Proposed Sheep Feedlot on Farm Portion 1 of 177 Vrolykheid Farm, Prince Albert Local Municipality

Specialist Plant Species and Terrestrial Biodiversity Report

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Date:	26 May 2025
Version:	Draft

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ABBREVIATIONS

BPA	Biodiversity Priority Area
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CD:NGI	Chief Directorate: National Geo-spatial Information
DFFE	Department of Forestry, Fisheries and the Environment
ESA	Ecological Support Area
FEPA	Freshwater Ecosystem Priority Area
GRI	Garden Route Initiative
LC / LT	Least Concern (referring to species) / Least Threatened (referring to ecosystems)
NEMA	National Environmental Management Act
NEM:BA	National Environmental Management: Biodiversity Act
NVM	National Vegetation Map
ONA	Other Natural Area
POSA	Plants of Southern Africa
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SEI	Site Ecological Importance
SSV	Site Sensitivity Verification
VAST	Vegetation Assets, States, and Transitions
WC BSP	Western Cape Biodiversity Spatial Plan

DECLARATION OF SPECIALIST INDEPENDENCE

The consulting services comprise an assessment of the potential sensitivity of the ecosystems and flora that fall within the development footprint for the site. The following declaration is given by the appointed specialist:

- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- At the time of conducting the field assessment and compiling this report I did not have any interest, hidden or otherwise, in the proposed development that this report has reference to, except for financial compensation for work done in a professional capacity.
- Work performed for this site was done in an objective manner. Even if this results in views and findings that are not favourable to the client/applicant, I will not be affected in any manner by the outcome of any environmental process of which this report may form a part, other than being members of the general public.
- I declare that there are no circumstances that may compromise my objectivity in performing this specialist investigation. I do not necessarily object to or endorse any proposed developments, but aim to present facts, findings and recommendations based on relevant professional experience and scientific data.
- I do not have any influence over decisions made by the governing authorities.
- I undertake to disclose 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 a competent authority to such a relevant authority and the applicant.
- I have the necessary qualifications and guidance from professional experts in conducting specialist reports relevant to this application, including knowledge of the relevant Act, regulations and any guidelines that have relevance to the proposed activity.
- This document and all information contained herein is and will remain the intellectual property of Confluent Environmental. This document, in its entirety or any portion thereof, may not be altered in any manner or form, for any purpose without the specific and written consent of the specialist investigators.
- All the particulars furnished by me in this document are true and correct.

Bianke Fouche (MSc Conservation Biology)

Signed: 26 May 2025

BIANKE FOUCHÉ ABRIDGED CV

Qualifications

- B.Sc. Environmental Sciences (Nelson Mandela University),
- B.Sc. Honours in Botany (Nelson Mandela University),
- M.Sc. Conservation Biology (University of Cape Town)

SACNASP Registration No: 141757 (Professional Botanical; Candidate Ecological)

Skills and Core Competencies

- My MSc research will add to our understanding of plant community niche construction and Alternative Stable State (ASS) theory. The knowledge gained will be used to advise landscape stewardship practices, especially regarding reforestation initiatives in the Overstrand.
- I have worked closely with the conservation team of the Grootbos Foundation, where I assisted with vegetation surveys, mounting voucher specimens in the Grootbos herbarium, and taken part in controlled fynbos fires in the Overberg.
- Postgraduate studies of mine included assessing the allelopathic effects of *Eucalyptus* leaves on garden peas and leeks and assessing the accuracy of the climate leaf analysis multivariate programme (CLAMP) in predicting the climate of fynbos vegetation.
- In Cape Town I regularly took part in alien clearing activities and helped to identify relevant listed invasive plants.
- I am currently a member of SACNASP, the International Association for Impact Assessment (IAIA) in South Africa, Botanical Society of South Africa, and the custodians for rare and endangered wildflowers (CREW-Outramps) in George.

References

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1. INTRODUCTION

1.1 Background

Confluent Environmental was appointed by Cape EAPrac to provide Botanical and Terrestrial Biodiversity specialist inputs for a sheep feedlot proposed on Portion 1/177, East of Klaarstroom. The Terrestrial Plant Species and Terrestrial Biodiversity Themes in this report are assessed according to the environmental protocols (Protocols for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impact Assessments, 2020). The scope of work for this report is guided by the legislative requirements of the National Environmental Management Act (NEMA; Act No. 108 of 1998). The location of the farm with mapped SANBI ecosystem remnants (from 2021) are illustrated in Fig. 1. These show how the proposed feedlot is situated within mapped remnant vegetation.

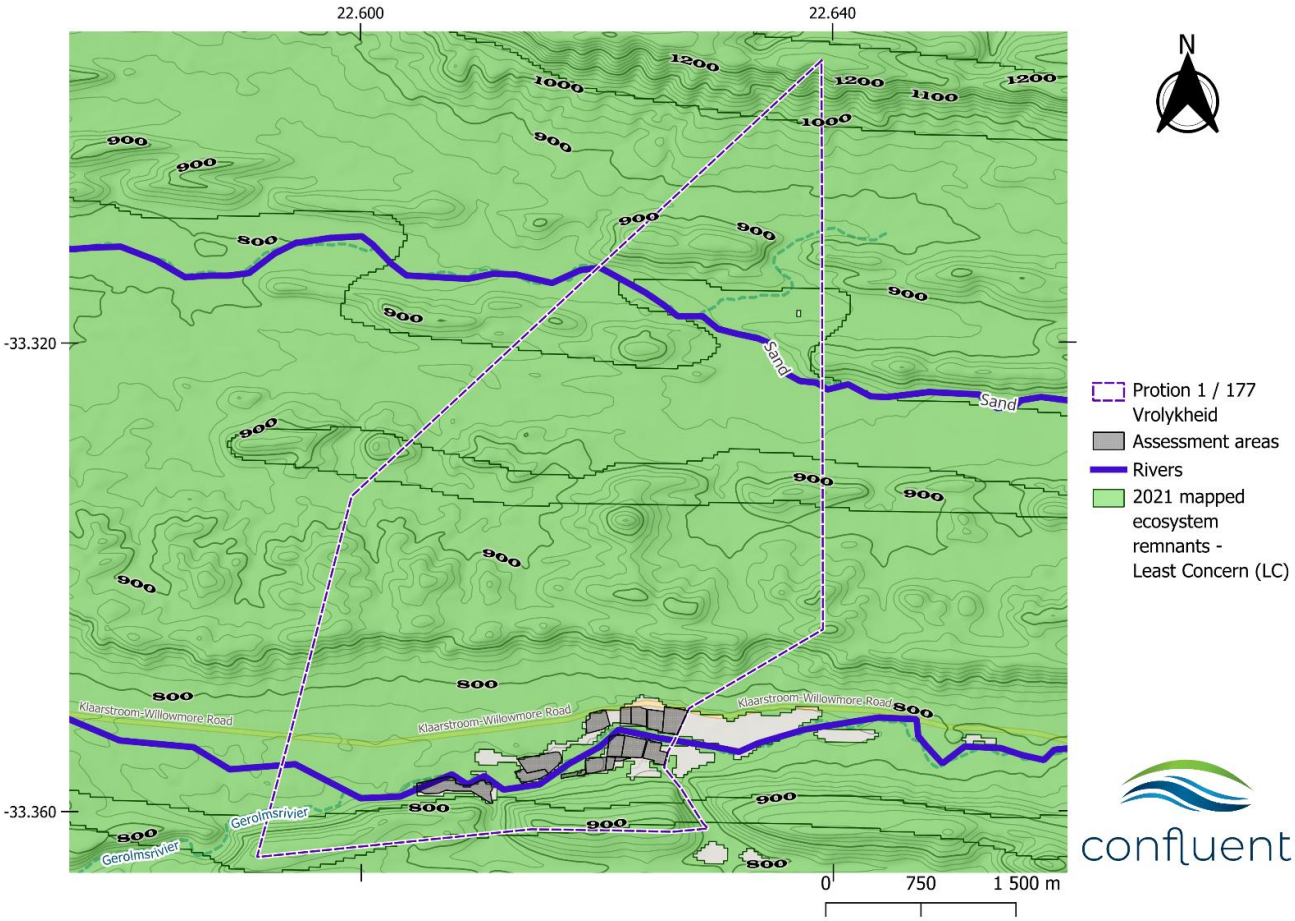


Figure 1: The location of the farm portion relative to mapped 2021 ecosystem remnants (produced by SANBI).

1.2 Screening Tool

According to the Department of Forestry, Fisheries, and the Environment (DFFE) Screening Tool, the report is required because Terrestrial Biodiversity theme has an overall **Very High** sensitivity (Fig. 2). the Terrestrial Plant Species theme has been highlighted as having a **Low** sensitivity, however despite this it is known that several SCC have the potential to occur in this area. Because of this, a search for plant SCC is also included in this report.

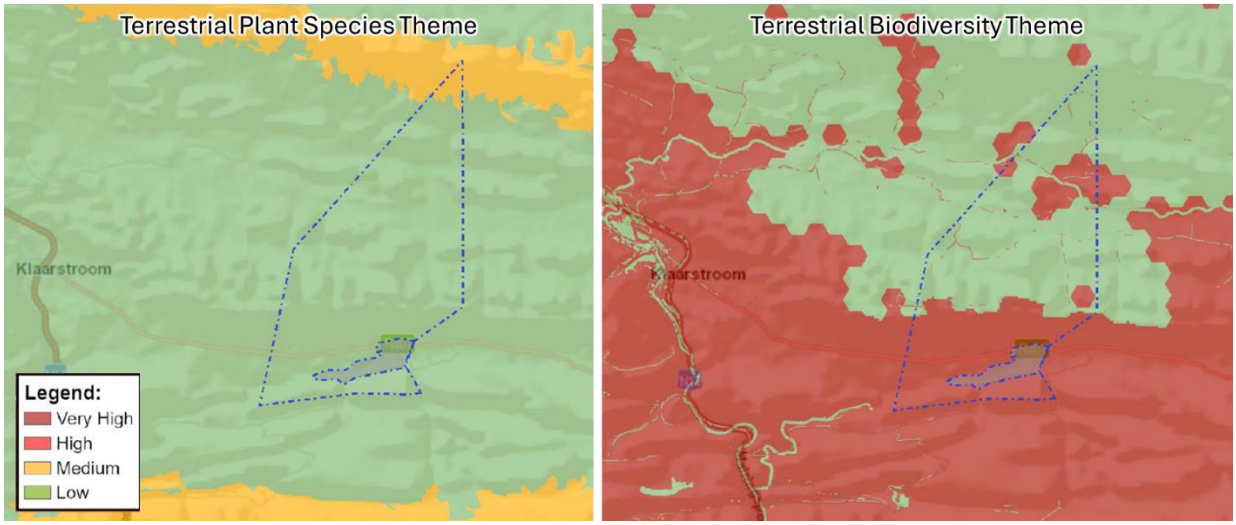


Figure 2: The Screening Tool sensitivity maps produced for the terrestrial plant species theme and terrestrial biodiversity theme.

A Very High sensitivity rating for Terrestrial Biodiversity is triggered for all Biodiversity Priority Areas (BPAs) and other sensitive features (Stewart et al., 2021). BPAs include the various management layers of the Western Cape Biodiversity Spatial Plan (WC BSP), as well as other sensitive features in Table 1. This Table forms the basis of the triggers for the Terrestrial Biodiversity sensitivity triggers, especially since the latest “reasons layer” for the 2023 WC BSP is not yet available.

Table 1: Sources of BPA data for the Terrestrial Biodiversity Theme sensitivity (Stewart et al., 2021).

Sensitivity layer	Data included and source
Critical Biodiversity Areas	These areas are essential for maintaining ecosystem health and functionality, including areas that support biodiversity patterns, processes, and species persistence, and are prioritized for conservation.
Ecological Support Areas	ESAs are strategically identified areas that play a vital role in supporting CBAs and aiding in the maintenance of ecosystem functionality, supporting biodiversity persistence, and ensuring ecological connectivity by sustaining essential processes.
Freshwater Ecosystems Priority Areas.	Freshwater ecosystem catchments, determined through the National Freshwater Ecosystem Priority Area (NFEPA) process.

1.3 Description of Proposed Activities

1.3.1 Proposed Sheep Feedlot

The proposal on Portion 1/177 (Vrolykheid) is for a sheep feedlot on a section of the Farm portion located south of some existing agricultural fields. The entire Farm portion 1/177 is 1908.36 ha according to Cape Farm Mapper. Existing areas of irrigated fields cover ca. 38.5 ha (see Fig. 3). This area accounts for approximately 2% of the entire property, and is excluded from the existing ecosystem remnants, as illustrated in Fig. 1 in the introduction. The irrigated fields are currently used as pasture (ucerne and oats) for grazing sheep but also include crops such as onion seed production.

The proposed feedlot is planned to the South of the existing fields. The operation would include the main feedlots, bounding berms (along the southern boundary of the feedlot), manure storage areas, and several new roads for accessing sections of the feedlot area. A summary of the infrastructure to be developed for the feedlot area is:

- Fencing of small kraals will be of wooden poles and wire;
- Each kraal will have a feeding trough on one side, and a water trough on the other side.
- A shadeport (shadecloth on a steel frame) will be erected in the middle of the two troughs to provide shade for animals.
- Troughs are made of steel with a rubber lining and they are free standing.
- It may be necessary to cast a small concrete slab so the troughs can stand on something level.
- Water containing waste will gravitate through an earth furrow to an existing, disused dam and will be used to periodically irrigate existing fields. Most of the solid faeces will be removed from the feedlot so the runoff should contain minimal solid waste.
- Solid waste will be spread onto existing fields using a manure spreader.

The proposed design for the feedlot presented in the inset map of Fig. 3 is to accommodate ca. 6 000 lambs (van Niekerk, 2024). A breakdown of this planning is as follows, where the density will be ca. 1.5 sqm per lamb, where the feedlot is also broken up into three distinct pen areas.

- Area 1 will cover 3 800 sqm,
- Area 2 will cover 3 150 sqm,
- Area 3 will cover 3 150 sqm,
- Areas for handling and shearing will cover 100 sqm
- Areas for processing and storage will cover 400 sqm

This means that the total area planned for the feedlot is 10 600 sqm (i.e., 1.06 ha). The proposed feedlot will result in additional transformed areas on Portion 1/177 that amounts to 0.05% of the total area of the farm portion. The size of the storage areas were calculated to accommodate the anticipated production where the pens will be cleaned on an annual basis and stored manure will be spread over the existing fields of ca. 38.5 ha as fertiliser. Together

the existing irrigated lands and the feedlot proposed will account for ca. 2.07% of the total farm portion.

In addition to the areas planned for the proposed feedlot (van Niekerk, 2024), the handling of manure on the site is also an important consideration, as it can have impacts on the environment. The anticipated manure production was calculated at 0.6 kg per lamb per day, and a density[1] of one ton per cubic meter (van Niekerk, 2024). The degree of transformation of the ecosystem & potential presence of species of conservation concern (SCC) in the proposed feedlot areas must be confirmed in the field via a specialist botanical assessment. This is linked to the confirmation of the sensitivities presented in the screening tool, which is the purpose of this report.

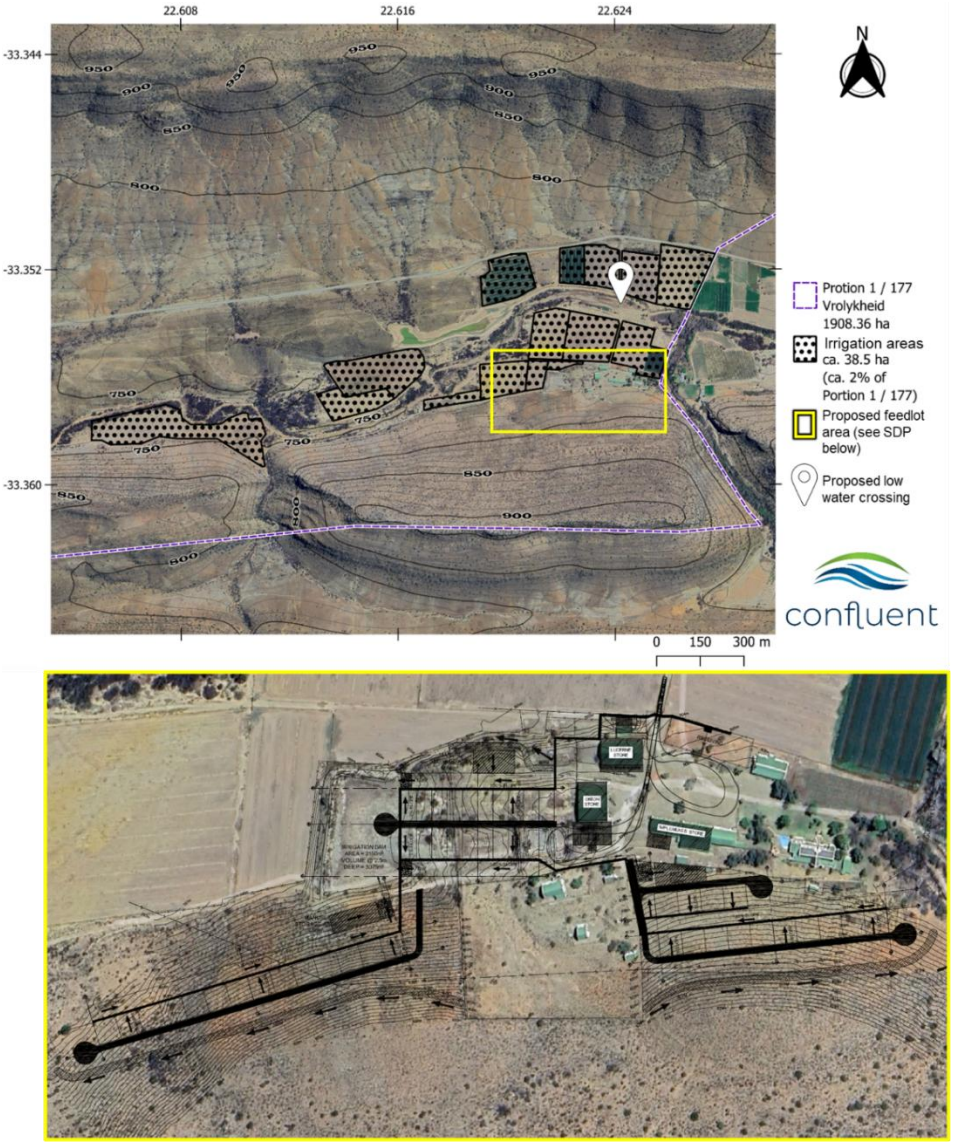


Figure 3: Recent satellite imagery overlaid with the existing irrigated fields (top map) and old fields that must be assessed for the proposed sheep feedlot area (bottom map).

[1] This density does not refer to any specific area or period of time, it is simply a description of the anticipated physical density of the manure. That is, how compact / voluminous the manure is, implying that for cubic meter of space filled with manure, the weight would be ca. 1 ton.

1.3.2 Proposed New Low Water Crossing

The proposed sheep feedlot will periodically require food deliveries involving large, heavy vehicles. The current river crossing is inadequate for this purpose. The proposal involves the upgrade of this crossing with a small low water crossing across the Jan Rolms River, where a dirt road currently exists over gabions. The plan is to replace the existing dirt crossing with a concrete structure (Fig. 4). On the northern side of the crossing, a small road section leading to the crossing will be reinforced with gabion walls on either side, with each gabion measuring 1m x 1m x 3m. No gabion wall is planned for the southern side. Six 600mm diameter pipes will be installed under the road to allow for water flow beneath the crossing. Although minimal disturbance to sensitive vegetation and plant species is expected (given it will be in the footprint of the existing crossing), the proposed upgrade is considered in this report.

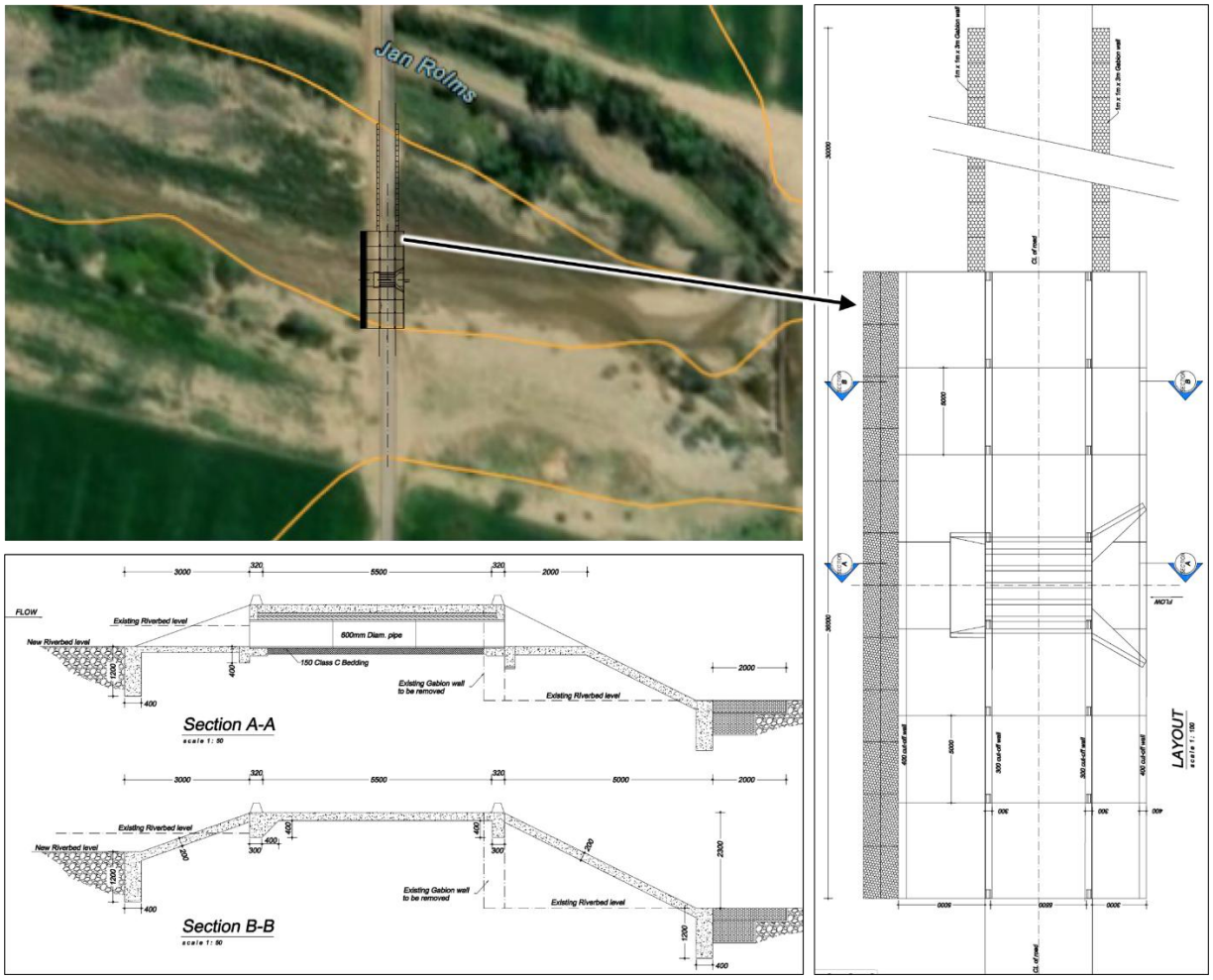


Figure 4: The engineering design for the proposed low water crossing across the drainage line (technical drawings by Outeniqua Consulting Engineers)

2. TERMS OF REFERENCE

This report provides information on Terrestrial and Botanical diversity and sensitivity in relation to the proposed feedlot establishment. The results presented are based on a desktop and field assessment, which includes a consideration of historical photographic records of the site. The assessment presented in this report follows the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity, and Terrestrial Plant Species themes. This assessment follows the requirements of:

- The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), which includes:
    - The protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial plant species (28 July 2023).
    - The protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity (20 March 2020).
- Additional guidelines for the terrestrial biodiversity theme:
    - Ecosystem Guidelines for Environmental Assessment in the Western Cape (de Villiers et al., 2016).
    - The 2023 version of the Western Cape Biodiversity Spatial Plan Handbook and summary booklet (Cape Nature, 2023; CapeNature, 2017; Pool-Sandvliet et al., 2017).
    - Ecosystem Guidelines for the Albany Thicket Biome (SANBI & CEN Integrated Environmental Management Unit, 2021)
- Additional guidelines for the terrestrial plant species theme:
    - Species Environmental Assessment Guideline: Guidelines for the implementation of the Terrestrial Flora (3c) & Terrestrial Fauna (3d) Species Protocols for environmental impact assessments in South Africa (Verburgt et al., 2020).

The assessment was undertaken by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with relevant expertise in the field of Botanical and Ecological Science.

3. METHODOLOGY

3.1 Desktop Assessment

The desktop assessment was performed using Cape Farm Mapper and QGIS version 3.36 called “Maidenhead”. Plant species data was sourced from the following sources:

- The DFFE screening tool (in this case, so SCC were flagged).
- Information on plant occurrence prior to the site visit was sourced from SANBIs Botanical Research and Herbarium Management System (BRAHMS) for the Plants of Southern Africa (POSA) database.
- iNaturalist observations of the property and surrounding areas.
- Past specialist reports and insight into the species likely present in the area.

Ecosystem/ vegetation type data was sourced from:

- The 2018 and 2024 updated South African Beta version of the National Vegetation Map (NVM) from SANBIs Biodiversity Geospatial Information System (BGIS) database, and the National Biodiversity Assessment report of 2018 (Skowno et al., 2018).
- Shapefiles for the Western Cape Biodiversity Spatial Plan (WC BSP) were downloaded from BGIS database (CapeNature, 2017; Pool-Sandvliet et al., 2017).
- Cape Farm Mapper for additional spatial information required for the site.
- Chief Directorate: National Geo-spatial Information (CD: NGI) Geospatial Portal and Google Earth for the acquisition of historical aerial imagery of the site.
- The conservation status of ecosystems was found in the Revised National List of Ecosystems that are Threatened and in need of protection, published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004, as revised in Nov. 2022), and also using the Vegetation of South Africa, Lesotho, and Swaziland (Mucina & Rutherford, 2006).

3.2 Field Assessment

Fieldwork on the property was undertaken on the 20th of March 2025. The method for identifying species was similar to a BioBlitz, also described as a “timed meander”, where the specialist records plant species composition of the site, and actively searches for rarer and threatened species. Some Red Listed plant species are found more easily during a site survey than other species. This survey method is an attempt to account for the short and single survey period, where detection probability of some rare and threatened species (e.g., geophytes, small succulents, small perennials etc.) may be low (Garrard et al., 2008; Wintle et al., 2012). Observations of individual species and environmental characteristics were photographed and then uploaded to iNaturalist, an open-source online platform.

3.3 Assumptions & Limitations

This assessment is subject to a few assumptions, uncertainties, and limitations, as listed below:

- Only one survey took place which means that the species list is limited to the surveyed areas.
- The species list reported is not exhaustive (Cowling et al., 2010; Perret et al., 2023).
    - The season of the assessment and survey timing always play a role in limiting the findings of a terrestrial habitat and plant species specialist report. In this case the survey was conducted in early Autumn, a period where many species, including many of the SCC, are not flowering / visible.
    - Invaded / degraded sections (due to past browsing & grazing) may obscure the true potential diversity of some near-transformed areas.
    - Some rare and threatened plant species are difficult to locate and some are easily overlooked when not flowering (a good example are small succulent species) or where past disturbance has almost led to their eradication from the landscape.
    - Grazing can render many plant species that are present unrecognisable. This means that while some species may be present, there is a high likelihood that they were not recognisable due to missing identifying features, or the removal of the top half of the plant so that only undetectable roots remain.
- Although it is possible to understand the difference between transformed and natural areas, it is often the case that SCC grow in areas where they are least expected. Therefore, the conformed absence of SCC does not mean the habitat is unsuitable for their future occurrence in some areas.

4. RESULTS: DESKTOP ASSESSMENT

4.1 Terrestrial Plant Species

The screening tool highlighted no potential Species of Conservation Concern (SCC); however, it is known that several SCC have been found nearby. Further comment on this is reported later in the report when the likelihood of occurrence of SCC is discussed.

4.2 Terrestrial Biodiversity

4.2.1 Climate

The nearest town to Portion 1/177 is Klaarstroom to the west (see the historical climate chart in Fig. 5). The climate of Klaarstroom is characterised by relatively hot summers with mild winters. During the summer, the average high temperature of the area is between 26 and 28 degrees Celsius. June and July are the coldest months. The rainfall here is moderate all year round, with two annual peaks that are usually around July, and the other around October / November. This area is at the foot of the Swartberg mountains, and this has an influence on the weather here.

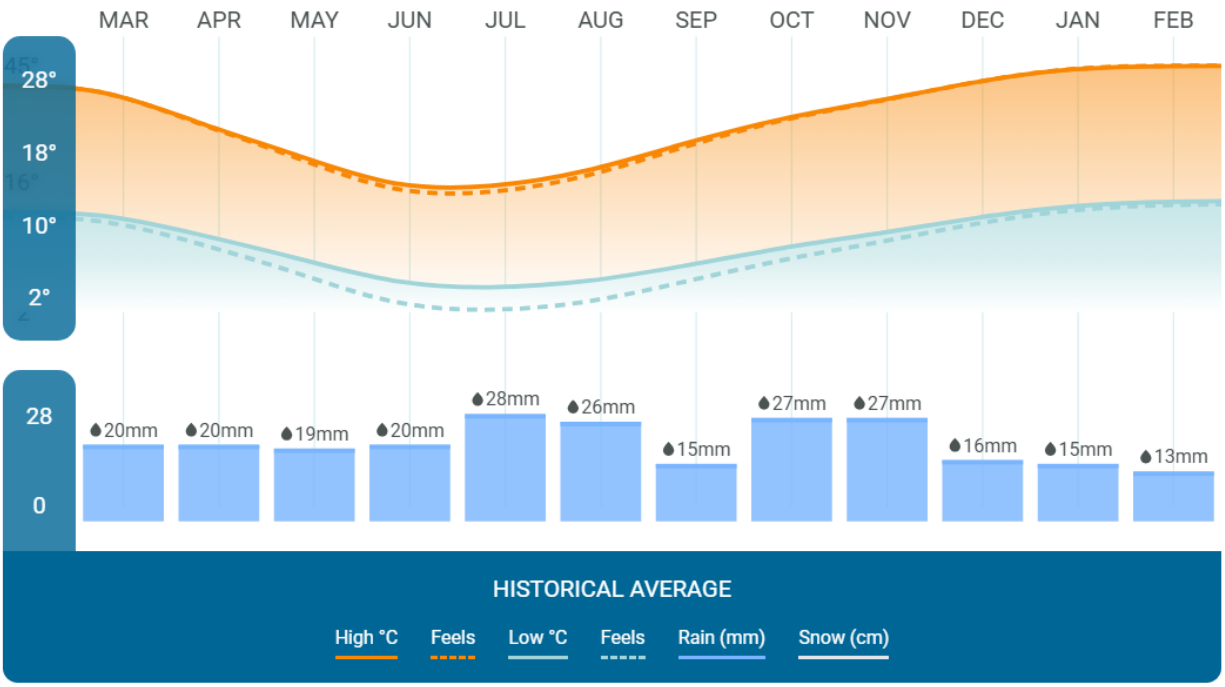


Figure 5: Historical climate averages for maximum and minimum temperature, and rainfall per month.

4.2.2 Geology and Soil

The geology around and nearby Klaarstroom is rather unique and is influenced by the mountainous terrain and semi-arid climate. The Swartberg Mountains, which rise steeply around Klaarstroom, are primarily made up of ancient rock formations, including quartzite and schist. These rocks are part of the Cape Supergroup, which dates back to over 500 million years ago. Swartberg quartzite is a dominant rock type that can be found in this area. It is hard and durable, contributing to the perceived ruggedness of the landscapes here. The geological history of the region involves tectonic movements and volcanic activity, which have shaped the land over millions of years. This is evident in the ruggedness of the terrain and the presence of numerous fault lines. In addition to the quartzite and schist, the area contains layers of sandstone and shale which contribute to the diversity of soil types – and plant life – that can be found here. The valleys in the area also often have sandstones, shales, and mudstones that are part of the Karoo Supergroup, which consists of a series of sedimentary rocks formed during the Permian and Triassic periods.

The soil in Klaarstroom and the nearby landscapes is typically dry and sandy. Soils are often shallow and have low organic matter, and as a consequence the majority of the plant life here are low shrubs and succulent plants. Red-brown soils (called “ferralsols”) dominate the area. These are clay-rich soils that have a reddish colour due to the high iron content and are relatively well-draining. Despite this, Cape Farm Mapper cites the area on and around Portion 1/177 as having a High erodibility (score of 0.53). It is only in valleys and near watercourses that soils may be slightly deeper and more loamy, with better fertility. These areas around watercourses therefore make up the majority of the agricultural areas.

4.2.3 Vegetation Type(s)

The mapped vegetation for the proposed sheep feedlot area is **Price Albert Succulent Karoo** (SKv 13), with Gamka Arid Thicket (AT 33) occurring to the south and a mosaic with Willowmore Gwarrieveld (AT 58) occurring to the north (Fig. 6). Each of the mapped vegetation types of Fig. 6 is associated with a list of important taxa. These species characterise the vegetation type and can be used to identify it. A list of the important taxa for Price Albert Succulent Karoo (SKv 13), Gamka Arid Thicket (AT 33), and Willowmore Gwarrieveld (AT 58) is provided in Appendix 11.1. A short description of these three vegetation types is provided below Fig. 6.

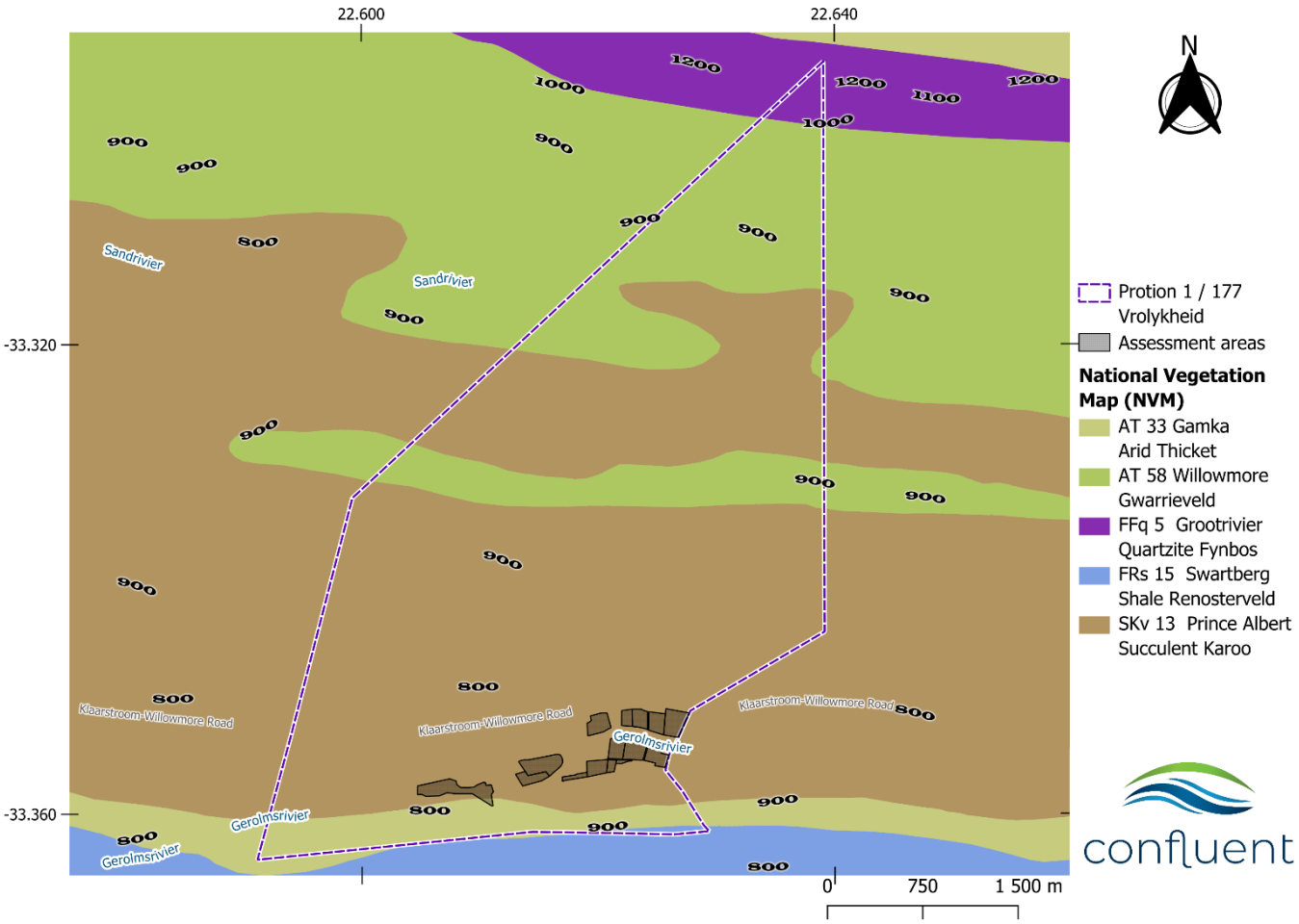


Figure 6: The mapped 2024 National Vegetation Map (NVM) vegetation types.

Price Albert Succulent Karoo (SKv 13) – Least Threatened

This vegetation type is found on flat or slightly undulating country which sometimes is also associated with prominent parallel stony ridges. The majority of the dominant plant species here are low-growing leaf-succulent vygies and small-leaved Karoo shrubs. Heuweltjies are an important feature of this vegetation – they occur at a density of about two per hectare, supporting succulent and salt-tolerant plant assemblages (*Augea, Brownanthus, Drosanthemum, Malephora, Psilocaulon, Ruschia, Salsola*). This vegetation type is considered Least Threatened, although it is exposed to overgrazing on some areas.

Approximately 3% (of the 16% conservation target) of this vegetation type is conserved in Gamkapoort, Groot Swartberg, Swartberg East and Towerkop Nature Reserves. Tierberg Research Station (near Prince Albert) houses one of the finest examples of this vegetation unit and one of the best researched locations of the Karoo.

Gamka Arid Thicket (AT 33) – Least Threatened

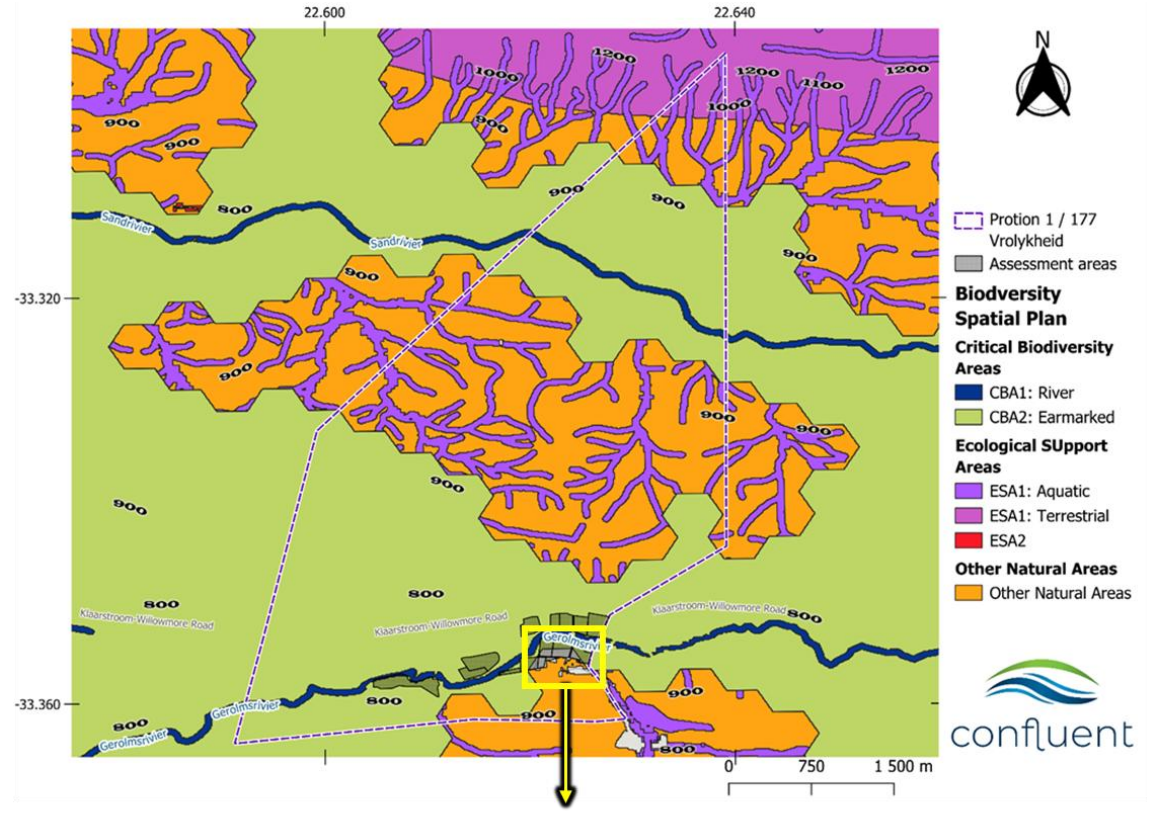
Some Gamka Arid Thicket may also be observed in places on the assessment area of Portion 1/177. The description of Gamka Thicket is given as a vegetation type that is found with undulating to steep foothills and valleys dominated by a low succulent thicket, sometimes quite open. In its pristine condition dense stands of spekboom (*Portulacaria afra*) occur, often with *Euclea undulata, Gloveria integrifolia, Pappea capensis* and *Searsia glauca*. Shrubs are also abundant, stem- and leaf-succulents are often prominent, and the grass component is poorly developed. This vegetation type is also Least Threatened with a conservation target of 19%, of which ca. 9% is conserved. The vegetation has complex floristic and spatial links to Nama-Karoo and Succulent Karoo as well as to the Fynbos Biome vegetation.

Willowmore Gwarrieveld (AT 58) – Least Threatened

Although this is mapped slightly further from the assessment area, some elements of this vegetation type may be present in the heuweltjies associated with Prince Albert Succulent Karoo. It is associated with slightly undulating landscape composed of extensive flats and a series of low hills. Dwarf succulent shrubland punctuated by scattered thicket clumps of medium height and solitary small trees (*Pappea capensis, Euclea undulata*). There is a strong north-south aspect effect, with the cooler southern slopes supporting patches of renosterveld (*Elytropappus rhinocerotis* dominant), especially where the soils are a sandy loam. *Portulacaria afra* can still be encountered on northern slopes. This vegetation type is also Least Threatened with a conservation target of 16%. Only very small patches statutorily conserved in the Kammanassie Swartberg East Nature Reserve. Although this vegetation type is mostly left undisturbed across its range, there are localized areas of negative grazing disturbance.

4.2.4 Western Cape Biodiversity Spatial Plan

The Biodiversity Spatial Plan for the Western Cape (WC BSP) contains several planning layers that are used to set priority areas for conserving biodiversity. The majority of Portion 1/177 is mapped as an Earmarked CBA2 area (Fig. 7). The proposed feedlot area falls within a section of Portion 1/177 that is considered an “Other Natural Area”.



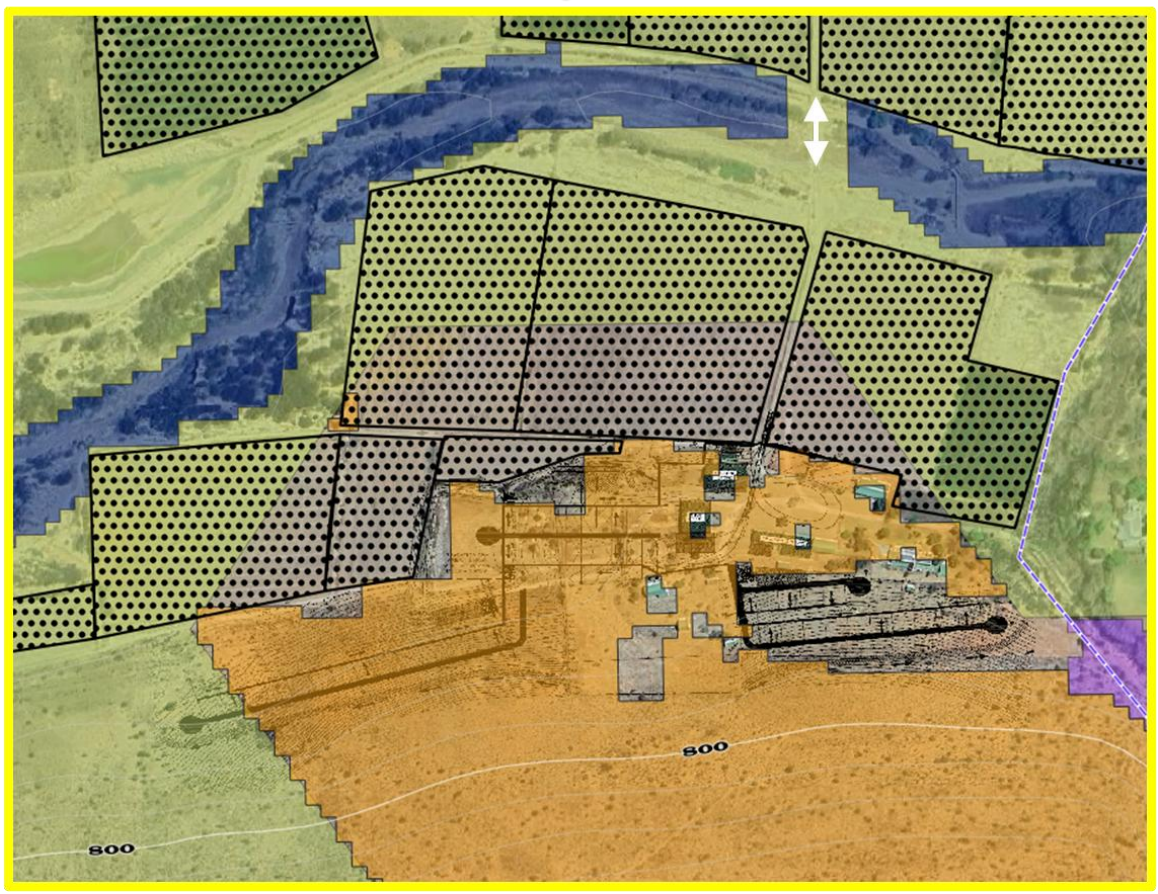


Figure 7: The 2023 Western Cape Biodiversity Spatial Plan (WC BSP) categories for Portion 1/177. The zoomed in inset map indicates a white arrow along the watercourse crossing to be upgraded, and the proposed feedlot layout is shown in the inset map under the semi-transparent BSP.

The two main drainage lines that bisect Portion 1/177 are both considered CBA1 areas. Some of the smaller drainage lines on Portion 1/177 are mapped as ESA1 areas with a matrix of ONAs between them. The reasons provided for the assignment of BSP layers, according to the 2023 version of the map, is not yet available from CapeNature. The definition and objectives of the WC BSP layers mapped crossing the proposed road alignment is in BOX 1. Appendix 11.2 illustrates the recommended land-uses associated with the various BSP layers.

BOX 1: The Biodiversity Spatial Plan

Critical Biodiversity Area 1

Definition: Areas in a natural condition. Required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure.

Objective: Maintain in a natural or near-natural state, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.

Critical Biodiversity Area 2

Definition: Areas in a degraded or secondary condition. Required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure.

Objective: Maintain in a functional, natural, or near-natural state, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.

Ecological Support Area 1

Definition: Not essential for meeting biodiversity targets. An important role in supporting the functioning of PAs or CBAs. Often vital for ecosystem services.

Objective: Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided underlying biodiversity objectives/ecological functioning are not compromised.

Ecological Support Area 2

Definition: Not essential for meeting biodiversity targets. Important in supporting functioning of PAs or CBAs. Often vital for ecosystem services.

Objective: Restore/minimise impact on ecological infrastructure functioning, especially soil and water-related services.

Other Natural Areas

Definition: These areas retain most of their natural character and perform biodiversity and ecological infrastructure functions but have not been prioritised in the current Western Cape Biodiversity Spatial Plan.

Objective: Minimise habitat and species loss to ensure ecosystem functionality through strategic landscape planning. Some flexibility in permissible land uses, but authorisation may still be required for high-impact uses.

4.2.5 Historical Aerial Imagery

Historical imagery was sourced from Google Earth and the CD NGI geospatial portal. Only two images are illustrated in Fig. 8, because there have been minimal changes in land use and cover since the 1960's (i.e., the past 8 decades). The majority of Portion 1/177 was untransformed and in a natural state in 1964, and this is still the case. The existing agricultural area on Portion 1/177 (south-east) was also present in the same area in 1964 (Dark blue polygons in the bottom two images of Fig. 8), with minimal changes to its extent. South of the dark blue polygon indicating the agricultural area, a yellow bounding box illustrates the position of the proposed sheep feedlot. Within that yellow polygon in Fig. 8, there are sections that seem more degraded (via grazing, most likely) compared to the surrounding landscape. However, although some degradation is visible in this area, the vegetation does not look completely transformed, as is the case for the irrigated fields.

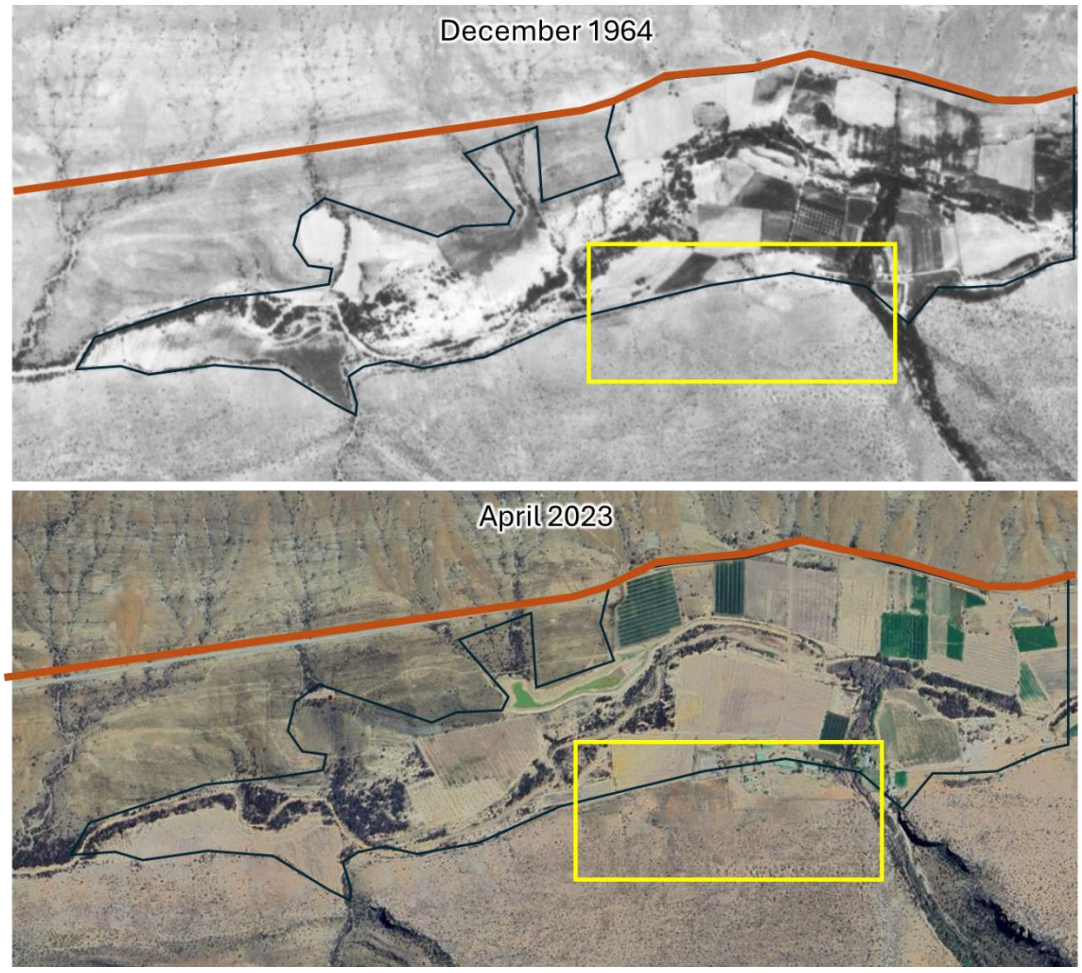


Figure 8: Two historical images of Portion 1/177.

5. RESULTS: FIELD ASSESSMENT

5.1 Ecosystems and Vegetation Observed

The track walked during the site assessment is presented in Fig. 9. The site assessment completed included the following areas as numbered on Fig. 9, namely:

1. The southern boundary of the current farmed area, which is where the feedlot area is being proposed (Images 1 through 6).
2. Some walkthroughs of the adjacent agricultural fields north of the proposed feedlot area (In this report only a fence-line contrast is illustrated in image no. 2)
3. A photo of the proposed upgrade to an existing watercourse crossing is presented in the image numbered 7).
4. Some assessment of the condition of the watercourse that runs between the existing fields (Images 8 through 10).

All the images mentioned above are presented in Table 2, which can be found after the map in Fig. 9. The existing agricultural fields are all transformed with no natural vegetation remaining there.

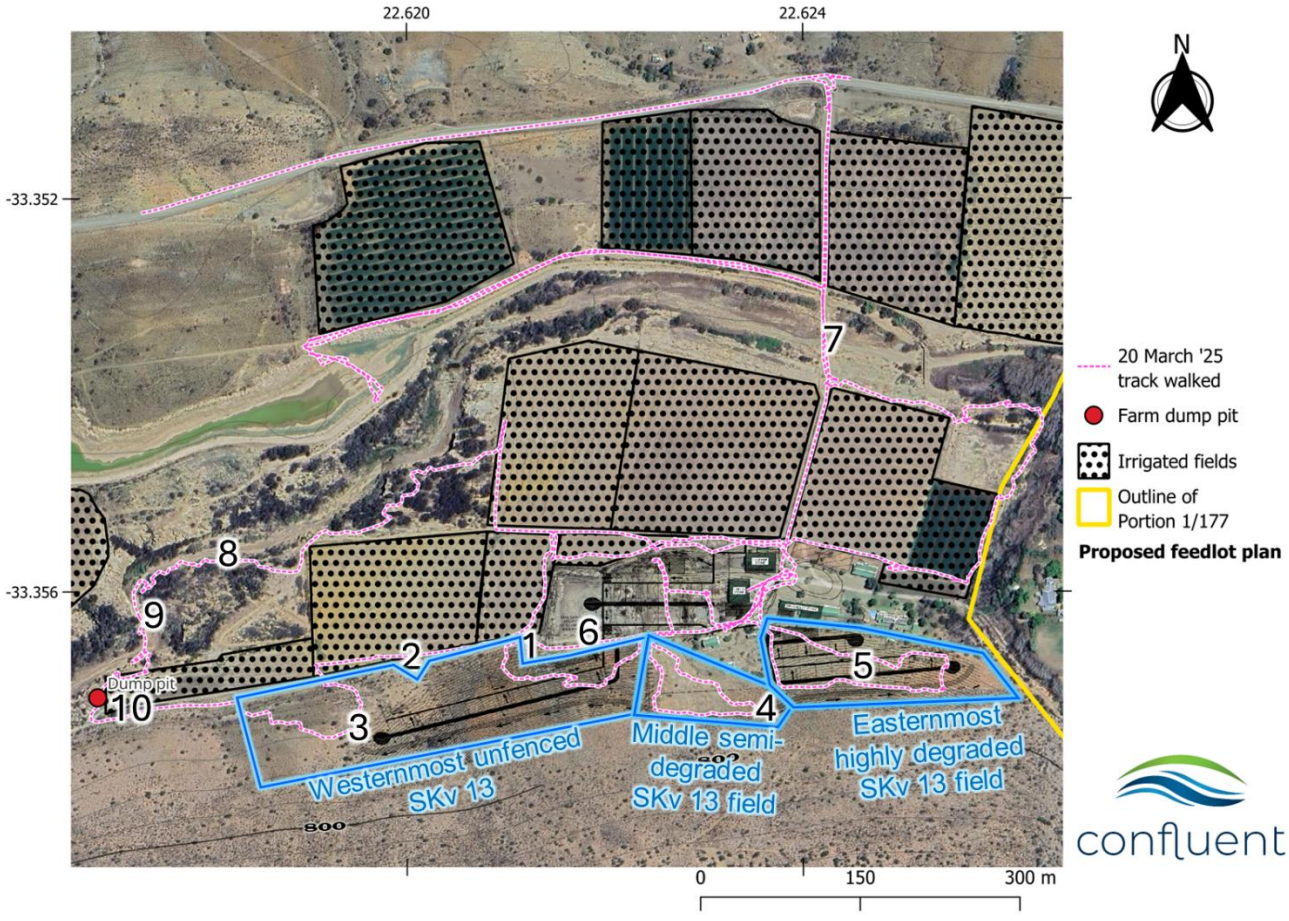
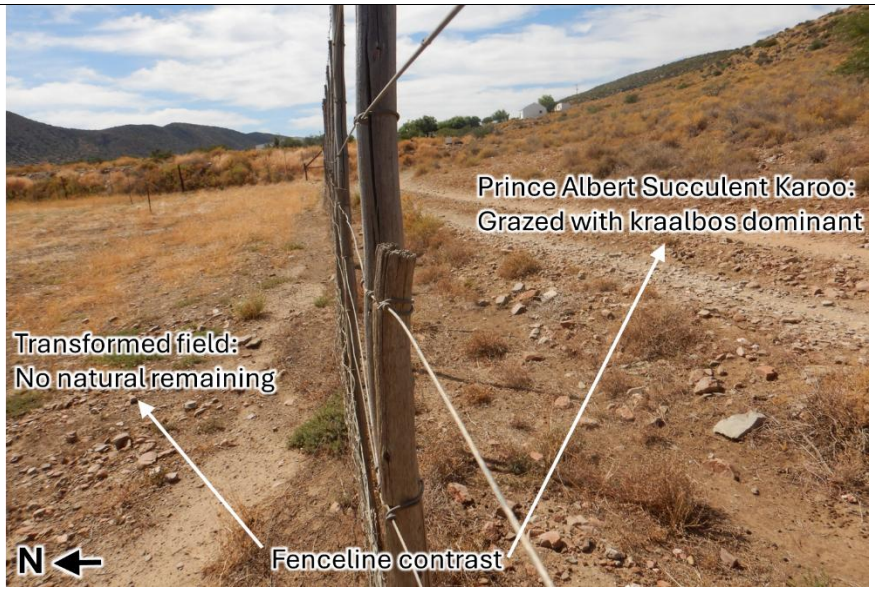
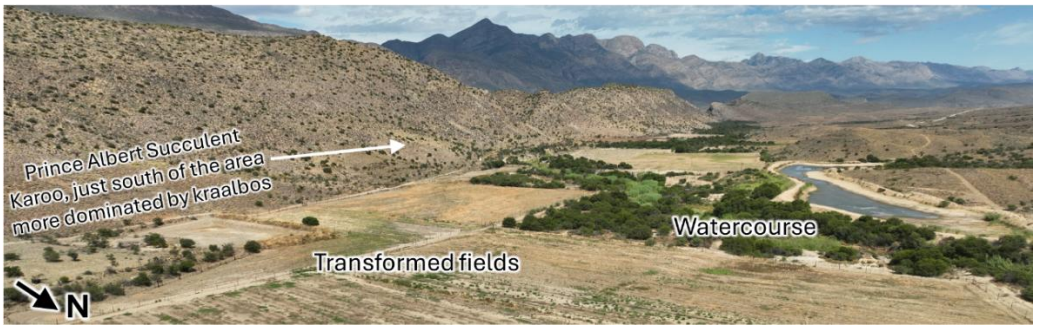


Figure 9: The track walked during the site assessment. The approximate location of images presented in Table 2 are numbered in this map. Take note of the three labelled SKv 13 fields, as they are referenced from this point forward.

The entire area here was very dry at the time of the site assessment, and therefore all the fields that were included in the assessment track were largely unvegetated. A small patch of lucerne was found, which is consistent with the description received for the site, i.e., that the irrigated pastures are used for lucerne, and oats which are all used for grazing & animal feed.

Table 2: Images taken of the landscape during the site assessment.

No	Site features
1	 **Westernmost unfenced SKv 13** The image above illustrates the view of SKv 13 vegetation south of the existing irrigated fields on Portion 1/177. The dominance of kraalbos (*Aizoon africanum*) in Prince Albert Succulent Karoo (SKv 13) suggests a disturbed or degraded ecological state, likely resulting from overgrazing or prolonged land use pressures such as livestock farming.
2	 **Westernmost unfenced SKv 13** This image is included in this report to illustrate the contrast between the secondary kraalbos (*Aizoon africanum*) dominated SKv 13 (on the right) and the completely transformed and irrigated fields (on the left) where no natural vegetation persists. The vegetation visible in the irrigated fields was dry at the time of the site assessment, and species found in these fields included lucerne (*Medicago sativa*), goosefoot species (*Chenopodium spp.*), spiny cocklebur (*Xanthium spinosum*), bermuda grass (*Cynodon dactylon*), plantains (*Plantago lanceolata*), pepperworts (*Lepidium africanum*), mats of puncture vines (*Tribulus terrestris*) and knotweed (*Polygonum arenastrum*) etc.

No	Site features
3	  **Westernmost unfenced SKv 13** The image above represents a field within SKv 13. In this field, small thicket clumps and stands of Aloes are present, and the succulent component of the vegetation remains intact and relatively diverse when compared to the more degraded kraalbos areas. Floristically, these areas are among the most sensitive on the site, however, further future walkthrough by a Botanical specialist is not required. Despite Species of Conservation Concern (SCC), being difficult to determine during the current assessment (due to ongoing dry conditions and the resulting poor visibility of many flagged SCC), it is relatively unlikely that a future walkthrough will result in a reduced impact on SCC (none of the potential SCC are likely to be irreplaceable).
4	 **Middle semi-degraded SKv 13 field** Kraalbos is a pioneer species that thrives in areas where the original, more diverse dwarf shrubland has been diminished. The occasional presence of *Vachellia karroo* and *Euphorbia mauritanica* is consistent with this interpretation of the areas where kraalbos is visible the dominant species. This is because both of these species tend to colonize degraded soils, while *Euphorbia mauritanica* persists in a range of conditions but can become more dominant where grazing has reduced plant competition. Together, this species composition points to a semi-degraded landscape undergoing secondary succession, with potential for ecological recovery if grazing pressure is reduced and restoration efforts are implemented.

No	Site features
5	  **Easternmost highly degraded SKv 13 field** The image above represents the field where a section of the sheep feedlot is being proposed. This field is in a significantly more degraded ecological condition. The lack of ground cover and reduced plant diversity suggest prolonged disturbance, most likely from overgrazing and associated soil erosion. In such conditions, the original succulent and dwarf shrub components of the SKv 13 vegetation here have been largely lost, and natural recovery is likely to be slow without active intervention. This area represents a late stage of degradation, where ecosystem function and floristic diversity have been substantially compromised.
6	  These images are also within the footprint of a section of the proposed feedlot. This area represents a degraded riparian or dam-edge environment showing signs of both woody encroachment (*Vachellia karroo*), and pressure from invasive species like pepper trees (*Schinus areira*) and torch cacti (*Trichocereus spachianus*). The area surrounding the dam is also notably degraded. The torch cactus poses a significant ecological threat due to its potential to establish dense stands, outcompete native flora, and alter soil conditions – it should be eradicated. Both *Schinus areira* and *Trichocereus spachianus* are considered invasive, listed under the National Environmental Management: Biodiversity Act (NEMBA).

No	Site features
7	 The image above illustrates the current condition of the existing watercourse crossing where upgrades are being proposed. In the background, *Arundo donax* (giant reed) is visible, while dense stands of *Phragmites australis* are dominant in the foreground of the crossing. Although not visible in the image, a large stand of invasive *Populus* × *canescens* (grey poplar) is present further east, forming a dense alien riparian forest near the edge of the farm Portion. The presence of invasive species & the high density of *Phragmites* reflects ecological disturbance, with potential impacts including altered hydrology, suppression of native vegetation, and reduced habitat quality.
8	 Dense stands of *Phragmites australis* (common reed) and other reeds. Large numbers of sheep in the watercourse were noted. This can exacerbate ecosystem degradation through trampling, erosion of streambanks, nutrient loading from droppings, and the suppression of natural vegetation recovery. Over time, this leads to a simplified and ecologically compromised riparian system, with reduced resilience to floods, dry conditions, and invasive species. It is recommended that sheep be excluded from the watercourse in the future.

No	Site features
9	 Evidence of active erosion downstream of the road crossing is visible in the image, with recent soil that had broken off from the eroded walls. In addition to the dominant invasive species already mentioned, this area also hosts further alien vegetation, including *Datura stramonium* (jimsonweed) and *Nicotiana glauca* (tree tobacco), both of which pose threats to local biodiversity. The combination of erosion, invasive plant species, and general habitat disturbance from sheep highlights a need for intervention and sustainable management to restore the integrity / biodiversity of this riparian zone. For more information on this, refer to the aquatic specialist report.

5.2 Plant Species

A species accumulation curve has not been included in this report, as the survey was not designed to generate a comprehensive species list. Instead, species observations were made with the specific goal of highlighting ecological contrasts between different habitat types within the study area, namely, between degraded SKv 13 fields, transformed agricultural fields, and riparian zones adjacent to the watercourse. The site was visited during relatively dry and hot conditions, which likely reduced plant visibility and detectability. In addition, grazing by domestic sheep further masked the presence of certain species. Time constraints also limited the scope of sampling. Some areas were visited multiple times, while others were only surveyed once, resulting in an uneven sampling effort across locations and time. Given these factors, the resulting species list reflects a targeted rather than exhaustive approach, and a species accumulation curve would not provide meaningful insight under these conditions. Therefore, it has not been included.

During the survey, one species of conservation concern, *Asparagus lignosus* (Near Threatened), was recorded in the **Westernmost unfenced SKv 13** — an indication that remnant patches of native SKv 13 vegetation still hold ecological value (Fig. 10).

Figure 10: A photo of *Asparagus* cf. *lignosus* which is an SCC that was found in the **westernmost unfenced SKv 13**.

However, this was in stark contrast to the heavily degraded / transformed nature of the existing worked farm, particularly the transformed irrigated field areas and riparian zone, where plant diversity was markedly lower and / or invasive alien species were dominant. These observations illustrate clearly the impact of habitat degradation, and grazing pressure on local plant communities. The plant species list for the site (presented in Table 3) illustrates invasive and naturalised exotic plant species in red and orange text respectively. The NEMBA (National Environmental Management: Biodiversity Act, Act No. 10 of 2004) and CARA (Conservation of Agricultural Resources Act, Act No. 43 of 1983) categories for the listed invasive species can be accessed from the relevant legislation. In short, NEMBA categorizes invasive species into four groups:

- Category 1a: Species that must be eradicated and prevented from being introduced or spread.
- Category 1b: Species that must be controlled to prevent further spread and impact.
- Category 2: Species that can be grown only in specific, controlled conditions, with a focus on prevention of escape.
- Category 3: Species that are already widely spread but must not be introduced or propagated further.

CARA focuses on controlling invasive plants that affect agricultural resources, categorizing them into (here Rooikrans is category 2):

- Category 1: Species that must be eradicated from land.
- Category 2: Species that must be controlled to prevent spread, with restrictions on planting.
- Category 3: Species that must be managed to avoid negative impacts on land use, with restrictions on their spread.

It is worth noting that exotic species were primarily recorded in areas that have been entirely transformed. For instance, Tree of Heaven (*Ailanthus altissima*) was found locally around a small vineyard on the farm but was not observed elsewhere, and Torch Cactus (*Trichocereus spachianus*) occurred only along the edge of an old dam between irrigated fields (within the proposed feedlot footprint). Although the Prince Albert Succulent Karoo (SKv 13) fields assessed south of the irrigated fields were degraded and depauperate due to grazing, invasive species have not yet encroached into these areas. However, this will change with the proposed feedlots proposed on and adjacent to these areas.

The species list for the site assessment (non-exhaustive), presented in order of different areas where species were observed. The species in Table 3 are indicated by

- purple for any species observed in SKv 13 and
- yellow for species in irrigated fields but not in SK v 13, and
- grey for species found between fields only

By coding species presence in this way in Table 3, the turnover between transformed and semi-natural SKV 13 is more clearly visible. More heavily grazed SKv 13 areas were typically dominated by kraalbos (*Aizoon africanum*) and supported fewer species overall (also visible in Table 3), while less disturbed areas had a similar species makeup but with greater diversity and less dominance by kraalbos.

Table 3: Purple shaded rows are species found in SKv 13 south of the irrigated fields. Light purple = **westernmost unfenced SKv 13**, purple = **middle semi-degraded SKv 13 field**, and dark purple = subset of species in the **easternmost highly degraded SKv 13 field**. Yellow rows = irrigated fields, and white rows = species between fields and in riparian areas. Red entries = invasive species, orange = exotic species, and green = SCC.

Family	Species	Common name	Easternmost degraded SKv 13 field	Middle kraalbos dominated SKv 13 field	Westernmost unfenced SKv 13	Irrigated transformed fields	Between fields	Riparian zone
Liliopsida (Monocots)								
ASPARAGACEAE	*Albuca sp.*	Slimelilies			1		1	
ASPARAGACEAE	*Asparagus lignosus*	Fire Asparagus			1			
ASPARAGACEAE	*Asparagus suaveolens*	Catthorn Asparagus			1			
ASPHODELACEAE	*Aloe ferox*	Cape Aloe			1			
ASPHODELACEAE	*Haworthiopsis viscosa*	Robust Haworthia			1			
ASPHODELACEAE	*Unknown species As1*	Aloe family			1			
CYPERACEAE	*Cyperus denudatus*	Cyperus species						1
POACEAE	*Arundo donax*	giant reed						1
POACEAE	*Cynodon dactylon*	Bermuda grass				1	1	1
POACEAE	*Ehrharta erecta*	panic veldtgrass						1
POACEAE	*Phragmites australis*	common reed						1
Magnoliopsida (Dicots)								
ACANTHACEAE	*Blepharis mitrata*	Stack Lashes		1	1			
AIZOACEAE	*Aizoon africanum*	Kraalbush	1	1	1	1	1	1
AIZOACEAE	*Drosanthemum barkerae*				1			

Family	Species	Common name	Easternmost degraded SKv 13 field	Middle kraalbos dominated SKv 13 field	Westernmost unfenced SKv 13	Irrigated transformed fields	Between fields	Riparian zone
AIZOACEAE	*Malephora lutea*	rocky point ice plant					1	1
AIZOACEAE	*Mesembryanthemum guerichianum*	Brakslaai					1	1
AIZOACEAE	*Mesembryanthemum junceum*	Soap Ashbush						1
AIZOACEAE	*Mesembryanthemum splendens*	Splendid Dropfig		1	1			
AIZOACEAE	*Ruschia multiflora*	Kraal Tentfig			1		1	1
AIZOACEAE	*Trichodiadema sp.*	Tuftleaf Vygie			1			
AIZOACEAE	*Unknown species Ai1*	Stone plants						1
AMARANTHACEAE	*Atriplex*	Saltbushes					1	1
AMARANTHACEAE	*Atriplex lindleyi*	Lindley's Saltbush					1	1
AMARANTHACEAE	*Atriplex semibaccata*	berry saltbush				1	1	
AMARANTHACEAE	*Chenopodium*	Goosefoots				1	1	1
ANACARDIACEAE	*Schinus areira*	Peppercorn Tree					1	1
ANACARDIACEAE	*Searsia burchellii*	Karoo Kunirhus					1	1
ANACARDIACEAE	*Searsia pendulina*	White Karee					1	1
ANACARDIACEAE	*Searsia pyroides*	Common currant-rhus						1
APOCYNACEAE	*Carissa haematocarpa*	Karoo Num-num			1			

Family	Species	Common name	Easternmost degraded SKv 13 field	Middle kraalbos dominated SKv 13 field	Westernmost unfenced SKv 13	Irrigated transformed fields	Between fields	Riparian zone
ASTERACEAE	*Berkheya onobromoides*	Smelly Capethistle					1	1
ASTERACEAE	*Chrysocoma ciliata*	Bitterbush		1	1		1	
ASTERACEAE	*Cirsium vulgare*	Bull Thistle				1	1	1
ASTERACEAE	*Dicerothamnus rhinocerotis*	Renosterbush		1	1		1	1
ASTERACEAE	*Helichrysum rosum*	Rose Everlasting			1			
ASTERACEAE	*Ifloga polycnemoides*	dicots			1			
ASTERACEAE	*Nidorella ivifolia*	Ivy Vleiweed					1	1
ASTERACEAE	*Oncosiphon pilulifer*	stinknet		1	1			
ASTERACEAE	*Senecio sp.*	groundsels			1			
ASTERACEAE	*Xanthium spinosum*	spiny cocklebur				1	1	1
BRASSICACEAE	*Lepidium africanum*	African Pepperwort				1	1	1
CACTACEAE	*Trichocereus spachianus*	torch cactus					1	
CELASTRACEAE	*Gymnosporia buxifolia*	Common Spikethorn			1			1
CRASSULACEAE	*Cotyledon papillaris*	Sprawling Pigsears			1			
CRASSULACEAE	*Crassula deltoidea*	Silver-beads			1			
CRASSULACEAE	*Crassula rupestris*	Kebab Bush			1			

Family	Species	Common name	Easternmost degraded SKv 13 field	Middle kraalbos dominated SKv 13 field	Westernmost unfenced SKv 13	Irrigated transformed fields	Between fields	Riparian zone
CRASSULACEAE	*Tylecodon wallichii*	Pegleg Butterbush			1			
CUCURBITACEAE	*Cucumis myriocarpus*	paddy melon				1		
EBENACEAE	*Diospyros lycioides*	Bluebush		1	1			
EBENACEAE	*Euclea undulata*	Gwarrie			1			1
EUPHORBIACEAE	*Euphorbia mauritanica*	Yellow Milkbush	1	1	1			
FABACEAE	*Medicago sativa*	Alfalfa				1	1	
FABACEAE	*Vachellia karroo*	Sweet Thorn		1	1		1	1
FRANCOACEAE	*Melianthus comosus*	Crown Honeyflower					1	1
LAMIACEAE	*Pseudodictamnus africanus*	Cat Herb					1	1
LORANTHACEAE	*Tapinanthus oleifolius*	Namnambush			1			
MALVACEAE	*Grewia robusta*	Karoo Crossberry			1			
MALVACEAE	*Hermannia althaeifolia*	Woolly Dollsrose	1	1	1			
PAPAVERACEAE	*Argemone ochroleuca*	Mexican Poppy					1	1
PLANTAGINACEAE	*Plantago lanceolata*	ribwort plantain				1	1	
POLYGONACEAE	*Polygonum arenastrum*	Oval Leaf Knotweed				1	1	
POLYGONACEAE	*Rumex crispus*	curled dock				1	1	1
SALICACEAE	*Populus x canescens*	Grey Poplar						1

Family	Species	Common name	Easternmost degraded SKv 13 field	Middle kraalbos dominated SKv 13 field	Westernmost unfenced SKv 13	Irrigated transformed fields	Between fields	Riparian zone
SANTALACEAE	*Viscum rotundifolium*	Redberry Mistletoe			1			
SIMAROUBACEAE	*Ailanthus altissima*	tree-of-heaven				1	1	
SOLANACEAE	*Datura stramonium*	jimsonweed					1	1
SOLANACEAE	*Lycium horridum*	Buck Honeythorn		1	1		1	
SOLANACEAE	*Lycium oxycarpum*	Cape honey-thorn			1		1	1
SOLANACEAE	*Lycium schizocalyx cf. cinereum*	Split Honeythorn			1			1
SOLANACEAE	*Nicotiana glauca*	tree tobacco						1
VERBENACEAE	*Verbena bonariensis*	purpletop vervain					1	1
ZYGOPHYLLACEAE	*Tribulus terrestris*	puncture vine				1	1	

5.3 Potential for Additional SCC

All SCC that may be present on the site have been identified using the screening tool report for the site, iNaturalist nearby observations, and the POSA database (Table 4). The likelihood of occurrence and detectability for each SCC identified in this report was assessed to ensure that conservation efforts towards conserving SCC follow the precautionary principle. By assessing SCC likelihood of occurrence, the knowledge gained from the field assessment, as well as historical nearby records, species most at risk can be ranked according to their likelihood of occurrence as well as detectability at the time of the assessment.

Note that one entry for detectability and six entries for likelihood of occurrence are given per SCC. These are to indicate differences in ecosystems observed on the site. The six areas, in order of the likelihood presented are as follows:

- In easternmost degraded kraalbos field
- In middle kraalbos dominated field
- In westernmost surveyed SKv 13
- In irrigated transformed fields
- In-between fields
- In riparian zone

Table 4: Plant SCC probability of occurrence on Portion 1/177.

Species	Family	SANBI Red List status	Likelihood of occurrence	Detectability during site assessment
Adromischus maculatus	CRASSULACEAE	LC	Low Moderate High Very Low Very Low Low	Very High
Monsonia crassicaulis	GERANIACEAE	LC	Very Low Low Moderate Very Low Very Low Low	Very High
Muraltia karroica	POLYGALACEAE	VU	Very Low Very Low Low Very Low Very Low Very Low	Very High
Leucadendron dregei	PROTEACEAE	EN	Very Low Very Low Very Low Very Low Very Low Very Low	Very High
Leucadendron pubibracteolatum	PROTEACEAE	NT	Very Low Very Low Very Low Very Low Very Low Very Low	Very High
Protea rupicola	PROTEACEAE	EN	Very Low Very Low Very Low	Very High

Species	Family	SANBI Red List status	Likelihood of occurrence	Detectability during site assessment
			Very Low Very Low Very Low	
Cliffortia nivenioides	ROSACEAE	VU	Very Low Very Low Very Low Very Low Very Low Low	Very High
Bijlia dilatata	AIZOACEAE	EN	Very Low Low Moderate Very Low Very Low Very Low	High
Brunsvigia josephinae	AMARYLLIDACEAE	VU	Very Low Very Low Low Very Low Very Low Low	High
Hoodia pilifera pilifera	APOCYNACEAE	NT	Low Low Moderate Very Low Low Low	High
Pachypodium bispinosum	APOCYNACEAE	EN	Very Low Very Low Moderate Very Low Very Low Low	High
Pachypodium succulentum	APOCYNACEAE	VU	Very Low Very Low Moderate Very Low Very Low Low	High
Asparagus lignosus	ASPARAGACEAE	NT	Low Moderate Confirmed present Very Low Very Low Low	High
Gasteria vlokii	ASPHODELACEAE	Rare	Very Low Very Low Low Very Low Very Low Low	High
Erica viridiflora redacta	ERICACEAE	EN	Very Low Very Low Very Low Very Low Very Low Very Low	High
Lessertia lanata	FABACEAE	EN	Very Low Low Moderate Very Low Very Low Very Low	High
Stirtonanthus taylorianus	FABACEAE	VU	Very Low Very Low Very Low Very Low Very Low	High

Species	Family	SANBI Red List status	Likelihood of occurrence	Detectability during site assessment
			Very Low	
Pelargonium carnosum	GERANIACEAE	LC	Very Low Low Moderate Very Low Very Low Very Low	High
Pelargonium citronellum	GERANIACEAE	Rare	Very Low Very Low Low Very Low Very Low Very Low	High
Pelargonium rapaceum	GERANIACEAE	LC	Very Low Low Moderate Very Low Very Low Very Low	High
Pelargonium triste	GERANIACEAE	LC	Very Low Low Moderate Very Low Very Low Low	High
Protea montana	PROTEACEAE	VU	Very Low Very Low Very Low Very Low Very Low Very Low	High
Protea venusta	PROTEACEAE	EN	Very Low Very Low Very Low Very Low Very Low Very Low	High
Bijlia tugwelliae	AIZOACEAE	VU	Very Low Low Moderate Very Low Very Low Very Low	Moderate
Mesembryanthemum expansum	AIZOACEAE	VU	Very Low Low Moderate Very Low Very Low Very Low	Moderate
Mesembryanthemum tortuosum	AIZOACEAE	LC	Very Low Low Moderate Very Low Very Low Very Low	Moderate
Eriospermum aequilibre	ASPARAGACEAE	VU	Very Low Low Moderate Very Low Very Low Very Low	Moderate
Astroloba herrei	ASPHODELACEAE	VU	Low Low Moderate Very Low Very Low Very Low	Moderate

Species	Family	SANBI Red List status	Likelihood of occurrence	Detectability during site assessment
Crassula peculiaris	CRASSULACEAE	Rare	Very Low Very Low Very Low Very Low Very Low Very Low	Moderate
Dioscorea hemicrypta	DIOSCORACEAE	LC	Very Low Very Low Moderate Very Low Very Low Low	Moderate
Cyclopia alopecuroides	FABACEAE	EN	Very Low Very Low Very Low Very Low Very Low Very Low	Moderate
Cyclopia bolusii	FABACEAE	VU	Very Low Very Low Very Low Very Low Very Low Very Low	Moderate
Cyclopia burtonii	FABACEAE	VU	Very Low Very Low Very Low Very Low Very Low Very Low	Moderate
Lotononis acocksii	FABACEAE	EN	Very Low Low Moderate Very Low Very Low Very Low	Moderate
Psoralea rubicunda	FABACEAE	CR	Very Low Low Moderate Very Low Very Low Very Low	Moderate
Psoralea swartbergensis	FABACEAE	NT	Very Low Very Low Low Very Low Very Low Very Low	Moderate
Pelargonium denticulatum	GERANIACEAE	Rare	Very Low Low Moderate Very Low Very Low Very Low	Moderate
Gladiolus aquamontanus	IRIDACEAE	VU	Very Low Very Low Very Low Very Low Very Low Low	Moderate
Agathosma zwartbergense	RUTACEAE	VU	Very Low Very Low Very Low Very Low Very Low Very Low	Moderate

Species	Family	SANBI Red List status	Likelihood of occurrence	Detectability during site assessment
Phyllopodium dolomiticum	SCROPHULARIACEAE	VU	Very Low Low Moderate Very Low Very Low Low	Moderate
Eriospermum paradoxum	ASPARAGACEAE	LC	Very Low Low Moderate Very Low Very Low Very Low	Low
Haworthia bayeri	ASPHODELACEAE	EN	Very Low Very Low Low Very Low Very Low Low	Low
Haworthia truncata	ASPHODELACEAE	VU	Very Low Very Low Low Very Low Very Low Low	Low
Haworthia vlokii	ASPHODELACEAE	Rare	Very Low Very Low Low Very Low Very Low Low	Low
Heliophila ephemera	BRASSICACEAE	VU	Very Low Very Low Low Very Low Very Low Very Low	Low
Babiana radiata	IRIDACEAE	CR	Very Low Low Moderate Very Low Very Low Low	Low
Syringodea derustensis	IRIDACEAE	VU	Very Low Low Low Very Low Very Low Very Low	Low
Syringodea longituba violacea	IRIDACEAE	NT	Very Low Low Moderate Very Low Very Low Low	Low
Bartholina etheliae	ORCHIDACEAE	LC	Very Low Low Moderate Very Low Very Low Low	Low
Thamnochortus papyraceus	RESTIONACEAE	VU	Very Low Very Low Very Low Very Low Very Low Very Low	Low

Species	Family	SANBI Red List status	Likelihood of occurrence	Detectability during site assessment
Gladiolus leptosiphon	IRIDACEAE	VU	Very Low Low Moderate Very Low Very Low Low	Very Low
Ixia micrandra	IRIDACEAE	NT	Very Low Low Moderate Very Low Very Low Very Low	Very Low
Moraea regalis	IRIDACEAE	CR	Very Low Low Moderate Very Low Very Low Very Low	Very Low
Disa spathulata tripartita	ORCHIDACEAE	EN	Very Low Low Moderate Very Low Very Low Low	Very Low

6. SITE SENSITIVITY VERIFICATION

6.1 Terrestrial Biodiversity

The sensitivity for Terrestrial Biodiversity is not uniform across the entire Portion 1/177. Based on the site-specific assessment of the proposed development areas, the **overall terrestrial biodiversity sensitivity is considered to be Low for both components of the project**: the proposed feedlot and the river crossing upgrade. The National Screening Tool flags potential sensitivity due to the development footprint intersecting Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), and a Freshwater Ecosystem Priority Area (FEPA). Detailed field verification and contextual interpretation indicate a lower actual risk to terrestrial biodiversity. This finding is based on the following points:

- The feedlot will occur adjacent to an existing transformed section on Portion 1/177. The feedlot infrastructure is compact and localised, representing a small proportion of the total farm, with sufficient surrounding natural vegetation to maintain ecological connectivity and corridor function.
- The proposed feedlot will impact Prince Albert Succulent Karoo (SKv 13) fields that, for the large part, show signs of past disturbance and does not represent irreplaceable or ecologically significant sections of this vegetation type.
- Large corridors of intact SKv 13 is still present in a natural state on Portion 1/177 (ca. 1351 ha of undisturbed SKv 13)
- The status of SKv 13 is Least Concern. Further to this, the proposed activity does not involve clearance of forest, wetlands, or formally protected ecosystems, and there is no overlap with declared protected areas.

- With appropriate mitigation, e.g., edge effect management, invasive species control, and buffer implementation, the project can be contained to the already degraded portion of the landscape, avoiding cumulative degradation and loss of natural areas.

6.1.1 Feedlot Area

The proposed feedlot is located primarily within a mapped Other Natural Area (ONA), which is not formally required to meet South Africa's biodiversity conservation targets. The Prince Albert Succulent Karoo vegetation type present at this site is currently classified as Least Threatened, and no remnants of Critically Endangered or Vulnerable ecosystems were observed. The specific areas assessed shows evidence of historical disturbance. A small section on the western edge of the proposed feedlot footprint extends into an area mapped as an Earmarked Critical Biodiversity Area 2 (CBA2). CBA2 areas are typically designated for their ecological support functions, and transformation may be permissible if biodiversity-compatible land uses and mitigation are implemented. In this case, the overall impact on the vegetation and ecological functioning of the broader area is expected to be negligible, particularly if the development is well-managed, includes edge buffers, prevents grazing spillover, and invasive species are controlled. Therefore, this localised overlap does not elevate the terrestrial biodiversity sensitivity rating beyond Low for the feedlot site as a whole. The FEPA trigger was not assessed in this report as it relates to terrestrial sensitivity (refer to the aquatic specialist report by Dr. Jackie Dabrowski where this trigger is assessed).

6.1.2 River Crossing Area

The proposed river crossing upgrade is confined to the footprint of an existing crossing, with no extension beyond previously disturbed areas. Although this section of the site is mapped as a CBA 2 with a River CBA 1 drainage line corridor on either side, the crossing upgrade is limited in scale and purpose (i.e., infrastructure improvement rather than expansion). The upgrade does not necessitate transformation of undisturbed natural habitat. Given the restricted spatial extent, the terrestrial biodiversity sensitivity at the crossing site is also considered Low. Refer to the aquatic specialist report by Dr. Jackie Dabrowski for more information on the FEPA, which would be applicable to the drainage line but is more suitably addressed under the aquatic theme.

6.2 Botanical Diversity

As part of the botanical assessment, the presence and likelihood of occurrence of SCC were key factors in determining sensitivity levels across the two main components assessed on Portion 1/177.

6.2.1 Feedlot Area

The botanical sensitivity of the feedlot area is considered **High** due to the confirmed presence of *Asparagus lignosus*, a Near Threatened (NT) species, recorded within the proposed footprint (a single individual observed during the site assessment). This is the main trigger for the impact assessment related to the themes assessed in this report. In addition, the SKv 13 (Prince Albert Succulent Karoo) vegetation in this area provides suitable habitat conditions for a number of other SCC, several of which have a moderate to high likelihood of occurrence.

6.2.2 River Crossing Area

The botanical sensitivity of the river crossing area is considered **Low** with respect to SCC. The surrounding vegetation is dominated by the reed species *Phragmites australis* and the invasive *Arundo donax*. No SCC were observed during the botanical site assessment, and the existing habitat conditions are considered unsuitable for supporting SCC. Given the nature of the watercourse and associated vegetation, the primary impacts associated with the river crossing are hydrological and aquatic, rather than botanical. Therefore, the potential ecological risks of this component are best addressed in the specialist aquatic assessment (see the report written by Dr. Jackie Dabrowski).

7. SITE ECOLOGICAL IMPORTANCE

The site ecological importance (SEI) for the different vegetation units identified on the site are calculated in this section. The site ecological importance (SEI) assessment is a function of biodiversity importance (BI) and receptor resilience (RR), which is defined as:

"The intrinsic capacity of the receptor (i.e., habitat type in question) to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention."

The function is as follows: SEI = BI + RR. BI is a function of conservation importance (CI) and habitat functional integrity (FI), so that BI = CI + FI. The definition of CI given by the Species Environmental Assessment Guideline of 2022 is:

"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 and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes."

Most features included in CI are provided by the screening tool but needs to be evaluated at a finer scale from the field work assessment. FI is defined as:

"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."

The criteria for defining RR, CI and FI are provided in the Species Environmental Assessment Guidelines of 2022. BI can be derived from a simple matrix of CI and FI, as illustrated in Table 5 below.

Table 5: The matrix that defines the biodiversity importance (BI) of a given habitat type, as identified from a desktop and field assessment.

Biodiversity Importance		**Conservation Importance**				
		Very High	High	Medium	Low	Very Low
Functional Integrity	Very High	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

SEI can then be derived from a second matrix, as depicted in Table 6. SEI is specific to the proposed feedlot and can therefore only be compared between alternative layouts for the same proposed feedlot, but not between different kinds of developments.

Table 6: The matrix that defines the site ecological importance (SEI) of a given habitat type, as identified from a desktop and field assessment.

Site Ecological Importance		Biodiversity Importance				
		Very High	High	Medium	Low	Very Low
Receptor Resilience	Very High	Very High	Very High	High	Medium	Low
	High	Very High	Very High	High	Medium	Very Low
	Medium	Very High	High	Medium	Low	Very Low
	Low	High	Medium	Low	Very Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

The overall SEI score is intended to provide a more refined overview of the sensitivity of the various habitats that have been identified on the site. The benchmark for "fully natural" vegetation is defined according to the Vegetation Assets, States, and Transitions (VAST) framework, which considers natural vegetation to be the state pre-European conditions (i.e., period prior to the 1700s or 1600s). The habitats and ecosystems of the property are therefore defined according to the VAST framework, which acts as an aid for the SEI calculation, especially in determining the appropriate RR to assign. The VAST framework categories are summarised in Appendix 11.3, and is an aid for the SEI calculation as it helps to (Thackway & Lesslie, 2006):

- Describe and accounts for changes in the condition and status of vegetation.
- Make explicit links between land management (current) and vegetation modification.
- Provide a mechanism for describing the consequences of certain land management on vegetation.
- Contribute to the analysis of terrestrial ecosystem services that are provided by vegetation, including comparison between various land-use

The SEI map can be used to effectively implement the mitigation hierarchy on the site, as described in the acceptable recommendations of Table 7 below.

Table 7: The mitigation guidelines for interpreting the various SEI categories for the proposed feedlot (Verburgt et al., 2020).

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

The assessed areas on the site are calculated to have Low and Very Low SEI values (and these correspond to areas with Low protocol sensitivities). The SEI map is presented in Fig. 11 and the calculation of the SEI is presented below the map in Table 8.

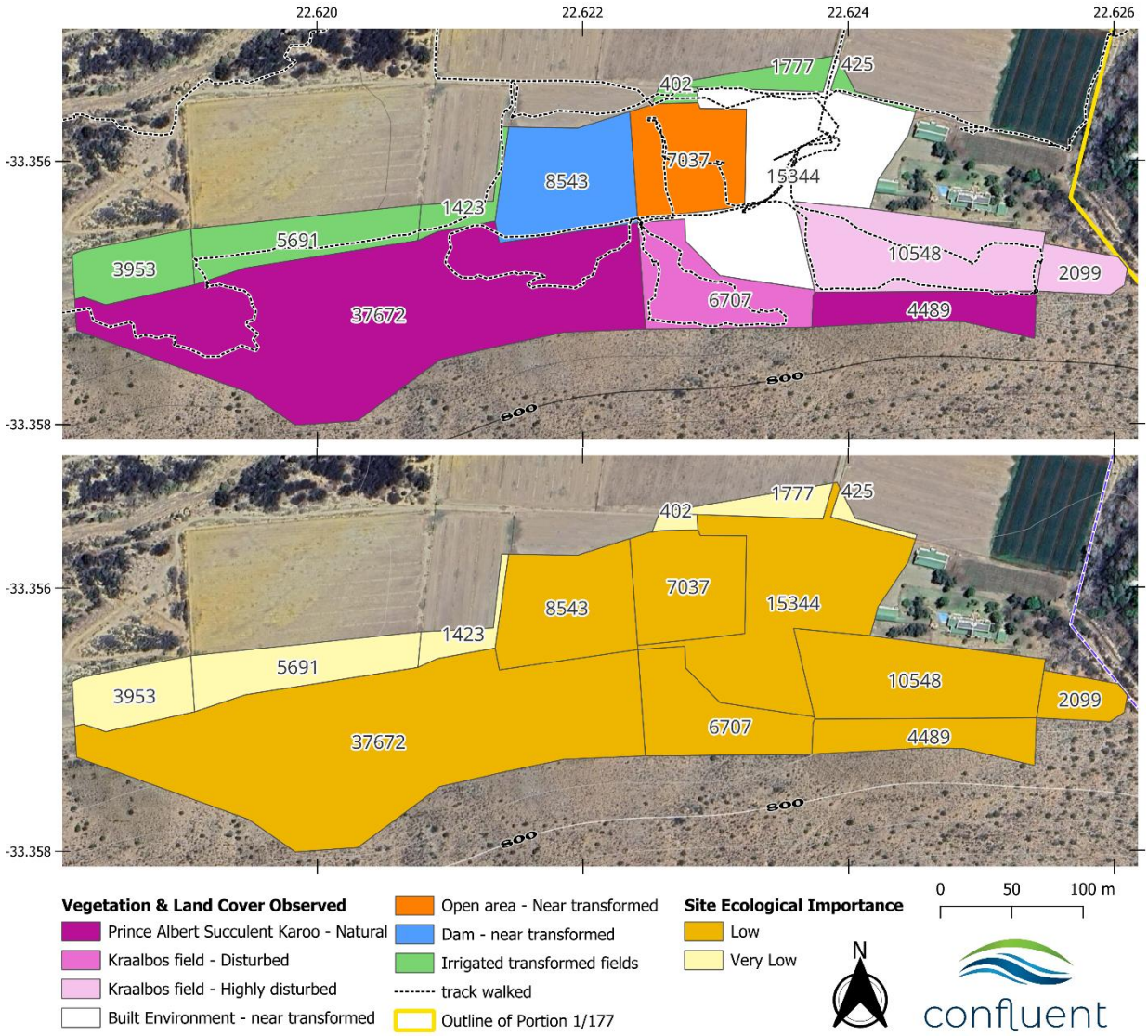


Figure 11: The vegetation and SEI map for assessed areas. The polygon areas are indicated on the map in square meters (sqm).

The current area of transformed fields on Portion 1/177 accounts for ca. 45ha, and the feedlot will add another 4ha to this transformed area. The total remaining natural area of Portion 1/177 is ca. 1863ha of which 1390ha is mapped Prince Albert Succulent Karoo (SKv 13). The proposed feedlot will result in a negligible loss of SKv 13 (see the impact assessment for more discussion around this versus the no-go scenario). This negligible loss is the main reason for assigning a High Receptor Resilience (RR) of SKv 13 (see Table 8).

In this instance, the receptor resilience of the ecosystem is considered high, primarily due to the very small scale and limited extent of the proposed feedlot on Portion 1/177. This indicates that the SKv 13 surrounding the working farm is expected to withstand or recover from disturbance without significant or lasting degradation. It is important to note that receptor resilience is context-dependent and should not be viewed in isolation from the nature, intensity, or spatial footprint of the proposed activity. Should the type of operation (e.g. a change in feedlot design, size, or waste management approach) or its scale increase, the

receptor's resilience could change, which will affect the SEI map. The SEI map can therefore not be meaningfully compared between different development types.

Table 8: The evaluation of the SEI for the vegetation/habitats present within and surrounding the proposed feedlot.

Land use / Land cover	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience (RR)	Site Ecological Importance (SEI)
Prince Albert Succulent Karoo (SKv 13) - Natural	**Medium** Confirmed presence of *Asparagus lignosus* (NT). Likely presence of additional SCC. > 50% of receptor contains natural habitat with potential to support SCC.	**High** Good habitat connectivity with functional ecological corridors	**High** VAST classes I - II This vegetation that remains natural beyond the feedlot footprint will recover relatively quickly if natural disturbance regimes continue and if sheep trampling beyond the feedlot area is kept minimal.	**Low** BI: Medium RR: High
Kraalbos Field - Disturbed	**Low** <50% of receptor contains natural habitat with limited potential to support SCC.	**Medium** Fenced field which therefore has limited connectivity to the surrounding karoo. Moderate rehabilitation potential.	**Medium** VAST class II This vegetation will recover slowly if it is disturbed.	**Low** BI: Low RR: Medium
Kraalbos Field – Highly disturbed; **Built environment – near transformed;** **Open area – near transformed;** **Dam – near transformed**	**Low** <50% of receptor contains natural habitat with limited potential to support SCC.	**Low** Fenced field which therefore has limited connectivity to the surrounding karoo. Low rehabilitation potential.	**Medium** VAST classes III - IV This vegetation will recover slowly if it is disturbed.	**Low** BI: Low RR: Medium
Irrigated transformed fields	**Very Low** No natural habitat remaining.	**Low** Several minor and major current negative ecological impacts. Low rehabilitation potential	**High** VAST class V The fields are likely going to remain transformed even when not in use.	**Very Low** BI: Very Low RR: High

8. IMPACT ASSESSMENT

The proposed feedlot on Portion 1/177 covers areas with both low and higher sensitivity areas. As stated earlier in the report, the addition on the feedlot will result in a near negligible additional loss to SKv 13. Furthermore, the upgrade to the river crossing will result in no additional loss of natural terrestrial vegetation. This impact assessment is required due to the near threatened (NT) *Asparagus lignosus* that was observed south of the existing fields near the westernmost section of the proposed feedlot layout.

The impact assessment follows the mitigation hierarchy (Fig. 12). The mitigation hierarchy (Brownlie et al., 2023; Ekstrom et al., 2015) states that the next step should only be followed once the previous step of the hierarchy is no longer viable with valid reason. The impact assessment methodology is presented in Appendix 11.4. Part of assessing the impacts in the site is also considering the “no-go” option.

The “no-go” option refers to the scenario what the feedlot is not developed. Under this scenario, the existing transformed fields plus roads and other infrastructure & buildings amounts to ca. 45ha out of the total Portion 1/177 covering 1908 ha (of which ca. 1390 ha is mapped SKv 13). By comparison, the proposed feedlot would increase the total transformed footprint by ca. 1ha, making the total transformed area on the farm ca. 46ha. The no-go scenario means that ca. 2.4% of the farm portion (and ca. 3.2% of SKv 13 mapped) remains in a transformed state, while the feedlot scenario results in a 2.5% transformed area on the Portion 1/177 (ca. 3.3% of SKv 13 mapped).

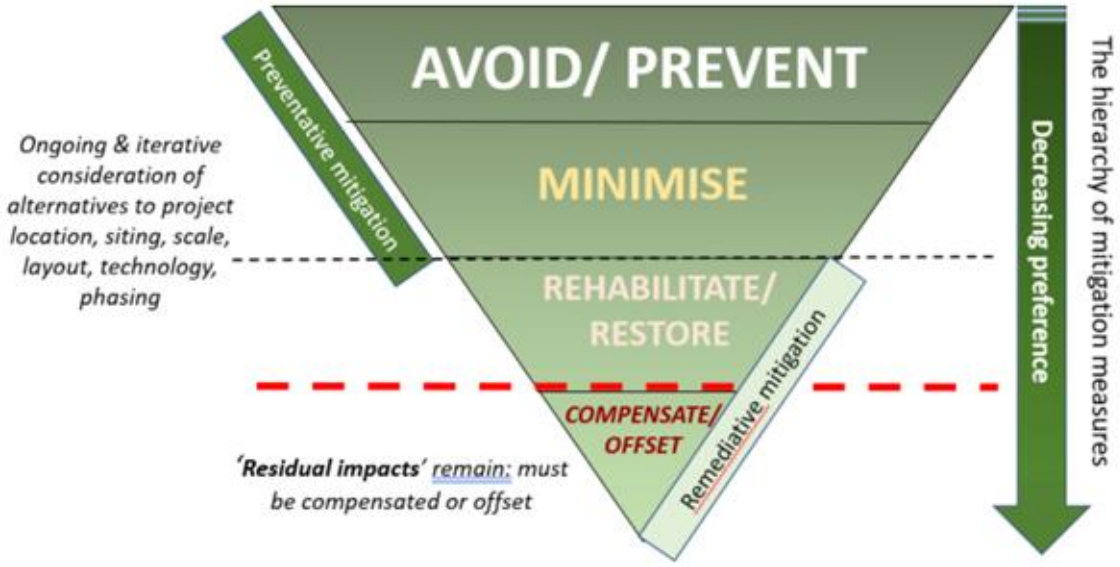


Figure 12: The mitigation hierarchy as presented in (Brownlie et al., 2023). Mitigation steps are illustrated in a hierarchy. The lower steps in the diagram should only be considered once the steps above have been duly considered.

8.1 Layout and Design Phase

The layout and design phase of the proposed feedlot has benefited from the historical land-use context of the site. The existing agricultural fields on the farm have been in place for several decades, and the proposed feedlot is strategically located directly adjacent to these fields along the south-eastern boundary. This placement ensures that new development is concentrated within an already disturbed portion of the farm, thereby minimising additional habitat fragmentation and avoiding disruption of ecological corridors. Furthermore, much of the proposed footprint overlaps with previously cultivated areas, reducing the likelihood of impacting sensitive or undisturbed natural vegetation. As a result, the current layout is considered appropriate from an ecological perspective, and no further mitigation measures related to site design are recommended.

8.2 Construction Phase

An Environmental Control Officer (ECO) must be appointed for the duration of the construction phase. They should be present for a site induction at commencement of work and should check on the development progress once a month, or promptly after significant rainfall events during the construction phase. This is especially important after rainfall events to ensure that unnecessary impacts (e.g., erosion etc.) are avoided.

8.2.1 Construction: The Loss of SCC in SKv 13 due to the Transformation of Land for Use as a Sheep Feedlot.

Description: This impact refers to the permanent loss of natural / semi-natural vegetation that could support SCC, due to the feedlot development proposed. Prior to construction, standard mitigation measures were evaluated, including the potential for a plant search and rescue operation. However, this approach is not recommended for the proposed feedlot site. Although a single *Asparagus lignosus* individual (Near Threatened) was recorded, this species is known for being cryptic and difficult to detect, particularly outside of flowering season, making targeted search efforts unreliable and of limited conservation value. Furthermore, the site does not represent irreplaceable habitat for SCC nor does it form part of a critical ecological corridor. The SKv 13 vegetation in the proposed development footprint has been previously disturbed and retains low structural integrity, further reducing the likelihood of successful rescue or restoration of viable SCC populations.

Mitigation efforts should therefore focus on impact avoidance, footprint containment, and post-construction ecological management, rather than on relocation interventions. See Table 9 for mitigation measures.

Table 9: Mitigation for The Loss of SCC in SKv 13 due to the Transformation of Land for Use as a Sheep Feedlot.

Outcomes and Actions	Responsibility	Monitoring and Reporting Actions
Minimise the construction footprint to the smallest area possible	Project manager, guided by the ECO	1. Make use of visible signage and danger tape. Signage indicating the extent of the work area in unfenced natural veld is especially important, such as the westernmost section of SKv 13 surveyed and included in the feedlot plan. Signage is also essential to indicate all roads and turning circles. 2. ECO to inspect signage and placement.
Incorporate a well-planned, phased construction approach to minimize the construction period.	Project manager guided by the ECO	Ensure that the construction follows a clear plan. Hold weekly briefing meetings with staff.
Minimize soil disturbance and soil compaction beyond existing roads and areas of disturbance.	Project manager	Turning and parking for construction and delivery vehicles must be in areas that are already cleared. Avoid activity in natural vegetation outside of the footprint layout.
Implement an invasive plant management plan for the duration of the construction period.	Farm owner (implementation) and ECO (monitoring)	Inspect the construction site monthly for invasive species (e.g., the tree of heaven – *Ailanthus altissima*; jimsonweed – *Datura stramonium* etc.)
Ensure proper waste management to prevent pollution of sensitive areas	Project manager, Owner	Have bins and skips on the construction site and ensure that staff remove rubbish weekly. Have weekly inspections to ensure no waste in the surrounding landscape.

8.3 Operational Phase

The operational phase here refers to the ongoing and long-term functional period of the proposed feedlot. During the operational phase of the proposed feedlot, a notable but largely unavoidable impact relates to nutrient enrichment of nearby natural vegetation. While the Prince Albert Succulent Karoo vegetation upslope of the site is unlikely to be affected due to the local topography, the riparian corridor situated between the existing cultivated fields is more vulnerable. Runoff and overspray containing nutrients from effluent, manure, and feed residues are likely to accumulate in this drainage line.

This could alter soil conditions and ecological functioning within the riparian zone, potentially encouraging the establishment of disturbance-tolerant or alien species at the expense of indigenous riparian flora. Over time, this may degrade the ecological integrity of these areas, even if they fall outside formally designated sensitive vegetation units. The aquatic specialist (Dr. Jackie Dabrowski) applied a 46m buffer abound the drainage line and identified two fields that could be left out so that no manure is applied to them. Refer to the aquatic specialist report for more detail here. Although mitigation options are limited relating to terrestrial ecosystem and plant species protection, it is important to acknowledge the potential for gradual biodiversity loss or species composition shifts specifically within the riparian zone.

8.3.1 Operational: The Negative Impact of Activity Beyond the Feedlot Footprint That Then Affect Natural Surrounding Vegetation and SCC.

Description: This impact refers to the potential for trampling, grazing, and related disturbance beyond the feedlot footprint, particularly into adjacent natural vegetation. These pressures can degrade soil quality and microhabitat features essential to Species of Conservation Concern (SCC), including *Asparagus lignosus* (Near Threatened), which was recorded within the proposed development area. Although only one individual was found, the species likely occurs more broadly. Long-term persistence of SCC depends not only on avoiding direct disturbance, but also on maintaining surrounding habitat integrity, such as soil crusts, root zones, and moisture dynamics, which are sensitive to sustained grazing.

While containment of sheep and prevention of grazing outside the feedlot footprint is considered standard practice and in the farm manager's interest, additional mitigation should include the active removal of invasive and alien plant species in adjacent natural areas. Where invasive species have established or bare soil occurs, locally appropriate Karoo-native species should be used to support vegetation recovery and maintain habitat quality for SCC. These actions will help buffer surrounding vegetation from further degradation and contribute to long-term ecological stability around the feedlot and fields. See Table 10 for some mitigation measures, .

Table 10: Mitigation for the Negative Impact of Activity Beyond the Feedlot Footprint That Then Affect Natural Surrounding Vegetation and SCC.

Outcomes and Actions	Responsibility	Monitoring and Reporting Actions
Contain sheep within designated areas	Farm Owner	1. Ensure sheep are monitored and overgrazing by free roaming sheep is prevented, especially within the riparian zone and in unfenced SKv 13.
Monitor feedlot and field edges for invasive species and remove regularly.	Farm Owner (guidance from ECO at the beginning, & auditing, e.g., annually)	1. Monitoring. Include findings of invasive plants in compliance reports 2. Remove new invasions & report of the species and methods used.

Some examples of plant species that might be considered to revegetate the soil berms along the south of the feedlot plans or localised areas of bare soil where revegetation is required:

Species	Growth Form	Benefit
Aizoon africanum (Kraalbos)	Pioneer shrub	Soil stabiliser, tolerates disturbance
Lycium cinereum (Confetti bush)	Shrub	Withstands grazing and trampling
Eriocephalus africanus (Wild rosemary)	Aromatic shrub	Drought and nutrient-tolerant
Tripteris sinuata	Herbaceous	Early cover and erosion control
Heliophila spp.	Annual herb	Seasonal cover, promotes insect activity
Ficinia indica	Tufted sedge	For wetter spots or along runoff channels

8.4 Impact Assessment Tables

The impact assessments presented above can be interpreted and ranked following the ratings in Table 11. The assessment illustrates the anticipated effectiveness of mitigation measures proposed, as well as the resulting residual impacts associated with the development. The **residual impact** of the no-go scenario on the karoo vegetation is negligible, and with the development of the feedlot and bridge the residual impact is **minor negative**.

Table 11: The impact ratings table and associated residual impacts for the proposed development versus the no-go scenario.

Alternatives	**Feedlot**		**No-go Option**	
Mitigation	**Without Mitigation**	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Confidence	High	High	High	High
Reversibility	Low	Low	Moderate	Moderate
Resource irreplaceability	Moderate	Moderate	Moderate	Moderate
8.2.1 Construction: The Loss of SCC in SKv 13 due to the Transformation of Land for Use as a Sheep Feedlot.				
Duration	Permanent	Permanent	Immediate	Immediate
Extent	Very limited	Very limited	Very limited	Very limited
Intensity	Low	Very low	Negligible	Negligible
Probability	Certain	Certain	Unlikely	Highly unlikely
SCORE	Moderate Negative: -77	Minor Negative: -42	Negligible Negative: -9	-3
8.3.1 Operational: the Negative Impact of Activity Beyond the Feedlot Footprint That Then Affect Natural Surrounding Vegetation and SCC.				
Duration	Short term	Immediate	Short term	Immediate
Extent	Limited	Very limited	Very limited	Very limited
Intensity	Low	Very low	Low	Negligible
Probability	Almost certain	Likely	Almost certain	Unlikely
SCORE	-48	-20	-42	-9
RESIDUAL IMPACT		**Minor Negative**		**Negligible negative**

9. CONCLUSION

The desktop and site assessment provide an overview of the ecological character and condition of the site, with a focus on vegetation types, habitat integrity, and the potential presence of Species of Conservation Concern (SCC). A significant contrast was observed between long-transformed agricultural fields and the remaining patches of Prince Albert Succulent Karoo (SKv 13), which have the highest biodiversity value. One *Asparagus lignosus* (Near Threatened) individual was recorded in this unfenced SKv 13 area, which remains the most sensitive part of the site and the only area that triggered an impact assessment from a plant species perspective.

Due to the arid nature of the site at the time of the assessment, the detectability of geophytes and other SCC was likely limited during the site visit. Therefore, the assessment adopts a precautionary approach, assuming additional SCC may be present but undetected within the unfenced sections of SKv 13 vegetation south of the existing farmed fields. Importantly, the proposed feedlot overlaps with some already transformed areas, and when considered in the context of the larger remaining natural SKv 13 on Portion 1/177, the additional transformation is minimal.

The Terrestrial Biodiversity Sensitivity for both the proposed feedlot and river crossing upgrade is rated as Low. However, the botanical sensitivity of the natural SKv 13 remains High due to the confirmed presence of a plant SCC and likelihood of SCC. This confirms that ecological sensitivity across the site is not uniform. Any future development and land-use change within the area should be guided by the spatial distribution of biodiversity sensitivity, as informed by this assessment and the accompanying specialist studies. Priority should be given to avoiding or minimizing impacts that would result in significant habitat fragmentation and loss.

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11. APPENDICES

11.1 Important Taxa for On-Site and Nearby Vegetation Types

A list of all the important taxa for the vegetation types on Portion 1/177 are presented in Table 12 below.

Table 12: A list of the important and endemic taxa to the three main vegetation types on Portion 1/177. Price Albert Succulent Karoo (SKv 13) is the vegetation type of the assessment area, and is indicated in brown, while Gamka Thicket (AT33) and Willowmore Gwarrieveld (AT58) are in shades of green. Species that were also observed during the site assessment are bold green entries in the table.

Veg. Type	Family	Growth Form	Species	Dom.	List & information
SKv13	CRASSULACEAE	Succulent Shrubs	*Adromischus triflorus*		Important Taxa
SKv13	ASPHODELACEAE	Succulent Herbs	*Aloe variegata*		Important Taxa
SKv13	ASTERACEAE	Herbs	*Amellus microglossus*		Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Antimima erosa*		Endemic Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Antimima piscodora*		Endemic Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Aridaria noctiflora subsp. straminea*		Important Taxa
SKv13	POACEAE	Graminoids	*Aristida congesta*		Important Taxa
SKv13	ASPARAGACEAE	Low Shrubs	*Asparagus recurvispinus*		Important Taxa
SKv13	ASPARAGACEAE	Woody Climber	*Asparagus retrofractus*		Important Taxa
SKv13	ASPHODELACEAE	Succulent Herbs	*Astroloba herrei*		Endemic Taxa
SKv13	ZYGOPHYLLACEAE	Succulent Shrubs	*Augea capensis*	[d]	Important Taxa
SKv13	ASTERACEAE	Low Shrubs	*Berkheya spinosa*		Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Herbs	*Bijlia dilatata*		Endemic Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Herbs	*Bijlia tugwelliae*		Endemic Taxa
SKv13	ACANTHACEAE	Low Shrubs	*Blepharis mitrata*		Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Herbs	*Brownanthus vaginatus*		Important Taxa
SKv13	POACEAE	Graminoids	*Cenchrus ciliaris*		Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Chasmatophyllum stanleyi*		Greak Karoo Basin endemic
SKv13	MESEMBRYANTHEMACEAE	Succulent Herbs	*Conophytum truncatum*		Important Taxa; Rocky ridges
SKv13	CRASSULACEAE	Succulent Herbs	*Crassula deltoidea*		Important Taxa; Rocky ridges
SKv13	CRASSULACEAE	Succulent Shrubs	*Crassula subaphylla*		Important Taxa
SKv13	CRASSULACEAE	Succulent Herbs	*Crassula tecta*		Important Taxa; Rocky ridges
SKv13	CRASSULACEAE	Succulent Herbs	*Crassula tomentosa*		Important Taxa; Rocky ridges
SKv13	ASTERACEAE	Herbs	*Cuspidia cernua*		Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Cylindrophyllum tugwelliae*		Greak Karoo Basin endemic

Veg. Type	Family	Growth Form	Species	Dom.	List & information
SKv13	ASTERACEAE	Herbs	*Dicoma capensis*		Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Drosanthemum praecultum*	[d]	Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Drosanthemum vespertinum*		Important Taxa
SKv13	POACEAE	Graminoids	*Enneapogon cenchroides*		Important Taxa
SKv13	POACEAE	Graminoids	*Enneapogon desvauxii*		Important Taxa
SKv13	POACEAE	Graminoids	*Enneapogon scaber*		Important Taxa
SKv13	ASTERACEAE	Low Shrubs	*Eriocephalus spinescens*		Important Taxa
SKv13	EUPHORBIACEAE	Succulent Shrubs	*Euphorbia atrispina*		Important Taxa; Rocky ridges
SKv13	EUPHORBIACEAE	Succulent Shrubs	*Euphorbia braunsii*		Important Taxa
SKv13	EUPHORBIACEAE	Succulent Shrubs	*Euphorbia caterviflora*		Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Faucaria bosscheana*		Important Taxa
SKv13	APOCYNACEAE	Herbaceous Climber	*Fockea comaru*		Important Taxa
SKv13	AIZOACEAE	Herbs	*Galenia papulosa*		Important Taxa
SKv13	AIZOACEAE	Low Shrubs	*Galenia pubescens*		Important Taxa
SKv13	RUBIACEAE	Herbs	*Galium tomentosum*		Important Taxa
SKv13	ASTERACEAE	Low Shrubs	*Garuleum bipinnatum*		Important Taxa
SKv13	ASTERACEAE	Herbs	*Gazania krebsiana subsp. arctotoides*		Important Taxa
SKv13	ASTERACEAE	Herbs	*Gazania lichtensteinii*		Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Glottiphyllum neilii*		Endemic Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Glottiphyllum peersii*		Important Taxa
SKv13	APOCYNACEAE	Tall Shrubs	*Gomphocarpus filiformis*		Important Taxa
SKv13	ASPHODELACEAE	Succulent Shrubs	*Haworthia latipetala*		Greak Karoo Basin endemic
SKv13	ASPHODELACEAE	Succulent Herbs	*Haworthia semiviva*		Important Taxa
SKv13	ASPHODELACEAE	Succulent Herbs	*Haworthia viscosa*		Important Taxa
SKv13	ASTERACEAE	Low Shrubs	*Helichrysum rosum*		Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Hereroa brevifolia*		Endemic Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Hereroa carinans*		Endemic Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Hereroa fimbriata*		Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Hereroa odorata*		Important Taxa
SKv13	APOCYNACEAE	Succulent Shrubs	*Hoodia pilifera subsp. annulata*		Important Taxa
SKv13	MOLLUGINACEAE	Succulent Shrubs	*Hypertelis salsoloides*		Important Taxa
SKv13	ASTERACEAE	Succulent Shrubs	*Kleinia longiflora*		Important Taxa; Rocky ridges
SKv13	ASTERACEAE	Herbs	*Lasiopogon glomerulatus*		Important Taxa

Veg. Type	Family	Growth Form	Species	Dom.	List & information
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Leipoldtia schultzei*		Important Taxa
SKv13	FABACEAE	Herbs	*Lessertia annularis*		Important Taxa
SKv13	ASTERACEAE	Herbs	*Leysera tenella*		Important Taxa
SKv13	FABACEAE	Herbs	*Lotononis pungens*		Important Taxa
SKv13	SOLANACEAE	Succulent Shrubs	*Lycium schizocalyx*		Important Taxa
SKv13	ASTERACEAE	Low Shrubs	*Macledium relhanioides*		Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Malephora flavo-crocea*		Endemic Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Malephora lutea*	[d]	Important Taxa
SKv13	SCROPHULARIACEAE	Herbs	*Manulea chrysantha*		Important Taxa
SKv13	OLEACEAE	Low Shrubs	*Menodora juncea*		Important Taxa
SKv13	LORANTHACEAE	Semiparasitic Epiphytic Shrubs	*Moquiniella rubra*		Important Taxa
SKv13	ASTERACEAE	Herbs	*Oncosiphon piluliferum*		Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Peersia macradenia*		Important Taxa
SKv13	GERANIACEAE	Succulent Shrubs	*Pelargonium karooicum*		Important Taxa
SKv13	GERANIACEAE	Herbs	*Pelargonium minimum*		Important Taxa
SKv13	ASTERACEAE	Low Shrub	*Pentzia pinnatisecta*		Important Taxa; Southern distribution limit
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Pleiospilos nelii*		Greak Karoo Basin endemic
SKv13	PLUMBAGINACEAE	Low Shrubs	*Plumbago tristis*		Important Taxa
SKv13	POLYGALACEAE	Low Shrubs	*Polygala leptophylla*		Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Prenia tetragona*		Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Herbs	*Psilocaulon junceum*		Important Taxa
SKv13	ASTERACEAE	Low Shrubs	*Pteronia empetrifolia*		Important Taxa
SKv13	ASTERACEAE	Low Shrubs	*Pteronia glomerata*		Important Taxa
SKv13	ASTERACEAE	Low Shrubs	*Pteronia viscosa*		Important Taxa
SKv13	APOCYNACEAE	Succulent Herbs	*Quaqua marlothii*		Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Rhinephyllum luteum*		Greak Karoo Basin endemic
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Rhombophyllum dolabriforme*		Important Taxa; Rocky ridges
SKv13	ASTERACEAE	Low Shrubs	*Rosenia humilis*		Important Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Ruschia bijliae*		Endemic Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Ruschia brevipes*		Endemic Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Ruschia callifera*		Endemic Taxa
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Ruschia crassa*		Greak Karoo Basin endemic
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Ruschia heteropetala*		Endemic Taxa

Veg. Type	Family	Growth Form	Species	Dom.	List & information
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Ruschia perfoliata*		Greak Karoo Basin endemic
SKv13	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Ruschia spinosa*	[d]	Important Taxa
SKv13	CHENOPODIACEAE	Succulent Shrubs	*Salsola aphylla*		Important Taxa
SKv13	CHENOPODIACEAE	Succulent Shrubs	*Salsola tuberculata*		Important Taxa
SKv13	ASTERACEAE	Low Shrubs	*Senecio angustifolius*		Important Taxa
SKv13	ASTERACEAE	Succulent Herbs	*Senecio radicans*		Important Taxa
SKv13	LORANTHACEAE	Semiparasitic Epiphytic Shrubs	*Septulina glauca*		Important Taxa; Rocky ridges
SKv13	AMARANTHACEAE	Low Shrubs	*Sericocoma avolans*		Important Taxa
SKv13	POACEAE	Graminoids	*Stipagrostis obtusa*		Important Taxa
SKv13	SCROPHULARIACEAE	Low Shrubs	*Sutera archeri*		Important Taxa
SKv13	AIZOACEAE	Succulent Herbs	*Tetragonia echinata*		Important Taxa
SKv13	AIZOACEAE	Succulent Shrubs	*Tetragonia spicata*		Important Taxa
SKv13	ASTERACEAE	Herbs	*Trichogyne polycnemoides*		Important Taxa
SKv13	IRIDACEAE	Geophytic Herbs	*Tritonia florentiae*		Important Taxa
SKv13	IRIDACEAE	Geophytic Herb	*Tritonia tugwelliae*		Greak Karoo Basin endemic
SKv13	CRASSULACEAE	Succulent Shrubs	*Tylecodon cacalioides*		Important Taxa
SKv13	CRASSULACEAE	Succulent Shrubs	*Tylecodon ventricosus*		Important Taxa; Rocky ridges
SKv13	CRASSULACEAE	Succulent Shrubs	*Tylecodon wallichii subsp. wallichii*		Important Taxa
SKv13	ASTERACEAE	Herbs	*Ursinia nana*		Important Taxa
SKv13	VISCACEAE	Semiparasitic Epiphytic Shrubs	*Viscum capense*		Important Taxa; Rocky ridges
SKv13	CAMPANULACEAE	Herbs	*Wahlenbergia androsacea*		Important Taxa
SKv13	APOCYNACEAE	Geophytic Herb	*Xysmalobium fluviale*		Endemic Taxa
SKv13	SCROPHULARIACEAE	Herbs	*Zaluzianskya peduncularis*		Important Taxa
SKv13	ZYGOPHYLLACEAE	Succulent Shrubs	*Zygophyllum lichtensteinianum*		Important Taxa
SKv13 & AT 58	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Drosanthemum lique*	[d in AT 58]	Important Taxa
SKv13 & AT 58	ASTERACEAE	Low Shrubs	*Eriocephalus ericoides*	[d in AT58]	Important Taxa
SKv13 & AT33	SCROPHULARIACEAE	Low Shrubs	*Aptosimum indivisum*		Important Taxa
SKv13 & AT33	POACEAE	Graminoids	*Aristida adscensionis*		Important Taxa
SKv13 & AT33	LAMIACEAE	Low Shrubs	*Ballota africana*		Important Taxa
SKv13 & AT33	CRASSULACEAE	Succulent Herbs	*Crassula muscosa*		Important Taxa
SKv13 & AT33	HYACINTHACEAE	Geophytic Herbs	*Drimia intricata*		Important Taxa

Veg. Type	Family	Growth Form	Species	Dom.	List & information
SKv13 & AT33	ASTERACEAE	Low Shrubs	*Felicia filifolia*		Important Taxa
SKv13 & AT33	POACEAE	Graminoids	*Fingerhuthia africana*		Important Taxa
SKv13 & AT33	MALVACEAE	Herbs	*Hermannia pulverata*		Important Taxa
SKv13 & AT33	BRASSICACEAE	Herbs	*Lepidium africanum*		Important Taxa
SKv13 & AT33	ACANTHACEAE	Low Shrubs	*Monechma spartioides*		Important Taxa
SKv13 & AT33	ASTERACEAE	Low Shrubs	*Pteronia pallens*	[d]	Important Taxa
SKv13 & AT33	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Sceletium rigidum*		Important Taxa
SKv13 & AT33	ZYGOPHYLLACEAE	Low Shrubs	*Zygophyllum microphyllum*		Important Taxa
SKv13 & AT33 & AT58	ASPARAGACEAE	Low Shrubs	*Asparagus burchellii*		Important Taxa
SKv13 & AT33 & AT58	CAPPARACEAE	Tall Shrubs	*Cadaba aphylla*		Important Taxa
SKv13 & AT33 & AT58	ASTERACEAE	Low Shrubs	*Chrysocoma ciliata*		Important Taxa
SKv13 & AT33 & AT58	CRASSULACEAE	Succulent Shrubs	*Cotyledon orbiculata var. orbiculata*		Important Taxa; Rocky ridges
SKv13 & AT33 & AT58	POACEAE	Graminoids	*Digitaria argyrograpta*		Important Taxa
SKv13 & AT33 & AT58	POACEAE	Graminoids	*Eragrostis obtusa*		Important Taxa
SKv13 & AT33 & AT58	ASTERACEAE	Low Shrubs	*Felicia muricata*		Important Taxa
SKv13 & AT33 & AT58	MOLLUGINACEAE	Low Shrubs	*Limeum aethiopicum*		Important Taxa
SKv13 & AT33 & AT58	SOLANACEAE	Low Shrubs	*Lycium cinereum*		Important Taxa
SKv13 & AT33 & AT58	SOLANACEAE	Low Shrubs	*Lycium oxycarpum*		Important Taxa
SKv13 & AT33 & AT58	APOCYNACEAE	Succulent Shrubs	*Pachypodium succulentum*		Important Taxa
SKv13 & AT33 & AT58	BIGNONIACEAE	Low Shrubs	*Rhigozum obovatum*		Important Taxa
SKv13 & AT33 & AT58	APOCYNACEAE	Woody Succulent Climbers	*Sarcostemma viminale*		Important Taxa; Rocky ridges in SKv13
SKv13 & AT33 & AT58	VISCACEAE	Semiparasitic Epiphytic Shrub	*Viscum rotundifolium*		Important Taxa
SKv13 & AT58	POACEAE	Graminoids	*Aristida diffusa*		Important Taxa
SKv13 & AT58	BRASSICACEAE	Herbs	*Lepidium desertorum*		Important Taxa
SKv13 & AT58	ASTERACEAE	Low Shrubs	*Pentzia incana*	[d in AT58]	Important Taxa
SKv13 & AT58	ASTERACEAE	Low Shrubs	*Pteronia adenocarpa*		Important Taxa
SKv13 & AT58	SANTALACEAE	Semiparasitic Shrub	*Thesium lineatum*		Important Taxa
SKv13 & AT58	ASTERACEAE	Low Shrubs	*Tripteris sinuata*		Important Taxa
AT33	ASPHODELACEAE	Succulent Shrubs	*Aloe microstigma*		Important Taxa
AT33	ASPHODELACEAE	Succulent Trees	*Aloe speciosa*		Important Taxa
AT33	ASTERACEAE	Herbs	*Arctotheca calendula*		Important Taxa
AT33	ASPARAGACEAE	Low Shrubs	*Asparagus mucronatus*		Important Taxa

Veg. Type	Family	Growth Form	Species	Dom.	List & information
AT33	ASPLENIACEAE	Geophytic Herbs	*Asplenium cordatum*		Important Taxa
AT33	APOCYNACEAE	Tall Shrubs	*Carissa bispinosa*		Important Taxa
AT33	EUPHORBIACEAE	Herbs	*Chamaesyce inaequilatera*		Important Taxa
AT33	PTERIDACEAE	Geophytic Herbs	*Cheilanthes hirta*		Important Taxa
AT33	ANTHERICACEAE	Geophytic Herbs	*Chlorophytum crispum*		Important Taxa
AT33	MENISPERMACEAE	Woody Climbers	*Cissampelos capensis*		Important Taxa
AT33	ASTERACEAE	Herbs	*Conyza scabrida*		Important Taxa
AT33	CRASSULACEAE	Succulent Shrubs	*Cotyledon papillaris*		Important Taxa
AT33	CRASSULACEAE	Succulent Shrubs	*Crassula cultrata*	[d]	Important Taxa
AT33	CRASSULACEAE	Succulent Shrubs	*Crassula lanceolata*		Important Taxa
AT33	CRASSULACEAE	Succulent Shrubs	*Crassula nudicaulis*		Important Taxa
AT33	CRASSULACEAE	Succulent Shrubs	*Crassula rupestris subsp. commutata*		Important Taxa
AT33	CRASSULACEAE	Succulent Shrubs	*Crassula tetragona subsp. acutifolia*		Important Taxa
AT33	POACEAE	Graminoids	*Cymbopogon prolixus*		Important Taxa
AT33	APOCYNACEAE	Herbaceous Climbers	*Cynanchum ellipticum*		Important Taxa
AT33	POACEAE	Graminoids	*Cynodon dactylon*	[d]	Important Taxa
AT33	POACEAE	Graminoids	*Digitaria eriantha*		Important Taxa
AT33	SAPINDACEAE	Tall Shrubs	*Dodonaea viscosa var. angustifolia*		Important Taxa
AT33	POACEAE	Graminoids	*Ehrharta erecta*		Important Taxa
AT33	ASTERACEAE	Tall Shrubs	*Elytropappus rhinocerotis*		Important Taxa
AT33	POLYGONACEAE	Herbs	*Emex australis*		Important Taxa
AT33	POACEAE	Graminoids	*Eragrostis curvula*	[d]	Important Taxa
AT33	ASTERACEAE	Low Shrubs	*Eriocephalus africanus*		Important Taxa
AT33	ERIOSPERMACEAE	Geophytic Herbs	*Eriospermum rhizomatum*		Important Taxa
AT33	EUPHORBIACEAE	Succulent Shrub	*Euphorbia gamkensis*		Important Taxa
AT33	ASTERACEAE	Low Shrubs	*Euryops brevipapposus*		Important Taxa
AT33	CELASTRACEAE	Low Shrubs	*Gloveria integrifolia*		Important Taxa
AT33	CELASTRACEAE	Tall Shrubs	*Gymnosporia heterophylla*		Important Taxa
AT33	ASPHODELACEAE	Succulent Herbs	*Haworthia blackburniae var. blackburniae*		Important Taxa
AT33	ASTERACEAE	Low Shrubs	*Helichrysum zeyheri*		Important Taxa
AT33	POACEAE	Graminoids	*Hyparrhenia poecilotricha*		Important Taxa
AT33	CUCURBITACEAE	Herbaceous Climbers	*Kedrostis capensis*		Important Taxa
AT33	HYACINTHACEAE	Geophytic Herbs	*Lachenalia haarlemensis*		Important Taxa
AT33	MELIANTHACEAE	Tall Shrubs	*Melianthus comosus*		Important Taxa

Veg. Type	Family	Growth Form	Species	Dom.	List & information
AT33	ASTERACEAE	Low Shrubs	*Oedera squarrosa*		Important Taxa
AT33	OLEACEAE	Tall Shrubs	*Olea europaea subsp. africana*		Important Taxa
AT33	ASTERACEAE	Succulent Shrubs	*Othonna carnosa*		Important Taxa
AT33	OXALIDACEAE	Geophytic Herbs	*Oxalis pes-caprae*	[d in AT33]	Important Taxa
AT33	GERANIACEAE	Woody Succulent Climbers	*Pelargonium zonale*		Important Taxa
AT33	POLYGALACEAE	Low Shrubs	*Polygala myrtifolia*		Important Taxa
AT33	POLYGALACEAE	Low Shrubs	*Polygala scabra*		Important Taxa
AT33	PORTULACACEAE	Succulent Shrubs	*Portulacaria afra*	[d in AT33]	Important Taxa
AT33	ASTERACEAE	Herbs	*Pulicaria scabra*		Important Taxa
AT33	ANACARDIACEAE	Tall Shrubs	*Searsia glauca*		Important Taxa
AT33	ANACARDIACEAE	Tall Shrubs	*Searsia lancea*		Important Taxa
AT33	POACEAE	Graminoids	*Stipagrostis ciliata var. capensis*		Important Taxa
AT33	ASTERACEAE	Herbs	*Troglophyton capillaceum*		Important Taxa
AT33	ZYGOPHYLLACEAE	Succulent Shrubs	*Zygophyllum flexuosum*		Important Taxa
AT33	ZYGOPHYLLACEAE	Succulent Shrubs	*Zygophyllum foetidum*		Important Taxa
AT33	ZYGOPHYLLACEAE	Succulent Shrubs	*Zygophyllum fulvum*		Important Taxa
AT33 & AT58	FABACEAE	Small Trees	*Acacia karroo*		Important Taxa
AT33 & AT58	ASPHODELACEAE	Succulent Trees	*Aloe ferox*		Important Taxa
AT33 & AT58	ASPARAGACEAE	Woody Climbers	*Asparagus racemosus*		Important Taxa
AT33 & AT58	ASPARAGACEAE	Low Shrubs	*Asparagus striatus*		Important Taxa
AT33 & AT58	ASTERACEAE	Herbs	*Cineraria platycarpa*		Important Taxa
AT33 & AT58	CRASSULACEAE	Succulent Shrubs	*Crassula ovata*		Important Taxa
AT33 & AT58	POACEAE	Graminoids	*Cynodon incompletus*	[d in AT33]	Important Taxa
AT33 & AT58	POACEAE	Graminoids	*Ehrharta calycina*	[d in AT33]	Important Taxa
AT33 & AT58	EBENACEAE	Tall Shrubs	*Euclea undulata*	[d in AT58]	Important Taxa
AT33 & AT58	EUPHORBIACEAE	Succulent Shrubs	*Euphorbia mauritanica*	[d in AT33]	Important Taxa
AT33 & AT58	AIZOACEAE	Low Shrubs	*Galenia africana*		Important Taxa
AT33 & AT58	ASTERACEAE	Low Shrubs	*Garuleum latifolium*	[d in AT33]	Important Taxa
AT33 & AT58	MELIACEAE	Tall Shrubs	*Nymania capensis*		Important Taxa
AT33 & AT58	SAPINDACEAE	Small Trees	*Pappea capensis*	[d in AT33]	Important Taxa
AT33 & AT58	ASTERACEAE	Low Shrubs	*Pteronia incana*	[d in AT33]	Important Taxa
AT33 & AT58	CELASTRACEAE	Tall Shrubs	*Putterlickia pyracantha*		Important Taxa
AT33 & AT58	FABACEAE	Small Trees	*Schotia afra var. afra*		Important Taxa
AT33 & AT58	ANACARDIACEAE	Tall Shrubs	*Searsia lucida*		Important Taxa

Veg. Type	Family	Growth Form	Species	Dom.	List & information
AT33 & AT58	AIZOACEAE	Low Shrubs	*Tetragonia robusta var. psiloptera*		Important Taxa
AT58	SCROPHULARIACEAE	Low Shrubs	*Aptosimum elongatum*		Important Taxa
AT58	APOCYNACEAE	Low Shrubs	*Carissa haematocarpa*		Important Taxa
AT58	EBENACEAE	Tall Shrubs	*Diospyros austro-africana*		Important Taxa
AT58	EBENACEAE	Tall Shrubs	*Diospyros lycioides*		Important Taxa
AT58	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Drosanthemum delicatulum*		Important Taxa
AT58	EUPHORBIACEAE	Succulent Shrubs	*Euphorbia rectirama*		Important Taxa
AT58	CHENOPODIACEAE	Succulent Shrubs	*Exomis microphylla var. axyrioides*		Important Taxa
AT58	MALVACEAE	Tall Shrubs	*Grewia robusta*		Important Taxa
AT58	CELASTRACEAE	Tall Shrubs	*Gymnosporia polyacanthus*		Important Taxa
AT58	ASTERACEAE	Low Shrub	*Helichrysum fourcadei*		Endemic Taxon
AT58	MALVACEAE	Low Shrubs	*Hermannia gracilis*		Important Taxa
AT58	SCROPHULARIACEAE	Low Shrubs	*Jamesbrittenia microphylla*		Important Taxa
AT58	POACEAE	Graminoids	*Karroochloa tenella*		Important Taxa
AT58	BORAGINACEAE	Herbs	*Lappula capensis*		Important Taxa
AT58	EUPHORBIACEAE	Herbs	*Leidesia procumbens*		Important Taxa
AT58	LAMIACEAE	Low Shrubs	*Leucas capensis*		Important Taxa
AT58	MOLLUGINACEAE	Low Shrubs	*Limeum africanum*		Important Taxa
AT58	COLCHICACEAE	Geophytic Herbs	*Ornithoglossum viride*		Important Taxa
AT58	POACEAE	Graminoids	*Pentaschistis airoides*		Important Taxa
AT58	ASTERACEAE	Low Shrubs	*Pentzia sphaerocephala*		Important Taxa
AT58	POLYGALACEAE	Low Shrubs	*Polygala seminuda*		Important Taxa
AT58	ASTERACEAE	Low Shrubs	*Pteronia glauca*		Important Taxa
AT58	ANACARDIACEAE	Tall Shrubs	*Searsia longispina*		Important Taxa
AT58	ANACARDIACEAE	Tall Shrubs	*Searsia undulata*		Important Taxa
AT58	SCROPHULARIACEAE	Low Shrubs	*Selago fruticosa*		Important Taxa
AT58	POACEAE	Graminoids	*Sporobolus fimbriatus*		Important Taxa
AT58	AIZOACEAE	Succulent Shrubs	*Tetragonia fruticosa*		Important Taxa
AT58	AIZOACEAE	Succulent Herb	*Tetragonia microptera*		Important Taxa
AT58	POACEAE	Graminoids	*Tragus berteronianus*		Important Taxa
AT58	POACEAE	Graminoids	*Tragus koelerioides*		Important Taxa
AT58	MESEMBRYANTHEMACEAE	Succulent Shrubs	*Trichodiadema barbatum*		Important Taxa
AT58	CRASSULACEAE	Succulent Shrubs	*Tylecodon paniculatus*		Important Taxa

11.2 Land-Use Recommendations According to the WC BSP

The recommended land-uses for each of the different BSP layers are outlined in Table 13.

Table 13: The land-use planning proposed by the Western Cape Biodiversity Spatial Plan.

Yes Permissible land uses that are unlikely to compromise the biodiversity objective	Restricted Land-uses that may compromise the biodiversity objective and are only permissible under certain conditions	No Land-uses that will compromise the biodiversity objective and are not permissible

Map and Land use Categories		Protected Area	Critical Biodiversity Area 1	Critical Biodiversity Area 2	Ecological Support Area 1: Terrestrial	Ecological Support Area 1: Aquatic	Ecological Support Area 2	Ecological Support Area: Species Specific Overlay	ONA: Natural to Near Natural	ONA: Degraded	No Natural Remaining
Conservation	Proclaimed Protected Areas	Land use within proclaimed protected areas is subject to a management plan drawn up for that specific protected area.	Yes	Yes	Yes	Yes	Yes	Restricted	Yes	Restricted	Restricted
	Conservation Areas		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Restricted	Restricted
Agriculture	Intensive Agriculture		No	No	No	No	No	Restricted	Restricted	Restricted	Yes
	Extensive Agriculture		Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Yes	Yes	Yes
Tourism and Recreational	Low Impact Facilities		No	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Yes	Yes
	High Impact Facilities		No	No	No	No	No	No	Restricted	Restricted	Yes
Rural Accommodation	Agri-worker Accommodation		No	No	No	No	No	Restricted	Restricted	Restricted	Yes
	Smallholdings		No	No	No	No	Restricted	Restricted	Restricted	Yes	Yes
Urban	Existing settlements and urban expansion		No	No	No	No	No	Restricted	Restricted	Restricted	Yes
	Community Facilities and Institutions		No	No	No	No	No	Restricted	Restricted	Restricted	Yes

Yes Permissible land uses that are unlikely to compromise the biodiversity objective	Restricted Land-uses that may compromise the biodiversity objective and are only permissible under certain conditions	No Land-uses that will compromise the biodiversity objective and are not permissible

Map and Land use Categories		Protected Area	Critical Biodiversity Area 1	Critical Biodiversity Area 2	Ecological Support Area 1: Terrestrial	Ecological Support Area 1: Aquatic	Ecological Support Area 2	Ecological Support Area: Species Specific Overlay	ONA: Natural to Near Natural	ONA: Degraded	No Natural Remaining
Business & Industrial	Rural Business	Land use within proclaimed protected areas is subject to a management plan drawn up for that specific protected area.	No	No	Restricted	No	No	No	Restricted	Restricted	Yes
	Non-place-bound Industry (low-moderate impact)		No	No	Restricted	No	No	Restricted	Restricted	Restricted	Yes
	Non-place-bound Industry (high impact)		No	No	No	No	No	Restricted	Restricted	Restricted	Yes
	Renewable Energy		No	No	Restricted	No	Restricted	No	Restricted	Restricted	Yes
	Extractive Industry (incl. Prospecting)		No	No	No	No	No	Restricted	Restricted	Restricted	Yes
Infrastructure Installations	Linear - roads and rail		No	Restricted	Restricted	Restricted	Restricted	No	Restricted	Yes	Yes
	Linear - pipelines & canals		No	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Yes	Yes
	Linear - powerlines		Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Yes	Yes
	Other Utilities		No	No	Restricted	No	Restricted	Restricted	Restricted	Yes	Yes

11.3 Vegetation Assets, States, and Transitions (VAST)

A table summarising the VAST score is presented in Table 14.

Table 14: Vegetation Assets, States, and Transitions (VAST) framework with columns representing states. Shifts between states are defined as transitions, as laid out in (Lesslie et al., 2010; Thackway & Lesslie, 2006).

Increasing modification

		Native vegetation cover Dominant plant species indigenous to the locality and spontaneous in occurrence, i.e. a vegetation community described using definitive vegetation types relative to estimated pre 1750 types				**Non-native vegetation cover** Dominant structuring plant species indigenous to the locality but cultivated; alien to the locality and cultivated; or alien to the locality and spontaneous		
Vegetation cover classes		**Class 0:** **RESIDUAL BARE**	**Class I:** **RESIDUAL**	**Class II:** **MODIFIED**	**Class III:** **TRANSFORMED**	**Class IV:** **REPLACED -ADVENTIVE**	**Class V:** **REPLACED -MANAGED**	**Class VI:** **REMOVED**
		Areas where native vegetation does not naturally persist	Native vegetation community structure, composition, and regenerative capacity intact —no significant perturbation from land use or land management practice. Class I forms the benchmark for classes II to VI	Native vegetation community structure, composition and regenerative capacity intact—perturbed by land use or land management practice	Native vegetation community structure, composition and regenerative capacity significantly altered by land use or land management practice	Native vegetation replacement—species alien to the locality and spontaneous in occurrence	Native vegetation replacement with cultivated vegetation	Vegetation removed
Diagnostic criteria	Current regenerative capacity	Natural regenerative capacity unmodified—ephemerals and lower plants	Natural regenerative capacity unmodified	Natural regeneration tolerates or endures under past and or current land management practices	Natural regenerative capacity limited or at risk under past and or current land use or land management practices. Rehabilitation and restoration possible through modified land management practice	Regeneration of native vegetation community has been suppressed by ongoing disturbances of the natural regenerative capacity; limited potential for restoration	Regeneration of native vegetation community lost or suppressed by intensive land management; limited potential for restoration	Nil or minimal
	Vegetation structure	Nil or minimal	Structural integrity of native vegetation community is very high	Structure is predominantly altered but intact, e.g. a layer or strata and or growth forms and or age classes removed	Dominant structuring species of native vegetation community significantly altered, e.g. a layer or strata frequently removed	Dominant structuring species of native vegetation community removed or predominantly cleared or extremely degraded	Dominant structuring species of native vegetation community removed	Vegetation absent or ornamental
	Vegetation composition	Nil or minimal	Compositional integrity of native vegetation community is very high	Composition of native vegetation community is altered but intact	Dominant structuring species present—species dominance significantly altered	Dominant structuring species of native vegetation community removed	Dominant structuring species of native vegetation community removed	Vegetation absent or ornamental

11.4 Impact Assessment Methods

Individual impacts for the construction and operational phase were identified and rated according to criteria which include their intensity, duration, and extent. The criteria and their associated ratings are shown in Table 15. The ratings were then used to calculate the consequence of the impact which can be either negative or positive as follows:

Consequence = *type x (intensity + duration + extent)*

Where type is either negative (i.e., -1) or positive (i.e., 1). The significance of the impact was then calculated by applying the probability of occurrence to the consequence as follows:

Significance = *consequence x probability*

Table 15: Categorical descriptions for impacts and their associated ratings.

Rating	Intensity	Duration	Extent	Probability
1	Negligible	Immediate	Very limited	Highly unlikely
2	Very low	Brief	Limited	Rare
3	Low	Short term	Local	Unlikely
4	Moderate	Medium term	Municipal area	Probably
5	High	Long term	Regional	Likely
6	Very high	Ongoing	National	Almost certain
7	Extremely high	Permanent	International	Certain

Categories assigned to the calculated significance ratings are presented in Table 16.

Table 16: Value ranges for significance ratings, where (-) indicates a negative impact and (+) indicates a positive impact

Significance Rating	Range	
Major (-)	-147	-109
Moderate (-)	-108	-73
Minor (-)	-72	-36
Negligible (-)	-35	-1
Neutral	0	0
Negligible (+)	1	35
Minor (+)	36	72
Moderate (+)	73	108
Major (+)	109	147

Each impact was considered from the perspective of whether losses or gains would be irreversible or result in the irreplaceable loss of biodiversity of ecosystem services. The level of confidence was also determined and rated as low, medium, or high (Table 17).

Table 17: Definition of reversibility, irreplaceability, and confidence ratings.

Rating	Reversibility	Irreplaceability	Confidence
Low	Permanent modification, no recovery possible.	No irreparable damage and the resource isn't scarce.	Judgement based on intuition.
Medium	Recovery possible with significant intervention.	Irreparable damage but is represented elsewhere.	Based on common sense and general knowledge
High	Recovery likely.	Irreparable damage and is not represented elsewhere.	Substantial data supports the assessment