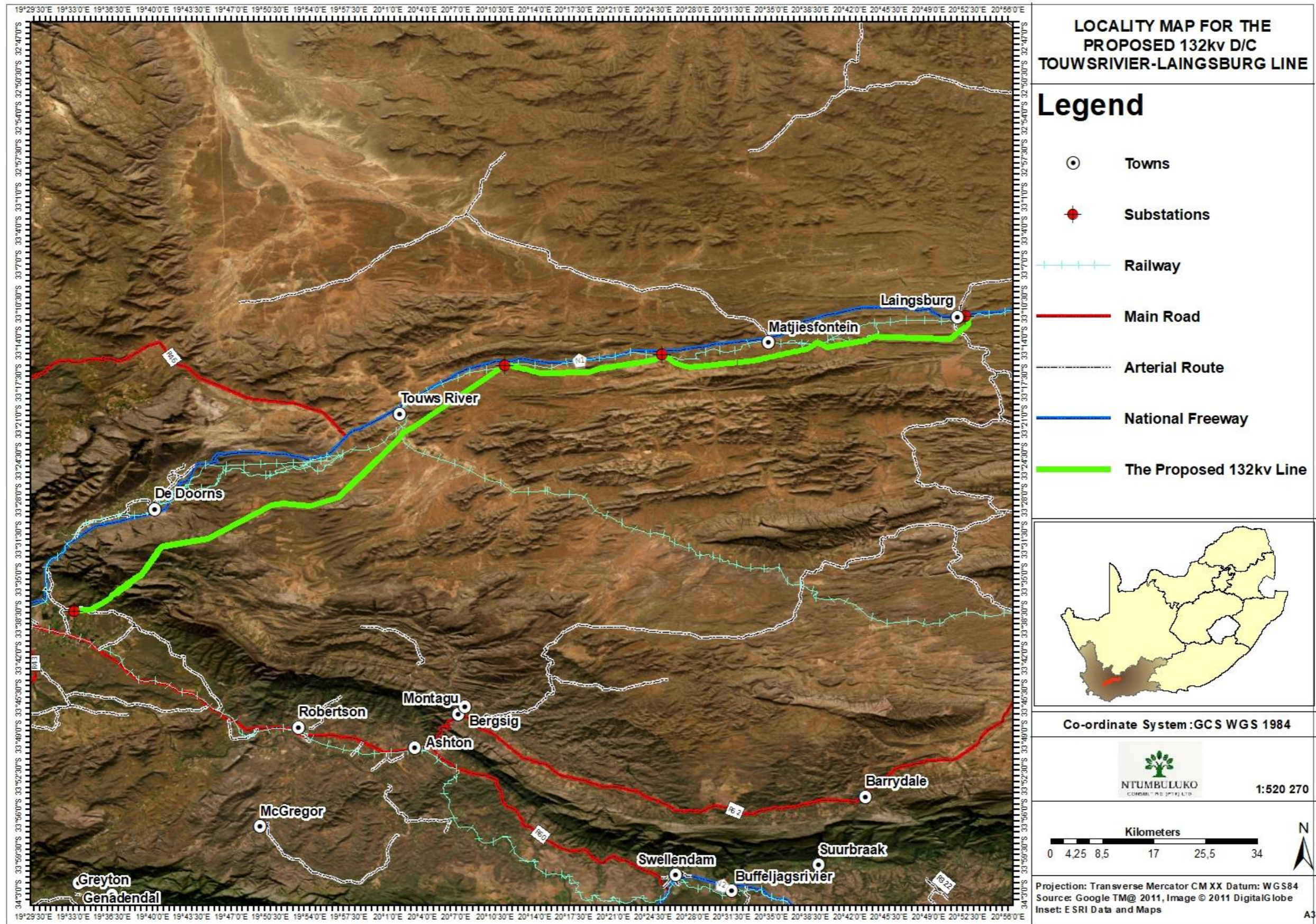


Figure 1-1: Locality Map

1.5 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.

1.6 TERMS OF REFERENCE AND OBJECTIVES

Ntumbuluko Consulting (Pty) Ltd has been appointed to undertake the following specialist functions:

- Describe and map the vegetation types in the study area.
- Describe the biodiversity and ecological state of each vegetation unit.
- 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.
- Assess the potential impacts of the proposed project on both the fauna and flora.
- Provide mitigation measures, rehabilitation process and/or vegetation removal procedures that would reduce the potential impacts of the developments on biodiversity.

1.7 SCOPE OF STUDY

1.7.1 FLORAL STUDY:

- Identify sensitive vegetation types and critical biodiversity areas on site.
- Identify Critical Biodiversity and Ecological Support Areas onsite.
- Describe the potential direct, indirect and cumulative negative and positive impacts of the proposed activity on the vegetation species during construction, operation and decommissioning phases of the project.

- Provide monitoring requirements, mitigation measures and recommendations.

1.7.2 FAUNAL STUDY:

- Describe the existing micro-habitats, and the species associated with those habitats.
- Provide a description of species composition and conservation status in terms of protected, endangered or vulnerable faunal species.
 - This description will include species which are likely to occur within, traverse across or forage within the proposed project area, as well as species which may not necessarily occur on site, but which are likely to be impacted upon as a result of the proposed development.

1.8 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.
- The study was done during the wet season and thus a follow-up is not necessary.
- Species of Conservation Concern (SCC) are difficult to find and difficult to identify, thus species described in this report do not comprise an exhaustive list. It is almost certain that additional SCCs will be found during construction and operation of the development.
- Some areas of the study site were not accessible during the day of the site inspection.
- The specialist responsible for this study reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.

2. REPORT LEGISLATIVE FRAMEWORK

In line with the protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity, as per Government Notice 320 published in terms of NEMA, dated 20 March 2020. "Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Act, 1998, when applying for Environmental Authorisation"-section 3, subsection 1:

- An applicant intending to undertake an activity identified in the scope of the protocol, on a site identified on the screening tool as being of 'Very High sensitivity for terrestrial biodiversity, must submit a Terrestrial Biodiversity Specialist Assessment; however
- Where the information gathered from the site sensitivity verification differs from the designation of Very High terrestrial biodiversity sensitivity on the screening tool and it is found to be of a Low sensitivity, then a Terrestrial Biodiversity Compliance Statement must be submitted.

The information obtained from a site sensitivity verification, which involved both a desktop assessment as well as a field survey, confirmed that the powerline route is mostly of a 'Very High -High' sensitivity. Therefore, a Terrestrial Biodiversity Impact Assessment will be conducted and submitted for this project.

As per sections 2 and 3 of the protocol discussed above, a Terrestrial Biodiversity Compliance Statement must contain the information as presented in **Table 2-1** below.

Table 2-1: Requirements of a Terrestrial Biodiversity Assessment Report.

Specialist Report Requirements According to GNR 320.	Chapter
Terrestrial Biodiversity	
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 I-V
3.1.2 A signed statement of independence by the specialist;	Page I-V
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;	Chapter 1 Page 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 4
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 4
3.1.6 A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Section 5.5
3.1.7 Additional environmental impacts expected from the proposed development;	Chapter 7
3.1.8 Any direct, indirect, and cumulative impacts of the proposed development;	Chapter 7
3.1.9 The degree to which the impacts and risks can be mitigated;	Chapter 7
3.1.10 The degree to which the impacts and risks can be reversed;	Chapter 7
3.1.11 The degree to which the impacts and risks can cause loss of irreplaceable resources;	Chapter 7
3.1.12 Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Chapter 7

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- | | | |
|--------|--|---------------------|
| 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 9 |
| 3.1.15 | Any conditions to which this statement is subjected. | Chapters 8.9 and 10 |
| 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. | N/A |
| 3.3 | A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report. | N/A |

A signed copy of the Terrestrial Biodiversity Report must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.

3. LEGAL FRAMEWORK

The following national and provincial legislative guidelines and requirements were followed as part of this study:

3.1 THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT NO 107 OF 1998) (NEMA) AS AMENDED

This Act embraces all three (3) fields of environmental concern namely: resource conservation and exploitation; pollution control and waste management; and land-use planning and development. The environmental management principles include the duty of care for wetlands and special attention is given to management and planning procedures. NEMA provides for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state; and to provide for matters connected therewith.

3.2 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (ACT NO 10 OF 2004) (NEM: BA)

NEMBA was signed into law in mid-2004 and entered into effect on 1 September 2004. NEM: BA provides for the consolidation of biodiversity legislation through establishing national norms and standards for the management of biodiversity across all sectors and by different management authorities. Certain activities, known as Restricted Activities, are regulated on listed species using permits by a special set of regulations published under the Act. Restricted activities regulated under the act are keeping, moving, having in possession, importing and exporting, and selling.

3.3 THE NATIONAL BIODIVERSITY FRAMEWORK (2017-2022)

The National Biodiversity Framework (NBF) is a requirement under Section 38 of the National Environmental Management: Biodiversity Act (Act 10 of 2004, hereafter referred to as the 'Biodiversity Act'). The NBF is a short to medium-term coordination tool that shows the alignment between the strategic objectives and outcomes identified in the National Biodiversity Strategy and Action Plan (NBSAP v.2, 2015) and other key national strategies, frameworks and systems that currently guide the work of the biodiversity sector and identifies mechanisms through which this work is coordinated. It also identifies a set of interventions or "acceleration measures" that can unlock or fast-track implementation of

the NBSAP and indicates the relative roles of the many agencies involved in implementing these activities. The purpose of the NBF is not to provide a comprehensive review of all work currently being undertaken in the biodiversity sector, nor to list all of the actions required to conserve and manage South Africa's biodiversity in support of sustainable development.

3.4 CONSERVATION OF AGRICULTURAL RESOURCES ACT (ACT NO 43 OF 1983) (CARA):

This act regulates the utilization and protection of wetlands, soil conservation and all matters relating thereto; control and prevention of veld fires, control of weeds and invader plants, the prevention of water pollution resulting from farming practices and losses in biodiversity.

3.5 THE NATIONAL FOREST ACT (ACT NO 84 OF 1998) (NFA)

The main objective of the National Forests Act, 1998 is to promote the sustainable management and development of forests and to provide protection for certain forests and trees. This said protection is provided through the protection of all natural forests (Section 7 (1), the protection of all trees declared to be protected in terms of section 12(1) of the Act, and the regulation of certain activities in a proclaimed State Forest (Section 23(1)(a) – (k)). It should be noted that there are other environmental legislation administered by other State Departments that also regulate natural resources. The Act is responsible for:

- Promotes the sustainable management and development of forests for the benefit of all;
- Creates the conditions necessary to restructure forestry in South Africa;
- Provide special measures for the protection of certain forests and protected trees;
- Promotes the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes;
- Promotes community forestry; and
- Promotes greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination.

3.6 CONVENTION ON BIOLOGICAL DIVERSITY

The objectives of the CBD are the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising from

commercial and other utilization of genetic resources. The agreement covers all ecosystems, species, and genetic resources.

3.7 CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA (CITES)

The CITES aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Through its three appendices, the Convention accords varying degrees of protection to more than 30,000 plant and animal species.

3.8 CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES OF WILD ANIMALS

The CMS, or the Bonn Convention aims to conserve terrestrial, marine and avian migratory species throughout their range. Parties to the CMS work together to conserve migratory species and their habitats by providing strict protection for the most endangered migratory species, by concluding regional multilateral agreements for the conservation and management of specific species or categories of species, and by undertaking co-operative research and conservation activities.

3.9 THE INTERNATIONAL TREATY ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

The objectives of the Treaty are the conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity, for sustainable agriculture and food security. The Treaty covers all plant genetic resources for food and agriculture, while its Multilateral System of Access and Benefit-sharing covers a specific list of 64 crops and forages. The Treaty also includes provisions on Farmers' Rights.

3.10 CONVENTION ON WETLANDS (POPULARLY KNOWN AS THE RAMSAR CONVENTION)

The Ramsar Convention provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The convention covers all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities.

3.11 WORLD HERITAGE CONVENTION (WHC)

The primary mission of the WHC is to identify and conserve the world's cultural and natural heritage, by drawing up a list of sites whose outstanding values should be preserved for all humanity and to ensure their protection through a closer co-operation among nations.

3.12 RAMSAR CONVENTION

The Convention on Wetlands of International Importance, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Ramsar Convention is the only global environmental treaty that deals with a particular ecosystem. The treaty was adopted in the Iranian city of Ramsar in 1971 and the Convention's member countries cover all geographic regions of the planet.

3.13 INTERNATIONAL PLANT PROTECTION CONVENTION (IPPC)

The IPPC aims to protect world plant resources, including cultivated and wild plants by preventing the introduction and spread of plant pests and promoting the appropriate measures for their control. The convention provides the mechanisms to develop the International Standards for Phytosanitary Measures (ISPMs), and to help countries to implement the ISPMs and the other obligations under the IPPC, by facilitating the national capacity development, national reporting and dispute settlement. The Secretariat of the IPPC is hosted by the Food and Agriculture Organization of the United Nations (FAO).

3.14 WESTERN CAPE BIODIVERSITY ACT 6 OF 2021

In December of 2021, the Western Cape Premier assented to the WCBA, which will come into effect in a phased manner. Once this Act is fully in force the legislative context within the Western Cape specific to biodiversity management will be harmonised through the repeal of the Sea Shore Act (Act 21 of 1935), the Mountain Catchment Areas Act (Act 63 of 1970), the Nature Conservation Ordinance (1974), and the Western Cape Biosphere Reserves Act (Act 6 of 2011), as well as the Western Cape Nature Conservation Laws Amendment Act (Act 3 of 2000) excluding section 2 and schedule 2. The WCBA will significantly improve the WCG's ability to give effect to the PBSAP, along with the commitments made under the CBD that are applicable to the WCG.

3.15 THE WESTERN CAPE BIODIVERSITY SPATIAL PLAN (BSP)

The 2017 BSP comprises a map of biodiversity priority areas accompanied by a handbook providing contextual information and land use guidelines. It identifies priority areas for biodiversity conservation and ecosystem delivery via the delineation of spatial categories of biodiversity priority areas such as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). The BSP Handbook provides guidelines for land use planning and decision-making, and for land and resource management using the BSP Map10. All the guidelines are informed by the ‘Desired Management Objective’ for the different categories included in the BSP Map, as well as the relative impact of a land use activity on biodiversity. The BSP is in the process of being updated, and the draft 2023 BSP identifies 24% of the province as CBAs, 13% as ESAs, 16% as Protected Areas, 18% as no natural habitat left remaining and 29% as other natural areas.

3.16 THE WESTERN CAPE PROTECTED AREA EXPANSION STRATEGY (WCPAES)

The WCPAES guides the strategic expansion of protected areas. It aligns with the National Protected Areas Expansion Strategy, CapeNature’s Strategic Plan (2021-2025) and the National Environmental Management: Protected Areas Act (Act 57 of 2003; NEM:PAA). It provides guidance for the strategic increase in the protected area network and is updated every five years. The concept of strategic increase is crucial and a key aim of the WCPAES is to increase representation of threatened ecosystem types into the conservation estate. These priority areas are identified in the Conservation Action Priorities Map.

OneCape 2040

OneCape 2040 complements the NDP and was designed to build on the then Provincial Strategic Objectives. OneCape 2040 sets the goal of:

“...creating a resilient, inclusive and competitive Western Cape with higher rates of employment producing growing incomes, greater equality and an improved quality of life”

The vision as stated in OneCape 2040 is that of:

“...a highly-skilled, innovation driven, resource efficient, connected, high opportunity and collaborative society”.

3.17 NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998)

The National Water Act, 1998 (Act No. 36 of 1998) (NWA) aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water

users. This requires that the quality of water resources is protected as well as integrated management of water resources with the delegation of powers to institutions at the regional or catchment level. The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in responsible ways. Of specific importance to this application is Section 19 of the NWA, which states that an owner of land, a person in control of land or a person who occupies or uses the land which thereby causes, has caused or is likely to cause pollution of a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring and must therefore comply with any prescribed waste standard or management practices.

Regulations GN 704 dated June 1999 under the NWA, 1998 (Act 36 of 1998) stipulates that no development activities may take place within the 1:100 year floodline of a watercourse, or within 100 m of the watercourse, whichever is the furthest.

Regulations GN 509 dated August 2016 under the Section 21 c and i water uses of the NWA, 1998 (Act No 36 of 1998) stipulates the:

"Extent of a watercourse" as:

- (a) The outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam.

"Regulated area of a watercourse" for section 21(c) or (i) of the Act water uses in terms of this Notice means:

- (a) The outer edge of the 1 in 100-year flood line and /or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;
- (b) In the absence of a determined 1 in 100-year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); or
- (c) A 500 m radius from the delineated boundary (extent) of any wetland or pan.

3.18 NATIONAL FRESHWATER ECOSYSTEM PRIORITY AREA (NFEP) STATUS

In an attempt to better conserve aquatic ecosystems, South Africa has recently categorised its river systems according to set ecological criteria (i.e. ecosystem

representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs) (Driver et al. 2011) The FEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act (NEM:BA) biodiversity goals (Nel et al. 2011).

4. TERRESTRIAL BIOSIVERSITY METHODOLOGY

4.1 THE ASSESSMENT

A site inspection was undertaken on **28th of June 2025** to assess the site-specific ecological state, current land-use, identify potential sensitive ecosystems and identify fauna and flora species associated with the proposed project activities. The site inspection also served to identify potential impacts of the proposed development, and its impacts 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);
- The National Freshwater Ecosystem Priority Areas (NFEPA, 2011/14);
- The National Environmental Management: Biodiversity Act (NEM:BA), 2004: List of Threatened Ecosystems (2011);
- National Biodiversity Management: Biodiversity Act (NEMBA) List of Threatened or Protected Species (2005);
- The Western Cape Biodiversity Spatial Plan (BSP); and
- International Union for Conservation of Nature (IUCN).

4.2 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 'Species of Concern'. These species are those that may be impacted significantly by the proposed activity. In general, these will be species that are already known to be threatened or at risk, or those that have restricted distributions (endemics) with a portion of their known range falling within the study area i.e. strict endemic and near endemic species. Species that are afforded special protection, notably those that are protected by NEM:BA (Act No. 10 of 2004).

4.3 SAMPLING PROTOCOL

The study site was visually surveyed to evaluate vegetation composition, and faunal assemblages and to provide detailed information on the plant communities present. The aim of the site inspection was to characterise and describe each fauna and flora community within the study site as well as identify areas of high sensitivity and SCC. Prior to the site visit, sampling locations representative of each vegetation type were identified. At these sampling locations, vegetation types within the study area were assessed and surveyed using plant identification guides and other published literature. Vegetation communities were then described according to the dominant set of species recorded from each type. These were mapped and assigned a sensitivity score using the methodology outlined in Species Environmental Assessment Guideline Document.

4.4 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 on 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.

The SA VEGMAP is compared to actual conditions of vegetation observed onsite during the site assessment through mapping from aerial photographs, satellite images, literature descriptions (e.g. SANBI and ECBCP) and related data gathered on the ground.

4.5 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 4-1**). 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 4-1: 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)	

4.6 TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT

4.6.1 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 of the NEMA EIA Regulations (2014 and subsequent 2017 amendments).

The potential impacts of the proposed establishment of a powerline route (Corridor) is rated using a clearly defined rating scale. The significance rating formula is as follows:

$$\text{Significance} = \text{Consequence} \times \text{Probability}$$

Where

$$\text{Consequence} = \text{Type of Impact} \times (\text{Intensity} + \text{Spatial Scale} + \text{Duration})$$

And

$$\text{Probability} = \text{Likelihood of an Impact Occurring}$$

In addition, the formula for calculating consequence:

$$\text{Type of Impact} = +1 \text{ (Positive Impact) or } -1 \text{ (Negative Impact)}$$

The weight assigned to the various parameters for positive and impacts to biodiversity is provided for in the formula and is presented in **Table 4-2**. The probability consequence matrix is displayed in **Table 4-3**, with the impact significance rating described in **Table 4-4**.

Table 4-2: Biodiversity Impact Assessment Parameter Ratings

RATING	INTENSITY		SPATIAL SCALE	DURATION	PROBABILITY
	Negative Impacts (Type of Impact = -1)	Positive Impacts (Type of Impact = +1)			
7	Very significant impact on the environment. Irreparable damage to highly valued species, habitat or ecosystem. Persistent severe damage. Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order.	Noticeable, on-going social and environmental benefits which have improved the livelihoods and living standards of the local community in general and the environmental features.	International The effect will occur across international borders.	Permanent: No Mitigation The impact will remain long after the life of the Project.	Certain/ Definite. There are sound scientific reasons to expect that the impact will definitely occur.
6	Significant impact on highly valued species, habitat or ecosystem. Irreparable damage to highly valued items of cultural significance or breakdown of social order.	Great improvement to livelihoods and living standards of a large percentage of population, as well as significant increase in the quality of the receiving environment.	National Will affect the entire country.	Beyond Project Life The impact will remain for some time after the life of a Project.	Almost certain/Highly probable It is most likely that the impact will occur.

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5	Very serious, long-term environmental impairment of ecosystem function that may take several years to rehabilitate. Very serious widespread social impacts. Irreparable damage to highly valued items.	On-going and widespread positive benefits to local communities which improves livelihoods, as well as a positive improvement to the receiving environment.	Province/ Region Will affect the entire province or region.	Project Life The impact will cease after the operational life span of the project	Likely The impact may occur.
4	Serious medium-term environmental effects. Environmental damage can be reversed in less than a year. On-going serious social issues. Significant damage to structures / items of cultural significance.	Average to intense social benefits to some people. Average to intense environmental enhancements.	Municipal Area Will affect the whole municipal area.	Long term 6-15 years.	Probable Has occurred here or elsewhere and could therefore occur.
3	Moderate, short-term effects but not affecting ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month.	Average, on-going positive benefits, not widespread but felt by some.	Local Extending across the site and to nearby settlements.	Medium term 1-5 years.	Unlikely Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility

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	On-going social issues. Damage to items of cultural significance.				that the impact will occur.
2	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants. Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Low positive impacts experience by very few of population.	Limited Limited to the site and its immediate surroundings.	Short term Less than 1 year.	Rare/ improbable Conceivable, but only in extreme circumstances and/ or has not happened during lifetime of the Project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures.
1	Limited damage to minimal area of low significance that will have no impact on the environment.	Some low-level social and environmental benefits felt by very few of the population.	Very limited Limited to specific isolated parts of the site.	Immediate Less than 1 month.	Highly unlikely/None Expected never to happen.

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Minimal social impacts, low-level repairable damage to commonplace structures.				
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Table 4-3: Probability Consequence Matrix.

		Significance																																					
Probability	7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
	6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
	5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
	4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
	3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
	2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
	1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
			-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Table 4-4: Significance Threshold Limits.

Score	Description	Rating
109 to 147	A very beneficial impact which may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change.	

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Score	Description	Rating
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and/or social) environment.	
36 to 72	An important positive impact. The impact is insufficient by itself to justify the implementation of the project. These impacts will usually result in positive medium to long-term effect on the social and/or natural environment.	
3 to 35	A small positive impact. The impact will result in medium to short term effects on the social and/or natural environment.	
-3 to -35	An acceptable negative impact 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 social and/or natural environment.	
-36 to -72	An important negative impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the Project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the social and/or natural environment.	
-73 to -108	A serious negative impact which may prevent the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term change to the (natural and/or social) environment and result in severe effects.	
-109 to -147	A very serious negative impact which may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects.	

5. SITE CHARACTERISTICS

5.1 GEOLOGY & SOILS

The area consists of mainly mudstone, shale and sandstone of the Adelaide Subgroup (Beaufort Group), accompanied by sandstone, shale and mudstone of the Permian Waterford Formation (Ecca Group) and sandstone and shale of other Ecca Group Formations as well as Dwyka Group diamictites (all of the Karoo Supergroup). This geology gives rise to shallow, skeletal soils. The region is classified as Fc land type (to a large extent), with Ib land type playing a subordinate role.

5.2 CLIMATE

The probability of rain is given for the entire year, but it is higher in winter. The Mean Annual Precipitation (MAP) is slightly above 200 mm. There are two slight rainfall optima: one in March and another spread from May to August. The mean annual temperature is close to 16°C, and the incidence of frost relatively high (30 days). See also climate diagram for SKv 6 Koedoesberge-Moordenaars Karoo (**Figure 5-1**).

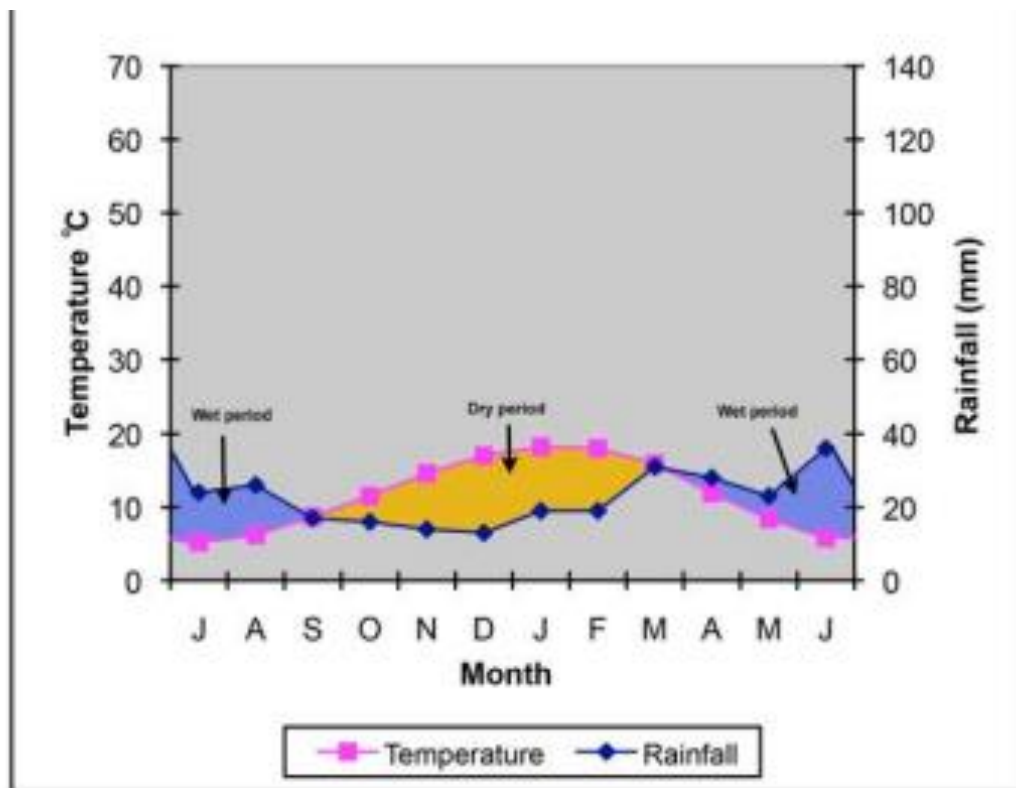


Figure 5-1: Climate diagram for SKv 6 Koedoesberge-Moordenaars Karoo

5.3 VEGETATION & LANDSCAPE ALONG THE 132KV D/C TOUWSRIVIER-LAINSBURG LINE

5.3.1 Breede Alluvium Renosterveld (FRa 1)

The existing Boskloof substation is located with the Breede Alluvium Renosterveld (FRa 1) vegetation unit, this unit consists of flat alluvial fans and valley bottoms supporting short grassy cupressoid-leaved shrubland usually dominated by renosterbos. The unit is distributed in the Western Cape Province, Breede River, it forms broad areas and narrow bands on valley bottomlands from Worcester to Ashton including the largest patch from Worcester to Nuy and Toontjiesrivier, and the belt in the vicinity of the Breede River also with many of its tributaries such as the Doringrivier south of Kwaggaskloof, Poesienetsrivier, Vinkrivier and Keisersrivier. Altitude 150–450 m.

The Breede Alluvium Renosterveld (FRa 1) is classified as **Endangered**. A conservation target of 27% has been set with small patches conserved in the Vrolijkheid and Riviersonderend Nature Reserves. Some 57% already transformed (cultivation, mainly vineyards). Alien species of *Acacia* occur locally at low densities, and erosion is generally moderate and very low, but also high in some places.

5.3.2 Breede Shale Renosterveld (FRs 8)

A small section of the line traverses the Breede Shale Renosterveld (FRs 8) vegetation unit which can be observed in Low hills, slightly undulating to undulating plains and lower mountain slopes. In the western regions low, cupressoid-leaved shrubland (with scattered emergent small trees) is dominated by renosterbos. Elements of shale fynbos are present. In the eastern regions open, tall shrublands (possibly closely affiliated to FRs 12 Central Rûens Shale Renosterveld) are found, with microphyllous shrubs forming the dominant layer. Breede Shale Renosterveld grades into SKv 7 Robertson Karoo in the central valley, with karoo shrublands usually occurring on the northern aspects and renosterveld found on the southern aspects, with a decline in the extent of the karoo shrublands to the south. Heuweltjies are very prominent, with either bush clumps in moister areas or succulent shrubs in drier habitats.

The Breede Shale Renosterveld (FRs 8) vegetation unit is distributed in the Western Cape Province: Patches in the Breede River Valley from Tulbagh to Swellendam; more specifically, most of the valley floor between Tulbagh and Wolseley, isolated small patches to the vicinity of Worcester, diverse patches between Stettyn and McGregor south

of the Breede River, a near continuous but irregular band on the southern foothills of the Langeberg from Philipsdale near Worcester to Ashton. The most extensive area occurs near Ashton. McGregor and the confluence of the Riviersonderend and Breede Rivers west of Swellendam. Altitude 100–650 m.

This vegetation unit is classified as **Vulnerable**. A conservation Target of 27% has been set. The unit is statutorily conserved in the Vrolijkheid Nature Reserve (2%) as well as in Langeberg-wes and Matroosberg mountain catchment areas. Some 31% transformed, mainly by cultivation. Alien *Pinus pinaster* and several species of *Acacia* occur locally, at low levels. Erosion spans high and very low.

5.3.3 Robertson Karoo (SKv 7)

The Boskloof substation also touches the Robertson Karoo (SKv 7), which forms undulating flats and adjacent hills (sometimes with very steep flanks) supporting dwarf succulent shrubland to succulent thicket of medium height dominated by succulent species of *Euphorbia*, *Crassula* (and related genera) and vygies (*Drosanthemum* and *Ruschia* the major structural players). *Euphorbia mauritanica* (var. *corallothamnus*) is usually dominant on heuweltjies, which are an important element of the landscape and vegetation of the Robertson Karoo (Midgley & Musil 1990, Van Wyk & Smith 2001).

This vegetation is distributed in the Western Cape Province, it forms Broad valley of the middle reaches of the Breede River around Worcester, Robertson and Ashton. It is four Altitudes range between 160–960 m.

The unit is classified as **Least threatened**, and a 16 % conservation target has been set. A small area is statutorily conserved in the Vrolijkheid Nature Reserve as well as on the premises of the Karoo Desert National Botanical Garden in Worcester (Oliver 2000) and in the Department of Agriculture Field Reserve (Olivier 1979). Marginal patches of the Robertson Karoo are under protection of private reserves such as Matroosberg, Drooge Riviers Berg, Langeberg-wes, Riviersonderend and Doornkloof. About 16% has been transformed by urban development as well as by cultivation: vineyards and orchards. Alien plant invasions can be a problem in places. The pressure of natural erosion processes is moderate (45%) to both high (24%) and low (22%).

5.3.4 South Langeberg Sandstone Fynbos (FFs 16)

The 132kv line passes through the South Langeberg Sandstone Fynbos (FFs 16) vegetation unit which features Complex of gentle to very steep, south-facing slopes, not much

dissected over most of the range, but deeply dissected in parts. The Cedarberg Shale Band is prominent in the east, in an almost vertical orientation, as a narrow, smooth-sided valley along which the hiking trails are orientated. Ericaceous and restioid fynbos predominate at higher altitudes, with moderately tall to tall proteoid fynbos on middle and lower slopes. Scrub and restioid fynbos are found in habitats with much groundwater.

The unit is distributed in the Western Cape Province, it forms the southern slopes of the Langeberg from the Keerom Mountains near Worcester to Cloete's Pass north of Albertinia, Waboomsberg (north of Montagu), Warmwaterberg (north of Barrydale) and Amandelbosberg (northeast of Heidelberg) Mountains. Altitude 200–1 800 m with several high peaks such as Misty Point (1 709 m) and Grootberg (1 637 m), generally higher in the west than the east.

The unit is classified as Least threatened, A 30% conservation target has been set. An estimated 23% has been Statutorily conserved in the Marloth Nature Reserve and Boosmansbos Wilderness Area. While an additional 54% enjoys protection in mountain catchment areas such as Langeberg-wes, Langeberg-oos and Matroosberg. Only 3% transformed (pine plantations, cultivation). Alien *Pinus pinaster*, *Hakea sericea* and *Acacia mearnsii* are found in places. Erosion very low and moderate.

5.3.5 Matjiesfontein Quartzite Fynbos (FFq 3)

The line touches the Matjiesfontein Quartzite Fynbos (FFq 3) at two sections, this vegetation unit features Low flat mountains and parallel ridges in a west-east orientation. Apart from the Witteberg and Elandsberg, this vegetation type consists of narrow, linear bands surrounded by FFh 2 Matjiesfontein Shale Fynbos and Succulent Karoo vegetation. It is a medium dense, medium tall shrubland, structurally classified mainly as asteraceous and proteoid fynbos, although restioid fynbos is also present. The lower northern slopes in the east, where there is a rainshadow effect due to the Swartberg Mountains, support Succulent Karoo vegetation.

It is distributed in the Western Cape Province, it forms a complex of ridges and low mountains mostly in the Western Little Karoo extending from Saalberg near Karoopoort and Skulpiesklip in the west to Elandsberg near the Gamkapoort Dam in the east. This includes parts of the Bontberg, Voetpadsberg and Koegaberge in the vicinity of Touws River, the Witteberg south of Matjiesfontein including many ridges between the Witteberg and Anysberg, and the higher ridges north of, and running parallel to, the Klein Swartberg. Also between Ouberg Pass and Gatskraal (Mont Eco) west of Warmwaterberg and on hill

summits around Ladismith, including Ladismith Hill. Altitude 750–1 684 m at an unnamed point north of Towerkop.

The is classified as **Least threatened**. A 27% conservation Target has been set, with estimated 5% Statutorily conserved in the Anysberg Nature Reserve and a further 3% in Vaalkloof Private Nature Reserve. Only about 15% has been transformed (cultivation). Erosion low and moderate.

5.3.6 Matjiesfontein Shale Renosterveld (FRs 6)

A significant length of the line touches the Matjiesfontein Shale Renosterveld (FRs 6) vegetation unit. This unit can be observed on Low mountains, parallel hills and mid-altitude plateaus supporting a low, open to medium dense, leptophyllous shrubland with a medium dense matrix of short, divaricate shrubs, dominated by renosterbos. Heuweltjies present at low densities in places.

It is distributed In the Western Cape Province: From De Doorns and the top of the Theronsberg Pass in the west to Gamka Poort in the east, remaining north of the Waboomberg and Warmwaterberg in the Little Karoo and north of the Anysberg and Groot Swartberg and positioned south of the Tanqua Karoo, the Grootrivier near Matjiesfontein and the Floriskraal Dam southeast of Laingsburg. This type surrounds the many higher elevation ridges of FFq 3 Matjiesfontein Quartzite Fynbos and FFh 2 Matjiesfontein Shale Fynbos. The unit thrives at altitudes ranging between 750–1 300 m.

The vegetation unit is classified as Least threatened, while a conservation Target of 27% has been set. About 7% in total conserved in the Anysberg Nature Reserve (CapeNature) and private conservation areas such as Rooikrans. Some 9% totally transformed (mainly cultivation). Erosion moderate to very low as well as very high in places.

5.3.7 Western Little Karoo (SKv 8)

The line near the Quarry Trac susbation consists of the Western Little Karoo (SKv 8) vegetation unit. This unit Flat or slightly undulating landscapes dominated by a mosaic of Karoo shrublands of low and medium height encompassing (as dominants) both nonsucculent (*Chrysocoma*, *Pentzia*, *Pteronia*, *Rhigozum*, *Tripteris*) as well as succulent (*Crassula*, *Euphorbia*, *Ruschia*, *Tylecodon*) shrubs.

It is distributed in the Western Cape Province: The unit covers most of the western basin of the Little Karoo from the confluence of the Groot and Gouritz Rivers in the west as far as Anysberg by surrounding this mountain range and also extending along the northern flanks of the Klein Swartberg. Two larger patches of the Western Little Karoo are found

immediately to the east and south of Touws River and one small isolated patch fringes the Langeberg Mountains in the Montagu area. Altitude 160–1 060 m (most of the area at 300–860 m).

The unit is classified as Least threatened. A conservation Target of 16% has been set About 4% of the area is statutorily conserved in Anysberg and Dornkloof Nature Reserves and Eyerpoort (private reserve). About 3% has been transformed by cultivation. Alien *Acacia cyclops* and *A. saligna* pose a threat to the vegetation locally. Invasive *Atriplex lindleyi* subsp. *inflata* is a serious local problem for grazing. Erosion is high (54%), moderate (19%) and very low (15%).

5.3.8 Koedoesberge-Moordenaars Karoo (SKv 6)

The bulk of line near the Laingsburg substation traverses through the Koedoesberge-Moordenaars Karoo (SKv6)br vegetation unit (**Figure 5-2**). This vegetation unit is typically found in slightly undulating to hilly landscape which is dominated by low succulent scrub and dotted by scattered tall shrubs, patches of ‘white’ grass visible on plains, the most conspicuous dominants being dwarf shrubs of *Pteronia*, *Drosanthemum* and *Galenia*.

The Koedoesberge-Moordenaars Karoo vegetation unit is distributed in the Western Cape and Northern Cape (smaller portion) Provinces, Koedoesberge and Pienaarsee Berg low mountain ranges bordering on southern Tanqua Karoo and separated by the Klein Roggeveld Mountains from the Moordenaars Karoo in the broad area of Laingsburg and Merweville. The unit also includes the Doesberg region east of Laingsburg and piedmonts of the Elandsberg as far as beyond the Gamkapoort Dam at Excelsior (west of Prince Albert). This vegetation unit thrives in altitudes ranging between 500–1 250 m (most of the area at 680–1 120 m).

The Koedoesberge-Moordenaars Karoo vegetation unit is classified as Least threatened. A conservation target 19% has been set, with a very small portion enjoying statutory conservation in the Gamkapoort Nature Reserve. The vegetation unit is transformed only to a very small extent. There are no serious alien plant invasions recorded. Erosion is moderate (88%) and only to lesser extent high or very low.

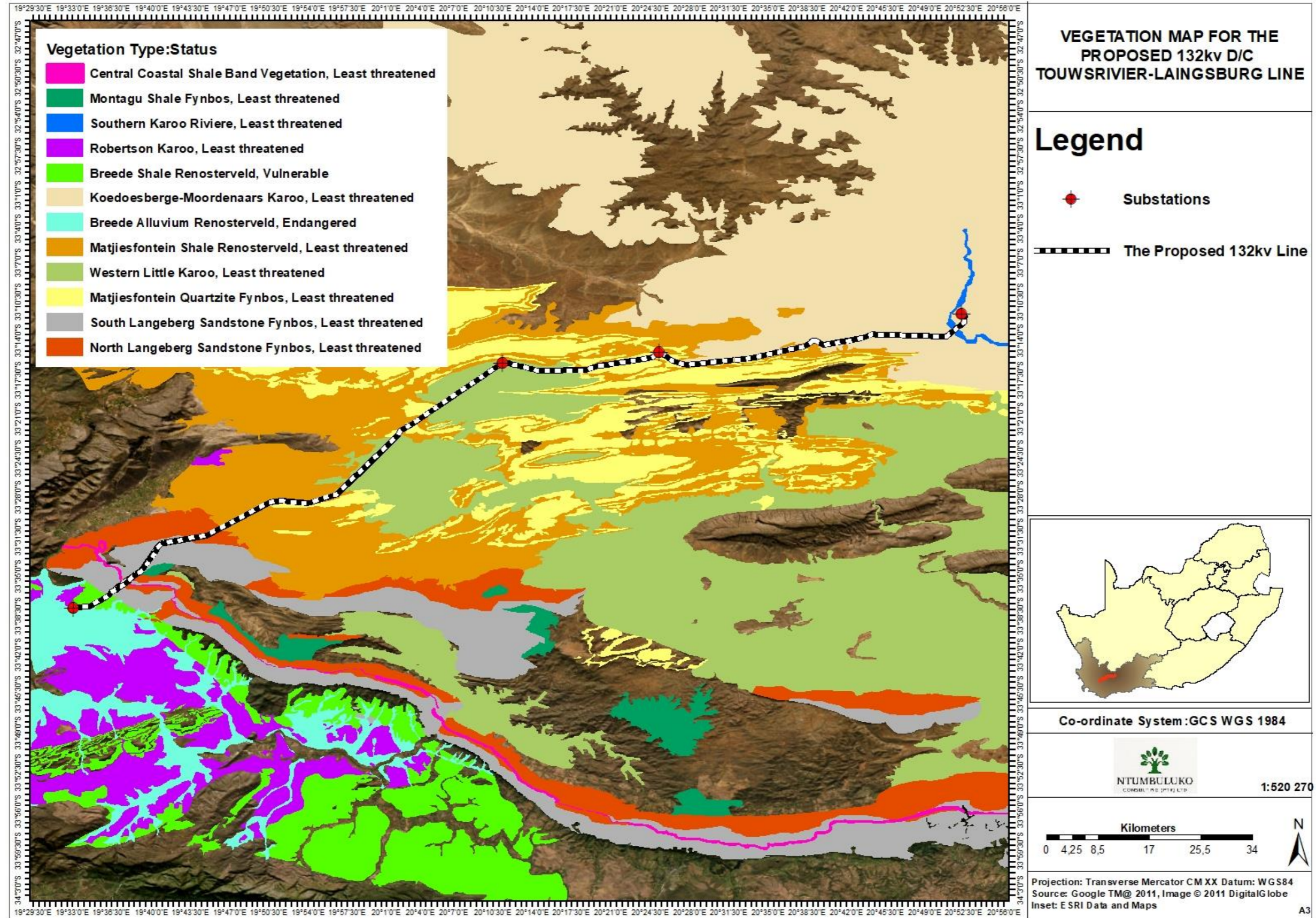


Figure 5-2:Vegetation Map

5.4 IMPORTANT TAXA ASSOCIATED WITH THE STUDY SITE

Table 5-1: Important Taxa within the study site (Mucina and Rutherford 2006)

PLANT FORM	SPECIES
SKv 6 Koedoesberge-Moordenaars Karoo	
Succulent Shrubs	<i>Hereroa odorata</i> (d), <i>Antimima fergusoniae</i> , <i>A. maxwellii</i> , <i>A. wittebergensis</i> , <i>Aridaria noctiflora</i> subsp. <i>straminea</i> , <i>Crassula nudicaulis</i> , <i>C. rupestris</i> subsp. <i>commutata</i> , <i>Cylindrophyllum comptonii</i> , <i>Drosanthemum framesii</i> , <i>D. karrooense</i> , <i>D. lique</i> , <i>Euphorbia decussata</i> , <i>E. eustacei</i> , <i>E. mauritanica</i> , <i>Hoodia gordonii</i> , <i>H. grandis</i> , <i>Lycium oxycarpum</i> , <i>Manochlamys albicans</i> , <i>Peersia macradenia</i> , <i>Pelargonium crithmifolium</i> , <i>Ruschia grisea</i> , <i>R. intricata</i> , <i>Salsola aphylla</i> , <i>Sarcocaulon crassicaule</i> , <i>Sceletium rigidum</i> , <i>Tetragonia robusta</i> var. <i>psiloptera</i> , <i>Trichodiadema barbatum</i> , <i>Tylecodon reticulatus</i> , <i>T. wallichii</i> subsp. <i>wallichii</i> , <i>Zygophyllum flexuosum</i> .
Tall Shrub	<i>Diospyros pallens</i> .
Low Shrubs	<i>Pteronia incana</i> (d), <i>Amphiglossa tomentosa</i> , <i>Aptosimum indivisum</i> , <i>A. spinescens</i> , <i>Asparagus burchellii</i> , <i>A. capensis</i> var. <i>capensis</i> , <i>Athanasia minuta</i> subsp. <i>inermis</i> , <i>Barleria stimulans</i> , <i>Berkheya spinosa</i> , <i>Chrysocoma ciliata</i> , <i>Eriocephalus africanus</i> , <i>E. ericoides</i> , <i>E. pauperrimus</i> , <i>E. spinescens</i> , <i>Euryops lateriflorus</i> , <i>Felicia filifolia</i> , <i>F. macrorrhiza</i> , <i>F. muricata</i> , <i>F. scabrida</i> , <i>Galenia africana</i> , <i>G. fruticosa</i> , <i>Garuleum bipinnatum</i> , <i>Helichrysum lucilioides</i> , <i>Hermannia grandiflora</i> , <i>H. multiflora</i> , <i>Lessertia fruticosa</i> , <i>Limeum aethiopicum</i> , <i>Melolobium candicans</i> , <i>Menodora juncea</i> , <i>Microloma armatum</i> , <i>Monechma spartioides</i> , <i>Muraltia scoparia</i> , <i>Pelargonium hirtum</i> , <i>Pentzia incana</i> , <i>Polygala seminuda</i> , <i>Pteronia adenocarpa</i> , <i>P. ambrariifolia</i> , <i>P. empetrifolia</i> , <i>P. glauca</i> , <i>P. glomerata</i> , <i>P. pallens</i> , <i>P. scariosa</i> , <i>P. sordida</i> , <i>Rhigozum obovatum</i> , <i>Senecio haworthii</i> , <i>Tripteris sinuata</i> , <i>Zygophyllum microphyllum</i> , <i>Z. retrofractum</i> , <i>Z. spinosum</i> . Semiparasitic Shrub: <i>Thesium lineatum</i> .
Woody Climbers	<i>Asparagus fasciculatus</i> , <i>A. racemosus</i> , <i>A. retrofractus</i> , <i>Microloma sagittatum</i> .
Herbaceous Climber	<i>Fockea sinuata</i>
Semiparasitic Epiphytic Shrub	<i>Viscum capense</i>
Herbs	<i>Atriplex suberecta</i> , <i>Felicia bergeriana</i> , <i>Gazania jurineifolia</i> subsp. <i>scabra</i> , <i>Hermannia althaeifolia</i> , <i>H. pulverata</i> , <i>Lepidium africanum</i> , <i>L. desertorum</i> , <i>Leysera tenella</i> , <i>Pelargonium minimum</i> , <i>P. nervifolium</i> , <i>Syncarpha dregeana</i> , <i>Ursinia nana</i> , <i>Zaluzianskya inflata</i> , <i>Z. peduncularis</i> . Geophytic Herbs: <i>Drimia</i>

TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT FOR THE PROPOSED 132KV D/C TOUWSRIVIER-LAINSBURG LINE REPAIRS, WITHIN BREEDE VALLEY LOCAL MUNICIPALITY OF CAPEWINELANDS DISTRICT AND LAINGSBURG LOCAL MUNICIPALITY OF CENTRAL KAROO DISTRICT, WESTERN CAPE PROVINCE.

	<i>intricata</i> , <i>Geissorhiza karooica</i> , <i>Ixia marginifolia</i> , <i>I. rapunculoides</i> , <i>Ornithogalum adseptentrionesvergentulum</i> , <i>Oxalis obtusa</i> , <i>Romulea austinii</i> , <i>R. tortuosa</i> subsp. <i>tortuosa</i> , <i>Strumaria karooica</i> , <i>S. pubescens</i> , <i>Trachyandra thyrsoidea</i> .
Succulent Herbs	<i>Astroloba foliolosa</i> , <i>A. spiralis</i> , <i>Brownanthus vaginatus</i> , <i>Crassula deceptor</i> , <i>C. muscosa</i> , <i>C. tomentosa</i> , <i>Deilanthus thudichumii</i> , <i>Haworthia marumiana</i> var. <i>archeri</i> , <i>Mesembryanthemum stenandrum</i> , <i>Pectinaria articulata</i> , <i>Piранthus parvulus</i> , <i>Psilocaulon coriarium</i> , <i>P. junceum</i> , <i>Quaqua arenicola</i> subsp. <i>arenicola</i> , <i>Q. arida</i> , <i>Q. ramosa</i> , <i>Stapelia pillansii</i> , <i>S. rufa</i> , <i>Stapeliopsis exasperata</i> , <i>Tetragonia microptera</i> , <i>Tripteris aghillana</i> var. <i>integrifolia</i> .
Parasitic Herb	<i>Hyobanche glabrata</i>
Graminoids	<i>Aristida adscensionis</i> , <i>A. diffusa</i> , <i>Ehrharta calycina</i> , <i>E. delicatula</i> , <i>Enneapogon scaber</i> , <i>Fingerhuthia africana</i> , <i>Karoochloa tenella</i> , <i>Pentaschistis airoides</i> , <i>Stipagrostis ciliata</i> , <i>S. obtusa</i> .
FRa 1 Breede Alluvium Renosterveld	
Tall Shrubs	<i>Montinia caryophyllacea</i> , <i>Rhus lucida</i> .
Low Shrubs	<i>Amphithalea spinosa</i> , <i>Aspalathus candicans</i> , <i>A. spinosa</i> subsp. <i>spinosa</i> , <i>Athanasia trifurcata</i> , <i>Cliffortia ruscifolia</i> , <i>Elytropappus rhinocerotis</i> , <i>Diosma passerinoides</i> , <i>Helichrysum incarnatum</i> , <i>Oedera imbricata</i> , <i>O. squarrosa</i> , <i>Pentzia incana</i>
Succulent Shrub	<i>Ruschia caroli</i> (d).
Herbs	<i>Corymbium glabrum</i> , <i>Senecio erysimoides</i> .
Geophytic Herbs	<i>Gladiolus permeabilis</i> subsp. <i>permeabilis</i> , <i>Moraea gawleri</i> .
Succulent Herb	<i>Crassula expansa</i> subsp. <i>expansa</i> .
Graminoids	<i>Willdenowia incurvata</i> (d), <i>Cynodon dactylon</i> , <i>Ehrharta longiflora</i> , <i>E. villosa</i> var. <i>villosa</i> , <i>Eragrostis curvula</i> , <i>Themeda triandra</i> .
FRs 8 Breede Shale Renosterveld	
Tall Shrubs	<i>Euclea undulata</i> (d), <i>Lycium ferocissimum</i> (d), <i>Dodonaea viscosa</i> var. <i>angustifolia</i> , <i>Euryops tenuissimus</i> , <i>Rhus angustifolia</i> , <i>R. undulata</i> .
Low Shrubs	<i>Aspalathus steudeliana</i> (d), <i>Elytropappus rhinocerotis</i> (d), <i>Galenia africana</i> (d), <i>G. herniariaefolia</i> (d), <i>G. secunda</i> (d), <i>Oedera sedifolia</i> (d), <i>O. squarrosa</i> (d), <i>Pentzia incana</i> (d), <i>Pteronia incana</i> (d), <i>P. paniculata</i> (d), <i>Anthospermum aethiopicum</i> , <i>Aspalathus candicans</i> , <i>A. pachyloba</i> subsp. <i>macroclada</i> , <i>A. submissa</i> , <i>A. varians</i> , <i>Carissa bispinosa</i> subsp. <i>bispinosa</i> , <i>Chrysocoma ciliata</i> , <i>C. coma-aurea</i> , <i>Felicia filifolia</i> subsp. <i>filifolia</i> , <i>F. flanaganii</i> , <i>Freylinia undulata</i> , <i>Hermannia vestita</i> , <i>Heterolepis peduncularis</i> , <i>Metalasia octoflora</i> , <i>Oedera genistifolia</i> , <i>Passerina obtusifolia</i> , <i>Pteronia fasciculata</i> , <i>Selago fruticosa</i> , <i>Senecio pinifolius</i> , <i>Wahlenbergia tenella</i> .

TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT FOR THE PROPOSED 132KV D/C TOUWSRIVIER-LAINSBURG LINE REPAIRS, WITHIN BREEDE VALLEY LOCAL MUNICIPALITY OF CAPEWINELANDS DISTRICT AND LAINGSBURG LOCAL MUNICIPALITY OF CENTRAL KAROO DISTRICT, WESTERN CAPE PROVINCE.

Succulent Shrubs	<i>Delosperma pageanum</i> (d), <i>Euphorbia burmannii</i> (d), <i>E. mauritanica</i> (d), <i>Ruschia caroli</i> (d), <i>R. festiva</i> (d), <i>Tylecodon paniculatus</i> (d), <i>Adromischus filicaulis</i> subsp. <i>filicaulis</i> , <i>Aloe microstigma</i> subsp. <i>microstigma</i> , <i>Crassula atropurpurea</i> var. <i>atropurpurea</i> , <i>C. pubescens</i> subsp. <i>pubescens</i> , <i>C. rupestris</i> , <i>C. tetragona</i> , <i>Pelargonium alternans</i> , <i>Psilocaulon coriarium</i> , <i>Ruschia multiflora</i> , <i>Tetragonia fruticosa</i> , <i>T. sarcophylla</i> , <i>Tylecodon grandifloras</i> .
Herb	<i>Hypericum lalandii</i> .
Geophytic Herbs	<i>Babiana melanops</i> , <i>Freesia caryophyllacea</i> , <i>Geissorhiza heterostyla</i> , <i>G. inflexa</i> , <i>G. ornithogaloides</i> subsp. <i>ornithogaloides</i> , <i>G. purpureolutea</i> , <i>G. tulbaghensis</i> , <i>Lachenalia polyphylla</i> , <i>Ornithogalum dubium</i> , <i>Oxalis goniorrhiza</i> , <i>Wurmbea monopetala</i> .
Succulent Herbs	<i>Crassula aphylla</i> , <i>C. muscosa</i> .
Graminoids:	<i>Ehrharta calycina</i> , <i>E. villosa</i> var. <i>villosa</i> , <i>Ficinia ramosissima</i> , <i>Hyparrhenia hirta</i> , <i>Ischyrolepis gaudichaudiana</i> , <i>Merxmuellera stricta</i> .
FFq 3 Matjiesfontein Quartzite Fynbos	
Tall Shrubs	<i>Protea laurifolia</i> (d), <i>P. repens</i> (d), <i>Leucadendron pubescens</i> , <i>L. rubrum</i> , <i>Nylandtia spinosa</i> , <i>Phylica buxifolia</i> .
Low Shrubs	<i>Agathosma squamosa</i> , <i>Amphiglossa tomentosa</i> , <i>Diosma hirsuta</i> , <i>Elytropappus rhinocerotis</i> , <i>Erica cerinthoides</i> var. <i>cerinthoides</i> , <i>E. plukenetii</i> subsp. <i>plukenetii</i> , <i>E. rigidula</i> , <i>Euryops erectus</i> , <i>E. oligoglossus</i> subsp. <i>oligoglossus</i> , <i>E. rehmannii</i> , <i>Leucadendron barkerae</i> , <i>L. cadens</i> , <i>L. salignum</i> , <i>L. teretifolium</i> , <i>Polygala myrtifolia</i> , <i>Protea canaliculata</i> , <i>P. lorifolia</i> , <i>P. pendula</i> , <i>P. revoluta</i> , <i>P. sulphurea</i> , <i>Stoebe plumosa</i> , <i>Vexatorella obtusata</i> subsp. <i>albomontana</i> .
Succulent Herb	<i>Quaqua pillansii</i> .
Graminoids	<i>Ischyrolepis capensis</i> , <i>Thamnochortus fruticosus</i> , <i>Willdenowia incurvata</i> .
FRs 6 Matjiesfontein Shale Renosterveld	
Low Shrubs	<i>Elytropappus rhinocerotis</i> (d), <i>Aspalathus alpestris</i> , <i>Asparagus capensis</i> var. <i>capensis</i> , <i>Athanasia flexuosa</i> , <i>Chrysocoma ciliata</i> , <i>C. oblongifolia</i> , <i>Eriocephalus ericoides</i> subsp. <i>ericoides</i> , <i>Euryops cuneatus</i> , <i>E. imbricatus</i> , <i>E. microphyllus</i> , <i>Helichrysum simulans</i> , <i>Oedera genistifolia</i> , <i>Passerina truncata</i> subsp. <i>truncata</i> , <i>Pteronia sordida</i> .
Succulent Shrub	<i>Antimima dasyphylla</i> .
Herb	<i>Cotula macroglossa</i> , <i>Foveolina dichotoma</i> , <i>Lepidium desertorum</i> , <i>Rhynchopsidium sessiliflorum</i> , <i>Rumex lanceolatus</i> , <i>Ursinia nana</i> . <i>Geophytic</i>
Geophytic Herbs	<i>Crassula lanceolata</i> subsp. <i>lanceolata</i> .
Graminoids	<i>Bromus pectinatus</i> , <i>Ehrharta calycina</i> , <i>E. capensis</i> , <i>E. delicatula</i> , <i>Hyparrhenia hirta</i> , <i>Hypodiscus sulcatus</i> , <i>Pentaschistis rigidissima</i> .

FFs 16 South Langeberg Sandstone Fynbos	
Tall Shrub	<i>Cliffortia densa</i> .
Low Shrubs	<i>Erica blenna</i> var. <i>blenna</i> (d), <i>Spatalla parilis</i> ^W (d), <i>Acmadenia burchellii</i> , <i>Adenandra fragrans</i> , <i>Agathosma linifolia</i> , <i>A. subteretifolia</i> , <i>A. umbonata</i> , <i>Amphithalea bullata</i> , <i>A. dahlgrenii</i> , <i>Anderbergia elsiae</i> , <i>A. ustulata</i> , <i>A. vlokii</i> , <i>Anisothrix kuntzei</i> , <i>Aspalathus cordicarpa</i> , <i>A. hypnoides</i> , <i>A. shawii</i> subsp. <i>glabripetala</i> , <i>Athanasia inopinata</i> , <i>Berzelia burchellii</i> , <i>Carpacoce gigantea</i> , <i>Cliffortia lanceolata</i> , <i>Coleonema pulchrum</i> , <i>C. virgatum</i> , <i>Elytropappus</i> sp. nov. (' <i>monticola</i> '), <i>Empleurum fragrans</i> ^W , <i>Erica albescens</i> , <i>E. amicorum</i> ^W , <i>E. ardens</i> , <i>E. blenna</i> var. <i>grandiflora</i> , <i>E. bracteolaris</i> , <i>E. chartacea</i> , <i>E. comata</i> , <i>E. condensata</i> , <i>E. crassisejala</i> , <i>E. cubitans</i> , <i>E. dysantha</i> , <i>E. elsieana</i> , <i>E. garciae</i> , <i>E. grata</i> , <i>E. heleophila</i> , <i>E. inclusa</i> , <i>E. ixanthera</i> , <i>E. keeromsbergensis</i> , <i>E. macilenta</i> , <i>E. macrophylla</i> , <i>E. miniscula</i> , <i>E. obconica</i> , <i>E. ocellata</i> , <i>E. omnino-glabra</i> , <i>E. oophylla</i> , <i>E. oxyandra</i> , <i>E. papyracea</i> , <i>E. parviporandra</i> , <i>E. podophylla</i> , <i>E. polifolia</i> , <i>E. procaviana</i> , <i>E. racemosa</i> , <i>E. stenantha</i> , <i>E. tetrathecooides</i> ^W , <i>E. tradouwensis</i> , <i>E. vallis-fluminis</i> , <i>E. winteri</i> , <i>Euchaetis avisylvana</i> , <i>Gymnostephium fruticosum</i> , <i>Helichrysum plebeium</i> , <i>Hippia hutchinsonii</i> , <i>Indigofera langebergensis</i> , <i>Kogelbergia phyllicoides</i> , <i>Lachnaea ericoides</i> , <i>L. oliverorum</i> , <i>L. stokoei</i> , <i>Langebergia canescens</i> , <i>Lebeckia leptophylla</i> , <i>Leucadendron radiatum</i> , <i>L. tradouwense</i> , <i>Leucospermum winteri</i> , <i>Metalasia oligocephala</i> , <i>Mniothamnea bullata</i> , <i>M. callunoides</i> , <i>Muraltia langebergensis</i> , <i>Oedera laevis</i> , <i>Osteospermum burttianum</i> , <i>O. pyriformium</i> , <i>Otholobium bowieanum</i> , <i>O. saxosum</i> , <i>Penaea dahlgrenii</i> , <i>Phylica lasiantha</i> , <i>P. longimontana</i> , <i>P. propinqua</i> , <i>P. recurvifolia</i> , <i>Raspalia barnardii</i> , <i>Spatalla colorata</i> , <i>S. nubicola</i> ^W , <i>Stilbe gymnopharyngia</i> , <i>Stylapterus dubius</i> , <i>S. ericifolius</i> , <i>Thamnea gracilis</i> .
Succulent Shrubs	<i>Drosanthemum acuminatum</i> , <i>D. subcompressum</i> , <i>Erepsia pentagona</i> , <i>Lampranthus hallii</i> , <i>L. laxifolius</i> . Semiparasitic.
Shrub	<i>Thesium susannae</i>
Herbs	<i>Aster bowiei</i> , <i>Galium undulatum</i> , <i>Lobelia dasyphylla</i> , <i>L. hypsibata</i> , <i>L. muscoides</i> , <i>Lyperia formosa</i> , <i>Mairia</i> sp. nov. (' <i>petiolaris</i> '), <i>Sebaea laxa</i> , <i>Sutera langebergensis</i> , <i>Wahlenbergia riversdalensis</i> , <i>Wimmerella longitubus</i> .
Geophytic Herbs	<i>Bobartia macrospatha</i> subsp. <i>anceps</i> , <i>B. parva</i> , <i>Disa aurata</i> , <i>D. cardinalis</i> ^W , <i>D. subtenuicornis</i> , <i>Geissoloma marginatum</i> , <i>Gladiolus crispulatus</i> , <i>Ixia stohriae</i> , <i>Lachenalia leomontana</i> , <i>Pachites appressa</i> .
Graminoids:	<i>Restio arcuatus</i> (d), <i>Calopsis monostylis</i> , <i>Ceratocaryum fistulosum</i> , <i>Ischyrolepis affinis</i> , <i>Restio fragilis</i> , <i>R. secundus</i> .
SKv 8 Western Little Karoo	
Small Tree	<i>Pappea capensis</i> .

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Succulent Shrubs	<i>Crassula rupestris</i> subsp. <i>commutata</i> (d), <i>Drosanthemum wittebergense</i> (d), <i>Euphorbia mauritanica</i> (d), <i>Hereroa odorata</i> (d), <i>Ruschia cymosa</i> (d), <i>R. spinosa</i> (d), <i>Tylecodon paniculatus</i> (d), <i>T. wallichii</i> subsp. <i>wallichii</i> (d), <i>Adromischus filicaulis</i> subsp. <i>marlothii</i> , <i>A. mammillaris</i> , <i>Aridaria noctiflora</i> subsp. <i>noctiflora</i> , <i>Augea capensis</i> , <i>Braunsia geminata</i> , <i>Cotyledon cuneata</i> , <i>C. orbiculata</i> var. <i>orbiculata</i> , <i>Crassula cultrata</i> , <i>C. ovata</i> , <i>C. rupestris</i> subsp. <i>rupestris</i> , <i>C. subaphylla</i> , <i>Drosanthemum chrysum</i> , <i>D. lique</i> , <i>Euphorbia brachiata</i> , <i>E. mammillaris</i> , <i>E. multiceps</i> , <i>E. mundii</i> , <i>E. stolonifera</i> , <i>Gibbaeum nuciforme</i> , <i>Leipoldtia schultzei</i> , <i>Lycium oxycarpum</i> , <i>Othonna carnosae</i> , <i>Phyllobolus nitidus</i> , <i>P. splendens</i> , <i>Ruschia archeri</i> , <i>R. intricata</i> , <i>R. multiflora</i> , <i>Salsola aphylla</i> , <i>Sarcocaulon patersonii</i> , <i>Sceletium rigidum</i> , <i>Smicrostigma viride</i> , <i>Tetragonia fruticosa</i> , <i>T. robusta</i> var. <i>psiloptera</i> , <i>Tylecodon cacalioides</i> .
Tall Shrubs	<i>Euclea undulata</i> , <i>Putterlickia pyracantha</i> .
Low Shrubs	<i>Chrysocoma ciliata</i> (d), <i>Eriocephalus ericoides</i> (d), <i>Felicia filifolia</i> (d), <i>F. muricata</i> (d), <i>Galenia africana</i> (d), <i>Monechma spartioides</i> (d), <i>Pentzia incana</i> (d), <i>Pteronia incana</i> (d), <i>P. pallens</i> (d), <i>Rhigozum obovatum</i> (d), <i>Rosenia humilis</i> (d), <i>Tripteris sinuata</i> (d), <i>Amphithalea spinosa</i> , <i>Aptosimum procumbens</i> , <i>Argyrolobium collinum</i> , <i>Asparagus burchellii</i> , <i>A. capensis</i> var. <i>capensis</i> , <i>A. krebsianus</i> , <i>A. mucronatus</i> , <i>Barleria pungens</i> , <i>Berkheya spinosa</i> , <i>Carissa haematocarpa</i> , <i>Elytropappus rhinocerotis</i> , <i>Eriocephalus africanus</i> , <i>E. purpureus</i> , <i>Felicia macrorrhiza</i> , <i>F. ovata</i> , <i>F. whitehillensis</i> , <i>Galenia fruticosa</i> , <i>G. secunda</i> , <i>Garuleum latifolium</i> , <i>Gnidia deserticola</i> , <i>Helichrysum asperum</i> var. <i>albidulum</i> , <i>H. rosum</i> , <i>H. simulans</i> , <i>H. zeyheri</i> , <i>Hermannia filifolia</i> var. <i>grandicalyx</i> , <i>H. multiflora</i> , <i>Hirpicium integrifolium</i> , <i>Indigofera heterophylla</i> , <i>Justicia cuneata</i> subsp. <i>cuneata</i> , <i>Lessertia fruticosa</i> , <i>Limeum aethiopicum</i> , <i>Macleodium spinosum</i> , <i>Nenax microphylla</i> , <i>Oedera squarrosa</i> , <i>Osteospermum microphyllum</i> , <i>Pegolettia baccaridifolia</i> , <i>Pentzia elegans</i> , <i>P. lanata</i> , <i>P. spinescens</i> , <i>Phymaspermum aciculare</i> , <i>Plumbago tristis</i> , <i>Polygala asbestina</i> , <i>Pteronia adenocarpa</i> , <i>P. empetrifolia</i> , <i>P. fasciculata</i> , <i>P. flexicaulis</i> , <i>P. glauca</i> , <i>P. membranacea</i> , <i>P. oblanceolata</i> , <i>P. paniculata</i> , <i>P. sordida</i> , <i>P. succulenta</i> , <i>Rosenia oppositifolia</i> , <i>Selago geniculata</i> , <i>Sericocoma avolans</i> , <i>Zygophyllum microphyllum</i> , <i>Z. spinosum</i> .
Semiparasitic Shrub	<i>Thesium lineatum</i>
Woody Climbers	<i>Asparagus racemosus</i> , <i>A. retrofractus</i> , <i>Cissampelos capensis</i> , <i>Microloma sagittatum</i> .
Succulent Herbs	<i>Crassula lanceolata</i> (d), <i>C. orbicularis</i> (d), <i>Psilocaulon articulatum</i> (d), <i>P. junceum</i> (d), <i>Aloe variegata</i> , <i>Astroloba foliolosa</i> , <i>Crassula muscosa</i> , <i>Othonna</i>

<p><i>auriculifolia</i>, <i>Psilocaulon coriarium</i>, <i>Senecio radicans</i>, <i>Stapelia engleriana</i>, <i>S. pillansii</i>, <i>S. rufa</i>, <i>Stapeliopsis saxatilis</i>, <i>Tetragonia microptera</i>, <i>Tridentea gemmiflora</i>. Graminoids: <i>Ehrharta delicatula</i> (d), <i>Stipagrostis obtusa</i> (d), <i>Digitaria argyrograpta</i>, <i>Ehrharta calycina</i>, <i>E. erecta</i>, <i>Enneapogon scaber</i>.</p>

5.5 THE WESTERN CAPE BIODIVERSITY SPATIAL PLAN (WCBSP)

The Western Cape Biodiversity Spatial Plan (WCBSP) is a spatial tool that comprises the Biodiversity Spatial Plan Map (BSP Map) of biodiversity priority areas, accompanied by contextual information and land use guidelines that make the most recent and best quality biodiversity information available for land use and development planning, environmental assessment and regulation, and natural resource management. The Western Cape Biodiversity Spatial Plan (WCBSP) classifies the habitats of the province according to conservation value in decreasing value, as follows:

1. Protected Areas (PA);
2. Critical Biodiversity Areas 1 (CBA1);
3. Critical Biodiversity Areas 2 (CBA2);
4. Ecological Support Area 1 (ESA1);
5. Ecological Support Area 2 (ESA2);
6. Other Natural Areas (ONA).

According to the Western Cape Biodiversity Spatial Plan (WCBSP) the proposed 132KV D/C Touwsrivier-Lainsburg Line servitude is located within the following:

1. **Ecological Support Area:** The existing powerline servitude crosses through three (3) Ecological Support Areas 1 (**Figure 5-3**).
2. **Important Bird Area:** Although the line does not traverse important Bird Areas it is located within close proximity to number of important bird area (**Figure 5-3**).
3. **Protected Areas:** The line does not traverse any Nature Reserve, however it is very close to a number of protected areas (**Figure 5-4**).

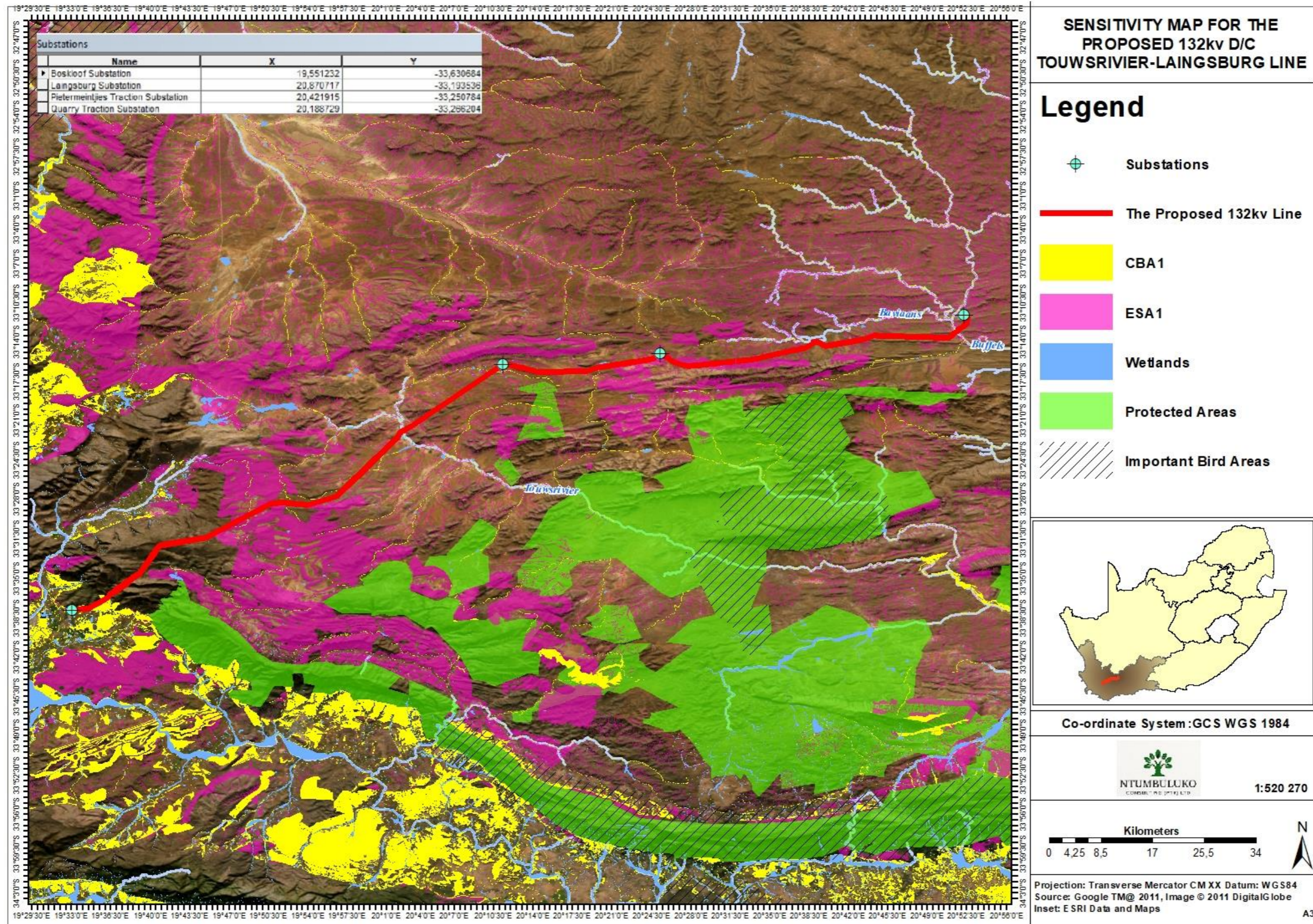


Figure 5-3: Sensitivity Map.

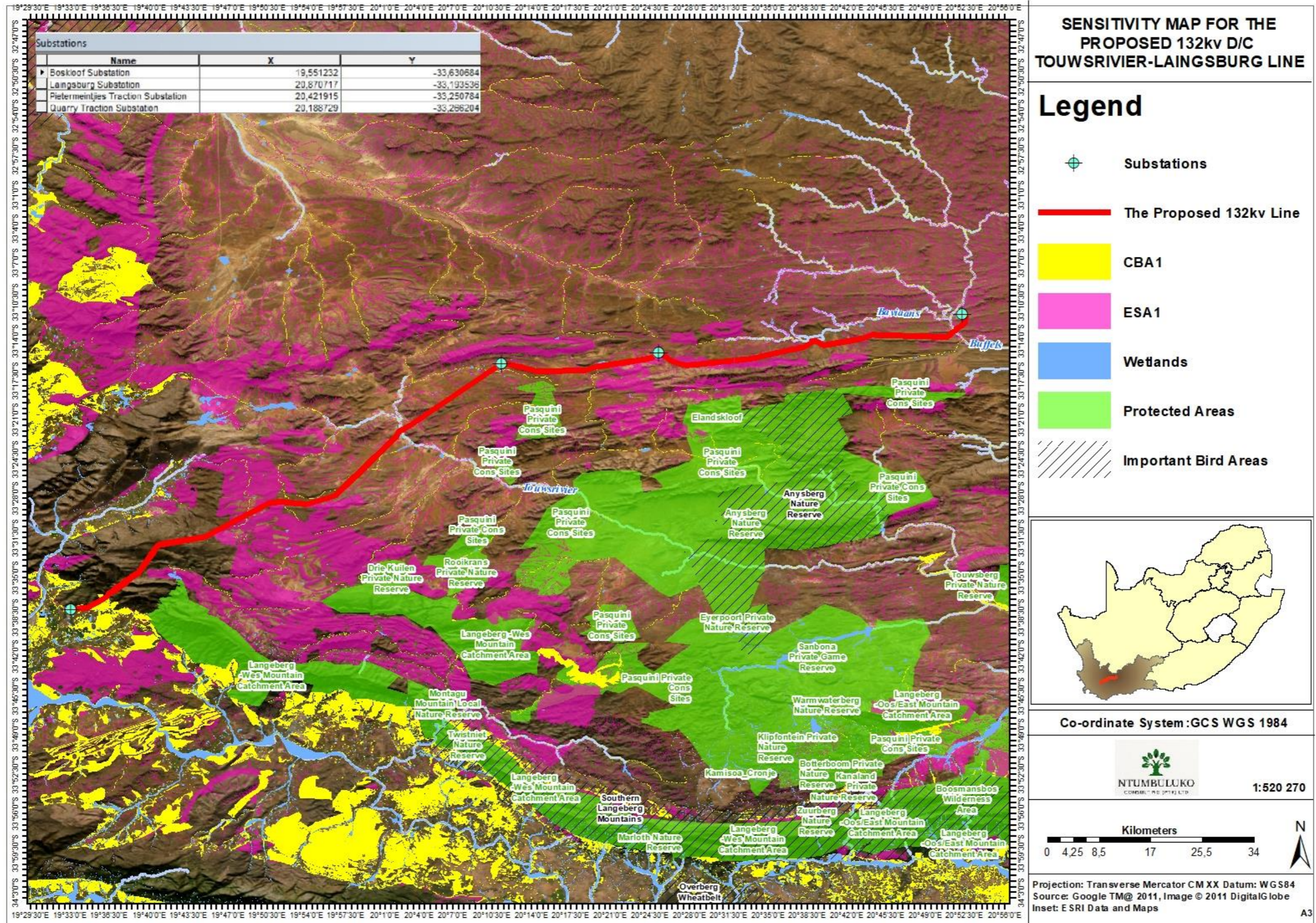


Figure 5-4: Sensitivity Map 1.

6. RESULTS

6.1 GENERAL OVERVIEW OF THE 32KV D/C TOUWSRIVIER-LAINSBURG LINE SERVITUDE

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. The site visit conducted on the **28th of June 2025** confirmed that the presence of atleast vegetation units, with notable differences across the line. The area near the Boskloof Substation consists of the Flat alluvial fans and valley bottoms supporting short grassy cupressoid-leaved shrubland usually dominated by renosterbos (**Figure 6-1**).



Figure 6-1: Overview of the renosterbos shrubland.

The line is dominated by shrublands consisting of low and medium height encompassing (as dominants) both nonsucculent (*Chrysocoma*, *Pentzia*, *Pteronia*, *Rhigozum*, *Tripteris*) as well as succulent (*Crassula*, *Euphorbia*, *Ruschia*, *Tylecodon*) shrubs (**Figure 6-2**).



Figure 6-2: Overview of the shrublands consisting of low and medium height non succulent species including aloes species observed onsite.

Certain sections of the powerline consist of open to medium dense, leptophyllous shrubland with a medium dense matrix of short, divaricate shrubs, dominated by *renosterbos*. *Heuveltjies* present at low densities in places (**Figure 6-3**).



Figure 6-3: pen to medium dense, leptophyllous shrubland with a medium dense matrix of short, divaricate shrubs, dominated by *renosterbos* and *Heuveltjies*.

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The area surrounding the Liangsburg Substation shows evidence of the Koedoesberge-Moordenaars Karoo vegetation type (**Figure 6-4**), along with signs of ecological disturbance (**Figure 6-5**).



Figure 6-4: Overview of the study site, with evidence of the Koedoesberge-Moordenaars Karoo vegetation unit.

TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT FOR THE PROPOSED 132KV D/C TOUWSRIVIER-LAINSBURG LINE REPAIRS, WITHIN BREEDE VALLEY LOCAL MUNICIPALITY OF CAPEWINELANDS DISTRICT AND LAINGSBURG LOCAL MUNICIPALITY OF CENTRAL KAROO DISTRICT, WESTERN CAPE PROVINCE.



Figure 6-5: Overview of the disturbance observed along the powerline including farming activities.

6.2 VEGETATION TYPES RECORDED ON SITE

Table 6-1: Species observed along the powerline servitude.

PLANT FORM	SPECIES
Succulent Shrubs	<i>Hereroa odorata</i> (d), <i>Antimima fergusoniae</i> , <i>A. maxwellii</i> , <i>A. wittebergensis</i> , <i>Aridaria noctiflora</i> subsp. <i>straminea</i> , <i>Crassula nudicaulis</i> , <i>C. rupestris</i> subsp. <i>commutata</i> , <i>Cylindrophyllum comptonii</i> , <i>Drosanthemum framesii</i> , <i>D. karrooense</i> , <i>D. lique</i> , <i>Euphorbia decussata</i> , <i>E. eustacei</i> , <i>E. mauritanica</i> , <i>Hoodia gordonii</i> , <i>H. grandis</i> , <i>Lycium oxycarpum</i> , <i>Manochlamys albicans</i> , <i>Peersia macradenia</i> , <i>Pelargonium crithmifolium</i> , <i>Ruschia grisea</i> , <i>R. intricata</i> , <i>Salsola aphylla</i> , <i>Sarcocaulon crassicaule</i> , <i>Sceletium rigidum</i> , <i>Tetragonia robusta</i> var. <i>psiloptera</i> , <i>Trichodiadema barbatum</i> , <i>Tylecodon reticulatus</i> , <i>T. wallichii</i> subsp. <i>wallichii</i> , <i>Zygophyllum flexuosum</i> .
Tall Shrub	<i>Diospyros pallens</i> .
Low Shrubs	<i>Pteronia incana</i> (d), <i>Amphiglossa tomentosa</i> , <i>Aptosimum indivisum</i> , <i>A. spinescens</i> , <i>Asparagus burchellii</i> , <i>A. capensis</i> var. <i>capensis</i> , <i>Athanasia minuta</i> subsp. <i>inermis</i> , <i>Barleria stimulans</i> , <i>Berkheya spinosa</i> , <i>Chrysocoma ciliata</i> , <i>Eriocephalus africanus</i> , <i>E. ericoides</i> , <i>E. pauperrimus</i> , <i>E. spinescens</i> , <i>Euryops lateriflorus</i> , <i>Felicia filifolia</i> , <i>F. macrorrhiza</i> , <i>F. muricata</i> , <i>F. scabrada</i> , <i>Galenia africana</i> , <i>G. fruticosa</i> , <i>Garuleum bipinnatum</i> , <i>Helichrysum lucilioides</i> , <i>Hermannia grandiflora</i> , <i>H. multiflora</i> , <i>Lessertia fruticosa</i> , <i>Limeum aethiopicum</i> , <i>Melolobium candicans</i> , <i>Menodora juncea</i> , <i>Microlooma armatum</i> , <i>Monechma spartioides</i> , <i>Muraltia scoparia</i> , <i>Pelargonium hirtum</i> , <i>Pentzia incana</i> , <i>Polygala seminuda</i> , <i>Pteronia adenocarpa</i> , <i>P. ambrariifolia</i> , <i>P. empetrifolia</i> , <i>P. glauca</i> , <i>P. glomerata</i> , <i>P. pallens</i> , <i>P. scariosa</i> , <i>P. sordida</i> , <i>Rhigozum obovatum</i> , <i>Senecio haworthii</i> , <i>Tripteris sinuata</i> , <i>Zygophyllum microphyllum</i> , <i>Z. retrofractum</i> , <i>Z. spinosum</i> . Semiparasitic Shrub: <i>Thesium lineatum</i> .
Woody Climbers	<i>Asparagus fasciculatus</i> , <i>A. racemosus</i> , <i>A. retrofractus</i> , <i>Microlooma sagittatum</i> .
Herbaceous	<i>Fockea sinuata</i>
Climber	
Semiparasitic	<i>Viscum capense</i>
Epiphytic Shrub	
Herbs	<i>Atriplex suberecta</i> , <i>Felicia bergeriana</i> , <i>Gazania jurineifolia</i> subsp. <i>scabra</i> , <i>Hermannia althaeifolia</i> , <i>H. pulverata</i> , <i>Lepidium africanum</i> , <i>L. desertorum</i> , <i>Leysera tenella</i> , <i>Pelargonium minimum</i> , <i>P. nervifolium</i> , <i>Syncarpha dregeana</i> , <i>Ursinia nana</i> , <i>Zaluzianskya inflata</i> , <i>Z. peduncularis</i> . Geophytic Herbs: <i>Drimia intricata</i> , <i>Geissorhiza karooica</i> , <i>Ixia marginifolia</i> , <i>I. rapunculoides</i> , <i>Ornithogalum adseptentrionesvergentulum</i> , <i>Oxalis obtusa</i> , <i>Romulea austinii</i> , <i>R. tortuosa</i> subsp. <i>tortuosa</i> , <i>Strumaria karooica</i> , <i>S. pubescens</i> , <i>Trachyandra thyrsoidea</i> .

Succulent Herbs	<i>Astroloba foliolosa</i> , <i>A. spiralis</i> , <i>Brownanthus vaginatus</i> , <i>Crassula deceptor</i> , <i>C. muscosa</i> , <i>C. tomentosa</i> , <i>Deilante thudichumii</i> , <i>Haworthia marumiana</i> var. <i>archeri</i> , <i>Mesembryanthemum stenandrum</i> , <i>Pectinaria articulata</i> , <i>Piaranthus parvulus</i> , <i>Psilocaulon coriarium</i> , <i>P. junceum</i> , <i>Quaqua arenicola</i> subsp. <i>arenicola</i> , <i>Q. arida</i> , <i>Q. ramosa</i> , <i>Stapelia pillansii</i> , <i>S. rufa</i> , <i>Stapeliopsis exasperata</i> , <i>Tetragonia microptera</i> , <i>Tripteris aghillana</i> var. <i>integrifolia</i> .
Parasitic Herb	<i>Hyobanche glabrata</i>
Graminoids	<i>Aristida adscensionis</i> , <i>A. diffusa</i> , <i>Ehrharta calycina</i> , <i>E. delicatula</i> , <i>Enneapogon scaber</i> , <i>Fingerhuthia africana</i> , <i>Karoochloa tenella</i> , <i>Pentaschistis airoides</i> , <i>Stipagrostis ciliata</i> , <i>S. obtusa</i> .

Table 6-2: Selected pictures of the species observed onsite.

Euphorbia spp.



Chrysocoma ciliata



Cenchrus ciliaris



Thesium lineatum



Pteronia incana

Acacia spp.



Chrysothamnus nauseosus



Aloe Species



6.3 ETHNOBOTANICAL PLANT SPECIES

Ethnobotany/ Ethnoecology is a branch of botany that focuses on the use of plants for medicines, cultural and recreational purposes. The overexploitation of indigenous plants for ethnobotanical purposes can be detrimental to populations of those particular plant species, and the other species that depend on its existence for their survival. South Africa has a rich diversity of medicinal plants that not only have a global significance, but also have a cultural and historical role (van Wyk *et al.* 2009). There is a rapidly growing concern for conservation of medicinal plants that are dwindling in number due to illegal harvesting (Institute of Natural Resources 2003). This is particularly apparent in rural areas where medicinal plants are overexploited by traditional doctors (Mazid *et al.*, 2012).

1. *Leysera gnaphalodes*

The study site has *Leysera gnaphalodes* (Figure 6-6), which is a perennial aromatic shrublet with radiant yellow flowers that occurs in the winter rainfall parts of South

Africa and Namibia. The plant's aromatic flavours give a pleasant infusion that makes an appetizing tea¹.



Figure 6-6: Example of the *Leysera gnaphalodes* (L.) L. found onsite.

Management and growth of *Leysera gnaphalodes*

Leysera gnaphalodes Plant material that is to be “rescued” must be potted up into bags utilising local soil obtained from the topsoil obtained from the construction site or larger area. Adequate root systems per plant material type must be carefully excavated and retained in order for plant material to remain viable. Search and Rescue activities would include the removal of grass clumps, smaller transplantable shrubs and trees and endangered species such as geophytes and succulents should be placed into bags using local soil. Do not overwater but do not allow the medium to dry out completely (R. Oliver, pers. comm.)².

Should the ECO require that plants be cleared for the proposed powerline repair, the following rescue and conservation strategy for the relevant plant species should apply:

- Vegetation removal must be limited to the powerline servitude onsite;
- Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step;

¹ <https://pza.sanbi.org/leysera-gnaphalodes>

² Bronwynne Busch Compton Herbarium, Kirstenbosch August 2011

- Materials should not be delivered to the site prematurely which could result in additional areas being cleared or affected;
- No vegetation to be used for firewood;
- Gathering of firewood, fruit, multi plants, or any other natural material onsite or in areas adjacent to the site is prohibited unless with prior approval of the ECO;
- Only vegetation within the footprint area must be removed;
- Vegetation removal must be phased in order to reduce impact of construction;
- Construction site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas;

Aloe Spp.

Additional, the site has number of aloe species onsite (**Figure 6-7**). In South Africa, aloe—particularly the species *Aloe ferox*, also known as Cape Aloe—plays a significant role in both traditional and modern contexts. Traditionally, aloe has been used by indigenous communities for its medicinal properties. The bitter sap extracted from the leaves is commonly used as a natural laxative, while the gel is applied to wounds, burns, and skin irritations due to its soothing, anti-inflammatory, and antimicrobial effects. Aloe also holds cultural significance and is often incorporated into traditional healing rituals.

In modern times, aloe has become a valuable commercial resource. It is widely used in the cosmetic industry, where its gel is a key ingredient in moisturizers, sunscreens, shampoos, and anti-aging products. The health and wellness sector also benefits from aloe, with its extracts being used in dietary supplements and health drinks for their antioxidant and immune-boosting properties. Additionally, aloe is processed into pharmaceutical products such as aloe bitters, which are exported internationally for digestive health.

Economically, aloe harvesting supports many rural communities in South Africa. Remarkably, about 95% of commercially used *Aloe ferox* is still wild harvested, providing income for thousands of people. Sustainable harvesting practices are encouraged to ensure the long-term availability of this valuable plant, making aloe not only a cultural and medicinal asset but also a contributor to rural development and biodiversity conservation.



Figure 6-7: Aloe species observed onsite.

6.4 PLANT SPECIES OF CONSERVATION CONCERN

According to the state of environment outlook report for the Western Cape Province, There are 13 489 recorded plant species in the Western Cape Province, which constitutes 56% of South Africa’s flora species, and a large number of these are endemic (6 776). Some 1 889 plant species in the Western Cape are classified as threatened, with 330 classified as Critically Endangered, of which 38 are presumed extinct. A further 636 are Endangered and 900 are Vulnerable. These species account for up to 68% of the threatened plant species in the country; 1 695 of these are endemic to the Western Cape (Le Roux et al. 2012). Moreover, there are 3 923 plant species of conservation concern because they are Near Threatened, Data Deficient³,

The plant species expected to occur within the study site are outlined in **Table 6-3**.

Table 6-3: Plant species of conservation concern expected to occur in grid square 3319DA, BD DB as well as the conservation status of each (POSA, 2017; SANBI, 2017)

SPECIES OF CONSERVATION CONCERN	RED STATUS	OBSERVED ALONG THE POWERLINE SERVITUDE
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³ Western Cape Department of Environmental Affairs and Development Planning: Final Biodiversity and Ecosystem Health Chapter, February 2018

DURING THE SURVEY (YES/NO)

<i>Eriocephalus grandiflorus</i>	Rare	No
<i>Phymaspermum thymelaeoides</i>	Currently not threatened	No
<i>Lotononis venosa</i>	Vulnerable	No
<i>Cleretum lyratifolium</i>	Rare	No
<i>Octopoma nanum</i>	Vulnerable	No
<i>Peersia macradenia</i>	Local endemic	No
<i>Tanquana archeri</i>	Vulnerable	No
<i>Adromischus phillipsiae</i>		No
<i>Geissorhiza karooica</i>	Near Threatened	No
<i>Geissorhiza cantharophila</i>	Local endemic	No
<i>Romulea eburnean</i>	Vulnerable	No
<i>Lachenalia whitehillensis</i>	Near Threatened	No
<i>Brunsvigia josephinae</i>	Vulnerable	No
<i>Ruschia beaufortensis</i> (Aizoaceae)	Vulnerable	No
<i>Peersia frithii</i> (Aizoaceae)	Vulnerable	No
<i>Tritonia florentiae</i> (Iridaceae)	Vulnerable	No

6.5 ALIEN INVASIVE SPECIES PRESENT ON SITE

An “invasive species” is any species whose establishment and spread outside of its natural distribution range (i) threatens ecosystems, habitats or other species or has a demonstrable potential to threaten ecosystems, habitats or other species; and (ii) 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) (NEMBA), for natural areas, invasive alien plant species should be controlled and eradicated with an emphasis on urgent action in biodiversity priority areas. NEMBA published a list of Alien and Invasive Species (No 599) in 2014 which regulates the management of alien and invasive plants in natural

environments. **According to CapeNature the top 10 invasive alien plants affecting the Western Cape are⁴:**

1. Rooikrans
2. Black wattle
3. Port Jackson
4. Silky hakea
5. Long-leafed wattle
6. Stinkbean
7. Australian myrtle
8. Spider gum
9. Cluster pine
10. Blackwood

None of the above listed species were observed within the powerline servitude. The study site has evidence of three (3) Alien invasive species near Laingsburg:

1. Opuntia Spp. (category 1 weed)

Prickly pear (also referred to in South Africa as sweet or mission prickly pear) is of Mexican origin. It is a tree or tall shrub, up to 5 m tall, with a thick, woody trunk (**Figure 6-8**).

⁴ <https://www.capenature.co.za/alien-vegetation-management>



Figure 6-8: Prickly pear.

The Alien invasive species management plan is outlined in Appendix 2.

6.6 DESCRIPTION OF FAUNA

According to the desktop study conducted, forty-eight species of mammal are known to occur or likely to occur within the region (Friedmann & Daly 2004, Skinner & Chimimba 2005, Monadjem et al. 2010), and the majority of these can be expected to occur within the study area, given the habitats available and the relatively untransformed nature of much of the study area. The species listed in **Table 6-4** were identified as being possible to occur within the study area or the immediate vicinity of the study site. It must be noted that some of these species are very sensitive to habitat and in some instances; the likeliness for them to occur is minimal.

Table 6-4 : List of mammal species that occur in the project area as well as their global and regional conservation statuses (IUCN, 2018; SANBI, 2016).

#	Scientific name	Common name	Red list category
1	ORDER Rodentia	Unidentified Rodentia	
2	<i>Raphicerus campestris</i>	Steenbok	Least Concern (2016)
3	<i>Sylvicapra grimmia</i>	Bush Duiker	Least Concern (2016)
4	<i>Canis mesomelas</i>	Black-backed Jackal	Least Concern (2016)
5	<i>Otocyon megalotis</i>	Bat-eared Fox	Least Concern (2016)
6	<i>Chlorocebus pygerythrus</i>	Vervet Monkey	Least Concern (2016)
7	<i>Papio ursinus</i>	Chacma Baboon	LC (IUCN, 2016)
8	<i>Caracal caracal</i>	Caracal	Least Concern (2016)
9	<i>Felis silvestris</i>	Wildcat	Least Concern (2016)
10	<i>Panthera pardus</i>	Leopard	Vulnerable (2016)
11	<i>Cynictis penicillata</i>	Yellow Mongoose	Least Concern (2016)
12	<i>Herpestes pulverulentus</i>	Cape Gray Mongoose	Least Concern (2016)
13	<i>Hyaena sp.</i>	Striped and Brown Hyaenas	
14	<i>Hystrix africaeaustralis</i>	Cape Porcupine	Least Concern
15	<i>Lepus capensis</i>	Cape Hare	Least Concern
16	<i>Desmodillus auricularis</i>	Cape Short-tailed Gerbil	Least Concern (2016)
17	<i>Otomys unisulcatus</i>	Karoo Bush Rat	Least Concern (2016)
18	<i>Parotomys brantsii</i>	Brants's Whistling Rat	Least Concern (2016)
19	<i>Rhabdomys pumilio</i>	Xeric Four-striped Grass Rat	Least Concern (2016)
20	<i>Procavia capensis capensis</i>	Cape Rock Hyrax	LC (IUCN 2015, global sp. level)
21	<i>Genetta tigrina</i>	Cape Genet (Cape Large-spotted Genet)	Least Concern (2016)

6.6.1 FIELD INVESTIGATION FINDINGS

During the site visit, none of mammals described on Table 6-4 above were observed. The likelihood of finding these animals is high

6.7 REPTILES AND AMPHIBIANS

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the Reptile Map database provided by the Animal Demography Unit (ADU, 2017) 13 reptile species are expected to occur in the project area. No species of conservation concern should be present according to the above-mentioned sources within the project area but in situ observations may prove otherwise.

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the Amphibian Map database provided by the Animal Demography Unit (ADU, 2017) 3 amphibian species are expected to occur in the project area, Namely:

1. *Vandijkophrynus gariensis gariensis*
2. *Amietia fuscigula*
3. *Tomopterna delalandii*

6.7.1 FIELD INVESTIGATION FINDINGS

None of the expected reptiles were observed on site during the site visit.

6.8 AVIFUANA

Birds are generally regarded as good ecological indicators, because their presence or absence tends to represent conditions pertaining to the proper functioning of an ecosystem. Bird communities and ecological conditions are directly linked to land cover. As the land cover of an area changes, so do the types of birds in that area (The Bird Community Index, 2007). Land cover is directly linked to habitats within the study area. The diversity of these habitats should give rise to many different species.

The proposed development is located within close proximity to the Anysberg Nature Reserve which is classified as an Important Bird Area (IBA). According to the South African Bird Atlas Project (SABAP2), over species of birds have been identified in the area. According to Birdlife South Africa, “Globally threatened species are Blue Crane, Ludwig’s Bustard, Southern Black Korhaan *Afrotis afra*, Martial Eagle and Black Harrier. Regionally threatened species are Karoo Korhaan, Verreauxs’ Eagle, Black Stork, Lanner Falcon *Falco*

biarmicus and Cape Rockjumper. Restricted-range and biome-restricted species that are common in the IBA are Cape Spurfowl, Cape Bulbul and Karoo Chat. Locally common restricted-range or biome-restricted species are Karoo Lark, Layard's Tit-Babbler, Karoo Eremomela and Namaqua Warbler, while uncommon species in this category are Ludwig's Bustard, Sickle-winged Chat *Cercomela sinuata*, Cape Rockjumper, Victorin's Warbler, Cape Sugarbird, Cape Siskin, Protea Seed eater *Crithagra leucoptera*, Orange-breasted Sunbird, Pale-winged Starling and Black-headed Canary".

6.8.1 FIELD INVESTIGATION FINDINGS

The study is located outside of an Important Bird Area, and the sensitivity is considered Medium to High especially within the neighboring properties. Furthermore, no Species of Conservation Concern were observed during the survey. A few avifaunal species were spotted onsite during the site inspection, All of the avifaunal species observed within the study site are considered to be of Least Concern by the IUCN and are common and widespread species (**Figure 6-9** and **Figure 6-10**).



Figure 6-9: Cape starling observed onsite.



Figure 6-10: Nests observed onsite.

6.9 INVERTEBRATES

Butterflies are a good indication of the habitats available in a specific region (Woodhall 2005). Although many species are eurytopes (able to use a wide range of habitats) and are widespread and common, South Africa has many stenotrope or endemic species (specific habitat requirements with populations concentrated in a small area) which may be very specialized (Woodhall 2005). Butterflies are useful indicators as they are relatively easy to locate and catch, and therefore identify.


6.9.1 FIELD INVESTIGATION FINDINGS

No butterflies or other invertebrates of conservation concern were seen on site.

7. TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT

The impact assessment is aimed predicting potential impacts of the proposed projects. Impact assessment strives to avoid damage, loss of ecosystems services, and where they cannot be avoided, to reduce and mitigate these impacts (DEA, 2013). Offsets to compensate for loss of habitat are regarded as a last resort, after all efforts have been made to avoid, reduce and mitigate. The mitigation hierarchy is represented in **Table 7-1**.

Table 7-1: Mitigation hierarchy of impacts

	Avoid or prevent	Refers to considering options in project location, sitting, scale, layout, technology and phasing to avoid impacts on biodiversity, associated ecosystem services and people. This is the best option but is not always possible. Where environmental and social factors give rise to unacceptable negative impacts, the activity should not take place. In such cases, it is unlikely to be possible or appropriate to rely on the other steps in the mitigation.
	Minimise	Refers to considering alternatives in the project location, sitting, scale, layout, technology and phasing that would minimise impacts on biodiversity, associated ecosystem services. In cases where there are environmental constraints, every effort should be made to minimise impacts.
	Rehabilitate	Refers to rehabilitation of areas where impacts are unavoidable, and measures are provided to return impacted areas to near natural state or an agreed land use after mine closure. Rehabilitation can, however, fall short of replicating the diversity and complexity of natural systems.
	Offset	Refers to measures over and above rehabilitation to compensate for the residual negative impacts on biodiversity after every effort has been made to minimise and then rehabilitate the impacts. Biodiversity offsets can provide a mechanism to compensate for significant residual impacts on biodiversity.

A significant portion of the powerline servitude with the remaining natural habitat is anticipated to be disturbed due to the proposed construction and associated activities. The impact of the proposed activity will involve a loss of habitat for both flora and fauna (**Table 7-2**).

7.1 GENERAL IMPACT ASSESSMENT

Table 7-2: Assessment of impacts associated with the proposed development.

CONSTRUCTION PHASE
IMPACT 1: LOSS OF VEGETATION (Approximately 30 hectares)
<u>Cause and Comment</u>
<i>Direct Impact</i> The clearing of land for the construction will result in the loss of vegetation. However, vegetation clearance will only be restricted to the powerline servitude. Therefore, the clearance of vegetation required for the required soil material is likely to impact on the extent and long-term conservation of this vegetation types. The overall significance of the project activities at this site, provided the recommended mitigation measures are implemented, would be moderate negative.
<i>Cumulative Impact</i> The bulk of the vegetation is still intact, with evidence of disturbance along certain sections of the powerline servitude. The proposed development will have a negative impact on the vegetation onsite. The additional loss of vegetation as a consequence of the proposed development will therefore have a High cumulative impact.
<i>No-Go Alternative</i> If the project does not go ahead, the current impacts associated with existing powerlines will continue. However, these are relatively minor within the proposed site and as such, the No-go Alternative is classified as low negative .

TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT FOR THE PROPOSED 132KV D/C TOUWSRIVIER-LAINSBURG LINE REPAIRS, WITHIN BREEDE VALLEY LOCAL MUNICIPALITY OF CAPEWINELANDS DISTRICT AND LAINGSBURG LOCAL MUNICIPALITY OF CENTRAL KAROO DISTRICT, WESTERN CAPE PROVINCE.

Mitigation Measures:

- Construction vehicles and machinery must not encroach into identified 'sensitive' areas or areas outside the project footprint. Refer to **Figure 5-3** and **Figure 5-4**.
- Topsoil (20 cm, where possible) must be collected and stored in an area of low sensitivity and used to rehabilitate impacted areas that are no longer required during the operational phase (e.g. laydown areas).
- Only indigenous species must be used for rehabilitation. The species include *Hereroa odorata (d)*, *Antimima fergusoniae*, *A. maxwellii*, *A. wittebergensis*, *Aridaria noctiflora subsp. straminea*, *Crassula nudicaulis*, *C. rupestris subsp. Commutate* etc. (Refer to **Table 5-1** for the full list of indigenous species).
- Lay down areas must not be located within any watercourses or drainage lines. Refer to **Error! Reference source not found.**
- Employees must be prohibited from making open fires during the construction phase.

- The Alien Invasive Management Plan should be compiled and implemented. Refer to **Appendix 2**. There site has *Ricinus communis* and *Opuntia ficus* near Laingsburg.

Significance Assessment:

Impact	Nature	Duration	Extent	Severity	Likelihood	Significance Before Mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance After Mitigation
Available Site	Direct	Permanent	Study-Area	Moderate	Definite	MODERATE (-)	Reversible	Resource will be partly lost	Achievable	MODERATE (-)

TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT FOR THE PROPOSED 132KV D/C TOUWSRIVIER-LAINSBURG LINE REPAIRS, WITHIN BREEDE VALLEY LOCAL MUNICIPALITY OF CAPEWINELANDS DISTRICT AND LAINGSBURG LOCAL MUNICIPALITY OF CENTRAL KAROO DISTRICT, WESTERN CAPE PROVINCE.

Cumulative	Cumulative	Long-Term	Study-Area	Slight	Possible	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 farming 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	Direct	Short-Term	Localised	Moderate	Probable	Low (-)	N/A	

IMPACT 2: LOSS OF PLANT SPECIES OF CONSERVATION CONCERN

Cause and Comment

Direct Impact

The permanent loss of plant species of conservation (I.e *Eriocephalus grandiflorus* *Lotononis venosa*, *Cleretum lyratifolium* etc.) may ~~xxx~~ Some of these are restricted range species with small Areas of Extent. The severity of the impact will be of high significance if a population of one or more of these species is affected. However, if populations of these species are avoided by the careful placement of infrastructure, the impact can be reduced to moderate significance. Refer to **Table 6-3: Plant species of conservation concern expected to occur in grid square 3319DA, BD DB as well as the conservation status of each (POSA, 2017; SANBI, 2017)**

Cumulative Impact

(*Eriocephalus grandiflorus* *Lotononis venosa*, *Cleretum lyratifolium* amongst other SCC's have likely already been lost as a result of the existing development onsite. As such, the loss of SCC associated with the proposed activities will likely contribute to the cumulative loss of SCC within the region. However, if the mitigation measures as described in this report are implemented and adhered to, this impact can be reduced to moderate negative.

TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT FOR THE PROPOSED 132KV D/C TOUWSRIVIER-LAINSBURG LINE REPAIRS, WITHIN BREEDE VALLEY LOCAL MUNICIPALITY OF CAPEWINELANDS DISTRICT AND LAINGSBURG LOCAL MUNICIPALITY OF CENTRAL KAROO DISTRICT, WESTERN CAPE PROVINCE.

No-Go Alternative

The No-go alternative will not require the clearance of vegetation and will therefore not result in the loss of plant SCC. The no-go alternative is therefore **negligible**.

Mitigation Measures:

- Development should be confined to the footprint of existing pylons to minimize potential adverse effects on the SCC.

Significance Assessment:

Impact	Nature	Duration	Extent	Severity	Likelihood	Significance Before Mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance After Mitigation
Both Layout Alternatives	Direct	Permanent	Study-Area	Severe	Definite	HIGH (-)	Reversible	Resource will be partly lost	Achievable	MODERATE (-)
Cumulative	Cumulative	Long-Term	Study-Area	Severe	May Occur	HIGH (-)	Reversible	Resource will be partly lost	Achievable	MODERATE (-)
No-Go	N/A					NEGLIGIBLE	N/A			

OPERATIONAL PHASE

No direct loss of habitat is expected during this phase of the project. Alien plant invasion is, however expected to occur. In addition, vehicular transport through the site may increase the risk of roadkill of fauna species that occur (**Table 7-3**).

Table 7-3: Loss of habitat during operation phase

Loss of habitat					
Phase	Operational				
Criteria	Details / Discussion				
Description of impact	<ul style="list-style-type: none"> Establishment of alien plant species in disturbed areas 				
Mitigation required	<ul style="list-style-type: none"> Manage alien invasive species establishment continually through chemical or mechanical removal. Reinstate vegetation cover through concurrent rehabilitation Erect signage to control the speed limit for trucks and other vehicles moving through the site 				
Parameters	<i>Intensity</i>	<i>Spatial scale</i>	<i>Duration</i>	<i>Probability</i>	<i>Significance</i>
Pre-Mitigation	Serious (4)	Limited (2)	Short-term (3-5 years) (3)	Likely (6)	Major (negative) (54)
Post Mitigation	Limited (1)	Minor (2)	Short-term (3-5 years) (3)	Likely (4)	Minor (negative) (24)

DECOMMISSIONING PHASE

No direct loss of habitat is expected during this phase of the project. Alien plant invasion is, however expected to occur as vehicles and machinery move throughout the site and disturb the soil (**Table 7-4**).

Table 7-4: Loss of habitat during decommissioning

Loss of habitat	
Phase	Decommissioning
Criteria	Details / Discussion

TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT FOR THE PROPOSED 132KV D/C TOUWSRIVIER-LAINSBURG LINE REPAIRS, WITHIN BREEDE VALLEY LOCAL MUNICIPALITY OF CAPEWINELANDS DISTRICT AND LAINGSBURG LOCAL MUNICIPALITY OF CENTRAL KAROO DISTRICT, WESTERN CAPE PROVINCE.

Description of impact	<ul style="list-style-type: none"> Removal infrastructure and equipment Disturbance of the soil Vehicle operation 				
Mitigation required	<ul style="list-style-type: none"> Minimise the impacted area and revegetate with indigenous where disturbed Avoid erosion, manage alien invasive species establishment, ensure the re-establishment of natural vegetation Employ stormwater management measures 				
Parameters	Intensity	Spatial scale	Duration	Probability	Significance
Pre-Mitigation	Very Significant (7)	National (6)	Permanent (6)	Likely (6)	Major (negative) (115)
Post Mitigation	Significant (6)	National (6)	Short-term (3-5 years) (3)	Likely (6)	Minor (negative) (90)

POST CLOSURE PHASE

No direct loss of habitat is expected during this phase of the project. Alien plant invasion should be monitored for up to 1-6 months after closure (**Table 7-5**).

Table 7-5: Loss of habitat during post-closure phase

Loss of habitat					
Phase	Post-closure				
Criteria	Details / Discussion				
Description of impact	<ul style="list-style-type: none"> On-going establishment of alien plant species in disturbed areas 				
Mitigation required	<ul style="list-style-type: none"> Manage alien invasive species establishment continually through chemical or mechanical removal. Revegetation of the site where previously disturbed. 				
Parameters	Intensity	Spatial scale	Duration	Probability	Significance
Pre-Mitigation	Serious (4)	Limited (2)	Short-term (3-5 years) (3)	Likely (6)	Major (negative) (54)

TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT FOR THE PROPOSED 132KV D/C TOUWSRIVIER-LAINSBURG LINE REPAIRS, WITHIN BREEDE VALLEY LOCAL MUNICIPALITY OF CAPEWINELANDS DISTRICT AND LAINGSBURG LOCAL MUNICIPALITY OF CENTRAL KAROO DISTRICT, WESTERN CAPE PROVINCE.

Post Mitigation	Limited (1)	Minor (2)	Short-term (3-5 years) (3)	Likely (4)	Minor (negative) (24)
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8. IMPACT STATEMENT, CONCLUSIONS AND RECOMMENDATIONS

The site inspection was conducted during the wet season, and thus there are plant species that may have been missed or misidentified. Some plant species that emerge and bloom during another time of the year or under very specific circumstances may have been missed entirely.

The study site was surveyed on the 28th of June 2025 to ascertain the overall state of biodiversity. The proposed 132kv D/C Touwsrivier-Lainsburg line repairs touches a few Ecological Support Areas (ESA), this implies that these areas should be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. This implies that the powerline repairs should be restricted to the existing servitude to minimise the footprint of the powerline repairs which will help protect these sensitive areas. The sensitivity maps should be used as a guide to identify no-go areas, this should be under the supervision of a qualified ECO. The contractor must be extra cautious when working in the mountainous areas near Laingsburg.

A summary of the biodiversity assessment is outlined Below:

8.1 Ecological Characteristics of the study sites:

The proposed site consists of eight (8) vegetation units, majority of which are classified as Least Threatened, one Endangered and one Vulnerable. This implies that the powerline repairs may need to be conducted carefully near areas that are classified as Endangered and Vulnerable. The area consists of slightly undulating to hilly landscape covered by low succulent scrub and dotted by scattered tall shrubs, patches of 'white' grass visible on plains, the most conspicuous dominants being dwarf shrubs of *Pteronia*, *Drosanthemum* and *Galenia*. The powerline servitude has been disturbed to some extent, especially around the winelands. The most sensitive areas are linked to the nature reserves and the mountainous areas.

9. STATEMENT AND OPINION OF THE SPECIALIST

The proposed development is considered environmentally acceptable, provided that the mitigation measures and recommendations outlined in this report are fully implemented and adhered to. Given the scope of the project, extensive vegetation clearing will not be required, as activities will be confined to the existing servitude and pylons.

If populations of Critically Endangered as listed in **Table 6-3**, or Endangered SCC (i.e. *Eriocephalus grandiflorus* *Lotononis venosa*, *Cleretum lyratifolium* etc) are found consider relocating them to the areas outside of the development footprint, and where this is not feasible, permits for their removal must be obtained from the relevant competent authority. Species that are known to survive translocation should be translocated to the nearest similar habitat type (adjacent areas that are outside of the development footprint. The ECO will be able to guide this process). Where possible avoid the rocky outcrops that are located outside of the development footprint, and extra caution will be required when cutting through the mountainous area because they are aligned to the Critical Biodiversity Areas.

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11. APPENDIX 1: LIST OF FLORA SPECIES EXPECTED ONSITE

Spreadsheet for creating species lists for describing vegetation types. It allows formatting in the paragraphs as contained in the book Mucina and Rutherford (2006).

VegType	Name of vegetation type. Full name, e.g. SVcb 21 Soutpansberg Mountain Bushveld
TaxonList	Important Taxa; Endemic Taxa; Biogeographically Important Taxa.
SubDivision	Vegetation type subdivision (optional, e.g. 'Mistbelt bush clumps', 'Open savanna sandveld' in SVcb 21 Soutpansberg Mountain Bushveld)
FamilyName	Name of family in which the taxon is classified. This is not essential, but is useful for quality control purposes.
GrowthForm	Refer to Table 2.1 (page 26 of Mucina & Rutherford (2006))
TaxonName	Name of taxon. Normally no subspecies or variety, unless they are diagnostic or endemic. Avoid sp. or spp. Do not abbreviate genus names - that comes in the formatting stage.
Superscript	Superscript. It must include an explanation of what the superscript means.
text for superscript	e.g. (^T Cape thickets, ^w Wetlands) e.g. T for 'Cape Thickets' in FFs1, page 99 of Mucina & Rutherford (2006)
Dominant	Dominant (biomass) or prominent (e.g. conspicuous). See p. 27 of Mucina & Rutherford (2006). Other unformatted suggested text can be put here.
Sort	This gives the order in which the author intends the species to be listed. Not essential, but highly desirable to give the author's choice.
Qualifier	Any qualifier as it appears in the book.e.g. variant 'speciosa'; (West Coast endemic); (southernmost distribution limit)
Growth Form Sort	Refer to the tab Growth forms and order . The order should normally follow the order already used in the biome.

VegType	TaxonList	SubDivision	FamilyName	GrowthForm	TaxonName	Superscript	Dominant	Sort	Qualifier	Growth Form Sort
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	AMARANTHAC	EAE	Low Shrubs	Sericocoma pungens	S		13323		6
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	AMARYLLIDAC	EAE	Geophytic Herbs	Brunsvigia comptonii	S		13326		2 0

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SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	APOCYNACEA E	Succulent Herbs	Pectinaria longipes subsp. longipes	R H		2 1
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	APOCYNACEA E	Succulent Herbs	Piaranthus comptus	GKB	13331	2 1
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	APOCYNACEA E	Succulent Herbs	Quaqua parviflora subsp. gracilis	R H		2 1
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	APOCYNACEA E	Succulent Herbs	Tridentea parvipuncta subsp. parvipuncta	GKB	13333	2 1
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	ASPHODELACE AE	Succulent Herbs	Aloe longistyla	W	13328	2 1
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	ASTERACEAE	Herbs	Helichrysum cerastioides var. aurosicum	W	13324	1 9
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	ASTERACEAE	Herbs	Ifloga molluginoides	S	13325	1 9
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	ASTERACEAE	Low Shrubs	Felicia lasiocarpa	GKB	13322	6
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	CRASSULACEA E	Succulent Herbs	Crassula hemisphaerica	W	13329	2 1
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	HYACINTHACE AE	Geophytic Herbs	Drimia karooica	W	13327	2 0
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Deilanthus peersii	W	13316	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Hereroa crassa	GKB	13317	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Pleiospilos nelii	GKB	13318	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Rhinephyllum graniforme	GKB	13319	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Ruschia crassa	GKB	13320	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Biogeographically Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Ruschia perfoliata		13321	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Endemic Taxa	AMARYLLIDAC EAE	Geophytic Herbs	Strumaria undulata		13348	2 0
SKv 6 Koedoesberge-Moordenaars Karoo	Endemic Taxa	ASPHODELACE AE	Succulent Herbs	Haworthia nortieri var. pehlemanniae		13349	2 1
SKv 6 Koedoesberge-Moordenaars Karoo	Endemic Taxa	CRASSULACEA E	Succulent Shrubs	Tylecodon faucium		13344	1 0

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SKv 6 Koedoesberge-Moordenaars Karoo	Endemic Taxa	GERANIACEAE	Low Shrub	Pelargonium stipulaceum subsp. ovato-stipulatum	13345	6
SKv 6 Koedoesberge-Moordenaars Karoo	Endemic Taxa	HYACINTHACEAE				2
SKv 6 Koedoesberge-Moordenaars Karoo	Endemic Taxa	AE	Geophytic Herbs	Lachenalia comptonii	13347	0
SKv 6 Koedoesberge-Moordenaars Karoo	Endemic Taxa	MESEMBRYANTHEAE	Succulent Shrubs	Antimima karroidea	13335	0
SKv 6 Koedoesberge-Moordenaars Karoo	Endemic Taxa	MESEMBRYANTHEAE	Succulent Shrubs	Antimima loganii	13337	0
SKv 6 Koedoesberge-Moordenaars Karoo	Endemic Taxa	MESEMBRYANTHEAE	Succulent Shrubs	Calamophyllum teretiusculum	13338	0
SKv 6 Koedoesberge-Moordenaars Karoo	Endemic Taxa	MESEMBRYANTHEAE	Succulent Shrubs	Cerochlamys gemina	13339	0
SKv 6 Koedoesberge-Moordenaars Karoo	Endemic Taxa	MESEMBRYANTHEAE	Succulent Shrubs	Drosanthemum comptonii	13340	0
SKv 6 Koedoesberge-Moordenaars Karoo	Endemic Taxa	MESEMBRYANTHEAE	Succulent Shrubs	Ruschia karrooica	13341	0
SKv 6 Koedoesberge-Moordenaars Karoo	Endemic Taxa	MESEMBRYANTHEAE	Succulent Shrubs	Tanquana archeri	13342	0
SKv 6 Koedoesberge-Moordenaars Karoo	Endemic Taxa	MESEMBRYANTHEAE	Succulent Shrubs	Trichodiadema hallii	13343	0
SKv 6 Koedoesberge-Moordenaars Karoo	Endemic Taxa	SANTALACEAE	Semiparasitic Shrub	Thesium marlothii	13346	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa		Succulent Shrubs	Hoodia grandis	13179	0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ACANTHACEAE	Low Shrubs	Barleria stimulans	13202	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ACANTHACEAE	Low Shrubs	Monechma spartioides	13225	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	AIZOACEAE	Low Shrubs	Galenia africana	13214	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	AIZOACEAE	Low Shrubs	Galenia fruticosa	13215	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	AIZOACEAE	Succulent Herbs	Tetragonia microptera	13295	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	AIZOACEAE	Succulent Shrubs	Tetragonia robusta var. psiloptera	13189	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	AMARYLLIDACEAE	Succulent Shrubs			0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	EAE	Geophytic Herbs	Strumaria karooica	13273	2

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SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	AMARYLLIDACEAE	Geophytic Herbs	Strumaria pubescens	13274	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	APOCYNACEAE	Herbaceous			0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	E	Climber	Fockea sinuata	13249	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	APOCYNACEAE	Low Shrubs	Microloma armatum	13224	5
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	E	Succulent Herbs	Pectinaria articulata	13285	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	APOCYNACEAE	Succulent Herbs	Piранthus parvulus	13286	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	E	Succulent Herbs	Quaqua arenicola subsp. arenicola	13289	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	APOCYNACEAE	Succulent Herbs	Quaqua arida	13290	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	E	Succulent Herbs	Quaqua ramosa	13291	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	APOCYNACEAE	Succulent Herbs	Stapelia pillansii	13292	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	E	Succulent Herbs	Stapelia rufa	13293	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	APOCYNACEAE	Succulent Herbs	Stapeliopsis exasperata	13294	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	E	Succulent Shrubs	Hoodia gordonii	13178	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	APOCYNACEAE	Woody Climbers	Microloma sagittatum	13248	0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASPARAGACEAE	Low Shrubs	Asparagus burchellii	13199	3
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	E	Low Shrubs	Asparagus capensis var. capensis	13200	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASPARAGACEAE	Woody Climbers	Asparagus fasciculatus	13245	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	E	Woody Climbers	Asparagus racemosus	13246	3
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASPARAGACEAE	Woody Climbers	Asparagus retrofractus	13247	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	E	Geophytic Herbs	Trachyandra thyrsoidea	13275	3
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASPHODELACEAE				2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	AE				0

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SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASPHODELACEAE	Succulent Herbs	<i>Astroloba foliolosa</i>	13276	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASPHODELACEAE	Succulent Herbs	<i>Astroloba spiralis</i>	13277	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASPHODELACEAE	Succulent Herbs	<i>Haworthia marumiana</i> var. <i>archeri</i>	13283	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Herbs	<i>Felicia bergeriana</i>	13252	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Herbs	<i>Gazania jurineifolia</i> subsp. <i>scabra</i>	13253	9
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Herbs	<i>Leysera tenella</i>	13258	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Herbs	<i>Syncarpha dregeana</i>	13261	9
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Herbs	<i>Ursinia nana</i>	13262	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	<i>Amphiglossa tomentosa</i>	13196	9
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	<i>Athanasia minuta</i> subsp. <i>inermis</i>	13201	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	<i>Berkheya spinosa</i>	13203	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	<i>Chrysocoma ciliata</i>	13204	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	<i>Eriocephalus africanus</i>	13205	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	<i>Eriocephalus ericoides</i>	13206	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	<i>Eriocephalus pauperrimus</i>	13207	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	<i>Eriocephalus spinescens</i>	13208	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	<i>Euryops lateriflorus</i>	13209	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	<i>Felicia filifolia</i>	13210	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	<i>Felicia macrorrhiza</i>	13211	6

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SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	Felicia muricata	13212	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	Felicia scabrida	13213	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	Garuleum bipinnatum	13216	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	Helichrysum lucilioides	13217	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	Pentzia incana	13228	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	Pteronia adenocarpa	13230	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	Pteronia ambrariifolia	13231	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	Pteronia empetrifolia	13232	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	Pteronia glauca	13233	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	Pteronia glomerata	13234	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	Pteronia incana	[d] 13195	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	Pteronia pallens	13235	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	Pteronia scariosa	13236	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	Pteronia sordida	13237	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	Senecio haworthii	13239	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Low Shrubs	Tripteris sinuata	13240	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ASTERACEAE	Succulent Herbs	Tripteris aghillana var. integrifolia	13296	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	BIGNONIACEAE	Low Shrubs	Rhigozum obovatum	13238	6

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SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	BRASSICACEA	Herbs	Lepidium africanum	13256	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	BRASSICACEA	Herbs	Lepidium desertorum	13257	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	CHENOPODIA	Herbs	Atriplex suberecta	13251	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	CEAE	Succulent Shrubs	Manochlamys albicans	13181	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	CHENOPODIA	Succulent Shrubs	Salsola aphylla	13186	0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	CEAE	Succulent Herbs	Crassula deceptor	13279	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	CEAE	Succulent Herbs	Crassula muscosa	13280	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	CRASSULACEA	Succulent Herbs	Crassula tomentosa	13281	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	CRASSULACEA	Succulent Shrubs	Crassula nudicaulis	13169	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	CRASSULACEA	Succulent Shrubs	Crassula rupestris subsp. commutata	13170	0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	CRASSULACEA	Succulent Shrubs	Tylecodon reticulatus	13191	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	CRASSULACEA	Succulent Shrubs	Tylecodon wallichii subsp. wallichii	13192	0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	EBENACEAE	Tall Shrub	Diospyros pallens	13194	7
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	EUPHORBIACE	Succulent Shrubs	Euphorbia decussata	13175	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	AE	Succulent Shrubs	Euphorbia eustacei	13176	0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	EUPHORBIACE	Succulent Shrubs	Euphorbia mauritanica	13177	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	AE	Low Shrubs	Lessertia fruticosa	13220	0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	FABACEAE	Low Shrubs	Melolobium candicans	13222	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	FABACEAE	Herbs	Pelargonium minimum	13259	1

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SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	GERANIACEAE	Herbs	Pelargonium nervifolium	13260	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	GERANIACEAE	Low Shrubs	Pelargonium hirtum	13227	9
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	GERANIACEAE	Succulent Shrubs	Pelargonium crithmifolium	13183	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	GERANIACEAE	Succulent Shrubs	Sarcocaulon crassicaule	13187	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	HYACINTHACEAE	Geophytic Herbs	Drimia intricata	13265	0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	AE	Geophytic Herbs	Ornithogalum adseptentrionesvergentulum	13269	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	IRIDACEAE	Geophytic Herbs	Geissorhiza karooica	13266	0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	IRIDACEAE	Geophytic Herbs	Ixia marginifolia	13267	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	IRIDACEAE	Geophytic Herbs	Ixia rapunculoides	13268	0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	IRIDACEAE	Geophytic Herbs	Romulea austinii	13271	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	IRIDACEAE	Geophytic Herbs	Romulea tortuosa subsp. tortuosa	13272	0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MALVACEAE	Herbs	Hermannia althaeifolia	13254	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MALVACEAE	Herbs	Hermannia pulverata	13255	9
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MALVACEAE	Low Shrubs	Hermannia grandiflora	13218	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MALVACEAE	Low Shrubs	Hermannia multiflora	13219	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANTHEMACEAE	Succulent Herbs	Brownanthus vaginatus	13278	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANTHEMACEAE	Succulent Herbs	Deilanthus thudichumii	13282	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANTHEMACEAE	Succulent Herbs	Mesembryanthemum stenandrum	13284	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANTHEMACEAE	Succulent Herbs	Psilocaulon coriarium	13287	1

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SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANT HEMACEAE	Succulent Herbs	Psilocaulon junceum	13288	2 1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Antimima fergusoniae	13165	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Antimima maxwellii	13166	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Antimima wittebergensis	13167	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Aridaria noctiflora subsp. straminea	13168	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Cylindrophyllum comptonii	13171	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Drosanthemum framesii	13172	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Drosanthemum karroense	13173	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Drosanthemum lique	13174	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Hereroa odorata	[d] 13164	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Peersia macradenia	13182	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Ruschia grisea	13184	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Ruschia intricata	13185	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Sceletium rigidum	13188	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MESEMBRYANT HEMACEAE	Succulent Shrubs	Trichodiadema barbatum	13190	1 0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	MOLLUGINACE AE	Low Shrubs	Limeum aethiopicum	13221	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	OLEACEAE	Low Shrubs	Menodora juncea	13223	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	OROBANCHAC EAE	Parasitic Herb	Hyobanche glabrata	13297	2 2

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SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	OXALIDACEAE	Geophytic Herbs	<i>Oxalis obtusa</i>	13270	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	POACEAE	Graminoids	<i>Aristida adscensionis</i>	13298	0
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	POACEAE	Graminoids	<i>Aristida diffusa</i>	13299	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	POACEAE	Graminoids	<i>Ehrharta calycina</i>	13300	5
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	POACEAE	Graminoids	<i>Ehrharta delicatula</i>	13301	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	POACEAE	Graminoids	<i>Enneapogon scaber</i>	13302	5
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	POACEAE	Graminoids	<i>Fingerhuthia africana</i>	13303	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	POACEAE	Graminoids	<i>Karoochloa tenella</i>	13304	5
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	POACEAE	Graminoids	<i>Pentaschistis airoides</i>	13305	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	POACEAE	Graminoids	<i>Stipagrostis ciliata</i>	13306	5
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	POACEAE	Graminoids	<i>Stipagrostis obtusa</i>	13307	2
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	POLYGALACEA	Low Shrubs	<i>Muraltia scoparia</i>	13226	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	POLYGALACEA	Low Shrubs	<i>Polygala seminuda</i>	13229	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	SANTALACEAE	Semiparasitic Shrub	<i>Thesium lineatum</i>	13244	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	SCROPHULARIACEAE	Herbs	<i>Zaluzianskya inflata</i>	13263	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	SCROPHULARIACEAE	Herbs	<i>Zaluzianskya peduncularis</i>	13264	9
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	SCROPHULARIACEAE	Low Shrubs	<i>Aptosimum indivisum</i>	13197	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	SCROPHULARIACEAE	Low Shrubs	<i>Aptosimum spinescens</i>	13198	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	SOLANACEAE	Succulent Shrubs	<i>Lycium oxycarpum</i>	13180	1
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	SOLANACEAE	Succulent Shrubs	<i>Lycium oxycarpum</i>	13180	0

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SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	VISCACEAE	Semiparasitic Epiphytic Shrub	Viscum capense	13250	3
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ZYGOPHYLLAC	Low Shrubs	Zygophyllum microphyllum	13241	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	EAE	Low Shrubs	Zygophyllum retrofractum	13242	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	ZYGOPHYLLAC	Low Shrubs	Zygophyllum spinosum	13243	6
SKv 6 Koedoesberge-Moordenaars Karoo	Important Taxa	EAE	Succulent Shrubs	Zygophyllum flexuosum	13193	0

Spreadsheet for creating species lists for describing vegetation types. It allows formatting in the paragraphs as contained in the book Mucina and Rutherford (2006).

VegType	Name of vegetation type. Full name, e.g. SVcb 21 Soutpansberg Mountain Bushveld
TaxonList	Important Taxa; Endemic Taxa; Biogeographically Important Taxa.
SubDivision	Vegetation type subdivision (optional, e.g. 'Mistbelt bush clumps', 'Open savanna sandveld' in SVcb 21 Soutpansberg Mountain Bushveld)
FamilyName	Name of family in which the taxon is classified. This is not essential, but is useful for quality control purposes.
GrowthForm	Refer to Table 2.1 (page 26 of Mucina & Rutherford (2006))
TaxonName	Name of taxon. Normally no subspecies or variety, unless they are diagnostic or endemic. Avoid sp. or spp. Do not abbreviate genus names - that comes in the formatting stage.
Superscript text for superscript	Superscript. It must include an explanation of what the superscript means. e.g. (^T Cape thickets, ^W Wetlands) e.g. T for 'Cape Thickets' in FFs1, page 99 of Mucina & Rutherford (2006)
Dominant	Dominant (biomass) or prominent (e.g. conspicuous). See p. 27 of Mucina & Rutherford (2006). Other unformatted suggested text can be put here.
Sort	This gives the order in which the author intends the species to be listed. Not essential, but highly desirable to give the author's choice.
Qualifier	Any qualifier as it appears in the book.e.g. variant 'speciosa'; (West Coast endemic); (southernmost distribution limit)
Growth Form Sort	Refer to the tab Growth forms and order . The order should normally follow the order already used in the biome.

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VegType	TaxonList	SubDivision	FamilyName	GrowthForm	TaxonName	Superscript	Dominant	Sort	Qualifier	Growth Form Sort
AZi 6 Southern Karoo Riviere	Endemic Taxon		CYPERACEAE	Graminoid	Isolepis expallescens			30820		25
AZi 6 Southern Karoo Riviere	Important Taxa		ANACARDIACEAE	Small Trees	Rhus lancea	[d]		30791		1
AZi 6 Southern Karoo Riviere	Important Taxa		ASPARAGACEAE	Low Shrub Succulent	Asparagus striatus			30799		6
AZi 6 Southern Karoo Riviere	Important Taxa		ASTERACEAE	Shrubs Tall	Amphiglossa callunoides			30801		10
AZi 6 Southern Karoo Riviere	Important Taxa		CAPPARACEAE	Shrubs Tall	Cadaba aphylla			30794		7
AZi 6 Southern Karoo Riviere	Important Taxa		CELASTRACEAE	Shrubs Tall	Gymnosporia buxifolia			30797		7
AZi 6 Southern Karoo Riviere	Important Taxa		EBENACEAE	Tall Shrubs	Diospyros lycioides	[d]		30792		7
AZi 6 Southern Karoo Riviere	Important Taxa		EBENACEAE	Tall Shrubs	Euclea undulata			30795		7
AZi 6 Southern Karoo Riviere	Important Taxa		FABACEAE	Small Trees Tall	Acacia karroo	[d]		30790		1
AZi 6 Southern Karoo Riviere	Important Taxa		MALVACEAE	Shrubs Tall	Grewia robusta			30796		7
AZi 6 Southern Karoo Riviere	Important Taxa		MELIANTHACEAE	Tall Shrubs	Melianthus comosus			30798		7
AZi 6 Southern Karoo Riviere	Important Taxa		SOLANACEAE	Succulent Shrubs	Lycium cinereum	[d]		30800		10
AZi 6 Southern Karoo Riviere	Important Taxa		SOLANACEAE	Succulent Shrubs	Lycium hirsutum			30802		10

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AZi 6 Southern Karoo Riviere	Important Taxa		SOLANACEAE	Succulent Shrubs	Lycium oxycarpum	308 03	1 0
AZi 6 Southern Karoo Riviere	Important Taxa		TAMARICACEAE	Tall Shrubs	Tamarix usneoides	[d 307 93	7
AZi 6 Southern Karoo Riviere	Important Taxa	Alluvial shrublands & herblands	APOCYNACEAE	Low Shrubs	Carissa haematocarpa	308 07	6
AZi 6 Southern Karoo Riviere	Important Taxa	Alluvial shrublands & herblands	ASTERACEAE	Low Shrubs	Pentzia incana	308 08	6
AZi 6 Southern Karoo Riviere	Important Taxa	Alluvial shrublands & herblands	CHENOPODIACEAE	Low Shrubs	Bassia salsoloides	308 06	6
AZi 6 Southern Karoo Riviere	Important Taxa	Alluvial shrublands & herblands	CHENOPODIACEAE	Succulent Shrubs	Salsola aphylla	[d 308 10	1 0
AZi 6 Southern Karoo Riviere	Important Taxa	Alluvial shrublands & herblands	CHENOPODIACEAE	Succulent Shrubs	Salsola arborea	[d 308 11	1 0
AZi 6 Southern Karoo Riviere	Important Taxa	Alluvial shrublands & herblands	CHENOPODIACEAE	Succulent Shrubs	Salsola geminiflora	308 13	1 0
AZi 6 Southern Karoo Riviere	Important Taxa	Alluvial shrublands & herblands	CHENOPODIACEAE	Succulent Shrubs	Salsola gemmifera	308 14	1 0
AZi 6 Southern Karoo Riviere	Important Taxa	Alluvial shrublands & herblands	CYPERACEAE	Graminoids	Cyperus marginatus	308 17	2 5
AZi 6 Southern Karoo Riviere	Important Taxa	Alluvial shrublands & herblands	LAMIACEAE	Low Shrubs	Ballota africana	308 05	6
AZi 6 Southern Karoo Riviere	Important Taxa	Alluvial shrublands & herblands	MESEMBRYANTHEMACEAE	Succulent Shrubs	Drosanthemum lique	308 12	1 0
AZi 6 Southern Karoo Riviere	Important Taxa	Alluvial shrublands & herblands	MESEMBRYANTHEMACEAE	Succulent Shrubs	Malephora uitenhagensis	[d 308 09	1 0
AZi 6 Southern Karoo Riviere	Important Taxa	Alluvial shrublands & herblands	POACEAE	Graminoids	Cenchrus ciliaris	308 16	2 5
AZi 6 Southern Karoo Riviere	Important Taxa	Alluvial shrublands & herblands	POACEAE	Graminoids	Cynodon incompletus	[d 308 15	2 5
AZi 6 Southern Karoo Riviere	Important Taxa	Reed beds	POACEAE	Megagraminoid	Phragmites australis	[d 308 18	2 6

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Azi 6 Southern Karoo Riviere	Important Taxa	Rocky slopes of river canals	POACEAE	Graminoid	Stipagrostis namaquensis	[d]	308 04	2 5
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12. APPENDIX 2- INVASIVE ALIEN PLANT SPECIES MANAGEMENT PLAN

12.1 PURPOSE OF THE INVASIVE ALIEN PLANT CONTROL PLAN

For this plan, most of the information was gathered from the Department of Water and Sanitation (DWS), the Agricultural Research Council (ARC) and the Working for Water websites (in addition to the physical site visit). There are around two hundred (200) listed invasive alien plant species, which have been listed as Categories 1a and b, 2 and 3 under the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) [as amended] (NEMBA). These lists do not include all exotic species that can be found in South Africa, but only lists species which have become problematic within the study site and surrounding areas and require control.

This document focuses mainly on invasive alien species listed under legislation, and that are typically associated with the Vegetation units, or those that have in the past been observed in the surrounding area. Other problem plants, whether exotic or indigenous species.

This Invasive Alien Plants Control Plan is not a static document and should be regarded as dynamic. Therefore, the programme was compiled in such a way that other species can be added, should they be identified on the study site, or should they become problematic within the area.

The content of this report includes a summary of relevant legislation, a brief overview of the problems associated with IAP species establishment, various control and eradication methods available, a list of chemicals that are registered and can be utilised to control and or eradicate IAP species and information sheets for the IAP species of concern. The information sheets indicate the category of listed IAP species that the species belongs to, the growth form of the species, the measures that can be used to control or eradicate these species and the monitoring methodology that should be applied. The use of the information sheets allows for easy update(s) of the various information as research uncover newer, improved measures to control and or eradicate species, and as biological control agents become available on the market.

IAP species can out-compete native species, especially when ecosystem health is stressed by factors such as drought, fire, pollution, resource exploitation and landscape disturbances. The lack of knowledge on how invasive species function in their new

environment, significantly inhibits the ability to detect and eradicate new or smaller infestations. Efforts to find and eliminate new infestations, are hampered by the lack of an effective early warning and rapid response system. In addition, there is a shortage of safe and effective techniques to limit the impact on non-target areas or sensitive natural species. Furthermore, control efforts can be hampered when they extend across multiple geopolitical jurisdictions and ownerships, especially in urban areas. Rehabilitation and restoration efforts require new and expanded sources of endemic plant materials and improved techniques to repair damaged ecosystems.

12.2 TERMS OF REFERENCE

As Per Government Notice Regulation 598: Alien and Invasive Species Regulations, 2014, which were promulgated in terms of NEMBA, an Invasive Alien Control Plan must be in place to manage invasive alien species, especially those in Categories 1a and 1b. The programme should include alien species removal, control and management procedures. The following aspects are listed and discussed throughout the plan:

1. Alien plant identification and listing;
2. Control of alien plant species;
3. Methods of removing alien plant species;
4. Alien plant material disposal; and
5. Early detection and rapid response to alien infestation.

12.3 REFERENCE DOCUMENTS

The following list of documentation was reviewed prior to the site visits, and was used to formulate the objectives for the IAP Management Plan:

- i. National Environmental Management Act, 1998 (Act No. 107 of 1998) [as amended] (NEMA);
- ii. National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) [as amended] (NEMBA);
- iii. National Water Act, 1998 (Act No. 36 of 1998 [as amended] (NWA);
- iv. Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) [as amended] (CARA);
- v. The Department of Water Affairs and Forestry Environmental Best Practice Specifications of 2005;
- vi. Policies on invasive alien eradication methods; and

- vii. GNR 598: NEMBA: Alien and Invasive Species Regulations, 2014 [as amended 2016].

12.4 LEGAL REFERENCE

12.4.1 National Legislation

1. The Constitution of the Republic of South Africa Act (Act No. 108 of 1996) [as amended] (CSA) Section 24

The Constitution is South Africa's overarching law. It prescribes minimum standards with which existing and new laws must comply. Chapter 2 of the Constitution contains the Bill of Rights in which basic human rights are enshrined. Section 24 of this chapter states that "Everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development." Government's commitment to give effect to the environmental rights enshrined in the Constitution is evident from the enactment of various pieces of environmental legislation since 1996, including the National Water Act, the National Environmental Management Act, etc.

2. National Environmental Management Act (Act No. 107 Of 1998) [as amended] (NEMA)

NEMA replaces a number of the provisions of the Environment Conservation Act, 1989 (Act No. 73 of 1989). The Act provides for cooperative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for coordinating environmental functions. The principles enshrined in NEMA guide the interpretation, administration and implementation of the Act with regards to the protection and / or management of the environment. These principles serve as a framework within which environmental management must be formulated. Section 2(4) specifies that "sustainable development requires the consideration of all relevant factors including the following aspects specifically relevant to biodiversity":

- The disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;

- The development, use, and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;
- A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- Negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.

Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

Of particular importance are the Environmental Impact Assessment (EIA) regulations, 2014 of the Act, which identify activities that may have a substantial detrimental effect on the environment. The identification of these activities results in the activity being prohibited unless the competent authority has granted a written authorisation after the consideration of an environmental impact assessment or basic assessment.

Section 28 (1) also places a "Duty of Care" and responsibilities to minimise and remediate environmental degradation on any person.

3. National Environmental Management: Biodiversity Act (Act No. 10 of 2004) [as amended] (NEMBA)

NEMBA provides for the management and conservation of biological diversity and components thereof; the use of indigenous biological resources in a sustainable manner; the fair and equitable sharing of benefits rising from bio-prospecting of biological resources; and cooperative governance in biodiversity management and conservation within the framework of NEMA. The Act also gives effect to International Strategic Review of the Status of Biodiversity Management in the South African Mining Industry agreements relating to biodiversity. The Act states that the Minister of Environmental Affairs, may

identify any process or activity in a listed ecosystem as a threatening process and will, thereafter, be regarded as an activity contemplated in Section 24(2)(b) of NEMA which states that:

a) Specified activities may not be commenced without prior authorisation from the Minister or MEC. This Act allows for any person, organisation or organ of state to contribute to biodiversity management. Such a party may submit to the Minister a draft management plan for an ecosystem or species. Should the Minister approve the management plan, an agreement can be entered into regarding the implementation of the plan.

b) NEMBA established the South African National Biodiversity Institute (SANBI) and gave it a mandate regarding monitoring, advising and co-coordinating biodiversity issues in South Africa.

Furthermore, Alien and Invasive Species Regulations, as well as new lists of invasive species under NEMBA, came into effect in August 2014, further assigning new categories for species designated under section 70 of the Act that cannot be propagated, grown, bought or sold by any industry without a permit. NEMBA categories of invasive alien plant species are as follows:

a) Category 1a: Invasive plant species requiring compulsory control. These plants can be removed and destroyed and any species falling within this category is by law required to be eradicated from the environment. No permits should be sought or given to keep or propagate plant species falling within this category.

b) Category 1b: Invasive plants requiring compulsory control as part of invasive alien plant species control programme. These plants are considered to have high invasive potential, thus require removal and eradication. Plants falling within this category qualify for governmental sponsored invasive alien plants control and Control Plans. Furthermore, no permits will be issued to keep or sell plant falling within this category.

c) Category 2: The plants falling within this category are invasive alien plants regulated by area or locality. These invasive alien plant species requires a demarcation permit in order to import, grow, breed, sell, buy or accept as gifts. However, no permit will be issued for invasive plant species within this category existing in riparian areas or zones.

d) Category 3: These invasive alien plant species are regulated by activity, thus an individual plant permit is required to import, grow, breed, possess, sell, buy, or move

these plants. No permit is issued for Category 3 invasive alien plant species existing in riparian areas.

4. National Water Act (Act No. 36 of 1998) [as amended] (NWA)

The National Water Act (NWA) is a legal framework for the effective and sustainable management of water resources in South Africa. Central to the NWA is recognition that water is a scarce resource in the country which belongs to all the people of South Africa and needs to be managed in a sustainable manner to benefit all members of society. The NWA places a strong emphasis on the protection of water resources in South Africa, especially against its exploitation, and the insurance that there is water for social and economic development in the country for present and future generations.

12.5 OBJECTIVES

This document describes the potential areas / sources of IAP infestation and provides a method for their control and management. The primary objective of this document is to provide an IAP Control Plan that focuses on IAPs control measures to be implemented by the Applicants on the site/s. Furthermore, it aims to provide methods to minimise, and also monitor the IAP infestation(s) as a result of vegetation clearance due to any activities.

This objective will be met through the implementation of the management measures specified in this plan, including:

- Effective management of IAP species currently occurring within the study area;
- Control and rehabilitation of open or unused areas at the site where possible; and
- Minimise re-invasion through preventative measures such as regular monitoring and planting of an endemic plant species during construction.

12.6 CONTROL OF ALIEN INVASIVE AND PROBLEM PLANT SPECIES

Alien plant invasions cause a decline in species diversity, local extinction of indigenous species and ecological imbalance. Thus, preventing the onset of an alien invasion, management of further spreading is required as problem plants outcompete indigenous plant species and quickly establish themselves in an area. In light of this, a national strategy was compiled identifying four primary programs to address the management of alien invasive plant species as listed below:

1. Prevention: Keep the invasive species out;

2. Early detection and rapid response: Detect and eradicate invasive species to stop them from spreading;
3. Control and management: Eliminate or control the problem of invasive species; and
4. Rehabilitation and restoration: Heal, minimize, or reverse the harmful effects from invasive species.

The occurrence of alien invasive plants not only affect the growth and distribution of natural endemic plants, they also use more water than indigenous plants, some have toxic fruits or leaves which when consumed could lead to fatalities. Therefore, alien invasive plant species need to be controlled or removed and the following section contains different methods that can be used.

The ultimate aim of an alien invasive management plan is to completely eradicate problem species from site. This is often very difficult as many of the species have seeds that remain viable for a very long time and even after physical removal of plants, the seeds germinate to form new infestations. An alien invasive management plan must therefore be an ongoing practice over many years and should follow the following phases:

1. The initial bulk eradication of alien invasive species by chemical or mechanical means, and in some instances biological control agents. This may also require rehabilitation if large stands of alien invasive species are removed. Local, indigenous species should be planted in the disturbed areas;
2. There should also be immediate follow up and all seedlings should be pulled out and removed. This should be done regularly, although the timeframes will vary from species to species depending on their growth forms and rates; and
3. Finally, monitoring of areas that appear to be under controlled must continue on at least an annual basis. Rehabilitated areas should also be monitored and action taken immediately if regeneration of problem plants occur.

Various options are available for the control of alien invasive species, including mechanical, chemical and biological control. In most instances, mechanical means are utilised and include physical removal of plants. Research on use of herbicides has been conducted on many species and can be applied in conjunction with mechanical methods. For some species, herbicides have not yet been fully researched and/or herbicides have not been registered and these need to be mechanically controlled. The Department of Water and Sanitation's Working for Water section provides guidelines to the preferred clearing methods for most problem plants. This information can be obtained from their

website: <http://www.dwaf.gov.za/wfw/Control/>. The selection of appropriate methods of control shall be based on the species to be controlled, the size of the plants, the density of the stand, the accessibility of terrain and environmental safety.

Biological control of alien invasive species is an ongoing process with some biological control agents having been released on various alien invasive species showing varying degrees of success. Biological control options need to be carried out with specialist advice from academic or research institutes involved in research of alien invasive species.

Control options must take into account the species being controlled, as well as the ecosystem in which the control options are being applied. For instance, some of the herbicides registered for control of alien invasive species may not be used in riparian areas, while some should preferably be used in areas where natural grass cover occurs. Some herbicides should only be utilised after consultation with a Working for Water technical advisor.

The control options are discussed below as individual actions, but in many cases integrated measures (more than one (1) control measure) are taken for more effective control of alien invasive species.

The Department of Water and Sanitation proposes that the following methods of control for age or size target plants:

❖ Seedlings

Hand pulling or hoeing:

- Hand pulling/hoeing should be carried out in sparse stands.
- Seedlings should be severed below the soil surface or removed from the soil. Soil disturbance should be minimized to reduce re-germination.

Herbicides:

- Herbicides can be used on dense stands.

❖ Saplings

Hand pulling or hoeing:

- Where appropriate saplings can be removed manually as described above.

Herbicides:

- Foliar sprays can be carried out depending on the density of the stand. Fan nozzles should be fitted for overall spraying and solid cone nozzles for

individual plant treatment. Spraying should be restricted to plants waist high or lower. Ensure there is sufficient foliage to carry the herbicide to the root system.

- Basal stem treatments of suitable herbicides in diesel can be carried out to the bottom 250 mm of the stem. Applications should be by means of a low pressure, coarse droplet spray from a narrow angle solid cone nozzle.
- Cut stump treatments can be used where stems are cut as low as practical. Herbicides are applied in diesel or water as recommended for the herbicide. Applications in diesel should be to the whole stump and exposed roots and in water to the cut area as recommended on the label.
- The application of herbicides should only be sprayed/used on site by a registered pest control officer.

❖ **Mature Trees (trees above shoulder height or robust bushes 12 – 1 months or older)**

Ring Barking:

- Bark must be removed from the bottom of the stem to a height of 0.75 – 1.0 m. All bark must be removed to below ground level for good results.
- Where clean de-barking is not possible due to crevices in the stem or where exposed roots are present, a combination of bark removal and basal stem treatment should be carried out.

Frilling or partial frilling:

- Cuts should be made through the bark into the sapwood by means of a light axe and a suitable herbicide must be applied into the cuts.

Basal stem treatments:

- Suitable herbicides should be applied in diesel to the base of the stem and to any exposed roots. Stems with a diameter up to 50 mm should be treated to a height of 250 mm and stems above 50 m diameter to a height of 500 mm. This method is only suitable for stems up to 100 mm in diameter.

Cut stump treatment:

- Stumps should be cut as low as practical and the herbicide applied. Applications in diesel should be to the whole stump and exposed roots and in water to the cut area as recommended on the label.